

# Midas Reference Manual

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## Contents

# 1 Midas documentation

Welcome to the world of Midas.

## 1.1 Introduction

Midas is a versatile Data acquisition System for middle range physics experiments. This document will try to answer most of your questions regarding installation, setup, running, and development.

If you think Midas can help you for your projects and you want to get more info on it, feel free to browse through the following Web sites: [Switzerland](#) , [Canada](#)

Chapters are:

- [New Documented Features](#) : Whats new in Midas.
- [Introduction](#) : Some initial words and description
- [Components](#) : listing
- [Quick Start](#) : The HowTo for installation.
- [Internal features](#) : The main internal components of the system.
- [Utilities](#) : The Midas applications.
- [Data format](#) : Supported data format
- [Supported hardware](#) : Supported hardware.
- [CAMAC and VME access function call](#) : CAMAC and VME access function call.
- [Midas build options and operation considerations](#) : Midas build options and operation consideration.
- [Midas Code and Libraries](#) : Midas Library.
- [Frequently Asked Questions](#) : Frequently Asked Questions.

# 2 Midas Module Documentation

## 2.1 Midas VME standard

### Modules

- [VME Functions \(mvme\\_xxx\)](#)

### Data Structures

- struct [MVME\\_INTERFACE](#)

### Defines

- `#define MVME_SUCCESS 1`
- `#define MVME_DMODE_D8 1`
- `#define MVME_DMODE_D16 2`
- `#define MVME_DMODE_D32 3`
- `#define MVME_DMODE_D64 4`
- `#define MVME_DMODE_RAMD16 5`
- `#define MVME_DMODE_RAMD32 6`
- `#define MVME_DMODE_LM 7`
- `#define MVME_BLT_NONE 1`
- `#define MVME_BLT_BLT32 2`
- `#define MVME_BLT_MBLT64 3`
- `#define MVME_BLT_2EVME 4`
- `#define MVME_BLT_2ESST 5`
- `#define MVME_BLT_BLT32FIFO 6`
- `#define MVME_BLT_MBLT64FIFO 7`
- `#define MVME_BLT_2EVMEFIFO 8`
- `#define MVME_AM_A32_SB (0x0F)`
- `#define MVME_AM_A32_SP (0x0E)`
- `#define MVME_AM_A32_SD (0x0D)`
- `#define MVME_AM_A32_NB (0x0B)`
- `#define MVME_AM_A32_NP (0x0A)`
- `#define MVME_AM_A32_ND (0x09)`
- `#define MVME_AM_A32_SMBLT (0x0C)`
- `#define MVME_AM_A32_NMBLT (0x08)`
- `#define MVME_AM_A24_SB (0x3F)`
- `#define MVME_AM_A24_SP (0x3E)`
- `#define MVME_AM_A24_SD (0x3D)`
- `#define MVME_AM_A24_NB (0x3B)`
- `#define MVME_AM_A24_NP (0x3A)`
- `#define MVME_AM_A24_ND (0x39)`

- `#define MVME_AM_A24_SMBLT` (0x3C)
- `#define MVME_AM_A24_NMBLT` (0x38)
- `#define MVME_AM_A16_SD` (0x2D)
- `#define MVME_AM_A16_ND` (0x29)
- `#define MAX_CRATE` 10

### 2.1.1 Define Documentation

#### 2.1.1.1 `#define MAX_CRATE 10`

maximum number of crates

Definition at line 134 of file `mvmestd.h`.

#### 2.1.1.2 `#define MVME_ACCESS_ERROR 7`

Definition at line 66 of file `mvmestd.h`.

#### 2.1.1.3 `#define MVME_AM_A16 MVME_AM_A16_SD`

Definition at line 128 of file `mvmestd.h`.

#### 2.1.1.4 `#define MVME_AM_A16_ND (0x29)`

A16 Short Non-Privileged Data Access

Definition at line 126 of file `mvmestd.h`.

#### 2.1.1.5 `#define MVME_AM_A16_SD (0x2D)`

A16 Short Supervisory Data Access

Definition at line 125 of file `mvmestd.h`.

#### 2.1.1.6 `#define MVME_AM_A24 MVME_AM_A24_SD`

Definition at line 122 of file `mvmestd.h`.

#### 2.1.1.7 `#define MVME_AM_A24_D64 MVME_AM_A24_SMBLT`

Definition at line 123 of file `mvmestd.h`.

**2.1.1.8 #define MVME\_AM\_A24\_NB (0x3B)**

A24 Standard Non-Privileged Block Transfer

Definition at line 116 of file mvmestd.h.

**2.1.1.9 #define MVME\_AM\_A24\_ND (0x39)**

A24 Standard Non-Privileged Data Access

Definition at line 118 of file mvmestd.h.

**2.1.1.10 #define MVME\_AM\_A24\_NMBLT (0x38)**

A24 Multiplexed Block Transfer (D64)

Definition at line 120 of file mvmestd.h.

**2.1.1.11 #define MVME\_AM\_A24\_NP (0x3A)**

A24 Standard Non-Privileged Program Access

Definition at line 117 of file mvmestd.h.

**2.1.1.12 #define MVME\_AM\_A24\_SB (0x3F)**

A24 Standard Supervisory Block Transfer

Definition at line 113 of file mvmestd.h.

**2.1.1.13 #define MVME\_AM\_A24\_SD (0x3D)**

A24 Standard Supervisory Data Access

Definition at line 115 of file mvmestd.h.

**2.1.1.14 #define MVME\_AM\_A24\_SMBLT (0x3C)**

A24 Multiplexed Block Transfer (D64)

Definition at line 119 of file mvmestd.h.

**2.1.1.15 #define MVME\_AM\_A24\_SP (0x3E)**

A24 Standard Supervisory Program Access

Definition at line 114 of file mvmestd.h.

**2.1.1.16 #define MVME\_AM\_A32 MVME\_AM\_A32\_SD**

Definition at line 110 of file mvmestd.h.

**2.1.1.17 #define MVME\_AM\_A32\_D64 MVME\_AM\_A32\_SMBLT**

Definition at line 111 of file mvmestd.h.

**2.1.1.18 #define MVME\_AM\_A32\_NB (0x0B)**

A32 Extended Non-Privileged Block

Definition at line 104 of file mvmestd.h.

**2.1.1.19 #define MVME\_AM\_A32\_ND (0x09)**

A32 Extended Non-Privileged Data

Definition at line 106 of file mvmestd.h.

**2.1.1.20 #define MVME\_AM\_A32\_NMBLT (0x08)**

A32 Multiplexed Block Transfer (D64)

Definition at line 108 of file mvmestd.h.

**2.1.1.21 #define MVME\_AM\_A32\_NP (0x0A)**

A32 Extended Non-Privileged Program

Definition at line 105 of file mvmestd.h.

**2.1.1.22 #define MVME\_AM\_A32\_SB (0x0F)**

A32 Extended Supervisory Block

Definition at line 101 of file mvmestd.h.

**2.1.1.23 #define MVME\_AM\_A32\_SD (0x0D)**

A32 Extended Supervisory Data

Definition at line 103 of file mvmestd.h.

**2.1.1.24 #define MVME\_AM\_A32\_SMBLT (0x0C)**

A32 Multiplexed Block Transfer (D64)

Definition at line 107 of file mvmestd.h.

**2.1.1.25 #define MVME\_AM\_A32\_SP (0x0E)**

A32 Extended Supervisory Program

Definition at line 102 of file mvmestd.h.

**2.1.1.26 #define MVME\_AM\_DEFAULT MVME\_AM\_A32**

Definition at line 130 of file mvmestd.h.

**2.1.1.27 #define MVME\_BLT\_2ESST 5**

two edge source synchronuous transfer

Definition at line 94 of file mvmestd.h.

**2.1.1.28 #define MVME\_BLT\_2EVME 4**

two edge block transfer

Definition at line 93 of file mvmestd.h.

**2.1.1.29 #define MVME\_BLT\_2EVMEFIFO 8**

two edge block transfer with FIFO mode

Definition at line 97 of file mvmestd.h.

**2.1.1.30 #define MVME\_BLT\_BLT32 2**

32-bit block transfer

Definition at line 91 of file mvmestd.h.

**2.1.1.31 #define MVME\_BLT\_BLT32FIFO 6**

FIFO mode, don't increment address

Definition at line 95 of file mvmestd.h.

**2.1.1.32 #define MVME\_BLT\_MBLT64 3**

multiplexed 64-bit block transfer

Definition at line 92 of file mvmestd.h.

**2.1.1.33 #define MVME\_BLT\_MBLT64FIFO 7**

FIFO mode, don't increment address

Definition at line 96 of file mvmestd.h.

**2.1.1.34 #define MVME\_BLT\_NONE 1**

normal programmed IO

Definition at line 90 of file mvmestd.h.

**2.1.1.35 #define MVME\_DMODE\_D16 2**

D16

Definition at line 79 of file mvmestd.h.

**2.1.1.36 #define MVME\_DMODE\_D32 3**

D32

Definition at line 80 of file mvmestd.h.

**2.1.1.37 #define MVME\_DMODE\_D64 4**

D64

Definition at line 81 of file mvmestd.h.

**2.1.1.38 #define MVME\_DMODE\_D8 1**

data modes D8

Definition at line 78 of file mvmestd.h.

**2.1.1.39 #define MVME\_DMODE\_DEFAULT MVME\_DMODE\_D32**

Definition at line 86 of file mvmestd.h.

**2.1.1.40 #define MVME\_DMODE\_LM 7**

local memory mapped to VME

Definition at line 84 of file mvmestd.h.

**2.1.1.41 #define MVME\_DMODE\_RAMD16 5**

RAM memory of VME adapter

Definition at line 82 of file mvmestd.h.



**2.1.1.42 #define MVME\_DMODE\_RAMD32 6**

RAM memory of VME adapter

Definition at line 83 of file mvmestd.h.

**2.1.1.43 #define MVME\_INVALID\_PARAM 5**

Definition at line 64 of file mvmestd.h.

**2.1.1.44 #define MVME\_NO\_CRATE 3**

Definition at line 62 of file mvmestd.h.

**2.1.1.45 #define MVME\_NO\_INTERFACE 2**

Definition at line 61 of file mvmestd.h.

**2.1.1.46 #define MVME\_NO\_MEM 6**

Definition at line 65 of file mvmestd.h.

**2.1.1.47 #define MVME\_SUCCESS 1**

dox

Definition at line 60 of file mvmestd.h.

**2.1.1.48 #define MVME\_UNSUPPORTED 4**

Definition at line 63 of file mvmestd.h.

**2.1.2 Typedef Documentation****2.1.2.1 typedef unsigned long mvme\_addr\_t**

Definition at line 70 of file mvmestd.h.

**2.1.2.2 typedef unsigned long mvme\_size\_t**

Definition at line 71 of file mvmestd.h.

## 2.2 VME Functions (mvme\_xxx)

### Functions

- int EXPRT [mvme\\_open](#) (MVME\_INTERFACE \*\*vme, int index)
- int EXPRT [mvme\\_close](#) (MVME\_INTERFACE \*vme)
- int EXPRT [mvme\\_sysreset](#) (MVME\_INTERFACE \*vme)
- int EXPRT [mvme\\_read](#) (MVME\_INTERFACE \*vme, void \*dst, mvme\_addr\_t vme\_addr, mvme\_size\_t n\_bytes)
- DWORD EXPRT [mvme\\_read\\_value](#) (MVME\_INTERFACE \*vme, mvme\_addr\_t vme\_addr)
- int EXPRT [mvme\\_write](#) (MVME\_INTERFACE \*vme, mvme\_addr\_t vme\_addr, void \*src, mvme\_size\_t n\_bytes)
- int EXPRT [mvme\\_write\\_value](#) (MVME\_INTERFACE \*vme, mvme\_addr\_t vme\_addr, DWORD value)
- int EXPRT [mvme\\_set\\_am](#) (MVME\_INTERFACE \*vme, int am)
- int EXPRT [mvme\\_get\\_am](#) (MVME\_INTERFACE \*vme, int \*am)
- int EXPRT [mvme\\_set\\_dmode](#) (MVME\_INTERFACE \*vme, int dmode)
- int EXPRT [mvme\\_get\\_dmode](#) (MVME\_INTERFACE \*vme, int \*dmode)
- int EXPRT [mvme\\_set\\_blt](#) (MVME\_INTERFACE \*vme, int mode)
- int EXPRT [mvme\\_get\\_blt](#) (MVME\_INTERFACE \*vme, int \*mode)

### 2.2.1 Function Documentation

#### 2.2.1.1 int EXPRT mvme\_close (MVME\_INTERFACE \* vme)

Close and release ALL the opened VME channel. See example in [mvme\\_open\(\)](#)

##### Parameters:

\*vme VME structure.

##### Returns:

MVME\_SUCCESS, MVME\_ACCESS\_ERROR

#### 2.2.1.2 int EXPRT mvme\_get\_am (MVME\_INTERFACE \* vme, int \* am)

Get Address Modifier.

##### Parameters:

\*vme VME structure

*\*am* returned address modifier

**Returns:**

MVME\_SUCCESS

**2.2.1.3 int EXPRT mvme\_get\_blt (MVME\_INTERFACE \* vme, int \* mode)**

Get current Data mode.

**Parameters:**

*\*vme* VME structure

*\*mode* returned BLT mode

**Returns:**

MVME\_SUCCESS

**2.2.1.4 int EXPRT mvme\_get\_dmode (MVME\_INTERFACE \* vme, int \* dmode)**

Get current Data mode.

**Parameters:**

*\*vme* VME structure

*\*dmode* returned address modifier

**Returns:**

MVME\_SUCCESS

**2.2.1.5 int EXPRT mvme\_open (MVME\_INTERFACE \*\* vme, int index)**

VME open The code below summarize the use of most of the mvme calls included in this interface.

```
#include "vmicvme.h" // or other VME interface driver.

int main () {
    int i, status, vmeio_status, data;
    MVME_INTERFACE *myvme;

    // Open VME channel
```

```

status = mvme_open(&myvme, 0);

// Reset VME
// Under VMIC reboot CPU!!
// status = mvme_sysreset(myvme);

// Setup AM
status = mvme_set_am(myvme, MVME_AM_A24_ND);

// Setup Data size
status = mvme_set_dmode(myvme, MVME_DMODE_D32);

// Read VMEIO status
status = mvme_read(myvme, &vmeio_status, 0x78001C, 4);
printf("VMEIO status : 0x%x\n", vmeio_status);

// Write Single value
mvme_write_value(myvme, 0x780010, 0x3);

// Read Single Value
printf("Value : 0x%x\n", mvme_read_value(myvme, 0x780018));

// Write to the VMEIO in latch mode
for (i=0;i<10000;i++) {
    data = 0xF;
    status = mvme_write(myvme, 0x780010, &data, 4);
    data = 0x0;
    status = mvme_write(myvme, 0x780010, &data, 4);
}

// Close VME channel
status = mvme_close(myvme);
return 1;
}

```

**Parameters:**

**\*\*vme** user VME pointer to the interface

**index** interface number should be used to distinguish multiple VME interface access within the same program.

**Returns:**

status MVME\_SUCCESS, MVME\_NO\_INTERFACE, MVME\_INVALID\_PARAM, MVME\_ACCESS\_ERROR

### 2.2.1.6 int EXPRT mvme\_read (MVME\_INTERFACE \* vme, void \* dst, mvme\_addr\_t vme\_addr, mvme\_size\_t n\_bytes)

Read from VME bus. Implementation of the read can include automatic DMA transfer based on the size of the data. See example in [mvme\\_open\(\)](#)

**Parameters:**

*\*vme* VME structure  
*\*dst* destination pointer  
*vme\_addr* source address (VME location).  
*n\_bytes* requested transfer size.

**Returns:**

MVME\_SUCCESS

**2.2.1.7 DWORD EXPRT mvme\_read\_value (MVME\_INTERFACE \* vme, mvme\_addr\_t vme\_addr)**

Read single data from VME bus. Useful for register access. See example in [mvme\\_open\(\)](#)

**Parameters:**

*\*vme* VME structure  
*vme\_addr* source address (VME location).

**Returns:**

MVME\_SUCCESS

**2.2.1.8 int EXPRT mvme\_set\_am (MVME\_INTERFACE \* vme, int am)**

Set Address Modifier.

**Parameters:**

*\*vme* VME structure  
*am* address modifier

**Returns:**

MVME\_SUCCESS

**2.2.1.9 int EXPRT mvme\_set\_blt (MVME\_INTERFACE \* vme, int mode)**

Set Block Transfer mode.

**Parameters:**

*\*vme* VME structure

*mode* BLT mode

**Returns:**

MVME\_SUCCESS

**2.2.1.10 int EXPRT mvme\_set\_dmode (MVME\_INTERFACE \* vme, int dmode)**

Set Data mode.

**Parameters:**

*\*vme* VME structure

*dmode* Data mode

**Returns:**

MVME\_SUCCESS

**2.2.1.11 int EXPRT mvme\_sysreset (MVME\_INTERFACE \* vme)**

VME bus reset. Effect of the VME bus reset is dependent of the type of VME interface used. See example in [mvme\\_open\(\)](#)

**Parameters:**

*\*vme* VME structure.

**Returns:**

MVME\_SUCCESS, MVME\_ACCESS\_ERROR

**2.2.1.12 int EXPRT mvme\_write (MVME\_INTERFACE \* vme, mvme\_addr\_t vme\_addr, void \* src, mvme\_size\_t n\_bytes)**

Write data to VME bus. Implementation of the write can include automatic DMA transfer based on the size of the data. See example in [mvme\\_open\(\)](#)

**Parameters:**

*\*vme* VME structure

*vme\_addr* source address (VME location).

*\*src* source array

*n\_bytes* size of the array in bytes

**Returns:**

MVME\_SUCCESS

**2.2.1.13** int EXPRT mvme\_write\_value ([MVME\\_INTERFACE](#) \* *vme*, [mvme\\_addr\\_t](#) *vme\_addr*, DWORD *value*)

Write single data to VME bus. Useful for register access. See example in [mvme\\_open\(\)](#)

**Parameters:**

*\*vme* VME structure

*vme\_addr* source address (VME location).

*value* Value to be written to the VME bus

**Returns:**

MVME\_SUCCESS

## 2.3 Midas CAMAC standard

### Modules

- [Camac Functions \(camxxx\)](#)

## 2.4 Camac Functions (camxxx)

### Functions

- EXTERNAL INLINE void EXPRT [cam16i](#) (const int c, const int n, const int a, const int f, WORD \*d)
- EXTERNAL INLINE void EXPRT [cam24i](#) (const int c, const int n, const int a, const int f, DWORD \*d)

- EXTERNAL INLINE void EXPRT [cam8i\\_q](#) (const int c, const int n, const int a, const int f, BYTE \*d, int \*x, int \*q)
- EXTERNAL INLINE void EXPRT [cam16i\\_q](#) (const int c, const int n, const int a, const int f, WORD \*d, int \*x, int \*q)
- EXTERNAL INLINE void EXPRT [cam24i\\_q](#) (const int c, const int n, const int a, const int f, DWORD \*d, int \*x, int \*q)
- EXTERNAL INLINE void EXPRT [cam16i\\_r](#) (const int c, const int n, const int a, const int f, WORD \*\*d, const int r)
- EXTERNAL INLINE void EXPRT [cam24i\\_r](#) (const int c, const int n, const int a, const int f, DWORD \*\*d, const int r)
- EXTERNAL INLINE void EXPRT [cam8i\\_rq](#) (const int c, const int n, const int a, const int f, BYTE \*\*d, const int r)
- EXTERNAL INLINE void EXPRT [cam16i\\_rq](#) (const int c, const int n, const int a, const int f, WORD \*\*d, const int r)
- EXTERNAL INLINE void EXPRT [cam24i\\_rq](#) (const int c, const int n, const int a, const int f, DWORD \*\*d, const int r)
- EXTERNAL INLINE void EXPRT [cam8i\\_sa](#) (const int c, const int n, const int a, const int f, BYTE \*\*d, const int r)
- EXTERNAL INLINE void EXPRT [cam16i\\_sa](#) (const int c, const int n, const int a, const int f, WORD \*\*d, const int r)
- EXTERNAL INLINE void EXPRT [cam24i\\_sa](#) (const int c, const int n, const int a, const int f, DWORD \*\*d, const int r)
- EXTERNAL INLINE void EXPRT [cam8i\\_sn](#) (const int c, const int n, const int a, const int f, BYTE \*\*d, const int r)
- EXTERNAL INLINE void EXPRT [cam16i\\_sn](#) (const int c, const int n, const int a, const int f, WORD \*\*d, const int r)
- EXTERNAL INLINE void EXPRT [cam24i\\_sn](#) (const int c, const int n, const int a, const int f, DWORD \*\*d, const int r)
- EXTERNAL INLINE void EXPRT [cami](#) (const int c, const int n, const int a, const int f, WORD \*d)
- EXTERNAL INLINE void EXPRT [cam8o](#) (const int c, const int n, const int a, const int f, BYTE d)
- EXTERNAL INLINE void EXPRT [cam16o](#) (const int c, const int n, const int a, const int f, WORD d)
- EXTERNAL INLINE void EXPRT [cam24o](#) (const int c, const int n, const int a, const int f, DWORD d)
- EXTERNAL INLINE void EXPRT [cam8o\\_q](#) (const int c, const int n, const int a, const int f, BYTE d, int \*x, int \*q)
- EXTERNAL INLINE void EXPRT [cam16o\\_q](#) (const int c, const int n, const int a, const int f, WORD d, int \*x, int \*q)
- EXTERNAL INLINE void EXPRT [cam24o\\_q](#) (const int c, const int n, const int a, const int f, DWORD d, int \*x, int \*q)
- EXTERNAL INLINE void EXPRT [cam8o\\_r](#) (const int c, const int n, const int a, const int f, BYTE \*d, const int r)



- EXTERNAL INLINE void EXPRT [cam16o\\_r](#) (const int c, const int n, const int a, const int f, WORD \*d, const int r)
- EXTERNAL INLINE void EXPRT [cam24o\\_r](#) (const int c, const int n, const int a, const int f, DWORD \*d, const int r)
- EXTERNAL INLINE void EXPRT [camo](#) (const int c, const int n, const int a, const int f, WORD d)
- EXTERNAL INLINE int EXPRT [camc\\_chk](#) (const int c)
- EXTERNAL INLINE void EXPRT [camc](#) (const int c, const int n, const int a, const int f)
- EXTERNAL INLINE void EXPRT [camc\\_q](#) (const int c, const int n, const int a, const int f, int \*q)
- EXTERNAL INLINE void EXPRT [camc\\_sa](#) (const int c, const int n, const int a, const int f, const int r)
- EXTERNAL INLINE void EXPRT [camc\\_sn](#) (const int c, const int n, const int a, const int f, const int r)
- EXTERNAL INLINE int EXPRT [cam\\_init](#) (void)
- EXTERNAL INLINE int EXPRT [cam\\_init\\_rpc](#) (char \*host\_name, char \*exp\_name, char \*fe\_name, char \*client\_name, char \*rpc\_server)
- EXTERNAL INLINE void EXPRT [cam\\_exit](#) (void)
- EXTERNAL INLINE void EXPRT [cam\\_inhibit\\_set](#) (const int c)
- EXTERNAL INLINE void EXPRT [cam\\_inhibit\\_clear](#) (const int c)
- EXTERNAL INLINE int EXPRT [cam\\_inhibit\\_test](#) (const int c)
- EXTERNAL INLINE void EXPRT [cam\\_crate\\_clear](#) (const int c)
- EXTERNAL INLINE void EXPRT [cam\\_crate\\_zinit](#) (const int c)
- EXTERNAL INLINE void EXPRT [cam\\_lam\\_enable](#) (const int c, const int n)
- EXTERNAL INLINE void EXPRT [cam\\_lam\\_disable](#) (const int c, const int n)
- EXTERNAL INLINE void EXPRT [cam\\_lam\\_read](#) (const int c, DWORD \*lam)
- EXTERNAL INLINE void EXPRT [cam\\_lam\\_clear](#) (const int c, const int n)
- EXTERNAL INLINE int EXPRT [cam\\_lam\\_wait](#) (int \*c, DWORD \*n, const int millisec)
- EXTERNAL INLINE void EXPRT [cam\\_interrupt\\_enable](#) (const int c)
- EXTERNAL INLINE void EXPRT [cam\\_interrupt\\_disable](#) (const int c)
- EXTERNAL INLINE int EXPRT [cam\\_interrupt\\_test](#) (const int c)
- EXTERNAL INLINE void EXPRT [cam\\_interrupt\\_attach](#) (const int c, const int n, void(\*isr)(void))
- EXTERNAL INLINE void EXPRT [cam\\_interrupt\\_detach](#) (const int c, const int n)

### 2.4.1 Function Documentation

**2.4.1.1 EXTERNAL INLINE void EXPRT cam16i (const int *c*, const int *n*, const int *a*, const int *f*, WORD \* *d*)**

16 bits input.

**Parameters:**

- c* crate number (0..)
- n* station number (0..30)
- a* sub-address (0..15)
- f* function (0..7)
- d* data read out data

**Returns:**

void

**2.4.1.2 EXTERNAL INLINE void EXPRT cam16i\_q (const int *c*, const int *n*, const int *a*, const int *f*, WORD \* *d*, int \* *x*, int \* *q*)**

16 bits input with Q response.

**Parameters:**

- c* crate number (0..)
- n* station number (0..30)
- a* sub-address (0..15)
- f* function (0..7)
- d* data read out data
- x* X response (0:failed,1:success)
- q* Q response (0:no Q, 1: Q)

**Returns:**

void

Referenced by csmad(), and cssa().

**2.4.1.3 EXTERNAL INLINE void EXPRT cam16i\_r (const int *c*, const int *n*, const int *a*, const int *f*, WORD \*\* *d*, const int *r*)**

Repeat 16 bits input.

**Parameters:**

- c* crate number (0..)

*n* station number (0..30)  
*a* sub-address (0..15)  
*f* function (0..7)  
*d* data read out data  
*r* repeat time

**Returns:**

void

**2.4.1.4 EXTERNAL INLINE void EXPRT cam16i\_rq (const int *c*, const int *n*, const int *a*, const int *f*, WORD \*\* *d*, const int *r*)**

Repeat 16 bits input with Q stop.

**Parameters:**

*c* crate number (0..)  
*n* station number (0..30)  
*a* sub-address (0..15)  
*f* function (0..7)  
*d* pointer to data read out  
*r* repeat time

**Returns:**

void

**2.4.1.5 EXTERNAL INLINE void EXPRT cam16i\_sa (const int *c*, const int *n*, const int *a*, const int *f*, WORD \*\* *d*, const int *r*)**

Read the given CAMAC address and increment the sub-address by one. Repeat *r* times.

```
WORD pbkdat[4];
cam16i_sa(crate, 5, 0, 2, &pbkdat, 4);
```

equivalent to :

```
cam16i(crate, 5, 0, 2, &pbkdat[0]);
cam16i(crate, 5, 1, 2, &pbkdat[1]);
cam16i(crate, 5, 2, 2, &pbkdat[2]);
cam16i(crate, 5, 3, 2, &pbkdat[3]);
```

**Parameters:**

*c* crate number (0..)  
*n* station number (0..30)  
*a* sub-address (0..15)  
*f* function (0..7)  
*d* pointer to data read out  
*r* number of consecutive sub-address to read

**Returns:**

void

**2.4.1.6 EXTERNAL INLINE void EXPRT cam16i\_sn (const int *c*, const int *n*, const int *a*, const int *f*, WORD \*\* *d*, const int *r*)**

Read the given CAMAC address and increment the station number by one. Repeat *r* times.

```
WORD pbkdat[4];  
cam16i_sa(crate, 5, 0, 2, &pbkdat, 4);
```

equivalent to :

```
cam16i(crate, 5, 0, 2, &pbkdat[0]);  
cam16i(crate, 6, 0, 2, &pbkdat[1]);  
cam16i(crate, 7, 0, 2, &pbkdat[2]);  
cam16i(crate, 8, 0, 2, &pbkdat[3]);
```

**Parameters:**

*c* crate number (0..)  
*n* station number (0..30)  
*a* sub-address (0..15)  
*f* function (0..7)  
*d* pointer to data read out  
*r* number of consecutive station to read

**Returns:**

void

**2.4.1.7 EXTERNAL INLINE void EXPRT cam16o (const int *c*, const int *n*, const int *a*, const int *f*, WORD *d*)**

Write data to given CAMAC address.

**Parameters:**

- c* crate number (0..)
- n* station number (0..30)
- a* sub-address (0..15)
- f* function (16..31)
- d* data to be written to CAMAC

**Returns:**

void

**2.4.1.8 EXTERNAL INLINE void EXPRT cam16o\_q (const int *c*, const int *n*, const int *a*, const int *f*, WORD *d*, int \* *x*, int \* *q*)**

Write data to given CAMAC address with Q response.

**Parameters:**

- c* crate number (0..)
- n* station number (0..30)
- a* sub-address (0..15)
- f* function (16..31)
- d* data to be written to CAMAC
- x* X response (0:failed,1:success)
- q* Q response (0:no Q, 1: Q)

**Returns:**

void

Referenced by cssa().

**2.4.1.9 EXTERNAL INLINE void EXPRT cam16o\_r (const int *c*, const int *n*, const int *a*, const int *f*, WORD \* *d*, const int *r*)**

Repeat write data to given CAMAC address *r* times.

**Parameters:**

- c* crate number (0..)

*n* station number (0..30)  
*a* sub-address (0..15)  
*f* function (16..31)  
*d* data to be written to CAMAC  
*r* number of repetition

**Returns:**

void

**2.4.1.10 EXTERNAL INLINE void EXPRT cam24i (const int *c*, const int *n*, const int *a*, const int *f*, DWORD \* *d*)**

24 bits input.

**Parameters:**

*c* crate number (0..)  
*n* station number (0..30)  
*a* sub-address (0..15)  
*f* function (0..7)  
*d* data read out data

**Returns:**

void

Referenced by read\_scaler\_event().

**2.4.1.11 EXTERNAL INLINE void EXPRT cam24i\_q (const int *c*, const int *n*, const int *a*, const int *f*, DWORD \* *d*, int \* *x*, int \* *q*)**

24 bits input with Q response.

**Parameters:**

*c* crate number (0..)  
*n* station number (0..30)  
*a* sub-address (0..15)  
*f* function (0..7)  
*d* data read out data  
*x* X response (0:failed,1:success)  
*q* Q response (0:no Q, 1: Q)

**Returns:**

void

Referenced by cfmad(), and cfsa().

**2.4.1.12 EXTERNAL INLINE void EXPRT cam24i\_r (const int *c*, const int *n*, const int *a*, const int *f*, DWORD \*\* *d*, const int *r*)**

Repeat 24 bits input.

**Parameters:**

*c* crate number (0..)  
*n* station number (0..30)  
*a* sub-address (0..15)  
*f* function (0..7)  
*d* data read out  
*r* repeat time

**Returns:**

void

**2.4.1.13 EXTERNAL INLINE void EXPRT cam24i\_rq (const int *c*, const int *n*, const int *a*, const int *f*, DWORD \*\* *d*, const int *r*)**

Repeat 24 bits input with Q stop.

**Parameters:**

*c* crate number (0..)  
*n* station number (0..30)  
*a* sub-address (0..15)  
*f* function (0..7)  
*d* pointer to data read out  
*r* repeat time

**Returns:**

void

**2.4.1.14 EXTERNAL INLINE void EXPRT cam24i\_sa (const int *c*, const int *n*, const int *a*, const int *f*, DWORD \*\* *d*, const int *r*)**

Read the given CAMAC address and increment the sub-address by one. Repeat *r* times.

```
DWORD pbkdat[8];
cam24i_sa(crate, 5, 0, 2, &pbkdat, 8);
```

equivalent to

```
cam24i(crate, 5, 0, 2, &pbkdat[0]);
cam24i(crate, 6, 0, 2, &pbkdat[1]);
cam24i(crate, 7, 0, 2, &pbkdat[2]);
cam24i(crate, 8, 0, 2, &pbkdat[3]);
```

**Parameters:**

- c* crate number (0..)
- n* station number (0..30)
- a* sub-address (0..15)
- f* function (0..7)
- d* pointer to data read out
- r* number of consecutive sub-address to read

**Returns:**

void

**2.4.1.15 EXTERNAL INLINE void EXPRT cam24i\_sn (const int *c*, const int *n*, const int *a*, const int *f*, DWORD \*\* *d*, const int *r*)**

Read the given CAMAC address and increment the station number by one. Repeat *r* times.

```
DWORD pbkdat[4];
cam24i_sa(crate, 5, 0, 2, &pbkdat, 4);
```

equivalent to :

```
cam24i(crate, 5, 0, 2, &pbkdat[0]);
cam24i(crate, 6, 0, 2, &pbkdat[1]);
cam24i(crate, 7, 0, 2, &pbkdat[2]);
cam24i(crate, 8, 0, 2, &pbkdat[3]);
```

**Parameters:**

- c* crate number (0..)



*n* station number (0..30)  
*a* sub-address (0..15)  
*f* function (0..7)  
*d* pointer to data read out  
*r* number of consecutive station to read

**Returns:**

void

**2.4.1.16 EXTERNAL INLINE void EXPRT cam24o (const int *c*, const int *n*, const int *a*, const int *f*, DWORD *d*)**

Write data to given CAMAC address.

**Parameters:**

*c* crate number (0..)  
*n* station number (0..30)  
*a* sub-address (0..15)  
*f* function (16..31)  
*d* data to be written to CAMAC

**Returns:**

void

**2.4.1.17 EXTERNAL INLINE void EXPRT cam24o\_q (const int *c*, const int *n*, const int *a*, const int *f*, DWORD *d*, int \* *x*, int \* *q*)**

Write data to given CAMAC address with Q response.

**Parameters:**

*c* crate number (0..)  
*n* station number (0..30)  
*a* sub-address (0..15)  
*f* function (16..31)  
*d* data to be written to CAMAC  
*x* X response (0:failed,1:success)  
*q* Q response (0:no Q, 1: Q)

**Returns:**

void

Referenced by cfsa().

**2.4.1.18 EXTERNAL INLINE void EXPRT cam24o\_r (const int *c*, const int *n*, const int *a*, const int *f*, DWORD \* *d*, const int *r*)**Repeat write data to given CAMAC address *r* times.**Parameters:**

*c* crate number (0..)  
*n* station number (0..30)  
*a* sub-address (0..15)  
*f* function (16..31)  
*d* data to be written to CAMAC  
*r* number of repeatition

**Returns:**

void

**2.4.1.19 EXTERNAL INLINE void EXPRT cam8i\_q (const int *c*, const int *n*, const int *a*, const int *f*, BYTE \* *d*, int \* *x*, int \* *q*)**

8 bits input with Q response.

**Parameters:**

*c* crate number (0..)  
*n* station number (0..30)  
*a* sub-address (0..15)  
*f* function (0..7)  
*d* data read out data  
*x* X response (0:failed,1:success)  
*q* Q resonpse (0:no Q, 1: Q)

**Returns:**

void

**2.4.1.20 EXTERNAL INLINE void EXPRT cam8i\_rq (const int *c*, const int *n*, const int *a*, const int *f*, BYTE \*\* *d*, const int *r*)**

Repeat 8 bits input with Q stop.

**Parameters:**

*c* crate number (0..)  
*n* station number (0..30)  
*a* sub-address (0..15)  
*f* function (0..7)  
*d* pointer to data read out  
*r* repeat time

**Returns:**

void

**2.4.1.21 EXTERNAL INLINE void EXPRT cam8i\_sa (const int *c*, const int *n*, const int *a*, const int *f*, BYTE \*\* *d*, const int *r*)**

Read the given CAMAC address and increment the sub-address by one. Repeat *r* times.

```
BYTE pbkdat[4];  
cam8i_sa(crate, 5, 0, 2, &pbkdat, 4);
```

equivalent to :

```
cam8i(crate, 5, 0, 2, &pbkdat[0]);  
cam8i(crate, 5, 1, 2, &pbkdat[1]);  
cam8i(crate, 5, 2, 2, &pbkdat[2]);  
cam8i(crate, 5, 3, 2, &pbkdat[3]);
```

**Parameters:**

*c* crate number (0..)  
*n* station number (0..30)  
*a* sub-address (0..15)  
*f* function (0..7)  
*d* pointer to data read out  
*r* number of consecutive sub-address to read

**Returns:**

void

**2.4.1.22 EXTERNAL INLINE void EXPRT cam8i\_sn (const int *c*, const int *n*, const int *a*, const int *f*, BYTE \*\* *d*, const int *r*)**

Read the given CAMAC address and increment the station number by one. Repeat *r* times.

```
BYTE pbkdat[4];
cam8i_sa(crate, 5, 0, 2, &pbkdat, 4);
```

equivalent to :

```
cam8i(crate, 5, 0, 2, &pbkdat[0]);
cam8i(crate, 6, 0, 2, &pbkdat[1]);
cam8i(crate, 7, 0, 2, &pbkdat[2]);
cam8i(crate, 8, 0, 2, &pbkdat[3]);
```

**Parameters:**

- c* crate number (0..)
- n* station number (0..30)
- a* sub-address (0..15)
- f* function (0..7)
- d* pointer to data read out
- r* number of consecutive station to read

**Returns:**

void

**2.4.1.23 EXTERNAL INLINE void EXPRT cam8o (const int *c*, const int *n*, const int *a*, const int *f*, BYTE *d*)**

Write data to given CAMAC address.

**Parameters:**

- c* crate number (0..)
- n* station number (0..30)
- a* sub-address (0..15)
- f* function (16..31)
- d* data to be written to CAMAC

**Returns:**

void

**2.4.1.24 EXTERNAL INLINE void EXPRT cam8o\_q (const int *c*, const int *n*, const int *a*, const int *f*, BYTE *d*, int \* *x*, int \* *q*)**

Write data to given CAMAC address with Q response.

**Parameters:**

- c* crate number (0..)
- n* station number (0..30)
- a* sub-address (0..15)
- f* function (16..31)
- d* data to be written to CAMAC
- x* X response (0:failed,1:success)
- q* Q response (0:no Q, 1: Q)

**Returns:**

void

**2.4.1.25 EXTERNAL INLINE void EXPRT cam8o\_r (const int *c*, const int *n*, const int *a*, const int *f*, BYTE \* *d*, const int *r*)**

Repeat write data to given CAMAC address *r* times.

**Parameters:**

- c* crate number (0..)
- n* station number (0..30)
- a* sub-address (0..15)
- f* function (16..31)
- d* data to be written to CAMAC
- r* number of repetition

**Returns:**

void

**2.4.1.26 EXTERNAL INLINE void EXPRT cam\_crate\_clear (const int *c*)**

Issue CLEAR to crate.

**Parameters:**

- c* crate number (0..)

**Returns:**

void

Referenced by cccc(), and frontend\_init().

**2.4.1.27 EXTERNAL INLINE void EXPRT cam\_crate\_zinit (const int *c*)**

Issue Z to crate.

**Parameters:**

*c* crate number (0..)

**Returns:**

void

Referenced by cccz(), and frontend\_init().

**2.4.1.28 EXTERNAL INLINE void EXPRT cam\_exit (void)**

Close CAMAC accesss.

**2.4.1.29 EXTERNAL INLINE void EXPRT cam\_inhibit\_clear (const int *c*)**

Clear Crate inhibit.

**Parameters:**

*c* crate number (0..)

**Returns:**

void

Referenced by ccci().

**2.4.1.30 EXTERNAL INLINE void EXPRT cam\_inhibit\_set (const int *c*)**

Set Crate inhibit.

**Parameters:**

*c* crate number (0..)

**Returns:**

void

Referenced by ccci().

**2.4.1.31 EXTERNAL INLINE int EXPRT cam\_inhibit\_test (const int *c*)**

Test Crate Inhibit.

**Parameters:**

*c* crate number (0..)

**Returns:**

1 for set, 0 for cleared

Referenced by ctc().

**2.4.1.32 EXTERNAL INLINE int EXPRT cam\_init (void)**

Initialize CAMAC access.

**Returns:**

1: success

Referenced by ccinit(), fccinit(), and frontend\_init().

**2.4.1.33 EXTERNAL INLINE int EXPRT cam\_init\_rpc (char \* *host\_name*, char \* *exp\_name*, char \* *fe\_name*, char \* *client\_name*, char \* *rpc\_server*)**

Initialize CAMAC access for rpc calls

**For ~~Intermdtuse~~ use only.**

*host\_name* Midas host to contact

*exp\_name* Midas experiment to contact

*fe\_name* frontend application name to contact

*client\_name* RPC host name

*rpc\_server* RPC server name

**Returns:**

1: success

**2.4.1.34 EXTERNAL INLINE void EXPRT cam\_interrupt\_attach (const int *c*, const int *n*, void(\*) (void) *isr*)**

Attach service routine to LAM of specific crate and station.

**Parameters:**

*c* crate number (0..)

*n* station number

(*\*isr*) Function pointer to attach to the LAM

**Returns:**

void

Referenced by cclnk().

**2.4.1.35 EXTERNAL INLINE void EXPRT cam\_interrupt\_detach (const int *c*, const int *n*)**

Detach service routine from LAM.

**Parameters:**

*c* crate number (0..)

*n* station number

**Returns:**

void

Referenced by cculk().

**2.4.1.36 EXTERNAL INLINE void EXPRT cam\_interrupt\_disable (const int *c*)**

Disables interrupts in specific crate

**Parameters:**

*c* crate number (0..)

**Returns:**

void

Referenced by cccd().

**2.4.1.37 EXTERNAL INLINE void EXPRT cam\_interrupt\_enable (const int *c*)**

Enable interrupts in specific crate

**Parameters:**

*c* crate number (0..)

**Returns:**

void

Referenced by cccd(), and ccrgl().



**2.4.1.38 EXTERNAL INLINE int EXPRT cam\_interrupt\_test (const int *c*)**

Test Crate Interrupt.

**Parameters:**

*c* crate number (0..)

**Returns:**

1 for set, 0 for cleared

Referenced by ctdc().

**2.4.1.39 EXTERNAL INLINE void EXPRT cam\_lam\_clear (const int *c*, const int *n*)**

Clear the LAM register of the crate controller. It doesn't clear the LAM of the particular station.

**Parameters:**

*c* crate number (0..)

*n* LAM station

**Returns:**

void

Referenced by cclnk(), ccrgl(), and read\_trigger\_event().

**2.4.1.40 EXTERNAL INLINE void EXPRT cam\_lam\_disable (const int *c*, const int *n*)**

Disable LAM generation for given station to the Crate controller. It doesn't disable the LAM of the actual station itself.

**Parameters:**

*c* crate number (0..)

*n* LAM station

**Returns:**

void

**2.4.1.41 EXTERNAL INLINE void EXPRT cam\_lam\_enable (const int *c*, const int *n*)**

Enable LAM generation for given station to the Crate controller. It doesn't enable the LAM of the actual station itself.

**Parameters:**

*c* crate number (0..)

*n* LAM station

**Returns:**

void

Referenced by cclnk(), ccrgl(), and frontend\_init().

**2.4.1.42 EXTERNAL INLINE void EXPRT cam\_lam\_read (const int *c*, DWORD \* *lam*)**

Reads in *lam* the lam pattern of the entire crate.

**Parameters:**

*c* crate number (0..)

*lam* LAM pattern of the crate

**Returns:**

void

Referenced by ctgl(), and poll\_event().

**2.4.1.43 EXTERNAL INLINE int EXPRT cam\_lam\_wait (int \* *c*, DWORD \* *n*, const int *millisec*)**

Wait for a LAM to occur with a certain timeout. Return crate and station if LAM occurs.

**Parameters:**

*c* crate number (0..)

*n* LAM station

*millisec* If there is no LAM after this timeout, the routine returns

**Returns:**

1 if LAM occurred, 0 else

**2.4.1.44 EXTERNAL INLINE void EXPRT camc (const int *c*, const int *n*, const int *a*, const int *f*)**

CAMAC command (no data).

**Parameters:**

- c* crate number (0..)
- n* station number (0..30)
- a* sub-address (0..15)
- f* function (8..15, 24..31)

**Returns:**

void

Referenced by cclc(), cclm(), frontend\_init(), and read\_trigger\_event().

**2.4.1.45 EXTERNAL INLINE int EXPRT camc\_chk (const int *c*)**

Crate presence check.

**Parameters:**

- c* crate number (0..)

**Returns:**

0:Success, -1:No CAMAC response

**2.4.1.46 EXTERNAL INLINE void EXPRT camc\_q (const int *c*, const int *n*, const int *a*, const int *f*, int \**q*)**

CAMAC command with Q response (no data).

**Parameters:**

- c* crate number (0..)
- n* station number (0..30)
- a* sub-address (0..15)
- f* function (8..15, 24..31)
- q* Q response (0:no Q, 1:Q)

**Returns:**

void

Referenced by cfsc(), cssa(), ctm(), and read\_trigger\_event().

**2.4.1.47** **EXTERNAL INLINE void EXPRT came\_sa** (const int *c*, const int *n*, const int *a*, const int *f*, const int *r*)

Scan CAMAC command on sub-address.

**Parameters:**

- c* crate number (0..)
- n* station number (0..30)
- a* sub-address (0..15)
- f* function (8..15, 24..31)
- r* number of consecutive sub-address to read

**Returns:**

void

**2.4.1.48** **EXTERNAL INLINE void EXPRT came\_sn** (const int *c*, const int *n*, const int *a*, const int *f*, const int *r*)

Scan CAMAC command on station.

**Parameters:**

- c* crate number (0..)
- n* station number (0..30)
- a* sub-address (0..15)
- f* function (8..15, 24..31)
- r* number of consecutive station to read

**Returns:**

void

**2.4.1.49** **EXTERNAL INLINE void EXPRT cami** (const int *c*, const int *n*, const int *a*, const int *f*, WORD \* *d*)

Same as [cam16i\(\)](#)

**2.4.1.50** **EXTERNAL INLINE void EXPRT camo** (const int *c*, const int *n*, const int *a*, const int *f*, WORD *d*)

Same as [cam16o\(\)](#)

Referenced by frontend\_init(), and read\_trigger\_event().

## 2.5 The midas.h & midas.c

### Modules

- [Midas Defne](#)
- [Midas Macros](#)
- [Midas Error definition](#)
- [Midas Structure Declaration](#)
- [Midas Message Functions \(msg\\_XXX\)](#)
- [Midas Common Functions \(cm\\_XXX\)](#)
- [Midas Buffer Manager Functions \(bm\\_XXX\)](#)
- [Midas RPC Functions \(rpc\\_XXX\)](#)
- [Midas Bank Functions \(bk\\_XXX\)](#)
- [Midas History Functions \(hs\\_XXX\)](#)
- [Midas Elog Functions \(el\\_XXX\)](#)
- [Midas Alarm Functions \(al\\_XXX\)](#)
- [Midas Dual Buffer Memory Functions \(dm\\_XXX\)](#)

### Defnes

- `#define TAPE_BUFFER_SIZE 0x8000`
- `#define NET_TCP_SIZE 0xFFFF`
- `#define OPT_TCP_SIZE 8192`
- `#define NET_UDP_SIZE 8192`
- `#define EVENT_BUFFER_SIZE 0x100000`
- `#define EVENT_BUFFER_NAME "SYSTEM"`
- `#define MAX_EVENT_SIZE 0x80000`
- `#define DEFAULT_EVENT_BUFFER_SIZE 0x200000;`
- `#define DEFAULT_ODB_SIZE 0x100000`
- `#define NAME_LENGTH 32`
- `#define HOST_NAME_LENGTH 256`
- `#define MAX_CLIENTS 64`
- `#define MAX_EVENT_REQUESTS 10`
- `#define MAX_OPEN_RECORDS 256`
- `#define MAX_ODB_PATH 256`
- `#define MAX_EXPERIMENT 32`
- `#define BANKLIST_MAX 64`
- `#define STRING_BANKLIST_MAX BANKLIST_MAX * 4`
- `#define DEFAULT_RPC_TIMEOUT 10000`
- `#define DEFAULT_WATCHDOG_TIMEOUT 10000`
- `#define CH_BS 8`
- `#define LAM_SOURCE(c, s) (c < 24 | ((s) & 0xFFFFF))`
- `#define LAM_STATION(s) (1 < (s-1))`

- #define LAM\_SOURCE\_CRATE(c) (c >> 24)
- #define LAM\_SOURCE\_STATION(s) ((s) & 0xFFFFFFF)
- #define CNAF 0x1
- #define ANA\_CONTINUE 1

### Variables

- short int EVENT\_HEADER::trigger\_mask
- DWORD EVENT\_HEADER::serial\_number
- DWORD EVENT\_HEADER::time\_stamp
- DWORD EVENT\_HEADER::data\_size
- BOOL EVENT\_REQUEST::valid
- short int EVENT\_REQUEST::event\_id
- short int EVENT\_REQUEST::trigger\_mask
- INT EVENT\_REQUEST::sampling\_type
- INT BUFFER\_CLIENT::pid
- INT BUFFER\_CLIENT::tid
- INT BUFFER\_CLIENT::thandle
- INT BUFFER\_CLIENT::port
- INT BUFFER\_CLIENT::read\_pointer
- INT BUFFER\_CLIENT::max\_request\_index
- INT BUFFER\_CLIENT::num\_received\_events
- INT BUFFER\_CLIENT::num\_sent\_events
- INT BUFFER\_CLIENT::num\_waiting\_events
- float BUFFER\_CLIENT::data\_rate
- BOOL BUFFER\_CLIENT::read\_wait
- INT BUFFER\_CLIENT::write\_wait
- BOOL BUFFER\_CLIENT::wake\_up
- BOOL BUFFER\_CLIENT::all\_flag
- DWORD BUFFER\_CLIENT::last\_activity
- DWORD BUFFER\_CLIENT::watchdog\_timeout
- INT BUFFER\_HEADER::num\_clients
- INT BUFFER\_HEADER::max\_client\_index
- INT BUFFER\_HEADER::size
- INT BUFFER\_HEADER::read\_pointer
- INT BUFFER\_HEADER::write\_pointer
- INT BUFFER\_HEADER::num\_in\_events
- INT BUFFER\_HEADER::num\_out\_events
- BUFFER\_CLIENT BUFFER\_HEADER::client [MAX\_CLIENTS]
- INT BUFFER::client\_index
- BUFFER\_HEADER \* BUFFER::buffer\_header
- void \* BUFFER::buffer\_data

- char \* BUFFER::read\_cache
- INT BUFFER::read\_cache\_size
- INT BUFFER::read\_cache\_rp
- INT BUFFER::read\_cache\_wp
- char \* BUFFER::write\_cache
- INT BUFFER::write\_cache\_size
- INT BUFFER::write\_cache\_rp
- INT BUFFER::write\_cache\_wp
- HANDLE BUFFER::mutex
- INT BUFFER::shm\_handle
- INT BUFFER::index
- BOOL BUFFER::callback
- INT KEY::num\_values
- char KEY::name [NAME\_LENGTH]
- INT KEY::data
- INT KEY::total\_size
- INT KEY::item\_size
- WORD KEY::access\_mode
- WORD KEY::notify\_count
- INT KEY::next\_key
- INT KEY::parent\_keylist
- INT KEY::last\_written
- INT KEYLIST::num\_keys
- INT KEYLIST::first\_key
- INT(\* BUS\_DRIVER::bd )(INT cmd,...)
- void \* BUS\_DRIVER::bd\_info
- INT(\* DEVICE\_DRIVER::dd )(INT cmd,...)
- INT DEVICE\_DRIVER::channels
- INT(\* DEVICE\_DRIVER::bd )(INT cmd,...)
- DWORD DEVICE\_DRIVER::flags
- void \* DEVICE\_DRIVER::dd\_info
- WORD EQUIPMENT\_INFO::trigger\_mask
- char EQUIPMENT\_INFO::buffer [NAME\_LENGTH]
- INT EQUIPMENT\_INFO::eq\_type
- INT EQUIPMENT\_INFO::source
- char EQUIPMENT\_INFO::format [8]
- BOOL EQUIPMENT\_INFO::enabled
- INT EQUIPMENT\_INFO::read\_on
- INT EQUIPMENT\_INFO::period
- double EQUIPMENT\_INFO::event\_limit
- DWORD EQUIPMENT\_INFO::num\_subevents
- INT EQUIPMENT\_INFO::history
- char EQUIPMENT\_INFO::frontend\_host [NAME\_LENGTH]

- char EQUIPMENT\_INFO::frontend\_name [NAME\_LENGTH]
- char EQUIPMENT\_INFO::frontend\_file\_name [256]
- EQUIPMENT\_INFO eqpmnt::info
- INT(\* eqpmnt::readout )(char \*, INT)
- INT(\* eqpmnt::cd )(INT cmd, PEQUIPMENT)
- DEVICE\_DRIVER \* eqpmnt::driver
- void \* eqpmnt::event\_descrip
- void \* eqpmnt::cd\_info
- INT eqpmnt::status
- DWORD eqpmnt::last\_called
- DWORD eqpmnt::last\_idle
- DWORD eqpmnt::poll\_count
- INT eqpmnt::format
- HANDLE eqpmnt::buffer\_handle
- HANDLE eqpmnt::hkey\_variables
- DWORD eqpmnt::serial\_number
- DWORD eqpmnt::subevent\_number
- DWORD eqpmnt::odb\_out
- DWORD eqpmnt::odb\_in
- DWORD eqpmnt::bytes\_sent
- DWORD eqpmnt::events\_sent
- DWORD BANK\_HEADER::mag
- WORD BANK::type
- WORD BANK::data\_size
- DWORD BANK32::type
- DWORD BANK32::data\_size
- DWORD TAG::type
- DWORD TAG::n\_data
- WORD BANK\_LIST::type
- DWORD BANK\_LIST::size
- char \*\* BANK\_LIST::init\_str
- BOOL BANK\_LIST::output\_mag
- void \* BANK\_LIST::addr
- DWORD BANK\_LIST::n\_data
- HANDLE BANK\_LIST::def\_key
- char ANA\_MODULE::author [NAME\_LENGTH]
- INT(\* ANA\_MODULE::analyzer )(EVENT\_HEADER \*, void \*)
- INT(\* ANA\_MODULE::bor )(INT run\_number)
- INT(\* ANA\_MODULE::eor )(INT run\_number)
- INT(\* ANA\_MODULE::init )()
- INT(\* ANA\_MODULE::exit )()
- void \* ANA\_MODULE::parameters
- INT ANA\_MODULE::param\_size



- char \*\* ANA\_MODULE::init\_str
- BOOL ANA\_MODULE::enabled
- INT AR\_INFO::trigger\_mask
- INT AR\_INFO::sampling\_type
- char AR\_INFO::buffer [NAME\_LENGTH]
- BOOL AR\_INFO::enabled
- char AR\_INFO::client\_name [NAME\_LENGTH]
- char AR\_INFO::host [NAME\_LENGTH]
- AR\_INFO ANALYZE\_REQUEST::ar\_info
- INT(\* ANALYZE\_REQUEST::analyzer)(EVENT\_HEADER \*, void \*)
- ANA\_MODULE \*\* ANALYZE\_REQUEST::ana\_module
- BANK\_LIST \* ANALYZE\_REQUEST::bank\_list
- INT ANALYZE\_REQUEST::rwnt\_buffer\_size
- BOOL ANALYZE\_REQUEST::use\_tests
- INT ANALYZE\_REQUEST::status
- HANDLE ANALYZE\_REQUEST::buffer\_handle
- HANDLE ANALYZE\_REQUEST::request\_id
- HANDLE ANALYZE\_REQUEST::hkey\_variables
- HANDLE ANALYZE\_REQUEST::hkey\_common
- void \* ANALYZE\_REQUEST::addr
- struct {
  - } ANALYZE\_REQUEST::number
- DWORD ANALYZE\_REQUEST::events\_received
- DWORD ANALYZE\_REQUEST::events\_written
- INT RUNINFO::online\_mode
- INT RUNINFO::run\_number
- INT RUNINFO::transition\_in\_progress
- INT RUNINFO::requested\_transition
- char RUNINFO::start\_time [32]
- DWORD RUNINFO::start\_time\_binary
- char RUNINFO::stop\_time [32]
- DWORD RUNINFO::stop\_time\_binary
- static HANDLE \_hKeyClient = 0

### 2.5.1 Define Documentation

#### 2.5.1.1 #define ANA\_CONTINUE 1

dox

Definition at line 713 of file midas.h.

**2.5.1.2 #define ANA\_SKIP 0**

Definition at line 714 of file midas.h.

**2.5.1.3 #define BANKLIST\_MAX 64**

max # of banks in event

Definition at line 227 of file midas.h.

Referenced by bk\_list().

**2.5.1.4 #define CH\_BS 8**

special characters

Definition at line 367 of file midas.h.

**2.5.1.5 #define CH\_CR 13**

Definition at line 369 of file midas.h.

**2.5.1.6 #define CH\_DELETE (CH\_EXT+2)**

Definition at line 375 of file midas.h.

**2.5.1.7 #define CH\_DOWN (CH\_EXT+7)**

Definition at line 380 of file midas.h.

**2.5.1.8 #define CH\_END (CH\_EXT+3)**

Definition at line 376 of file midas.h.

**2.5.1.9 #define CH\_EXT 0x100**

Definition at line 371 of file midas.h.

**2.5.1.10 #define CH\_HOME (CH\_EXT+0)**

Definition at line 373 of file midas.h.

**2.5.1.11 #define CH\_INSERT (CH\_EXT+1)**

Definition at line 374 of file midas.h.

**2.5.1.12 #define CH\_LEFT (CH\_EXT+9)**

Definition at line 382 of file midas.h.

**2.5.1.13 #define CH\_PDOWN (CH\_EXT+5)**

Definition at line 378 of file midas.h.

**2.5.1.14 #define CH\_PUP (CH\_EXT+4)**

Definition at line 377 of file midas.h.

**2.5.1.15 #define CH\_RIGHT (CH\_EXT+8)**

Definition at line 381 of file midas.h.

**2.5.1.16 #define CH\_TAB 9**

Definition at line 368 of file midas.h.

**2.5.1.17 #define CH\_UP (CH\_EXT+6)**

Definition at line 379 of file midas.h.

**2.5.1.18 #define CNAF 0x1**

CNAF commands

Definition at line 412 of file midas.h.

**2.5.1.19 #define CNAF\_CRATE\_CLEAR 0x102**

Definition at line 417 of file midas.h.

**2.5.1.20 #define CNAF\_CRATE\_ZINIT 0x103**

Definition at line 418 of file midas.h.

**2.5.1.21 #define CNAF\_INHIBIT\_CLEAR 0x101**

Definition at line 416 of file midas.h.

**2.5.1.22 #define CNAF\_INHIBIT\_SET 0x100**

Definition at line 415 of file midas.h.

**2.5.1.23 #define CNAF\_nQ 0x2**

Definition at line 413 of file midas.h.

**2.5.1.24 #define CNAF\_TEST 0x110**

Definition at line 419 of file midas.h.

**2.5.1.25 #define DATABASE\_VERSION 2**

Definition at line 46 of file midas.h.

Referenced by db\_open\_database().

**2.5.1.26 #define DEFAULT\_EVENT\_BUFFER\_SIZE 0x200000;**

2M

Definition at line 217 of file midas.h.

**2.5.1.27 #define DEFAULT\_ODB\_SIZE 0x100000**

online database 1M

Definition at line 218 of file midas.h.

Referenced by cm\_connect\_experiment(), cm\_connect\_experiment1(), and main().

**2.5.1.28 #define DEFAULT\_RPC\_TIMEOUT 10000**

Timeouts [ms]

Definition at line 235 of file midas.h.

**2.5.1.29 #define DEFAULT\_WATCHDOG\_TIMEOUT 10000**

Watchdog

Definition at line 238 of file midas.h.

Referenced by cm\_connect\_experiment(), and cm\_connect\_experiment1().

**2.5.1.30 #define EVENT\_BUFFER\_NAME "SYSTEM"**

buffer name for commands

Definition at line 215 of file midas.h.

**2.5.1.31 #define EVENT\_BUFFER\_SIZE 0x100000**

buffer used for events

Definition at line 214 of file midas.h.

Referenced by register\_equipment(), and source\_booking().

**2.5.1.32 #define HOST\_NAME\_LENGTH 256**

length of TCP/IP names

Definition at line 221 of file midas.h.

Referenced by cm\_connect\_client(), cm\_connect\_experiment1(), cm\_disconnect\_experiment(), cm\_set\_client\_info(), cm\_shutdown(), and cm\_transition().

**2.5.1.33 #define LAM\_SOURCE(c, s) (c < 24 | ((s) & 0xFFFFFF))**

Code the LAM crate and LAM station into a bitwise register.

**Parameters:**

*c* Crate number

*s* Slot number

Definition at line 390 of file midas.h.

**2.5.1.34 #define LAM\_SOURCE\_CRATE(c) (c > 24)**

Convert the coded LAM crate to Crate number.

**Parameters:**

*c* coded crate

Definition at line 402 of file midas.h.

Referenced by poll\_event().

**2.5.1.35 #define LAM\_SOURCE\_STATION(s) ((s) & 0xFFFFFF)**

Convert the coded LAM station to Station number.

**Parameters:**

*s* Slot number

Definition at line 408 of file midas.h.

Referenced by poll\_event().

**2.5.1.36 #define LAM\_STATION(s) (1<<(s-1))**

Code the Station number bitwise for the LAM source.

**Parameters:**

*s* Slot number

Definition at line 396 of file midas.h.

**2.5.1.37 #define MAX\_CLIENTS 64**

client processes per buf/db

Definition at line 222 of file midas.h.

Referenced by bm\_close\_buffer(), bm\_open\_buffer(), cm\_cleanup(), db\_close\_database(), and db\_open\_database().

**2.5.1.38 #define MAX\_EVENT\_REQUESTS 10**

event requests per client

Definition at line 223 of file midas.h.

Referenced by bm\_remove\_event\_request().

**2.5.1.39 #define MAX\_EVENT\_SIZE 0x80000**

maximum event size 512k

Definition at line 216 of file midas.h.

Referenced by bm\_send\_event(), dm\_buffer\_create(), main(), register\_equipment(), and rpc\_send\_event().

**2.5.1.40 #define MAX\_EXPERIMENT 32**

number of different exp.

Definition at line 226 of file midas.h.

Referenced by cm\_connect\_experiment1(), cm\_list\_experiments(), cm\_scan\_experiments(), and cm\_select\_experiment().

**2.5.1.41 #define MAX\_ODB\_PATH 256**

length of path in ODB

Definition at line 225 of file midas.h.

Referenced by db\_copy().

**2.5.1.42 #define MAX\_OPEN\_RECORDS 256**

number of open DB records

Definition at line 224 of file midas.h.

**2.5.1.43 #define MIDAS\_TCP\_PORT 1175**

Definition at line 231 of file midas.h.

Referenced by cm\_list\_experiments(), and cm\_transition().

**2.5.1.44 #define MIDAS\_VERSION "1.9.5"**

Definition at line 45 of file midas.h.

Referenced by cm\_get\_version().

**2.5.1.45 #define NAME\_LENGTH 32**

length of names, mult.of 8!

Definition at line 220 of file midas.h.

Referenced by bm\_open\_buffer(), cm\_check\_client(), cm\_connect\_client(), cm\_connect\_experiment1(), cm\_exist(), cm\_get\_client\_info(), cm\_select\_experiment(), cm\_set\_client\_info(), cm\_shutdown(), cm\_transition(), db\_open\_database(), and load\_fragment().

**2.5.1.46 #define NET\_TCP\_SIZE 0xFFFF**

maximum TCP transfer

Definition at line 210 of file midas.h.

Referenced by rpc\_send\_event(), and scheduler().

**2.5.1.47 #define NET\_UDP\_SIZE 8192**

maximum UDP transfer

Definition at line 212 of file midas.h.

**2.5.1.48 #define OPT\_TCP\_SIZE 8192**

optimal TCP buffer size

Definition at line 211 of file midas.h.

**2.5.1.49 #define STRING\_BANKLIST\_MAX BANKLIST\_MAX \* 4**

for [bk\\_list\(\)](#)

Definition at line 228 of file midas.h.

**2.5.1.50 #define TAPE\_BUFFER\_SIZE 0x8000**

dox buffer size for taping data

Definition at line 208 of file midas.h.

**2.5.1.51 #define WATCHDOG\_INTERVAL 1000**

Definition at line 236 of file midas.h.

Referenced by [cm\\_set\\_client\\_info\(\)](#), [cm\\_set\\_watchdog\\_params\(\)](#), and [ss\\_sleep\(\)](#).

**2.5.2 Variable Documentation****2.5.2.1 INT [\\_call\\_watchdog](#) = TRUE [static]**

Definition at line 992 of file midas.c.

**2.5.2.2 char [\\_client\\_name](#)[NAME\_LENGTH] [static]**

Definition at line 990 of file midas.c.

**2.5.2.3 HANDLE [\\_hDB](#) = 0 [static]**

Definition at line 989 of file midas.c.

**2.5.2.4 HANDLE [\\_hKeyClient](#) = 0 [static]**

dox

Definition at line 988 of file midas.c.

**2.5.2.5 INT [\\_mutex\\_alarm](#)**

Definition at line 994 of file midas.c.

Referenced by [db\\_close\\_database\(\)](#).



### 2.5.2.6 INT `_mutex_eolog`

Definition at line 994 of file midas.c.

Referenced by db\_close\_database().

### 2.5.2.7 char `_path_name`[MAX\_STRING\_LENGTH] [static]

Definition at line 991 of file midas.c.

### 2.5.2.8 INT `_watchdog_timeout` = DEFAULT\_WATCHDOG\_TIMEOUT [static]

Definition at line 993 of file midas.c.

### 2.5.2.9 WORD `KEY::access_mode` [inherited]

Access mode

Definition at line 860 of file midas.h.

Referenced by cm\_cleanup(), db\_create\_key(), db\_delete\_key1(), db\_end\_key(), db\_get\_data(), db\_get\_data\_index(), db\_get\_value(), db\_open\_database(), db\_open\_record(), db\_set\_data(), db\_set\_data\_index(), and db\_set\_value().

### 2.5.2.10 void\* `ANALYZE_REQUEST::addr` [inherited]

Buffer for CWNT filling

Definition at line 1050 of file midas.h.

### 2.5.2.11 void\* `BANK_LIST::addr` [inherited]

•

Definition at line 992 of file midas.h.

### 2.5.2.12 char `ALARM::alarm_class`[32] [inherited]

Definition at line 1245 of file midas.h.

Referenced by al\_trigger\_alarm().

### 2.5.2.13 char `PROGRAM_INFO::alarm_class`[32] [inherited]

Definition at line 1180 of file midas.h.

**2.5.2.14** char **ALARM::alarm\_message**[80] [inherited]

Definition at line 1246 of file midas.h.

Referenced by al\_trigger\_alarm().

**2.5.2.15** BOOL **BUFFER\_CLIENT::all\_mag** [inherited]

at least one GET\_ALL request

Definition at line 809 of file midas.h.

Referenced by bm\_remove\_event\_request().

**2.5.2.16** **ANA\_MODULE\*\*** **ANALYZE\_REQUEST::ana\_module** [inherited]

List of analyzer modules

Definition at line 1040 of file midas.h.

**2.5.2.17** INT(\* **ANALYZE\_REQUEST::analyzer**)(**EVENT\_HEADER \***, **void \***) [inherited]

Pointer to user analyzer routine

**2.5.2.18** INT(\* **ANA\_MODULE::analyzer**)(**EVENT\_HEADER \***, **void \***) [inherited]

Pointer to user analyzer routine

**2.5.2.19** **AR\_INFO** **ANALYZE\_REQUEST::ar\_info** [inherited]

From above

Definition at line 1038 of file midas.h.

**2.5.2.20** **AR\_STATS** **ANALYZE\_REQUEST::ar\_stats** [inherited]

Definition at line 1058 of file midas.h.

**2.5.2.21** char **ANA\_MODULE::author**[NAME\_LENGTH] [inherited]

Author

Definition at line 1006 of file midas.h.

**2.5.2.22** **BOOL** **PROGRAM\_INFO::auto\_restart** [inherited]

Definition at line 1179 of file midas.h.

**2.5.2.23** **BOOL** **PROGRAM\_INFO::auto\_start** [inherited]

Definition at line 1177 of file midas.h.

Referenced by cm\_transition().

**2.5.2.24** **BOOL** **PROGRAM\_INFO::auto\_stop** [inherited]

Definition at line 1178 of file midas.h.

Referenced by cm\_transition().

**2.5.2.25** **BANK\_LIST\*** **ANALYZE\_REQUEST::bank\_list** [inherited]

List of banks for event

Definition at line 1041 of file midas.h.

**2.5.2.26** **DWORD** **HISTORY::base\_time** [inherited]

Definition at line 1120 of file midas.h.

**2.5.2.27** **INT**(\* **DEVICE\_DRIVER::bd**)(**INT** cmd,...) [inherited]

Bus driver entry point

**2.5.2.28** **INT**(\* **BUS\_DRIVER::bd**)(**INT** cmd,...) [inherited]

Device driver entry point

**2.5.2.29** **void\*** **BUS\_DRIVER::bd\_info** [inherited]

Private info for bus driver

Definition at line 890 of file midas.h.

**2.5.2.30** **INT**(\* **ANA\_MODULE::bor**)(**INT** run\_number) [inherited]

Pointer to begin-of-run routine

**2.5.2.31 char [AR\\_INFO::buffer](#)[NAME\_LENGTH] [inherited]**

Event buffer to send events into

Definition at line 1024 of file midas.h.

**2.5.2.32 char [EQUIPMENT\\_INFO::buffer](#)[NAME\_LENGTH]  
[inherited]**

Event buffer to send events into

Definition at line 905 of file midas.h.

Referenced by register\_equipment().

**2.5.2.33 void\* [BUFFER::buffer\\_data](#) [inherited]**

pointer to buffer data

Definition at line 837 of file midas.h.

Referenced by bm\_open\_buffer().

**2.5.2.34 HANDLE [ANALYZE\\_REQUEST::buffer\\_handle](#) [inherited]**

MIDAS buffer handle

Definition at line 1046 of file midas.h.

**2.5.2.35 HANDLE [eqpmnt::buffer\\_handle](#) [inherited]**

MIDAS buffer handle

Definition at line 941 of file midas.h.

Referenced by interrupt\_routine(), register\_equipment(), and scheduler().

**2.5.2.36 [BUFFER\\_HEADER\\*](#) [BUFFER::buffer\\_header](#) [inherited]**

pointer to buffer header

Definition at line 836 of file midas.h.

Referenced by bm\_close\_buffer(), bm\_empty\_buffers(), bm\_push\_cache(), bm\_open\_buffer(), bm\_push\_event(), bm\_receive\_event(), bm\_remove\_event\_request(), bm\_send\_event(), bm\_skip\_event(), cm\_cleanup(), and cm\_set\_watchdog\_params().

**2.5.2.37 DWORD [eqpmnt::bytes\\_sent](#) [inherited]**

number of bytes sent

Definition at line 947 of file midas.h.

Referenced by interrupt\_routine(), scan\_fragment(), scheduler(), send\_event(), source\_scan(), and tr\_stop().

#### 2.5.2.38 **BOOL BUFFER::callback** [inherited]

callback defined for this buffer

Definition at line 849 of file midas.h.

Referenced by bm\_open\_buffer(), and bm\_push\_event().

#### 2.5.2.39 **INT(\* eqpmnt::cd)(INT cmd, PEQUIPMENT)** [inherited]

Class driver routine

Referenced by main(), register\_equipment(), and scheduler().

#### 2.5.2.40 **void\* eqpmnt::cd\_info** [inherited]

private data for class driver

Definition at line 935 of file midas.h.

#### 2.5.2.41 **INT DEVICE\_DRIVER::channels** [inherited]

Number of channels

Definition at line 896 of file midas.h.

#### 2.5.2.42 **INT ALARM::check\_interval** [inherited]

Definition at line 1240 of file midas.h.

Referenced by al\_trigger\_alarm().

#### 2.5.2.43 **DWORD PROGRAM\_INFO::check\_interval** [inherited]

Definition at line 1175 of file midas.h.

#### 2.5.2.44 **DWORD ALARM::checked\_last** [inherited]

Definition at line 1241 of file midas.h.

Referenced by al\_trigger\_alarm().

**2.5.2.45** `BUFFER_CLIENT` `BUFFER_HEADER::client`[MAX\_CLIENTS]  
[inherited]

entries for clients

Definition at line 827 of file midas.h.

Referenced by `bm_close_buffer()`, `bm_push_cache()`, `bm_open_buffer()`, `bm_push_event()`, `bm_receive_event()`, `bm_send_event()`, `bm_skip_event()`, `cm_cleanup()`, and `cm_set_watchdog_params()`.

**2.5.2.46** `INT` `BUFFER::client_index` [inherited]

index to CLIENT str. in buf.

Definition at line 835 of file midas.h.

Referenced by `bm_close_buffer()`, `bm_empty_buffers()`, `bm_push_cache()`, `bm_open_buffer()`, `bm_push_event()`, `bm_receive_event()`, `bm_remove_event_request()`, `bm_send_event()`, `bm_skip_event()`, `cm_cleanup()`, and `cm_set_watchdog_params()`.

**2.5.2.47** `char` `AR_INFO::client_name`[NAME\_LENGTH] [inherited]

Analyzer name

Definition at line 1026 of file midas.h.

**2.5.2.48** `char` `ALARM::condition`[256] [inherited]

Definition at line 1244 of file midas.h.

**2.5.2.49** `DWORD` `ANA_TEST::count` [inherited]

Definition at line 1067 of file midas.h.

**2.5.2.50** `INT` `KEY::data` [inherited]

Address of variable (offset)

Definition at line 857 of file midas.h.

Referenced by `db_create_key()`, `db_delete_key1()`, `db_enum_key()`, `db_find_key()`, `db_get_data()`, `db_get_data_index()`, `db_get_key_info()`, `db_get_value()`, `db_open_database()`, `db_set_data()`, `db_set_data_index()`, and `db_set_value()`.

**2.5.2.51** `float` `BUFFER_CLIENT::data_rate` [inherited]

data rate in kB/sec

Definition at line 805 of file midas.h.

**2.5.2.52** `DWORD HIST_RECORD::data_size` [inherited]

Definition at line 1097 of file midas.h.

**2.5.2.53** `DWORD BANK32::data_size` [inherited]

- 

Definition at line 977 of file midas.h.

Referenced by `bk_close()`, `bk_create()`, `bk_end()`, `bk_locate()`, and `bk_swap()`.

**2.5.2.54** `WORD BANK::data_size` [inherited]

- 

Definition at line 971 of file midas.h.

Referenced by `bk_close()`, `bk_create()`, `bk_end()`, `bk_iterate()`, `bk_locate()`, and `bk_swap()`.

**2.5.2.55** `DWORD EVENT_HEADER::data_size` [inherited]

size of event in bytes w/o header

Definition at line 734 of file midas.h.

Referenced by `bm_compose_event()`, `bm_push_cache()`, `bm_push_event()`, `bm_receive_event()`, `cm_msg()`, `cm_msg1()`, `eb_user()`, `interrupt_routine()`, `scheduler()`, `send_event()`, and `update_odb()`.

**2.5.2.56** `INT(* DEVICE_DRIVER::dd)(INT cmd,...)` [inherited]

Device driver entry point

**2.5.2.57** `void* DEVICE_DRIVER::dd_info` [inherited]

Private info for device driver

Definition at line 899 of file midas.h.

**2.5.2.58** `DWORD HISTORY::def_fh` [inherited]

Definition at line 1119 of file midas.h.

**2.5.2.59** `HNDLE BANK_LIST::def_key` [inherited]

- 

Definition at line 994 of file midas.h.

**2.5.2.60** `DWORD HISTORY::def_offset` [inherited]

Definition at line 1121 of file midas.h.

**2.5.2.61** `DWORD DEF_RECORD::def_offset` [inherited]

Definition at line 1103 of file midas.h.

**2.5.2.62** `DWORD HIST_RECORD::def_offset` [inherited]

Definition at line 1096 of file midas.h.

**2.5.2.63** `void(* EVENT_REQUEST::dispatch)(HNDLE, HNDLE, EVENT_HEADER *, void *)` [inherited]**2.5.2.64** `char ALARM_CLASS::display_bgcolor[32]` [inherited]

Definition at line 1215 of file midas.h.

**2.5.2.65** `char ALARM_CLASS::display_fgcolor[32]` [inherited]

Definition at line 1216 of file midas.h.

**2.5.2.66** `DEVICE_DRIVER* eqpmnt::driver` [inherited]

Device driver list

Definition at line 933 of file midas.h.

**2.5.2.67** `BOOL AR_INFO::enabled` [inherited]

Enable tag

Definition at line 1025 of file midas.h.



**2.5.2.68** **BOOL** **ANA\_MODULE::enabled** [inherited]

Enabled flag

Definition at line 1016 of file midas.h.

**2.5.2.69** **BOOL** **EQUIPMENT\_INFO::enabled** [inherited]

Enable flag

Definition at line 909 of file midas.h.

Referenced by register\_equipment(), scheduler(), send\_all\_periodic\_events(), and tr\_start().

**2.5.2.70** **INT**(\* **ANA\_MODULE::eor**)(**INT** **run\_number**) [inherited]

Pointer to end-of-run routine

**2.5.2.71** **INT** **EQUIPMENT\_INFO::eq\_type** [inherited]

One of EQ\_XXX

Definition at line 906 of file midas.h.

Referenced by register\_equipment(), scheduler(), and send\_event().

**2.5.2.72** **void\*** **eqpmnt::event\_descrip** [inherited]

Init string for fixed events or bank list

Definition at line 934 of file midas.h.

**2.5.2.73** **DWORD** **HIST\_RECORD::event\_id** [inherited]

Definition at line 1094 of file midas.h.

**2.5.2.74** **short int** **EVENT\_REQUEST::event\_id** [inherited]

event ID

Definition at line 787 of file midas.h.

Referenced by bm\_push\_cache(), bm\_push\_event(), bm\_receive\_event(), and bm\_send\_event().

**2.5.2.75** **double** **EQUIPMENT\_INFO::event\_limit** [inherited]

Stop run when limit is reached

Definition at line 912 of file midas.h.

Referenced by register\_equipment(), and scheduler().

**2.5.2.76** char **HISTORY::event\_name**[NAME\_LENGTH] [inherited]

Definition at line 1114 of file midas.h.

**2.5.2.77** char **DEF\_RECORD::event\_name**[NAME\_LENGTH]  
[inherited]

Definition at line 1102 of file midas.h.

**2.5.2.78** **EVENT\_REQUEST** **BUFFER\_CLIENT::event\_request**[MAX\_  
EVENT\_REQUESTS] [inherited]

Definition at line 813 of file midas.h.

Referenced by bm\_push\_cache(), bm\_push\_event(), bm\_receive\_event(), bm\_remove\_event\_request(), and bm\_send\_event().

**2.5.2.79** double **AR\_STATS::events\_per\_sec** [inherited]

Definition at line 1032 of file midas.h.

**2.5.2.80** double **EQUIPMENT\_STATS::events\_per\_sec** [inherited]

Definition at line 922 of file midas.h.

Referenced by register\_equipment(), scan\_fragment(), and scheduler().

**2.5.2.81** **DWORD** **ANALYZE\_REQUEST::events\_received** [inherited]

number of events sent

Definition at line 1056 of file midas.h.

**2.5.2.82** **DWORD** **eqpmnt::events\_sent** [inherited]

number of events sent

Definition at line 948 of file midas.h.

Referenced by display(), interrupt\_routine(), scan\_fragment(), scheduler(), send\_event(), source\_scan(), and tr\_stop().

**2.5.2.83** `DWORD ANALYZE_REQUEST::events_written` [inherited]

number of events written

Definition at line 1057 of file midas.h.

**2.5.2.84** `double AR_STATS::events_written` [inherited]

Definition at line 1033 of file midas.h.

**2.5.2.85** `char ALARM_CLASS::execute_command[256]` [inherited]

Definition at line 1211 of file midas.h.

**2.5.2.86** `INT ALARM_CLASS::execute_interval` [inherited]

Definition at line 1212 of file midas.h.

**2.5.2.87** `DWORD ALARM_CLASS::execute_last` [inherited]

Definition at line 1213 of file midas.h.

**2.5.2.88** `INT(*ANA_MODULE::exit)()` [inherited]

Pointer to exit routine

**2.5.2.89** `DWORD PROGRAM_INFO::first_failed` [inherited]

Definition at line 1181 of file midas.h.

**2.5.2.90** `INT KEYLIST::first_key` [inherited]

Address of first key

Definition at line 870 of file midas.h.

Referenced by db\_create\_key(), db\_delete\_key1(), db\_enum\_key(), db\_find\_key(), and db\_open\_database().

**2.5.2.91** `DWORD BANK_HEADER::mag` [inherited]

internal mag

Definition at line 965 of file midas.h.

Referenced by bk\_swap().

**2.5.2.92** **DWORD** **DEVICE\_DRIVER::flags** [inherited]

Combination of DF\_xx

Definition at line 898 of file midas.h.

**2.5.2.93** **INT** **eqpmnt::format** [inherited]

FORMAT\_xxx

Definition at line 940 of file midas.h.

Referenced by register\_equipment(), and scheduler().

**2.5.2.94** **char** **EQUIPMENT\_INFO::format[8]** [inherited]

Data format to produce

Definition at line 908 of file midas.h.

Referenced by load\_fragment(), and register\_equipment().

**2.5.2.95** **char** **EQUIPMENT\_INFO::frontend\_file\_name[256]** [inherited]

Source file used for user FE

Definition at line 917 of file midas.h.

Referenced by register\_equipment().

**2.5.2.96** **char** **EQUIPMENT\_INFO::frontend\_host[NAME\_LENGTH]**  
[inherited]

Host on which FE is running

Definition at line 915 of file midas.h.

Referenced by register\_equipment().

**2.5.2.97** **char** **EQUIPMENT\_INFO::frontend\_name[NAME\_LENGTH]**  
[inherited]

Frontend name

Definition at line 916 of file midas.h.

Referenced by register\_equipment().

**2.5.2.98** **DWORD** **HISTORY::hist\_fh** [inherited]

Definition at line 1117 of file midas.h.

**2.5.2.99** void\* **ANA\_MODULE::histo\_folder** [inherited]

Definition at line 1017 of file midas.h.

**2.5.2.100** INT **EQUIPMENT\_INFO::history** [inherited]

Log history

Definition at line 914 of file midas.h.

Referenced by interrupt\_routine(), scheduler(), and send\_event().

**2.5.2.101** HANDLE **ANALYZE\_REQUEST::hkey\_common** [inherited]

Key to common subtree

Definition at line 1049 of file midas.h.

**2.5.2.102** HANDLE **ANALYZE\_REQUEST::hkey\_variables** [inherited]

Key to variables subtree in ODB

Definition at line 1048 of file midas.h.

**2.5.2.103** HANDLE **eqpmnt::hkey\_variables** [inherited]

Key to variables subtree in ODB

Definition at line 942 of file midas.h.

Referenced by register\_equipment(), and scheduler().

**2.5.2.104** char **AR\_INFO::host**[NAME\_LENGTH] [inherited]

Host on which analyzer is running

Definition at line 1027 of file midas.h.

**2.5.2.105** INT **BUFFER::index** [inherited]

connection index / tid

Definition at line 848 of file midas.h.

Referenced by bm\_open\_buffer().

**2.5.2.106** **DWORD HISTORY::index\_fh** [inherited]

Definition at line 1118 of file midas.h.

**2.5.2.107** **EQUIPMENT\_INFO eqpmnt::info** [inherited]

From above

Definition at line 930 of file midas.h.

Referenced by interrupt\_routine(), load\_fragment(), main(), register\_equipment(), scan\_fragment(), scheduler(), send\_all\_periodic\_events(), send\_event(), and tr\_start().

**2.5.2.108** **INT(\* ANA\_MODULE::init)()** [inherited]

Pointer to init routine

**2.5.2.109** **char\*\* ANA\_MODULE::init\_str** [inherited]

Parameter init string

Definition at line 1015 of file midas.h.

**2.5.2.110** **char\*\* BANK\_LIST::init\_str** [inherited]

•

Definition at line 990 of file midas.h.

Referenced by register\_equipment().

**2.5.2.111** **char\*\* ANALYZE\_REQUEST::init\_string** [inherited]

Definition at line 1044 of file midas.h.

**2.5.2.112** **INT KEY::item\_size** [inherited]

Size of single data item

Definition at line 859 of file midas.h.

Referenced by db\_copy(), db\_create\_key(), db\_get\_data(), db\_get\_data\_index(), db\_get\_key\_info(), db\_get\_record(), db\_get\_record\_size(), db\_get\_value(), db\_open\_database(), db\_save\_xml\_key(), db\_set\_data(), db\_set\_data\_index(), db\_set\_record(), db\_set\_value(), and update\_odb().

**2.5.2.113 double EQUIPMENT\_STATS::kbytes\_per\_sec** [inherited]

Definition at line 923 of file midas.h.

Referenced by register\_equipment(), scan\_fragment(), and scheduler().

**2.5.2.114 DWORD BUFFER\_CLIENT::last\_activity** [inherited]

time of last activity

Definition at line 810 of file midas.h.

Referenced by bm\_open\_buffer(), cm\_cleanup(), and cm\_set\_watchdog\_params().

**2.5.2.115 DWORD eqpmnt::last\_called** [inherited]

Last time event was read

Definition at line 937 of file midas.h.

Referenced by interrupt\_routine(), scheduler(), and send\_event().

**2.5.2.116 DWORD eqpmnt::last\_idle** [inherited]

Last time idle func was called

Definition at line 938 of file midas.h.

Referenced by scheduler().

**2.5.2.117 INT KEY::last\_written** [inherited]

Time of last write action

Definition at line 864 of file midas.h.

Referenced by db\_get\_key\_time(), db\_set\_data(), db\_set\_data\_index(), and db\_set\_value().

**2.5.2.118 INT BUFFER\_HEADER::max\_client\_index** [inherited]

index of last client

Definition at line 820 of file midas.h.

Referenced by bm\_close\_buffer(), bm\_open\_buffer(), and cm\_cleanup().

**2.5.2.119 INT BUFFER\_CLIENT::max\_request\_index** [inherited]

index of last request

Definition at line 801 of file midas.h.

Referenced by `bm_remove_event_request()`.

#### 2.5.2.120 **HNDLE BUFFER::mutex** [inherited]

mutex/semaphore handle

Definition at line 846 of file `midas.h`.

#### 2.5.2.121 **DWORD BANK\_LIST::n\_data** [inherited]

•

Definition at line 993 of file `midas.h`.

#### 2.5.2.122 **DWORD TAG::n\_data** [inherited]

•

Definition at line 983 of file `midas.h`.

#### 2.5.2.123 **DWORD HISTORY::n\_tag** [inherited]

Definition at line 1115 of file `midas.h`.

#### 2.5.2.124 **char KEY::name**[NAME\_LENGTH] [inherited]

name of variable

Definition at line 856 of file `midas.h`.

Referenced by `cm_check_client()`, `cm_shutdown()`, `cm_transition()`, `db_check_record()`, `db_copy()`, `db_create_key()`, `db_find_key()`, `db_get_data()`, `db_get_data_index()`, `db_get_key_info()`, `db_get_record()`, `db_open_database()`, `db_save_struct()`, `db_save_xml_key()`, `db_set_data()`, `db_set_data_index()`, `db_set_record()`, and `load_fragment()`.

#### 2.5.2.125 **INT KEY::next\_key** [inherited]

Address of next key

Definition at line 862 of file `midas.h`.

Referenced by `db_create_key()`, `db_delete_key1()`, `db_enum_key()`, and `db_find_key()`.



**2.5.2.126 WORD KEY::notify\_count** [inherited]

Notify counter

Definition at line 861 of file midas.h.

Referenced by cm\_cleanup(), db\_delete\_key1(), and db\_open\_database().

**2.5.2.127 INT BUFFER\_HEADER::num\_clients** [inherited]

no of active clients

Definition at line 819 of file midas.h.

Referenced by bm\_close\_buffer(), bm\_open\_buffer(), and cm\_cleanup().

**2.5.2.128 INT BUFFER\_HEADER::num\_in\_events** [inherited]

no of received events

Definition at line 824 of file midas.h.

Referenced by bm\_push\_cache(), and bm\_send\_event().

**2.5.2.129 INT KEYLIST::num\_keys** [inherited]

number of keys

Definition at line 869 of file midas.h.

Referenced by db\_create\_key(), db\_delete\_key1(), db\_enum\_key(), db\_find\_key(), db\_get\_key\_info(), and db\_open\_database().

**2.5.2.130 INT BUFFER\_HEADER::num\_out\_events** [inherited]

no of distributed events

Definition at line 825 of file midas.h.

Referenced by bm\_push\_event(), and bm\_receive\_event().

**2.5.2.131 INT BUFFER\_CLIENT::num\_received\_events** [inherited]

no of received events

Definition at line 802 of file midas.h.

**2.5.2.132 INT BUFFER\_CLIENT::num\_sent\_events** [inherited]

no of sent events

Definition at line 803 of file midas.h.

**2.5.2.133** **DWORD** [EQUIPMENT\\_INFO::num\\_subevents](#) [inherited]

Number of events in super event

Definition at line 913 of file midas.h.

Referenced by scheduler().

**2.5.2.134** **INT** [KEY::num\\_values](#) [inherited]

number of values

Definition at line 855 of file midas.h.

Referenced by cm\_register\_transition(), cm\_transition(), db\_check\_record(), db\_copy(), db\_create\_key(), db\_get\_data(), db\_get\_data\_index(), db\_get\_key\_info(), db\_get\_record(), db\_get\_record\_size(), db\_get\_value(), db\_open\_database(), db\_save\_xml\_key(), db\_set\_data(), db\_set\_data\_index(), db\_set\_record(), db\_set\_value(), tr\_start(), and update\_odb().

**2.5.2.135** **INT** [BUFFER\\_CLIENT::num\\_waiting\\_events](#) [inherited]

no of waiting events

Definition at line 804 of file midas.h.

Referenced by bm\_send\_event().

**2.5.2.136** **struct { ... }** [ANALYZE\\_REQUEST::number](#) [inherited]

Buffer for event number for CWNT

**2.5.2.137** **DWORD** [eqpmnt::odb\\_in](#) [inherited]

# updated ODB -> FE

Definition at line 946 of file midas.h.

Referenced by tr\_start().

**2.5.2.138** **DWORD** [eqpmnt::odb\\_out](#) [inherited]

# updates FE -> ODB

Definition at line 945 of file midas.h.

Referenced by interrupt\_routine(), scheduler(), send\_event(), and tr\_start().

**2.5.2.139** **DWORD** [INDEX\\_RECORD::offset](#) [inherited]

Definition at line 1109 of file midas.h.

**2.5.2.140 INT RUNINFO::online\_mode** [inherited]

Mode of operation online/offline

Definition at line 1137 of file midas.h.

Referenced by ana\_end\_of\_run().

**2.5.2.141 BOOL BANK\_LIST::output\_flag** [inherited]

•

Definition at line 991 of file midas.h.

**2.5.2.142 INT ANA\_MODULE::param\_size** [inherited]

Size of parameter structure

Definition at line 1014 of file midas.h.

**2.5.2.143 void\* ANA\_MODULE::parameters** [inherited]

Pointer to parameter structure

Definition at line 1013 of file midas.h.

**2.5.2.144 INT KEY::parent\_keylist** [inherited]

keylist to which this key belongs

Definition at line 863 of file midas.h.

Referenced by db\_create\_key(), db\_delete\_key1(), db\_enum\_key(), db\_find\_key(), and db\_open\_database().

**2.5.2.145 INT EQUIPMENT\_INFO::period** [inherited]

Readout interval/Polling time in ms

Definition at line 911 of file midas.h.

Referenced by register\_equipment(), and scheduler().

**2.5.2.146 INT BUFFER\_CLIENT::pid** [inherited]

process ID

Definition at line 796 of file midas.h.

Referenced by `bm_close_buffer()`, `bm_push_cache()`, `bm_open_buffer()`, `bm_push_event()`, `bm_receive_event()`, `bm_send_event()`, and `cm_cleanup()`.

**2.5.2.147** **DWORD** `eqpmnt::poll_count` [inherited]

Needed to poll 'period'

Definition at line 939 of file `midas.h`.

Referenced by `register_equipment()`, and `scheduler()`.

**2.5.2.148** **INT** `BUFFER_CLIENT::port` [inherited]

UDP port for wake up

Definition at line 799 of file `midas.h`.

Referenced by `bm_close_buffer()`, `bm_push_cache()`, `bm_open_buffer()`, `bm_push_event()`, `bm_receive_event()`, `bm_send_event()`, and `cm_cleanup()`.

**2.5.2.149** **DWORD** `ANA_TEST::previous_count` [inherited]

Definition at line 1068 of file `midas.h`.

**2.5.2.150** **char\*** `BUFFER::read_cache` [inherited]

cache for burst read

Definition at line 838 of file `midas.h`.

Referenced by `bm_push_event()`, `bm_receive_event()`, and `bm_set_cache_size()`.

**2.5.2.151** **INT** `BUFFER::read_cache_rp` [inherited]

cache read pointer

Definition at line 840 of file `midas.h`.

Referenced by `bm_empty_buffers()`, `bm_push_event()`, `bm_receive_event()`, `bm_set_cache_size()`, and `bm_skip_event()`.

**2.5.2.152** **INT** `BUFFER::read_cache_size` [inherited]

cache size in bytes

Definition at line 839 of file `midas.h`.

Referenced by `bm_push_event()`, `bm_receive_event()`, and `bm_set_cache_size()`.

**2.5.2.153 INT BUFFER::read\_cache\_wp** [inherited]

cache write pointer

Definition at line 841 of file midas.h.

Referenced by bm\_empty\_buffers(), bm\_push\_event(), bm\_receive\_event(), bm\_set\_cache\_size(), and bm\_skip\_event().

**2.5.2.154 INT EQUIPMENT\_INFO::read\_on** [inherited]

Combination of Read-On flags RO\_XXX

Definition at line 910 of file midas.h.

Referenced by interrupt\_routine(), scheduler(), send\_all\_periodic\_events(), and send\_event().

**2.5.2.155 INT BUFFER\_HEADER::read\_pointer** [inherited]

read pointer

Definition at line 822 of file midas.h.

Referenced by bm\_push\_cache(), bm\_push\_event(), bm\_receive\_event(), and bm\_send\_event().

**2.5.2.156 INT BUFFER\_CLIENT::read\_pointer** [inherited]

read pointer to buffer

Definition at line 800 of file midas.h.

Referenced by bm\_empty\_buffers(), bm\_push\_cache(), bm\_open\_buffer(), bm\_push\_event(), bm\_receive\_event(), bm\_send\_event(), and bm\_skip\_event().

**2.5.2.157 BOOL BUFFER\_CLIENT::read\_wait** [inherited]

wait for read - flag

Definition at line 806 of file midas.h.

Referenced by bm\_close\_buffer(), bm\_push\_cache(), bm\_receive\_event(), bm\_send\_event(), and cm\_cleanup().

**2.5.2.158 INT(\* eqpmnt::readout)(char \*, INT)** [inherited]

Pointer to user readout routine

Referenced by interrupt\_routine(), scheduler(), and send\_event().

**2.5.2.159** **BOOL** **ANA\_TEST::registered** [inherited]

Definition at line 1066 of file midas.h.

**2.5.2.160** **HNDLE** **ANALYZE\_REQUEST::request\_id** [inherited]

Event request handle

Definition at line 1047 of file midas.h.

**2.5.2.161** **INT** **RUNINFO::requested\_transition** [inherited]

Deferred transition request

Definition at line 1140 of file midas.h.

**2.5.2.162** **DWORD** { ... } **::run** [inherited]

Definition at line 1052 of file midas.h.

**2.5.2.163** **INT** **RUNINFO::run\_number** [inherited]

Current processing run number

Definition at line 1138 of file midas.h.

Referenced by ana\_end\_of\_run().

**2.5.2.164** **INT** **ANALYZE\_REQUEST::rwnt\_buffer\_size** [inherited]

Size in events of RW N-tuple buf

Definition at line 1042 of file midas.h.

**2.5.2.165** **INT** **AR\_INFO::sampling\_type** [inherited]

GET\_ALL/GET\_SOME

Definition at line 1023 of file midas.h.

**2.5.2.166** **INT** **EVENT\_REQUEST::sampling\_type** [inherited]

GET\_ALL, GET\_SOME, GET\_FARM dispatch function

Definition at line 789 of file midas.h.

Referenced by bm\_push\_cache(), bm\_remove\_event\_request(), and bm\_send\_event().

**2.5.2.167** **DWORD { ... } ::serial** [inherited]

Definition at line 1053 of file midas.h.

**2.5.2.168** **DWORD ANALYZE\_REQUEST::serial** [inherited]

Definition at line 1053 of file midas.h.

**2.5.2.169** **DWORD eqpmnt::serial\_number** [inherited]

event serial number

Definition at line 943 of file midas.h.

Referenced by interrupt\_routine(), scheduler(), send\_event(), and tr\_start().

**2.5.2.170** **DWORD EVENT\_HEADER::serial\_number** [inherited]

serial number starting from one

Definition at line 732 of file midas.h.

Referenced by bm\_compose\_event(), bm\_receive\_event(), interrupt\_routine(), scheduler(), and send\_event().

**2.5.2.171** **INT BUFFER::shm\_handle** [inherited]

handle to shared memory

Definition at line 847 of file midas.h.

Referenced by bm\_close\_buffer(), and bm\_open\_buffer().

**2.5.2.172** **DWORD BANK\_LIST::size** [inherited]

•

Definition at line 989 of file midas.h.

**2.5.2.173** **INT BUFFER\_HEADER::size** [inherited]

size of data area in bytes

Definition at line 821 of file midas.h.

Referenced by bm\_push\_cache(), bm\_open\_buffer(), bm\_push\_event(), bm\_receive\_event(), and bm\_send\_event().

**2.5.2.174 INT EQUIPMENT\_INFO::source** [inherited]

Event source (LAM/IRQ)

Definition at line 907 of file midas.h.

Referenced by main(), register\_equipment(), and scheduler().

**2.5.2.175 char PROGRAM\_INFO::start\_command[256]** [inherited]

Definition at line 1176 of file midas.h.

Referenced by cm\_transition().

**2.5.2.176 char RUNINFO::start\_time[32]** [inherited]

ASCII of the last start time

Definition at line 1141 of file midas.h.

Referenced by ana\_end\_of\_run().

**2.5.2.177 DWORD RUNINFO::start\_time\_binary** [inherited]

Bin of the last start time

Definition at line 1142 of file midas.h.

**2.5.2.178 EQUIPMENT\_STATS eqpmnt::stats** [inherited]

Definition at line 949 of file midas.h.

Referenced by close\_buffers(), register\_equipment(), scan\_fragment(), scheduler(), tr\_start(), and tr\_stop().

**2.5.2.179 INT ANALYZE\_REQUEST::status** [inherited]

One of FE\_XXX

Definition at line 1045 of file midas.h.

**2.5.2.180 INT eqpmnt::status** [inherited]

One of FE\_XXX

Definition at line 936 of file midas.h.

Referenced by display(), main(), register\_equipment(), scheduler(), and send\_all\_periodic\_events().



**2.5.2.181** **BOOL** **ALARM\_CLASS::stop\_run** [inherited]

Definition at line 1214 of file midas.h.

**2.5.2.182** **char** **RUNINFO::stop\_time**[32] [inherited]

ASCII of the last stop time

Definition at line 1143 of file midas.h.

**2.5.2.183** **DWORD** **RUNINFO::stop\_time\_binary** [inherited]

ASCII of the last stop time

Definition at line 1144 of file midas.h.

**2.5.2.184** **DWORD** **eqpmnt::subevent\_number** [inherited]

subevent number

Definition at line 944 of file midas.h.

Referenced by scheduler(), and tr\_start().

**2.5.2.185** **INT** **ALARM\_CLASS::system\_message\_interval** [inherited]

Definition at line 1209 of file midas.h.

**2.5.2.186** **DWORD** **ALARM\_CLASS::system\_message\_last** [inherited]

Definition at line 1210 of file midas.h.

**2.5.2.187** **TAG\*** **HISTORY::tag** [inherited]

Definition at line 1116 of file midas.h.

**2.5.2.188** **INT** **BUFFER\_CLIENT::thandle** [inherited]

thread handle

Definition at line 798 of file midas.h.

Referenced by bm\_open\_buffer().

**2.5.2.189** **INT** **BUFFER\_CLIENT::tid** [inherited]

thread ID

Definition at line 797 of file midas.h.

Referenced by `bm_open_buffer()`, `bm_push_event()`, and `bm_receive_event()`.

#### 2.5.2.190 **DWORD INDEX\_RECORD::time** [inherited]

Definition at line 1108 of file midas.h.

#### 2.5.2.191 **DWORD HIST\_RECORD::time** [inherited]

Definition at line 1095 of file midas.h.

#### 2.5.2.192 **DWORD { ... } ::time** [inherited]

Definition at line 1054 of file midas.h.

#### 2.5.2.193 **DWORD ANALYZE\_REQUEST::time** [inherited]

Definition at line 1054 of file midas.h.

#### 2.5.2.194 **DWORD EVENT\_HEADER::time\_stamp** [inherited]

time of production of event

Definition at line 733 of file midas.h.

Referenced by `bm_compose_event()`, `bm_receive_event()`, `interrupt_routine()`, `scheduler()`, and `send_event()`.

#### 2.5.2.195 **char ALARM::time\_triggered\_first[32]** [inherited]

Definition at line 1242 of file midas.h.

Referenced by `al_trigger_alarm()`.

#### 2.5.2.196 **char ALARM::time\_triggered\_last[32]** [inherited]

Definition at line 1243 of file midas.h.

Referenced by `al_trigger_alarm()`.

#### 2.5.2.197 **INT KEY::total\_size** [inherited]

Total size of data block

Definition at line 858 of file midas.h.

Referenced by db\_copy(), db\_create\_key(), db\_delete\_key1(), db\_open\_database(), db\_save\_xml\_key(), db\_set\_data(), db\_set\_data\_index(), db\_set\_record(), db\_set\_value(), and tr\_start().

#### 2.5.2.198 INT RUNINFO::transition\_in\_progress [inherited]

Intermediate state during transition

Definition at line 1139 of file midas.h.

#### 2.5.2.199 INT AR\_INFO::trigger\_mask [inherited]

Trigger mask

Definition at line 1022 of file midas.h.

#### 2.5.2.200 WORD EQUIPMENT\_INFO::trigger\_mask [inherited]

Trigger mask

Definition at line 904 of file midas.h.

Referenced by interrupt\_routine(), scheduler(), send\_event(), and source\_scan().

#### 2.5.2.201 short int EVENT\_REQUEST::trigger\_mask [inherited]

trigger mask

Definition at line 788 of file midas.h.

Referenced by bm\_push\_cache(), bm\_push\_event(), bm\_receive\_event(), and bm\_send\_event().

#### 2.5.2.202 short int EVENT\_HEADER::trigger\_mask [inherited]

hardware trigger mask

Definition at line 731 of file midas.h.

Referenced by bm\_compose\_event(), bm\_match\_event(), bm\_receive\_event(), interrupt\_routine(), scheduler(), and send\_event().

#### 2.5.2.203 INT ALARM::triggered [inherited]

Definition at line 1238 of file midas.h.

Referenced by al\_trigger\_alarm().

**2.5.2.204 INT ALARM::type** [inherited]

Definition at line 1239 of file midas.h.

Referenced by al\_trigger\_alarm().

**2.5.2.205 WORD BANK\_LIST::type** [inherited]

•

Definition at line 988 of file midas.h.

Referenced by register\_equipment().

**2.5.2.206 DWORD TAG::type** [inherited]

•

Definition at line 982 of file midas.h.

**2.5.2.207 DWORD BANK32::type** [inherited]

•

Definition at line 976 of file midas.h.

Referenced by bk\_close(), bk\_create(), bk\_end(), bk\_locate(), bk\_swap(), and update\_odb().

**2.5.2.208 WORD BANK::type** [inherited]

•

Definition at line 970 of file midas.h.

Referenced by bk\_close(), bk\_create(), bk\_end(), bk\_locate(), bk\_swap(), and update\_odb().

**2.5.2.209 BOOL ANALYZE\_REQUEST::use\_tests** [inherited]

Use tests for this event

Definition at line 1043 of file midas.h.

**2.5.2.210** **BOOL** **EVENT\_REQUEST::valid** [inherited]

indicating a valid entry

Definition at line 786 of file midas.h.

Referenced by bm\_push\_cache(), bm\_push\_event(), bm\_receive\_event(), bm\_remove\_event\_request(), and bm\_send\_event().

**2.5.2.211** **BOOL** **ANA\_TEST::value** [inherited]

Definition at line 1069 of file midas.h.

**2.5.2.212** **BOOL** **BUFFER\_CLIENT::wake\_up** [inherited]

client got a wake-up msg

Definition at line 808 of file midas.h.

**2.5.2.213** **INT** **PROGRAM\_INFO::watchdog\_timeout** [inherited]

Definition at line 1174 of file midas.h.

**2.5.2.214** **DWORD** **BUFFER\_CLIENT::watchdog\_timeout** [inherited]

timeout in ms

Definition at line 811 of file midas.h.

Referenced by bm\_open\_buffer(), cm\_cleanup(), and cm\_set\_watchdog\_params().

**2.5.2.215** **char\*** **BUFFER::write\_cache** [inherited]

cache for burst read

Definition at line 842 of file midas.h.

Referenced by bm\_push\_cache(), bm\_send\_event(), and bm\_set\_cache\_size().

**2.5.2.216** **INT** **BUFFER::write\_cache\_rp** [inherited]

cache read pointer

Definition at line 844 of file midas.h.

Referenced by bm\_push\_cache(), and bm\_set\_cache\_size().

**2.5.2.217** **INT** **BUFFER::write\_cache\_size** [inherited]

cache size in bytes

Definition at line 843 of file midas.h.

Referenced by `bm_push_cache()`, `bm_send_event()`, and `bm_set_cache_size()`.

#### 2.5.2.218 INT BUFFER::write\_cache\_wp [inherited]

cache write pointer

Definition at line 845 of file midas.h.

Referenced by `bm_push_cache()`, `bm_send_event()`, and `bm_set_cache_size()`.

#### 2.5.2.219 BOOL ALARM\_CLASS::write\_eolog\_message [inherited]

Definition at line 1208 of file midas.h.

#### 2.5.2.220 INT BUFFER\_HEADER::write\_pointer [inherited]

read pointer

Definition at line 823 of file midas.h.

Referenced by `bm_push_cache()`, `bm_open_buffer()`, `bm_push_event()`, `bm_receive_event()`, `bm_send_event()`, and `bm_skip_event()`.

#### 2.5.2.221 INT BUFFER\_CLIENT::write\_wait [inherited]

wait for write # bytes

Definition at line 807 of file midas.h.

Referenced by `bm_close_buffer()`, `bm_push_cache()`, `bm_push_event()`, `bm_receive_event()`, `bm_send_event()`, and `cm_cleanup()`.

## 2.6 Midas Define

### Defines

- #define STATE\_STOPPED 1
- #define STATE\_PAUSED 2
- #define STATE\_RUNNING 3
- #define FORMAT\_MIDAS 1
- #define FORMAT\_YBOS 2
- #define FORMAT\_ASCII 3
- #define FORMAT\_FIXED 4
- #define FORMAT\_DUMP 5
- #define FORMAT\_HBOOK 6

- #define [FORMAT\\_ROOT](#) 7
- #define [GET\\_ALL](#) (1<<0)
- #define [GET\\_SOME](#) (1<<1)
- #define [GET\\_FARM](#) (1<<2)
- #define [TID\\_BYTE](#) 1
- #define [TID\\_SBYTE](#) 2
- #define [TID\\_CHAR](#) 3
- #define [TID\\_WORD](#) 4
- #define [TID\\_SHORT](#) 5
- #define [TID\\_DWORD](#) 6
- #define [TID\\_INT](#) 7
- #define [TID\\_BOOL](#) 8
- #define [TID\\_FLOAT](#) 9
- #define [TID\\_DOUBLE](#) 10
- #define [TID\\_BITFIELD](#) 11
- #define [TID\\_STRING](#) 12
- #define [TID\\_ARRAY](#) 13
- #define [TID\\_STRUCT](#) 14
- #define [TID\\_KEY](#) 15
- #define [TID\\_LINK](#) 16
- #define [TID\\_LAST](#) 17
- #define [SYNC](#) 0
- #define [MODE\\_READ](#) (1<<0)
- #define [RPC\\_otimeout](#) 1
- #define [WF\\_WATCH\\_ME](#) (1<<0)
- #define [TR\\_START](#) (1<<0)
- #define [TR\\_STOP](#) (1<<1)
- #define [TR\\_PAUSE](#) (1<<2)
- #define [TR\\_RESUME](#) (1<<3)
- #define [EQ\\_PERIODIC](#) (1<<0)
- #define [EQ\\_POLLED](#) (1<<1)
- #define [EQ\\_INTERRUPT](#) (1<<2)
- #define [EQ\\_SLOW](#) (1<<3)
- #define [EQ\\_MANUAL\\_TRIG](#) (1<<4)
- #define [EQ\\_FRAGMENTED](#) (1<<5)
- #define [EQ\\_EB](#) (1<<6)
- #define [RO\\_RUNNING](#) (1<<0)
- #define [RO\\_STOPPED](#) (1<<1)
- #define [RO\\_PAUSED](#) (1<<2)
- #define [RO\\_BOR](#) (1<<3)
- #define [RO\\_EOR](#) (1<<4)
- #define [RO\\_PAUSE](#) (1<<5)
- #define [RO\\_RESUME](#) (1<<6)

- #define **RO\_TRANSITIONS** (RO\_BOR|RO\_EOR|RO\_PAUSE|RO\_RESUME)
- #define **RO\_ALWAYS** (0xFF)
- #define **RO\_ODB** (1<<8)
- #define **MT\_ERROR** (1<<0)
- #define **MT\_INFO** (1<<1)
- #define **MT\_DEBUG** (1<<2)
- #define **MT\_USER** (1<<3)
- #define **MT\_LOG** (1<<4)
- #define **MT\_TALK** (1<<5)
- #define **MT\_CALL** (1<<6)
- #define **MT\_ALL** 0xFF
- #define **MERROR** MT\_ERROR, \_\_FILE\_\_, \_\_LINE\_\_
- #define **MINFO** MT\_INFO, \_\_FILE\_\_, \_\_LINE\_\_
- #define **MDEBUG** MT\_DEBUG, \_\_FILE\_\_, \_\_LINE\_\_
- #define **MUSER** MT\_USER, \_\_FILE\_\_, \_\_LINE\_\_
- #define **MLOG** MT\_LOG, \_\_FILE\_\_, \_\_LINE\_\_
- #define **MTALK** MT\_TALK, \_\_FILE\_\_, \_\_LINE\_\_
- #define **MCALL** MT\_CALL, \_\_FILE\_\_, \_\_LINE\_\_

### 2.6.1 Define Documentation

#### 2.6.1.1 #define ASYNC 1

Definition at line 295 of file midas.h.

Referenced by `bm_receive_event()`, `cm_transition()`, `handFlush()`, `rpc_send_event()`, `scan_fragment()`, `scheduler()`, and `source_scan()`.

#### 2.6.1.2 #define EQ\_EB (1<<6)

Event run through the event builder

Definition at line 344 of file midas.h.

Referenced by `load_fragment()`, and `register_equipment()`.

#### 2.6.1.3 #define EQ\_FRAGMENTED (1<<5)

Fragmented Event

Definition at line 343 of file midas.h.

Referenced by `send_event()`.



**2.6.1.4 #define EQ\_INTERRUPT (1<<2)**

Interrupt Event

Definition at line 340 of file midas.h.

Referenced by register\_equipment(), and scheduler().

**2.6.1.5 #define EQ\_MANUAL\_TRIG (1<<4)**

Manual triggered Event

Definition at line 342 of file midas.h.

Referenced by register\_equipment().

**2.6.1.6 #define EQ\_PERIODIC (1<<0)**

Equipment types Periodic Event

Definition at line 338 of file midas.h.

Referenced by scheduler().

**2.6.1.7 #define EQ\_POLLED (1<<1)**

Polling Event

Definition at line 339 of file midas.h.

Referenced by register\_equipment(), and scheduler().

**2.6.1.8 #define EQ\_SLOW (1<<3)**

Slow Control Event

Definition at line 341 of file midas.h.

Referenced by main(), register\_equipment(), scheduler(), and send\_event().

**2.6.1.9 #define EVENTID\_ALL -1**

Definition at line 458 of file midas.h.

Referenced by bm\_match\_event(), and cm\_msg\_register().

**2.6.1.10 #define FORMAT\_ASCII 3**

ASCII format

Definition at line 259 of file midas.h.

**2.6.1.11 #define FORMAT\_DUMP 5**

Dump (detailed ASCII) format

Definition at line 261 of file midas.h.

**2.6.1.12 #define FORMAT\_FIXED 4**

Fixed length binary records

Definition at line 260 of file midas.h.

Referenced by register\_equipment(), and update\_odb().

**2.6.1.13 #define FORMAT\_HBOOK 6**

CERN hbook (rz) format

Definition at line 262 of file midas.h.

**2.6.1.14 #define FORMAT\_MIDAS 1**

Data format MIDAS banks

Definition at line 257 of file midas.h.

Referenced by load\_fragment(), register\_equipment(), source\_scan(), and update\_odb().

**2.6.1.15 #define FORMAT\_ROOT 7**

CERN ROOT format

Definition at line 263 of file midas.h.

**2.6.1.16 #define FORMAT\_YBOS 2**

YBOS banks

Definition at line 258 of file midas.h.

Referenced by load\_fragment(), register\_equipment(), source\_scan(), and update\_odb().

**2.6.1.17 #define GET\_ALL (1<<0)**

Event Sampling type get all events (consume)

Definition at line 267 of file midas.h.

Referenced by `bm_push_cache()`, `bm_remove_event_request()`, `bm_send_event()`, and `source_booking()`.

#### 2.6.1.18 `#define GET_FARM (1<<2)`

distribute events over several clients (farming)

Definition at line 269 of file `midas.h`.

#### 2.6.1.19 `#define GET_SOME (1<<1)`

get as much as possible (sampling)

Definition at line 268 of file `midas.h`.

Referenced by `cm_msg_register()`.

#### 2.6.1.20 `#define MCALL MT_CALL, __FILE__, __LINE__`

info message for telephone call

Definition at line 478 of file `midas.h`.

#### 2.6.1.21 `#define MDEBUG MT_DEBUG, __FILE__, __LINE__`

•

Definition at line 474 of file `midas.h`.

Referenced by `bm_push_cache()`, `bm_push_event()`, `bm_receive_event()`, `bm_send_event()`, and `cm_transition()`.

#### 2.6.1.22 `#define MERROR MT_ERROR, __FILE__, __LINE__`

•

Definition at line 472 of file `midas.h`.

Referenced by `analyzer_init()`, `bm_close_buffer()`, `bm_push_cache()`, `bm_open_buffer()`, `bm_push_event()`, `bm_receive_event()`, `bm_remove_event_request()`, `bm_request_event()`, `bm_send_event()`, `bm_set_cache_size()`, `bm_skip_event()`, `cm_check_client()`, `cm_check_deferred_transition()`, `cm_cleanup()`, `cm_connect_experiment1()`, `cm_get_watchdog_info()`, `cm_list_experiments()`, `cm_register_deferred_transition()`, `cm_register_transition()`, `cm_set_client_info()`, `cm_set_transition_sequence()`, `cm_shutdown()`, `cm_transition()`, `db_check_record()`, `db_close_database()`, `db_copy()`, `db_copy_xml()`, `db_create_key()`, `db_create_link()`,

db\_create\_record(), db\_delete\_key1(), db\_enum\_key(), db\_find\_key(), db\_get\_data(), db\_get\_data\_index(), db\_get\_key(), db\_get\_key\_info(), db\_get\_key\_time(), db\_get\_record(), db\_get\_value(), db\_load(), db\_lock\_database(), db\_open\_database(), db\_open\_record(), db\_paste(), db\_paste\_node(), db\_protect\_database(), db\_save(), db\_save\_struct(), db\_save\_xml(), db\_save\_xml\_key(), db\_set\_data(), db\_set\_data\_index(), db\_set\_record(), db\_set\_value(), db\_unlock\_database(), handFlush(), interrupt\_routine(), load\_fragment(), main(), register\_equipment(), rpc\_register\_functions(), rpc\_set\_option(), scan\_fragment(), scheduler(), send\_event(), source\_booking(), source\_scan(), source\_unbooking(), tr\_start(), tr\_stop(), and update\_odb().

#### 2.6.1.23 #define MINFO MT\_INFO, \_\_FILE\_\_, \_\_LINE\_\_

•

Definition at line 473 of file midas.h.

Referenced by bk\_list(), close\_buffers(), cm\_check\_client(), cm\_cleanup(), cm\_connect\_experiment1(), cm\_disconnect\_experiment(), cm\_set\_client\_info(), cm\_shutdown(), cm\_transition(), load\_fragment(), register\_equipment(), tr\_start(), and ybk\_list().

#### 2.6.1.24 #define MLOG MT\_LOG, \_\_FILE\_\_, \_\_LINE\_\_

info message which is only logged

Definition at line 476 of file midas.h.

#### 2.6.1.25 #define MODE\_ALLOC (1<<7)

Definition at line 303 of file midas.h.

Referenced by db\_close\_all\_records(), db\_close\_record(), and db\_open\_record().

#### 2.6.1.26 #define MODE\_DELETE (1<<2)

Definition at line 301 of file midas.h.

Referenced by cm\_delete\_client\_info(), cm\_set\_client\_info(), cm\_transition(), db\_create\_key(), db\_delete\_key1(), and db\_open\_database().

#### 2.6.1.27 #define MODE\_EXCLUSIVE (1<<3)

Definition at line 302 of file midas.h.

Referenced by cm\_cleanup(), db\_create\_key(), db\_open\_database(), db\_open\_record(), db\_set\_data(), db\_set\_data\_index(), and db\_set\_value().

**2.6.1.28 #define MODE\_READ (1<<0)**

Access modes

Definition at line 299 of file midas.h.

Referenced by analyzer\_init(), cm\_delete\_client\_info(), cm\_register\_deferred\_transition(), cm\_register\_transition(), cm\_set\_client\_info(), cm\_set\_transition\_sequence(), cm\_set\_watchdog\_params(), cm\_transition(), db\_create\_key(), db\_end\_key(), db\_get\_data(), db\_get\_data\_index(), db\_get\_value(), db\_open\_database(), db\_open\_record(), and register\_equipment().

**2.6.1.29 #define MODE\_WRITE (1<<1)**

Definition at line 300 of file midas.h.

Referenced by cm\_cleanup(), cm\_delete\_client\_info(), cm\_register\_deferred\_transition(), cm\_register\_transition(), cm\_set\_client\_info(), cm\_set\_transition\_sequence(), cm\_set\_watchdog\_params(), cm\_transition(), db\_create\_key(), db\_open\_database(), db\_set\_data(), db\_set\_data\_index(), db\_set\_value(), and register\_equipment().

**2.6.1.30 #define MT\_ALL 0xFF**

•

Definition at line 470 of file midas.h.

Referenced by cm\_connect\_experiment1(), and main().

**2.6.1.31 #define MT\_CALL (1<<6)**

•

Definition at line 469 of file midas.h.

**2.6.1.32 #define MT\_DEBUG (1<<2)**

•

Definition at line 465 of file midas.h.

Referenced by cm\_msg\_log(), and cm\_msg\_log1().

**2.6.1.33 #define MT\_ERROR (1<<0)**

System message types -

Definition at line 463 of file midas.h.

Referenced by cm\_msg(), and cm\_msg1().

**2.6.1.34 #define MT\_INFO (1<<1)**

- 

Definition at line 464 of file midas.h.

**2.6.1.35 #define MT\_LOG (1<<4)**

- 

Definition at line 467 of file midas.h.

Referenced by cm\_msg(), and cm\_msg1().

**2.6.1.36 #define MT\_TALK (1<<5)**

- 

Definition at line 468 of file midas.h.

**2.6.1.37 #define MT\_USER (1<<3)**

- 

Definition at line 466 of file midas.h.

Referenced by cm\_msg(), and cm\_msg1().

**2.6.1.38 #define MTALK MT\_TALK, \_\_FILE\_\_, \_\_LINE\_\_**

info message for speech system

Definition at line 477 of file midas.h.

Referenced by scan\_fragment(), and scheduler().

**2.6.1.39 #define MUSER MT\_USER, \_\_FILE\_\_, \_\_LINE\_\_**

produced by interactive user

Definition at line 475 of file midas.h.

**2.6.1.40 #define RO\_ALWAYS (0xFF)**

Always (independent of the run status)

Definition at line 358 of file midas.h.

**2.6.1.41 #define RO BOR (1<<3)**

At the Begin of run

Definition at line 352 of file midas.h.

Referenced by send\_all\_periodic\_events().

**2.6.1.42 #define RO\_EOR (1<<4)**

At the End of run

Definition at line 353 of file midas.h.

Referenced by send\_all\_periodic\_events().

**2.6.1.43 #define RO\_ODB (1<<8)**

Submit data to ODB only

Definition at line 360 of file midas.h.

Referenced by interrupt\_routine(), scheduler(), and send\_event().

**2.6.1.44 #define RO\_PAUSE (1<<5)**

Before pausing the run

Definition at line 354 of file midas.h.

Referenced by send\_all\_periodic\_events().

**2.6.1.45 #define RO\_PAUSED (1<<2)**

???

Definition at line 351 of file midas.h.

Referenced by scheduler().

**2.6.1.46 #define RO\_RESUME (1<<6)**

Before resuming the run

Definition at line 355 of file midas.h.

Referenced by send\_all\_periodic\_events().

**2.6.1.47 #define RO\_RUNNING (1<<0)**

Read - On flags While running

Definition at line 349 of file midas.h.

Referenced by scheduler().

**2.6.1.48 #define RO\_STOPPED (1<<1)**

Before stopping the run

Definition at line 350 of file midas.h.

Referenced by scheduler().

**2.6.1.49 #define RO\_TRANSITIONS (RO BOR|RO EOR|RO PAUSE|RO RESUME)**

At all transitions

Definition at line 357 of file midas.h.

**2.6.1.50 #define RPC\_CLIENT\_HANDLE 9**

Definition at line 315 of file midas.h.

Referenced by cm\_get\_experiment\_database(), and cm\_set\_client\_info().

**2.6.1.51 #define RPC\_CONVERT\_FLAGS 7**

Definition at line 313 of file midas.h.

Referenced by bm\_receive\_event(), db\_get\_record(), db\_set\_record(), and db\_update\_record().

**2.6.1.52 #define RPC\_FTCP 1**

Definition at line 321 of file midas.h.

Referenced by cm\_transition(), db\_send\_changed\_records(), and scheduler().



**2.6.1.53 #define RPC\_NODELAY 12**

Definition at line 318 of file midas.h.

Referenced by rpc\_set\_option().

**2.6.1.54 #define RPC\_OCONVERT\_FLAG 3**

Definition at line 309 of file midas.h.

**2.6.1.55 #define RPC\_ODB\_HANDLE 8**

Definition at line 314 of file midas.h.

Referenced by cm\_get\_experiment\_database(), and cm\_set\_client\_info().

**2.6.1.56 #define RPC\_OHW\_TYPE 4**

Definition at line 310 of file midas.h.

Referenced by cm\_connect\_experiment1().

**2.6.1.57 #define RPC\_OSERVER\_NAME 6**

Definition at line 312 of file midas.h.

**2.6.1.58 #define RPC\_OSERVER\_TYPE 5**

Definition at line 311 of file midas.h.

Referenced by bm\_check\_buffers(), bm\_close\_buffer(), bm\_empty\_buffers(), bm\_open\_buffer(), bm\_receive\_event(), cm\_disconnect\_experiment(), cm\_set\_watchdog\_params(), db\_close\_database(), db\_get\_record(), db\_open\_database(), and db\_set\_record().

**2.6.1.59 #define RPC\_OTIMEOUT 1**

RPC options

Definition at line 307 of file midas.h.

Referenced by cm\_transition(), main(), and rpc\_set\_option().

**2.6.1.60 #define RPC\_OTRANSPORT 2**

Definition at line 308 of file midas.h.

Referenced by cm\_transition(), db\_send\_changed\_records(), rpc\_set\_option(), scheduler(), and update\_odb().

**2.6.1.61 #define RPC\_SEND\_SOCKET 10**

Definition at line 316 of file midas.h.

**2.6.1.62 #define RPC\_TCP 0**

Definition at line 320 of file midas.h.

Referenced by cm\_transition(), db\_send\_changed\_records(), scheduler(), and update\_oddb().

**2.6.1.63 #define RPC\_WATCHDOG\_TIMEOUT 11**

Definition at line 317 of file midas.h.

Referenced by cm\_set\_watchdog\_params().

**2.6.1.64 #define STATE\_PAUSED 2**

MIDAS run paused

Definition at line 252 of file midas.h.

Referenced by cm\_transition(), scan\_fragment(), scheduler(), and tr\_pause().

**2.6.1.65 #define STATE\_RUNNING 3**

MIDAS run running

Definition at line 253 of file midas.h.

Referenced by cm\_transition(), display(), main(), scan\_fragment(), scheduler(), tr\_resume(), and tr\_start().

**2.6.1.66 #define STATE\_STOPPED 1**

System states MIDAS run stopped

Definition at line 251 of file midas.h.

Referenced by close\_buffers(), cm\_transition(), display(), handFlush(), register\_equipement(), scan\_fragment(), scheduler(), and tr\_stop().

**2.6.1.67 #define SYNC 0**

Synchronous / Asynchronous flags

Definition at line 294 of file midas.h.

Referenced by close\_buffers(), cm\_check\_deferred\_transition(), cm\_msg(), cm\_msg1(), interrupt\_routine(), scheduler(), send\_event(), source\_scan(), and tr\_stop().

**2.6.1.68 #define TID\_ARRAY 13**

array with unknown contents

Definition at line 286 of file midas.h.

**2.6.1.69 #define TID\_BITFIELD 11**

32 Bits Bitfield 0 111... (32)

Definition at line 284 of file midas.h.

Referenced by db\_sprintf().

**2.6.1.70 #define TID\_BOOL 8**

four bytes bool 0 1

Definition at line 281 of file midas.h.

Referenced by al\_trigger\_alarm(), ana\_end\_of\_run(), bk\_swap(), db\_sprintf(), scheduler(), and tr\_start().

**2.6.1.71 #define TID\_BYTE 1**

Data types Definition min max unsigned byte 0 255

Definition at line 274 of file midas.h.

Referenced by db\_sprintf().

**2.6.1.72 #define TID\_CHAR 3**

single character 0 255

Definition at line 276 of file midas.h.

Referenced by db\_sprintf().

**2.6.1.73 #define TID\_DOUBLE 10**

8 Byte float format

Definition at line 283 of file midas.h.

Referenced by ana\_end\_of\_run(), bk\_swap(), db\_sprintf(), register\_equipment(), and scaler\_accum().

**2.6.1.74 #define TID\_DWORD 6**

four bytes 0  $2^{32}-1$

Definition at line 279 of file midas.h.

Referenced by bk\_swap(), bm\_receive\_event(), cm\_transition(), db\_sprintf(), db\_update\_record(), eb\_user(), and read\_scaler\_event().

#### 2.6.1.75 #define TID\_FLOAT 9

4 Byte float format

Definition at line 282 of file midas.h.

Referenced by adc\_calib(), bk\_swap(), and db\_sprintf().

#### 2.6.1.76 #define TID\_INT 7

signed dword  $-2^{31}$   $2^{31}-1$

Definition at line 280 of file midas.h.

Referenced by al\_trigger\_alarm(), bk\_swap(), cm\_connect\_client(), cm\_connect\_experiment1(), cm\_delete\_client\_info(), cm\_register\_deferred\_transition(), cm\_register\_transition(), cm\_set\_client\_info(), cm\_set\_transition\_sequence(), cm\_set\_watchdog\_params(), cm\_shutdown(), cm\_transition(), db\_sprintf(), el\_submit(), load\_fragment(), register\_equipment(), scheduler(), and tr\_start().

#### 2.6.1.77 #define TID\_KEY 15

key in online database

Definition at line 288 of file midas.h.

Referenced by cm\_transition(), db\_check\_record(), db\_copy(), db\_create\_key(), db\_create\_record(), db\_delete\_key1(), db\_enum\_key(), db\_find\_key(), db\_get\_data(), db\_get\_data\_index(), db\_get\_key\_info(), db\_get\_record(), db\_get\_record\_size(), db\_open\_database(), db\_paste(), db\_paste\_node(), db\_save\_xml\_key(), db\_set\_data(), db\_set\_data\_index(), db\_set\_record(), db\_set\_value(), load\_fragment(), and register\_equipment().

#### 2.6.1.78 #define TID\_LAST 17

end of TID list indicator

Definition at line 290 of file midas.h.

Referenced by db\_check\_record(), db\_create\_key(), db\_paste(), and db\_paste\_node().

#### 2.6.1.79 #define TID\_LINK 16

link in online database

Definition at line 289 of file midas.h.

Referenced by db\_check\_record(), db\_copy(), db\_create\_key(), db\_create\_link(), db\_delete\_key1(), db\_enum\_key(), db\_find\_key(), db\_get\_value(), db\_paste(), db\_paste\_node(), db\_save\_xml\_key(), db\_set\_data\_index(), db\_set\_value(), db\_sprintf(), and update\_odb().

#### 2.6.1.80 #define TID\_SBYTE 2

signed byte -128 127

Definition at line 275 of file midas.h.

Referenced by db\_sprintf().

#### 2.6.1.81 #define TID\_SHORT 5

signed word -32768 32767

Definition at line 278 of file midas.h.

Referenced by bk\_swap(), bm\_receive\_event(), and db\_sprintf().

#### 2.6.1.82 #define TID\_STRING 12

zero terminated string

Definition at line 285 of file midas.h.

Referenced by al\_trigger\_alarm(), ana\_end\_of\_run(), cm\_check\_client(), cm\_connect\_client(), cm\_connect\_experiment1(), cm\_exist(), cm\_get\_client\_info(), cm\_msg\_log(), cm\_msg\_log1(), cm\_msg\_retrieve(), cm\_set\_client\_info(), cm\_shutdown(), cm\_transition(), db\_check\_record(), db\_copy(), db\_create\_key(), db\_get\_value(), db\_paste(), db\_paste\_node(), db\_save\_xml\_key(), db\_set\_data\_index(), db\_set\_value(), db\_sprintf(), el\_submit(), load\_fragment(), logger\_root(), tr\_start(), and update\_odb().

#### 2.6.1.83 #define TID\_STRUCT 14

structure with fixed length

Definition at line 287 of file midas.h.

Referenced by adc\_summing(), bk\_close(), register\_equipment(), and update\_odb().

#### 2.6.1.84 #define TID\_WORD 4

two bytes 0 65535

Definition at line 277 of file midas.h.

Referenced by `bk_swap()`, `db_sprintf()`, `load_fragment()`, and `read_trigger_event()`.

#### 2.6.1.85 `#define TR_DEFERRED (1<<12)`

Definition at line 334 of file `midas.h`.

Referenced by `cm_check_deferred_transition()`, and `cm_transition()`.

#### 2.6.1.86 `#define TR_PAUSE (1<<2)`

Pause transition

Definition at line 332 of file `midas.h`.

Referenced by `cm_register_transition()`, `cm_set_transition_sequence()`, `cm_transition()`, `main()`, `send_all_periodic_events()`, and `tr_pause()`.

#### 2.6.1.87 `#define TR_RESUME (1<<3)`

Resume transition

Definition at line 333 of file `midas.h`.

Referenced by `cm_register_transition()`, `cm_set_transition_sequence()`, `cm_transition()`, `main()`, `send_all_periodic_events()`, and `tr_resume()`.

#### 2.6.1.88 `#define TR_START (1<<0)`

Transitions values Start transition

Definition at line 330 of file `midas.h`.

Referenced by `cm_register_transition()`, `cm_set_transition_sequence()`, `cm_transition()`, `main()`, `scheduler()`, `send_all_periodic_events()`, and `tr_start()`.

#### 2.6.1.89 `#define TR_STOP (1<<1)`

Stop transition

Definition at line 331 of file `midas.h`.

Referenced by `cm_register_transition()`, `cm_set_transition_sequence()`, `cm_transition()`, `main()`, `scan_fragment()`, `scheduler()`, `send_all_periodic_events()`, and `tr_stop()`.

#### 2.6.1.90 `#define TRIGGER_ALL -1`

Definition at line 459 of file `midas.h`.

Referenced by `bm_match_event()`, and `cm_msg_register()`.

**2.6.1.91 #define WF\_CALL\_WD (1<<1)**

Definition at line 326 of file midas.h.

**2.6.1.92 #define WF\_WATCH\_ME (1<<0)**

Watchdog flags

Definition at line 325 of file midas.h.

**2.7 Midas Macros****Defines**

- #define **MAX**(a, b) (((a) > (b)) ? (a) : (b))
- #define **MIN**(a, b) (((a) < (b)) ? (a) : (b))
- #define **ALIGN8**(x) (((x)+7) & ~7)
- #define **VALIGN**(adr, align) (((PTYPE) (adr)+align-1) & ~(align-1))

**2.7.1 Define Documentation****2.7.1.1 #define ALIGN8(x) (((x)+7) & ~7)**

Align macro for data alignment on 8-byte boundary

Definition at line 443 of file midas.h.

Referenced by bk\_close(), bk\_end(), bk\_iterate(), bk\_locate(), bk\_swap(), bm\_push\_cache(), bm\_push\_event(), bm\_receive\_event(), bm\_send\_event(), db\_open\_database(), and rpc\_send\_event().

**2.7.1.2 #define MAX(a, b) (((a) > (b)) ? (a) : (b))**

MAX

Definition at line 430 of file midas.h.

Referenced by cm\_execute(), and scheduler().

**2.7.1.3 #define MIN(a, b) (((a) < (b)) ? (a) : (b))**

MIN

Definition at line 436 of file midas.h.

Referenced by update\_odb().

#### 2.7.1.4 `#define VALIGN(adr, align) (((PType) (adr)+align-1) & ~(align-1))`

Align macro for variable data alignment

Definition at line 447 of file midas.h.

Referenced by `db_get_record_size()`, and `update_odb()`.

## 2.8 Midas Error definition

### Modules

- [Status and error codes](#)
- [Buffer Manager error codes](#)
- [Online Database error codes](#)
- [System Services error code](#)
- [Remote Procedure Calls error codes](#)
- [Other errors](#)

## 2.9 Midas Structure Declaration

### Modules

- [Buffer Section](#)
- [Equipment related](#)
- [Bank related](#)
- [Analyzer related](#)
- [History related](#)
- [ODB runinfo related](#)
- [Alarm related](#)

## 2.10 Status and error codes

### Defines

- `#define SUCCESS 1`
- `#define CM_SUCCESS 1`
- `#define CM_SET_ERROR 102`
- `#define CM_NO_CLIENT 103`



- `#define CM_DB_ERROR` 104
- `#define CM_UNDEF_EXP` 105
- `#define CM_VERSION_MISMATCH` 106
- `#define CM_SHUTDOWN` 107
- `#define CM_WRONG_PASSWORD` 108
- `#define CM_UNDEF_ENVIRON` 109
- `#define CM_DEFERRED_TRANSITION` 110
- `#define CM_TRANSITION_IN_PROGRESS` 111
- `#define CM_TIMEOUT` 112
- `#define CM_INVALID_TRANSITION` 113
- `#define CM_TOO_MANY_REQUESTS` 114

### 2.10.1 Define Documentation

#### 2.10.1.1 `#define CM_DB_ERROR` 104

db access error

Definition at line 498 of file `midas.h`.

Referenced by `cm_msg_retrieve()`.

#### 2.10.1.2 `#define CM_DEFERRED_TRANSITION` 110

•

Definition at line 504 of file `midas.h`.

Referenced by `cm_transition()`.

#### 2.10.1.3 `#define CM_INVALID_TRANSITION` 113

•

Definition at line 507 of file `midas.h`.

Referenced by `cm_register_transition()`, `cm_set_transition_sequence()`, and `cm_transition()`.

**2.10.1.4 #define CM\_NO\_CLIENT 103**

nobody

Definition at line 497 of file midas.h.

Referenced by cm\_check\_client(), cm\_connect\_client(), cm\_exist(), cm\_get\_watchdog\_info(), cm\_set\_client\_info(), and cm\_shutdown().

**2.10.1.5 #define CM\_SET\_ERROR 102**

set

Definition at line 496 of file midas.h.

**2.10.1.6 #define CM\_SHUTDOWN 107**

•

Definition at line 501 of file midas.h.

**2.10.1.7 #define CM\_SUCCESS 1**

Same

Definition at line 495 of file midas.h.

Referenced by ana\_begin\_of\_run(), ana\_end\_of\_run(), ana\_pause\_run(), ana\_resume\_run(), analyzer\_exit(), analyzer\_loop(), cm\_asctime(), cm\_check\_client(), cm\_check\_deferred\_transition(), cm\_cleanup(), cm\_connect\_experiment(), cm\_connect\_experiment1(), cm\_delete\_client\_info(), cm\_disconnect\_experiment(), cm\_execute(), cm\_exist(), cm\_get\_client\_info(), cm\_get\_environment(), cm\_get\_error(), cm\_get\_experiment\_database(), cm\_get\_path(), cm\_get\_watchdog\_info(), cm\_get\_watchdog\_params(), cm\_list\_experiments(), cm\_msg(), cm\_msg1(), cm\_msg\_log(), cm\_msg\_log1(), cm\_msg\_retrieve(), cm\_register\_deferred\_transition(), cm\_register\_transition(), cm\_scan\_experiments(), cm\_select\_experiment(), cm\_set\_client\_info(), cm\_set\_experiment\_database(), cm\_set\_path(), cm\_set\_transition\_sequence(), cm\_set\_watchdog\_params(), cm\_shutdown(), cm\_synchronize(), cm\_time(), cm\_transition(), dm\_buffer\_create(), eb\_mfragment\_add(), eb\_yfragment\_add(), main(), scan\_fragment(), scheduler(), send\_event(), tr\_pause(), tr\_resume(), tr\_start(), and tr\_stop().

**2.10.1.8 #define CM\_TIMEOUT 112**

•

Definition at line 506 of file midas.h.

**2.10.1.9 #define CM\_TOO\_MANY\_REQUESTS 114**

- 

Definition at line 508 of file midas.h.

Referenced by cm\_register\_transition().

**2.10.1.10 #define CM\_TRANSITION\_IN\_PROGRESS 111**

- 

Definition at line 505 of file midas.h.

Referenced by cm\_transition().

**2.10.1.11 #define CM\_UNDEF\_ENVIRON 109**

- 

Definition at line 503 of file midas.h.

Referenced by cm\_scan\_experiments().

**2.10.1.12 #define CM\_UNDEF\_EXP 105**

- 

Definition at line 499 of file midas.h.

Referenced by cm\_connect\_experiment1(), and cm\_get\_client\_info().

**2.10.1.13 #define CM\_VERSION\_MISMATCH 106**

- 

Definition at line 500 of file midas.h.

**2.10.1.14 #define CM\_WRONG\_PASSWORD 108**

- 

Definition at line 502 of file midas.h.

Referenced by cm\_connect\_experiment1(), and cm\_set\_client\_info().

**2.10.1.15 #define SUCCESS 1**

Success

Definition at line 494 of file midas.h.

Referenced by `adc_calib()`, `adc_calib_bor()`, `adc_calib_eor()`, `adc_calib_init()`, `adc_summing()`, `adc_summing_init()`, `analyzer_init()`, `begin_of_run()`, `cm_check_deferred_transition()`, `cm_transition()`, `el_submit()`, `end_of_run()`, `fccinit()`, `frontend_exit()`, `frontend_init()`, `frontend_loop()`, `interrupt_configure()`, `main()`, `manual_trigger()`, `pause_run()`, `register_equipment()`, `resume_run()`, `scaler_accum()`, `scaler_clear()`, `scaler_eor()`, `scheduler()`, `source_booking()`, and `tr_start()`.

**2.11 Buffer Manager error codes****Defines**

- `#define BM_SUCCESS 1`
- `#define BM_CREATED 202`
- `#define BM_NO_MEMORY 203`
- `#define BM_INVALID_NAME 204`
- `#define BM_INVALID_HANDLE 205`
- `#define BM_NO_SLOT 206`
- `#define BM_NO_MUTEX 207`
- `#define BM_NOT_FOUND 208`
- `#define BM_ASYNC_RETURN 209`
- `#define BM_TRUNCATED 210`
- `#define BM_MULTIPLE_HOSTS 211`
- `#define BM_MEMSIZE_MISMATCH 212`
- `#define BM_CONFLICT 213`
- `#define BM_EXIT 214`
- `#define BM_INVALID_PARAM 215`
- `#define BM_MORE_EVENTS 216`
- `#define BM_INVALID_MIXING 217`
- `#define BM_NO_SHM 218`

**2.11.1 Define Documentation****2.11.1.1 #define BM\_ASYNC\_RETURN 209**

-

Definition at line 524 of file midas.h.

Referenced by bm\_push\_cache(), bm\_receive\_event(), bm\_send\_event(), rpc\_send\_event(), scan\_fragment(), and source\_scan().

#### 2.11.1.2 **#define BM\_CONFLICT 213**

- 

Definition at line 528 of file midas.h.

Referenced by source\_booking().

#### 2.11.1.3 **#define BM\_CREATED 202**

- 

Definition at line 517 of file midas.h.

Referenced by bm\_open\_buffer(), cm\_msg(), cm\_msg1(), cm\_msg\_register(), register\_equipment(), and source\_booking().

#### 2.11.1.4 **#define BM\_EXIT 214**

- 

Definition at line 529 of file midas.h.

#### 2.11.1.5 **#define BM\_INVALID\_HANDLE 205**

- 

Definition at line 520 of file midas.h.

Referenced by bm\_close\_buffer(), bm\_delete\_request(), bm\_push\_cache(), bm\_push\_event(), bm\_receive\_event(), bm\_remove\_event\_request(), bm\_send\_event(), bm\_set\_cache\_size(), and bm\_skip\_event().

#### 2.11.1.6 **#define BM\_INVALID\_MIXING 217**

- 

Definition at line 532 of file midas.h.

**2.11.1.7 #define BM\_INVALID\_NAME 204**

- 

Definition at line 519 of file midas.h.

Referenced by bm\_open\_buffer().

**2.11.1.8 #define BM\_INVALID\_PARAM 215**

- 

Definition at line 530 of file midas.h.

Referenced by bm\_open\_buffer(), bm\_send\_event(), bm\_set\_cache\_size(), rpc\_send\_event(), and scheduler().

**2.11.1.9 #define BM\_MEMSIZE\_MISMATCH 212**

- 

Definition at line 527 of file midas.h.

Referenced by bm\_open\_buffer(), and dm\_buffer\_create().

**2.11.1.10 #define BM\_MORE\_EVENTS 216**

- 

Definition at line 531 of file midas.h.

Referenced by bm\_check\_buffers(), and bm\_push\_event().

**2.11.1.11 #define BM\_MULTIPLE\_HOSTS 211**

- 

Definition at line 526 of file midas.h.

**2.11.1.12 #define BM\_NO\_MEMORY 203**

- 

Definition at line 518 of file midas.h.

Referenced by bm\_open\_buffer(), bm\_push\_event(), bm\_request\_event(), bm\_send\_event(), bm\_set\_cache\_size(), dm\_buffer\_create(), and source\_booking().

**2.11.1.13 #define BM\_NO\_MUTEX 207**

- 

Definition at line 522 of file midas.h.

Referenced by bm\_open\_buffer().

**2.11.1.14 #define BM\_NO\_SHM 218**

- 

Definition at line 533 of file midas.h.

Referenced by bm\_open\_buffer().

**2.11.1.15 #define BM\_NO\_SLOT 206**

- 

Definition at line 521 of file midas.h.

Referenced by bm\_open\_buffer().

**2.11.1.16 #define BM\_NOT\_FOUND 208**

- 

Definition at line 523 of file midas.h.

Referenced by bm\_remove\_event\_request().

**2.11.1.17 #define BM\_SUCCESS 1**

- 

Definition at line 516 of file midas.h.

Referenced by `bm_close_all_buffers()`, `bm_close_buffer()`, `bm_compose_event()`, `bm_delete_request()`, `bm_empty_buffers()`, `bm_flush_cache()`, `bm_open_buffer()`, `bm_push_event()`, `bm_receive_event()`, `bm_remove_event_request()`, `bm_request_event()`, `bm_send_event()`, `bm_set_cache_size()`, `bm_skip_event()`, `cm_msg()`, `cm_msg1()`, `cm_msg_register()`, `cm_set_msg_print()`, `handFlush()`, `register_equipment()`, `scheduler()`, `send_event()`, `source_booking()`, `source_scan()`, `source_unbooking()`, and `tr_stop()`.

**2.11.1.18 #define BM\_TRUNCATED 210**

- 

Definition at line 525 of file midas.h.

Referenced by `bm_receive_event()`.

**2.12 Online Database error codes****Defines**

- `#define DB_SUCCESS 1`
- `#define DB_CREATED 302`
- `#define DB_NO_MEMORY 303`
- `#define DB_INVALID_NAME 304`
- `#define DB_INVALID_HANDLE 305`
- `#define DB_NO_SLOT 306`
- `#define DB_NO_MUTEX 307`
- `#define DB_MEMSIZE_MISMATCH 308`
- `#define DB_INVALID_PARAM 309`
- `#define DB_FULL 310`
- `#define DB_KEY_EXIST 311`
- `#define DB_NO_KEY 312`
- `#define DB_KEY_CREATED 313`
- `#define DB_TRUNCATED 314`
- `#define DB_TYPE_MISMATCH 315`
- `#define DB_NO_MORE_SUBKEYS 316`
- `#define DB_FILE_ERROR 317`



- `#define DB_NO_ACCESS` 318
- `#define DB_STRUCT_SIZE_MISMATCH` 319
- `#define DB_OPEN_RECORD` 320
- `#define DB_OUT_OF_RANGE` 321
- `#define DB_INVALID_LINK` 322
- `#define DB_CORRUPTED` 323
- `#define DB_STRUCT_MISMATCH` 324
- `#define DB_TIMEOUT` 325
- `#define DB_VERSION_MISMATCH` 326

### 2.12.1 Define Documentation

#### 2.12.1.1 `#define DB_CORRUPTED` 323

- 

Definition at line 562 of file `midas.h`.

Referenced by `db_create_key()`, and `db_end_key()`.

#### 2.12.1.2 `#define DB_CREATED` 302

- 

Definition at line 541 of file `midas.h`.

Referenced by `cm_connect_experiment1()`, and `db_open_database()`.

#### 2.12.1.3 `#define DB_FILE_ERROR` 317

- 

Definition at line 556 of file `midas.h`.

Referenced by `db_load()`, `db_save()`, `db_save_struct()`, and `db_save_xml()`.

**2.12.1.4 #define DB\_FULL 310**

- 

Definition at line 549 of file midas.h.

Referenced by db\_create\_key(), db\_set\_data(), db\_set\_data\_index(), and db\_set\_value().

**2.12.1.5 #define DB\_INVALID\_HANDLE 305**

- 

Definition at line 544 of file midas.h.

Referenced by cm\_get\_watchdog\_info(), db\_close\_database(), db\_close\_record(), db\_create\_key(), db\_delete\_key1(), db\_enum\_key(), db\_end\_key(), db\_get\_data(), db\_get\_data\_index(), db\_get\_key(), db\_get\_key\_info(), db\_get\_key\_time(), db\_get\_value(), db\_lock\_database(), db\_protect\_database(), db\_save\_struct(), db\_set\_data(), db\_set\_data\_index(), db\_unlock\_database(), and db\_update\_record().

**2.12.1.6 #define DB\_INVALID\_LINK 322**

- 

Definition at line 561 of file midas.h.

Referenced by db\_end\_key().

**2.12.1.7 #define DB\_INVALID\_NAME 304**

- 

Definition at line 543 of file midas.h.

Referenced by db\_open\_database().

**2.12.1.8 #define DB\_INVALID\_PARAM 309**

- 

Definition at line 548 of file midas.h.

Referenced by db\_create\_key(), db\_get\_value(), db\_open\_database(), db\_set\_data(), and db\_set\_value().

**2.12.1.9 #define DB\_KEY\_CREATED 313**

- 

Definition at line 552 of file midas.h.

**2.12.1.10 #define DB\_KEY\_EXIST 311**

- 

Definition at line 550 of file midas.h.

Referenced by db\_create\_key().

**2.12.1.11 #define DB\_MEMSIZE\_MISMATCH 308**

- 

Definition at line 547 of file midas.h.

**2.12.1.12 #define DB\_NO\_ACCESS 318**

- 

Definition at line 557 of file midas.h.

Referenced by db\_create\_key(), db\_delete\_key1(), db\_end\_key(), db\_get\_data(), db\_get\_data\_index(), db\_get\_value(), db\_open\_record(), db\_set\_data(), db\_set\_data\_index(), and db\_set\_value().

**2.12.1.13 #define DB\_NO\_KEY 312**

- 

Definition at line 551 of file midas.h.

Referenced by cm\_exist(), cm\_shutdown(), db\_check\_record(), db\_create\_key(), db\_create\_link(), db\_create\_record(), db\_end\_key(), db\_get\_value(), db\_paste(), db\_paste\_node(), and db\_set\_value().

**2.12.1.14 #define DB\_NO\_MEMORY 303**

- 

Definition at line 542 of file midas.h.

Referenced by db\_copy(), db\_copy\_xml(), db\_load(), db\_open\_database(), db\_open\_record(), db\_paste(), and db\_save\_xml\_key().

**2.12.1.15 #define DB\_NO\_MORE\_SUBKEYS 316**

- 

Definition at line 555 of file midas.h.

Referenced by cm\_connect\_client(), cm\_exist(), cm\_set\_client\_info(), cm\_shutdown(), cm\_transition(), db\_enum\_key(), logger\_root(), and update\_odb().

**2.12.1.16 #define DB\_NO\_MUTEX 307**

- 

Definition at line 546 of file midas.h.

Referenced by db\_lock\_database(), and db\_open\_database().

**2.12.1.17 #define DB\_NO\_SLOT 306**

- 

Definition at line 545 of file midas.h.

Referenced by db\_open\_database().

**2.12.1.18 #define DB\_OPEN\_RECORD 320**

- 

Definition at line 559 of file midas.h.

Referenced by db\_create\_record(), and db\_delete\_key1().

**2.12.1.19 #define DB\_OUT\_OF\_RANGE 321**

- 

Definition at line 560 of file midas.h.

Referenced by db\_get\_data\_index().

**2.12.1.20 #define DB\_STRUCT\_MISMATCH 324**

- 

Definition at line 563 of file midas.h.

Referenced by cm\_connect\_experiment1(), and db\_check\_record().

**2.12.1.21 #define DB\_STRUCT\_SIZE\_MISMATCH 319**

- 

Definition at line 558 of file midas.h.

Referenced by db\_get\_record(), db\_open\_record(), and db\_set\_record().

**2.12.1.22 #define DB\_SUCCESS 1**

- 

Definition at line 540 of file midas.h.

Referenced by al\_trigger\_alarm(), analyzer\_init(), cm\_connect\_client(), cm\_connect\_experiment1(), cm\_delete\_client\_info(), cm\_exist(), cm\_get\_client\_info(), cm\_msg\_log(), cm\_msg\_log1(), cm\_msg\_retrieve(), cm\_register\_deferred\_transition(), cm\_register\_transition(), cm\_set\_client\_info(), cm\_set\_transition\_sequence(), cm\_shutdown(), cm\_transition(), db\_check\_record(), db\_close\_all\_records(), db\_close\_database(), db\_close\_record(), db\_copy(), db\_copy\_xml(), db\_create\_key(), db\_create\_link(), db\_create\_record(), db\_delete\_key1(), db\_enum\_key(), db\_end\_key(), db\_get\_data(), db\_get\_data\_index(), db\_get\_key(), db\_get\_key\_info(), db\_get\_key\_time(), db\_get\_record(), db\_get\_record\_size(), db\_get\_value(), db\_load(), db\_lock\_database(), db\_open\_database(), db\_open\_record(), db\_paste(), db\_paste\_node(), db\_protect\_database(), db\_save(), db\_save\_struct(), db\_save\_xml(), db\_save\_xml\_key(), db\_send\_changed\_records(), db\_set\_data(), db\_set\_data\_index(), db\_set\_record(), db\_set\_value(), db\_sprintf(), db\_unlock\_database(), db\_update\_record(), el\_submit(), load\_fragment(), logger\_root(), register\_equipment(), scheduler(), tr\_start(), and update\_odb().

**2.12.1.23 #define DB\_TIMEOUT 325**

- 

Definition at line 564 of file midas.h.

Referenced by db\_lock\_database().

**2.12.1.24 #define DB\_TRUNCATED 314**

- 

Definition at line 553 of file midas.h.

Referenced by db\_check\_record(), db\_copy(), db\_copy\_xml(), db\_create\_record(), db\_get\_data(), db\_get\_data\_index(), db\_get\_value(), db\_paste(), and db\_save().

**2.12.1.25 #define DB\_TYPE\_MISMATCH 315**

- 

Definition at line 554 of file midas.h.

Referenced by db\_get\_data(), db\_get\_data\_index(), db\_get\_value(), db\_paste\_node(), db\_paste\_xml(), db\_set\_data(), db\_set\_data\_index(), and db\_set\_value().

**2.12.1.26 #define DB\_VERSION\_MISMATCH 326**

- 

Definition at line 565 of file midas.h.

Referenced by db\_open\_database().

**2.13 System Services error code****Defines**

- #define [SS\\_SUCCESS](#) 1
- #define [SS\\_CREATED](#) 402
- #define [SS\\_NO\\_MEMORY](#) 403
- #define [SS\\_INVALID\\_NAME](#) 404
- #define [SS\\_INVALID\\_HANDLE](#) 405

- `#define SS_INVALID_ADDRESS` 406
- `#define SS_FILE_ERROR` 407
- `#define SS_NO_MUTEX` 408
- `#define SS_NO_PROCESS` 409
- `#define SS_NO_THREAD` 410
- `#define SS_SOCKET_ERROR` 411
- `#define SS_TIMEOUT` 412
- `#define SS_SERVER_RECV` 413
- `#define SS_CLIENT_RECV` 414
- `#define SS_ABORT` 415
- `#define SS_EXIT` 416
- `#define SS_NO_TAPE` 417
- `#define SS_DEV_BUSY` 418
- `#define SS_IO_ERROR` 419
- `#define SS_TAPE_ERROR` 420
- `#define SS_NO_DRIVER` 421
- `#define SS_END_OF_TAPE` 422
- `#define SS_END_OF_FILE` 423
- `#define SS_FILE_EXISTS` 424
- `#define SS_NO_SPACE` 425
- `#define SS_INVALID_FORMAT` 426
- `#define SS_NO_ROOT` 427

### 2.13.1 Define Documentation

#### 2.13.1.1 `#define SS_ABORT` 415

- 

Definition at line 586 of file `midas.h`.

Referenced by `bm_push_cache()`, `bm_receive_event()`, `bm_send_event()`, `scan_fragment()`, and `scheduler()`.

#### 2.13.1.2 `#define SS_CLIENT_RECV` 414

- 

Definition at line 585 of file `midas.h`.

**2.13.1.3 #define SS\_CREATED 402**

- 

Definition at line 573 of file midas.h.

Referenced by bm\_open\_buffer(), cm\_connect\_experiment1(), db\_open\_database(), and dm\_buffer\_create().

**2.13.1.4 #define SS\_DEV\_BUSY 418**

- 

Definition at line 589 of file midas.h.

**2.13.1.5 #define SS\_END\_OF\_FILE 423**

- 

Definition at line 594 of file midas.h.

**2.13.1.6 #define SS\_END\_OF\_TAPE 422**

- 

Definition at line 593 of file midas.h.

**2.13.1.7 #define SS\_EXIT 416**

- 

Definition at line 587 of file midas.h.

**2.13.1.8 #define SS\_FILE\_ERROR 407**

- 

Definition at line 578 of file midas.h.

Referenced by bm\_open\_buffer(), and db\_open\_database().



**2.13.1.9 #define SS\_FILE\_EXISTS 424**

- 

Definition at line 595 of file midas.h.

**2.13.1.10 #define SS\_INVALID\_ADDRESS 406**

- 

Definition at line 577 of file midas.h.

**2.13.1.11 #define SS\_INVALID\_FORMAT 426**

- 

Definition at line 597 of file midas.h.

**2.13.1.12 #define SS\_INVALID\_HANDLE 405**

- 

Definition at line 576 of file midas.h.

**2.13.1.13 #define SS\_INVALID\_NAME 404**

- 

Definition at line 575 of file midas.h.

**2.13.1.14 #define SS\_IO\_ERROR 419**

- 

Definition at line 590 of file midas.h.

**2.13.1.15 #define SS\_NO\_DRIVER 421**

- 

Definition at line 592 of file midas.h.

**2.13.1.16 #define SS\_NO\_MEMORY 403**

- 

Definition at line 574 of file midas.h.

Referenced by bm\_open\_buffer(), db\_open\_database(), scheduler(), and send\_event().

**2.13.1.17 #define SS\_NO\_MUTEX 408**

- 

Definition at line 579 of file midas.h.

**2.13.1.18 #define SS\_NO\_PROCESS 409**

- 

Definition at line 580 of file midas.h.

**2.13.1.19 #define SS\_NO\_ROOT 427**

- 

Definition at line 598 of file midas.h.

**2.13.1.20 #define SS\_NO\_SPACE 425**

- 

Definition at line 596 of file midas.h.

**2.13.1.21 #define SS\_NO\_TAPE 417**

- 

Definition at line 588 of file midas.h.

**2.13.1.22 #define SS\_NO\_THREAD 410**

- 

Definition at line 581 of file midas.h.

Referenced by ss\_thread\_kill().

**2.13.1.23 #define SS\_SERVER\_RECV 413**

- 

Definition at line 584 of file midas.h.

**2.13.1.24 #define SS\_SOCKET\_ERROR 411**

- 

Definition at line 582 of file midas.h.

Referenced by ss\_sleep().

**2.13.1.25 #define SS\_SUCCESS 1**

- 

Definition at line 572 of file midas.h.

Referenced by bm\_open\_buffer(), bm\_receive\_event(), cm\_connect\_experiment1(), db\_lock\_database(), db\_open\_database(), dm\_buffer\_create(), el\_submit(), ss\_sleep(), and ss\_thread\_kill().

**2.13.1.26 #define SS\_TAPE\_ERROR 420**

- 

Definition at line 591 of file midas.h.

**2.13.1.27 #define SS\_TIMEOUT 412**

- 

Definition at line 583 of file midas.h.

Referenced by db\_lock\_database().

## 2.14 Remote Procedure Calls error codes

### Defines

- `#define RPC_SUCCESS 1`
- `#define RPC_ABORT SS_ABORT`
- `#define RPC_NO_CONNECTION 502`
- `#define RPC_NET_ERROR 503`
- `#define RPC_TIMEOUT 504`
- `#define RPC_EXCEED_BUFFER 505`
- `#define RPC_NOT_REGISTERED 506`
- `#define RPC_CONNCLOSED 507`
- `#define RPC_INVALID_ID 508`
- `#define RPC_SHUTDOWN 509`
- `#define RPC_NO_MEMORY 510`
- `#define RPC_DOUBLE_DEFINED 511`

### 2.14.1 Define Documentation

#### 2.14.1.1 `#define RPC_ABORT SS_ABORT`

- 

Definition at line 606 of file `midas.h`.

#### 2.14.1.2 `#define RPC_CONNCLOSED 507`

- 

Definition at line 612 of file `midas.h`.

#### 2.14.1.3 `#define RPC_DOUBLE_DEFINED 511`

- 

Definition at line 616 of file `midas.h`.

Referenced by `rpc_register_functions()`.

**2.14.1.4 #define RPC\_EXCEED\_BUFFER 505**

- 

Definition at line 610 of file midas.h.

Referenced by rpc\_send\_event().

**2.14.1.5 #define RPC\_INVALID\_ID 508**

- 

Definition at line 613 of file midas.h.

**2.14.1.6 #define RPC\_NET\_ERROR 503**

- 

Definition at line 608 of file midas.h.

Referenced by bm\_receive\_event(), cm\_connect\_experiment1(), cm\_list\_experiments(), rpc\_push\_event(), and rpc\_send\_event().

**2.14.1.7 #define RPC\_NO\_CONNECTION 502**

- 

Definition at line 607 of file midas.h.

**2.14.1.8 #define RPC\_NO\_MEMORY 510**

- 

Definition at line 615 of file midas.h.

Referenced by rpc\_register\_functions().

**2.14.1.9 #define RPC\_NOT\_REGISTERED 506**

- 

Definition at line 611 of file midas.h.

**2.14.1.10 #define RPC\_SHUTDOWN 509**

- 

Definition at line 614 of file midas.h.

Referenced by cm\_yield(), main(), scan\_fragment(), and scheduler().

**2.14.1.11 #define RPC\_SUCCESS 1**

- 

Definition at line 605 of file midas.h.

Referenced by cm\_connect\_experiment1(), cm\_shutdown(), cm\_transition(), rpc\_push\_event(), rpc\_register\_client(), rpc\_register\_functions(), rpc\_send\_event(), and scheduler().

**2.14.1.12 #define RPC\_TIMEOUT 504**

- 

Definition at line 609 of file midas.h.

**2.15 Other errors****Defines**

- #define FE\_SUCCESS 1
- #define FE\_ERR\_ODB 602
- #define FE\_ERR\_HW 603
- #define FE\_ERR\_DISABLED 604
- #define FE\_ERR\_DRIVER 605
- #define HS\_SUCCESS 1
- #define HS\_FILE\_ERROR 702
- #define HS\_NO\_MEMORY 703
- #define HS\_TRUNCATED 704
- #define HS\_WRONG\_INDEX 705
- #define HS\_UNDEFINED\_EVENT 706
- #define HS\_UNDEFINED\_VAR 707
- #define FTP\_SUCCESS 1
- #define FTP\_NET\_ERROR 802

- `#define FTP_FILE_ERROR` 803
- `#define FTP_RESPONSE_ERROR` 804
- `#define FTP_INVALID_ARG` 805
- `#define EL_SUCCESS` 1
- `#define EL_FILE_ERROR` 902
- `#define EL_NO_MESSAGE` 903
- `#define EL_TRUNCATED` 904
- `#define EL_FIRST_MSG` 905
- `#define EL_LAST_MSG` 906
- `#define AL_SUCCESS` 1
- `#define AL_INVALID_NAME` 1002
- `#define AL_ERROR_ODB` 1003
- `#define AL_RESET` 1004
- `#define CMD_INIT` (1<<0)
- `#define CMD_WRITE` 100
- `#define CMD_INTERRUPT_ENABLE` 100
- `#define BD_GETS(s, z, p, t) info → bd(CMD_GETS, info → bd_info, s, z, p, t)`

### 2.15.1 Define Documentation

#### 2.15.1.1 `#define AL_ERROR_ODB` 1003

- 

Definition at line 660 of file `midas.h`.

Referenced by `al_trigger_alarm()`.

#### 2.15.1.2 `#define AL_INVALID_NAME` 1002

- 

Definition at line 659 of file `midas.h`.

#### 2.15.1.3 `#define AL_RESET` 1004

- 

Definition at line 661 of file `midas.h`.

**2.15.1.4 #define AL\_SUCCESS 1**

Alarm error code -

Definition at line 658 of file midas.h.

Referenced by al\_trigger\_alarm().

**2.15.1.5 #define BD\_GETS(s, z, p, t) info → bd(CMD\_GETS, info → bd\_info, s, z, p, t)**

macros for bus driver access

Definition at line 701 of file midas.h.

**2.15.1.6 #define BD\_PUTS(s) info → bd(CMD\_PUTS, info → bd\_info, s)**

Definition at line 703 of file midas.h.

**2.15.1.7 #define BD\_READS(s, z, p, t) info → bd(CMD\_READ, info → bd\_info, s, z, p, t)**

Definition at line 702 of file midas.h.

**2.15.1.8 #define BD\_WRITES(s) info → bd(CMD\_WRITE, info → bd\_info, s)**

Definition at line 704 of file midas.h.

**2.15.1.9 #define CMD\_DEBUG 104**

Definition at line 689 of file midas.h.

**2.15.1.10 #define CMD\_DISABLE\_COMMAND (1<<16)**

Definition at line 681 of file midas.h.

**2.15.1.11 #define CMD\_ENABLE\_COMMAND (1<<15)**

Definition at line 680 of file midas.h.

**2.15.1.12 #define CMD\_EXIT (1<<1)**

Definition at line 666 of file midas.h.

Referenced by main().



**2.15.1.13 #define CMD\_GET (1<<5)**

Definition at line 670 of file midas.h.

**2.15.1.14 #define CMD\_GET\_ALL (1<<6)**

Definition at line 671 of file midas.h.

**2.15.1.15 #define CMD\_GET\_CURRENT (1<<7)**

Definition at line 672 of file midas.h.

**2.15.1.16 #define CMD\_GET\_CURRENT\_ALL (1<<8)**

Definition at line 673 of file midas.h.

**2.15.1.17 #define CMD\_GET\_DEFAULT\_NAME (1<<12)**

Definition at line 677 of file midas.h.

**2.15.1.18 #define CMD\_GET\_DEFAULT\_THRESHOLD (1<<13)**

Definition at line 678 of file midas.h.

**2.15.1.19 #define CMD\_GET\_DEMAND (1<<11)**

Definition at line 676 of file midas.h.

**2.15.1.20 #define CMD\_GETS 103**

Definition at line 688 of file midas.h.

**2.15.1.21 #define CMD\_IDLE (1<<2)**

Definition at line 667 of file midas.h.

Referenced by scheduler().

**2.15.1.22 #define CMD\_INIT (1<<0)**

Slow control commands error code

Definition at line 665 of file midas.h.

Referenced by register\_equipment().

**2.15.1.23 #define CMD\_INTERRUPT\_ATTACH 102**

Definition at line 696 of file midas.h.

Referenced by interrupt\_configure(), and register\_equipment().

**2.15.1.24 #define CMD\_INTERRUPT\_DETACH 103**

Definition at line 697 of file midas.h.

Referenced by interrupt\_configure(), and main().

**2.15.1.25 #define CMD\_INTERRUPT\_DISABLE 101**

Definition at line 695 of file midas.h.

Referenced by interrupt\_configure(), interrupt\_enable(), and main().

**2.15.1.26 #define CMD\_INTERRUPT\_ENABLE 100**

Commands for interrupt events error code

Definition at line 694 of file midas.h.

Referenced by interrupt\_configure(), and interrupt\_enable().

**2.15.1.27 #define CMD\_NAME 105**

Definition at line 690 of file midas.h.

**2.15.1.28 #define CMD\_PUTS 102**

Definition at line 687 of file midas.h.

**2.15.1.29 #define CMD\_READ 101**

Definition at line 686 of file midas.h.

**2.15.1.30 #define CMD\_SET (1<<3)**

Definition at line 668 of file midas.h.

**2.15.1.31 #define CMD\_SET\_ALL (1<<4)**

Definition at line 669 of file midas.h.

**2.15.1.32 #define CMD\_SET\_CURRENT\_LIMIT (1<<9)**

Definition at line 674 of file midas.h.

**2.15.1.33 #define CMD\_SET\_CURRENT\_LIMIT\_ALL (1<<10)**

Definition at line 675 of file midas.h.

**2.15.1.34 #define CMD\_SET\_LABEL (1<<14)**

Definition at line 679 of file midas.h.

**2.15.1.35 #define CMD\_WRITE 100**

Bus driver commands

Definition at line 685 of file midas.h.

**2.15.1.36 #define EL\_FILE\_ERROR 902**

- 

Definition at line 650 of file midas.h.

Referenced by el\_submit().

**2.15.1.37 #define EL\_FIRST\_MSG 905**

- 

Definition at line 653 of file midas.h.

**2.15.1.38 #define EL\_LAST\_MSG 906**

- 

Definition at line 654 of file midas.h.

**2.15.1.39 #define EL\_NO\_MESSAGE 903**

- 

Definition at line 651 of file midas.h.

**2.15.1.40 #define EL\_SUCCESS 1**

ELog error code -

Definition at line 649 of file midas.h.

Referenced by el\_submit().

**2.15.1.41 #define EL\_TRUNCATED 904**

- 

Definition at line 652 of file midas.h.

**2.15.1.42 #define FE\_ERR\_DISABLED 604**

- 

Definition at line 626 of file midas.h.

Referenced by display(), and register\_equipment().

**2.15.1.43 #define FE\_ERR\_DRIVER 605**

- 

Definition at line 627 of file midas.h.

**2.15.1.44 #define FE\_ERR\_HW 603**

- 

Definition at line 625 of file midas.h.

Referenced by display().

**2.15.1.45 #define FE\_ERR\_ODB 602**

- 

Definition at line 624 of file midas.h.

Referenced by display().

**2.15.1.46 #define FE\_SUCCESS 1**

- 

Definition at line 623 of file midas.h.

Referenced by display(), main(), register\_equipment(), scheduler(), and send\_all\_periodic\_events().

**2.15.1.47 #define FTP\_FILE\_ERROR 803**

- 

Definition at line 643 of file midas.h.

**2.15.1.48 #define FTP\_INVALID\_ARG 805**

- 

Definition at line 645 of file midas.h.

**2.15.1.49 #define FTP\_NET\_ERROR 802**

- 

Definition at line 642 of file midas.h.

**2.15.1.50 #define FTP\_RESPONSE\_ERROR 804**

- 

Definition at line 644 of file midas.h.

**2.15.1.51 #define FTP\_SUCCESS 1**

FTP error code -

Definition at line 641 of file midas.h.

**2.15.1.52 #define HS\_FILE\_ERROR 702**

- 

Definition at line 632 of file midas.h.

**2.15.1.53 #define HS\_NO\_MEMORY 703**

- 

Definition at line 633 of file midas.h.

**2.15.1.54 #define HS\_SUCCESS 1**

History error code -

Definition at line 631 of file midas.h.

Referenced by hs\_open\_file(), and hs\_set\_path().

**2.15.1.55 #define HS\_TRUNCATED 704**

- 

Definition at line 634 of file midas.h.

**2.15.1.56 #define HS\_UNDEFINED\_EVENT 706**

- 

Definition at line 636 of file midas.h.

**2.15.1.57 #define HS\_UNDEFINED\_VAR 707**

- 

Definition at line 637 of file midas.h.

**2.15.1.58 #define HS\_WRONG\_INDEX 705**

- 

Definition at line 635 of file midas.h.

## 2.16 Buffer Section

### Data Structures

- struct [EVENT\\_HEADER](#)
- struct [EVENT\\_REQUEST](#)
- struct [BUFFER\\_CLIENT](#)
- struct [BUFFER\\_HEADER](#)
- struct [BUFFER](#)
- struct [KEY](#)
- struct [KEYLIST](#)

### Defines

- `#define TRIGGER_MASK(e) (((EVENT_HEADER *) e)-1) → trigger_mask)`
- `#define EVENT_ID(e) (((EVENT_HEADER *) e)-1) → event_id)`
- `#define SERIAL_NUMBER(e) (((EVENT_HEADER *) e)-1) → serial_number)`
- `#define TIME_STAMP(e) (((EVENT_HEADER *) e)-1) → time_stamp)`
- `#define EVENTID_BOR ((short int) 0x8000)`
- `#define EVENTID_EOR ((short int) 0x8001)`
- `#define EVENTID_MESSAGE ((short int) 0x8002)`
- `#define EVENTID_FRAG1 ((unsigned short) 0xC000)`
- `#define MIDAS_MAGIC 0x494d`

#### 2.16.1 Define Documentation

##### 2.16.1.1 `#define EVENT_ID(e) (((EVENT_HEADER *) e)-1) → event_id)`

EVENT\_ID Extract or set the event ID field pointed by the argument..

##### Parameters:

*e* pointer to the midas event (pevent)

Definition at line 749 of file midas.h.

##### 2.16.1.2 `#define EVENT_SOURCE(e, o) (* (INT*) (e+o))`

Definition at line 764 of file midas.h.

**2.16.1.3 #define EVENTID\_BOR ((short int) 0x8000)**

system event IDs Begin-of-run

Definition at line 768 of file midas.h.

**2.16.1.4 #define EVENTID\_EOR ((short int) 0x8001)**

End-of-run

Definition at line 769 of file midas.h.

**2.16.1.5 #define EVENTID\_FRAG ((unsigned short) 0xD000)**

Definition at line 775 of file midas.h.

Referenced by bm\_match\_event(), bm\_push\_event(), and send\_event().

**2.16.1.6 #define EVENTID\_FRAG1 ((unsigned short) 0xC000)**

fragmented events

Definition at line 774 of file midas.h.

Referenced by bm\_match\_event(), bm\_push\_event(), and send\_event().

**2.16.1.7 #define EVENTID\_MESSAGE ((short int) 0x8002)**

Message events

Definition at line 770 of file midas.h.

Referenced by cm\_msg(), and cm\_msg1().

**2.16.1.8 #define MIDAS\_MAGIC 0x494d**

magic number used in trigger\_mask for BOR event 'MI'

Definition at line 779 of file midas.h.

**2.16.1.9 #define SERIAL\_NUMBER(e) (((EVENT\_HEADER \*) e)-1) → serial\_number)**

SERIAL\_NUMBER Extract or set/reset the serial number field pointed by the argument.

**Parameters:**

*e* pointer to the midas event (pevent)

Definition at line 756 of file midas.h.



**2.16.1.10** `#define TIME_STAMP(e) (((EVENT_HEADER *) e)-1) → time_stamp)`

TIME\_STAMP Extract or set/reset the time stamp field pointed by the argument.

**Parameters:**

*e* pointer to the midas event (pevent)

Definition at line 763 of file midas.h.

**2.16.1.11** `#define TRIGGER_MASK(e) (((EVENT_HEADER *) e)-1) → trigger_mask)`

TRIGGER\_MASK Extract or set the trigger mask field pointed by the argument.

**Parameters:**

*e* pointer to the midas event (pevent)

Definition at line 742 of file midas.h.

## 2.17 Equipment related

### Data Structures

- struct [BUS\\_DRIVER](#)
- struct [DEVICE\\_DRIVER](#)
- struct [EQUIPMENT\\_INFO](#)
- struct [EQUIPMENT\\_STATS](#)
- struct [eqpmnt](#)

### Defines

- `#define DF_INPUT (1<<0)`
- `#define DF_OUTPUT (1<<1)`
- `#define DF_PRIO_DEVICE (1<<2)`
- `#define DF_READ_ONLY (1<<3)`

#### 2.17.1 Define Documentation

**2.17.1.1 #define DF\_INPUT (1<<0)**

channel is input

Definition at line 882 of file midas.h.

**2.17.1.2 #define DF\_OUTPUT (1<<1)**

channel is output

Definition at line 883 of file midas.h.

**2.17.1.3 #define DF\_PRIO\_DEVICE (1<<2)**

get demand values from device instead of ODB

Definition at line 884 of file midas.h.

**2.17.1.4 #define DF\_READ\_ONLY (1<<3)**

never write demand values to device

Definition at line 885 of file midas.h.

**2.17.2 Typedef Documentation****2.17.2.1 typedef struct [eqpmnt](#) [EQUIPMENT](#)****2.17.2.2 typedef struct [eqpmnt](#)\* [PEQUIPMENT](#)**

Definition at line 926 of file midas.h.

**2.18 Bank related****Data Structures**

- struct [BANK\\_HEADER](#)
- struct [BANK](#)
- struct [BANK32](#)
- struct [TAG](#)
- struct [BANK\\_LIST](#)

## Defines

- `#define BANK_FORMAT_VERSION 1`
- `#define BANK_FORMAT_32BIT (1<<4)`

### 2.18.1 Define Documentation

#### 2.18.1.1 `#define BANK_FORMAT_32BIT (1<<4)`

- 

Definition at line 961 of file `midas.h`.

Referenced by `bk_create()`, and `bk_init32()`.

#### 2.18.1.2 `#define BANK_FORMAT_VERSION 1`

- 

Definition at line 960 of file `midas.h`.

Referenced by `bk_init()`, and `bk_init32()`.

## 2.19 Analyzer related

### Data Structures

- struct [ANA\\_MODULE](#)
- struct [AR\\_INFO](#)
- struct [AR\\_STATS](#)
- struct [ANALYZE\\_REQUEST](#)
- struct [ANA\\_TEST](#)

### 2.19.1 Define Documentation

#### 2.19.1.1 `#define DEF_TEST(t) extern ANA_TEST t;`

Definition at line 1078 of file `midas.h`.

**2.19.1.2** `#define SET_TEST(t, v) { if (!t.registered) test_register(&t); t.value = (v); }`

Definition at line 1072 of file midas.h.

Referenced by `adc_summing()`.

**2.19.1.3** `#define TEST(t) (t.value)`

Definition at line 1073 of file midas.h.

## 2.20 History related

### Data Structures

- struct [HIST\\_RECORD](#)
- struct [DEF\\_RECORD](#)
- struct [INDEX\\_RECORD](#)
- struct [HISTORY](#)

### 2.20.1 Define Documentation

**2.20.1.1** `#define RT_DATA (*((DWORD *) "HSDA"))`

Definition at line 1089 of file midas.h.

**2.20.1.2** `#define RT_DEF (*((DWORD *) "HSDF"))`

Definition at line 1090 of file midas.h.

## 2.21 ODB runinfo related

### Data Structures

- struct [RUNINFO](#)

### 2.21.1 Define Documentation

**2.21.1.1 #define RUNINFO\_STR(\_name)****Value:**

```

char *_name[] = {\
    "[.]",\
    "State = INT : 1",\
    "Online Mode = INT : 1",\
    "Run number = INT : 0",\
    "Transition in progress = INT : 0",\
    "Requested transition = INT : 0",\
    "Start time = STRING : [32] Tue Sep 09 15:04:42 1997",\
    "Start time binary = DWORD : 0",\
    "Stop time = STRING : [32] Tue Sep 09 15:04:42 1997",\
    "Stop time binary = DWORD : 0",\
    "",\
    NULL }

```

Definition at line 1147 of file midas.h.

Referenced by analyzer\_init(), and cm\_connect\_experiment1().

**2.22 Alarm related****2.22.1 Detailed Description**

Alarm structre.

**Data Structures**

- struct [PROGRAM\\_INFO](#)
- struct [ALARM\\_CLASS](#)
- struct [ALARM](#)

**Defines**

- #define [AT\\_INTERNAL](#) 1
- #define [AT\\_PROGRAM](#) 2
- #define [AT\\_EVALUATED](#) 3
- #define [AT\\_PERIODIC](#) 4
- #define [AT\\_LAST](#) 4

**2.22.2 Define Documentation**

**2.22.2.1 #define ALARM\_CLASS\_STR(\_name)****Value:**

```

char *_name[] = {\
    "[.]",\
    "Write system message = BOOL : y",\
    "Write Elog message = BOOL : n",\
    "System message interval = INT : 60",\
    "System message last = DWORD : 0",\
    "Execute command = STRING : [256] ",\
    "Execute interval = INT : 0",\
    "Execute last = DWORD : 0",\
    "Stop run = BOOL : n",\
    "Display BGColor = STRING : [32] red",\
    "Display FGColor = STRING : [32] black",\
    "",\
    NULL }

```

Definition at line 1219 of file midas.h.

**2.22.2.2 #define ALARM\_ODB\_STR(\_name)****Value:**

```

char *_name[] = {\
    "[.]",\
    "Active = BOOL : n",\
    "Triggered = INT : 0",\
    "Type = INT : 3",\
    "Check interval = INT : 60",\
    "Checked last = DWORD : 0",\
    "Time triggered first = STRING : [32] ",\
    "Time triggered last = STRING : [32] ",\
    "Condition = STRING : [256] /Runinfo/Run number > 100",\
    "Alarm Class = STRING : [32] Alarm",\
    "Alarm Message = STRING : [80] Run number became too large",\
    "",\
    NULL }

```

Definition at line 1249 of file midas.h.

Referenced by al\_trigger\_alarm().

**2.22.2.3 #define ALARM\_PERIODIC\_STR(\_name)****Value:**

```

char *_name[] = {\
    "[.]",\
    "Active = BOOL : n",\
    "Triggered = INT : 0",\

```

```

"Type = INT : 4",\
"Check interval = INT : 28800",\
"Checked last = DWORD : 0",\
"Time triggered first = STRING : [32] ",\
"Time triggered last = STRING : [32] ",\
"Condition = STRING : [256] ",\
"Alarm Class = STRING : [32] Warning",\
"Alarm Message = STRING : [80] Please do your shift checks",\
"",\
NULL }

```

Definition at line 1264 of file midas.h.

#### 2.22.2.4 #define AT\_EVALUATED 3

•

Definition at line 1186 of file midas.h.

Referenced by al\_trigger\_alarm().

#### 2.22.2.5 #define AT\_INTERNAL 1

•

Definition at line 1184 of file midas.h.

#### 2.22.2.6 #define AT\_LAST 4

•

Definition at line 1188 of file midas.h.

Referenced by al\_trigger\_alarm().

#### 2.22.2.7 #define AT\_PERIODIC 4

•

Definition at line 1187 of file midas.h.

Referenced by al\_trigger\_alarm().

### 2.22.2.8 #define AT\_PROGRAM 2

•

Definition at line 1185 of file midas.h.

### 2.22.2.9 #define PROGRAM\_INFO\_STR(\_name)

**Value:**

```
char *_name[] = {\
    "[.]",\
    "Required = BOOL : n",\
    "Watchdog timeout = INT : 10000",\
    "Check interval = DWORD : 180000",\
    "Start command = STRING : [256] ",\
    "Auto start = BOOL : n",\
    "Auto stop = BOOL : n",\
    "Auto restart = BOOL : n",\
    "Alarm class = STRING : [32] ",\
    "First failed = DWORD : 0",\
    "",\
    NULL }
```

Definition at line 1190 of file midas.h.

Referenced by cm\_set\_client\_info().

## 2.23 The ybos.h & ybos.c

### Modules

- [YBOS Define](#)
- [YBOS error code](#)
- [YBOS Macros](#)
- [YBOS Bank Functions \(ybk\\_XXX\)](#)

## 2.24 YBOS Define

### Defines

- #define [YBOS\\_PHYREC\\_SIZE](#) 8192
- #define [YBOS\\_BUFFER\\_SIZE](#) 3\*(YBOS\_PHYREC\_SIZE<<2) + MAX\_EVENT\_SIZE + 128



- #define YB\_BANKLIST\_MAX 32
- #define YB\_STRING\_BANKLIST\_MAX YB\_BANKLIST\_MAX \* 4
- #define H\_BLOCK\_SIZE 0
- #define H\_BLOCK\_NUM 1
- #define H\_HEAD\_LEN 2
- #define H\_START 3
- #define D\_RECORD 1
- #define D\_HEADER 2
- #define D\_EVTLEN 3
- #define YB\_COMPLETE 1
- #define YB\_INCOMPLETE 2
- #define YB\_NO\_RECOVER -1
- #define YB\_NO\_RUN 0
- #define YB\_ADD\_RUN 1
- #define DSP\_RAW 1
- #define DSP\_BANK 2
- #define DSP\_UNK 0
- #define DSP\_DEC 1
- #define DSP\_HEX 2
- #define DSP\_ASC 3
- #define I2\_BKTYPE 1
- #define A1\_BKTYPE 2
- #define I4\_BKTYPE 3
- #define F4\_BKTYPE 4
- #define D8\_BKTYPE 5
- #define I1\_BKTYPE 8
- #define MAX\_BKTYPE I1\_BKTYPE+1

### 2.24.1 Defne Documentation

#### 2.24.1.1 #define A1\_BKTYPE 2

ASCII 1 byte

Definition at line 276 of file ybos.h.

Referenced by update\_odb().

#### 2.24.1.2 #define D8\_BKTYPE 5

Double 8 bytes

Definition at line 279 of file ybos.h.

Referenced by update\_odb().

**2.24.1.3 #define D\_EVTLEN 3**

YBOS

Definition at line 109 of file ybos.h.

**2.24.1.4 #define D\_HEADER 2**

YBOS

Definition at line 108 of file ybos.h.

**2.24.1.5 #define D\_RECORD 1**

Display parameters YBOS

Definition at line 107 of file ybos.h.

**2.24.1.6 #define DSP\_ASC 3**

Display data in ASCII format

Definition at line 129 of file ybos.h.

**2.24.1.7 #define DSP\_BANK 2**

Display data in bank format

Definition at line 122 of file ybos.h.

**2.24.1.8 #define DSP\_DEC 1**

Display data in decimal format

Definition at line 127 of file ybos.h.

**2.24.1.9 #define DSP\_HEX 2**

Display data in hexadecimal format

Definition at line 128 of file ybos.h.

**2.24.1.10 #define DSP\_RAW 1**

Display mode options Display raw data

Definition at line 121 of file ybos.h.

**2.24.1.11 #define DSP\_UNK 0**

Display format Display format unknown

Definition at line 126 of file ybos.h.

**2.24.1.12 #define F4\_BKTYPE 4**

Float 4 bytes

Definition at line 278 of file ybos.h.

**2.24.1.13 #define H\_BLOCK\_NUM 1**

YBOS

Definition at line 101 of file ybos.h.

**2.24.1.14 #define H\_BLOCK\_SIZE 0**

record header content YBOS

Definition at line 100 of file ybos.h.

**2.24.1.15 #define H\_HEAD\_LEN 2**

YBOS

Definition at line 102 of file ybos.h.

**2.24.1.16 #define H\_START 3**

YBOS

Definition at line 103 of file ybos.h.

**2.24.1.17 #define I1\_BKTYPE 8**

Signed Integer 1 byte

Definition at line 280 of file ybos.h.

Referenced by update\_odb(), and ybk\_iterate().

**2.24.1.18 #define I2\_BKTYPE 1**

YBOS Bank types Signed Integer 2 bytes

Definition at line 275 of file ybos.h.

Referenced by update\_odb().

**2.24.1.19 #define I4\_BKTYPE 3**

Signed Integer 4bytes

Definition at line 277 of file ybos.h.

**2.24.1.20 #define MAX\_BKTYPE I1\_BKTYPE+1**

delimiter

Definition at line 281 of file ybos.h.

Referenced by ybk\_end(), ybk\_list(), and ybk\_locate().

**2.24.1.21 #define YB\_ADD\_RUN 1**

YBOS

Definition at line 117 of file ybos.h.

**2.24.1.22 #define YB\_BANKLIST\_MAX 32**

maximum number of banks to be found by the [ybk\\_list\(\)](#) or [bk\\_list\(\)](#)

Definition at line 69 of file ybos.h.

Referenced by ybk\_list().

**2.24.1.23 #define YB\_COMPLETE 1**

File fragmentation YBOS

Definition at line 113 of file ybos.h.

**2.24.1.24 #define YB\_INCOMPLETE 2**

YBOS

Definition at line 114 of file ybos.h.

**2.24.1.25 #define YB\_NO\_RECOVER -1**

YBOS

Definition at line 115 of file ybos.h.

**2.24.1.26 #define YB\_NO\_RUN 0**

YBOS

Definition at line 116 of file ybos.h.

**2.24.1.27 #define YB\_STRING\_BANKLIST\_MAX YB\_BANKLIST\_MAX \* 4**

to be used for xbk\_list()

Definition at line 71 of file ybos.h.

**2.24.1.28 #define YBOS\_BUFFER\_SIZE 3\*(YBOS\_PHYREC\_SIZE<<2) + MAX\_EVENT\_SIZE + 128**

in BYTES

Definition at line 67 of file ybos.h.

**2.24.1.29 #define YBOS\_HEADER\_LENGTH 4**

Definition at line 66 of file ybos.h.

**2.24.1.30 #define YBOS\_PHYREC\_SIZE 8192**

General parameters I\*4

Definition at line 64 of file ybos.h.

**2.25 YBOS Macros****Defines**

- #define [SWAP\\_D2WORD](#)(\_d2w)
- #define [EVID\\_TRINAT](#)
- #define [YBOS\\_EVID\\_BANK](#)(\_\_a, \_\_b, \_\_c, \_\_d, \_\_e)
- #define [MIDAS\\_EVID\\_BANK](#)(\_\_a, \_\_b, \_\_c, \_\_d, \_\_e)

**2.25.1 Define Documentation****2.25.1.1 #define EVID\_TRINAT**

As soon as the Midas header is striped out from the event, the YBOS remaining data has lost the event synchronization unless included by the user. It is therefore necessary to have a YBOS bank duplicating this information usually done in the FE by creating a "EVID" bank filled with the Midas info and other user information.

Unfortunately the format of this EVID is flexible and I couldn't force user to use a default structure. For this reason, I'm introducing a preprocessor flag for selecting such format.

Omitting the declaration of the pre-processor flag the EVID\_TRINAT is taken by default see [Midas build options and operation considerations](#).

Special macros are available to retrieve this information based on the EVID content and the type of EVID structure.

The Macro parameter should point to the first data of the EVID bank.

```
// check if EVID is present if so display its content
if ((status = ybk_find (pybos, "EVID", &bklen, &bktyp, (void *)&pybk)) == YB_SUCCESS)
{
    pdata = (DWORD *)((YBOS_BANK_HEADER *)pybk + 1);
    pevent->event_id      = YBOS_EVID_EVENT_ID(pdata);
    pevent->trigger_mask  = YBOS_EVID_TRIGGER_MASK(pdata);
    pevent->serial_number = YBOS_EVID_SERIAL(pdata);
    pevent->time_stamp    = YBOS_EVID_TIME(pdata);
    pevent->data_size     = pybk->length;
}
```

The current type of EVID bank are:

- [EVID\_TRINAT] Specific for Trinat experiment.

```
ybk_create((DWORD *)pevent, "EVID", I4_BKTYPE, (DWORD *)&pbkdat));
*((WORD *)pbkdat) = EVENT_ID(pevent);      ((WORD *)pbkdat)++;
*((WORD *)pbkdat) = TRIGGER_MASK(pevent); ((WORD *)pbkdat)++;
*(pbkdat)++ = SERIAL_NUMBER(pevent);
*(pbkdat)++ = TIME_STAMP(pevent);
*(pbkdat)++ = gbl_run_number;                // run number
```

- [EVID\_TWIST] Specific to Twist Experiment (Triumf).

```
ybk_create((DWORD *)pevent, "EVID", I4_BKTYPE, &pbkdat);
*((WORD *)pbkdat) = EVENT_ID(pevent);      ((WORD *)pbkdat)++;
*((WORD *)pbkdat) = TRIGGER_MASK(pevent); ((WORD *)pbkdat)++;
*(pbkdat)++ = SERIAL_NUMBER(pevent);
*(pbkdat)++ = TIME_STAMP(pevent);
*(pbkdat)++ = gbl_run_number;                // run number
*(pbkdat)++ = *((DWORD *)frontend_name);    // frontend name
ybk_close((DWORD *)pevent, pbkdat);
```

Definition at line 209 of file ybos.h.

### 2.25.1.2 #define MIDAS\_EVID\_BANK(\_\_a, \_\_b, \_\_c, \_\_d, \_\_e)

**Value:**

```
{\
    DWORD * pbuf;\
    bk_create(__a, "EVID", TID_DWORD, &pbuf);\
    *(pbuf)++ = (DWORD)__b;\
    *(pbuf)++ = (DWORD)__c;\
    *(pbuf)++ = (DWORD)__d;\
    *(pbuf)++ = (DWORD)ss_millitime();\
    *(pbuf)++ = (DWORD)__e;\
    bk_close(__a, pbuf);\
}
```

pevt Evt# id/msk serial run#

Definition at line 253 of file ybos.h.

### 2.25.1.3 #define SWAP\_D2WORD(\_d2w)

**Value:**

```
{\
    WORD _tmp2;\
    _tmp2 = *((WORD *) (_d2w));\
    *((WORD *) (_d2w)) = *((WORD *) (_d2w)+1);\
    *((WORD *) (_d2w)+1) = _tmp2;\
}
```

word swap (I4=I21I22 -> I4=I22I21

Definition at line 142 of file ybos.h.

### 2.25.1.4 #define YBOS\_EVID\_BANK(\_\_a, \_\_b, \_\_c, \_\_d, \_\_e)

**Value:**

```
{\
    DWORD * pbuf;\
    ybk_create(__a, "EVID", I4_BKTYPE, &pbuf);\
    *(pbuf)++ = (DWORD)__b;\
    *(pbuf)++ = (DWORD)__c;\
    *(pbuf)++ = (DWORD)__d;\
    *(pbuf)++ = (DWORD)ss_millitime();\
    *(pbuf)++ = (DWORD)__e;\
    ybk_close(__a, pbuf);\
}
```

pevt Evt# id/msk serial run#

Definition at line 239 of file ybos.h.

### 2.25.1.5 #define YBOS\_EVID\_EVENT\_ID(e) \*((WORD \*)(e)+1)

Definition at line 213 of file ybos.h.

**2.25.1.6 #define YBOS\_EVID\_EVENT\_NB(e) \*((DWORD \*)(e)+1)**

Definition at line 218 of file ybos.h.

**2.25.1.7 #define YBOS\_EVID\_RUN\_NUMBER(e) \*((DWORD \*)(e)+3)**

Definition at line 217 of file ybos.h.

**2.25.1.8 #define YBOS\_EVID\_SERIAL(e) \*((DWORD \*)(e)+1)**

Definition at line 215 of file ybos.h.

**2.25.1.9 #define YBOS\_EVID\_TIME(e) \*((DWORD \*)(e)+2)**

Definition at line 216 of file ybos.h.

**2.25.1.10 #define YBOS\_EVID\_TRIGGER\_MASK(e) \*((WORD \*)(e)+0)**

Definition at line 214 of file ybos.h.

**2.26 YBOS error code****Defines**

- `#define YB_SUCCESS 1`
- `#define YB_EVENT_NOT_SWAPPED 2`
- `#define YB_DONE 2`
- `#define YB_WRONG_BANK_TYPE -100`
- `#define YB_BANK_NOT_FOUND -101`
- `#define YB_SWAP_ERROR -102`
- `#define YB_NOMORE_SLOT -103`
- `#define YB_UNKNOWN_FORMAT -104`

**2.26.1 Define Documentation****2.26.1.1 #define YB\_BANK\_NOT\_FOUND -101**

Bank not found

Definition at line 85 of file ybos.h.

Referenced by `ybk_fnd()`, and `ybk_locate()`.



**2.26.1.2 #define YB\_DONE 2**

Operation complete

Definition at line 83 of file ybos.h.

**2.26.1.3 #define YB\_EVENT\_NOT\_SWAPPED 2**

Not swapped

Definition at line 82 of file ybos.h.

**2.26.1.4 #define YB\_NOMORE\_SLOT -103**

No more space for fragment

Definition at line 87 of file ybos.h.

**2.26.1.5 #define YB\_SUCCESS 1**

Ok

Definition at line 81 of file ybos.h.

Referenced by ybk\_end().

**2.26.1.6 #define YB\_SWAP\_ERROR -102**

Error swapping

Definition at line 86 of file ybos.h.

**2.26.1.7 #define YB\_UNKNOWN\_FORMAT -104**

Unknown format (see [YBOS format](#))

Definition at line 88 of file ybos.h.

**2.26.1.8 #define YB\_WRONG\_BANK\_TYPE -100**

Wrong bank type (see [YBOS Bank Types](#))

Definition at line 84 of file ybos.h.

Referenced by ybk\_end(), ybk\_list(), and ybk\_locate().

## 2.27 YBOS Bank Functions (ybk\_xxx)

### Functions

- void [ybk\\_init](#) (DWORD \*plrl)
- void [ybk\\_create](#) (DWORD \*plrl, char \*bkname, DWORD bktype, void \*pbkdat)
- INT [ybk\\_close](#) (DWORD \*plrl, void \*pbkdat)
- INT [ybk\\_size](#) (DWORD \*plrl)
- INT [ybk\\_list](#) (DWORD \*plrl, char \*bklist)
- INT [ybk\\_end](#) (DWORD \*plrl, char \*bkname, DWORD \*bklen, DWORD \*bktype, void \*\*pbk)
- INT [ybk\\_locate](#) (DWORD \*plrl, char \*bkname, void \*pdata)
- INT [ybk\\_iterate](#) (DWORD \*plrl, YBOS\_BANK\_HEADER \*\*pybkh, void \*\*pdata)

### 2.27.1 Function Documentation

#### 2.27.1.1 INT ybk\_close (DWORD \* *plrl*, void \* *pbkdat*)

Close the YBOS bank previously created by [ybk\\_create\(\)](#).

The data pointer *pdata* must be obtained by [ybk\\_create\(\)](#) and used as an address to fill a bank. It is incremented with every value written to the bank and finally points to a location just after the last byte of the bank. It is then passed to [ybk\\_close\(\)](#) to finish the bank creation. YBOS is a 4 bytes bank aligned structure. Padding is performed at the closing of the bank with values of 0x0f or/and 0xffb. See [YBOS bank examples](#).

#### Parameters:

*plrl* pointer to current composed event.

*pbkdat* pointer to the current data.

#### Returns:

number of bytes contained in bank.

Definition at line 384 of file `ybos.c`.

#### 2.27.1.2 void ybk\_create (DWORD \* *plrl*, char \* *bkname*, DWORD *bktype*, void \* *pbkdat*)

Define the following memory area to be a YBOS bank with the given attribute. See [YBOS bank examples](#).

Before banks can be created in an event, `ybk_init()` has to be called first. YBOS does not support mixed bank type. i.e: all the data are expected to be of the same type. YBOS is a 4 bytes bank aligned structure. Padding is performed at the closing of the bank (see `ybk_close`) with values of 0x0f or/and 0x0ffb. See [YBOS bank examples](#).

**Parameters:**

*plrl* pointer to the first DWORD of the event area.  
*bkname* name to be assigned to the created bank (max 4 char)  
*bktype* [YBOS Bank Types](#) of the values for the entire created bank.  
*pbkdat* return pointer to the first empty data location.

**Returns:**

void

Definition at line 273 of file `ybos.c`.

### 2.27.1.3 INT ybk\_find (DWORD \* plrl, char \* bkname, DWORD \* bklen, DWORD \* bktype, void \*\* pbk)

Find the requested bank and return the information if the bank as well as the pointer to the top of the data section.

**Parameters:**

*plrl* pointer to the area of event.  
*bkname* name of the bank to be located.  
*bklen* returned length in 4bytes unit of the bank.  
*bktype* returned bank type.  
*pbk* pointer to the first data of the found bank.

**Returns:**

YB\_SUCCESS, YB\_BANK\_NOT\_FOUND, YB\_WRONG\_BANK\_TYPE

Definition at line 478 of file `ybos.c`.

### 2.27.1.4 void ybk\_init (DWORD \* plrl)

Initializes an event for YBOS banks structure.

Before banks can be created in an event, `ybk_init()` has to be called first. See [YBOS bank examples](#).

**Parameters:**

*plrl* pointer to the first DWORD of the event area of event

**Returns:**

void

Definition at line 243 of file ybos.c.

**2.27.1.5 INT ybk\_iterate (DWORD \* *plrl*, YBOS\_BANK\_HEADER \*\* *pybkh*, void \*\* *pdata*)**

Returns the bank header pointer and data pointer of the given bank name.

**Parameters:**

*plrl* pointer to the area of event.

*pybkh* pointer to the YBOS bank header.

*pdata* pointer to the first data of the current bank.

**Returns:**

data length in 4 bytes unit. return -1 if no more bank found.

Definition at line 564 of file ybos.c.

Referenced by update\_odb().

**2.27.1.6 INT ybk\_list (DWORD \* *plrl*, char \* *bklist*)**

Returns the size in bytes of the event composed of YBOS bank(s).

The [bk\\_list\(\)](#) has to be a predefined string of max size of YB\_STRING\_BANKLIST\_MAX.

**Parameters:**

*plrl* pointer to the area of event

*bklist* Filled character string of the YBOS bank names found in the event.

**Returns:**

number of banks found in this event.

Definition at line 429 of file ybos.c.

**2.27.1.7 INT ybk\_locate (DWORD \* *plrl*, char \* *bkname*, void \* *pdata*)**

Locate the requested bank and return the pointer to the top of the data section.

**Parameters:**

*plrl* pointer to the area of event

*bkname* name of the bank to be located.

*pdata* pointer to the first data of the located bank.

**Returns:**

Number of DWORD in bank or YB\_BANK\_NOT\_FOUND, YB\_WRONG\_BANK\_TYPE (<0)

Definition at line 525 of file ybos.c.

### 2.27.1.8 INT ybk\_size (DWORD \*plrl)

Returns the size in bytes of the event composed of YBOS bank(s).

**Parameters:**

*plrl* pointer to the area of event

**Returns:**

number of bytes contained in data area of the event

Definition at line 414 of file ybos.c.

## 2.28 Midas Common Functions (cm\_xxx)

### Data Structures

- struct [TR\\_CLIENT](#)

### Functions

- INT [cm\\_synchronize](#) (DWORD \*seconds)
- INT [cm\\_asctime](#) (char \*str, INT buf\_size)
- INT [cm\\_time](#) (DWORD \*time)
- char \* [cm\\_get\\_version](#) ()
- INT [cm\\_set\\_path](#) (char \*path)
- INT [cm\\_get\\_path](#) (char \*path)
- INT [cm\\_scan\\_experiments](#) (void)
- INT [cm\\_delete\\_client\\_info](#) (HANDLE hDB, INT pid)
- INT [cm\\_check\\_client](#) (HANDLE hDB, HANDLE hKeyClient)
- INT [cm\\_set\\_client\\_info](#) (HANDLE hDB, HANDLE \*hKeyClient, char \*[host\\_name](#), char \*client\_name, INT hw\_type, char \*password, DWORD watchdog\_timeout)
- INT [cm\\_get\\_client\\_info](#) (char \*client\_name)
- INT [cm\\_get\\_environment](#) (char \*[host\\_name](#), int host\_name\_size, char \*[exp\\_name](#), int exp\_name\_size)

- INT `cm_connect_experiment` (char \*`host_name`, char \*`exp_name`, char \*`client_name`, void(\*func)(char \*))
- INT `cm_connect_experiment1` (char \*`host_name`, char \*`exp_name`, char \*`client_name`, void(\*func)(char \*), INT `odb_size`, DWORD watchdog\_timeout)
- INT `cm_list_experiments` (char \*`host_name`, char `exp_name`[MAX\_EXPERIMENT][NAME\_LENGTH])
- INT `cm_select_experiment` (char \*`host_name`, char \*`exp_name`)
- INT `cm_connect_client` (char \*`client_name`, HANDLE \*hConn)
- INT `cm_disconnect_client` (HANDLE hConn, BOOL bShutdown)
- INT `cm_disconnect_experiment` (void)
- INT `cm_set_experiment_database` (HANDLE `hDB`, HANDLE hKeyClient)
- INT `cm_get_experiment_database` (HANDLE \*`hDB`, HANDLE \*hKeyClient)
- INT `cm_set_watchdog_params` (BOOL call\_watchdog, DWORD timeout)
- INT `cm_get_watchdog_params` (BOOL \*call\_watchdog, DWORD \*timeout)
- INT `cm_get_watchdog_info` (HANDLE `hDB`, char \*`client_name`, DWORD \*timeout, DWORD \*last)
- INT `cm_register_transition` (INT transition, INT(\*func)(INT, char \*), INT sequence\_number)
- INT `cm_set_transition_sequence` (INT transition, INT sequence\_number)
- INT `cm_register_deferred_transition` (INT transition, BOOL(\*func)(INT, BOOL))
- INT `cm_check_deferred_transition` ()
- INT `cm_transition` (INT transition, INT `run_number`, char \*perror, INT strsize, INT async\_flag, INT debug\_flag)
- INT `cm_yield` (INT millisecond)
- INT `cm_execute` (char \*command, char \*result, INT bufsize)
- INT `cm_shutdown` (char \*name, BOOL bUnique)
- INT `cm_exist` (char \*name, BOOL bUnique)
- INT `cm_cleanup` (char \*`client_name`, BOOL ignore\_timeout)

### 2.28.1 Function Documentation

#### 2.28.1.1 INT `cm_asctime` (char \*`str`, INT `buf_size`)

Get time from MIDAS server and set local time.

##### Parameters:

*str* return time string

*buf\_size* Maximum size of str

##### Returns:

CM\_SUCCESS

Definition at line 947 of file midas.c.

Referenced by al\_trigger\_alarm(), and cm\_transition().

#### 2.28.1.2 INT cm\_check\_client (HANDLE hDB, HANDLE hKeyClient)

Check if a client with a /system/client/xxx entry has a valid entry in the ODB client table. If not, remove that client from the /system/client tree.

**Parameters:**

*hDB* Handle to online database

*hKeyClient* Handle to client key

**Returns:**

CM\_SUCCESS, CM\_NO\_CLIENT

Definition at line 1215 of file midas.c.

Referenced by cm\_set\_client\_info().

#### 2.28.1.3 INT cm\_check\_deferred\_transition ()

Check for any deferred transition. If a deferred transition handler has been registered via the cm\_register\_deferred\_transition function, this routine should be called regularly. It checks if a transition request is pending. If so, it calls the registered handler if the transition should be done and then actually does the transition.

**Returns:**

CM\_SUCCESS, <error> Error from [cm\\_transition\(\)](#)

Definition at line 2792 of file midas.c.

Referenced by scheduler().

#### 2.28.1.4 INT cm\_cleanup (char \* client\_name, BOOL ignore\_timeout)

Remove hanging clients independent of their watchdog timeout.

Since this function does not obey the client watchdog timeout, it should be only called to remove clients which have their watchdog checking turned off or which are known to be dead. The normal client removal is done via cm\_watchdog().

Currently (Sept. 02) there are two applications for that:

1. The ODBedit command "cleanup", which can be used to remove clients which have their watchdog checking off, like the analyzer started with the "-d" flag for a debugging session.

2. The frontend init code to remove previous frontends. This can be helpful if a frontend dies. Normally, one would have to wait 60 sec. for a crashed frontend to be removed. Only then one can start again the frontend. Since the frontend init code contains a call to `cm_cleanup(<frontend_name>)`, one can restart a frontend immediately.

Added `ignore_timeout` on Nov.03. A logger might have an increased timeout of up to 60 sec. because of tape operations. If `ignore_timeout` is FALSE, the logger is then not killed if its inactivity is less than 60 sec., while in the previous implementation it was always killed after `2*WATCHDOG_INTERVAL`.

**Parameters:**

*client\_name* Client name, if zero check all clients

*ignore\_timeout* If TRUE, ignore a possible increased timeout defined by each client.

**Returns:**

CM\_SUCCESS

Definition at line 4473 of file `midas.c`.

Referenced by `main()`.

### 2.28.1.5 INT `cm_connect_client` (char \* *client\_name*, HANDLE \* *hConn*)

Connect to a MIDAS client of the current experiment

For ~~Intermidas~~ **Intermidas** only.

*client\_name* Name of client to connect to. This name is set by the other client via the `cm_connect_experiment` call.

*hConn* Connection handle

**Returns:**

CM\_SUCCESS, CM\_NO\_CLIENT

Definition at line 1989 of file `midas.c`.

### 2.28.1.6 INT `cm_connect_experiment` (char \* *host\_name*, char \* *exp\_name*, char \* *client\_name*, void(\*) (char \*) *func*)

This function connects to an existing MIDAS experiment. This must be the first call in a MIDAS application. It opens three TCP connection to the remote host (one for RPC calls, one to send events and one for hot-link notifications from the remote host) and writes client information into the ODB under `/System/Clients`.



**Attention:**

All MIDAS applications should evaluate the MIDAS\_SERVER\_HOST and MIDAS\_EXPT\_NAME environment variables as defaults to the host name and experiment name (see [Environment variables](#)). For that purpose, the function `cm_get_environment()` should be called prior to `cm_connect_experiment()`. If command line parameters `-h` and `-e` are used, the evaluation should be done between `cm_get_environment()` and `cm_connect_experiment()`. The function `cm_disconnect_experiment()` must be called before a MIDAS application exits.

```
#include <stdio.h>
#include <midas.h>
main(int argc, char *argv[])
{
    INT status, i;
    char host_name[256], exp_name[32];

    // get default values from environment
    cm_get_environment(host_name, exp_name);

    // parse command line parameters
    for (i=1 ; i<argc ; i++)
    {
        if (argv[i][0] == '-')
        {
            if (i+1 >= argc || argv[i+1][0] == '-')
                goto usage;
            if (argv[i][1] == 'e')
                strcpy(exp_name, argv[++i]);
            else if (argv[i][1] == 'h')
                strcpy(host_name, argv[++i]);
            else
            {
usage:
                printf("usage: test [-h Hostname] [-e Experiment]\n\n");
                return 1;
            }
        }
    }
    status = cm_connect_experiment(host_name, exp_name, "Test", NULL);
    if (status != CM_SUCCESS)
        return 1;
    ...do operations...
    cm_disconnect_experiment();
}
```

**Parameters:**

**host\_name** Specifies host to connect to. Must be a valid IP host name. The string can be empty ("") if to connect to the local computer.

**exp\_name** Specifies the experiment to connect to. If this string is empty, the number of defined experiments in exptab is checked. If only one experiment is defined, the function automatically connects to this one. If more than one experiment is defined, a list is presented and the user can interactively select one experiment.

**client\_name** Client name of the calling program as it can be seen by others (like the scl command in ODBEdit).

**func** Callback function to read in a password if security has been enabled. In all command line applications this function is NULL which invokes an internal `ss_gets()` function to read in a password. In windows environments (MS Windows, X Windows) a function can be supplied to open a dialog box and read in the password. The argument of this function must be the returned password.

**Returns:**

CM\_SUCCESS, CM\_UNDEF\_EXP, CM\_SET\_ERROR, RPC\_NET\_ERROR  
CM\_VERSION\_MISMATCH MIDAS library version different on local and remote computer

Definition at line 1628 of file `midas.c`.

Referenced by `main()`.

**2.28.1.7 INT cm\_connect\_experiment1 (char \* *host\_name*, char \* *exp\_name*, char \* *client\_name*, void(\*) (char \*) *func*, INT *odb\_size*, DWORD *watchdog\_timeout*)**

Connect to a MIDAS experiment (to the online database) on a specific host.

**For internal use only.**

Definition at line 1650 of file `midas.c`.

Referenced by `cm_connect_experiment()`, and `main()`.

**2.28.1.8 INT cm\_delete\_client\_info (HANDLE *hDB*, INT *pid*)**

Delete client info from database

**Parameters:**

**hDB** Database handle  
**pid** PID of entry to delete, zero for this process.

**Returns:**

CM\_SUCCESS

Definition at line 1164 of file `midas.c`.

Referenced by `cm_check_client()`, `cm_cleanup()`, and `cm_disconnect_experiment()`.

**2.28.1.9 INT cm\_disconnect\_client (HANDLE *hConn*, BOOL *bShutdown*)**

Disconnect from a MIDAS client

**Parameters:**

*hConn* Connection handle obtained via [cm\\_connect\\_client\(\)](#)

*bShutdown* If TRUE, disconnect from client and shut it down (exit the client program) by sending a RPC\_SHUTDOWN message

**Returns:**

see [rpc\\_client\\_disconnect\(\)](#)

Definition at line 2055 of file `midas.c`.

**2.28.1.10 INT cm\_disconnect\_experiment (void)**

Disconnect from a MIDAS experiment.

**Attention:**

Should be the last call to a MIDAS library function in an application before it exits. This function removes the client information from the ODB, disconnects all TCP connections and frees all internal allocated memory. See [cm\\_connect\\_experiment\(\)](#) for example.

**Returns:**

CM\_SUCCESS

Definition at line 2069 of file `midas.c`.

Referenced by `cm_connect_experiment1()`, `main()`, and `register_equipment()`.

**2.28.1.11 INT cm\_execute (char \* *command*, char \* *result*, INT *bufsize*)**

Executes command via `system()` call

**Parameters:**

*command* Command string to execute

*result* stdout of command

*bufsize* string size in byte

**Returns:**

CM\_SUCCESS

Definition at line 3545 of file `midas.c`.

**2.28.1.12 INT cm\_exist (char \* name, BOOL bUnique)**

Check if a MIDAS client exists in current experiment

**Parameters:**

*name* Client name

*bUnique* If true, look for the exact client name. If false, look for namexxx where xxx is a any number

**Returns:**

CM\_SUCCESS, CM\_NO\_CLIENT

Definition at line 4395 of file midas.c.

Referenced by main().

**2.28.1.13 INT cm\_get\_client\_info (char \* client\_name)**

Get info about the current client

**Parameters:**

*\*client\_name* Client name.

**Returns:**

CM\_SUCCESS, CM\_UNDEF\_EXP

Definition at line 1454 of file midas.c.

Referenced by bm\_open\_buffer().

**2.28.1.14 INT cm\_get\_environment (char \* host\_name, int host\_name\_size, char \* exp\_name, int exp\_name\_size)**

Returns MIDAS environment variables.

**Attention:**

This function can be used to evaluate the standard MIDAS environment variables before connecting to an experiment (see [Environment variables](#)). The usual way is that the host name and experiment name are first derived from the environment variables MIDAS\_SERVER\_HOST and MIDAS\_EXPT\_NAME. They can then be superseded by command line parameters with -h and -e flags.

```
#include <stdio.h>
#include <midas.h>
main(int argc, char *argv[])
{
    INT status, i;
    char host_name[256], exp_name[32];
```

```

// get default values from environment
cm_get_environment(host_name, exp_name);

// parse command line parameters
for (i=1 ; i<argc ; i++)
{
    if (argv[i][0] == '-')
    {
        if (i+1 >= argc || argv[i+1][0] == '-')
            goto usage;
        if (argv[i][1] == 'e')
            strcpy(exp_name, argv[++i]);
        else if (argv[i][1] == 'h')
            strcpy(host_name, argv[++i]);
        else
        {
usage:
            printf("usage: test [-h Hostname] [-e Experiment]\n\n");
            return 1;
        }
    }
}

status = cm_connect_experiment(host_name, exp_name, "Test", NULL);
if (status != CM_SUCCESS)
    return 1;
...do anything...
cm_disconnect_experiment();
}

```

**Parameters:**

*host\_name* Contents of MIDAS\_SERVER\_HOST environment variable.

*host\_name\_size* string length

*exp\_name* Contents of MIDAS\_EXPT\_NAME environment variable.

*exp\_name\_size* string length

**Returns:**

CM\_SUCCESS

Definition at line 1530 of file midas.c.

Referenced by main().

### 2.28.1.15 INT cm\_get\_experiment\_database (HANDLE \* hDB, HANDLE \* hKey-Client)

Get the handle to the ODB from the currently connected experiment.

**Attention:**

This function returns the handle of the online database (ODB) which can be used in future db\_xxx() calls. The hkeyclient key handle can be used to access the client

information in the ODB. If the client key handle is not needed, the parameter can be NULL.

```
HNDLE hdb, hkeyclient;
char name[32];
int size;
db_get_experiment_database(&hdb, &hkeyclient);
size = sizeof(name);
db_get_value(hdb, hkeyclient, "Name", name, &size, TID_STRING, TRUE);
printf("My name is %s\n", name);
```

**Parameters:**

*hDB* Database handle.

*hKeyClient* Handle for key where search starts, zero for root.

**Returns:**

CM\_SUCCESS

Definition at line 2214 of file midas.c.

Referenced by al\_trigger\_alarm(), ana\_end\_of\_run(), analyzer\_init(), cm\_connect\_client(), cm\_disconnect\_experiment(), cm\_exist(), cm\_get\_client\_info(), cm\_msg\_log(), cm\_msg\_log1(), cm\_msg\_retrieve(), cm\_register\_deferred\_transition(), cm\_register\_transition(), cm\_set\_transition\_sequence(), cm\_set\_watchdog\_params(), cm\_shutdown(), cm\_transition(), el\_submit(), and main().

### 2.28.1.16 INT cm\_get\_path (char \* *path*)

Return the path name previously set with cm\_set\_path.

**Parameters:**

*path* Pathname

**Returns:**

CM\_SUCCESS

Definition at line 1036 of file midas.c.

Referenced by cm\_connect\_experiment1(), cm\_msg\_log(), cm\_msg\_log1(), and cm\_msg\_retrieve().

### 2.28.1.17 char\* cm\_get\_version ()

Return version number of current MIDAS library as a string

**Returns:**

version number \* 100

Definition at line 1005 of file midas.c.

Referenced by cm\_transition().

**2.28.1.18 INT cm\_get\_watchdog\_info (HANDLE *hDB*, char \* *client\_name*, DWORD \* *timeout*, DWORD \* *last*)**

Return watchdog information about specific client

**Parameters:**

*hDB* ODB handle  
*client\_name* ODB client name  
*timeout* Timeout for this application in seconds  
*last* Last time watchdog was called in msec

**Returns:**

CM\_SUCCESS, CM\_NO\_CLIENT, DB\_INVALID\_HANDLE

Definition at line 2435 of file midas.c.

**2.28.1.19 INT cm\_get\_watchdog\_params (BOOL \* *call\_watchdog*, DWORD \* *timeout*)**

Return the current watchdog parameters

**Parameters:**

*call\_watchdog* Call the cm\_watchdog routine periodically  
*timeout* Timeout for this application in seconds

**Returns:**

CM\_SUCCESS

Definition at line 2415 of file midas.c.

Referenced by bm\_open\_buffer(), cm\_connect\_experiment1(), cm\_set\_client\_info(), and db\_open\_database().

**2.28.1.20 INT cm\_list\_experiments (char \* *host\_name*, char *exp\_name*[MAX\_EXPERIMENT][NAME\_LENGTH])**

Connect to a MIDAS server and return all defined experiments in \*exp\_name[MAX\_EXPERIMENTS]

**Parameters:**

*host\_name* Internet host name.  
*exp\_name* list of experiment names

**Returns:**

CM\_SUCCESS, RPC\_NET\_ERROR

Definition at line 1847 of file midas.c.

Referenced by cm\_select\_experiment().

### 2.28.1.21 INT cm\_register\_deferred\_transition (INT *transition*, BOOL(\*) (INT, BOOL) *func*)

Register a deferred transition handler. If a client is registered as a deferred transition handler, it may defer a requested transition by returning FALSE until a certain condition (like a motor reaches its end position) is reached.

#### Parameters:

*transition* One of TR\_xxx

(*\*func*) Function which gets called whenever a transition is requested. If it returns FALSE, the transition is not performed.

#### Returns:

CM\_SUCCESS, <error> Error from ODB access

Definition at line 2731 of file midas.c.

### 2.28.1.22 INT cm\_register\_transition (INT *transition*, INT(\*) (INT, char \*) *func*, INT *sequence\_number*)

Registers a callback function for run transitions. This function internally registers the transition callback function and publishes its request for transition notification by writing a transition request to /System/Clients/<pid>/Transition XXX. Other clients making a transition scan the transition requests of all clients and call their transition callbacks via RPC.

Clients can register for transitions (Start/Stop/Pause/Resume) in a given sequence. All sequence numbers given in the registration are sorted on a transition and the clients are contacted in ascending order. By default, all programs register with a sequence number of 500. The logger however uses 200 for start, so that it can open files before the other clients are contacted, and 800 for stop, so that the files get closed when all other clients have gone already through the stop transition.

The callback function returns CM\_SUCCESS if it can perform the transition or a value larger than one in case of error. An error string can be copied into the error variable.

#### Attention:

The callback function will be called on transitions from inside the [cm\\_yield\(\)](#) function which therefore must be contained in the main program loop.

```
INT start(INT run_number, char *error)
{
    if (<not ok>)
```



```

    {
        strcpy(error, "Cannot start because ...");
        return 2;
    }
    printf("Starting run %d\n", run_number);
    return CM_SUCCESS;
}
main()
{
    ...
    cm_register_transition(TR_START, start, 500);
    do
    {
        status = cm_yield(1000);
    } while (status != RPC_SHUTDOWN &&
            status != SS_ABORT);
    ...
}

```

**Parameters:**

***transition*** Transition to register for (see [State Codes & Transition Codes](#))

***func*** Callback function.

***sequence\_number*** Sequence number for that transition (1..1000)

**Returns:**

CM\_SUCCESS

Definition at line 2594 of file midas.c.

Referenced by main().

**2.28.1.23 INT cm\_scan\_experiments (void)**

Scan the "exptab" file for MIDAS experiment names and save them for later use by `rpc_server_accept()`. The file is first searched under \$MIDAS/exptab if present, then the directory from `argv[0]` is probed.

**Returns:**

CM\_SUCCESS

CM\_UNDEF\_EXP exptab not found and MIDAS\_DIR not set

Definition at line 1072 of file midas.c.

Referenced by `cm_connect_experiment1()`, and `cm_list_experiments()`.

**2.28.1.24 INT cm\_select\_experiment (char \* host\_name, char \* exp\_name)**

Connect to a MIDAS server and select an experiment from the experiments available on this server

For ~~Intermidas~~ **Intermidas** only.

*host\_name* Internet host name.

*exp\_name* list of experiment names

**Returns:**

CM\_SUCCESS, RPC\_NET\_ERROR

Definition at line 1950 of file midas.c.

Referenced by cm\_connect\_experiment1().

**2.28.1.25 INT cm\_set\_client\_info (HANDLE *hDB*, HANDLE \* *hKeyClient*, char \* *host\_name*, char \* *client\_name*, INT *hw\_type*, char \* *password*, DWORD *watchdog\_timeout*)**

Set client information in online database and return handle

**Parameters:**

*hDB* Handle to online database

*hKeyClient* returned key

*host\_name* server name

*client\_name* Name of this program as it will be seen by other clients.

*hw\_type* Type of byte order

*password* MIDAS password

*watchdog\_timeout* Default watchdog timeout, can be overwritten by ODB setting  
/programs/<name>/Watchdog timeout

**Returns:**

CM\_SUCCESS

Definition at line 1277 of file midas.c.

Referenced by cm\_connect\_experiment1().

**2.28.1.26 INT cm\_set\_experiment\_database (HANDLE *hDB*, HANDLE *hKeyClient*)**

Set the handle to the ODB for the currently connected experiment

**Parameters:**

*hDB* Database handle

*hKeyClient* Key handle of client structure

**Returns:**

CM\_SUCCESS

Definition at line 2151 of file midas.c.

Referenced by cm\_connect\_experiment1(), and cm\_disconnect\_experiment().

**2.28.1.27 INT cm\_set\_path (char \* *path*)**

Set path to actual experiment. This function gets called by cm\_connect\_experiment if the connection is established to a local experiment (not through the TCP/IP server). The path is then used for all shared memory routines.

**Parameters:**

*path* Pathname

**Returns:**

CM\_SUCCESS

Definition at line 1019 of file midas.c.

Referenced by cm\_connect\_experiment1().

**2.28.1.28 INT cm\_set\_transition\_sequence (INT *transition*, INT *sequence\_number*)**

Change the transition sequence for the calling program.

**Parameters:**

*transition* TR\_START, TR\_PAUSE, TR\_RESUME or TR\_STOP.

*sequence\_number* New sequence number, should be between 1 and 1000

**Returns:**

CM\_SUCCESS

Definition at line 2666 of file midas.c.

**2.28.1.29 INT cm\_set\_watchdog\_params (BOOL *call\_watchdog*, DWORD *timeout*)**

Sets the internal watchdog flags and the own timeout. If call\_watchdog is TRUE, the cm\_watchdog routine is called periodically from the system to show other clients that this application is "alive". On UNIX systems, the alarm() timer is used which is then not available for user purposes.

The timeout specifies the time, after which the calling application should be considered "dead" by other clients. Normally, the cm\_watchdog() routine is called periodically. If a client crashes, this does not occur any more. Then other clients can detect this and clear all buffer and database entries of this application so they are not blocked any more. If this application should not be checked by others, the timeout can be specified as zero. It might be useful for debugging purposes to do so, because if a debugger comes to a breakpoint and stops the application, the periodic call of cm\_watchdog is disabled and the client looks like dead.

If the timeout is not zero, but the watchdog is not called (`call_watchdog == FALSE`), the user must ensure to call `cm_watchdog` periodically with a period of `WATCHDOG_INTERVAL` milliseconds or less.

An application which calls system routines which block the alarm signal for some time, might increase the timeout to the maximum expected blocking time before issuing the calls. One example is the logger doing Exabyte tape IO, which can take up to one minute.

**Parameters:**

*call\_watchdog* Call the `cm_watchdog` routine periodically

*timeout* Timeout for this application in ms

**Returns:**

`CM_SUCCESS`

Definition at line 2301 of file `midas.c`.

Referenced by `cm_connect_experiment1()`, `cm_set_client_info()`, and `main()`.

### 2.28.1.30 INT cm\_shutdown (char \* name, BOOL bUnique)

Shutdown (exit) other MIDAS client

**Parameters:**

*name* Client name or "all" for all clients

*bUnique* If true, look for the exact client name. If false, look for `namexxx` where `xxx` is a any number.

**Returns:**

`CM_SUCCESS`, `CM_NO_CLIENT`, `DB_NO_KEY`

Definition at line 4305 of file `midas.c`.

Referenced by `cm_transition()`, and `main()`.

### 2.28.1.31 INT cm\_synchronize (DWORD \* seconds)

Get time from MIDAS server and set local time.

**Parameters:**

*seconds* Time in seconds

**Returns:**

`CM_SUCCESS`

Definition at line 919 of file `midas.c`.

Referenced by `main()`.

**2.28.1.32 INT cm\_time (DWORD \* *time*)**

Get time from ss\_time on server.

**Parameters:**

*time* string

**Returns:**

CM\_SUCCESS

Definition at line 965 of file midas.c.

Referenced by cm\_transition().

**2.28.1.33 INT cm\_transition (INT *transition*, INT *run\_number*, char \* *perror*, INT *strsize*, INT *async\_flag*, INT *debug\_flag*)**

Performs a run transition (Start/Stop/Pause/Resume).

Synchronous/Asynchronous flag. If set to ASYNC, the transition is done asynchronously, meaning that clients are connected and told to execute their callback routine, but no result is awaited. The return value is specified by the transition callback function on the remote clients. If all callbacks can perform the transition, CM\_SUCCESS is returned. If one callback cannot perform the transition, the return value of this callback is returned from [cm\\_transition\(\)](#). The *async\_flag* is usually FALSE so that transition callbacks can block a run transition in case of problems and return an error string. The only exception are situations where a run transition is performed automatically by a program which cannot block in a transition. For example the logger can cause a run stop when a disk is nearly full but it cannot block in the [cm\\_transition\(\)](#) function since it has its own run stop callback which must flush buffers and close disk files and tapes.

```
...
    i = 1;
    db_set_value(hDB, 0, "Runinfo/Transition in progress", &i, sizeof(INT), 1, TID_INT);

    status = cm_transition(TR_START, new_run_number, str, sizeof(str), SYNC, debug_flag);
    if (status != CM_SUCCESS)
    {
        // in case of error
        printf("Error: %s\n", str);
    }
    ...
```

**Parameters:**

*transition* TR\_START, TR\_PAUSE, TR\_RESUME or TR\_STOP.

*run\_number* New run number. If zero, use current run number plus one.

*perror* returned error string.

*strsize* Size of error string.

*async\_flag* SYNC: synchronization flag (SYNC:wait completion, ASYNC: return immediately)

*debug\_flag* If 1 output debugging information, if 2 output via [cm\\_msg\(\)](#).

**Returns:**

CM\_SUCCESS, <error> error code from remote client

Definition at line 2889 of file `midas.c`.

Referenced by `cm_check_deferred_transition()`, `scan_fragment()`, and `scheduler()`.

### 2.28.1.34 INT `cm_yield` (INT *millisec*)

Central yield functions for clients. This routine should be called in an infinite loop by a client in order to give the MIDAS system the opportunity to receive commands over RPC channels, update database records and receive events.

**Parameters:**

*millisec* Timeout in millisec. If no message is received during the specified timeout, the routine returns. If `millisec=-1`, it only returns when receiving an `RPC_SHUTDOWN` message.

**Returns:**

CM\_SUCCESS, `RPC_SHUTDOWN`

Definition at line 3492 of file `midas.c`.

Referenced by `scan_fragment()`, and `scheduler()`.

### 2.28.1.35 int `tr_compare` (const void \* *arg1*, const void \* *arg2*)

Definition at line 2844 of file `midas.c`.

Referenced by `cm_transition()`.

## 2.29 Midas Buffer Manager Functions (bm\_xxx)

**Functions**

- INT [bm\\_match\\_event](#) (short int *event\_id*, short int *trigger\_mask*, [EVENT\\_HEADER](#) \**pevent*)
- INT [bm\\_open\\_buffer](#) (char \**buffer\_name*, INT *buffer\_size*, INT \**buffer\_handle*)
- INT [bm\\_close\\_buffer](#) (INT *buffer\_handle*)
- INT [bm\\_close\\_all\\_buffers](#) (void)

- INT [bm\\_set\\_cache\\_size](#) (INT buffer\_handle, INT read\_size, INT write\_size)
- INT [bm\\_compose\\_event](#) (EVENT\_HEADER \*event\_header, short int event\_id, short int trigger\_mask, DWORD size, DWORD serial)
- INT [bm\\_request\\_event](#) (HNDLE buffer\_handle, short int event\_id, short int trigger\_mask, INT sampling\_type, HNDLE \*request\_id, void(\*func)(HNDLE, HNDLE, EVENT\_HEADER \*, void \*))
- INT [bm\\_remove\\_event\\_request](#) (INT buffer\_handle, INT request\_id)
- INT [bm\\_delete\\_request](#) (INT request\_id)
- INT [bm\\_send\\_event](#) (INT buffer\_handle, void \*source, INT buf\_size, INT async\_tag)
- INT [bm\\_push\\_cache](#) (INT buffer\_handle, INT async\_tag)
- INT [bm\\_receive\\_event](#) (INT buffer\_handle, void \*destination, INT \*buf\_size, INT async\_tag)
- INT [bm\\_skip\\_event](#) (INT buffer\_handle)
- INT [bm\\_push\\_event](#) (char \*buffer\_name)
- INT [bm\\_check\\_buffers](#) ()
- INT [bm\\_empty\\_buffers](#) ()

### 2.29.1 Function Documentation

#### 2.29.1.1 INT [bm\\_check\\_buffers](#) ()

Check if any requested event is waiting in a buffer

**Returns:**

TRUE More events are waiting  
FALSE No more events are waiting

Definition at line 6766 of file midas.c.

Referenced by [cm\\_yield\(\)](#).

#### 2.29.1.2 INT [bm\\_close\\_all\\_buffers](#) (void)

Close all open buffers

**Returns:**

BM\_SUCCESS

Definition at line 4048 of file midas.c.

Referenced by [cm\\_disconnect\\_experiment\(\)](#), and [cm\\_set\\_client\\_info\(\)](#).

**2.29.1.3 INT bm\_close\_buffer (INT *buffer\_handle*)**

Closes an event buffer previously opened with [bm\\_open\\_buffer\(\)](#).

**Parameters:**

*buffer\_handle* buffer handle

**Returns:**

BM\_SUCCESS, BM\_INVALID\_HANDLE

Definition at line 3937 of file `midas.c`.

Referenced by `bm_close_all_buffers()`, and `source_unbooking()`.

**2.29.1.4 INT bm\_compose\_event (EVENT\_HEADER \* *event\_header*, short int *event\_id*, short int *trigger\_mask*, DWORD *size*, DWORD *serial*)**

Compose a Midas event header. An event header can usually be set-up manually or through this routine. If the data size of the event is not known when the header is composed, it can be set later with `event_header->data-size = <...>`. Following structure is created at the beginning of an event

```
typedef struct {
    short int    event_id;
    short int    trigger_mask;
    DWORD        serial_number;
    DWORD        time_stamp;
    DWORD        data_size;
} EVENT_HEADER;

char event[1000];
bm_compose_event((EVENT_HEADER *)event, 1, 0, 100, 1);
*(event+sizeof(EVENT_HEADER)) = <...>
```

**Parameters:**

*event\_header* pointer to the event header

*event\_id* event ID of the event

*trigger\_mask* trigger mask of the event

*size* size of the data part of the event in bytes

*serial* serial number

**Returns:**

BM\_SUCCESS

Definition at line 5023 of file `midas.c`.

Referenced by `cm_msg()`, `cm_msg1()`, and `source_scan()`.



### 2.29.1.5 INT `bm_delete_request` (INT *request\_id*)

Deletes an event request previously done with `bm_request_event()`. When an event request gets deleted, events of that requested type are not received any more. When a buffer is closed via `bm_close_buffer()`, all event requests from that buffer are deleted automatically

**Parameters:**

*request\_id* request identifier given by `bm_request_event()`

**Returns:**

BM\_SUCCESS, BM\_INVALID\_HANDLE

Definition at line 5330 of file `midas.c`.

Referenced by `bm_close_buffer()`, and `source_unbooking()`.

### 2.29.1.6 INT `bm_empty_buffers` ()

Clears event buffer and cache. If an event buffer is large and a consumer is slow in analyzing events, events are usually received some time after they are produced. This effect is even more experienced if a read cache is used (via `bm_set_cache_size()`). When changes to the hardware are made in the experience, the consumer will then still analyze old events before any new event which reflects the hardware change. Users can be fooled by looking at histograms which reflect the hardware change many seconds after they have been made.

To overcome this potential problem, the analyzer can call `bm_empty_buffers()` just after the hardware change has been made which skips all old events contained in event buffers and read caches. Technically this is done by forwarding the read pointer of the client. No events are really deleted, they are still visible to other clients like the logger.

Note that the front-end also contains write buffers which can delay the delivery of events. The standard front-end framework `mfe.c` reduces this effect by flushing all buffers once every second.

**Returns:**

BM\_SUCCESS

Definition at line 7088 of file `midas.c`.

Referenced by `handFlush()`, `source_booking()`, and `source_unbooking()`.

### 2.29.1.7 INT `bm_flush_cache` (INT *buffer\_handle*, INT *async\_flag*)

Empty write cache. This function should be used if events in the write cache should be visible to the consumers immediately. It should be called at the end of each run, otherwise events could be kept in the write buffer and will flow to the data of the next run.

**Parameters:**

*buffer\_handle* Buffer handle obtained via [bm\\_open\\_buffer\(\)](#)

*async\_flag* Synchronous/asynchronous flag. If FALSE, the function blocks if the buffer has not enough free space to receive the full cache. If TRUE, the function returns immediately with a value of BM\_ASYNC\_RETURN without writing the cache.

**Returns:**

BM\_SUCCESS, BM\_INVALID\_HANDLE

BM\_ASYNC\_RETURN Routine called with *async\_flag* == TRUE and buffer has not enough space to receive cache

BM\_NO\_MEMORY Event is too large for network buffer or event buffer. One has to increase MAX\_EVENT\_SIZE or EVENT\_BUFFER\_SIZE in [midas.h](#) and recompile.

Definition at line 5749 of file [midas.c](#).

Referenced by [bm\\_send\\_event\(\)](#), [close\\_buffers\(\)](#), [scan\\_fragment\(\)](#), [scheduler\(\)](#), [send\\_event\(\)](#), and [tr\\_stop\(\)](#).

### 2.29.1.8 INT [bm\\_match\\_event](#) (short int *event\_id*, short int *trigger\_mask*, [EVENT\\_HEADER](#) \**pevent*)

Check if an event matches a given event request by the event id and trigger mask

**Parameters:**

*event\_id* Event ID of request

*trigger\_mask* Trigger mask of request

*pevent* Pointer to event to check

**Returns:**

TRUE if event matches request

Definition at line 3653 of file [midas.c](#).

Referenced by [bm\\_push\\_cache\(\)](#), [bm\\_push\\_event\(\)](#), [bm\\_receive\\_event\(\)](#), and [bm\\_send\\_event\(\)](#).

### 2.29.1.9 INT [bm\\_open\\_buffer](#) (char \* *buffer\_name*, INT *buffer\_size*, INT \* *buffer\_handle*)

Open an event buffer. Two default buffers are created by the system. The "SYSTEM" buffer is used to exchange events and the "SYSMSG" buffer is used to exchange system messages. The name and size of the event buffers is defined in [midas.h](#) as EVENT\_BUFFER\_NAME and EVENT\_BUFFER\_SIZE. Following example opens the "SYSTEM" buffer, requests events with ID 1 and enters a main loop. Events are then received in [process\\_event\(\)](#)

```

#include <stdio.h>
#include "midas.h"
void process_event(HNDLE hbuf, HNDLE request_id,
                  EVENT_HEADER *pheader, void *pevent)
{
    printf("Received event #%d\r",
          pheader->serial_number);
}
main()
{
    INT status, request_id;
    HNDLE hbuf;
    status = cm_connect_experiment("pc810", "Sample", "Simple Analyzer", NULL);
    if (status != CM_SUCCESS)
        return 1;
    bm_open_buffer(EVENT_BUFFER_NAME, EVENT_BUFFER_SIZE, &hbuf);
    bm_request_event(hbuf, 1, TRIGGER_ALL, GET_ALL, request_id, process_event);

    do
    {
        status = cm_yield(1000);
    } while (status != RPC_SHUTDOWN && status != SS_ABORT);
    cm_disconnect_experiment();
    return 0;
}

```

**Parameters:**

*buffer\_name* Name of buffer  
*buffer\_size* Size of buffer in bytes  
*buffer\_handle* Buffer handle returned by function

**Returns:**

BM\_SUCCESS, BM\_CREATED  
 BM\_NO\_SHM Shared memory cannot be created  
 BM\_NO\_MUTEX Mutex cannot be created  
 BM\_NO\_MEMORY Not enough memory to create buffer descriptor  
 BM\_MEMSIZE\_MISMATCH Buffer size conflicts with an existing buffer of different size  
 BM\_INVALID\_PARAM Invalid parameter

Definition at line 3715 of file midas.c.

Referenced by cm\_msg(), cm\_msg1(), cm\_msg\_register(), register\_equipment(), and source\_booking().

**2.29.1.10 INT bm\_push\_event (char \* *buffer\_name*)**

Check a buffer if an event is available and call the dispatch function if found.

**Parameters:**

*buffer\_name* Name of buffer

**Returns:**

BM\_SUCCESS, BM\_INVALID\_HANDLE, BM\_TRUNCATED, BM\_ASYNC\_RETURN, RPC\_NET\_ERROR

Definition at line 6494 of file midas.c.

Referenced by bm\_check\_buffers().

### 2.29.1.11 INT bm\_receive\_event (INT *buffer\_handle*, void \* *destination*, INT \* *buf\_size*, INT *async\_tag*)

Receives events directly. This function is an alternative way to receive events without a main loop.

It can be used in analysis systems which actively receive events, rather than using callbacks. A analysis package could for example contain its own command line interface. A command like "receive 1000 events" could make it necessary to call [bm\\_receive\\_event\(\)](#) 1000 times in a row to receive these events and then return back to the command line prompt. The according [bm\\_request\\_event\(\)](#) call contains NULL as the callback routine to indicate that [bm\\_receive\\_event\(\)](#) is called to receive events.

```
#include <stdio.h>
#include "midas.h"
void process_event(EVENT_HEADER *pheader)
{
    printf("Received event #%d\r",
        pheader->serial_number);
}
main()
{
    INT status, request_id;
    HNDLE hbuf;
    char event_buffer[1000];
    status = cm_connect_experiment("", "Sample",
        "Simple Analyzer", NULL);
    if (status != CM_SUCCESS)
        return 1;
    bm_open_buffer(EVENT_BUFFER_NAME, EVENT_BUFFER_SIZE, &hbuf);
    bm_request_event(hbuf, 1, TRIGGER_ALL, GET_ALL, request_id, NULL);

    do
    {
        size = sizeof(event_buffer);
        status = bm_receive_event(hbuf, event_buffer, &size, ASYNC);
        if (status == CM_SUCCESS)
            process_event((EVENT_HEADER *) event_buffer);
        <...do something else...>
        status = cm_yield(0);
    } while (status != RPC_SHUTDOWN &&
        status != SS_ABORT);
    cm_disconnect_experiment();
    return 0;
}
```

**Parameters:***buffer\_handle* buffer handle*destination* destination address where event is written to*buf\_size* size of destination buffer on input, size of event plus header on return.*async\_flag* Synchronous/asynchronous flag. If FALSE, the function blocks if no event is available. If TRUE, the function returns immediately with a value of BM\_ASYNC\_RETURN without receiving any event.**Returns:**

BM\_SUCCESS, BM\_INVALID\_HANDLE

BM\_TRUNCATED The event is larger than the destination buffer and was therefore truncated

BM\_ASYNC\_RETURN No event available

Definition at line 6114 of file midas.c.

Referenced by handFlush(), and source\_scan().

**2.29.1.12 INT bm\_remove\_event\_request (INT *buffer\_handle*, INT *request\_id*)**Delete a previously placed request for a specific event type in the client structure of the buffer referenced by *buffer\_handle*.**Parameters:***buffer\_handle* Handle to the buffer where the request should be placed in*request\_id* Request id returned by bm\_request\_event**Returns:**

BM\_SUCCESS, BM\_INVALID\_HANDLE, BM\_NOT\_FOUND, RPC\_NET\_ERROR

Definition at line 5257 of file midas.c.

Referenced by bm\_delete\_request().

**2.29.1.13 INT bm\_request\_event (HANDLE *buffer\_handle*, short int *event\_id*, short int *trigger\_mask*, INT *sampling\_type*, HANDLE \**request\_id*, void(\*) (HANDLE, HANDLE, **EVENT\_HEADER** \*, void \*) *func*)**Place an event request based on certain characteristics. Multiple event requests can be placed for each buffer, which are later identified by their request ID. They can contain different callback routines. Example see [bm\\_open\\_buffer\(\)](#) and [bm\\_receive\\_event\(\)](#)**Parameters:***buffer\_handle* buffer handle obtained via [bm\\_open\\_buffer\(\)](#)

**event\_id** event ID for requested events. Use EVENTID\_ALL to receive events with any ID.

**trigger\_mask** trigger mask for requested events. The requested events must have at least one bit in its trigger mask common with the requested trigger mask. Use TRIGGER\_ALL to receive events with any trigger mask.

**sampling\_type** specifies how many events to receive. A value of GET\_ALL receives all events which match the specified event ID and trigger mask. If the events are consumed slower than produced, the producer is automatically slowed down. A value of GET\_SOME receives as much events as possible without slowing down the producer. GET\_ALL is typically used by the logger, while GET\_SOME is typically used by analyzers.

**request\_id** request ID returned by the function. This ID is passed to the callback routine and must be used in the [bm\\_delete\\_request\(\)](#) routine.

**func** allback routine which gets called when an event of the specified type is received.

#### Returns:

BM\_SUCCESS, BM\_INVALID\_HANDLE

BM\_NO\_MEMORY too many requests. The value MAX\_EVENT\_REQUESTS in [midas.h](#) should be increased.

Definition at line 5189 of file [midas.c](#).

Referenced by [cm\\_msg\\_register\(\)](#), and [source\\_booking\(\)](#).

#### 2.29.1.14 INT bm\_send\_event (INT *buffer\_handle*, void \* *source*, INT *buf\_size*, INT *async\_flag*)

Sends an event to a buffer. This function check if the buffer has enough space for the event, then copies the event to the buffer in shared memory. If clients have requests for the event, they are notified via an UDP packet.

```
char event[1000];
// create event with ID 1, trigger mask 0, size 100 bytes and serial number 1
bm_compose_event((EVENT_HEADER *) event, 1, 0, 100, 1);

// set first byte of event
*(event+sizeof(EVENT_HEADER)) = <...>
#include <stdio.h>
#include "midas.h"
main()
{
    INT status, i;
    HANDLE hbuf;
    char event[1000];
    status = cm_connect_experiment("", "Sample", "Producer", NULL);
    if (status != CM_SUCCESS)
        return 1;
}
```

```

bm_open_buffer(EVENT_BUFFER_NAME, EVENT_BUFFER_SIZE, &hbuf);

// create event with ID 1, trigger mask 0, size 100 bytes and serial number 1
bm_compose_event((EVENT_HEADER *) event, 1, 0, 100, 1);

// set event data
for (i=0 ; i<100 ; i++)
*(event+sizeof(EVENT_HEADER)+i) = i;
// send event
bm_send_event(hbuf, event, 100+sizeof(EVENT_HEADER), SYNC);
cm_disconnect_experiment();
return 0;
}

```

**Parameters:**

**buffer\_handle** Buffer handle obtained via [bm\\_open\\_buffer\(\)](#)

**source** Address of event buffer

**buf\_size** Size of event including event header in bytes

**async\_flag** Synchronous/asynchronous flag. If FALSE, the function blocks if the buffer has not enough free space to receive the event. If TRUE, the function returns immediately with a value of BM\_ASYNC\_RETURN without writing the event to the buffer

**Returns:**

BM\_SUCCESS, BM\_INVALID\_HANDLE, BM\_INVALID\_PARAM

BM\_ASYNC\_RETURN Routine called with `async_flag == TRUE` and buffer has not enough space to receive event

BM\_NO\_MEMORY Event is too large for network buffer or event buffer. One has to increase MAX\_EVENT\_SIZE or EVENT\_BUFFER\_SIZE in [midas.h](#) and recompile.

Definition at line 5394 of file `midas.c`.

Referenced by `cm_msg()`, `cm_msg1()`, `rpc_send_event()`, and `send_event()`.

### 2.29.1.15 INT bm\_set\_cache\_size (INT buffer\_handle, INT read\_size, INT write\_size)

Modifies buffer cache size. Without a buffer cache, events are copied to/from the shared memory event by event.

To protect processed from accessing the shared memory simultaneously, semaphores are used. Since semaphore operations are CPU consuming (typically 50-100us) this can slow down the data transfer especially for small events. By using a cache the number of semaphore operations is reduced dramatically. Instead writing directly to the shared memory, the events are copied to a local cache buffer. When this buffer is full, it is copied to the shared memory in one operation. The same technique can be used when receiving events.

The drawback of this method is that the events have to be copied twice, once to the cache and once from the cache to the shared memory. Therefore it can happen that the usage of a cache even slows down data throughput on a given environment (computer type, OS type, event size). The cache size has therefore be optimized manually to maximize data throughput.

**Parameters:**

*buffer\_handle* buffer handle obtained via [bm\\_open\\_buffer\(\)](#)  
*read\_size* cache size for reading events in bytes, zero for no cache  
*write\_size* cache size for writing events in bytes, zero for no cache

**Returns:**

BM\_SUCCESS, BM\_INVALID\_HANDLE, BM\_NO\_MEMORY, BM\_INVALID\_PARAM

Definition at line 4926 of file midas.c.

Referenced by register\_equipment().

### 2.29.1.16 INT bm\_skip\_event (INT *buffer\_handle*)

Skip all events in current buffer.

Useful for single event displays to see the newest events

**Parameters:**

*buffer\_handle* Handle of the buffer. Must be obtained via [bm\\_open\\_buffer](#).

**Returns:**

BM\_SUCCESS, BM\_INVALID\_HANDLE, RPC\_NET\_ERROR

Definition at line 6446 of file midas.c.

## 2.30 Midas Message Functions (msg\_xxx)

**Functions**

- INT [cm\\_get\\_error](#) (INT code, char \*string)
- INT [cm\\_set\\_msg\\_print](#) (INT system\_mask, INT user\_mask, int(\*func)(const char \*))
- INT [cm\\_msg\\_log](#) (INT message\_type, const char \*message)
- INT [cm\\_msg\\_log1](#) (INT message\_type, const char \*message, const char \*facility)
- INT [cm\\_msg](#) (INT message\_type, char \*filename, INT line, const char \*routine, const char \*format,...)



- INT [cm\\_msg1](#) (INT message\_type, char \*filename, INT line, const char \*facility, const char \*routine, const char \*format,...)
- INT [cm\\_msg\\_register](#) (void(\*func)(HANDLE, HANDLE, [EVENT\\_HEADER](#) \*, void \*))
- INT [cm\\_msg\\_retrieve](#) (INT n\_message, char \*message, INT \*buf\_size)

### 2.30.1 Function Documentation

#### 2.30.1.1 INT [cm\\_get\\_error](#) (INT *code*, char \* *string*)

Convert error code to string. Used after [cm\\_connect\\_experiment](#) to print error string in command line programs or windows programs.

**Parameters:**

- code* Error code as defined in [midas.h](#)
- string* Error string

**Returns:**

CM\_SUCCESS

Definition at line 288 of file [midas.c](#).

Referenced by [cm\\_connect\\_experiment\(\)](#).

#### 2.30.1.2 INT [cm\\_msg](#) (INT *message\_type*, char \* *filename*, INT *line*, const char \* *routine*, const char \* *format*, ...)

This routine can be called whenever an internal error occurs or an informative message is produced. Different message types can be enabled or disabled by setting the type bits via [cm\\_set\\_msg\\_print\(\)](#).

**Attention:**

Do not add the "\n" escape carriage control at the end of the formatted line as it is already added by the client on the receiving side.

```
...
cm_msg(MINFO, "my program", "This is a information message only);
cm_msg(MERROR, "my program", "This is an error message with status:%d", my_status);
cm_msg(MTALK, "my_program", "My program is Done!");
...
```

**Parameters:**

- message\_type* (See [MIDAS Macros](#)).
- filename* Name of source file where error occurred

*line* Line number where error occurred

*routine* Routine name.

*format* message to printout, ... Parameters like for printf()

#### Returns:

CM\_SUCCESS

Definition at line 534 of file midas.c.

Referenced by al\_trigger\_alarm(), analyzer\_init(), bk\_list(), bm\_close\_buffer(), bm\_push\_cache(), bm\_open\_buffer(), bm\_push\_event(), bm\_receive\_event(), bm\_remove\_event\_request(), bm\_request\_event(), bm\_send\_event(), bm\_set\_cache\_size(), bm\_skip\_event(), close\_buffers(), cm\_check\_client(), cm\_check\_deferred\_transition(), cm\_cleanup(), cm\_connect\_experiment1(), cm\_disconnect\_experiment(), cm\_get\_watchdog\_info(), cm\_list\_experiments(), cm\_register\_deferred\_transition(), cm\_register\_transition(), cm\_set\_client\_info(), cm\_set\_transition\_sequence(), cm\_shutdown(), cm\_transition(), db\_check\_record(), db\_close\_database(), db\_copy(), db\_copy\_xml(), db\_create\_key(), db\_create\_link(), db\_create\_record(), db\_delete\_key1(), db\_enum\_key(), db\_find\_key(), db\_get\_data(), db\_get\_data\_index(), db\_get\_key(), db\_get\_key\_info(), db\_get\_key\_time(), db\_get\_record(), db\_get\_value(), db\_load(), db\_lock\_database(), db\_open\_database(), db\_open\_record(), db\_paste(), db\_paste\_node(), db\_protect\_database(), db\_save(), db\_save\_struct(), db\_save\_xml(), db\_save\_xml\_key(), db\_set\_data(), db\_set\_data\_index(), db\_set\_record(), db\_set\_value(), db\_unlock\_database(), dm\_buffer\_create(), el\_submit(), handFlush(), interrupt\_routine(), load\_fragment(), main(), register\_equipment(), rpc\_push\_event(), rpc\_register\_functions(), rpc\_send\_event(), rpc\_set\_option(), scan\_fragment(), scheduler(), send\_event(), source\_booking(), source\_scan(), source\_unbooking(), tr\_start(), tr\_stop(), update\_odb(), and ybk\_list().

#### 2.30.1.3 INT cm\_msg1 (INT message\_type, char \* filename, INT line, const char \* facility, const char \* routine, const char \* format, ...)

This routine is similar to [cm\\_msg\(\)](#). It differs from [cm\\_msg\(\)](#) only by the logging destination being a file given through the argument list i.e: **facility**

##### For ~~Attention~~ use only.

Do not add the "\n" escape carriage control at the end of the formatted line as it is already added by the client on the receiving side. The first arg in the following example uses the predefined macro MINFO which handles automatically the first 3 arguments of the function (see [MIDAS Macros](#)).

```
...
cm_msg1(MINFO, "my_log_file", "my_program", " My message status:%d", status);
...
//----- File my_log_file.log
Thu Nov  8 17:59:28 2001 [my_program] My message status:1
```

**Parameters:**

*message\_type* See [MIDAS Macros](#).  
*£lename* Name of source £le where error occurred  
*line* Line number where error occurred  
*facility* Logging £le name  
*routine* Routine name  
*format* message to printout, ... Parameters like for printf()

**Returns:**

CM\_SUCCESS

Definition at line 647 of £le midas.c.

**2.30.1.4 INT cm\_msg\_log (INT *message\_type*, const char \* *message*)**

Write message to logging £le. Called by cm\_msg.

**Attention:**

May burn your £ngers

**Parameters:**

*message\_type* Message type  
*message* Message string

**Returns:**

CM\_SUCCESS

Definition at line 350 of £le midas.c.

Referenced by cm\_msg().

**2.30.1.5 INT cm\_msg\_log1 (INT *message\_type*, const char \* *message*, const char \* *facility*)**

Write message to logging £le. Called by [cm\\_msg\(\)](#).

**For ~~Intermidatus~~ only.**

*message\_type* Message type  
*message* Message string  
*facility* Message facility, £lename in which messages will be written

**Returns:**

CM\_SUCCESS

Definition at line 419 of £le midas.c.

Referenced by cm\_msg1().

### 2.30.1.6 INT cm\_msg\_register (void(\*) (HANDLE, HANDLE, EVENT\_HEADER \*, void \*) func)

Register a dispatch function for receiving system messages.

- example code from mlxspeaker.c

```
void receive_message(HANDLE hBuf, HANDLE id, EVENT_HEADER *header, void *message)
{
    char str[256], *pc, *sp;
    // print message
    printf("%s\n", (char *) (message));

    printf("evID:%x Mask:%x Serial:%i Size:%d\n"
           ,header->event_id
           ,header->trigger_mask
           ,header->serial_number
           ,header->data_size);
    pc = strchr((char *) (message), ',')+2;
    ...
    // skip none talking message
    if (header->trigger_mask == MT_TALK ||
        header->trigger_mask == MT_USER)
        ...
}

int main(int argc, char *argv[])
{
    ...
    // now connect to server
    status = cm_connect_experiment(host_name, exp_name, "Speaker", NULL);
    if (status != CM_SUCCESS)
        return 1;
    // Register callback for messages
    cm_msg_register(receive_message);
    ...
}
```

#### Parameters:

*func* Dispatch function.

#### Returns:

CM\_SUCCESS or bm\_open\_buffer and bm\_request\_event return status

Definition at line 778 of file midas.c.

### 2.30.1.7 INT cm\_msg\_retrieve (INT n\_message, char \* message, INT \* buf\_size)

Retrieve old messages from log file

#### Parameters:

*n\_message* Number of messages to retrieve

*message* buf\_size bytes of messages, separated by characters. The returned number of bytes is normally smaller than the initial buf\_size, since only full lines are returned.

*\*buf\_size* Size of message buffer to fill

**Returns:**

CM\_SUCCESS

Definition at line 808 of file midas.c.

### 2.30.1.8 INT cm\_set\_msg\_print (INT system\_mask, INT user\_mask, int(\*) (const char \*) func)

Set message masks. When a message is generated by calling [cm\\_msg\(\)](#), it can go to two destinations. First a user defined callback routine and second to the "SYSMSG" buffer.

A user defined callback receives all messages which satisfy the user\_mask.

```
int message_print(const char *msg)
{
    char str[160];

    memset(str, ' ', 159);
    str[159] = 0;
    if (msg[0] == '[')
        msg = strchr(msg, ']')+2;
    memcpy(str, msg, strlen(msg));
    ss_printf(0, 20, str);
    return 0;
}
...
cm_set_msg_print(MT_ALL, MT_ALL, message_print);
...
```

**Parameters:**

*system\_mask* Bit masks for MERROR, MINFO etc. to send system messages.

*user\_mask* Bit masks for MERROR, MINFO etc. to send messages to the user callback.

*func* Function which receives all printout. By setting "puts", messages are just printed to the screen.

**Returns:**

CM\_SUCCESS

Definition at line 333 of file midas.c.

Referenced by [cm\\_connect\\_experiment1\(\)](#), and [main\(\)](#).

## 2.31 Midas Bank Functions (bk\_xxx)

### Functions

- void [bk\\_init](#) (void \*event)
- void [bk\\_init32](#) (void \*event)
- INT [bk\\_size](#) (void \*event)
- void [bk\\_create](#) (void \*event, const char \*name, WORD type, void \*pdata)
- INT [bk\\_close](#) (void \*event, void \*pdata)
- INT [bk\\_list](#) (void \*event, char \*bklist)
- INT [bk\\_locate](#) (void \*event, const char \*name, void \*pdata)
- INT [bk\\_end](#) ([BANK\\_HEADER](#) \*pbkh, const char \*name, DWORD \*bklen, DWORD \*bktype, void \*\*pdata)
- INT [bk\\_iterate](#) (void \*event, [BANK](#) \*\*pbk, void \*pdata)
- INT [bk\\_swap](#) (void \*event, BOOL force)

### 2.31.1 Function Documentation

#### 2.31.1.1 INT [bk\\_close](#) (void \* *event*, void \* *pdata*)

Close the Midas bank prviously created by [bk\\_create\(\)](#). The data pointer pdata must be obtained by [bk\\_create\(\)](#) and used as an address to fill a bank. It is incremented with every value written to the bank and finally points to a location just after the last byte of the bank. It is then passed to [bk\\_close\(\)](#) to finish the bank creation

#### Parameters:

- event* pointer to current composed event
- pdata* pointer to the data

#### Returns:

- number of bytes contained in bank

Definition at line 12175 of file midas.c.

Referenced by [adc\\_calib\(\)](#), [adc\\_summing\(\)](#), [eb\\_user\(\)](#), [read\\_scaler\\_event\(\)](#), [read\\_trigger\\_event\(\)](#), and [scaler\\_accum\(\)](#).

#### 2.31.1.2 void [bk\\_create](#) (void \* *event*, const char \* *name*, WORD *type*, void \* *pdata*)

Create a Midas bank. The data pointer pdata must be used as an address to fill a bank. It is incremented with every value written to the bank and finally points to a location

just after the last byte of the bank. It is then passed to the function `bk_close()` to finish the bank creation.

```
INT *pdata;
bk_init(pevent);
bk_create(pevent, "ADC0", TID_INT, &pdata);
*pdata++ = 123
*pdata++ = 456
bk_close(pevent, pdata);
```

**Parameters:**

- event* pointer to the data area
- name* of the bank, must be exactly 4 characters
- type* type of bank, one of the [Midas Data Types](#) values defined in `midas.h`
- pdata* pointer to the data area of the newly created bank

**Returns:**

void

Definition at line 12054 of file `midas.c`.

Referenced by `adc_calib()`, `adc_summing()`, `eb_user()`, `read_scaler_event()`, `read_trigger_event()`, and `scaler_accum()`.

**2.31.1.3 INT bk\_find (BANK\_HEADER \*pbkh, const char \*name, DWORD \*bklen, DWORD \*bktype, void \*\*pdata)**

Finds a MIDAS bank of given name inside an event.

**Parameters:**

- pbkh* pointer to current composed event
- name* bank name to look for
- bklen* number of elements in bank
- bktype* bank type, one of TID\_XXX
- pdata* pointer to data area of bank, NULL if bank not found

**Returns:**

1 if bank found, 0 otherwise

Definition at line 12323 of file `midas.c`.

**2.31.1.4 void bk\_init (void \* event)**

Initializes an event for Midas banks structure. Before banks can be created in an event, [bk\\_init\(\)](#) has to be called first.

**Parameters:**

*event* pointer to the area of event

Definition at line 11972 of file midas.c.

Referenced by [eb\\_user\(\)](#), [read\\_scaler\\_event\(\)](#), and [read\\_trigger\\_event\(\)](#).

**2.31.1.5 void bk\_init32 (void \* event)**

Initializes an event for Midas banks structure for large bank size (> 32KBytes) Before banks can be created in an event, [bk\\_init32\(\)](#) has to be called first.

**Parameters:**

*event* pointer to the area of event

**Returns:**

void

Definition at line 12013 of file midas.c.

**2.31.1.6 INT bk\_iterate (void \* event, BANK \*\* pbk, void \* pdata)**

Iterates through banks inside an event. The function can be used to enumerate all banks of an event. The returned pointer to the bank header has following structure:

```
typedef struct {
char    name[4];
WORD    type;
WORD    data_size;
} BANK;
```

where type is a TID\_xxx value and data\_size the size of the bank in bytes.

```
BANK *pbk;
INT size;
void *pdata;
char name[5];
pbk = NULL;
do
{
size = bk_iterate(event, &pbk, &pdata);
if (pbk == NULL)
break;
*((DWORD *)name) = *((DWORD *)pbk->name);
```



```

name[4] = 0;
printf("bank %s found\n", name);
} while(TRUE);

```

**Parameters:**

*event* Pointer to data area of event.

*pbk* pointer to the bank header, must be NULL for the first call to this function.

*pdata* Pointer to the bank header, must be NULL for the first call to this function

**Returns:**

Size of bank in bytes

Definition at line 12405 of file midas.c.

Referenced by bk\_list(), and update\_odb().

**2.31.1.7 INT bk\_list (void \* event, char \* bklst)**

Extract the MIDAS bank name listing of an event. The bklst should be dimensioned with STRING\_BANKLIST\_MAX which corresponds to a max of BANKLIST\_MAX banks ([midas.h](#): 32 banks max).

```

INT adc_calib(EVENT_HEADER *pheader, void *pevent)
{
    INT    n_adc, nbanks;
    WORD    *pdata;
    char    banklist[STRING_BANKLIST_MAX];

    // Display # of banks and list of banks in the event
    nbanks = bk_list(pevent, banklist);
    printf("#banks:%d List:%s\n", nbanks, banklist);

    // look for ADC0 bank, return if not present
    n_adc = bk_locate(pevent, "ADC0", &pdata);
    ...
}

```

**Parameters:**

*event* pointer to current composed event

*bklst* returned ASCII string, has to be booked with STRING\_BANKLIST\_MAX.

**Returns:**

number of bank found in this event.

Definition at line 12229 of file midas.c.

**2.31.1.8 INT bk\_locate (void \* event, const char \* name, void \* pdata)**

Locates a MIDAS bank of given name inside an event.

**Parameters:**

- event* pointer to current composed event
- name* bank name to look for
- pdata* pointer to data area of bank, NULL if bank not found

**Returns:**

- number of values inside the bank

Definition at line 12273 of file midas.c.

Referenced by `adc_calib()`, `adc_summing()`, and `scaler_accum()`.

**2.31.1.9 INT bk\_size (void \* event)**

Returns the size of an event containing banks. The total size of an event is the value returned by `bk_size()` plus the size of the event header (`sizeof(EVENT_HEADER)`).

**Parameters:**

- event* pointer to the area of event

**Returns:**

- number of bytes contained in data area of event

Definition at line 12027 of file midas.c.

Referenced by `read_scaler_event()`, and `read_trigger_event()`.

**2.31.1.10 INT bk\_swap (void \* event, BOOL force)**

Swaps bytes from little endian to big endian or vice versa for a whole event.

An event contains a flag which is set by `bk_init()` to identify the endian format of an event. If force is FALSE, this flag is evaluated and the event is only swapped if it is in the "wrong" format for this system. An event can be swapped to the "wrong" format on purpose for example by a front-end which wants to produce events in a "right" format for a back-end analyzer which has different byte ordering.

**Parameters:**

- event* pointer to data area of event
- force* If TRUE, the event is always swapped, if FALSE, the event is only swapped if it is in the wrong format.

**Returns:**

1==event has been swap, 0==event has not been swapped.

Definition at line 12482 of file midas.c.

Referenced by eb\_mfragment\_add(), and source\_scan().

**2.32 Midas Alarm Functions (al\_xxx)****Functions**

- INT [al\\_trigger\\_alarm](#) (char \*alarm\_name, char \*alarm\_message, char \*default\_class, char \*cond\_str, INT type)

**2.32.1 Function Documentation****2.32.1.1 INT al\_trigger\_alarm (char \* *alarm\_name*, char \* *alarm\_message*, char \* *default\_class*, char \* *cond\_str*, INT *type*)**

Trigger a certain alarm.

```
...
lazy.alarm[0] = 0;
size = sizeof(lazy.alarm);
db_get_value(hDB, pLch->hKey, "Settings/Alarm Class", lazy.alarm, &size, TID_STRING, TRUE);

// trigger alarm if defined
if (lazy.alarm[0])
    al_trigger_alarm("Tape", "Tape full...load new one!", lazy.alarm, "Tape full", AT_INTERNAL);
...
```

**Parameters:**

***alarm\_name*** Alarm name, defined in /alarms/alarms

***alarm\_message*** Optional message which goes with alarm

***default\_class*** If alarm is not yet defined under /alarms/alarms/<alarm\_name>, a new one is created and this default class is used.

***cond\_str*** String displayed in alarm condition

***type*** Alarm type, one of AT\_xxx

**Returns:**

AL\_SUCCESS, AL\_INVALID\_NAME

Definition at line 15463 of file midas.c.

## 2.33 Midas History Functions (hs\_XXX)

### Functions

- INT [hs\\_set\\_path](#) (char \*path)
- INT [hs\\_open\\_file](#) (DWORD ltime, char \*suffix, INT mode, int \*fh)

### 2.33.1 Function Documentation

#### 2.33.1.1 INT [hs\\_open\\_file](#) (DWORD *ltime*, char \* *suffix*, INT *mode*, int \* *fh*)

Open history file belonging to certain date. Internal use only.

##### Parameters:

*ltime* Date for which a history file should be opened.

*suffix* File name suffix like "hst", "idx", "idf"

*mode* R/W access mode

*fh* File handle

##### Returns:

HS\_SUCCESS

Definition at line 12621 of file midas.c.

#### 2.33.1.2 INT [hs\\_set\\_path](#) (char \* *path*)

Sets the path for future history file accesses. Should be called before any other history function is called.

##### Parameters:

*path* Directory where history files reside

##### Returns:

HS\_SUCCESS

Definition at line 12594 of file midas.c.

## 2.34 Midas Elog Functions (el\_xxx)

### Functions

- INT `el_submit` (int *run*, char \**author*, char \**type*, char \**system*, char \**subject*, char \**text*, char \**reply\_to*, char \**encoding*, char \**a\$lename1*, char \**buffer1*, INT *buffer\_size1*, char \**a\$lename2*, char \**buffer2*, INT *buffer\_size2*, char \**a\$lename3*, char \**buffer3*, INT *buffer\_size3*, char \**tag*, INT *tag\_size*)

### 2.34.1 Function Documentation

**2.34.1.1 INT `el_submit`** (int *run*, char \* *author*, char \* *type*, char \* *system*, char \* *subject*, char \* *text*, char \* *reply\_to*, char \* *encoding*, char \* *a\$lename1*, char \* *buffer1*, INT *buffer\_size1*, char \* *a\$lename2*, char \* *buffer2*, INT *buffer\_size2*, char \* *a\$lename3*, char \* *buffer3*, INT *buffer\_size3*, char \* *tag*, INT *tag\_size*)

Submit an ELog entry.

#### Parameters:

- run* Run Number.
- author* Message author.
- type* Message type.
- system* Message system.
- subject* Subject.
- text* Message text.
- reply\_to* In reply to this message.
- encoding* Text encoding, either HTML or plain.
- a\$lename1* File name of attachment.
- buffer1* File contents.
- buffer\_size1* Size of buffer in bytes.
- a\$lename2* File name of attachment.
- buffer2* File contents.
- buffer\_size2* Size of buffer in bytes.
- a\$lename3* File name of attachment.
- buffer3* File contents.
- buffer\_size3* Size of buffer in bytes.
- tag* If given, edit existing message.

*tag\_size* Maximum size of tag.

**Returns:**

EL\_SUCCESS

Definition at line 14412 of file midas.c.

## 2.35 Midas RPC Functions (rpc\_xxx)

### Functions

- INT [rpc\\_register\\_client](#) (char \*name, RPC\_LIST \*list)
- INT [rpc\\_register\\_functions](#) (RPC\_LIST \*new\_list, INT(\*func)(INT, void \*\*))
- INT [rpc\\_set\\_option](#) (HANDLE hConn, INT item, INT value)
- INT [rpc\\_send\\_event](#) (INT buffer\_handle, void \*source, INT buf\_size, INT async\_tag)
- INT [rpc\\_push\\_event](#) ()

### 2.35.1 Function Documentation

#### 2.35.1.1 INT [rpc\\_push\\_event](#) ()

Send event residing in the TCP cache buffer filled by [rpc\\_send\\_event](#). This routine should be called when a run is stopped.

**Returns:**

RPC\_SUCCESS, RPC\_NET\_ERROR

Definition at line 9655 of file midas.c.

Referenced by [scan\\_fragment\(\)](#), [scheduler\(\)](#), [send\\_event\(\)](#), and [tr\\_stop\(\)](#).

#### 2.35.1.2 INT [rpc\\_register\\_client](#) (char \* *name*, RPC\_LIST \* *list*)

Register RPC client for standalone mode (without standard midas server)

**Parameters:**

*list* Array of RPC\_LIST structures containing function IDs and parameter definitions. The end of the list must be indicated by a function ID of zero.

*name* Name of this client

**Returns:**

RPC\_SUCCESS

Definition at line 7547 of file midas.c.

**2.35.1.3 INT rpc\_register\_functions (RPC\_LIST \* *new\_list*, INT(\*) (INT, void \*\*) *func*)**

Register a set of RPC functions (both as clients or servers)

**Parameters:***new\_list* Array of RPC\_LIST structures containing function IDs and parameter definitions. The end of the list must be indicated by a function ID of zero.*func* Default dispatch function**Returns:**

RPC\_SUCCESS, RPC\_NO\_MEMORY, RPC\_DOUBLE\_DEFINED

Definition at line 7567 of file midas.c.

Referenced by cm\_connect\_experiment1(), and rpc\_register\_client().

**2.35.1.4 INT rpc\_send\_event (INT *buffer\_handle*, void \* *source*, INT *buf\_size*, INT *async\_flag*)**

Fast send\_event routine which bypasses the RPC layer and sends the event directly at the TCP level.

**Parameters:***buffer\_handle* Handle of the buffer to send the event to. Must be obtained via bm\_open\_buffer.*source* Address of the event to send. It must have a proper event header.*buf\_size* Size of event in bytes with header.*async\_flag* SYNC / ASYNC flag. In ASYNC mode, the function returns immediately if it cannot send the event over the network. In SYNC mode, it waits until the packet is sent (blocking).**Returns:**

BM\_INVALID\_PARAM, BM\_ASYNC\_RETURN, RPC\_SUCCESS, RPC\_NET\_ERROR, RPC\_NO\_CONNECTION, RPC\_EXCEED\_BUFFER

Definition at line 9472 of file midas.c.

Referenced by interrupt\_routine(), scheduler(), and source\_scan().

### 2.35.1.5 INT rpc\_set\_option (HANDLE *hConn*, INT *item*, INT *value*)

Set RPC option

**Parameters:**

*hConn* RPC connection handle

*item* One of RPC\_Oxxx

*value* Value to set

**Returns:**

RPC\_SUCCESS

Definition at line 8561 of file midas.c.

Referenced by cm\_transition(), db\_send\_changed\_records(), main(), scheduler(), and update\_odb().

## 2.36 Midas Dual Buffer Memory Functions (dm\_xxx)

### Functions

- INT [dm\\_buffer\\_create](#) (INT size, INT user\_max\_event\_size)

### 2.36.1 Function Documentation

#### 2.36.1.1 INT dm\_buffer\_create (INT *size*, INT *user\_max\_event\_size*)

Setup a dual memory buffer. Has to be called initially before any other dm\_xxx function

**Parameters:**

*size* Size in bytes

*user\_max\_event\_size* max event size

**Returns:**

CM\_SUCCESS, BM\_NO\_MEMORY, BM\_MEMSIZE\_MISMATCH

Definition at line 16438 of file midas.c.

Referenced by main().



## 2.37 System Functions (ss\_xxx)

### Functions

- midas\_thread\_t [ss\\_thread\\_create](#) (INT(\*thread\_func)(void \*), void \*param)
- INT [ss\\_thread\\_kill](#) (midas\_thread\_t thread\_id)
- DWORD [ss\\_millitime](#) ()
- DWORD [ss\\_time](#) ()
- INT [ss\\_sleep](#) (INT millisec)

### 2.37.1 Function Documentation

#### 2.37.1.1 DWORD [ss\\_millitime](#) ()

Returns the actual time in milliseconds with an arbitrary origin. This time may only be used to calculate relative times.

Overruns in the 32 bit value don't hurt since in a subtraction calculated with 32 bit accuracy this overrun cancels (you may think about!)..

```
...
DWORD start, stop;
start = ss_millitime();
< do operations >
stop = ss_millitime();
printf("Operation took %1.3lf seconds\n", (stop-start)/1000.0);
...
```

#### Returns:

millisecond time stamp.

Definition at line 1979 of file system.c.

Referenced by [bm\\_check\\_buffers\(\)](#), [bm\\_open\\_buffer\(\)](#), [close\\_buffers\(\)](#), [cm\\_cleanup\(\)](#), [cm\\_get\\_watchdog\\_info\(\)](#), [cm\\_set\\_watchdog\\_params\(\)](#), [cm\\_shutdown\(\)](#), [db\\_open\\_database\(\)](#), [dm\\_buffer\\_create\(\)](#), [register\\_equipment\(\)](#), [scan\\_fragment\(\)](#), [scheduler\(\)](#), [send\\_event\(\)](#), and [tr\\_stop\(\)](#).

#### 2.37.1.2 INT [ss\\_sleep](#) (INT *millisec*)

Suspend the calling process for a certain time.

The function is similar to the [sleep\(\)](#) function, but has a resolution of one milliseconds. Under VxWorks the resolution is 1/60 of a second. It uses the socket [select\(\)](#) function with a time-out. See examples in [ss\\_time\(\)](#)

**Parameters:**

*millisec* Time in milliseconds to sleep. Zero means infinite (until another process calls ss\_wake)

**Returns:**

SS\_SUCCESS

Definition at line 2205 of file system.c.

Referenced by cm\_shutdown(), main(), read\_trigger\_event(), and register\_equipment().

### 2.37.1.3 midas\_thread\_t ss\_thread\_create (INT(\*) (void \*) thread\_func, void \* param)

Execute command in a separate process, close all open file descriptors invoke ss\_exec() and ignore pid.

```
{ ...
char cmd[256];
sprintf(cmd,"%s %s %i %s/%s %1.3lf %d",lazy.commandAfter,
        lazy.backlabel, lazyst.nfiles, lazy.path, lazyst.backfile,
        lazyst.file_size/1024.0/1024.0, blockn);
cm_msg(MINFO,"Lazy","Exec post file write script:%s",cmd);
ss_system(cmd);
}
...
\encode
@param command Command to execute.
@return SS_SUCCESS or ss_exec() return code
*/
INT ss_system(char *command)
{
#ifdef OS_UNIX
    INT childpid;

    return ss_exec(command, &childpid);

#else

    system(command);
    return SS_SUCCESS;

#endif
}

/**dox*****/
#ifndef DOXYGEN_SHOULD_SKIP_THIS

/*-----*/
INT ss_exec(char *command, INT * pid)
/*****\
```

Routine: ss\_exec

Purpose: Execute command in a separate process, close all open file descriptors, return the pid of the child process.

Input:

char \* command      Command to execute  
INT \* pid            Returned PID of the spawned process.

Output:

none

Function value:

SS\_SUCCESS          Successful completion  
SS\_ABORT            fork() was not successful, or other problem

```
\*****/
{
#ifdef OS_UNIX

    /* only implemented for UNIX */
    int i, fd;

    if ((*pid = fork()) < 0)
        return SS_ABORT;
    else if (*pid != 0) {
        /* avoid <defunc> parent processes */
        signal(SIGCHLD, catch_sigchld);
        return SS_SUCCESS;      /* parent returns */
    }

    /* child continues here... */

    /* close all open file descriptors */
    for (i = 0; i < 256; i++)
        close(i);

    /* try and use up stdin, stdout and stderr, so other
       routines writing to stdout etc won't cause havoc */
    for (i = 0; i < 3; i++) {
        fd = open("/dev/null", O_RDWR, 0);
        if (fd < 0)
            fd = open("/dev/null", O_WRONLY, 0);
        if (fd < 0) {
            cm_msg(MERROR, "ss_exec", "Can't open /dev/null");
            return SS_ABORT;
        }
        if (fd != i) {
            cm_msg(MERROR, "ss_exec", "Did not get file descriptor");
            return SS_ABORT;
        }
    }

    setsid();
    /* chdir("/"); */ /* change working directory (not on NFS!) */
    umask(0);         /* clear our file mode creation mask */

    /* execute command */
```

```

    execl("/bin/sh", "sh", "-c", command, NULL);

#else

    system(command);

#endif

    return SS_SUCCESS;
}

/**dox*****/
#endif          /* DOXYGEN_SHOULD_SKIP_THIS */

/*****/
/**
Creates and returns a new thread of execution.

```

Note the difference when calling from vxWorks versus Linux and Windows. The parameter pointer for a vxWorks call is a VX\_TASK\_SPAWN structure, whereas for Linux and Windows it is a void pointer. Early versions returned SS\_SUCCESS or SS\_NO\_THREAD instead of thread ID.

Example for VxWorks

```

\code
...
VX_TASK_SPAWN tsWatch = {"Watchdog", 100, 0, 2000, (int) pDevice, 0, 0, 0, 0, 0, 0, 0, 0, 0};
midas_thread_t thread_id = ss_thread_create((void *) taskWatch, &tsWatch);
if (thread_id == 0) {
    printf("cannot spawn taskWatch\n");
}
...

```

Example for Linux

```

...
midas_thread_t thread_id = ss_thread_create((void *) taskWatch, pDevice);
if (thread_id == 0) {
    printf("cannot spawn taskWatch\n");
}
...

```

#### Parameters:

(*\*thread\_func*) Thread function to create.

*param* a pointer to a VX\_TASK\_SPAWN structure for vxWorks and a void pointer for Unix and Windows

#### Returns:

the new thread id or zero on error

Definition at line 1419 of file system.c.

Referenced by dm\_buffer\_create().

**2.37.1.4 INT ss\_thread\_kill (midas\_thread\_t thread\_id)**

Destroys the thread identified by the passed thread id. The thread id is returned by [ss\\_thread\\_create\(\)](#) on creation.

```
...
midas_thread_t thread_id = ss_thread_create((void *) taskWatch, pDevice);
if (thread_id == 0) {
    printf("cannot spawn taskWatch\n");
}
...
ss_thread_kill(thread_id);
...
```

**Parameters:**

*thread\_id* the thread id of the thread to be killed.

**Returns:**

SS\_SUCCESS if no error, else SS\_NO\_THREAD

Definition at line 1493 of file system.c.

**2.37.1.5 DWORD ss\_time ()**

Returns the actual time in seconds since 1.1.1970 UTC.

```
...
DWORD start, stop;
start = ss_time();
ss_sleep(12000);
stop = ss_time();
printf("Operation took %1.3lf seconds\n", stop-start);
...
```

**Returns:**

Time in seconds

Definition at line 2046 of file system.c.

Referenced by [al\\_trigger\\_alarm\(\)](#), [bm\\_compose\\_event\(\)](#), [cm\\_synchronize\(\)](#), [cm\\_time\(\)](#), [cm\\_yield\(\)](#), [db\\_get\\_key\\_time\(\)](#), [db\\_set\\_data\(\)](#), [db\\_set\\_data\\_index\(\)](#), [db\\_set\\_value\(\)](#), [scheduler\(\)](#), and [send\\_event\(\)](#).

**2.38 The msystem.h & system.c****Modules**

- [System Functions \(ss\\_XXX\)](#)

- [System Define](#)
- [System Macros](#)
- [System Structure Declaration](#)

## 2.39 System Define

### Defines

- `#define DRI_16` (1<<0)
- `#define DRI_32` (1<<1)
- `#define DRI_64` (1<<2)
- `#define DRI_LITTLE_ENDIAN` (1<<3)
- `#define DRI_BIG_ENDIAN` (1<<4)
- `#define DRF_IEEE` (1<<5)
- `#define DRF_G_FLOAT` (1<<6)
- `#define DR_ASCII` (1<<7)

### 2.39.1 Define Documentation

#### 2.39.1.1 `#define DR_ASCII` (1<<7)

- 

Definition at line 60 of file `msystem.h`.

#### 2.39.1.2 `#define DRF_G_FLOAT` (1<<6)

- 

Definition at line 59 of file `msystem.h`.

#### 2.39.1.3 `#define DRF_IEEE` (1<<5)

- 

Definition at line 58 of file `msystem.h`.

**2.39.1.4 #define DRI\_16 (1<<0)**

data representations -

Definition at line 53 of file msystem.h.

**2.39.1.5 #define DRI\_32 (1<<1)**

- 

Definition at line 54 of file msystem.h.

**2.39.1.6 #define DRI\_64 (1<<2)**

- 

Definition at line 55 of file msystem.h.

**2.39.1.7 #define DRI\_BIG\_ENDIAN (1<<4)**

- 

Definition at line 57 of file msystem.h.

**2.39.1.8 #define DRI\_LITTLE\_ENDIAN (1<<3)**

- 

Definition at line 56 of file msystem.h.

**2.40 System Macros****Defines**

- #define [WORD\\_SWAP\(x\)](#)
- #define [DWORD\\_SWAP\(x\)](#)
- #define [QWORD\\_SWAP\(x\)](#)

**2.40.1 Define Documentation**

**2.40.1.1 #define DWORD\_SWAP(x)****Value:**

```

{ BYTE _tmp;
    _tmp= *((BYTE *) (x));
    *((BYTE *) (x)) = *(( (BYTE *) (x)) +3);
    *(( (BYTE *) (x)) +3) = _tmp;
    _tmp= *(( (BYTE *) (x)) +1);
    *(( (BYTE *) (x)) +1) = *(( (BYTE *) (x)) +2);
    *(( (BYTE *) (x)) +2) = _tmp; }

```

SWAP DWORD macro

Definition at line 80 of file msystem.h.

Referenced by bk\_swap().

**2.40.1.2 #define QWORD\_SWAP(x)****Value:**

```

{ BYTE _tmp;
    _tmp= *((BYTE *) (x));
    *(( (BYTE *) (x)) +7) = _tmp;
    _tmp= *(( (BYTE *) (x)) +1);
    *(( (BYTE *) (x)) +1) = *(( (BYTE *) (x)) +6);
    *(( (BYTE *) (x)) +6) = _tmp;
    _tmp= *(( (BYTE *) (x)) +2);
    *(( (BYTE *) (x)) +2) = *(( (BYTE *) (x)) +5);
    *(( (BYTE *) (x)) +5) = _tmp;
    _tmp= *(( (BYTE *) (x)) +3);
    *(( (BYTE *) (x)) +3) = *(( (BYTE *) (x)) +4);
    *(( (BYTE *) (x)) +4) = _tmp; }

```

SWAP QWORD macro

Definition at line 90 of file msystem.h.

Referenced by bk\_swap().

**2.40.1.3 #define WORD\_SWAP(x)****Value:**

```

{ BYTE _tmp;
    _tmp= *((BYTE *) (x));
    *(( (BYTE *) (x)) +1) = _tmp;
    *(( (BYTE *) (x)) +1) = _tmp; }

```

SWAP WORD macro



Definition at line 73 of file msystem.h.

Referenced by bk\_swap().

## 2.41 System Structure Declaration

### Data Structures

- struct [FREE\\_DESCRIP](#)
- struct [OPEN\\_RECORD](#)
- struct [DATABASE\\_CLIENT](#)
- struct [DATABASE\\_HEADER](#)
- struct [DATABASE](#)
- struct [RECORD\\_LIST](#)
- struct [REQUEST\\_LIST](#)

## 2.42 The mrpc.h & mrpc.c

### Modules

- [RPC Defne](#)
- [Midas RPC\\_LIST](#)

## 2.43 RPC Defne

### Defnes

- #define [RPC\\_CM\\_SET\\_CLIENT\\_INFO](#) 11000
- #define [RPC\\_CM\\_SET\\_WATCHDOG\\_PARAMS](#) 11001
- #define [RPC\\_CM\\_CLEANUP](#) 11002
- #define [RPC\\_CM\\_GET\\_WATCHDOG\\_INFO](#) 11003
- #define [RPC\\_CM\\_MSG\\_LOG](#) 11004
- #define [RPC\\_CM\\_EXECUTE](#) 11005
- #define [RPC\\_CM\\_SYNCHRONIZE](#) 11006
- #define [RPC\\_CM\\_ASCTIME](#) 11007
- #define [RPC\\_CM\\_TIME](#) 11008
- #define [RPC\\_CM\\_MSG](#) 11009
- #define [RPC\\_CM\\_EXIST](#) 11011

- #define [RPC\\_CM\\_MSG\\_RETRIEVE](#) 11012
- #define [RPC\\_CM\\_MSG\\_LOG1](#) 11013
- #define [RPC\\_BM\\_OPEN\\_BUFFER](#) 11100
- #define [RPC\\_BM\\_CLOSE\\_BUFFER](#) 11101
- #define [RPC\\_BM\\_CLOSE\\_ALL\\_BUFFERS](#) 11102
- #define [RPC\\_BM\\_GET\\_BUFFER\\_INFO](#) 11103
- #define [RPC\\_BM\\_GET\\_BUFFER\\_LEVEL](#) 11104
- #define [RPC\\_BM\\_INIT\\_BUFFER\\_COUNTERS](#) 11105
- #define [RPC\\_BM\\_SET\\_CACHE\\_SIZE](#) 11106
- #define [RPC\\_BM\\_ADD\\_EVENT\\_REQUEST](#) 11107
- #define [RPC\\_BM\\_REMOVE\\_EVENT\\_REQUEST](#) 11108
- #define [RPC\\_BM\\_SEND\\_EVENT](#) 11109
- #define [RPC\\_BM\\_FLUSH\\_CACHE](#) 11110
- #define [RPC\\_BM\\_RECEIVE\\_EVENT](#) 11111
- #define [RPC\\_BM\\_MARK\\_READ\\_WAITING](#) 11112
- #define [RPC\\_BM\\_EMPTY\\_BUFFERS](#) 11113
- #define [RPC\\_BM\\_SKIP\\_EVENT](#) 11114
- #define [RPC\\_DB\\_OPEN\\_DATABASE](#) 11200
- #define [RPC\\_DB\\_CLOSE\\_DATABASE](#) 11201
- #define [RPC\\_DB\\_CLOSE\\_ALL\\_DATABASES](#) 11202
- #define [RPC\\_DB\\_CREATE\\_KEY](#) 11203
- #define [RPC\\_DB\\_CREATE\\_LINK](#) 11204
- #define [RPC\\_DB\\_SET\\_VALUE](#) 11205
- #define [RPC\\_DB\\_GET\\_VALUE](#) 11206
- #define [RPC\\_DB\\_FIND\\_KEY](#) 11207
- #define [RPC\\_DB\\_FIND\\_LINK](#) 11208
- #define [RPC\\_DB\\_GET\\_PATH](#) 11209
- #define [RPC\\_DB\\_DELETE\\_KEY](#) 11210
- #define [RPC\\_DB\\_ENUM\\_KEY](#) 11211
- #define [RPC\\_DB\\_GET\\_KEY](#) 11212
- #define [RPC\\_DB\\_GET\\_DATA](#) 11213
- #define [RPC\\_DB\\_SET\\_DATA](#) 11214
- #define [RPC\\_DB\\_SET\\_DATA\\_INDEX](#) 11215
- #define [RPC\\_DB\\_SET\\_MODE](#) 11216
- #define [RPC\\_DB\\_GET\\_RECORD\\_SIZE](#) 11219
- #define [RPC\\_DB\\_GET\\_RECORD](#) 11220
- #define [RPC\\_DB\\_SET\\_RECORD](#) 11221
- #define [RPC\\_DB\\_ADD\\_OPEN\\_RECORD](#) 11222
- #define [RPC\\_DB\\_REMOVE\\_OPEN\\_RECORD](#) 11223
- #define [RPC\\_DB\\_SAVE](#) 11224
- #define [RPC\\_DB\\_LOAD](#) 11225
- #define [RPC\\_DB\\_SET\\_CLIENT\\_NAME](#) 11226
- #define [RPC\\_DB\\_RENAME\\_KEY](#) 11227

- #define [RPC\\_DB\\_ENUM\\_LINK](#) 11228
- #define [RPC\\_DB\\_REORDER\\_KEY](#) 11229
- #define [RPC\\_DB\\_CREATE\\_RECORD](#) 11230
- #define [RPC\\_DB\\_GET\\_DATA\\_INDEX](#) 11231
- #define [RPC\\_DB\\_GET\\_KEY\\_TIME](#) 11232
- #define [RPC\\_DB\\_GET\\_OPEN\\_RECORDS](#) 11233
- #define [RPC\\_DB\\_FLUSH\\_DATABASE](#) 11235
- #define [RPC\\_DB\\_SET\\_DATA\\_INDEX2](#) 11236
- #define [RPC\\_DB\\_GET\\_KEY\\_INFO](#) 11237
- #define [RPC\\_DB\\_GET\\_DATA1](#) 11238
- #define [RPC\\_DB\\_SET\\_NUM\\_VALUES](#) 11239
- #define [RPC\\_DB\\_CHECK\\_RECORD](#) 11240
- #define [RPC\\_DB\\_GET\\_NEXT\\_LINK](#) 11241
- #define [RPC\\_HS\\_SET\\_PATH](#) 11300
- #define [RPC\\_HS\\_DEFINE\\_EVENT](#) 11301
- #define [RPC\\_HS\\_WRITE\\_EVENT](#) 11302
- #define [RPC\\_HS\\_COUNT\\_EVENTS](#) 11303
- #define [RPC\\_HS\\_ENUM\\_EVENTS](#) 11304
- #define [RPC\\_HS\\_COUNT\\_VARS](#) 11305
- #define [RPC\\_HS\\_ENUM\\_VARS](#) 11306
- #define [RPC\\_HS\\_READ](#) 11307
- #define [RPC\\_HS\\_GET\\_VAR](#) 11308
- #define [RPC\\_HS\\_GET\\_EVENT\\_ID](#) 11309
- #define [RPC\\_EL\\_SUBMIT](#) 11400
- #define [RPC\\_AL\\_CHECK](#) 11500
- #define [RPC\\_AL\\_TRIGGER\\_ALARM](#) 11501
- #define [RPC\\_RC\\_TRANSITION](#) 12000
- #define [RPC\\_ANA\\_CLEAR\\_HISTOS](#) 13000
- #define [RPC\\_LOG\\_REWIND](#) 14000
- #define [RPC\\_TEST](#) 15000
- #define [RPC\\_CNAF16](#) 16000
- #define [RPC\\_CNAF24](#) 16001
- #define [RPC\\_MANUAL\\_TRIG](#) 17000
- #define [RPC\\_ID\\_WATCHDOG](#) 99997
- #define [RPC\\_ID\\_SHUTDOWN](#) 99998
- #define [RPC\\_ID\\_EXIT](#) 99999

#### 2.43.1 Define Documentation

**2.43.1.1 #define RPC\_AL\_CHECK 11500**

- 

Definition at line 121 of file mrpc.h.

**2.43.1.2 #define RPC\_AL\_TRIGGER\_ALARM 11501**

- 

Definition at line 122 of file mrpc.h.

Referenced by al\_trigger\_alarm().

**2.43.1.3 #define RPC\_ANA\_CLEAR\_HISTOS 13000**

- 

Definition at line 126 of file mrpc.h.

**2.43.1.4 #define RPC\_BM\_ADD\_EVENT\_REQUEST 11107**

- 

Definition at line 59 of file mrpc.h.

**2.43.1.5 #define RPC\_BM\_CLOSE\_ALL\_BUFFERS 11102**

- 

Definition at line 54 of file mrpc.h.

Referenced by bm\_close\_all\_buffers().

**2.43.1.6 #define RPC\_BM\_CLOSE\_BUFFER 11101**

- 

Definition at line 53 of file mrpc.h.

Referenced by bm\_close\_buffer().

**2.43.1.7 #define RPC\_BM\_EMPTY\_BUFFERS 11113**

- 

Definition at line 65 of file mrpc.h.

Referenced by bm\_empty\_buffers().

**2.43.1.8 #define RPC\_BM\_FLUSH\_CACHE 11110**

- 

Definition at line 62 of file mrpc.h.

Referenced by bm\_flush\_cache().

**2.43.1.9 #define RPC\_BM\_GET\_BUFFER\_INFO 11103**

- 

Definition at line 55 of file mrpc.h.

**2.43.1.10 #define RPC\_BM\_GET\_BUFFER\_LEVEL 11104**

- 

Definition at line 56 of file mrpc.h.

**2.43.1.11 #define RPC\_BM\_INIT\_BUFFER\_COUNTERS 11105**

- 

Definition at line 57 of file mrpc.h.

**2.43.1.12 #define RPC\_BM\_MARK\_READ\_WAITING 11112**

- 

Definition at line 64 of file mrpc.h.

**2.43.1.13 #define RPC\_BM\_OPEN\_BUFFER 11100**

- 

Definition at line 52 of file mrpc.h.

Referenced by bm\_open\_buffer().

**2.43.1.14 #define RPC\_BM\_RECEIVE\_EVENT 11111**

- 

Definition at line 63 of file mrpc.h.

Referenced by bm\_receive\_event().

**2.43.1.15 #define RPC\_BM\_REMOVE\_EVENT\_REQUEST 11108**

- 

Definition at line 60 of file mrpc.h.

Referenced by bm\_remove\_event\_request().

**2.43.1.16 #define RPC\_BM\_SEND\_EVENT 11109**

- 

Definition at line 61 of file mrpc.h.

Referenced by bm\_send\_event(), and rpc\_send\_event().

**2.43.1.17 #define RPC\_BM\_SET\_CACHE\_SIZE 11106**

- 

Definition at line 58 of file mrpc.h.

Referenced by bm\_set\_cache\_size().

**2.43.1.18 #define RPC\_BM\_SKIP\_EVENT 11114**

- 

Definition at line 66 of file mrpc.h.

Referenced by bm\_skip\_event().

**2.43.1.19 #define RPC\_CM\_ASCTIME 11007**

- 

Definition at line 45 of file mrpc.h.

Referenced by cm\_asctime().

**2.43.1.20 #define RPC\_CM\_CLEANUP 11002**

- 

Definition at line 40 of file mrpc.h.

Referenced by cm\_cleanup().

**2.43.1.21 #define RPC\_CM\_EXECUTE 11005**

- 

Definition at line 43 of file mrpc.h.

Referenced by cm\_execute().

**2.43.1.22 #define RPC\_CM\_EXIST 11011**

- 

Definition at line 48 of file mrpc.h.

Referenced by cm\_exist().

**2.43.1.23 #define RPC\_CM\_GET\_WATCHDOG\_INFO 11003**

- 

Definition at line 41 of file mrpc.h.

Referenced by cm\_get\_watchdog\_info().

**2.43.1.24 #define RPC\_CM\_MSG 11009**

- 

Definition at line 47 of file mrpc.h.

**2.43.1.25 #define RPC\_CM\_MSG\_LOG 11004**

- 

Definition at line 42 of file mrpc.h.

Referenced by cm\_msg\_log().

**2.43.1.26 #define RPC\_CM\_MSG\_LOG1 11013**

- 

Definition at line 50 of file mrpc.h.

Referenced by cm\_msg\_log1().

**2.43.1.27 #define RPC\_CM\_MSG\_RETRIEVE 11012**

- 

Definition at line 49 of file mrpc.h.

Referenced by cm\_msg\_retrieve().

**2.43.1.28 #define RPC\_CM\_SET\_CLIENT\_INFO 11000**

routine IDs for RPC calls -

Definition at line 38 of file mrpc.h.

Referenced by cm\_set\_client\_info().

**2.43.1.29 #define RPC\_CM\_SET\_WATCHDOG\_PARAMS 11001**

- 

Definition at line 39 of file mrpc.h.

Referenced by cm\_set\_watchdog\_params().

**2.43.1.30 #define RPC\_CM\_SYNCHRONIZE 11006**

- 

Definition at line 44 of file mrpc.h.

Referenced by cm\_synchronize().



**2.43.1.31 #define RPC\_CM\_TIME 11008**

- 

Definition at line 46 of file mrpc.h.

Referenced by cm\_time().

**2.43.1.32 #define RPC\_CNAF16 16000**

- 

Definition at line 132 of file mrpc.h.

**2.43.1.33 #define RPC\_CNAF24 16001**

- 

Definition at line 133 of file mrpc.h.

**2.43.1.34 #define RPC\_DB\_ADD\_OPEN\_RECORD 11222**

- 

Definition at line 88 of file mrpc.h.

**2.43.1.35 #define RPC\_DB\_CHECK\_RECORD 11240**

- 

Definition at line 105 of file mrpc.h.

Referenced by db\_check\_record().

**2.43.1.36 #define RPC\_DB\_CLOSE\_ALL\_DATABASES 11202**

- 

Definition at line 70 of file mrpc.h.

**2.43.1.37 #define RPC\_DB\_CLOSE\_DATABASE 11201**

- 

Definition at line 69 of file mrpc.h.

Referenced by db\_close\_database().

**2.43.1.38 #define RPC\_DB\_CREATE\_KEY 11203**

- 

Definition at line 71 of file mrpc.h.

Referenced by db\_create\_key().

**2.43.1.39 #define RPC\_DB\_CREATE\_LINK 11204**

- 

Definition at line 72 of file mrpc.h.

Referenced by db\_create\_link().

**2.43.1.40 #define RPC\_DB\_CREATE\_RECORD 11230**

- 

Definition at line 96 of file mrpc.h.

Referenced by db\_create\_record().

**2.43.1.41 #define RPC\_DB\_DELETE\_KEY 11210**

- 

Definition at line 78 of file mrpc.h.

Referenced by db\_delete\_key().

**2.43.1.42 #define RPC\_DB\_ENUM\_KEY 11211**

- 

Definition at line 79 of file mrpc.h.

Referenced by db\_enum\_key().

**2.43.1.43 #define RPC\_DB\_ENUM\_LINK 11228**

- 

Definition at line 94 of file mrpc.h.

**2.43.1.44 #define RPC\_DB\_FIND\_KEY 11207**

- 

Definition at line 75 of file mrpc.h.

Referenced by db\_end\_key().

**2.43.1.45 #define RPC\_DB\_FIND\_LINK 11208**

- 

Definition at line 76 of file mrpc.h.

**2.43.1.46 #define RPC\_DB\_FLUSH\_DATABASE 11235**

- 

Definition at line 100 of file mrpc.h.

**2.43.1.47 #define RPC\_DB\_GET\_DATA 11213**

- 

Definition at line 81 of file mrpc.h.

Referenced by db\_get\_data().

**2.43.1.48 #define RPC\_DB\_GET\_DATA1 11238**

- 

Definition at line 103 of file mrpc.h.

**2.43.1.49 #define RPC\_DB\_GET\_DATA\_INDEX 11231**

- 

Definition at line 97 of file mrpc.h.

Referenced by db\_get\_data\_index().

**2.43.1.50 #define RPC\_DB\_GET\_KEY 11212**

- 

Definition at line 80 of file mrpc.h.

Referenced by db\_get\_key().

**2.43.1.51 #define RPC\_DB\_GET\_KEY\_INFO 11237**

- 

Definition at line 102 of file mrpc.h.

Referenced by db\_get\_key\_info().

**2.43.1.52 #define RPC\_DB\_GET\_KEY\_TIME 11232**

- 

Definition at line 98 of file mrpc.h.

Referenced by db\_get\_key\_time().

**2.43.1.53 #define RPC\_DB\_GET\_NEXT\_LINK 11241**

- 

Definition at line 106 of file mrpc.h.

**2.43.1.54 #define RPC\_DB\_GET\_OPEN\_RECORDS 11233**

- 

Definition at line 99 of file mrpc.h.

**2.43.1.55 #define RPC\_DB\_GET\_PATH 11209**

- 

Definition at line 77 of file mrpc.h.

**2.43.1.56 #define RPC\_DB\_GET\_RECORD 11220**

- 

Definition at line 86 of file mrpc.h.

Referenced by db\_get\_record().

**2.43.1.57 #define RPC\_DB\_GET\_RECORD\_SIZE 11219**

- 

Definition at line 85 of file mrpc.h.

Referenced by db\_get\_record\_size().

**2.43.1.58 #define RPC\_DB\_GET\_VALUE 11206**

- 

Definition at line 74 of file mrpc.h.

Referenced by db\_get\_value().

**2.43.1.59 #define RPC\_DB\_LOAD 11225**

- 

Definition at line 91 of file mrpc.h.

Referenced by db\_load().

**2.43.1.60 #define RPC\_DB\_OPEN\_DATABASE 11200**

- 

Definition at line 68 of file mrpc.h.

Referenced by db\_open\_database().

**2.43.1.61 #define RPC\_DB\_REMOVE\_OPEN\_RECORD 11223**

- 

Definition at line 89 of file mrpc.h.

**2.43.1.62 #define RPC\_DB\_RENAME\_KEY 11227**

- 

Definition at line 93 of file mrpc.h.

**2.43.1.63 #define RPC\_DB\_REORDER\_KEY 11229**

- 

Definition at line 95 of file mrpc.h.

**2.43.1.64 #define RPC\_DB\_SAVE 11224**

- 

Definition at line 90 of file mrpc.h.

Referenced by db\_save().

**2.43.1.65 #define RPC\_DB\_SET\_CLIENT\_NAME 11226**

- 

Definition at line 92 of file mrpc.h.

**2.43.1.66 #define RPC\_DB\_SET\_DATA 11214**

- 

Definition at line 82 of file mrpc.h.

Referenced by db\_set\_data().

**2.43.1.67 #define RPC\_DB\_SET\_DATA\_INDEX 11215**

- 

Definition at line 83 of file mrpc.h.

Referenced by db\_set\_data\_index().

**2.43.1.68 #define RPC\_DB\_SET\_DATA\_INDEX2 11236**

- 

Definition at line 101 of file mrpc.h.

**2.43.1.69 #define RPC\_DB\_SET\_MODE 11216**

- 

Definition at line 84 of file mrpc.h.

**2.43.1.70 #define RPC\_DB\_SET\_NUM\_VALUES 11239**

- 

Definition at line 104 of file mrpc.h.

**2.43.1.71 #define RPC\_DB\_SET\_RECORD 11221**

- 

Definition at line 87 of file mrpc.h.

Referenced by db\_set\_record().

**2.43.1.72 #define RPC\_DB\_SET\_VALUE 11205**

- 

Definition at line 73 of file mrpc.h.

Referenced by db\_set\_value().

**2.43.1.73 #define RPC\_EL\_SUBMIT 11400**

- 

Definition at line 119 of file mrpc.h.

Referenced by el\_submit().

**2.43.1.74 #define RPC\_HS\_COUNT\_EVENTS 11303**

- 

Definition at line 111 of file mrpc.h.

**2.43.1.75 #define RPC\_HS\_COUNT\_VARS 11305**

- 

Definition at line 113 of file mrpc.h.

**2.43.1.76 #define RPC\_HS\_DEFINE\_EVENT 11301**

- 

Definition at line 109 of file mrpc.h.

**2.43.1.77 #define RPC\_HS\_ENUM\_EVENTS 11304**

- 

Definition at line 112 of file mrpc.h.

**2.43.1.78 #define RPC\_HS\_ENUM\_VARS 11306**

- 

Definition at line 114 of file mrpc.h.



**2.43.1.79 #define RPC\_HS\_GET\_EVENT\_ID 11309**

- 

Definition at line 117 of file mrpc.h.

**2.43.1.80 #define RPC\_HS\_GET\_VAR 11308**

- 

Definition at line 116 of file mrpc.h.

**2.43.1.81 #define RPC\_HS\_READ 11307**

- 

Definition at line 115 of file mrpc.h.

**2.43.1.82 #define RPC\_HS\_SET\_PATH 11300**

- 

Definition at line 108 of file mrpc.h.

Referenced by hs\_set\_path().

**2.43.1.83 #define RPC\_HS\_WRITE\_EVENT 11302**

- 

Definition at line 110 of file mrpc.h.

**2.43.1.84 #define RPC\_ID\_EXIT 99999**

- 

Definition at line 139 of file mrpc.h.

**2.43.1.85 #define RPC\_ID\_SHUTDOWN 99998**

- 

Definition at line 138 of file mrpc.h.

**2.43.1.86 #define RPC\_ID\_WATCHDOG 99997**

- 

Definition at line 137 of file mrpc.h.

**2.43.1.87 #define RPC\_LOG\_REWIND 14000**

- 

Definition at line 128 of file mrpc.h.

**2.43.1.88 #define RPC\_MANUAL\_TRIG 17000**

- 

Definition at line 135 of file mrpc.h.

Referenced by register\_equipment().

**2.43.1.89 #define RPC\_RC\_TRANSITION 12000**

- 

Definition at line 124 of file mrpc.h.

Referenced by cm\_register\_transition(), and cm\_transition().

**2.43.1.90 #define RPC\_TEST 15000**

- 

Definition at line 130 of file mrpc.h.

## 2.44 Midas RPC\_LIST

### Variables

- static RPC\_LIST [rpc\\_list\\_library](#) [ ]
- static RPC\_LIST [rpc\\_list\\_system](#) [ ]

### 2.44.1 Function Documentation

#### 2.44.1.1 RPC\_LIST\* [rpc\\_get\\_internal\\_list](#) (INT *mag*)

Definition at line 1187 of file `mrpc.c`.

Referenced by `cm_connect_experiment1()`, `rpc_register_client()`, and `rpc_register_functions()`.

### 2.44.2 Variable Documentation

#### 2.44.2.1 RPC\_LIST [rpc\\_list\\_library](#)[ ] [static]

`rpc_list_library` contains all MIDAS library functions and gets registered whenever a connection to the MIDAS server is established

Definition at line 44 of file `mrpc.c`.

Referenced by `rpc_get_internal_list()`.

#### 2.44.2.2 RPC\_LIST [rpc\\_list\\_system](#)[ ] [static]

**Initial value:**

```
{
    {RPC_ID_WATCHDOG, "id_watchdog",
      {{0}}},
    {RPC_ID_SHUTDOWN, "id_shutdown",
      {{0}}},
    {RPC_ID_EXIT, "id_exit",
      {{0}}},
    {0}
```

```
}

```

rpc\_list\_system contains MIDAS system functions and gets registered whenever a RPC server is registered

Definition at line 1171 of file mrpc.c.

Referenced by rpc\_get\_internal\_list().

## 2.45 The odb.c

### Modules

- [Midas ODB Functions \(db\\_XXX\)](#)

## 2.46 Midas ODB Functions (db\_XXX)

### Functions

- INT [db\\_open\\_database](#) (char \*database\_name, INT database\_size, HANDLE \*hDB, char \*client\_name)
- INT [db\\_close\\_database](#) (HANDLE hDB)
- INT [db\\_lock\\_database](#) (HANDLE hDB)
- INT [db\\_unlock\\_database](#) (HANDLE hDB)
- INT [db\\_protect\\_database](#) (HANDLE hDB)
- INT [db\\_create\\_key](#) (HANDLE hDB, HANDLE hKey, char \*key\_name, DWORD type)
- INT [db\\_create\\_link](#) (HANDLE hDB, HANDLE hKey, char \*link\_name, char \*destination)
- INT [db\\_delete\\_key1](#) (HANDLE hDB, HANDLE hKey, INT level, BOOL follow\_links)
- INT [db\\_delete\\_key](#) (HANDLE hDB, HANDLE hKey, BOOL follow\_links)
- INT [db\\_find\\_key](#) (HANDLE hDB, HANDLE hKey, char \*key\_name, HANDLE \*subhKey)
- INT [db\\_set\\_value](#) (HANDLE hDB, HANDLE hKeyRoot, char \*key\_name, void \*data, INT data\_size, INT num\_values, DWORD type)
- INT [db\\_get\\_value](#) (HANDLE hDB, HANDLE hKeyRoot, char \*key\_name, void \*data, INT \*buf\_size, DWORD type, BOOL create)
- INT [db\\_enum\\_key](#) (HANDLE hDB, HANDLE hKey, INT index, HANDLE \*subkey\_handle)
- INT [db\\_get\\_key](#) (HANDLE hDB, HANDLE hKey, KEY \*key)

- INT `db_get_key_time` (HANDLE `hDB`, HANDLE `hKey`, DWORD `*delta`)
- INT `db_get_key_info` (HANDLE `hDB`, HANDLE `hKey`, char `*name`, INT `name_size`, INT `*type`, INT `*num_values`, INT `*item_size`)
- INT `db_get_data` (HANDLE `hDB`, HANDLE `hKey`, void `*data`, INT `*buf_size`, DWORD type)
- INT `db_get_data_index` (HANDLE `hDB`, HANDLE `hKey`, void `*data`, INT `*buf_size`, INT `index`, DWORD type)
- INT `db_set_data` (HANDLE `hDB`, HANDLE `hKey`, void `*data`, INT `buf_size`, INT `num_values`, DWORD type)
- INT `db_set_data_index` (HANDLE `hDB`, HANDLE `hKey`, void `*data`, INT `data_size`, INT `index`, DWORD type)
- INT `db_load` (HANDLE `hDB`, HANDLE `hKeyRoot`, char `*filename`, BOOL `bRemote`)
- INT `db_copy` (HANDLE `hDB`, HANDLE `hKey`, char `*buffer`, INT `*buffer_size`, char `*path`)
- INT `db_paste` (HANDLE `hDB`, HANDLE `hKeyRoot`, char `*buffer`)
- INT `db_paste_xml` (HANDLE `hDB`, HANDLE `hKeyRoot`, char `*buffer`)
- INT `db_copy_xml` (HANDLE `hDB`, HANDLE `hKey`, char `*buffer`, INT `*buffer_size`)
- INT `db_save` (HANDLE `hDB`, HANDLE `hKey`, char `*filename`, BOOL `bRemote`)
- INT `db_save_xml` (HANDLE `hDB`, HANDLE `hKey`, char `*filename`)
- INT `db_save_struct` (HANDLE `hDB`, HANDLE `hKey`, char `*file_name`, char `*struct_name`, BOOL `append`)
- INT `db_sprintf` (char `*string`, void `*data`, INT `data_size`, INT `index`, DWORD type)
- INT `db_get_record_size` (HANDLE `hDB`, HANDLE `hKey`, INT `align`, INT `*buf_size`)
- INT `db_get_record` (HANDLE `hDB`, HANDLE `hKey`, void `*data`, INT `*buf_size`, INT `align`)
- INT `db_set_record` (HANDLE `hDB`, HANDLE `hKey`, void `*data`, INT `buf_size`, INT `align`)
- INT `db_create_record` (HANDLE `hDB`, HANDLE `hKey`, char `*orig_key_name`, char `*init_str`)
- INT `db_check_record` (HANDLE `hDB`, HANDLE `hKey`, char `*keyname`, char `*rec_str`, BOOL `correct`)
- INT `db_open_record` (HANDLE `hDB`, HANDLE `hKey`, void `*ptr`, INT `rec_size`, WORD `access_mode`, void(`*dispatcher`)(INT, INT, void `*`), void `*info`)
- INT `db_close_record` (HANDLE `hDB`, HANDLE `hKey`)
- INT `db_close_all_records` ()
- INT `db_update_record` (INT `hDB`, INT `hKey`, int `socket`)
- INT `db_send_changed_records` ()

### 2.46.1 Function Documentation

#### 2.46.1.1 INT db\_check\_record (HANDLE *hDB*, HANDLE *hKey*, char \* *keyname*, char \* *rec\_str*, BOOL *correct*)

This function ensures that a certain ODB subtree matches a given C structure, by comparing the *init\_str* with the current ODB structure. If the record does not exist at all, it is created with the default values in *init\_str*. If it does exist but does not match the variables in *init\_str*, the function returns an error if *correct*=FALSE or calls [db\\_create\\_record\(\)](#) if *correct*=TRUE.

##### Parameters:

*hDB* ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

*hKey* Handle for key where search starts, zero for root.

*keyname* Name of key to search, can contain directories.

*rec\_str* ASCII representation of ODB record in the format

*correct* If TRUE, correct ODB record if necessary

##### Returns:

DB\_SUCCESS, DB\_INVALID\_HANDLE, DB\_NO\_KEY, DB\_STRUCTURE\_MISMATCH

Definition at line 7392 of file odb.c.

Referenced by [al\\_trigger\\_alarm\(\)](#), [cm\\_connect\\_experiment1\(\)](#), and [register\\_equipment\(\)](#).

#### 2.46.1.2 INT db\_close\_all\_records ()

Release local memory for open records. This routine is called by [db\\_close\\_all\\_databases\(\)](#) and [cm\\_disconnect\\_experiment\(\)](#)

##### Returns:

DB\_SUCCESS, DB\_INVALID\_HANDLE

Definition at line 7868 of file odb.c.

Referenced by [cm\\_disconnect\\_experiment\(\)](#).

#### 2.46.1.3 INT db\_close\_database (HANDLE *hDB*)

Close a database

**Parameters:**

*hDB* ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

**Returns:**

DB\_SUCCESS, DB\_INVALID\_HANDLE, RPC\_NET\_ERROR

Definition at line 1031 of file odb.c.

**2.46.1.4 INT db\_close\_record (HANDLE hDB, HANDLE hKey)**

Close a record previously opened with db\_open\_record.

**Parameters:**

*hDB* ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

*hKey* Handle for key where search starts, zero for root.

**Returns:**

DB\_SUCCESS, DB\_INVALID\_HANDLE

Definition at line 7831 of file odb.c.

**2.46.1.5 INT db\_copy (HANDLE hDB, HANDLE hKey, char \* buffer, INT \* buffer\_size, char \* path)**

Copy an ODB subtree in ASCII format to a buffer

This function converts the binary ODB contents to an ASCII. The function [db\\_paste\(\)](#) can be used to convert the ASCII representation back to binary ODB contents. The functions [db\\_load\(\)](#) and [db\\_save\(\)](#) internally use [db\\_copy\(\)](#) and [db\\_paste\(\)](#). This function converts the binary ODB contents to an ASCII representation of the form:

- For single value:

```
[ODB path]
key name = type : value
```

- For strings:

```
key name = STRING : [size] string contents
```

- For arrays (type can be BYTE, SBYTE, CHAR, WORD, SHORT, DWORD, INT, BOOL, FLOAT, DOUBLE, STRING or LINK):

```
key name = type[size] :
[0] value0
[1] value1
[2] value2
...
```

**Parameters:**

*hDB* ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).  
*hKey* Handle for key where search starts, zero for root.  
*buffer* ASCII buffer which receives ODB contents.  
*buffer\_size* Size of buffer, returns remaining space in buffer.  
*path* Internal use only, must be empty ("").

**Returns:**

DB\_SUCCESS, DB\_TRUNCATED, DB\_NO\_MEMORY

Definition at line 4991 of file odb.c.

Referenced by db\_create\_record(), and db\_save().

**2.46.1.6 INT db\_copy\_xml (HANDLE hDB, HANDLE hKey, char \* buffer, INT \* buffer\_size)**

Copy an ODB subtree in XML format to a buffer

**Parameters:**

*hDB* ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).  
*hKey* Handle for key where search starts, zero for root.  
*buffer* ASCII buffer which receives ODB contents.  
*buffer\_size* Size of buffer, returns remaining space in buffer.

**Returns:**

DB\_SUCCESS, DB\_TRUNCATED, DB\_NO\_MEMORY

Definition at line 5668 of file odb.c.

**2.46.1.7 INT db\_create\_key (HANDLE hDB, HANDLE hKey, char \* key\_name, DWORD type)**

Create a new key in a database

**Parameters:**

*hDB* ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).  
*hKey* Key handle to start with, 0 for root  
*key\_name* Name of key in the form "/key/key/key"  
*type* Type of key, one of TID\_xxx (see [Midas Data Types](#))

**Returns:**

DB\_SUCCESS, DB\_INVALID\_HANDLE, DB\_INVALID\_PARAM, DB\_FULL,  
DB\_KEY\_EXIST, DB\_NO\_ACCESS



Definition at line 1447 of file odb.c.

Referenced by db\_create\_record(), db\_get\_value(), db\_paste(), db\_paste\_node(), db\_set\_value(), and register\_equipment().

#### 2.46.1.8 INT db\_create\_link (HANDLE hDB, HANDLE hKey, char \* link\_name, char \* destination)

Create a link to a key or set the destination of an existing link.

##### Parameters:

*hDB* ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

*hKey* Key handle to start with, 0 for root

*link\_name* Name of key in the form "/key/key/key"

*destination* Destination of link in the form "/key/key/key"

##### Returns:

DB\_SUCCESS, DB\_INVALID\_HANDLE, DB\_FULL, DB\_KEY\_EXIST, DB\_NO\_ACCESS

Definition at line 1686 of file odb.c.

#### 2.46.1.9 INT db\_create\_record (HANDLE hDB, HANDLE hKey, char \* orig\_key\_name, char \* init\_str)

Create a record. If a part of the record exists already, merge it with the init\_str (use values from the init\_str only when they are not in the existing record).

This function creates a ODB sub-tree according to an ASCII representation of that tree. See [db\\_copy\(\)](#) for a description. It can be used to create a sub-tree which exactly matches a C structure. The sub-tree can then later be mapped to the C structure ("hot-link") via the function [db\\_open\\_record\(\)](#).

If a sub-tree exists already which exactly matches the ASCII representation, it is not modified. If part of the tree exists, it is merged with the ASCII representation where the ODB values have priority, only values not present in the ODB are created with the default values of the ASCII representation. It is therefore recommended that before creating an ODB hot-link the function [db\\_create\\_record\(\)](#) is called to insure that the ODB tree and the C structure contain exactly the same values in the same order.

Following example creates a record under /Equipment/Trigger/Settings, opens a hot-link between that record and a local C structure trigger\_settings and registers a callback function trigger\_update() which gets called each time the record is changed.

```
struct {
    INT level1;
    INT level2;
```

```

} trigger_settings;
char *trigger_settings_str =
"[Settings]\n\
level1 = INT : 0\n\
level2 = INT : 0";
void trigger_update(INT hDB, INT hkey, void *info)
{
    printf("New levels: %d %d\n",
        trigger_settings.level1,
        trigger_settings.level2);
}
main()
{
    HANDLE hDB, hkey;
    char[128] info;
    ...
    cm_get_experiment_database(&hDB, NULL);
    db_create_record(hDB, 0, "/Equipment/Trigger", trigger_settings_str);
    db_find_key(hDB, 0, "/Equipment/Trigger/Settings", &hkey);
    db_open_record(hDB, hkey, &trigger_settings,
        sizeof(trigger_settings), MODE_READ, trigger_update, info);
    ...
}

```

**Parameters:**

***hDB*** ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

***hKey*** Handle for key where search starts, zero for root.

***orig\_key\_name*** Name of key to search, can contain directories.

***init\_str*** Initialization string in the format of the db\_copy/db\_save functions.

**Returns:**

DB\_SUCCESS, DB\_INVALID\_HANDLE, DB\_FULL, DB\_NO\_ACCESS, DB\_OPEN\_RECORD

Definition at line 7222 of file odb.c.

Referenced by al\_trigger\_alarm(), analyzer\_init(), cm\_set\_client\_info(), db\_check\_record(), and tr\_start().

**2.46.1.10 INT db\_delete\_key (HANDLE hDB, HANDLE hKey, BOOL follow\_links)**

Delete a subtree in a database starting from a key (including this key).

```

...
status = db_find_link(hDB, 0, str, &hkey);
if (status != DB_SUCCESS)
{
    cm_msg(MINFO, "my_delete", " Cannot find key %s", str);
    return;
}

```

```

status = db_delete_key(hDB, hkey, FALSE);
if (status != DB_SUCCESS)
{
    cm_msg(MERROR, "my_delete", " Cannot delete key %s", str);
    return;
}
...

```

**Parameters:**

*hDB* ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

*hKey* for key where search starts, zero for root.

*follow\_links* Follow links when TRUE.

**Returns:**

DB\_SUCCESS, DB\_INVALID\_HANDLE, DB\_NO\_ACCESS, DB\_OPEN\_RECORD

Definition at line 1886 of file odb.c.

Referenced by [cm\\_set\\_client\\_info\(\)](#), and [db\\_create\\_record\(\)](#).

#### 2.46.1.11 INT db\_delete\_key1 (HANDLE *hDB*, HANDLE *hKey*, INT *level*, BOOL *follow\_links*)

Delete a subtree, using level information (only called internally by [db\\_delete\\_key\(\)](#))

**For ~~Intermdat~~ users only.**

*hDB* ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

*hKey* Key handle to start with, 0 for root

*level* Recursion level, must be zero when

*follow\_links* Follow links when TRUE called from a user routine

**Returns:**

DB\_SUCCESS, DB\_INVALID\_HANDLE, DB\_OPEN\_RECORD

Definition at line 1716 of file odb.c.

Referenced by [cm\\_delete\\_client\\_info\(\)](#), and [db\\_delete\\_key\(\)](#).

#### 2.46.1.12 INT db\_enum\_key (HANDLE *hDB*, HANDLE *hKey*, INT *index*, HANDLE \* *subkey\_handle*)

Enumerate subkeys from a key, follow links.

hkey must correspond to a valid ODB directory. The index is usually incremented in a loop until the last key is reached. Information about the sub-keys can be obtained with [db\\_get\\_key\(\)](#). If a returned key is of type TID\_KEY, it contains itself sub-keys. To scan a whole ODB sub-tree, the function [db\\_scan\\_tree\(\)](#) can be used.

```

INT    i;
HANDLE hkey, hsubkey;
KEY    key;
db_find_key(hdb, 0, "/Runinfo", &hkey);
for (i=0 ; i++)
{
    db_enum_key(hdb, hkey, i, &hsubkey);
    if (!hsubkey)
        break; // end of list reached
    // print key name
    db_get_key(hdb, hkey, &key);
    printf("%s\n", key.name);
}

```

**Parameters:**

**hDB** ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

**hKey** Handle for key where search starts, zero for root.

**index** Subkey index, could be initially 0, then incremented in each call until subkey becomes zero and the function returns DB\_NO\_MORE\_SUBKEYS

**subkey\_handle** Handle of subkey which can be used in [db\\_get\\_key\(\)](#) and [db\\_get\\_data\(\)](#)

**Returns:**

DB\_SUCCESS, DB\_INVALID\_HANDLE, DB\_NO\_MORE\_SUBKEYS

Definition at line 3149 of file odb.c.

Referenced by [cm\\_connect\\_client\(\)](#), [cm\\_exist\(\)](#), [cm\\_set\\_client\\_info\(\)](#), [cm\\_shutdown\(\)](#), [cm\\_transition\(\)](#), [db\\_save\\_xml\\_key\(\)](#), [load\\_fragment\(\)](#), [logger\\_root\(\)](#), and [update\\_odb\(\)](#).

### 2.46.1.13 INT db\_find\_key (HANDLE hDB, HANDLE hKey, char \* key\_name, HANDLE \* subhKey)

Returns key handle for a key with a specific name.

Keys can be accessed by their name including the directory or by a handle. A key handle is an internal offset to the shared memory where the ODB lives and allows a much faster access to a key than via its name.

The function [db\\_find\\_key\(\)](#) must be used to convert a key name to a handle. Most other database functions use this key handle in various operations.

```

HANDLE hkey, hsubkey;
// use full name, start from root
db_find_key(hDB, 0, "/Runinfo/Run number", &hkey);
// start from subdirectory
db_find_key(hDB, 0, "/Runinfo", &hkey);
db_find_key(hdb, hkey, "Run number", &hsubkey);

```

**Parameters:**

***hDB*** ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

***hKey*** Handle for key where search starts, zero for root.

***key\_name*** Name of key to search, can contain directories.

***subhKey*** Returned handle of key, zero if key cannot be found.

**Returns:**

DB\_SUCCESS, DB\_INVALID\_HANDLE, DB\_NO\_ACCESS, DB\_NO\_KEY

Definition at line 1919 of file odb.c.

Referenced by [al\\_trigger\\_alarm\(\)](#), [analyzer\\_init\(\)](#), [cm\\_connect\\_client\(\)](#), [cm\\_exist\(\)](#), [cm\\_get\\_client\\_info\(\)](#), [cm\\_msg\\_log\(\)](#), [cm\\_msg\\_log1\(\)](#), [cm\\_msg\\_retrieve\(\)](#), [cm\\_register\\_deferred\\_transition\(\)](#), [cm\\_register\\_transition\(\)](#), [cm\\_set\\_client\\_info\(\)](#), [cm\\_shutdown\(\)](#), [cm\\_transition\(\)](#), [db\\_check\\_record\(\)](#), [db\\_create\\_link\(\)](#), [db\\_create\\_record\(\)](#), [db\\_delete\\_key1\(\)](#), [db\\_enum\\_key\(\)](#), [db\\_get\\_value\(\)](#), [db\\_paste\(\)](#), [db\\_paste\\_xml\(\)](#), [db\\_set\\_value\(\)](#), [load\\_fragment\(\)](#), [logger\\_root\(\)](#), [register\\_equipment\(\)](#), [tr\\_start\(\)](#), and [update\\_odb\(\)](#).

#### 2.46.1.14 INT db\_get\_data (HANDLE hDB, HANDLE hKey, void \* data, INT \* buf\_size, DWORD type)

Get key data from a handle

The function returns single values or whole arrays which are contained in an ODB key. Since the data buffer is of type void, no type checking can be performed by the compiler. Therefore the type has to be explicitly supplied, which is checked against the type stored in the ODB.

```
HANDLE hkey;
INT run_number, size;
// get key handle for run number
db_find_key(hDB, 0, "Runinfo/Run number", &hkey);
// return run number
size = sizeof(run_number);
db_get_data(hDB, hkey, &run_number, &size, TID_INT);
```

**Parameters:**

***hDB*** ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

***hKey*** Handle for key where search starts, zero for root.

***data*** Pointer to the return data.

***buf\_size*** Size of data buffer.

***type*** Type of key, one of TID\_xxx (see [Midas Data Types](#)).

**Returns:**

DB\_SUCCESS, DB\_INVALID\_HANDLE, DB\_TRUNCATED, DB\_TYPE\_MISMATCH

Definition at line 3918 of file odb.c.

Referenced by `cm_connect_client()`, `cm_get_client_info()`, `cm_set_client_info()`, `db_copy()`, `db_get_record()`, `db_save_xml_key()`, and `tr_start()`.

#### 2.46.1.15 INT db\_get\_data\_index (HANDLE hDB, HANDLE hKey, void \*data, INT \*buf\_size, INT index, DWORD type)

returns a single value of keys containing arrays of values.

The function returns a single value of keys containing arrays of values.

##### Parameters:

**hDB** ODB handle obtained via `cm_get_experiment_database()`.

**hKey** Handle for key where search starts, zero for root.

**data** Size of data buffer.

**buf\_size** Return size of the record.

**index** Index of array [0..n-1].

**type** Type of key, one of TID\_xxx (see [Midas Data Types](#)).

##### Returns:

DB\_SUCCESS, DB\_INVALID\_HANDLE, DB\_TRUNCATED, DB\_OUT\_OF\_RANGE

Definition at line 4144 of file odb.c.

Referenced by `cm_transition()`.

#### 2.46.1.16 INT db\_get\_key (HANDLE hDB, HANDLE hKey, KEY \*key)

Get key structure from a handle.

[KEY](#) structure has following format:

```
typedef struct {
    DWORD      type;                // TID_xxx type
    INT        num_values;          // number of values
    char       name[NAME_LENGTH];   // name of variable
    INT        data;                // Address of variable (offset)
    INT        total_size;          // Total size of data block
    INT        item_size;           // Size of single data item
    WORD       access_mode;         // Access mode
    WORD       notify_count;        // Notify counter
    INT        next_key;            // Address of next key
    INT        parent_keylist;      // keylist to which this key belongs
    INT        last_written;        // Time of last write action
} KEY;
```

Most of these values are used for internal purposes, the values which are of public interest are type, num\_values, and name. For keys which contain a single value, num\_values equals to one and total\_size equals to item\_size. For keys which contain an array of strings (TID\_STRING), item\_size equals to the length of one string.

```
KEY    key;
HANDLE hkey;
db_find_key(hDB, 0, "/Runinfo/Run number", &hkey);
db_get_key(hDB, hkey, &key);
printf("The run number is of type %s\n", rpc_tid_name(key.type));
```

**Parameters:**

*hDB* ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

*hKey* Handle for key where search starts, zero for root.

*key* Pointer to [KEY](#) stucture.

**Returns:**

DB\_SUCCESS, DB\_INVALID\_HANDLE

Definition at line 3481 of file odb.c.

Referenced by [cm\\_check\\_client\(\)](#), [cm\\_register\\_transition\(\)](#), [cm\\_shutdown\(\)](#), [cm\\_transition\(\)](#), [db\\_check\\_record\(\)](#), [db\\_copy\(\)](#), [db\\_get\\_record\(\)](#), [db\\_get\\_record\\_size\(\)](#), [db\\_open\\_record\(\)](#), [db\\_paste\(\)](#), [db\\_save\\_struct\(\)](#), [db\\_save\\_xml\\_key\(\)](#), [db\\_set\\_record\(\)](#), [load\\_fragment\(\)](#), [tr\\_start\(\)](#), and [update\\_odb\(\)](#).

**2.46.1.17 INT db\_get\_key\_info (HANDLE *hDB*, HANDLE *hKey*, char \* *name*, INT *name\_size*, INT \* *type*, INT \* *num\_values*, INT \* *item\_size*)**

Get key info (separate values instead of structure)

**Parameters:**

*hDB* ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

*hKey* Handle of key to operate on

*name* Key name

*name\_size* Size of the give name (done with sizeof())

*type* Key type (see [Midas Data Types](#)).

*num\_values* Number of values in key.

*item\_size* Size of individual key value (used for strings)

**Returns:**

DB\_SUCCESS, DB\_INVALID\_HANDLE

Definition at line 3603 of file odb.c.

**2.46.1.18 INT db\_get\_key\_time (HANDLE *hDB*, HANDLE *hKey*, DWORD \* *delta*)**

Get time when key was last modified

**Parameters:**

*hDB* ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

*hKey* Handle of key to operate on

*delta* Seconds since last update

**Returns:**

DB\_SUCCESS, DB\_INVALID\_HANDLE

Definition at line 3545 of file odb.c.

**2.46.1.19 INT db\_get\_record (HANDLE *hDB*, HANDLE *hKey*, void \* *data*, INT \* *buf\_size*, INT *align*)**

Copy a set of keys to local memory.

An ODB sub-tree can be mapped to a C structure automatically via a hot-link using the function [db\\_open\\_record\(\)](#) or manually with this function. Problems might occur if the ODB sub-tree contains values which don't match the C structure. Although the structure size is checked against the sub-tree size, no checking can be done if the type and order of the values in the structure are the same than those in the ODB sub-tree. Therefore it is recommended to use the function [db\\_create\\_record\(\)](#) before [db\\_get\\_record\(\)](#) is used which ensures that both are equivalent.

```
struct {
    INT level1;
    INT level2;
} trigger_settings;
char *trigger_settings_str =
"[Settings]\n\
level1 = INT : 0\n\
level2 = INT : 0";

main()
{
    HANDLE hDB, hkey;
    INT size;
    ...
    cm_get_experiment_database(&hDB, NULL);
    db_create_record(hDB, 0, "/Equipment/Trigger", trigger_settings_str);
    db_find_key(hDB, 0, "/Equipment/Trigger/Settings", &hkey);
    size = sizeof(trigger_settings);
    db_get_record(hDB, hkey, &trigger_settings, &size, 0);
    ...
}
```



**Parameters:**

*hDB* ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

*hKey* Handle for key where search starts, zero for root.

*data* Pointer to the retrieved data.

*buf\_size* Size of data structure, must be obtained via `sizeof(RECORD-NAME)`.

*align* Byte alignment calculated by the stub and passed to the rpc side to align data according to local machine. Must be zero when called from user level.

**Returns:**

DB\_SUCCESS, DB\_INVALID\_HANDLE, DB\_STRUCT\_SIZE\_MISMATCH

Definition at line 6726 of file odb.c.

Referenced by `al_trigger_alarm()`, `cm_transition()`, `db_open_record()`, `db_update_record()`, `register_equipment()`, and `tr_start()`.

#### 2.46.1.20 INT db\_get\_record\_size (HANDLE hDB, HANDLE hKey, INT align, INT \* buf\_size)

Calculates the size of a record.

**Parameters:**

*hDB* ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

*hKey* Handle for key where search starts, zero for root.

*align* Byte alignment calculated by the stub and passed to the rpc side to align data according to local machine. Must be zero when called from user level

*buf\_size* Size of record structure

**Returns:**

DB\_SUCCESS, DB\_INVALID\_HANDLE, DB\_TYPE\_MISMATCH, DB\_STRUCT\_SIZE\_MISMATCH, DB\_NO\_KEY

Definition at line 6640 of file odb.c.

Referenced by `db_get_record()`, `db_open_record()`, and `db_set_record()`.

#### 2.46.1.21 INT db\_get\_value (HANDLE hDB, HANDLE hKeyRoot, char \* key\_name, void \* data, INT \* buf\_size, DWORD type, BOOL create)

Get value of a single key.

The function returns single values or whole arrays which are contained in an ODB key. Since the data buffer is of type void, no type checking can be performed by the compiler. Therefore the type has to be explicitly supplied, which is checked against the

type stored in the ODB. *key\_name* can contain the full path of a key (like: "/Equipment/Trigger/Settings/Level1") while *hkey* is zero which refers to the root, or *hkey* can refer to a sub-directory (like: /Equipment/Trigger) and *key\_name* is interpreted relative to that directory like "Settings/Level1".

```
INT level1, size;
size = sizeof(level1);
db_get_value(hDB, 0, "/Equipment/Trigger/Settings/Level1",
              &level1, &size, TID_INT, 0);
```

**Parameters:**

- hDB* ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).
- hKeyRoot* Handle for key where search starts, zero for root.
- key\_name* Name of key to search, can contain directories.
- data* Address of data.
- buf\_size* Maximum buffer size on input, number of written bytes on return.
- type* Type of key, one of TID\_xxx (see [Midas Data Types](#))
- create* If TRUE, create key if not existing

**Returns:**

DB\_SUCCESS, DB\_INVALID\_HANDLE, DB\_NO\_ACCESS, DB\_TYPE\_MISMATCH, DB\_TRUNCATED, DB\_NO\_KEY

Definition at line 2991 of file odb.c.

Referenced by [al\\_trigger\\_alarm\(\)](#), [ana\\_end\\_of\\_run\(\)](#), [cm\\_check\\_client\(\)](#), [cm\\_connect\\_experiment1\(\)](#), [cm\\_exist\(\)](#), [cm\\_msg\\_log\(\)](#), [cm\\_msg\\_log1\(\)](#), [cm\\_msg\\_retrieve\(\)](#), [cm\\_register\\_deferred\\_transition\(\)](#), [cm\\_set\\_client\\_info\(\)](#), [cm\\_shutdown\(\)](#), [cm\\_transition\(\)](#), [el\\_submit\(\)](#), [load\\_fragment\(\)](#), [logger\\_root\(\)](#), [register\\_equipment\(\)](#), [scheduler\(\)](#), and [tr\\_start\(\)](#).

#### 2.46.1.22 INT db\_load (HANDLE hDB, HANDLE hKeyRoot, char \* filename, BOOL bRemote)

Load a branch of a database from an .ODB file.

This function is used by the ODBedit command load. For a description of the ASCII format, see [db\\_copy\(\)](#). Data can be loaded relative to the root of the ODB (*hkey* equal zero) or relative to a certain key.

**Parameters:**

- hDB* ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).
- hKeyRoot* Handle for key where search starts, zero for root.
- filename* Filename of .ODB file.

***bRemote*** If TRUE, the file is loaded by the server process on the back-end, if FALSE, it is loaded from the current process

**Returns:**

DB\_SUCCESS, DB\_INVALID\_HANDLE, DB\_FILE\_ERROR

Definition at line 4906 of file odb.c.

### 2.46.1.23 INT db\_lock\_database (HANDLE hDB)

Lock a database for exclusive access via system mutex calls.

**Parameters:**

***hDB*** Handle to the database to lock

**Returns:**

DB\_SUCCESS, DB\_INVALID\_HANDLE, DB\_TIMEOUT

Definition at line 1311 of file odb.c.

Referenced by cm\_check\_client(), cm\_cleanup(), cm\_delete\_client\_info(), cm\_get\_watchdog\_info(), cm\_set\_client\_info(), cm\_set\_watchdog\_params(), db\_close\_database(), db\_create\_key(), db\_create\_record(), db\_delete\_key1(), db\_enum\_key(), db\_find\_key(), db\_get\_data(), db\_get\_data\_index(), db\_get\_key(), db\_get\_key\_info(), db\_get\_key\_time(), db\_get\_record(), db\_get\_record\_size(), db\_get\_value(), db\_open\_database(), db\_set\_data(), db\_set\_data\_index(), db\_set\_record(), and db\_set\_value().

### 2.46.1.24 INT db\_open\_database (char \* database\_name, INT database\_size, HANDLE \* hDB, char \* client\_name)

Open an online database

**Parameters:**

***database\_name*** Database name.

***database\_size*** Initial size of database if not existing

***client\_name*** Name of this application

***hDB*** ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

**Returns:**

DB\_SUCCESS, DB\_CREATED, DB\_INVALID\_NAME, DB\_NO\_MEMORY, DB\_MEMSIZE\_MISMATCH, DB\_NO\_MUTEX, DB\_INVALID\_PARAM, RPC\_NET\_ERROR

Definition at line 719 of file odb.c.

Referenced by cm\_connect\_experiment1().

### 2.46.1.25 INT db\_open\_record (HANDLE hDB, HANDLE hKey, void \* ptr, INT rec\_size, WORD access\_mode, void(\*) (INT, INT, void \*) dispatcher, void \* info)

Open a record. Create a local copy and maintain an automatic update.

This function opens a hot-link between an ODB sub-tree and a local structure. The sub-tree is copied to the structure automatically every time it is modified by someone else. Additionally, a callback function can be declared which is called after the structure has been updated. The callback function receives the database handle and the key handle as parameters.

Problems might occur if the ODB sub-tree contains values which don't match the C structure. Although the structure size is checked against the sub-tree size, no checking can be done if the type and order of the values in the structure are the same than those in the ODB sub-tree. Therefore it is recommended to use the function [db\\_create\\_record\(\)](#) before [db\\_open\\_record\(\)](#) is used which ensures that both are equivalent.

The access mode might either be MODE\_READ or MODE\_WRITE. In read mode, the ODB sub-tree is automatically copied to the local structure when modified by other clients. In write mode, the local structure is copied to the ODB sub-tree if it has been modified locally. This update has to be manually scheduled by calling [db\\_send\\_changed\\_records\(\)](#) periodically in the main loop. The system keeps a copy of the local structure to determine if its contents has been changed.

If MODE\_ALLOC is or'ed with the access mode, the memory for the structure is allocated internally. The structure pointer must contain a pointer to a pointer to the structure. The internal memory is released when [db\\_close\\_record\(\)](#) is called.

- To open a record in write mode.

```
struct {
    INT level1;
    INT level2;
} trigger_settings;
char *trigger_settings_str =
"[Settings]\n\
level1 = INT : 0\n\
level2 = INT : 0";
main()
{
    HANDLE hDB, hkey, i=0;
    ...
    cm_get_experiment_database(&hDB, NULL);
    db_create_record(hDB, 0, "/Equipment/Trigger", trigger_settings_str);
    db_find_key(hDB, 0, "/Equipment/Trigger/Settings", &hkey);
    db_open_record(hDB, hkey, &trigger_settings, sizeof(trigger_settings)
        , MODE_WRITE, NULL);

    do
    {
        trigger_settings.level1 = i++;
        db_send_changed_records()
        status = cm_yield(1000);
    } while (status != RPC_SHUTDOWN && status != SS_ABORT);
```

```
    ...
}
```

**Parameters:**

***hDB*** ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

***hKey*** Handle for key where search starts, zero for root.

***ptr*** If access\_mode includes MODE\_ALLOC: Address of pointer which points to the record data after the call if access\_mode includes not MODE\_ALLOC: Address of record if ptr==NULL, only the dispatcher is called.

***rec\_size*** Record size in bytes

***access\_mode*** Mode for opening record, either MODE\_READ or MODE\_WRITE. May be or'ed with MODE\_ALLOC to let db\_open\_record allocate the memory for the record.

***(\*dispatcher)*** Function which gets called when record is updated. The argument list composed of: HANDLE hDB, HANDLE hKey, void \*info

***info*** Additional info passed to the dispatcher.

**Returns:**

DB\_SUCCESS, DB\_INVALID\_HANDLE, DB\_NO\_MEMORY, DB\_NO\_ACCESS, DB\_STRUCT\_SIZE\_MISMATCH

Definition at line 7697 of file odb.c.

Referenced by analyzer\_init(), cm\_register\_deferred\_transition(), and register\_equipment().

**2.46.1.26 INT db\_paste (HANDLE hDB, HANDLE hKeyRoot, char \* buffer)**

Copy an ODB subtree in ASCII format from a buffer

**Parameters:**

***hDB*** ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

***hKeyRoot*** Handle for key where search starts, zero for root.

***buffer*** NULL-terminated buffer

**Returns:**

DB\_SUCCESS, DB\_TRUNCATED, DB\_NO\_MEMORY

Definition at line 5246 of file odb.c.

Referenced by db\_create\_record(), and db\_load().

**2.46.1.27 int db\_paste\_node (HANDLE hDB, HANDLE hKeyRoot, PMXML\_NODE node)**

Definition at line 5523 of file odb.c.

Referenced by db\_paste\_xml().

**2.46.1.28 INT db\_paste\_xml (HANDLE *hDB*, HANDLE *hKeyRoot*, char \* *buffer*)**

Paste an ODB subtree in XML format from a buffer

**Parameters:**

*hDB* ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

*hKeyRoot* Handle for key where search starts, zero for root.

*buffer* NULL-terminated buffer

**Returns:**

DB\_SUCCESS, DB\_INVALID\_PARAM, DB\_NO\_MEMORY, DB\_TYPE\_MISMATCH

Definition at line 5629 of file odb.c.

Referenced by db\_load().

**2.46.1.29 INT db\_protect\_database (HANDLE *hDB*)**

Protect a database for read/write access outside of the **db\_xxx** functions

**Parameters:**

*hDB* ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

**Returns:**

DB\_SUCCESS, DB\_INVALID\_HANDLE

Definition at line 1390 of file odb.c.

**2.46.1.30 INT db\_save (HANDLE *hDB*, HANDLE *hKey*, char \* *filename*, BOOL *bRemote*)**

Save a branch of a database to an .ODB file

This function is used by the ODBEdit command save. For a description of the ASCII format, see [db\\_copy\(\)](#). Data of the whole ODB can be saved (hkey equal zero) or only a sub-tree.

**Parameters:**

*hDB* ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

*hKey* Handle for key where search starts, zero for root.

*filename* Filename of .ODB file.

*bRemote* Flag for saving database on remote server.

**Returns:**

DB\_SUCCESS, DB\_FILE\_ERROR

Definition at line 5840 of file odb.c.

**2.46.1.31 INT db\_save\_struct (HANDLE *hDB*, HANDLE *hKey*, char \* *file\_name*, char \* *struct\_name*, BOOL *append*)**

Save a branch of a database to a C structure .H file

**Parameters:**

*hDB* ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

*hKey* Handle for key where search starts, zero for root.

*file\_name* Filename of .ODB file.

*struct\_name* Name of structure. If struct\_name == NULL, the name of the key is used.

*append* If TRUE, append to end of existing file

**Returns:**

DB\_SUCCESS, DB\_INVALID\_HANDLE, DB\_FILE\_ERROR

Definition at line 6090 of file odb.c.

**2.46.1.32 INT db\_save\_xml (HANDLE *hDB*, HANDLE *hKey*, char \* *filename*)**

Save a branch of a database to an .xml file

This function is used by the ODBedit command save to write the contents of the ODB into a XML file. Data of the whole ODB can be saved (hkey equal zero) or only a sub-tree.

**Parameters:**

*hDB* ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

*hKey* Handle for key where search starts, zero for root.

*filename* Filename of .XML file.

**Returns:**

DB\_SUCCESS, DB\_FILE\_ERROR

Definition at line 6041 of file odb.c.

**2.46.1.33 INT db\_save\_xml\_key (HANDLE *hDB*, HANDLE *hKey*, INT *level*, MXML\_WRITER \* *writer*)**

Definition at line 5938 of file odb.c.

Referenced by db\_copy\_xml(), and db\_save\_xml().

**2.46.1.34 INT db\_send\_changed\_records ()**

Send all records to the ODB which were changed locally since the last call to this function.

This function is valid if used in conjunction with [db\\_open\\_record\(\)](#) under the condition the record is open as MODE\_WRITE access code.

- Full example dbchange.c which can be compiled as follow

```
gcc -DOS_LINUX -I/midas/include -o dbchange dbchange.c
/midas/linux/lib/libmidas.a -lutil}

\begin{verbatim}
//----- dbchange.c
#include "midas.h"
#include "msystem.h"

//----- BOF dbchange.c
typedef struct {
    INT    my_number;
    float  my_rate;
} MY_STATISTICS;

MY_STATISTICS myrec;

#define MY_STATISTICS(_name) char *_name[] = {\
    "My Number = INT : 0",\
    "My Rate = FLOAT : 0",\
    "",\
    NULL }

HANDLE hDB, hKey;

// Main
int main(unsigned int argc, char **argv)
{
    char    host_name[HOST_NAME_LENGTH];
    char    expt_name[HOST_NAME_LENGTH];
    INT     lastnumber, status, msg;
    BOOL    debug=FALSE;
    char    i, ch;
    DWORD   update_time, mainlast_time;
    MY_STATISTICS (my_stat);

    // set default
    host_name[0] = 0;
    expt_name[0] = 0;

    // get default
    cm_get_environment(host_name, sizeof(host_name), expt_name, sizeof(expt_name));

    // get parameters
    for (i=1 ; i<argc ; i++)
    {
        if (argv[i][0] == '-' && argv[i][1] == 'd')

```



```

        debug = TRUE;
    else if (argv[i][0] == '-')
    {
        if (i+1 >= argc || argv[i+1][0] == '-')
            goto usage;
        if (strcmp(argv[i], "-e", 2) == 0)
            strcpy(expt_name, argv[++i]);
        else if (strcmp(argv[i], "-h", 2) == 0)
            strcpy(host_name, argv[++i]);
    }
    else
    {
        usage:
        printf("usage: dbchange [-h <Hostname>] [-e <Experiment>]\n");
        return 0;
    }
}

// connect to experiment
status = cm_connect_experiment(host_name, expt_name, "dbchange", 0);
if (status != CM_SUCCESS)
    return 1;

// Connect to DB
cm_get_experiment_database(&hDB, &hKey);

// Create a default structure in ODB
db_create_record(hDB, 0, "My statistics", strcmp(my_stat));

// Retrieve key for that structure in ODB
if (db_find_key(hDB, 0, "My statistics", &hKey) != DB_SUCCESS)
{
    cm_msg(MESSAGE, "mychange", "cannot find My statistics");
    goto error;
}

// Hot link this structure in Write mode
status = db_open_record(hDB, hKey, &myrec
                        , sizeof(MY_STATISTICS), MODE_WRITE, NULL, NULL);
if (status != DB_SUCCESS)
{
    cm_msg(MESSAGE, "mychange", "cannot open My statistics record");
    goto error;
}

// initialize ss_getchar()
ss_getchar(0);

// Main loop
do
{
    // Update local structure
    if ((ss_millitime() - update_time) > 100)
    {
        myrec.my_number += 1;
        if (myrec.my_number - lastnumber) {
            myrec.my_rate = 1000.f * (float) (myrec.my_number - lastnumber)

```

```

        / (float) (ss_millitime() - update_time);
    }
    update_time = ss_millitime();
    lastnumber = myrec.my_number;
}

// Publish local structure to ODB (db_send_changed_record)
if ((ss_millitime() - mainlast_time) > 5000)
{
    db_send_changed_records();           // <----- Call
    mainlast_time = ss_millitime();
}

// Check for keyboard interaction
ch = 0;
while (ss_kbhit())
{
    ch = ss_getchar(0);
    if (ch == -1)
        ch = getchar();
    if ((char) ch == '!')
        break;
}
msg = cm_yield(20);
} while (msg != RPC_SHUTDOWN && msg != SS_ABORT && ch != '!');

error:
    cm_disconnect_experiment();
    return 1;
}
//----- EOF dbchange.c

```

**Returns:**

DB\_SUCCESS

Definition at line 8111 of file odb.c.

Referenced by scan\_fragment(), scheduler(), and tr\_stop().

### 2.46.1.35 INT db\_set\_data (HANDLE hDB, HANDLE hKey, void \* data, INT buf\_size, INT num\_values, DWORD type)

Set key data from a handle. Adjust number of values if previous data has different size.

```

HANDLE hkey;
INT run_number;
// get key handle for run number
db_find_key(hDB, 0, "/Runinfo/Run number", &hkey);
// set run number
db_set_data(hDB, hkey, &run_number, sizeof(run_number), TID_INT);

```

**Parameters:**

*hDB* ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

*hKey* Handle for key where search starts, zero for root.  
*data* Buffer from which data gets copied to.  
*buf\_size* Size of data buffer.  
*num\_values* Number of data values (for arrays).  
*type* Type of key, one of TID\_xxx (see [Midas Data Types](#)).

**Returns:**

DB\_SUCCESS, DB\_INVALID\_HANDLE, DB\_TRUNCATED

Definition at line 4271 of file odb.c.

Referenced by db\_paste(), db\_paste\_node(), db\_set\_record(), and update\_odb().

#### 2.46.1.36 INT db\_set\_data\_index (HANDLE hDB, HANDLE hKey, void \* data, INT data\_size, INT index, DWORD type)

Set key data for a key which contains an array of values.

This function sets individual values of a key containing an array. If the index is larger than the array size, the array is extended and the intermediate values are set to zero.

**Parameters:**

*hDB* ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).  
*hKey* Handle for key where search starts, zero for root.  
*data* Pointer to single value of data.  
*data\_size*  
*index* Size of single data element.  
*type* Type of key, one of TID\_xxx (see [Midas Data Types](#)).

**Returns:**

DB\_SUCCESS, DB\_INVALID\_HANDLE, DB\_NO\_ACCESS, DB\_TYPE\_MISMATCH

Definition at line 4495 of file odb.c.

Referenced by cm\_register\_transition(), and db\_paste\_node().

#### 2.46.1.37 INT db\_set\_record (HANDLE hDB, HANDLE hKey, void \* data, INT buf\_size, INT align)

Copy a set of keys from local memory to the database.

An ODB sub-tree can be mapped to a C structure automatically via a hot-link using the function [db\\_open\\_record\(\)](#) or manually with this function. Problems might occur

if the ODB sub-tree contains values which don't match the C structure. Although the structure size is checked against the sub-tree size, no checking can be done if the type and order of the values in the structure are the same than those in the ODB sub-tree. Therefore it is recommended to use the function [db\\_create\\_record\(\)](#) before using this function.

```
...
memset(&lazyst,0,size);
if (db_find_key(hDB, pLch->hKey, "Statistics",&hKeyst) == DB_SUCCESS)
    status = db_set_record(hDB, hKeyst, &lazyst, size, 0);
else
    cm_msg(MERROR,"task","record %s/statistics not found", pLch->name)
...
```

#### Parameters:

**hDB** ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

**hKey** Handle for key where search starts, zero for root.

**data** Pointer where data is stored.

**buf\_size** Size of data structure, must be obtained via sizeof(RECORD-NAME).

**align** Byte alignment calculated by the stub and passed to the rpc side to align data according to local machine. Must be zero when called from user level.

#### Returns:

DB\_SUCCESS, DB\_INVALID\_HANDLE, DB\_TYPE\_MISMATCH, DB\_STRUCT\_SIZE\_MISMATCH

Definition at line 6830 of file odb.c.

Referenced by [al\\_trigger\\_alarm\(\)](#), [db\\_open\\_record\(\)](#), [db\\_send\\_changed\\_records\(\)](#), [register\\_equipment\(\)](#), and [update\\_odb\(\)](#).

#### 2.46.1.38 INT db\_set\_value (HANDLE hDB, HANDLE hKeyRoot, char \*key\_name, void \*data, INT data\_size, INT num\_values, DWORD type)

Set value of a single key.

The function sets a single value or a whole array to a ODB key. Since the data buffer is of type void, no type checking can be performed by the compiler. Therefore the type has to be explicitly supplied, which is checked against the type stored in the ODB. key\_name can contain the full path of a key (like: "/Equipment/Trigger/Settings/Level1") while hkey is zero which refers to the root, or hkey can refer to a sub-directory (like /Equipment/Trigger) and key\_name is interpreted relative to that directory like "Settings/Level1".

```
INT level1;
db_set_value(hDB, 0, "/Equipment/Trigger/Settings/Level1",
             &level1, sizeof(level1), 1, TID_INT);
```

**Parameters:**

*hDB* ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

*hKeyRoot* Handle for key where search starts, zero for root.

*key\_name* Name of key to search, can contain directories.

*data* Address of data.

*data\_size* Size of data (in bytes).

*num\_values* Number of data elements.

*type* Type of key, one of TID\_xxx (see [Midas Data Types](#))

**Returns:**

DB\_SUCCESS, DB\_INVALID\_HANDLE, DB\_NO\_ACCESS, DB\_TYPE\_MISMATCH

Definition at line 2858 of file odb.c.

Referenced by [al\\_trigger\\_alarm\(\)](#), [cm\\_connect\\_experiment1\(\)](#), [cm\\_delete\\_client\\_info\(\)](#), [cm\\_register\\_deferred\\_transition\(\)](#), [cm\\_register\\_transition\(\)](#), [cm\\_set\\_client\\_info\(\)](#), [cm\\_set\\_transition\\_sequence\(\)](#), [cm\\_set\\_watchdog\\_params\(\)](#), [cm\\_transition\(\)](#), [db\\_create\\_link\(\)](#), [db\\_get\\_value\(\)](#), [register\\_equipment\(\)](#), [tr\\_start\(\)](#), and [update\\_odb\(\)](#).

### 2.46.1.39 INT db\_sprintf (char \* *string*, void \* *data*, INT *data\_size*, INT *index*, DWORD *type*)

Convert a database value to a string according to its type.

This function is a convenient way to convert a binary ODB value into a string depending on its type if is not known at compile time. If it is known, the normal [sprintf\(\)](#) function can be used.

```
...
for (j=0 ; j<key.num_values ; j++)
{
    db_sprintf(pbuf, pdata, key.item_size, j, key.type);
    strcat(pbuf, "\n");
}
...
```

**Parameters:**

*string* output ASCII string of data.

*data* Value data.

*data\_size* Size of single data element.

*index* Index for array data.

*type* Type of key, one of TID\_xxx (see [Midas Data Types](#)).

**Returns:**

DB\_SUCCESS

Definition at line 6264 of file odb.c.

Referenced by db\_copy(), and db\_save\_xml\_key().

#### 2.46.1.40 INT db\_unlock\_database (HANDLE hDB)

Unlock a database via system mutex calls.

##### Parameters:

*hDB* Handle to the database to unlock

##### Returns:

DB\_SUCCESS, DB\_INVALID\_HANDLE

Definition at line 1361 of file odb.c.

Referenced by cm\_check\_client(), cm\_cleanup(), cm\_delete\_client\_info(), cm\_get\_watchdog\_info(), cm\_set\_client\_info(), cm\_set\_watchdog\_params(), db\_close\_database(), db\_create\_key(), db\_create\_record(), db\_delete\_key1(), db\_enum\_key(), db\_find\_key(), db\_get\_data(), db\_get\_data\_index(), db\_get\_key(), db\_get\_key\_info(), db\_get\_key\_time(), db\_get\_record(), db\_get\_record\_size(), db\_get\_value(), db\_open\_database(), db\_set\_data(), db\_set\_data\_index(), db\_set\_record(), and db\_set\_value().

#### 2.46.1.41 INT db\_update\_record (INT hDB, INT hKey, int socket)

If called locally, update a record (hDB/hKey) and copy its new contents to the local copy of it.

If called from a server, send a network notification to the client.

##### Parameters:

*hDB* ODB handle obtained via [cm\\_get\\_experiment\\_database\(\)](#).

*hKey* Handle for key where search starts, zero for root.

*socket* optional server socket

##### Returns:

DB\_SUCCESS, DB\_INVALID\_HANDLE

Definition at line 7903 of file odb.c.

#### 2.46.1.42 BOOL equal\_ustring (char \* str1, char \* str2)

Definition at line 1419 of file odb.c.

Referenced by bm\_open\_buffer(), cm\_connect\_client(), cm\_connect\_experiment1(), cm\_exist(), cm\_get\_watchdog\_info(), cm\_list\_experiments(), cm\_set\_client\_info(), cm\_shutdown(), db\_check\_record(), db\_create\_key(), db\_find\_key(), db\_open\_database(), db\_paste(), logger\_root(), and register\_equipment().

**2.46.1.43** `char* extract_key (char * key_list, char * key_name)`

Definition at line 1407 of file odb.c.

Referenced by db\_create\_key(), and db\_end\_key().

**2.46.1.44** `void xml_encode (char * src, int size)`

Definition at line 5895 of file odb.c.

## 3 Midas Directory Documentation

### 3.1 /home1/midas/svn/midas/drivers/camac/ Directory Reference

#### Files

- file [esone.c](#)

### 3.2 /home1/midas/svn/midas/drivers/ Directory Reference

#### Directories

- directory [camac](#)

### 3.3 /home1/midas/svn/midas/examples/eventbuilder/ Directory Reference

#### Files

- file [ebuser.c](#)
- file [mevb.c](#)

### 3.4 /home1/midas/svn/midas/examples/ Directory Reference

#### Directories

- directory [eventbuilder](#)
- directory [experiment](#)

### 3.5 /home1/midas/svn/midas/examples/experiment/ Directory Reference

#### Files

- file [adccalib.c](#)
- file [adcsun.c](#)
- file [analyzer.c](#)
- file [experim.h](#)
- file [frontend.c](#)
- file [scaler.c](#)

### 3.6 /home1/midas/svn/midas/include/ Directory Reference

#### Files

- file [mcstd.h](#)
- file [midas.h](#)
- file [mrpc.h](#)
- file [msystem.h](#)
- file [mvmestd.h](#)
- file [ybos.h](#)

### 3.7 /home1/midas/svn/midas/src/ Directory Reference

#### Files

- file [mfe.c](#)
- file [midas.c](#)



- file [mrpc.c](#)
- file [odb.c](#)
- file [system.c](#)
- file [ybos.c](#)

## 4 Midas Data Structure Documentation

### 4.1 ADC\_CALIBRATION\_PARAM Struct Reference

#### 4.1.1 Detailed Description

Definition at line 40 of file `experim.h`.

#### 4.1.2 Field Documentation

##### 4.1.2.1 double [ADC\\_CALIBRATION\\_PARAM::histo\\_threshold](#)

Definition at line 43 of file `experim.h`.

##### 4.1.2.2 INT [ADC\\_CALIBRATION\\_PARAM::pedestal](#)[8]

Definition at line 41 of file `experim.h`.

##### 4.1.2.3 float [ADC\\_CALIBRATION\\_PARAM::software\\_gain](#)[8]

Definition at line 42 of file `experim.h`.

### 4.2 ADC\_SUMMING\_PARAM Struct Reference

#### 4.2.1 Detailed Description

Definition at line 76 of file `experim.h`.

#### 4.2.2 Field Documentation

#### 4.2.2.1 float [ADC\\_SUMMING\\_PARAM::adc\\_threshold](#)

Definition at line 77 of file `experim.h`.

### 4.3 ALARM Struct Reference

#### 4.3.1 Detailed Description

Alarm structure

Definition at line 1236 of file `midas.h`.

#### 4.3.2 Field Documentation

##### 4.3.2.1 BOOL [ALARM::active](#)

Definition at line 1237 of file `midas.h`.

Referenced by `al_trigger_alarm()`.

### 4.4 ALARM\_CLASS Struct Reference

#### 4.4.1 Detailed Description

Alarm class structure

Definition at line 1206 of file `midas.h`.

#### 4.4.2 Field Documentation

##### 4.4.2.1 BOOL [ALARM\\_CLASS::write\\_system\\_message](#)

Definition at line 1207 of file `midas.h`.

### 4.5 ANA\_MODULE Struct Reference

#### 4.5.1 Detailed Description

Definition at line 1004 of file `midas.h`.

### Data Fields

- char [name](#) [NAME\_LENGTH]
- char [author](#) [NAME\_LENGTH]
- INT(\* [analyzer](#) )(EVENT\_HEADER \*, void \*)
- INT(\* [bor](#) )(INT [run\\_number](#))
- INT(\* [eor](#) )(INT [run\\_number](#))
- INT(\* [init](#) )()
- INT(\* [exit](#) )()
- void \* [parameters](#)
- INT [param\\_size](#)
- char \*\* [init\\_str](#)
- BOOL [enabled](#)

### 4.5.2 Field Documentation

#### 4.5.2.1 char [ANA\\_MODULE::name](#)[NAME\_LENGTH]

Module name

Definition at line 1005 of file midas.h.

## 4.6 ANA\_TEST Struct Reference

### 4.6.1 Detailed Description

Definition at line 1064 of file midas.h.

### 4.6.2 Field Documentation

#### 4.6.2.1 char [ANA\\_TEST::name](#)[80]

Definition at line 1065 of file midas.h.

## 4.7 ANALYZE\_REQUEST Struct Reference

### 4.7.1 Detailed Description

Definition at line 1036 of file midas.h.

### Data Fields

- char `event_name` [NAME\_LENGTH]
- `AR_INFO` `ar_info`
- INT(\* `analyzer` )(EVENT\_HEADER \*, void \*)
- `ANA_MODULE` \*\* `ana_module`
- `BANK_LIST` \* `bank_list`
- INT `rwnt_buffer_size`
- BOOL `use_tests`
- INT `status`
- HANDLE `buffer_handle`
- HANDLE `request_id`
- HANDLE `hkey_variables`
- HANDLE `hkey_common`
- void \* `addr`
- struct {  
    } `number`
- DWORD `events_received`
- DWORD `events_written`

### 4.7.2 Field Documentation

#### 4.7.2.1 char `ANALYZE_REQUEST::event_name`[NAME\_LENGTH]

Event name

Definition at line 1037 of file `midas.h`.

#### 4.7.2.2 DWORD `ANALYZE_REQUEST::run`

Definition at line 1052 of file `midas.h`.

## 4.8 AR\_INFO Struct Reference

### 4.8.1 Detailed Description

Definition at line 1020 of file `midas.h`.

### Data Fields

- INT [event\\_id](#)
- INT [trigger\\_mask](#)
- INT [sampling\\_type](#)
- char [buffer](#) [NAME\_LENGTH]
- BOOL [enabled](#)
- char [client\\_name](#) [NAME\_LENGTH]
- char [host](#) [NAME\_LENGTH]

### 4.8.2 Field Documentation

#### 4.8.2.1 INT [AR\\_INFO::event\\_id](#)

Event ID associated with equipm.

Definition at line 1021 of file midas.h.

## 4.9 AR\_STATS Struct Reference

### 4.9.1 Detailed Description

Definition at line 1030 of file midas.h.

### 4.9.2 Field Documentation

#### 4.9.2.1 double [AR\\_STATS::events\\_received](#)

Definition at line 1031 of file midas.h.

## 4.10 ASUM\_BANK Struct Reference

### 4.10.1 Detailed Description

Definition at line 108 of file experim.h.

### 4.10.2 Field Documentation

#### 4.10.2.1 float ASUM\_BANK::average

Definition at line 110 of file `experim.h`.

Referenced by `adc_summing()`.

#### 4.10.2.2 float ASUM\_BANK::sum

Definition at line 109 of file `experim.h`.

Referenced by `adc_summing()`.

## 4.11 BANK Struct Reference

### 4.11.1 Detailed Description

Definition at line 968 of file `midas.h`.

#### Data Fields

- char `name` [4]
- WORD `type`
- WORD `data_size`

### 4.11.2 Field Documentation

#### 4.11.2.1 char BANK::name[4]

- 

Definition at line 969 of file `midas.h`.

Referenced by `bk_close()`, `bk_create()`, `bk_end()`, `bk_list()`, `bk_locate()`, and `update_odb()`.

## 4.12 BANK32 Struct Reference

### 4.12.1 Detailed Description

Definition at line 974 of file midas.h.

#### Data Fields

- char [name](#) [4]
- DWORD [type](#)
- DWORD [data\\_size](#)

### 4.12.2 Field Documentation

#### 4.12.2.1 char [BANK32::name](#)[4]

- 

Definition at line 975 of file midas.h.

Referenced by [bk\\_close\(\)](#), [bk\\_create\(\)](#), [bk\\_end\(\)](#), [bk\\_list\(\)](#), [bk\\_locate\(\)](#), and [update\\_odb\(\)](#).

## 4.13 BANK\_HEADER Struct Reference

### 4.13.1 Detailed Description

Definition at line 963 of file midas.h.

#### Data Fields

- DWORD [data\\_size](#)
- DWORD [tags](#)

### 4.13.2 Field Documentation

#### 4.13.2.1 DWORD [BANK\\_HEADER::data\\_size](#)

Size in bytes

Definition at line 964 of file midas.h.

Referenced by [bk\\_iterate\(\)](#), [bk\\_swap\(\)](#), and [eb\\_mfragment\\_add\(\)](#).

### 4.14 BANK\_LIST Struct Reference

#### 4.14.1 Detailed Description

Definition at line 986 of file midas.h.

##### Data Fields

- char [name](#) [9]
- WORD [type](#)
- DWORD [size](#)
- char \*\* [init\\_str](#)
- BOOL [output\\_flag](#)
- void \* [addr](#)
- DWORD [n\\_data](#)
- HANDLE [def\\_key](#)

#### 4.14.2 Field Documentation

##### 4.14.2.1 char [BANK\\_LIST::name](#)[9]

- 

Definition at line 987 of file midas.h.

Referenced by [register\\_equipment\(\)](#).

### 4.15 BUFFER Struct Reference

#### 4.15.1 Detailed Description

Definition at line 833 of file midas.h.



### Data Fields

- `BOOL attached`
- `INT client_index`
- `BUFFER_HEADER * buffer_header`
- `void * buffer_data`
- `char * read_cache`
- `INT read_cache_size`
- `INT read_cache_rp`
- `INT read_cache_wp`
- `char * write_cache`
- `INT write_cache_size`
- `INT write_cache_rp`
- `INT write_cache_wp`
- `HANDLE mutex`
- `INT shm_handle`
- `INT index`
- `BOOL callback`

### 4.15.2 Field Documentation

#### 4.15.2.1 `BOOL BUFFER::attached`

TRUE if buffer is attached

Definition at line 834 of file `midas.h`.

Referenced by `bm_close_buffer()`, `bm_flush_cache()`, `bm_open_buffer()`, `bm_push_event()`, `bm_receive_event()`, `bm_send_event()`, and `bm_skip_event()`.

## 4.16 BUFFER\_CLIENT Struct Reference

### 4.16.1 Detailed Description

Definition at line 794 of file `midas.h`.

### Data Fields

- `char name` [NAME\_LENGTH]
- `INT pid`
- `INT tid`

- INT [thandle](#)
- INT [port](#)
- INT [read\\_pointer](#)
- INT [max\\_request\\_index](#)
- INT [num\\_received\\_events](#)
- INT [num\\_sent\\_events](#)
- INT [num\\_waiting\\_events](#)
- float [data\\_rate](#)
- BOOL [read\\_wait](#)
- INT [write\\_wait](#)
- BOOL [wake\\_up](#)
- BOOL [all\\_mag](#)
- DWORD [last\\_activity](#)
- DWORD [watchdog\\_timeout](#)

#### 4.16.2 Field Documentation

##### 4.16.2.1 char [BUFFER\\_CLIENT::name](#)[NAME\_LENGTH]

name of client

Definition at line 795 of file `midas.h`.

Referenced by `bm_open_buffer()`, and `cm_cleanup()`.

## 4.17 BUFFER\_HEADER Struct Reference

### 4.17.1 Detailed Description

Definition at line 817 of file `midas.h`.

#### Data Fields

- char [name](#) [NAME\_LENGTH]
- INT [num\\_clients](#)
- INT [max\\_client\\_index](#)
- INT [size](#)
- INT [read\\_pointer](#)
- INT [write\\_pointer](#)
- INT [num\\_in\\_events](#)
- INT [num\\_out\\_events](#)
- [BUFFER\\_CLIENT](#) [client](#) [MAX\_CLIENTS]

### 4.17.2 Field Documentation

#### 4.17.2.1 char **BUFFER\_HEADER::name**[NAME\_LENGTH]

name of buffer

Definition at line 818 of file midas.h.

Referenced by `bm_check_buffers()`, `bm_close_buffer()`, `bm_flush_cache()`, `bm_push_event()`, `bm_send_event()`, and `cm_cleanup()`.

## 4.18 BUS\_DRIVER Struct Reference

### 4.18.1 Detailed Description

Definition at line 887 of file midas.h.

#### Data Fields

- char **name** [NAME\_LENGTH]
- INT(\* **bd**)(INT cmd,...)
- void \* **bd\_info**

### 4.18.2 Field Documentation

#### 4.18.2.1 char **BUS\_DRIVER::name**[NAME\_LENGTH]

Driver name

Definition at line 888 of file midas.h.

## 4.19 DATABASE Struct Reference

### 4.19.1 Detailed Description

Definition at line 378 of file msystem.h.

### 4.19.2 Field Documentation

#### 4.19.2.1 **BOOL** `DATABASE::attached`

Definition at line 380 of file `msystem.h`.

Referenced by `db_close_database()`, and `db_open_database()`.

#### 4.19.2.2 **INT** `DATABASE::client_index`

Definition at line 381 of file `msystem.h`.

Referenced by `cm_cleanup()`, `cm_set_watchdog_params()`, `db_close_database()`, and `db_open_database()`.

#### 4.19.2.3 **void\*** `DATABASE::database_data`

Definition at line 383 of file `msystem.h`.

Referenced by `db_open_database()`.

#### 4.19.2.4 **DATABASE\_HEADER\*** `DATABASE::database_header`

Definition at line 382 of file `msystem.h`.

Referenced by `cm_check_client()`, `cm_cleanup()`, `cm_get_watchdog_info()`, `cm_set_watchdog_params()`, `db_close_database()`, `db_create_key()`, `db_delete_key1()`, `db_enum_key()`, `db_find_key()`, `db_get_data()`, `db_get_data_index()`, `db_get_key()`, `db_get_key_info()`, `db_get_key_time()`, `db_get_value()`, `db_open_database()`, `db_protect_database()`, `db_set_data()`, `db_set_data_index()`, `db_set_value()`, and `db_unlock_database()`.

#### 4.19.2.5 **INT** `DATABASE::index`

Definition at line 387 of file `msystem.h`.

Referenced by `db_open_database()`.

#### 4.19.2.6 **INT** `DATABASE::lock_cnt`

Definition at line 385 of file `msystem.h`.

Referenced by `db_lock_database()`, `db_open_database()`, and `db_unlock_database()`.

**4.19.2.7** `HANDLE DATABASE::mutex`

Definition at line 384 of file `msystem.h`.

**4.19.2.8** `char DATABASE::name[NAME_LENGTH]`

Definition at line 379 of file `msystem.h`.

**4.19.2.9** `BOOL DATABASE::protect`

Definition at line 388 of file `msystem.h`.

Referenced by `db_open_database()`, and `db_protect_database()`.

**4.19.2.10** `HANDLE DATABASE::shm_handle`

Definition at line 386 of file `msystem.h`.

Referenced by `db_close_database()`, and `db_open_database()`.

**4.20** DATABASE\_CLIENT Struct Reference**4.20.1** Detailed Description

Definition at line 346 of file `msystem.h`.

**4.20.2** Field Documentation**4.20.2.1** `DWORD DATABASE_CLIENT::last_activity`

Definition at line 353 of file `msystem.h`.

Referenced by `cm_cleanup()`, `cm_get_watchdog_info()`, `cm_set_watchdog_params()`, and `db_open_database()`.

**4.20.2.2** `INT DATABASE_CLIENT::max_index`

Definition at line 355 of file `msystem.h`.

**4.20.2.3** `char DATABASE_CLIENT::name[NAME_LENGTH]`

Definition at line 347 of file `msystem.h`.

Referenced by `cm_cleanup()`, `cm_get_watchdog_info()`, and `db_open_database()`.

**4.20.2.4 INT DATABASE\_CLIENT::num\_open\_records**

Definition at line 352 of file msystem.h.

Referenced by db\_open\_database().

**4.20.2.5 OPEN\_RECORD DATABASE\_CLIENT::open\_record[MAX\_OPEN\_RECORDS]**

Definition at line 357 of file msystem.h.

Referenced by cm\_cleanup(), db\_close\_database(), and db\_open\_database().

**4.20.2.6 INT DATABASE\_CLIENT::pid**

Definition at line 348 of file msystem.h.

Referenced by cm\_cleanup(), cm\_get\_watchdog\_info(), db\_close\_database(), and db\_open\_database().

**4.20.2.7 INT DATABASE\_CLIENT::port**

Definition at line 351 of file msystem.h.

Referenced by db\_open\_database().

**4.20.2.8 INT DATABASE\_CLIENT::thandle**

Definition at line 350 of file msystem.h.

Referenced by db\_open\_database().

**4.20.2.9 INT DATABASE\_CLIENT::tid**

Definition at line 349 of file msystem.h.

Referenced by cm\_check\_client(), cm\_cleanup(), and db\_open\_database().

**4.20.2.10 DWORD DATABASE\_CLIENT::watchdog\_timeout**

Definition at line 354 of file msystem.h.

Referenced by cm\_cleanup(), cm\_get\_watchdog\_info(), cm\_set\_watchdog\_params(), and db\_open\_database().

## 4.21 DATABASE\_HEADER Struct Reference

### 4.21.1 Detailed Description

Definition at line 361 of file msystem.h.

### 4.21.2 Field Documentation

#### 4.21.2.1 DATABASE\_CLIENT DATABASE\_HEADER::client[MAX\_CLIENTS]

Definition at line 372 of file msystem.h.

Referenced by cm\_check\_client(), cm\_cleanup(), cm\_get\_watchdog\_info(), cm\_set\_watchdog\_params(), db\_close\_database(), and db\_open\_database().

#### 4.21.2.2 INT DATABASE\_HEADER::data\_size

Definition at line 367 of file msystem.h.

Referenced by db\_close\_database(), and db\_open\_database().

#### 4.21.2.3 INT DATABASE\_HEADER::first\_free\_data

Definition at line 370 of file msystem.h.

Referenced by db\_open\_database().

#### 4.21.2.4 INT DATABASE\_HEADER::first\_free\_key

Definition at line 369 of file msystem.h.

Referenced by db\_open\_database().

#### 4.21.2.5 INT DATABASE\_HEADER::key\_size

Definition at line 366 of file msystem.h.

Referenced by db\_open\_database().

#### 4.21.2.6 INT DATABASE\_HEADER::max\_client\_index

Definition at line 365 of file msystem.h.

Referenced by `cm_check_client()`, `cm_cleanup()`, `db_close_database()`, and `db_open_database()`.

#### 4.21.2.7 char DATABASE\_HEADER::name[NAME\_LENGTH]

Definition at line 362 of file `msystem.h`.

Referenced by `cm_cleanup()`, `db_close_database()`, and `db_open_database()`.

#### 4.21.2.8 INT DATABASE\_HEADER::num\_clients

Definition at line 364 of file `msystem.h`.

Referenced by `cm_cleanup()`, `db_close_database()`, and `db_open_database()`.

#### 4.21.2.9 INT DATABASE\_HEADER::root\_key

Definition at line 368 of file `msystem.h`.

Referenced by `db_create_key()`, `db_delete_key1()`, `db_enum_key()`, `db_find_key()`, `db_get_key()`, and `db_open_database()`.

#### 4.21.2.10 INT DATABASE\_HEADER::version

Definition at line 363 of file `msystem.h`.

Referenced by `db_open_database()`.

## 4.22 DEF\_RECORD Struct Reference

### 4.22.1 Detailed Description

Definition at line 1100 of file `midas.h`.

### 4.22.2 Field Documentation

#### 4.22.2.1 DWORD DEF\_RECORD::event\_id

Definition at line 1101 of file `midas.h`.



## 4.23 DEVICE\_DRIVER Struct Reference

### 4.23.1 Detailed Description

Definition at line 893 of file midas.h.

#### Data Fields

- char [name](#) [NAME\_LENGTH]
- INT(\* [dd](#) )(INT cmd,...)
- INT [channels](#)
- INT(\* [bd](#) )(INT cmd,...)
- DWORD [lags](#)
- void \* [dd\\_info](#)

### 4.23.2 Field Documentation

#### 4.23.2.1 char [DEVICE\\_DRIVER::name](#)[NAME\_LENGTH]

Driver name

Definition at line 894 of file midas.h.

## 4.24 eqpmnt Struct Reference

### 4.24.1 Detailed Description

Definition at line 928 of file midas.h.

#### Data Fields

- char [name](#) [NAME\_LENGTH]
- [EQUIPMENT\\_INFO](#) [info](#)
- INT(\* [readout](#) )(char \*, INT)
- INT(\* [cd](#) )(INT cmd, [PEQUIPMENT](#))
- [DEVICE\\_DRIVER](#) \* [driver](#)
- void \* [event\\_descrip](#)
- void \* [cd\\_info](#)
- INT [status](#)
- DWORD [last\\_called](#)

- DWORD [last\\_idle](#)
- DWORD [poll\\_count](#)
- INT [format](#)
- HANDLE [buffer\\_handle](#)
- HANDLE [hkey\\_variables](#)
- DWORD [serial\\_number](#)
- DWORD [subevent\\_number](#)
- DWORD [odb\\_out](#)
- DWORD [odb\\_in](#)
- DWORD [bytes\\_sent](#)
- DWORD [events\\_sent](#)

#### 4.24.2 Field Documentation

##### 4.24.2.1 char [eqpmnt::name](#)[NAME\_LENGTH]

Equipment name

Definition at line 929 of file `midas.h`.

Referenced by `scheduler()`.

## 4.25 EQUIPMENT\_INFO Struct Reference

### 4.25.1 Detailed Description

Definition at line 902 of file `midas.h`.

#### Data Fields

- WORD [event\\_id](#)
- WORD [trigger\\_mask](#)
- char [buffer](#) [NAME\_LENGTH]
- INT [eq\\_type](#)
- INT [source](#)
- char [format](#) [8]
- BOOL [enabled](#)
- INT [read\\_on](#)
- INT [period](#)
- double [event\\_limit](#)
- DWORD [num\\_subevents](#)

- INT [history](#)
- char [frontend\\_host](#) [NAME\_LENGTH]
- char [frontend\\_name](#) [NAME\_LENGTH]
- char [frontend\\_file\\_name](#) [256]

#### 4.25.2 Field Documentation

##### 4.25.2.1 WORD [EQUIPMENT\\_INFO::event\\_id](#)

Event ID associated with equipm.

Definition at line 903 of file midas.h.

Referenced by [interrupt\\_routine\(\)](#), [register\\_equipment\(\)](#), [scheduler\(\)](#), [send\\_event\(\)](#), and [source\\_scan\(\)](#).

## 4.26 EQUIPMENT\_STATS Struct Reference

### 4.26.1 Detailed Description

Definition at line 920 of file midas.h.

#### 4.26.2 Field Documentation

##### 4.26.2.1 double [EQUIPMENT\\_STATS::events\\_sent](#)

Definition at line 921 of file midas.h.

Referenced by [close\\_buffers\(\)](#), [register\\_equipment\(\)](#), [scan\\_fragment\(\)](#), [scheduler\(\)](#), [tr\\_start\(\)](#), and [tr\\_stop\(\)](#).

## 4.27 EVENT\_HEADER Struct Reference

### 4.27.1 Detailed Description

Event header

Definition at line 729 of file midas.h.

### Data Fields

- short int [event\\_id](#)
- short int [trigger\\_mask](#)
- DWORD [serial\\_number](#)
- DWORD [time\\_stamp](#)
- DWORD [data\\_size](#)

### 4.27.2 Field Documentation

#### 4.27.2.1 short int [EVENT\\_HEADER::event\\_id](#)

event ID starting from one

Definition at line 730 of file `midas.h`.

Referenced by `bm_compose_event()`, `bm_match_event()`, `bm_push_event()`, `bm_receive_event()`, `interrupt_routine()`, `scheduler()`, `send_event()`, and `update_odb()`.

## 4.28 EVENT\_REQUEST Struct Reference

### 4.28.1 Detailed Description

Buffer structure

Definition at line 784 of file `midas.h`.

### Data Fields

- INT [id](#)
- BOOL [valid](#)
- short int [event\\_id](#)
- short int [trigger\\_mask](#)
- INT [sampling\\_type](#)

### 4.28.2 Field Documentation

#### 4.28.2.1 INT [EVENT\\_REQUEST::id](#)

request id

Definition at line 785 of file midas.h.

Referenced by [bm\\_push\\_cache\(\)](#), [bm\\_remove\\_event\\_request\(\)](#), and [bm\\_send\\_event\(\)](#).

### 4.29 EXP\_PARAM Struct Reference

#### 4.29.1 Detailed Description

Definition at line 26 of file [experim.h](#).

#### 4.29.2 Field Documentation

##### 4.29.2.1 char [EXP\\_PARAM::comment](#)[80]

Definition at line 27 of file [experim.h](#).

Referenced by [ana\\_end\\_of\\_run\(\)](#).

### 4.30 FREE\_DESCRIP Struct Reference

#### 4.30.1 Detailed Description

Definition at line 334 of file [msystem.h](#).

#### Data Fields

- INT [size](#)
- INT [next\\_free](#)

#### 4.30.2 Field Documentation

##### 4.30.2.1 INT [FREE\\_DESCRIP::next\\_free](#)

Address of next free block

Definition at line 336 of file msystem.h.

Referenced by db\_open\_database().

#### 4.30.2.2 INT [FREE\\_DESCRIP::size](#)

size in bytes

Definition at line 335 of file msystem.h.

Referenced by db\_open\_database().

### 4.31 GLOBAL\_PARAM Struct Reference

#### 4.31.1 Detailed Description

Definition at line 92 of file experim.h.

#### 4.31.2 Field Documentation

##### 4.31.2.1 float [GLOBAL\\_PARAM::adc\\_threshold](#)

Definition at line 93 of file experim.h.

### 4.32 HIST\_RECORD Struct Reference

#### 4.32.1 Detailed Description

Definition at line 1092 of file midas.h.

#### 4.32.2 Field Documentation

##### 4.32.2.1 DWORD [HIST\\_RECORD::record\\_type](#)

Definition at line 1093 of file midas.h.

## 4.33 HISTORY Struct Reference

### 4.33.1 Detailed Description

Definition at line 1112 of file midas.h.

### 4.33.2 Field Documentation

#### 4.33.2.1 DWORD [HISTORY::event\\_id](#)

Definition at line 1113 of file midas.h.

## 4.34 INDEX\_RECORD Struct Reference

### 4.34.1 Detailed Description

Definition at line 1106 of file midas.h.

### 4.34.2 Field Documentation

#### 4.34.2.1 DWORD [INDEX\\_RECORD::event\\_id](#)

Definition at line 1107 of file midas.h.

## 4.35 KEY Struct Reference

### 4.35.1 Detailed Description

Definition at line 853 of file midas.h.

#### Data Fields

- DWORD [type](#)
- INT [num\\_values](#)
- char [name](#) [NAME\_LENGTH]
- INT [data](#)
- INT [total\\_size](#)

- INT [item\\_size](#)
- WORD [access\\_mode](#)
- WORD [notify\\_count](#)
- INT [next\\_key](#)
- INT [parent\\_keylist](#)
- INT [last\\_written](#)

#### 4.35.2 Field Documentation

##### 4.35.2.1 DWORD [KEY::type](#)

TID\_xxx type

Definition at line 854 of file midas.h.

Referenced by [cm\\_transition\(\)](#), [db\\_check\\_record\(\)](#), [db\\_copy\(\)](#), [db\\_create\\_key\(\)](#), [db\\_delete\\_key1\(\)](#), [db\\_enum\\_key\(\)](#), [db\\_find\\_key\(\)](#), [db\\_get\\_data\(\)](#), [db\\_get\\_data\\_index\(\)](#), [db\\_get\\_key\(\)](#), [db\\_get\\_key\\_info\(\)](#), [db\\_get\\_record\(\)](#), [db\\_get\\_record\\_size\(\)](#), [db\\_get\\_value\(\)](#), [db\\_open\\_database\(\)](#), [db\\_paste\(\)](#), [db\\_save\\_xml\\_key\(\)](#), [db\\_set\\_data\(\)](#), [db\\_set\\_data\\_index\(\)](#), [db\\_set\\_record\(\)](#), [db\\_set\\_value\(\)](#), [load\\_fragment\(\)](#), and [update\\_odb\(\)](#).

## 4.36 KEYLIST Struct Reference

### 4.36.1 Detailed Description

Definition at line 867 of file midas.h.

#### Data Fields

- INT [parent](#)
- INT [num\\_keys](#)
- INT [first\\_key](#)

#### 4.36.2 Field Documentation

##### 4.36.2.1 INT [KEYLIST::parent](#)

Address of parent key

Definition at line 868 of file midas.h.



Referenced by `db_create_key()`, `db_delete_key1()`, `db_enum_key()`, `db_end_key()`, and `db_open_database()`.

## 4.37 MVME\_INTERFACE Struct Reference

### 4.37.1 Detailed Description

Definition at line 136 of file `mvmestd.h`.

#### Data Fields

- int [handle](#)
- int [index](#)
- void \* [info](#)
- int [am](#)
- int [dmode](#)
- int [blt\\_mode](#)
- void \* [table](#)

### 4.37.2 Field Documentation

#### 4.37.2.1 int [MVME\\_INTERFACE::am](#)

Address modifier

Definition at line 140 of file `mvmestd.h`.

#### 4.37.2.2 int [MVME\\_INTERFACE::blt\\_mode](#)

Block transfer mode

Definition at line 142 of file `mvmestd.h`.

#### 4.37.2.3 int [MVME\\_INTERFACE::dmode](#)

Data mode (D8,D16,D32,D64)

Definition at line 141 of file `mvmestd.h`.

**4.37.2.4 int [MVME\\_INTERFACE::handle](#)**

internal handle

Definition at line 137 of file mvmestd.h.

**4.37.2.5 int [MVME\\_INTERFACE::index](#)**

index of interface 0..n

Definition at line 138 of file mvmestd.h.

**4.37.2.6 void\* [MVME\\_INTERFACE::info](#)**

internal info structure

Definition at line 139 of file mvmestd.h.

**4.37.2.7 void\* [MVME\\_INTERFACE::table](#)**

Optional table for some drivers

Definition at line 143 of file mvmestd.h.

**4.38 OPEN\_RECORD Struct Reference****4.38.1 Detailed Description**

Definition at line 339 of file msystem.h.

**Data Fields**

- INT [handle](#)
- WORD [access\\_mode](#)
- WORD [flags](#)

**4.38.2 Field Documentation****4.38.2.1 WORD [OPEN\\_RECORD::access\\_mode](#)**

R/W [flags](#)

Definition at line 341 of file msystem.h.

Referenced by [cm\\_cleanup\(\)](#), and [db\\_open\\_database\(\)](#).

#### 4.38.2.2 WORD [OPEN\\_RECORD::ags](#)

Data format, ...

Definition at line 342 of file msystem.h.

#### 4.38.2.3 INT [OPEN\\_RECORD::handle](#)

Handle of record base key

Definition at line 340 of file msystem.h.

Referenced by cm\_cleanup(), db\_close\_database(), and db\_open\_database().

### 4.39 PROGRAM\_INFO Struct Reference

#### 4.39.1 Detailed Description

Program information structure

Definition at line 1172 of file midas.h.

#### 4.39.2 Field Documentation

##### 4.39.2.1 BOOL [PROGRAM\\_INFO::required](#)

Definition at line 1173 of file midas.h.

### 4.40 RECORD\_LIST Struct Reference

#### 4.40.1 Detailed Description

Definition at line 394 of file msystem.h.

#### 4.40.2 Field Documentation

##### 4.40.2.1 WORD [RECORD\\_LIST::access\\_mode](#)

Definition at line 397 of file msystem.h.

Referenced by db\_open\_record().

**4.40.2.2 INT RECORD\_LIST::buf\_size**

Definition at line 400 of file msystem.h.

Referenced by db\_open\_record(), and db\_update\_record().

**4.40.2.3 void\* RECORD\_LIST::copy**

Definition at line 399 of file msystem.h.

Referenced by db\_open\_record().

**4.40.2.4 void\* RECORD\_LIST::data**

Definition at line 398 of file msystem.h.

Referenced by db\_open\_record().

**4.40.2.5 void(\* RECORD\_LIST::dispatcher)(INT, INT, void \*)**

Referenced by db\_open\_record(), and db\_update\_record().

**4.40.2.6 HANDLE RECORD\_LIST::handle**

Definition at line 395 of file msystem.h.

Referenced by db\_open\_record().

**4.40.2.7 HANDLE RECORD\_LIST::hDB**

Definition at line 396 of file msystem.h.

Referenced by db\_open\_record().

**4.40.2.8 void\* RECORD\_LIST::info**

Definition at line 402 of file msystem.h.

Referenced by db\_open\_record().

**4.41 REQUEST\_LIST Struct Reference****4.41.1 Detailed Description**

Definition at line 408 of file msystem.h.

### 4.41.2 Field Documentation

#### 4.41.2.1 INT [REQUEST\\_LIST::buffer\\_handle](#)

Definition at line 409 of file `msystem.h`.

#### 4.41.2.2 void(\* [REQUEST\\_LIST::dispatcher](#))(HANDLE, HANDLE, [EVENT\\_HEADER](#) \*, void \*)

#### 4.41.2.3 short int [REQUEST\\_LIST::event\\_id](#)

Definition at line 410 of file `msystem.h`.

#### 4.41.2.4 short int [REQUEST\\_LIST::trigger\\_mask](#)

Definition at line 411 of file `msystem.h`.

## 4.42 RUNINFO Struct Reference

### 4.42.1 Detailed Description

Contains the main parameters regarding the run status. The content reflects the current system ONLY if Midas clients are connected. Otherwise the status is erroneous.

Definition at line 1135 of file `midas.h`.

#### Data Fields

- INT [state](#)
- INT [online\\_mode](#)
- INT [run\\_number](#)
- INT [transition\\_in\\_progress](#)
- INT [requested\\_transition](#)
- char [start\\_time](#) [32]
- DWORD [start\\_time\\_binary](#)
- char [stop\\_time](#) [32]
- DWORD [stop\\_time\\_binary](#)

#### 4.42.2 Field Documentation

##### 4.42.2.1 INT [RUNINFO::state](#)

Current run condition

Definition at line 1136 of file midas.h.

### 4.43 SCALER\_COMMON Struct Reference

#### 4.43.1 Detailed Description

Definition at line 178 of file experim.h.

#### 4.43.2 Field Documentation

##### 4.43.2.1 char [SCALER\\_COMMON::buffer](#)[32]

Definition at line 181 of file experim.h.

##### 4.43.2.2 BOOL [SCALER\\_COMMON::enabled](#)

Definition at line 185 of file experim.h.

##### 4.43.2.3 WORD [SCALER\\_COMMON::event\\_id](#)

Definition at line 179 of file experim.h.

##### 4.43.2.4 double [SCALER\\_COMMON::event\\_limit](#)

Definition at line 188 of file experim.h.

##### 4.43.2.5 char [SCALER\\_COMMON::format](#)[8]

Definition at line 184 of file experim.h.

##### 4.43.2.6 char [SCALER\\_COMMON::frontend\\_file\\_name](#)[256]

Definition at line 193 of file experim.h.

**4.43.2.7 char SCALER\_COMMON::frontend\_host[32]**

Definition at line 191 of file `experim.h`.

**4.43.2.8 char SCALER\_COMMON::frontend\_name[32]**

Definition at line 192 of file `experim.h`.

**4.43.2.9 INT SCALER\_COMMON::log\_history**

Definition at line 190 of file `experim.h`.

**4.43.2.10 DWORD SCALER\_COMMON::num\_subevents**

Definition at line 189 of file `experim.h`.

**4.43.2.11 INT SCALER\_COMMON::period**

Definition at line 187 of file `experim.h`.

**4.43.2.12 INT SCALER\_COMMON::read\_on**

Definition at line 186 of file `experim.h`.

**4.43.2.13 INT SCALER\_COMMON::source**

Definition at line 183 of file `experim.h`.

**4.43.2.14 WORD SCALER\_COMMON::trigger\_mask**

Definition at line 180 of file `experim.h`.

**4.43.2.15 INT SCALER\_COMMON::type**

Definition at line 182 of file `experim.h`.

**4.44 TAG Struct Reference****4.44.1 Detailed Description**

Definition at line 980 of file `midas.h`.

### Data Fields

- char [name](#) [NAME\_LENGTH]
- DWORD [type](#)
- DWORD [n\\_data](#)

#### 4.44.2 Field Documentation

##### 4.44.2.1 char [TAG::name](#)[NAME\_LENGTH]

- 

Definition at line 981 of file `midas.h`.

### 4.45 TR\_CLIENT Struct Reference

#### 4.45.1 Detailed Description

dox

Definition at line 2837 of file `midas.c`.

#### 4.45.2 Field Documentation

##### 4.45.2.1 char [TR\\_CLIENT::client\\_name](#)[NAME\_LENGTH]

Definition at line 2840 of file `midas.c`.

##### 4.45.2.2 char [TR\\_CLIENT::host\\_name](#)[HOST\_NAME\_LENGTH]

Definition at line 2839 of file `midas.c`.

##### 4.45.2.3 int [TR\\_CLIENT::port](#)

Definition at line 2841 of file `midas.c`.

Referenced by `cm_transition()`.



#### 4.45.2.4 int [TR\\_CLIENT::sequence\\_number](#)

Definition at line 2838 of file midas.c.

Referenced by cm\_transition().

### 4.46 TRIGGER\_COMMON Struct Reference

#### 4.46.1 Detailed Description

Definition at line 122 of file experim.h.

#### 4.46.2 Field Documentation

##### 4.46.2.1 char [TRIGGER\\_COMMON::buffer](#)[32]

Definition at line 125 of file experim.h.

##### 4.46.2.2 BOOL [TRIGGER\\_COMMON::enabled](#)

Definition at line 129 of file experim.h.

##### 4.46.2.3 WORD [TRIGGER\\_COMMON::event\\_id](#)

Definition at line 123 of file experim.h.

##### 4.46.2.4 double [TRIGGER\\_COMMON::event\\_limit](#)

Definition at line 132 of file experim.h.

##### 4.46.2.5 char [TRIGGER\\_COMMON::format](#)[8]

Definition at line 128 of file experim.h.

##### 4.46.2.6 char [TRIGGER\\_COMMON::frontend\\_file\\_name](#)[256]

Definition at line 137 of file experim.h.

##### 4.46.2.7 char [TRIGGER\\_COMMON::frontend\\_host](#)[32]

Definition at line 135 of file experim.h.

**4.46.2.8 char [TRIGGER\\_COMMON::frontend\\_name\[32\]](#)**

Definition at line 136 of file `experim.h`.

**4.46.2.9 INT [TRIGGER\\_COMMON::log\\_history](#)**

Definition at line 134 of file `experim.h`.

**4.46.2.10 DWORD [TRIGGER\\_COMMON::num\\_subevents](#)**

Definition at line 133 of file `experim.h`.

**4.46.2.11 INT [TRIGGER\\_COMMON::period](#)**

Definition at line 131 of file `experim.h`.

**4.46.2.12 INT [TRIGGER\\_COMMON::read\\_on](#)**

Definition at line 130 of file `experim.h`.

**4.46.2.13 INT [TRIGGER\\_COMMON::source](#)**

Definition at line 127 of file `experim.h`.

**4.46.2.14 WORD [TRIGGER\\_COMMON::trigger\\_mask](#)**

Definition at line 124 of file `experim.h`.

**4.46.2.15 INT [TRIGGER\\_COMMON::type](#)**

Definition at line 126 of file `experim.h`.

**4.47 TRIGGER\_SETTINGS Struct Reference****4.47.1 Detailed Description**

Definition at line 162 of file `experim.h`.

**4.47.2 Field Documentation**

#### 4.47.2.1 BYTE [TRIGGER\\_SETTINGS::io506](#)

Definition at line 163 of file `experim.h`.

## 5 Midas File Documentation

### 5.1 `adccalib.c` File Reference

#### 5.1.1 Define Documentation

##### 5.1.1.1 `#define ADC_N_BINS 500`

Definition at line 67 of file `adccalib.c`.

Referenced by `adc_calib_init()`.

##### 5.1.1.2 `#define ADC_X_HIGH 4000`

Definition at line 69 of file `adccalib.c`.

Referenced by `adc_calib_init()`.

##### 5.1.1.3 `#define ADC_X_LOW 0`

Definition at line 68 of file `adccalib.c`.

Referenced by `adc_calib_init()`.

#### 5.1.2 Function Documentation

##### 5.1.2.1 `INT adc_calib(EVENT\_HEADER *, void *)`

Definition at line 106 of file `adccalib.c`.

##### 5.1.2.2 `INT adc_calib_bor (INT run_number)`

Definition at line 92 of file `adccalib.c`.

### 5.1.2.3 INT `adc_calib_eor` (INT *run\_number*)

Definition at line 99 of file `adccalib.c`.

### 5.1.2.4 INT `adc_calib_init` (void)

Definition at line 71 of file `adccalib.c`.

### 5.1.2.5 ADC\_CALIBRATION\_PARAM\_STR (`adc_calibration_param_str`)

## 5.1.3 Variable Documentation

### 5.1.3.1 ANA\_MODULE `adc_calib_module`

Initial value:

```
{
    "ADC calibration",
    "Stefan Ritt",
    adc_calib,
    adc_calib_bor,
    adc_calib_eor,
    adc_calib_init,
    NULL,
    &adccalib_param,
    sizeof(adccalib_param),
    adc_calibration_param_str,
}
```

Definition at line 48 of file `adccalib.c`.

### 5.1.3.2 ADC\_CALIBRATION\_PARAM `adccalib_param`

Definition at line 35 of file `adccalib.c`.

### 5.1.3.3 EXP\_PARAM `exp_param`

Definition at line 51 of file `analyzer.c`.

### 5.1.3.4 TH1D\* `hAdcHists`[N\_ADC] [static]

Definition at line 63 of file `adccalib.c`.

Referenced by `adc_calib()`, and `adc_calib_init()`.

### 5.1.3.5 **RUNINFO** *runinfo*

Definition at line 49 of file analyzer.c.

## 5.2 adcsun.c File Reference

### 5.2.1 Define Documentation

#### 5.2.1.1 **#define** *DEFINE\_TESTS*

Definition at line 22 of file adcsun.c.

#### 5.2.1.2 **#define** *PI 3.14159265359*

Definition at line 33 of file adcsun.c.

### 5.2.2 Function Documentation

#### 5.2.2.1 **INT** *adc\_summing* (**EVENT\_HEADER** \*, void \*)

Definition at line 87 of file adcsun.c.

#### 5.2.2.2 **INT** *adc\_summing\_bor* (INT *run\_number*)

#### 5.2.2.3 **INT** *adc\_summing\_init* (void)

Definition at line 72 of file adcsun.c.

#### 5.2.2.4 **ADC\_SUMMING\_PARAM\_STR** (*adc\_summing\_param\_str*)

#### 5.2.2.5 **DEF\_TEST** (*high\_sum*)

#### 5.2.2.6 **DEF\_TEST** (*low\_sum*)

### 5.2.3 Variable Documentation

#### 5.2.3.1 ANA\_MODULE adc\_summing\_module

Initial value:

```
{
    "ADC summing",
    "Stefan Ritt",
    adc_summing,
    NULL,
    NULL,
    adc_summing_init,
    NULL,
    &adc_summing_param,
    sizeof(adc_summing_param),
    adc_summing_param_str,
}
```

Definition at line 53 of file adcsun.c.

#### 5.2.3.2 ADC\_SUMMING\_PARAM adc\_summing\_param

Definition at line 38 of file adcsun.c.

#### 5.2.3.3 TH1D \* hAdcAvg [static]

Definition at line 68 of file adcsun.c.

Referenced by adc\_summing(), and adc\_summing\_init().

#### 5.2.3.4 TH1D\* hAdcSum [static]

Definition at line 68 of file adcsun.c.

## 5.3 analyzer.c File Reference

### 5.3.1 Function Documentation

#### 5.3.1.1 INT ana\_begin\_of\_run (INT run\_number, char \* error)

Definition at line 199 of file analyzer.c.

**5.3.1.2 INT ana\_end\_of\_run (INT *run\_number*, char \* *error*)**

Definition at line 206 of file analyzer.c.

**5.3.1.3 INT ana\_pause\_run (INT *run\_number*, char \* *error*)**

Definition at line 263 of file analyzer.c.

**5.3.1.4 INT ana\_resume\_run (INT *run\_number*, char \* *error*)**

Definition at line 270 of file analyzer.c.

**5.3.1.5 INT analyzer\_exit ()**

Definition at line 192 of file analyzer.c.

**5.3.1.6 INT analyzer\_init ()**

Definition at line 137 of file analyzer.c.

**5.3.1.7 INT analyzer\_loop ()**

Definition at line 277 of file analyzer.c.

**5.3.1.8 ASUM\_BANK\_STR (asum\_bank\_str)****5.3.2 Variable Documentation****5.3.2.1 ANA\_MODULE [adc\\_calib\\_module](#)**

Definition at line 48 of file adccalib.c.

**5.3.2.2 ANA\_MODULE [adc\\_summing\\_module](#)**

Definition at line 53 of file adcsum.c.

**5.3.2.3 BANK\_LIST [ana\\_scaler\\_bank\\_list](#) [ ]**

Initial value:

```

{
    {"SCLR", TID_DWORD, N_ADC, NULL},

    {"ACUM", TID_DOUBLE, N_ADC, NULL},
    {" "},
}

```

Definition at line 88 of file analyzer.c.

#### 5.3.2.4 **BANK\_LIST** ana\_trigger\_bank\_list[]

Initial value:

```

{

    {"ADC0", TID_WORD, N_ADC, NULL},
    {"TDC0", TID_WORD, N_TDC, NULL},

    {"CADC", TID_FLOAT, N_ADC, NULL},
    {"ASUM", TID_STRUCT, sizeof(ASUM_BANK), asum_bank_str},

    {" "},
}

```

Definition at line 75 of file analyzer.c.

#### 5.3.2.5 **ANALYZE\_REQUEST** analyze\_request[]

Definition at line 99 of file analyzer.c.

#### 5.3.2.6 **INT** analyzer\_loop\_period = 0

Definition at line 43 of file analyzer.c.

#### 5.3.2.7 **char\*** analyzer\_name = "Analyzer"

Definition at line 40 of file analyzer.c.

Referenced by analyzer\_init().

#### 5.3.2.8 **EXP\_PARAM** exp\_param

Definition at line 51 of file analyzer.c.



**5.3.2.9 GLOBAL\_PARAM global\_param**

Definition at line 50 of file analyzer.c.

**5.3.2.10 INT odb\_size = DEFAULT\_ODB\_SIZE**

Definition at line 46 of file analyzer.c.

**5.3.2.11 RUNINFO runinfo**

Definition at line 49 of file analyzer.c.

**5.3.2.12 ANA\_MODULE scaler\_accum\_module**

Definition at line 32 of file scaler.c.

**5.3.2.13 ANA\_MODULE\* scaler\_module[]**

Initial value:

```
{
    &scaler_accum_module,
    NULL
}
```

Definition at line 60 of file analyzer.c.

**5.3.2.14 ANA\_MODULE\* trigger\_module[]**

Initial value:

```
{
    &adc_calib_module,
    &adc_summing_module,
    NULL
}
```

Definition at line 65 of file analyzer.c.

**5.3.2.15 TRIGGER\_SETTINGS trigger\_settings**

Definition at line 52 of file analyzer.c.

**5.4 analyzer.dox File Reference**

## 5.5 appendixA.dox File Reference

## 5.6 appendixB.dox File Reference

## 5.7 appendixC.dox File Reference

## 5.8 appendixD.dox File Reference

## 5.9 appendixE.dox File Reference

## 5.10 appendixG.dox File Reference

## 5.11 components.dox File Reference

## 5.12 ebuser.c File Reference

### 5.12.1 Detailed Description

The Event builder user file

Definition in file [ebuser.c](#).

#### Functions

- INT [eb\\_begin\\_of\\_run](#) (INT, char \*, char \*)

- INT `eb_end_of_run` (INT, char \*)
- INT `eb_user` (INT nfrag, BOOL mismatch, EBUILDER\_CHANNEL \*`ebch`, EVENT\_HEADER \*pheader, void \*pevent, INT \*dest\_size)

### Variables

- INT `lModulo` = 100

### 5.12.2 Function Documentation

#### 5.12.2.1 INT `eb_begin_of_run` (INT *rn*, char \* *UserField*, char \* *error*)

Hook to the event builder task at PreStart transition.

##### Parameters:

- rn* run number
- UserField* argument from /Ebuilder/Settings
- error* error string to be passed back to the system.

##### Returns:

EB\_SUCCESS

#### 5.12.2.2 INT `eb_end_of_run` (INT *rn*, char \* *error*)

Hook to the event builder task at completion of event collection after receiving the Stop transition.

##### Parameters:

- rn* run number
- error* error string to be passed back to the system.

##### Returns:

EB\_SUCCESS

### 5.12.2.3 INT eb\_user (INT nfrag, BOOL mismatch, EBUILDER\_CHANNEL \* ebch, EVENT\_HEADER \* pheader, void \* pevent, INT \* dest\_size)

Hook to the event builder task after the reception of all fragments of the same serial number. The destination event has already the final `EVENT_HEADER` setup with the data size set to 0. It is then possible to add private data at this point using the proper bank calls.

The `ebch[]` array structure points to nfragment channel structure with the following content:

```
typedef struct {
    char  name[32];           // Fragment name (Buffer name).
    DWORD serial;            // Serial fragment number.
    char *pfragment;         // Pointer to fragment (EVENT_HEADER *)
    ...
} EBUILDER_CHANNEL;
```

The correct code for including your own MIDAS bank is shown below where **TID\_XXX** is one of the valid Bank type starting with **TID\_** for midas format or **XXX\_BKTYPE** for Ybos data format. **bank\_name** is a 4 character descriptor. **pdata** has to be declared accordingly with the bank type. Refers to the [ebuser.c](#) source code for further description.

**It is not possible to mix within the same destination event different event format!**

```
// Event is empty, fill it with BANK_HEADER
// If you need to add your own bank at this stage

bk_init(pevent);
bk_create(pevent, bank_name, TID_XXXX, &pdata);
*pdata++ = ...;
*dest_size = bk_close(pevent, pdata);
pheader->data_size = *dest_size + sizeof(EVENT_HEADER);
```

For YBOS format, use the following example.

```
ybk_init(pevent);
ybk_create(pevent, "EBBK", I4_BKTYPE, &pdata);
*pdata++ = 0x12345678;
*pdata++ = 0x87654321;
*dest_size = ybk_close(pevent, pdata);
*dest_size *= 4;
pheader->data_size = *dest_size + sizeof(YBOS_BANK_HEADER);
```

#### Parameters:

- nfrag** Number of fragment.
- mismatch** Midas Serial number mismatch flag.
- ebch** Structure to all the fragments.
- pheader** Destination pointer to the header.

*pevent* Destination pointer to the bank header.

*dest\_size* Destination event size in bytes.

**Returns:**

EB\_SUCCESS

Definition at line 187 of file ebuser.c.

Referenced by source\_scan().

#### 5.12.2.4 INT ebuilder\_exit ()

#### 5.12.2.5 INT ebuilder\_init ()

#### 5.12.2.6 INT ebuilder\_loop ()

#### 5.12.2.7 INT ebuser (INT, BOOL *mismatch*, EBUILDER\_CHANNEL \*, EVENT\_HEADER \*, void \*, INT \*)

#### 5.12.2.8 INT read\_scaler\_event (char \* *pevent*, INT *off*)

Definition at line 345 of file frontend.c.

### 5.12.3 Variable Documentation

#### 5.12.3.1 BOOL *debug*

Definition at line 68 of file mfe.c.

#### 5.12.3.2 INT *display\_period* = 3000

Definition at line 32 of file ebuser.c.

### 5.12.3.3 EBUILDER\_SETTINGS ebset

Definition at line 28 of file mevb.c.

Referenced by eb\_user(), handFlush(), main(), source\_booking(), source\_scan(), and tr\_start().

### 5.12.3.4 BOOL ebuilder\_call\_loop = FALSE

Definition at line 29 of file ebuser.c.

### 5.12.3.5 EQUIPMENT equipment[]

Initial value:

```
{
    { "EB",
      { 1, 0,
        "SYSTEM",
        0,
        0,
        "MIDAS",
        TRUE,
      },
    },
    { " " }
}
```

Definition at line 59 of file ebuser.c.

### 5.12.3.6 INT event\_buffer\_size = 10 \* 10000

Definition at line 41 of file ebuser.c.

### 5.12.3.7 char\* frontend\_file\_name = \_\_FILE\_\_

Definition at line 26 of file ebuser.c.

### 5.12.3.8 char\* frontend\_name = "Ebuilder"

Definition at line 23 of file ebuser.c.

### 5.12.3.9 INT lModulo = 100

Global var for testing passed at BOR.

Globals

Definition at line 45 of file ebuser.c.

Referenced by eb\_begin\_of\_run().

#### 5.12.3.10 INT `max_event_size` = 10000

Definition at line 35 of file ebuser.c.

#### 5.12.3.11 INT `max_event_size_frag` = 5 \* 1024 \* 1024

Definition at line 38 of file ebuser.c.

## 5.13 esone.c File Reference

### 5.13.1 Detailed Description

The ESONE CAMAC standard call file

Definition in file `esone.c`.

### Functions

- INLINE void `ccinit` (void)
- INLINE int `fccinit` (void)
- INLINE void `cdreg` (int \*ext, const int b, const int c, const int n, const int a)
- INLINE void `cssa` (const int f, int ext, unsigned short \*d, int \*q)
- INLINE void `cfsa` (const int f, const int ext, unsigned long \*d, int \*q)
- INLINE void `cccc` (const int ext)
- INLINE void `cccz` (const int ext)
- INLINE void `ccci` (const int ext, int l)
- INLINE void `ctci` (const int ext, int \*l)
- INLINE void `cccd` (const int ext, int l)
- INLINE void `ctcd` (const int ext, int \*l)
- INLINE void `cdlam` (int \*lam, const int b, const int c, const int n, const int a, const int inta[2])
- INLINE void `ctgl` (const int ext, int \*l)
- INLINE void `cclm` (const int lam, int l)
- INLINE void `cclnk` (const int lam, void(\*isr)(void))
- INLINE void `cculk` (const int lam)
- INLINE void `ccrgl` (const int lam)
- INLINE void `cclc` (const int lam)
- INLINE void `ctlm` (const int lam, int \*l)
- INLINE void `cfga` (int f[ ], int exta[ ], int intc[ ], int qa[ ], int cb[ ])

- `INLINE void csga (int f[ ], int exta[ ], int intc[ ], int qa[ ], int cb[ ])`
- `INLINE void cfmad (int f, int extb[ ], int intc[ ], int cb[ ])`
- `INLINE void csmad (int f, int extb[ ], int intc[ ], int cb[ ])`
- `INLINE void cfubc (const int f, int ext, int intc[ ], int cb[ ])`
- `INLINE void csubc (const int f, int ext, int intc[ ], int cb[ ])`
- `INLINE void cfubr (const int f, int ext, int intc[ ], int cb[ ])`
- `INLINE void csubr (const int f, int ext, int intc[ ], int cb[ ])`

### 5.13.2 Function Documentation

#### 5.13.2.1 `INLINE void cccc (const int ext)`

Control Crate Clear.

Generate Crate Clear function. Execute [cam\\_crate\\_clear\(\)](#)

**Parameters:**

*ext* external address

**Returns:**

void

Definition at line 188 of file esone.c.

#### 5.13.2.2 `INLINE void cccd (const int ext, int l)`

Control Crate D.

Enable or Disable Crate Demand.

**Parameters:**

*ext* external address

*l* action l=0 -> Clear D, l=1 -> Set D

**Returns:**

void

Definition at line 262 of file esone.c.



**5.13.2.3 INLINE void ccci (const int *ext*, int *l*)**

Control Crate I.

Set or Clear Dataway Inhibit, Execute `cam_inhinit_set()` /`clear()`

**Parameters:**

*ext* external address

*l* action *l*=0 -> Clear I, *l*=1 -> Set I

**Returns:**

void

Definition at line 223 of file `esone.c`.

**5.13.2.4 INLINE void cccz (const int *ext*)**

Control Crate Z.

Generate Dataway Initialize. Execute `cam_crate_zinit()`

**Parameters:**

*ext* external address

**Returns:**

void

Definition at line 205 of file `esone.c`.

**5.13.2.5 INLINE void ccinit (void)**

CAMAC initialization

CAMAC initialization must be called before any other ESONE subroutine call.

**Returns:**

void

Definition at line 67 of file `esone.c`.

**5.13.2.6 INLINE void cclc (const int *lam*)**

Control Clear LAM.

Clear the LAM of the station pointer by the *lam* address.

**Parameters:**

*lam* external address

**Returns:**

void

Definition at line 423 of file esone.c.

**5.13.2.7 INLINE void cclm (const int *lam*, int *l*)**

Control Crate LAM.

Enable or Disable LAM. Execute F24 for disable, F26 for enable.

**Parameters:**

*lam* external address

*l* action *l*=0 -> disable LAM , *l*=1 -> enable LAM

**Returns:**

void

Definition at line 343 of file esone.c.

**5.13.2.8 INLINE void cclnk (const int *lam*, void(\*) (void) *isr*)**

Link LAM to service procedure

Link a specific service routine to a LAM. Since this routine is executed asynchronously, care must be taken on re-entrancy.

**Parameters:**

*lam* external address

*isr* name of service procedure

**Returns:**

void

Definition at line 366 of file esone.c.

**5.13.2.9 INLINE void ccrgl (const int *lam*)**

Relink LAM

Re-enable LAM in the controller

**Parameters:**

*lam* external address

**Returns:**

void

Definition at line 403 of file esone.c.

**5.13.2.10 INLINE void cculk (const int *lam*)**

Unlink LAM from service procedure

Performs complementary operation to cclnk.

**Parameters:**

*lam* external address

**Returns:**

void

Definition at line 386 of file esone.c.

**5.13.2.11 INLINE void cdlam (int \* *lam*, const int *b*, const int *c*, const int *n*, const int *a*, const int *inta*[2])**

Control Declare LAM.

Declare LAM, Identical to cdreg.

**Parameters:**

*lam* external LAM address

*b* branch number (0..7)

*c* crate number (0..)

*n* station number (0..30)

*a* sub-address (0..15)

*inta* implementation dependent

**Returns:**

void

Definition at line 306 of file esone.c.

**5.13.2.12** `INLINE void cdreg (int * ext, const int b, const int c, const int n, const int a)`

Control Declaration REGister.

Compose an external address from BCNA for later use. Accessing CAMAC through *ext* could be faster if the external address is memory mapped to the processor (hardware dependent). Some CAMAC controller do not have this option see [Supported hardware](#).

**Parameters:**

- ext* external address
- b* branch number (0..7)
- c* crate number (0..)
- n* station number (0..30)
- a* sub-address (0..15)

**Returns:**

void

Definition at line 104 of file `esone.c`.

Referenced by `cdlam()`.

**5.13.2.13** `INLINE void cfga (int f[], int exta[], int intc[], int qa[], int cb[])`

Control Full (24bit) word General Action.

**Parameters:**

- f* function code
- exta*[] external address array
- intc*[] data array
- qa*[] Q response array
- cb*[] control block array
  - `cb[0]` : number of function to perform
  - `cb[1]` : returned number of function performed

**Returns:**

void

Definition at line 462 of file `esone.c`.

**5.13.2.14** **INLINE void cfmad (int *f*, int *extb*[], int *intc*[], int *cb*[])**

Control Full (24bit) Address Q scan.

Scan all sub-address while Q=1 from a0..a15 max from address extb[0] and store corresponding data in intc[]. If Q=0 while A<15 or A=15 then cross station boundary is applied (n-> n+1) and sub-address is reset (a=0). Perform action until either cb[0] action are performed or current external address exceeds extb[1].

**implementation of cb[2] for LAM recognition is not implemented.**

**Parameters:**

*f* function code  
*extb*[] external address array  
extb[0] : first valid external address  
extb[1] : last valid external address  
*intc*[] data array  
*cb*[] control block array  
cb[0] : number of function to perform  
cb[1] : returned number of function performed

**Returns:**

void

Definition at line 516 of file esone.c.

**5.13.2.15** **INLINE void cfsa (const int *f*, const int *ext*, unsigned long \* *d*, int \* *q*)**

Control Full Operation.

24 bit operation on a given external CAMAC address.

The range of the *f* is hardware dependent. The number indicated below are for standard ANSI/IEEE Std (758-1979) Execute cam24i for *f*<8, cam24o for *f*>15, camc\_q for (*f*>7 or *f*>23)

**Parameters:**

*f* function code (0..31)  
*ext* external address  
*d* data long word  
*q* Q response

**Returns:**

void

Definition at line 160 of file esone.c.

Referenced by cfga(), cfubc(), and cfubr().

**5.13.2.16** **INLINE void cfubc (const int *f*, int *ext*, int *intc*[], int *cb*[])**

Control Full (24bit) Block Repeat with Q-stop.

Execute function *f* on address *ext* with data *intc*[] while Q.

**Parameters:**

*f* function code

*ext* external address array

*intc*[] data array

*cb*[] control block array

cb[0] : number of function to perform

cb[1] : returned number of function performed

**Returns:**

void

Definition at line 613 of file esone.c.

**5.13.2.17** **INLINE void cfubr (const int *f*, int *ext*, int *intc*[], int *cb*[])**

Repeat Mode Block Transfer (24bit).

Execute function *f* on address *ext* with data *intc*[] if Q. If noQ keep current *intc*[] data.

Repeat cb[0] times.

**Parameters:**

*f* function code

*ext* external address array

*intc*[] data array

*cb*[] control block array

cb[0] : number of function to perform

cb[1] : returned number of function performed

**Returns:**

void

Definition at line 676 of file esone.c.

**5.13.2.18** **INLINE void csga (int *f*[], int *exta*[], int *intc*[], int *qa*[], int *cb*[])**

Control (16bit) word General Action.

**Parameters:**

*f* function code

*exta[ ]* external address array  
*intc[ ]* data array  
*qa[ ]* Q response array  
*cb[ ]* control block array  
     *cb[0]* : number of function to perform  
     *cb[1]* : returned number of function performed

**Returns:**

void

Definition at line 485 of file esone.c.

**5.13.2.19 INLINE void csmad (int *f*, int *extb[ ]*, int *intc[ ]*, int *cb[ ]*)**

Control (16bit) Address Q scan.

Scan all sub-address while Q=1 from a0..a15 max from address *extb[0]* and store corresponding data in *intc[ ]*. If Q=0 while A<15 or A=15 then cross station boundary is applied (n-> n+1) and sub-address is reset (a=0). Perform action until either *cb[0]* action are performed or current external address exceeds *extb[1]*.

**implementation of *cb[2]* for LAM recognition is not implemented.**

**Parameters:**

*f* function code  
*extb[ ]* external address array  
     *extb[0]* : first valid external address  
     *extb[1]* : last valid external address  
*intc[ ]* data array  
*cb[ ]* control block array  
     *cb[0]* : number of function to perform  
     *cb[1]* : returned number of function performed

**Returns:**

void

Definition at line 568 of file esone.c.

**5.13.2.20 INLINE void cssa (const int *f*, int *ext*, unsigned short \* *d*, int \* *q*)**

Control Short Operation.

16 bit operation on a given external CAMAC address.

The range of the  $f$  is hardware dependent. The number indicated below are for standard ANSI/IEEE Std (758-1979) Execute cam16i for  $f < 8$ , cam16o for  $f > 15$ , camc\_q for ( $f > 7$  or  $f > 23$ )

**Parameters:**

$f$  function code (0..31)  
 $ext$  external address  
 $d$  data word  
 $q$  Q response

**Returns:**

void

Definition at line 125 of file esone.c.

Referenced by csga(), csubc(), and csubr().

**5.13.2.21 INLINE void csubc (const int  $f$ , int  $ext$ , int  $intc$ [], int  $cb$ [])**

Control (16bit) Block Repeat with Q-stop.

Execute function  $f$  on address  $ext$  with data  $intc$ [] while Q.

**Parameters:**

$f$  function code  
 $ext$  external address array  
 $intc$ [] data array  
 $cb$ [] control block array  
 $cb[0]$  : number of function to perform  
 $cb[1]$  : returned number of function performed

**Returns:**

void

Definition at line 644 of file esone.c.

**5.13.2.22 INLINE void csubr (const int  $f$ , int  $ext$ , int  $intc$ [], int  $cb$ [])**

Repeat Mode Block Transfer (16bit).

Execute function  $f$  on address  $ext$  with data  $intc$ [] if Q. If noQ keep current  $intc$ [] data.  
 Repeat  $cb[0]$  times.

**Parameters:**

$f$  function code



*ext* external address array  
*intc[]* data array  
*cb[]* control block array  
cb[0] : number of function to perform  
cb[1] : returned number of function performed

**Returns:**

void

Definition at line 707 of file esone.c.

**5.13.2.23 INLINE void ctcd (const int *ext*, int \* *l*)**

Control Test Crate D.

Test Crate Demand.

**Parameters:**

*ext* external address  
*l* D cleared -> l=0, D set -> l=1

**Returns:**

void

Definition at line 284 of file esone.c.

**5.13.2.24 INLINE void ctci (const int *ext*, int \* *l*)**

Test Crate I.

Test Crate Inhibit, Execute [cam\\_inhibit\\_test\(\)](#)

**Parameters:**

*ext* external address  
*l* action l=0 -> Clear I, l=1 -> Set I

**Returns:**

void

Definition at line 244 of file esone.c.

**5.13.2.25** **INLINE void ctgl (const int *ext*, int \* *l*)**

Control Test Demand Present.

Test the LAM register.

**Parameters:**

*ext* external LAM register address

*l* !=0 if any LAM is set.

**Returns:**

void

Definition at line 323 of file esone.c.

**5.13.2.26** **INLINE void ctlm (const int *lam*, int \* *l*)**

Test LAM.

Test the LAM of the station pointed by lam. Performs an F8

**Parameters:**

*lam* external address

*l* No LAM-> l=0, LAM present-> l=1

**Returns:**

void

Definition at line 441 of file esone.c.

**5.13.2.27** **INLINE int fccinit (void)**

CAMAC initialization with return status

fccinit can be called instead of ccinit to determine if the initialization was successful

**Returns:**

1 for success, 0 for failure

Definition at line 81 of file esone.c.

**5.14 eventbuilder.dox File Reference**

## 5.15 `experim.h` File Reference

### Data Structures

- struct [EXP\\_PARAM](#)
- struct [ADC\\_CALIBRATION\\_PARAM](#)
- struct [ADC\\_SUMMING\\_PARAM](#)
- struct [GLOBAL\\_PARAM](#)
- struct [ASUM\\_BANK](#)
- struct [TRIGGER\\_COMMON](#)
- struct [TRIGGER\\_SETTINGS](#)
- struct [SCALER\\_COMMON](#)

### 5.15.1 `#define` Documentation

#### 5.15.1.1 `#define ADC_CALIBRATION_PARAM_DEFINED`

Definition at line 38 of file `experim.h`.

#### 5.15.1.2 `#define ADC_CALIBRATION_PARAM_STR(_name)`

##### Value:

```
char *_name[] = {\
    "[.]",\
    "Pedestal = INT[8] :",\
    "[0] 174",\
    "[1] 194",\
    "[2] 176",\
    "[3] 182",\
    "[4] 185",\
    "[5] 215",\
    "[6] 202",\
    "[7] 202",\
    "Software Gain = FLOAT[8] :",\
    "[0] 1",\
    "[1] 1",\
    "[2] 1",\
    "[3] 1",\
    "[4] 1",\
    "[5] 1",\
    "[6] 1",\
    "[7] 1",\
    "Histo threshold = DOUBLE : 20",\
    "",\
    NULL }
```

Definition at line 46 of file `experim.h`.

**5.15.1.3 `#define ADC_SUMMING_PARAM_DEFINED`**

Definition at line 74 of file `experim.h`.

**5.15.1.4 `#define ADC_SUMMING_PARAM_STR(_name)`**

**Value:**

```
char *_name[] = {\n    "[.]",\n    "ADC threshold = FLOAT : 5",\n    "",\n    NULL }
```

Definition at line 80 of file `experim.h`.

**5.15.1.5 `#define ASUM_BANK_DEFINED`**

Definition at line 106 of file `experim.h`.

**5.15.1.6 `#define ASUM_BANK_STR(_name)`**

**Value:**

```
char *_name[] = {\n    "[.]",\n    "Sum = FLOAT : 0",\n    "Average = FLOAT : 0",\n    "",\n    NULL }
```

Definition at line 113 of file `experim.h`.

**5.15.1.7 `#define EXP_PARAM_DEFINED`**

Definition at line 24 of file `experim.h`.

**5.15.1.8 `#define EXP_PARAM_STR(_name)`**

**Value:**

```
char *_name[] = {\n    "[.]",\n    "Comment = STRING : [80] Test",\n    "",\n    NULL }
```

Definition at line 30 of file `experim.h`.

Referenced by `analyzer_init()`.

**5.15.1.9 `#define GLOBAL_PARAM_DEFINED`**

Definition at line 90 of file `experim.h`.

**5.15.1.10 `#define GLOBAL_PARAM_STR(_name)`**

**Value:**

```
char *_name[] = {\n    "[.]",\n    "ADC Threshold = FLOAT : 5",\n    "",\n    NULL }
```

Definition at line 96 of file `experim.h`.

Referenced by `analyzer_init()`.

**5.15.1.11 `#define SCALER_COMMON_DEFINED`**

Definition at line 176 of file `experim.h`.

**5.15.1.12 `#define SCALER_COMMON_STR(_name)`**

**Value:**

```
char *_name[] = {\n    "[.]",\n    "Event ID = WORD : 2",\n    "Trigger mask = WORD : 0",\n    "Buffer = STRING : [32] SYSTEM",\n    "Type = INT : 17",\n    "Source = INT : 0",\n    "Format = STRING : [8] MIDAS",\n    "Enabled = BOOL : y",\n    "Read on = INT : 377",\n    "Period = INT : 10000",\n    "Event limit = DOUBLE : 0",\n    "Num subevents = DWORD : 0",\n    "Log history = INT : 0",\n    "Frontend host = STRING : [32] pc810",\n    "Frontend name = STRING : [32] Sample Frontend",\n    "Frontend file name = STRING : [256] C:\\Midas\\examples\\experiment\\frontend.c",\n    "",\n    NULL }
```

Definition at line 196 of file `experim.h`.

**5.15.1.13 `#define TRIGGER_COMMON_DEFINED`**

Definition at line 120 of file `experim.h`.

**5.15.1.14 #define TRIGGER\_COMMON\_STR(\_name)****Value:**

```

char *_name[] = {\
    "[.]",\
    "Event ID = WORD : 1",\
    "Trigger mask = WORD : 0",\
    "Buffer = STRING : [32] SYSTEM",\
    "Type = INT : 2",\
    "Source = INT : 16777215",\
    "Format = STRING : [8] MIDAS",\
    "Enabled = BOOL : y",\
    "Read on = INT : 257",\
    "Period = INT : 500",\
    "Event limit = DOUBLE : 0",\
    "Num subevents = DWORD : 0",\
    "Log history = INT : 0",\
    "Frontend host = STRING : [32] pc810",\
    "Frontend name = STRING : [32] Sample Frontend",\
    "Frontend file name = STRING : [256] C:\Midas\examples\experiment\frontend.c",\
    "",\
    NULL }

```

Definition at line 140 of file `experim.h`.

**5.15.1.15 #define TRIGGER\_SETTINGS\_DEFINED**

Definition at line 160 of file `experim.h`.

**5.15.1.16 #define TRIGGER\_SETTINGS\_STR(\_name)****Value:**

```

char *_name[] = {\
    "[.]",\
    "IO506 = BYTE : 7",\
    "",\
    NULL }

```

Definition at line 166 of file `experim.h`.

Referenced by `analyzer_init()`.

**5.16 frontend.c File Reference****5.16.1 Define Documentation**

**5.16.1.1 #define CRATE 0**

Definition at line 56 of file frontend.c.

Referenced by frontend\_init(), read\_scaler\_event(), and read\_trigger\_event().

**5.16.1.2 #define N\_ADC 4**

Definition at line 51 of file frontend.c.

Referenced by adc\_calib(), adc\_calib\_init(), and read\_trigger\_event().

**5.16.1.3 #define N\_SCLR 4**

Definition at line 53 of file frontend.c.

Referenced by read\_scaler\_event().

**5.16.1.4 #define N\_TDC 4**

Definition at line 52 of file frontend.c.

Referenced by read\_trigger\_event().

**5.16.1.5 #define SLOT\_ADC 1**

Definition at line 58 of file frontend.c.

Referenced by read\_trigger\_event().

**5.16.1.6 #define SLOT\_IO 23**

Definition at line 57 of file frontend.c.

Referenced by frontend\_init(), and read\_trigger\_event().

**5.16.1.7 #define SLOT\_SCLR 3**

Definition at line 60 of file frontend.c.

Referenced by read\_scaler\_event().

**5.16.1.8 #define SLOT\_TDC 2**

Definition at line 59 of file frontend.c.

Referenced by read\_trigger\_event().

### 5.16.2 Function Documentation

**5.16.2.1** INT begin\_of\_run (INT *run\_number*, char \* *error*)

**5.16.2.2** INT end\_of\_run (INT *run\_number*, char \* *error*)

**5.16.2.3** INT frontend\_exit ()

**5.16.2.4** INT frontend\_init ()

**5.16.2.5** INT frontend\_loop ()

**5.16.2.6** INT interrupt\_configure (INT *cmd*, INT *source*, PTYPE *adr*)

Definition at line 258 of file frontend.c.

Referenced by interrupt\_enable(), main(), and register\_equipment().

**5.16.2.7** INT pause\_run (INT *run\_number*, char \* *error*)

**5.16.2.8** INT poll\_event (INT *source*, INT *count*, BOOL *test*)

Definition at line 237 of file frontend.c.

Referenced by register\_equipment(), and scheduler().

**5.16.2.9** INT read\_scaler\_event (char \* *pevent*, INT *off*)



**5.16.2.10 INT read\_trigger\_event (char \* *pevent*, INT *off*)**

Definition at line 275 of file frontend.c.

**5.16.2.11 void register\_cnaf\_callback (int *debug*)**

Referenced by frontend\_init().

**5.16.2.12 INT resume\_run (INT *run\_number*, char \* *error*)****5.16.3 Variable Documentation****5.16.3.1 INT [display\\_period](#) = 3000**

Definition at line 39 of file frontend.c.

**5.16.3.2 [EQUIPMENT](#) [equipment](#)[ ]**

Definition at line 81 of file frontend.c.

**5.16.3.3 INT [event\\_buffer\\_size](#) = 10 \* 10000**

Definition at line 48 of file frontend.c.

**5.16.3.4 BOOL [frontend\\_call\\_loop](#) = FALSE**

Definition at line 36 of file frontend.c.

**5.16.3.5 char\* [frontend\\_file\\_name](#) = \_\_FILE\_\_**

Definition at line 33 of file frontend.c.

**5.16.3.6 char\* [frontend\\_name](#) = "Sample Frontend"**

Definition at line 31 of file frontend.c.

**5.16.3.7 INT [max\\_event\\_size](#) = 10000**

Definition at line 42 of file frontend.c.

**5.16.3.8 INT [max\\_event\\_size\\_frag](#) = 5 \* 1024 \* 1024**

Definition at line 45 of file frontend.c.

**5.17 internal.dox File Reference****5.18 introduction.dox File Reference****5.19 mcstd.h File Reference****5.19.1 Detailed Description**

The Midas CAMAC include file

Definition in file [mcstd.h](#).

**Functions**

- EXTERNAL INLINE void EXPRT [cam16i](#) (const int c, const int n, const int a, const int f, WORD \*d)
- EXTERNAL INLINE void EXPRT [cam24i](#) (const int c, const int n, const int a, const int f, DWORD \*d)
- EXTERNAL INLINE void EXPRT [cam8i\\_q](#) (const int c, const int n, const int a, const int f, BYTE \*d, int \*x, int \*q)
- EXTERNAL INLINE void EXPRT [cam16i\\_q](#) (const int c, const int n, const int a, const int f, WORD \*d, int \*x, int \*q)
- EXTERNAL INLINE void EXPRT [cam24i\\_q](#) (const int c, const int n, const int a, const int f, DWORD \*d, int \*x, int \*q)
- EXTERNAL INLINE void EXPRT [cam16i\\_r](#) (const int c, const int n, const int a, const int f, WORD \*\*d, const int r)
- EXTERNAL INLINE void EXPRT [cam24i\\_r](#) (const int c, const int n, const int a, const int f, DWORD \*\*d, const int r)
- EXTERNAL INLINE void EXPRT [cam8i\\_rq](#) (const int c, const int n, const int a, const int f, BYTE \*\*d, const int r)
- EXTERNAL INLINE void EXPRT [cam16i\\_rq](#) (const int c, const int n, const int a, const int f, WORD \*\*d, const int r)
- EXTERNAL INLINE void EXPRT [cam24i\\_rq](#) (const int c, const int n, const int a, const int f, DWORD \*\*d, const int r)

- EXTERNAL INLINE void EXPRT [cam8i\\_sa](#) (const int c, const int n, const int a, const int f, BYTE \*\*d, const int r)
- EXTERNAL INLINE void EXPRT [cam16i\\_sa](#) (const int c, const int n, const int a, const int f, WORD \*\*d, const int r)
- EXTERNAL INLINE void EXPRT [cam24i\\_sa](#) (const int c, const int n, const int a, const int f, DWORD \*\*d, const int r)
- EXTERNAL INLINE void EXPRT [cam8i\\_sn](#) (const int c, const int n, const int a, const int f, BYTE \*\*d, const int r)
- EXTERNAL INLINE void EXPRT [cam16i\\_sn](#) (const int c, const int n, const int a, const int f, WORD \*\*d, const int r)
- EXTERNAL INLINE void EXPRT [cam24i\\_sn](#) (const int c, const int n, const int a, const int f, DWORD \*\*d, const int r)
- EXTERNAL INLINE void EXPRT [cami](#) (const int c, const int n, const int a, const int f, WORD \*d)
- EXTERNAL INLINE void EXPRT [cam8o](#) (const int c, const int n, const int a, const int f, BYTE d)
- EXTERNAL INLINE void EXPRT [cam16o](#) (const int c, const int n, const int a, const int f, WORD d)
- EXTERNAL INLINE void EXPRT [cam24o](#) (const int c, const int n, const int a, const int f, DWORD d)
- EXTERNAL INLINE void EXPRT [cam8o\\_q](#) (const int c, const int n, const int a, const int f, BYTE d, int \*x, int \*q)
- EXTERNAL INLINE void EXPRT [cam16o\\_q](#) (const int c, const int n, const int a, const int f, WORD d, int \*x, int \*q)
- EXTERNAL INLINE void EXPRT [cam24o\\_q](#) (const int c, const int n, const int a, const int f, DWORD d, int \*x, int \*q)
- EXTERNAL INLINE void EXPRT [cam8o\\_r](#) (const int c, const int n, const int a, const int f, BYTE \*d, const int r)
- EXTERNAL INLINE void EXPRT [cam16o\\_r](#) (const int c, const int n, const int a, const int f, WORD \*d, const int r)
- EXTERNAL INLINE void EXPRT [cam24o\\_r](#) (const int c, const int n, const int a, const int f, DWORD \*d, const int r)
- EXTERNAL INLINE void EXPRT [camo](#) (const int c, const int n, const int a, const int f, WORD d)
- EXTERNAL INLINE int EXPRT [camc\\_chk](#) (const int c)
- EXTERNAL INLINE void EXPRT [camc](#) (const int c, const int n, const int a, const int f)
- EXTERNAL INLINE void EXPRT [camc\\_q](#) (const int c, const int n, const int a, const int f, int \*q)
- EXTERNAL INLINE void EXPRT [camc\\_sa](#) (const int c, const int n, const int a, const int f, const int r)
- EXTERNAL INLINE void EXPRT [camc\\_sn](#) (const int c, const int n, const int a, const int f, const int r)
- EXTERNAL INLINE int EXPRT [cam\\_init](#) (void)

- EXTERNAL INLINE int EXPRT [cam\\_init\\_rpc](#) (char \*[host\\_name](#), char \*[exp\\_name](#), char \*fe\_name, char \*client\_name, char \*rpc\_server)
- EXTERNAL INLINE void EXPRT [cam\\_exit](#) (void)
- EXTERNAL INLINE void EXPRT [cam\\_inhibit\\_set](#) (const int c)
- EXTERNAL INLINE void EXPRT [cam\\_inhibit\\_clear](#) (const int c)
- EXTERNAL INLINE int EXPRT [cam\\_inhibit\\_test](#) (const int c)
- EXTERNAL INLINE void EXPRT [cam\\_crate\\_clear](#) (const int c)
- EXTERNAL INLINE void EXPRT [cam\\_crate\\_zinit](#) (const int c)
- EXTERNAL INLINE void EXPRT [cam\\_lam\\_enable](#) (const int c, const int n)
- EXTERNAL INLINE void EXPRT [cam\\_lam\\_disable](#) (const int c, const int n)
- EXTERNAL INLINE void EXPRT [cam\\_lam\\_read](#) (const int c, DWORD \*lam)
- EXTERNAL INLINE void EXPRT [cam\\_lam\\_clear](#) (const int c, const int n)
- EXTERNAL INLINE int EXPRT [cam\\_lam\\_wait](#) (int \*c, DWORD \*n, const int millisec)
- EXTERNAL INLINE void EXPRT [cam\\_interrupt\\_enable](#) (const int c)
- EXTERNAL INLINE void EXPRT [cam\\_interrupt\\_disable](#) (const int c)
- EXTERNAL INLINE int EXPRT [cam\\_interrupt\\_test](#) (const int c)
- EXTERNAL INLINE void EXPRT [cam\\_interrupt\\_attach](#) (const int c, const int n, void(\*isr)(void))
- EXTERNAL INLINE void EXPRT [cam\\_interrupt\\_detach](#) (const int c, const int n)

## 5.20 mevb.c File Reference

### Defines

- #define [SERVER\\_CACHE\\_SIZE](#) 100000

### Functions

- INT [source\\_scan](#) (INT fmt, [EQUIPMENT\\_INFO](#) \*eq\_info)
- INT [eb\\_begin\\_of\\_run](#) (INT, char \*, char \*)
- INT [eb\\_end\\_of\\_run](#) (INT, char \*)
- INT [eb\\_user](#) (INT, BOOL mismatch, [EBUILDER\\_CHANNEL](#) \*, [EVENT\\_HEADER](#) \*, void \*, INT \*)

#### 5.20.1 Define Documentation

**5.20.1.1 #define DEFAULT\_FE\_TIMEOUT 60000**

Definition at line 26 of file mevb.c.

```
5.20.1.2 #define EQUIPMENT_COMMON_STR "\Event ID = WORD :  
0\nTrigger mask = WORD : 0\nBuffer = STRING : [32] SYSTEM\nType  
= INT : 0\nSource = INT : 0\nFormat = STRING : [8] FIXED\nEnabled =  
BOOL : 0\nRead on = INT : 0\nPeriod = INT : 0\nEvent limit = DOUBLE  
: 0\nNum subevents = DWORD : 0\nLog history = INT : 0\nFrontend host  
= STRING : [32] \nFrontend name = STRING : [32] \nFrontend file name =  
STRING : [256] \n"
```

Definition at line 81 of file mevb.c.

```
5.20.1.3 #define EQUIPMENT_STATISTICS_STR "\Events sent = DOUBLE :  
0\nEvents per sec. = DOUBLE : 0\nkBytes per sec. = DOUBLE : 0\n"
```

Definition at line 99 of file mevb.c.

**5.20.1.4 #define ODB\_UPDATE\_TIME 1000**

Definition at line 24 of file mevb.c.

**5.20.1.5 #define SERVER\_CACHE\_SIZE 100000**

dox

Definition at line 22 of file mevb.c.

**5.20.2 Function Documentation****5.20.2.1 INT close\_buffers (void)**

Definition at line 804 of file mevb.c.

Referenced by scan\_fragment().

**5.20.2.2 INT eb\_begin\_of\_run (INT *rn*, char \* *UserField*, char \* *error*)**

Hook to the event builder task at PreStart transition.

**Parameters:**

*rn* run number

*UserField* argument from /Ebuilder/Settings

*error* error string to be passed back to the system.

**Returns:**

EB\_SUCCESS

Definition at line 105 of file ebuser.c.

Referenced by tr\_start().

### 5.20.2.3 INT eb\_end\_of\_run (INT *rn*, char \* *error*)

Hook to the event builder task at completion of event collection after receiving the Stop transition.

**Parameters:**

*rn* run number

*error* error string to be passed back to the system.

**Returns:**

EB\_SUCCESS

Definition at line 120 of file ebuser.c.

Referenced by close\_buffers().

### 5.20.2.4 INT eb\_mfragment\_add (char \* *pdest*, char \* *psrce*, INT \* *size*)

Definition at line 406 of file mevb.c.

Referenced by load\_fragment().

### 5.20.2.5 INT eb\_user (INT *nfrag*, BOOL *mismatch*, EBUILDER\_CHANNEL \* *ebch*, EVENT\_HEADER \* *pheader*, void \* *pevent*, INT \* *dest\_size*)

Hook to the event builder task after the reception of all fragments of the same serial number. The destination event has already the final EVENT\_HEADER setup with the data size set to 0. It is then possible to add private data at this point using the proper bank calls.

The ebch[] array structure points to nfragment channel structure with the following content:

```
typedef struct {
    char  name[32];           // Fragment name (Buffer name).
    DWORD serial;            // Serial fragment number.
    char *pfragment;         // Pointer to fragment (EVENT_HEADER *)
    ...
} EBUILDER_CHANNEL;
```

The correct code for including your own MIDAS bank is shown below where **TID\_XXX** is one of the valid Bank type starting with **TID\_** for midas format or **xxx\_BKTYPE** for Ybos data format. **bank\_name** is a 4 character descriptor. **pdata** has to be declared accordingly with the bank type. Refers to the [ebuser.c](#) source code for further description.

**It is not possible to mix within the same destination event different event format!**

```
// Event is empty, fill it with BANK_HEADER
// If you need to add your own bank at this stage

bk_init(pevent);
bk_create(pevent, bank_name, TID_XXXX, &pdata);
*pdata++ = ...;
*dest_size = bk_close(pevent, pdata);
pheader->data_size = *dest_size + sizeof(EVENT_HEADER);
```

For YBOS format, use the following example.

```
ybk_init(pevent);
ybk_create(pevent, "EBBK", I4_BKTYPE, &pdata);
*pdata++ = 0x12345678;
*pdata++ = 0x87654321;
*dest_size = ybk_close(pevent, pdata);
*dest_size *= 4;
pheader->data_size = *dest_size + sizeof(YBOS_BANK_HEADER);
```

#### Parameters:

- nfrag** Number of fragment.
- mismatch** Midas Serial number mismatch flag.
- ebch** Structure to all the fragments.
- pheader** Destination pointer to the header.
- pevent** Destination pointer to the bank header.
- dest\_size** Destination event size in bytes.

#### Returns:

EB\_SUCCESS

Definition at line 187 of file ebuser.c.

Referenced by `source_scan()`.

#### 5.20.2.6 INT eb\_yfragment\_add (char \* pdest, char \* psrce, INT \* size)

Definition at line 462 of file mevb.c.

Referenced by `load_fragment()`.

**5.20.2.7 INT ebuilder\_exit (void)**

Definition at line 86 of file ebuser.c.

Referenced by main().

**5.20.2.8 INT ebuilder\_init (void)**

Definition at line 80 of file ebuser.c.

Referenced by main().

**5.20.2.9 INT ebuilder\_loop (void)**

Definition at line 92 of file ebuser.c.

**5.20.2.10 void free\_event\_buffer (INT nfrag)**

Definition at line 652 of file mevb.c.

Referenced by main(), source\_booking(), and source\_unbooking().

**5.20.2.11 INT handFlush (void)**

Definition at line 664 of file mevb.c.

Referenced by close\_buffers().

**5.20.2.12 INT load\_fragment (void)**

Definition at line 233 of file mevb.c.

Referenced by main().

**5.20.2.13 int main (unsigned int argc, char \*\* argv)**

Definition at line 1013 of file mevb.c.

**5.20.2.14 INT register\_equipment (void)**

Definition at line 106 of file mevb.c.

**5.20.2.15 INT scan\_fragment (void)**

Definition at line 306 of file mevb.c.

Referenced by main().



**5.20.2.16 INT source\_booking (void)**

Definition at line 698 of file mevb.c.

Referenced by tr\_start().

**5.20.2.17 INT source\_scan (INT *fmt*, EQUIPMENT\_INFO \* *eq\_info*)**

Scan all the fragment source once per call.

1. This will retrieve the full midas event not swapped (except the MIDAS\_HEADER) for each fragment if possible. The fragment will be stored in the channel event pointer.
2. if after a full nfrag path some frag are still not collected, it returns with the frag# missing for timeout check.
3. If ALL fragments are present it will check the midas serial# for a full match across all the fragments.
4. If the serial check fails it returns with "event mismatch" and will abort the event builder but not stop the run for now.
5. If the serial check is passed, it will call the user\_build function where the destination event is going to be composed.

**Parameters:**

*fmt* Fragment format type

*eq\_info* Equipement pointer

**Returns:**

EB\_NO\_MORE\_EVENT, EB\_COMPOSE\_TIMEOUT if different then SUCCESS (bm\_compose, rpc\_sent error)

Definition at line 853 of file mevb.c.

Referenced by scan\_fragment().

**5.20.2.18 INT source\_unbooking (void)**

Definition at line 768 of file mevb.c.

Referenced by close\_buffers(), and main().

**5.20.2.19 INT tr\_start (INT *rn*, char \* *error*)**

Definition at line 534 of file mevb.c.

**5.20.2.20 INT tr\_stop (INT *rn*, char \* *error*)**

Definition at line 639 of file mevb.c.

**5.20.2.21 INT ybos\_event\_swap (DWORD \* *pevt*)**

Referenced by eb\_yfragment\_add(), and source\_scan().

**5.20.3 Variable Documentation****5.20.3.1 BOOL abort\_requested = FALSE**

Definition at line 49 of file mevb.c.

Referenced by close\_buffers(), scan\_fragment(), and tr\_start().

**5.20.3.2 DWORD actual\_millitime**

Definition at line 35 of file mevb.c.

**5.20.3.3 DWORD actual\_time**

Definition at line 34 of file mevb.c.

**5.20.3.4 char bars[] = "|\\-/"**

Definition at line 47 of file mevb.c.

Referenced by scan\_fragment(), and source\_scan().

**5.20.3.5 char buffer\_name[NAME\_LENGTH]**

Definition at line 40 of file mevb.c.

Referenced by load\_fragment(), and main().

**5.20.3.6 BOOL debug = FALSE**

Definition at line 44 of file mevb.c.

**5.20.3.7 BOOL debug1 = FALSE**

Definition at line 44 of file mevb.c.

Referenced by handFlush(), and source\_scan().

**5.20.3.8 char\* [dest\\_event](#)**

Definition at line 42 of file mevb.c.

Referenced by load\_fragment(), and source\_scan().

**5.20.3.9 INT [display\\_period](#)**

Definition at line 32 of file ebuser.c.

**5.20.3.10 EBUILDER\_CHANNEL [ebch](#)[MAX\_CHANNELS]**

Definition at line 29 of file mevb.c.

Referenced by free\_event\_buffer(), handFlush(), load\_fragment(), main(), scan\_fragment(), source\_booking(), source\_scan(), and source\_unbooking().

**5.20.3.11 EBUILDER\_SETTINGS [ebset](#)**

Definition at line 28 of file mevb.c.

Referenced by eb\_user(), handFlush(), main(), source\_booking(), source\_scan(), and tr\_start().

**5.20.3.12 EQUIPMENT [equipment](#)[ ]**

Definition at line 59 of file ebuser.c.

**5.20.3.13 INT [event\\_buffer\\_size](#)**

Definition at line 41 of file ebuser.c.

**5.20.3.14 char [expt\\_name](#)[NAME\_LENGTH]**

Definition at line 38 of file mevb.c.

Referenced by main().

**5.20.3.15 BOOL [frontend\\_call\\_loop](#)**

Definition at line 36 of file frontend.c.

**5.20.3.16 char\* [frontend\\_file\\_name](#)**

Definition at line 26 of file ebuser.c.

**5.20.3.17 char\* frontend\_name**

Definition at line 23 of file ebuser.c.

**5.20.3.18 char full\_frontend\_name[256]**

Definition at line 39 of file mevb.c.

**5.20.3.19 HANDLE hDB**

Definition at line 43 of file mevb.c.

**5.20.3.20 HANDLE hEqKey**

Definition at line 43 of file mevb.c.

Referenced by load\_fragment().

**5.20.3.21 HANDLE hESetKey**

Definition at line 43 of file mevb.c.

**5.20.3.22 HANDLE hKey**

Definition at line 43 of file mevb.c.

Referenced by analyzer\_init(), cm\_connect\_client(), cm\_delete\_client\_info(), cm\_disconnect\_experiment(), cm\_get\_client\_info(), cm\_msg\_log(), cm\_msg\_log1(), cm\_msg\_retrieve(), cm\_set\_client\_info(), cm\_set\_watchdog\_params(), logger\_root(), main(), register\_equipment(), and tr\_start().

**5.20.3.23 char host\_name[HOST\_NAME\_LENGTH]**

Definition at line 37 of file mevb.c.

**5.20.3.24 HANDLE hStatKey**

Definition at line 43 of file mevb.c.

**5.20.3.25 HANDLE hSubkey**

Definition at line 43 of file mevb.c.

Referenced by cm\_connect\_client(), cm\_exist(), cm\_set\_client\_info(), cm\_shutdown(), cm\_transition(), and load\_fragment().

**5.20.3.26 int i\_bar**

Definition at line 48 of file mevb.c.

Referenced by scan\_fragment(), and source\_scan().

**5.20.3.27 DWORD last\_time**

Definition at line 33 of file mevb.c.

Referenced by scan\_fragment().

**5.20.3.28 INT max\_event\_size**

Definition at line 35 of file ebuser.c.

**5.20.3.29 INT max\_event\_size\_frag**

Definition at line 38 of file ebuser.c.

**5.20.3.30 INT(\* meb\_fragment\_add)(char \*, char \*, INT \*)**

Definition at line 52 of file mevb.c.

Referenced by load\_fragment(), and source\_scan().

**5.20.3.31 INT nfragment**

Definition at line 41 of file mevb.c.

Referenced by handFlush(), load\_fragment(), scan\_fragment(), source\_booking(), source\_scan(), source\_unbooking(), and tr\_start().

**5.20.3.32 DWORD request\_stop\_time = 0**

Definition at line 50 of file mevb.c.

Referenced by close\_buffers(), and tr\_stop().

**5.20.3.33 INT run\_number**

Definition at line 32 of file mevb.c.

**5.20.3.34 INT run\_state**

Definition at line 31 of file mevb.c.

**5.20.3.35 BOOL stop\_requested = TRUE**

Definition at line 49 of file mevb.c.

Referenced by scan\_fragment(), tr\_start(), and tr\_stop().

**5.20.3.36 DWORD stop\_time = 0**

Definition at line 50 of file mevb.c.

Referenced by close\_buffers().

**5.20.3.37 BOOL wheel = FALSE**

Definition at line 46 of file mevb.c.

Referenced by main(), and scan\_fragment().

**5.21 mfe.c File Reference****5.21.1 Define Documentation****5.21.1.1 #define DEFAULT\_FE\_TIMEOUT 60000**

Definition at line 54 of file mfe.c.

Referenced by main().

```
5.21.1.2 #define EQUIPMENT_COMMON_STR "\Event ID = WORD :  
0\nTrigger mask = WORD : 0\nBuffer = STRING : [32] SYSTEM\nType  
= INT : 0\nSource = INT : 0\nFormat = STRING : [8] FIXED\nEnabled =  
BOOL : 0\nRead on = INT : 0\nPeriod = INT : 0\nEvent limit = DOUBLE  
: 0\nNum subevents = DWORD : 0\nLog history = INT : 0\nFrontend host  
= STRING : [32] \nFrontend name = STRING : [32] \nFrontend file name =  
STRING : [256] \n"
```

Definition at line 106 of file mfe.c.

Referenced by register\_equipment().

```
5.21.1.3 #define EQUIPMENT_STATISTICS_STR "\Events sent = DOUBLE :  
0\nEvents per sec. = DOUBLE : 0\nkBytes per sec. = DOUBLE : 0\n"
```

Definition at line 124 of file mfe.c.

Referenced by register\_equipment().

**5.21.1.4 #define ODB\_UPDATE\_TIME 1000**

Definition at line 52 of file mfe.c.

Referenced by interrupt\_routine(), and scheduler().

**5.21.1.5 #define SERVER\_CACHE\_SIZE 100000**

Definition at line 50 of file mfe.c.

Referenced by register\_equipment(), and scheduler().

**5.21.2 Function Documentation****5.21.2.1 INT begin\_of\_run (INT *run\_number*, char \* *error*)**

Definition at line 190 of file frontend.c.

Referenced by tr\_start().

**5.21.2.2 void display (BOOL *bInit*)**

Definition at line 1008 of file mfe.c.

Referenced by main(), and scheduler().

**5.21.2.3 INT end\_of\_run (INT *run\_number*, char \* *error*)**

Definition at line 199 of file frontend.c.

Referenced by tr\_stop().

**5.21.2.4 INT frontend\_exit (void)**

Definition at line 183 of file frontend.c.

Referenced by main().

**5.21.2.5 INT frontend\_init (void)**

Definition at line 155 of file frontend.c.

Referenced by main().

**5.21.2.6 INT frontend\_loop (void)**

Definition at line 220 of file frontend.c.

Referenced by scheduler().

**5.21.2.7 INT get\_frontend\_index ()**

Definition at line 1568 of file mfe.c.

**5.21.2.8 INT interrupt\_configure (INT *cmd*, INT *source*, PTYPE *adr*)**

Definition at line 258 of file frontend.c.

Referenced by interrupt\_enable(), main(), and register\_equipment().

**5.21.2.9 void interrupt\_enable (BOOL *arg*)**

Definition at line 925 of file mfe.c.

Referenced by main(), scheduler(), tr\_pause(), tr\_resume(), tr\_start(), and tr\_stop().

**5.21.2.10 void interrupt\_routine (void)**

Definition at line 939 of file mfe.c.

Referenced by register\_equipment().

**5.21.2.11 BOOL logger\_root ()**

Definition at line 1079 of file mfe.c.

Referenced by scheduler().

**5.21.2.12 int main (int *argc*, char \* *argv*[ ])**

Definition at line 1578 of file mfe.c.

**5.21.2.13 INT manual\_trigger (INT *index*, void \* *prpc\_param*[ ])**

Definition at line 266 of file mfe.c.

Referenced by register\_equipment().

**5.21.2.14 int message\_print (const char \* *msg*)**

Definition at line 990 of file mfe.c.

Referenced by main().



**5.21.2.15 INT pause\_run (INT *run\_number*, char \* *error*)**

Definition at line 206 of file frontend.c.

Referenced by tr\_pause().

**5.21.2.16 INT poll\_event (INT *source*, INT *count*, BOOL *test*)**

Definition at line 237 of file frontend.c.

Referenced by register\_equipment(), and scheduler().

**5.21.2.17 INT register\_equipment (void)**

Definition at line 274 of file mfe.c.

Referenced by main().

**5.21.2.18 INT resume\_run (INT *run\_number*, char \* *error*)**

Definition at line 213 of file frontend.c.

Referenced by tr\_resume().

**5.21.2.19 INT scheduler (void)**

Definition at line 1106 of file mfe.c.

Referenced by main().

**5.21.2.20 void send\_all\_periodic\_events (INT *transition*)**

Definition at line 897 of file mfe.c.

Referenced by tr\_pause(), tr\_resume(), tr\_start(), and tr\_stop().

**5.21.2.21 int send\_event (INT *index*)**

Definition at line 704 of file mfe.c.

Referenced by scheduler(), and send\_all\_periodic\_events().

**5.21.2.22 INT tr\_pause (INT *rn*, char \* *error*)**

Definition at line 217 of file mfe.c.

Referenced by main().

**5.21.2.23 INT tr\_resume (INT *rn*, char \* *error*)**

Definition at line 242 of file mfe.c.

Referenced by main().

**5.21.2.24 INT tr\_start (INT *rn*, char \* *error*)**

Definition at line 134 of file mfe.c.

Referenced by main().

**5.21.2.25 INT tr\_stop (INT *rn*, char \* *error*)**

Definition at line 168 of file mfe.c.

Referenced by main().

**5.21.2.26 void update\_odb (EVENT\_HEADER \* *pevent*, HANDLE *hKey*, INT *format*)**

Definition at line 558 of file mfe.c.

Referenced by scheduler(), and send\_event().

**5.21.3 Variable Documentation****5.21.3.1 DWORD [actual\\_millitime](#)**

Definition at line 59 of file mfe.c.

Referenced by interrupt\_routine(), scan\_fragment(), and scheduler().

**5.21.3.2 DWORD [actual\\_time](#)**

Definition at line 58 of file mfe.c.

Referenced by interrupt\_routine(), and scheduler().

**5.21.3.3 DWORD [auto\\_restart](#) = 0**

Definition at line 69 of file mfe.c.

Referenced by scheduler().

#### 5.21.3.4 **BOOL** `debug`

Definition at line 68 of file mfe.c.

Referenced by `eb_user()`, `handFlush()`, `load_fragment()`, `main()`, `scan_fragment()`, `source_booking()`, `source_scan()`, and `source_unbooking()`.

#### 5.21.3.5 **INT** `display_period`

Definition at line 32 of file ebuser.c.

Referenced by `main()`, `register_equipment()`, `scheduler()`, `tr_pause()`, `tr_resume()`, `tr_start()`, and `tr_stop()`.

#### 5.21.3.6 **EQUIPMENT** `equipment[]`

Definition at line 59 of file ebuser.c.

#### 5.21.3.7 **INT** `event_buffer_size`

Definition at line 41 of file ebuser.c.

Referenced by `main()`.

#### 5.21.3.8 **char** `exp_name`[NAME\_LENGTH]

Definition at line 62 of file mfe.c.

Referenced by `main()`.

#### 5.21.3.9 **INT** `fe_stop` = 0

Definition at line 67 of file mfe.c.

Referenced by `scheduler()`.

#### 5.21.3.10 **BOOL** `frontend_call_loop`

Definition at line 36 of file frontend.c.

Referenced by `scheduler()`.

#### 5.21.3.11 **char\*** `frontend_file_name`

Definition at line 26 of file ebuser.c.

Referenced by `register_equipment()`.

**5.21.3.12 INT `frontend_index` = -1**

Definition at line 71 of file mfe.c.

Referenced by `get_frontend_index()`, `main()`, and `register_equipment()`.

**5.21.3.13 char\* `frontend_name`**

Definition at line 23 of file ebuser.c.

Referenced by `main()`.

**5.21.3.14 char `full_frontend_name`[256]**

Definition at line 63 of file mfe.c.

Referenced by `display()`, `load_fragment()`, `main()`, `register_equipment()`, `scan_fragment()`, `source_scan()`, `tr_start()`, and `tr_stop()`.

**5.21.3.15 HANDLE `hDB`**

Definition at line 73 of file mfe.c.

Referenced by `ana_end_of_run()`, `analyzer_init()`, `cm_connect_client()`, `cm_connect_experiment1()`, `cm_disconnect_experiment()`, `cm_get_client_info()`, `cm_msg_log()`, `cm_msg_log1()`, `cm_msg_retrieve()`, `cm_set_watchdog_params()`, `load_fragment()`, `logger_root()`, `main()`, `register_equipment()`, `scheduler()`, `tr_start()`, and `update_odb()`.

**5.21.3.16 char `host_name`[HOST\_NAME\_LENGTH]**

Definition at line 61 of file mfe.c.

Referenced by `display()`, and `main()`.

**5.21.3.17 BOOL `interrupt_enabled`**

Definition at line 923 of file mfe.c.

Referenced by `interrupt_enable()`.

**5.21.3.18 EQUIPMENT\* `interrupt_eq` = NULL**

Definition at line 94 of file mfe.c.

**5.21.3.19 EVENT\_HEADER\* `interrupt_odb_buffer`**

Definition at line 95 of file mfe.c.

**5.21.3.20** **BOOL** [interrupt\\_odb\\_buffer\\_valid](#)

Definition at line 96 of file mfe.c.

Referenced by `interrupt_routine()`, and `scheduler()`.

**5.21.3.21** **INT** [manual\\_trigger\\_event\\_id](#) = 0

Definition at line 70 of file mfe.c.

Referenced by `manual_trigger()`, and `scheduler()`.

**5.21.3.22** **INT** [max\\_bytes\\_per\\_sec](#)

Definition at line 65 of file mfe.c.

Referenced by `scheduler()`.

**5.21.3.23** **INT** [max\\_event\\_size](#)

Definition at line 35 of file ebuser.c.

Referenced by `main()`, `scheduler()`, and `send_event()`.

**5.21.3.24** **INT** [max\\_event\\_size\\_frag](#)

Definition at line 38 of file ebuser.c.

Referenced by `main()`, and `send_event()`.

**5.21.3.25** **INT** [optimize](#) = 0

Definition at line 66 of file mfe.c.

Referenced by `scheduler()`.

**5.21.3.26** **INT** [run\\_number](#)

Definition at line 57 of file mfe.c.

Referenced by `close_buffers()`, `display()`, `register_equipment()`, `scheduler()`, `tr_pause()`, `tr_resume()`, `tr_start()`, and `tr_stop()`.

**5.21.3.27** **INT** [run\\_state](#)

Definition at line 56 of file mfe.c.

Referenced by `close_buffers()`, `display()`, `handFlush()`, `main()`, `register_equipment()`, `scan_fragment()`, `scheduler()`, `tr_pause()`, `tr_resume()`, `tr_start()`, and `tr_stop()`.

## 5.22 mhttpd.dox File Reference

### 5.23 midas.c File Reference

#### 5.23.1 Detailed Description

The main core C-code for Midas.

Definition in file [midas.c](#).

#### Data Structures

- struct [TR\\_CLIENT](#)

#### Functions

- INT [cm\\_get\\_error](#) (INT code, char \*string)
- INT [cm\\_set\\_msg\\_print](#) (INT system\_mask, INT user\_mask, int(\*func)(const char \*))
- INT [cm\\_msg\\_log](#) (INT message\_type, const char \*message)
- INT [cm\\_msg\\_log1](#) (INT message\_type, const char \*message, const char \*facility)
- INT [cm\\_msg](#) (INT message\_type, char \*filename, INT line, const char \*routine, const char \*format,...)
- INT [cm\\_msg1](#) (INT message\_type, char \*filename, INT line, const char \*facility, const char \*routine, const char \*format,...)
- INT [cm\\_msg\\_register](#) (void(\*func)(HANDLE, HANDLE, [EVENT\\_HEADER](#) \*, void \*))
- INT [cm\\_msg\\_retrieve](#) (INT n\_message, char \*message, INT \*buf\_size)
- INT [cm\\_synchronize](#) (DWORD \*seconds)
- INT [cm\\_asctime](#) (char \*str, INT buf\_size)
- INT [cm\\_time](#) (DWORD \*time)
- char \* [cm\\_get\\_version](#) ()
- INT [cm\\_set\\_path](#) (char \*path)
- INT [cm\\_get\\_path](#) (char \*path)
- INT [cm\\_scan\\_experiments](#) (void)
- INT [cm\\_delete\\_client\\_info](#) (HANDLE [hDB](#), INT pid)
- INT [cm\\_check\\_client](#) (HANDLE [hDB](#), HANDLE hKeyClient)
- INT [cm\\_set\\_client\\_info](#) (HANDLE [hDB](#), HANDLE \*hKeyClient, char \*[host\\_name](#), char \*client\_name, INT hw\_type, char \*password, DWORD watchdog\_timeout)

- INT [cm\\_get\\_client\\_info](#) (char \*client\_name)
- INT [cm\\_get\\_environment](#) (char \*host\_name, int host\_name\_size, char \*exp\_name, int exp\_name\_size)
- INT [cm\\_connect\\_experiment](#) (char \*host\_name, char \*exp\_name, char \*client\_name, void(\*func)(char \*))
- INT [cm\\_connect\\_experiment1](#) (char \*host\_name, char \*exp\_name, char \*client\_name, void(\*func)(char \*), INT odb\_size, DWORD watchdog\_timeout)
- INT [cm\\_list\\_experiments](#) (char \*host\_name, char exp\_name[MAX\_EXPERIMENT][NAME\_LENGTH])
- INT [cm\\_select\\_experiment](#) (char \*host\_name, char \*exp\_name)
- INT [cm\\_connect\\_client](#) (char \*client\_name, HANDLE hConn)
- INT [cm\\_disconnect\\_client](#) (HANDLE hConn, BOOL bShutdown)
- INT [cm\\_disconnect\\_experiment](#) (void)
- INT [cm\\_set\\_experiment\\_database](#) (HANDLE hDB, HANDLE hKeyClient)
- INT [cm\\_get\\_experiment\\_database](#) (HANDLE \*hDB, HANDLE \*hKeyClient)
- INT [cm\\_set\\_watchdog\\_params](#) (BOOL call\_watchdog, DWORD timeout)
- INT [cm\\_get\\_watchdog\\_params](#) (BOOL \*call\_watchdog, DWORD \*timeout)
- INT [cm\\_get\\_watchdog\\_info](#) (HANDLE hDB, char \*client\_name, DWORD \*timeout, DWORD \*last)
- INT [cm\\_register\\_transition](#) (INT transition, INT(\*func)(INT, char \*), INT sequence\_number)
- INT [cm\\_set\\_transition\\_sequence](#) (INT transition, INT sequence\_number)
- INT [cm\\_register\\_deferred\\_transition](#) (INT transition, BOOL(\*func)(INT, BOOL))
- INT [cm\\_check\\_deferred\\_transition](#) ()
- INT [cm\\_transition](#) (INT transition, INT run\_number, char \*perror, INT strsize, INT async\_flag, INT debug\_flag)
- INT [cm\\_yield](#) (INT millisec)
- INT [cm\\_execute](#) (char \*command, char \*result, INT bufsize)
- INT [bm\\_match\\_event](#) (short int event\_id, short int trigger\_mask, EVENT\_HEADER \*pevent)
- INT [bm\\_open\\_buffer](#) (char \*buffer\_name, INT buffer\_size, INT \*buffer\_handle)
- INT [bm\\_close\\_buffer](#) (INT buffer\_handle)
- INT [bm\\_close\\_all\\_buffers](#) (void)
- INT [cm\\_shutdown](#) (char \*name, BOOL bUnique)
- INT [cm\\_exist](#) (char \*name, BOOL bUnique)
- INT [cm\\_cleanup](#) (char \*client\_name, BOOL ignore\_timeout)
- INT [bm\\_set\\_cache\\_size](#) (INT buffer\_handle, INT read\_size, INT write\_size)
- INT [bm\\_compose\\_event](#) (EVENT\_HEADER \*event\_header, short int event\_id, short int trigger\_mask, DWORD size, DWORD serial)
- INT [bm\\_request\\_event](#) (HANDLE buffer\_handle, short int event\_id, short int trigger\_mask, INT sampling\_type, HANDLE \*request\_id, void(\*func)(HANDLE, HANDLE, EVENT\_HEADER \*, void \*))

- INT [bm\\_remove\\_event\\_request](#) (INT buffer\_handle, INT request\_id)
- INT [bm\\_delete\\_request](#) (INT request\_id)
- INT [bm\\_send\\_event](#) (INT buffer\_handle, void \*source, INT buf\_size, INT async\_tag)
- INT [bm\\_push\\_cache](#) (INT buffer\_handle, INT async\_tag)
- INT [bm\\_receive\\_event](#) (INT buffer\_handle, void \*destination, INT \*buf\_size, INT async\_tag)
- INT [bm\\_skip\\_event](#) (INT buffer\_handle)
- INT [bm\\_push\\_event](#) (char \*buffer\_name)
- INT [bm\\_check\\_buffers](#) ()
- INT [bm\\_empty\\_buffers](#) ()
- INT [rpc\\_register\\_client](#) (char \*name, RPC\_LIST \*list)
- INT [rpc\\_register\\_functions](#) (RPC\_LIST \*new\_list, INT(\*func)(INT, void \*\*))
- INT [rpc\\_set\\_option](#) (HANDLE hConn, INT item, INT value)
- INT [rpc\\_send\\_event](#) (INT buffer\_handle, void \*source, INT buf\_size, INT async\_tag)
- INT [rpc\\_push\\_event](#) ()
- void [bk\\_init](#) (void \*event)
- void [bk\\_init32](#) (void \*event)
- INT [bk\\_size](#) (void \*event)
- void [bk\\_create](#) (void \*event, const char \*name, WORD type, void \*pdata)
- INT [bk\\_close](#) (void \*event, void \*pdata)
- INT [bk\\_list](#) (void \*event, char \*bklist)
- INT [bk\\_locate](#) (void \*event, const char \*name, void \*pdata)
- INT [bk\\_end](#) ([BANK\\_HEADER](#) \*pbkh, const char \*name, DWORD \*bklen, DWORD \*bktype, void \*\*pdata)
- INT [bk\\_iterate](#) (void \*event, [BANK](#) \*\*pbk, void \*pdata)
- INT [bk\\_swap](#) (void \*event, BOOL force)
- INT [hs\\_set\\_path](#) (char \*path)
- INT [hs\\_open\\_file](#) (DWORD ltime, char \*suffix, INT mode, int \*fh)
- INT [el\\_submit](#) (int run, char \*author, char \*type, char \*system, char \*subject, char \*text, char \*reply\_to, char \*encoding, char \*afilename1, char \*buffer1, INT buffer\_size1, char \*afilename2, char \*buffer2, INT buffer\_size2, char \*afilename3, char \*buffer3, INT buffer\_size3, char \*tag, INT tag\_size)
- INT [al\\_trigger\\_alarm](#) (char \*alarm\_name, char \*alarm\_message, char \*default\_class, char \*cond\_str, INT type)
- INT [dm\\_buffer\\_create](#) (INT size, INT user\_max\_event\_size)

## Variables

- static HANDLE [\\_hKeyClient](#) = 0



## 5.24 midas.dox File Reference

## 5.25 midas.h File Reference

### 5.25.1 Detailed Description

The main include file

Definition in file [midas.h](#).

#### Data Structures

- struct [EVENT\\_HEADER](#)
- struct [EVENT\\_REQUEST](#)
- struct [BUFFER\\_CLIENT](#)
- struct [BUFFER\\_HEADER](#)
- struct [BUFFER](#)
- struct [KEY](#)
- struct [KEYLIST](#)
- struct [BUS\\_DRIVER](#)
- struct [DEVICE\\_DRIVER](#)
- struct [EQUIPMENT\\_INFO](#)
- struct [EQUIPMENT\\_STATS](#)
- struct [eqpmnt](#)
- struct [BANK\\_HEADER](#)
- struct [BANK](#)
- struct [BANK32](#)
- struct [TAG](#)
- struct [BANK\\_LIST](#)
- struct [ANA\\_MODULE](#)
- struct [AR\\_INFO](#)
- struct [AR\\_STATS](#)
- struct [ANALYZE\\_REQUEST](#)
- struct [ANA\\_TEST](#)
- struct [HIST\\_RECORD](#)
- struct [DEF\\_RECORD](#)
- struct [INDEX\\_RECORD](#)
- struct [HISTORY](#)
- struct [RUNINFO](#)
- struct [PROGRAM\\_INFO](#)
- struct [ALARM\\_CLASS](#)
- struct [ALARM](#)

## Defines

- `#define TAPE_BUFFER_SIZE 0x8000`
- `#define NET_TCP_SIZE 0xFFFF`
- `#define OPT_TCP_SIZE 8192`
- `#define NET_UDP_SIZE 8192`
- `#define EVENT_BUFFER_SIZE 0x100000`
- `#define EVENT_BUFFER_NAME "SYSTEM"`
- `#define MAX_EVENT_SIZE 0x80000`
- `#define DEFAULT_EVENT_BUFFER_SIZE 0x200000;`
- `#define DEFAULT_ODB_SIZE 0x100000`
- `#define NAME_LENGTH 32`
- `#define HOST_NAME_LENGTH 256`
- `#define MAX_CLIENTS 64`
- `#define MAX_EVENT_REQUESTS 10`
- `#define MAX_OPEN_RECORDS 256`
- `#define MAX_ODB_PATH 256`
- `#define MAX_EXPERIMENT 32`
- `#define BANKLIST_MAX 64`
- `#define STRING_BANKLIST_MAX BANKLIST_MAX * 4`
- `#define DEFAULT_RPC_TIMEOUT 10000`
- `#define DEFAULT_WATCHDOG_TIMEOUT 10000`
- `#define STATE_STOPPED 1`
- `#define STATE_PAUSED 2`
- `#define STATE_RUNNING 3`
- `#define FORMAT_MIDAS 1`
- `#define FORMAT_YBOS 2`
- `#define FORMAT_ASCII 3`
- `#define FORMAT_FIXED 4`
- `#define FORMAT_DUMP 5`
- `#define FORMAT_HBOOK 6`
- `#define FORMAT_ROOT 7`
- `#define GET_ALL (1<<0)`
- `#define GET_SOME (1<<1)`
- `#define GET_FARM (1<<2)`
- `#define TID_BYTE 1`
- `#define TID_SBYTE 2`
- `#define TID_CHAR 3`
- `#define TID_WORD 4`
- `#define TID_SHORT 5`
- `#define TID_DWORD 6`
- `#define TID_INT 7`
- `#define TID_BOOL 8`

- `#define TID_FLOAT` 9
- `#define TID_DOUBLE` 10
- `#define TID_BITFIELD` 11
- `#define TID_STRING` 12
- `#define TID_ARRAY` 13
- `#define TID_STRUCT` 14
- `#define TID_KEY` 15
- `#define TID_LINK` 16
- `#define TID_LAST` 17
- `#define SYNC` 0
- `#define MODE_READ` (1<<0)
- `#define RPC_OTIMEOUT` 1
- `#define WF_WATCH_ME` (1<<0)
- `#define TR_START` (1<<0)
- `#define TR_STOP` (1<<1)
- `#define TR_PAUSE` (1<<2)
- `#define TR_RESUME` (1<<3)
- `#define EQ_PERIODIC` (1<<0)
- `#define EQ_POLLED` (1<<1)
- `#define EQ_INTERRUPT` (1<<2)
- `#define EQ_SLOW` (1<<3)
- `#define EQ_MANUAL_TRIG` (1<<4)
- `#define EQ_FRAGMENTED` (1<<5)
- `#define EQ_EB` (1<<6)
- `#define RO_RUNNING` (1<<0)
- `#define RO_STOPPED` (1<<1)
- `#define RO_PAUSED` (1<<2)
- `#define RO_BOR` (1<<3)
- `#define RO_EOR` (1<<4)
- `#define RO_PAUSE` (1<<5)
- `#define RO_RESUME` (1<<6)
- `#define RO_TRANSITIONS` (RO\_BOR|RO\_EOR|RO\_PAUSE|RO\_RESUME)
- `#define RO_ALWAYS` (0xFF)
- `#define RO_ODB` (1<<8)
- `#define CH_BS` 8
- `#define LAM_SOURCE`(c, s) (c<<24 | ((s) & 0xFFFFF))
- `#define LAM_STATION`(s) (1<<(s-1))
- `#define LAM_SOURCE_CRATE`(c) (c>>24)
- `#define LAM_SOURCE_STATION`(s) ((s) & 0xFFFFF)
- `#define CNAF` 0x1
- `#define MAX`(a, b) (((a) > (b)) ? (a) : (b))
- `#define MIN`(a, b) (((a) < (b)) ? (a) : (b))
- `#define ALIGN8`(x) (((x)+7) & ~7)

- #define VALIGN(adr, align) (((PTYPE) (adr)+align-1) & ~(align-1))
- #define MT\_ERROR (1<<0)
- #define MT\_INFO (1<<1)
- #define MT\_DEBUG (1<<2)
- #define MT\_USER (1<<3)
- #define MT\_LOG (1<<4)
- #define MT\_TALK (1<<5)
- #define MT\_CALL (1<<6)
- #define MT\_ALL 0xFF
- #define MERROR MT\_ERROR, \_\_FILE\_\_, \_\_LINE\_\_
- #define MINFO MT\_INFO, \_\_FILE\_\_, \_\_LINE\_\_
- #define MDEBUG MT\_DEBUG, \_\_FILE\_\_, \_\_LINE\_\_
- #define MUSER MT\_USER, \_\_FILE\_\_, \_\_LINE\_\_
- #define MLOG MT\_LOG, \_\_FILE\_\_, \_\_LINE\_\_
- #define MTALK MT\_TALK, \_\_FILE\_\_, \_\_LINE\_\_
- #define MCALL MT\_CALL, \_\_FILE\_\_, \_\_LINE\_\_
- #define SUCCESS 1
- #define CM\_SUCCESS 1
- #define CM\_SET\_ERROR 102
- #define CM\_NO\_CLIENT 103
- #define CM\_DB\_ERROR 104
- #define CM\_UNDEF\_EXP 105
- #define CM\_VERSION\_MISMATCH 106
- #define CM\_SHUTDOWN 107
- #define CM\_WRONG\_PASSWORD 108
- #define CM\_UNDEF\_ENVIRON 109
- #define CM\_DEFERRED\_TRANSITION 110
- #define CM\_TRANSITION\_IN\_PROGRESS 111
- #define CM\_TIMEOUT 112
- #define CM\_INVALID\_TRANSITION 113
- #define CM\_TOO\_MANY\_REQUESTS 114
- #define BM\_SUCCESS 1
- #define BM\_CREATED 202
- #define BM\_NO\_MEMORY 203
- #define BM\_INVALID\_NAME 204
- #define BM\_INVALID\_HANDLE 205
- #define BM\_NO\_SLOT 206
- #define BM\_NO\_MUTEX 207
- #define BM\_NOT\_FOUND 208
- #define BM\_ASYNC\_RETURN 209
- #define BM\_TRUNCATED 210
- #define BM\_MULTIPLE\_HOSTS 211
- #define BM\_MEMSIZE\_MISMATCH 212

- `#define BM_CONFLICT` 213
- `#define BM_EXIT` 214
- `#define BM_INVALID_PARAM` 215
- `#define BM_MORE_EVENTS` 216
- `#define BM_INVALID_MIXING` 217
- `#define BM_NO_SHM` 218
- `#define DB_SUCCESS` 1
- `#define DB_CREATED` 302
- `#define DB_NO_MEMORY` 303
- `#define DB_INVALID_NAME` 304
- `#define DB_INVALID_HANDLE` 305
- `#define DB_NO_SLOT` 306
- `#define DB_NO_MUTEX` 307
- `#define DB_MEMSIZE_MISMATCH` 308
- `#define DB_INVALID_PARAM` 309
- `#define DB_FULL` 310
- `#define DB_KEY_EXIST` 311
- `#define DB_NO_KEY` 312
- `#define DB_KEY_CREATED` 313
- `#define DB_TRUNCATED` 314
- `#define DB_TYPE_MISMATCH` 315
- `#define DB_NO_MORE_SUBKEYS` 316
- `#define DB_FILE_ERROR` 317
- `#define DB_NO_ACCESS` 318
- `#define DB_STRUCT_SIZE_MISMATCH` 319
- `#define DB_OPEN_RECORD` 320
- `#define DB_OUT_OF_RANGE` 321
- `#define DB_INVALID_LINK` 322
- `#define DB_CORRUPTED` 323
- `#define DB_STRUCT_MISMATCH` 324
- `#define DB_TIMEOUT` 325
- `#define DB_VERSION_MISMATCH` 326
- `#define SS_SUCCESS` 1
- `#define SS_CREATED` 402
- `#define SS_NO_MEMORY` 403
- `#define SS_INVALID_NAME` 404
- `#define SS_INVALID_HANDLE` 405
- `#define SS_INVALID_ADDRESS` 406
- `#define SS_FILE_ERROR` 407
- `#define SS_NO_MUTEX` 408
- `#define SS_NO_PROCESS` 409
- `#define SS_NO_THREAD` 410
- `#define SS_SOCKET_ERROR` 411

- `#define SS_TIMEOUT` 412
- `#define SS_SERVER_RECV` 413
- `#define SS_CLIENT_RECV` 414
- `#define SS_ABORT` 415
- `#define SS_EXIT` 416
- `#define SS_NO_TAPE` 417
- `#define SS_DEV_BUSY` 418
- `#define SS_IO_ERROR` 419
- `#define SS_TAPE_ERROR` 420
- `#define SS_NO_DRIVER` 421
- `#define SS_END_OF_TAPE` 422
- `#define SS_END_OF_FILE` 423
- `#define SS_FILE_EXISTS` 424
- `#define SS_NO_SPACE` 425
- `#define SS_INVALID_FORMAT` 426
- `#define SS_NO_ROOT` 427
- `#define RPC_SUCCESS` 1
- `#define RPC_ABORT` `SS_ABORT`
- `#define RPC_NO_CONNECTION` 502
- `#define RPC_NET_ERROR` 503
- `#define RPC_TIMEOUT` 504
- `#define RPC_EXCEED_BUFFER` 505
- `#define RPC_NOT_REGISTERED` 506
- `#define RPC_CONNCLOSED` 507
- `#define RPC_INVALID_ID` 508
- `#define RPC_SHUTDOWN` 509
- `#define RPC_NO_MEMORY` 510
- `#define RPC_DOUBLE_DEFINED` 511
- `#define FE_SUCCESS` 1
- `#define FE_ERR_ODB` 602
- `#define FE_ERR_HW` 603
- `#define FE_ERR_DISABLED` 604
- `#define FE_ERR_DRIVER` 605
- `#define HS_SUCCESS` 1
- `#define HS_FILE_ERROR` 702
- `#define HS_NO_MEMORY` 703
- `#define HS_TRUNCATED` 704
- `#define HS_WRONG_INDEX` 705
- `#define HS_UNDEFINED_EVENT` 706
- `#define HS_UNDEFINED_VAR` 707
- `#define FTP_SUCCESS` 1
- `#define FTP_NET_ERROR` 802
- `#define FTP_FILE_ERROR` 803

- #define [FTP\\_RESPONSE\\_ERROR](#) 804
- #define [FTP\\_INVALID\\_ARG](#) 805
- #define [EL\\_SUCCESS](#) 1
- #define [EL\\_FILE\\_ERROR](#) 902
- #define [EL\\_NO\\_MESSAGE](#) 903
- #define [EL\\_TRUNCATED](#) 904
- #define [EL\\_FIRST\\_MSG](#) 905
- #define [EL\\_LAST\\_MSG](#) 906
- #define [AL\\_SUCCESS](#) 1
- #define [AL\\_INVALID\\_NAME](#) 1002
- #define [AL\\_ERROR\\_ODB](#) 1003
- #define [AL\\_RESET](#) 1004
- #define [CMD\\_INIT](#) (1<<0)
- #define [CMD\\_WRITE](#) 100
- #define [CMD\\_INTERRUPT\\_ENABLE](#) 100
- #define [BD\\_GETS](#)(s, z, p, t) info → bd(CMD\_GETS, info → bd\_info, s, z, p, t)
- #define [ANA\\_CONTINUE](#) 1
- #define [TRIGGER\\_MASK](#)(e) ((([EVENT\\_HEADER](#) \*) e)-1) → trigger\_mask)
- #define [EVENT\\_ID](#)(e) ((([EVENT\\_HEADER](#) \*) e)-1) → event\_id)
- #define [SERIAL\\_NUMBER](#)(e) ((([EVENT\\_HEADER](#) \*) e)-1) → serial\_number)
- #define [TIME\\_STAMP](#)(e) ((([EVENT\\_HEADER](#) \*) e)-1) → time\_stamp)
- #define [EVENTID\\_BOR](#) ((short int) 0x8000)
- #define [EVENTID\\_EOR](#) ((short int) 0x8001)
- #define [EVENTID\\_MESSAGE](#) ((short int) 0x8002)
- #define [EVENTID\\_FRAG1](#) ((unsigned short) 0xC000)
- #define [MIDAS\\_MAGIC](#) 0x494d
- #define [DF\\_INPUT](#) (1<<0)
- #define [DF\\_OUTPUT](#) (1<<1)
- #define [DF\\_PRIO\\_DEVICE](#) (1<<2)
- #define [DF\\_READ\\_ONLY](#) (1<<3)
- #define [BANK\\_FORMAT\\_VERSION](#) 1
- #define [BANK\\_FORMAT\\_32BIT](#) (1<<4)
- #define [AT\\_INTERNAL](#) 1
- #define [AT\\_PROGRAM](#) 2
- #define [AT\\_EVALUATED](#) 3
- #define [AT\\_PERIODIC](#) 4
- #define [AT\\_LAST](#) 4

## 5.26 mrpc.c File Reference

### 5.26.1 Detailed Description

The Midas RPC file

Definition in file [mrpc.c](#).

#### Variables

- static RPC\_LIST [rpc\\_list\\_library](#) []
- static RPC\_LIST [rpc\\_list\\_system](#) []

## 5.27 mrpc.h File Reference

### 5.27.1 Detailed Description

The mrpc include file

Definition in file [mrpc.h](#).

#### Defines

- `#define` [RPC\\_CM\\_SET\\_CLIENT\\_INFO](#) 11000
- `#define` [RPC\\_CM\\_SET\\_WATCHDOG\\_PARAMS](#) 11001
- `#define` [RPC\\_CM\\_CLEANUP](#) 11002
- `#define` [RPC\\_CM\\_GET\\_WATCHDOG\\_INFO](#) 11003
- `#define` [RPC\\_CM\\_MSG\\_LOG](#) 11004
- `#define` [RPC\\_CM\\_EXECUTE](#) 11005
- `#define` [RPC\\_CM\\_SYNCHRONIZE](#) 11006
- `#define` [RPC\\_CM\\_ASCTIME](#) 11007
- `#define` [RPC\\_CM\\_TIME](#) 11008
- `#define` [RPC\\_CM\\_MSG](#) 11009
- `#define` [RPC\\_CM\\_EXIST](#) 11011
- `#define` [RPC\\_CM\\_MSG\\_RETRIEVE](#) 11012
- `#define` [RPC\\_CM\\_MSG\\_LOG1](#) 11013
- `#define` [RPC\\_BM\\_OPEN\\_BUFFER](#) 11100
- `#define` [RPC\\_BM\\_CLOSE\\_BUFFER](#) 11101
- `#define` [RPC\\_BM\\_CLOSE\\_ALL\\_BUFFERS](#) 11102
- `#define` [RPC\\_BM\\_GET\\_BUFFER\\_INFO](#) 11103
- `#define` [RPC\\_BM\\_GET\\_BUFFER\\_LEVEL](#) 11104



- `#define` [RPC\\_BM\\_INIT\\_BUFFER\\_COUNTERS](#) 11105
- `#define` [RPC\\_BM\\_SET\\_CACHE\\_SIZE](#) 11106
- `#define` [RPC\\_BM\\_ADD\\_EVENT\\_REQUEST](#) 11107
- `#define` [RPC\\_BM\\_REMOVE\\_EVENT\\_REQUEST](#) 11108
- `#define` [RPC\\_BM\\_SEND\\_EVENT](#) 11109
- `#define` [RPC\\_BM\\_FLUSH\\_CACHE](#) 11110
- `#define` [RPC\\_BM\\_RECEIVE\\_EVENT](#) 11111
- `#define` [RPC\\_BM\\_MARK\\_READ\\_WAITING](#) 11112
- `#define` [RPC\\_BM\\_EMPTY\\_BUFFERS](#) 11113
- `#define` [RPC\\_BM\\_SKIP\\_EVENT](#) 11114
- `#define` [RPC\\_DB\\_OPEN\\_DATABASE](#) 11200
- `#define` [RPC\\_DB\\_CLOSE\\_DATABASE](#) 11201
- `#define` [RPC\\_DB\\_CLOSE\\_ALL\\_DATABASES](#) 11202
- `#define` [RPC\\_DB\\_CREATE\\_KEY](#) 11203
- `#define` [RPC\\_DB\\_CREATE\\_LINK](#) 11204
- `#define` [RPC\\_DB\\_SET\\_VALUE](#) 11205
- `#define` [RPC\\_DB\\_GET\\_VALUE](#) 11206
- `#define` [RPC\\_DB\\_FIND\\_KEY](#) 11207
- `#define` [RPC\\_DB\\_FIND\\_LINK](#) 11208
- `#define` [RPC\\_DB\\_GET\\_PATH](#) 11209
- `#define` [RPC\\_DB\\_DELETE\\_KEY](#) 11210
- `#define` [RPC\\_DB\\_ENUM\\_KEY](#) 11211
- `#define` [RPC\\_DB\\_GET\\_KEY](#) 11212
- `#define` [RPC\\_DB\\_GET\\_DATA](#) 11213
- `#define` [RPC\\_DB\\_SET\\_DATA](#) 11214
- `#define` [RPC\\_DB\\_SET\\_DATA\\_INDEX](#) 11215
- `#define` [RPC\\_DB\\_SET\\_MODE](#) 11216
- `#define` [RPC\\_DB\\_GET\\_RECORD\\_SIZE](#) 11219
- `#define` [RPC\\_DB\\_GET\\_RECORD](#) 11220
- `#define` [RPC\\_DB\\_SET\\_RECORD](#) 11221
- `#define` [RPC\\_DB\\_ADD\\_OPEN\\_RECORD](#) 11222
- `#define` [RPC\\_DB\\_REMOVE\\_OPEN\\_RECORD](#) 11223
- `#define` [RPC\\_DB\\_SAVE](#) 11224
- `#define` [RPC\\_DB\\_LOAD](#) 11225
- `#define` [RPC\\_DB\\_SET\\_CLIENT\\_NAME](#) 11226
- `#define` [RPC\\_DB\\_RENAME\\_KEY](#) 11227
- `#define` [RPC\\_DB\\_ENUM\\_LINK](#) 11228
- `#define` [RPC\\_DB\\_REORDER\\_KEY](#) 11229
- `#define` [RPC\\_DB\\_CREATE\\_RECORD](#) 11230
- `#define` [RPC\\_DB\\_GET\\_DATA\\_INDEX](#) 11231
- `#define` [RPC\\_DB\\_GET\\_KEY\\_TIME](#) 11232
- `#define` [RPC\\_DB\\_GET\\_OPEN\\_RECORDS](#) 11233
- `#define` [RPC\\_DB\\_FLUSH\\_DATABASE](#) 11235

- `#define` [RPC\\_DB\\_SET\\_DATA\\_INDEX2](#) 11236
- `#define` [RPC\\_DB\\_GET\\_KEY\\_INFO](#) 11237
- `#define` [RPC\\_DB\\_GET\\_DATA1](#) 11238
- `#define` [RPC\\_DB\\_SET\\_NUM\\_VALUES](#) 11239
- `#define` [RPC\\_DB\\_CHECK\\_RECORD](#) 11240
- `#define` [RPC\\_DB\\_GET\\_NEXT\\_LINK](#) 11241
- `#define` [RPC\\_HS\\_SET\\_PATH](#) 11300
- `#define` [RPC\\_HS\\_DEFINE\\_EVENT](#) 11301
- `#define` [RPC\\_HS\\_WRITE\\_EVENT](#) 11302
- `#define` [RPC\\_HS\\_COUNT\\_EVENTS](#) 11303
- `#define` [RPC\\_HS\\_ENUM\\_EVENTS](#) 11304
- `#define` [RPC\\_HS\\_COUNT\\_VARS](#) 11305
- `#define` [RPC\\_HS\\_ENUM\\_VARS](#) 11306
- `#define` [RPC\\_HS\\_READ](#) 11307
- `#define` [RPC\\_HS\\_GET\\_VAR](#) 11308
- `#define` [RPC\\_HS\\_GET\\_EVENT\\_ID](#) 11309
- `#define` [RPC\\_EL\\_SUBMIT](#) 11400
- `#define` [RPC\\_AL\\_CHECK](#) 11500
- `#define` [RPC\\_AL\\_TRIGGER\\_ALARM](#) 11501
- `#define` [RPC\\_RC\\_TRANSITION](#) 12000
- `#define` [RPC\\_ANA\\_CLEAR\\_HISTOS](#) 13000
- `#define` [RPC\\_LOG\\_REWIND](#) 14000
- `#define` [RPC\\_TEST](#) 15000
- `#define` [RPC\\_CNAF16](#) 16000
- `#define` [RPC\\_CNAF24](#) 16001
- `#define` [RPC\\_MANUAL\\_TRIG](#) 17000
- `#define` [RPC\\_ID\\_WATCHDOG](#) 99997
- `#define` [RPC\\_ID\\_SHUTDOWN](#) 99998
- `#define` [RPC\\_ID\\_EXIT](#) 99999

## 5.28 msystem.h File Reference

### 5.28.1 Detailed Description

The Midas System include file  
Definition in file [msystem.h](#).

### Data Structures

- struct [FREE\\_DESCRIP](#)
- struct [OPEN\\_RECORD](#)
- struct [DATABASE\\_CLIENT](#)
- struct [DATABASE\\_HEADER](#)
- struct [DATABASE](#)
- struct [RECORD\\_LIST](#)
- struct [REQUEST\\_LIST](#)

### Defines

- #define [DRI\\_16](#) (1<<0)
- #define [DRI\\_32](#) (1<<1)
- #define [DRI\\_64](#) (1<<2)
- #define [DRI\\_LITTLE\\_ENDIAN](#) (1<<3)
- #define [DRI\\_BIG\\_ENDIAN](#) (1<<4)
- #define [DRF\\_IEEE](#) (1<<5)
- #define [DRF\\_G\\_FLOAT](#) (1<<6)
- #define [DR\\_ASCII](#) (1<<7)
- #define [WORD\\_SWAP\(x\)](#)
- #define [DWORD\\_SWAP\(x\)](#)
- #define [QWORD\\_SWAP\(x\)](#)

## 5.29 mvmestd.h File Reference

### 5.29.1 Detailed Description

The Midas VME include file

Definition in file [mvmestd.h](#).

### Data Structures

- struct [MVME\\_INTERFACE](#)

## Defines

- `#define MVME_SUCCESS` 1
- `#define MVME_DMODE_D8` 1
- `#define MVME_DMODE_D16` 2
- `#define MVME_DMODE_D32` 3
- `#define MVME_DMODE_D64` 4
- `#define MVME_DMODE_RAMD16` 5
- `#define MVME_DMODE_RAMD32` 6
- `#define MVME_DMODE_LM` 7
- `#define MVME_BLT_NONE` 1
- `#define MVME_BLT_BLT32` 2
- `#define MVME_BLT_MBLT64` 3
- `#define MVME_BLT_2EVME` 4
- `#define MVME_BLT_2ESST` 5
- `#define MVME_BLT_BLT32FIFO` 6
- `#define MVME_BLT_MBLT64FIFO` 7
- `#define MVME_BLT_2EVMEFIFO` 8
- `#define MVME_AM_A32_SB` (0x0F)
- `#define MVME_AM_A32_SP` (0x0E)
- `#define MVME_AM_A32_SD` (0x0D)
- `#define MVME_AM_A32_NB` (0x0B)
- `#define MVME_AM_A32_NP` (0x0A)
- `#define MVME_AM_A32_ND` (0x09)
- `#define MVME_AM_A32_SMBLT` (0x0C)
- `#define MVME_AM_A32_NMBLT` (0x08)
- `#define MVME_AM_A24_SB` (0x3F)
- `#define MVME_AM_A24_SP` (0x3E)
- `#define MVME_AM_A24_SD` (0x3D)
- `#define MVME_AM_A24_NB` (0x3B)
- `#define MVME_AM_A24_NP` (0x3A)
- `#define MVME_AM_A24_ND` (0x39)
- `#define MVME_AM_A24_SMBLT` (0x3C)
- `#define MVME_AM_A24_NMBLT` (0x38)
- `#define MVME_AM_A16_SD` (0x2D)
- `#define MVME_AM_A16_ND` (0x29)
- `#define MAX_CRATE` 10

**Functions**

- int EXPRT [mvme\\_open](#) (MVME\_INTERFACE \*\*vme, int index)
- int EXPRT [mvme\\_close](#) (MVME\_INTERFACE \*vme)
- int EXPRT [mvme\\_sysreset](#) (MVME\_INTERFACE \*vme)
- int EXPRT [mvme\\_read](#) (MVME\_INTERFACE \*vme, void \*dst, [mvme\\_addr\\_t](#) vme\_addr, [mvme\\_size\\_t](#) n\_bytes)
- DWORD EXPRT [mvme\\_read\\_value](#) (MVME\_INTERFACE \*vme, [mvme\\_addr\\_t](#) vme\_addr)
- int EXPRT [mvme\\_write](#) (MVME\_INTERFACE \*vme, [mvme\\_addr\\_t](#) vme\_addr, void \*src, [mvme\\_size\\_t](#) n\_bytes)
- int EXPRT [mvme\\_write\\_value](#) (MVME\_INTERFACE \*vme, [mvme\\_addr\\_t](#) vme\_addr, DWORD value)
- int EXPRT [mvme\\_set\\_am](#) (MVME\_INTERFACE \*vme, int am)
- int EXPRT [mvme\\_get\\_am](#) (MVME\_INTERFACE \*vme, int \*am)
- int EXPRT [mvme\\_set\\_dmode](#) (MVME\_INTERFACE \*vme, int dmode)
- int EXPRT [mvme\\_get\\_dmode](#) (MVME\_INTERFACE \*vme, int \*dmode)
- int EXPRT [mvme\\_set\\_blt](#) (MVME\_INTERFACE \*vme, int mode)
- int EXPRT [mvme\\_get\\_blt](#) (MVME\_INTERFACE \*vme, int \*mode)

**5.30 newdocfeatures.dox File Reference****5.31 odb.c File Reference****5.31.1 Detailed Description**

The Online Database file

Definition in file [odb.c](#).

**Functions**

- INT [db\\_open\\_database](#) (char \*database\_name, INT database\_size, HANDLE \*hDB, char \*client\_name)
- INT [db\\_close\\_database](#) (HANDLE hDB)
- INT [db\\_lock\\_database](#) (HANDLE hDB)
- INT [db\\_unlock\\_database](#) (HANDLE hDB)
- INT [db\\_protect\\_database](#) (HANDLE hDB)

- INT [db\\_create\\_key](#) (HANDLE [hDB](#), HANDLE [hKey](#), char \*key\_name, DWORD type)
- INT [db\\_create\\_link](#) (HANDLE [hDB](#), HANDLE [hKey](#), char \*link\_name, char \*destination)
- INT [db\\_delete\\_key1](#) (HANDLE [hDB](#), HANDLE [hKey](#), INT level, BOOL follow\_links)
- INT [db\\_delete\\_key](#) (HANDLE [hDB](#), HANDLE [hKey](#), BOOL follow\_links)
- INT [db\\_find\\_key](#) (HANDLE [hDB](#), HANDLE [hKey](#), char \*key\_name, HANDLE \*subhKey)
- INT [db\\_set\\_value](#) (HANDLE [hDB](#), HANDLE [hKeyRoot](#), char \*key\_name, void \*data, INT data\_size, INT num\_values, DWORD type)
- INT [db\\_get\\_value](#) (HANDLE [hDB](#), HANDLE [hKeyRoot](#), char \*key\_name, void \*data, INT \*buf\_size, DWORD type, BOOL create)
- INT [db\\_enum\\_key](#) (HANDLE [hDB](#), HANDLE [hKey](#), INT index, HANDLE \*subkey\_handle)
- INT [db\\_get\\_key](#) (HANDLE [hDB](#), HANDLE [hKey](#), KEY \*key)
- INT [db\\_get\\_key\\_time](#) (HANDLE [hDB](#), HANDLE [hKey](#), DWORD \*delta)
- INT [db\\_get\\_key\\_info](#) (HANDLE [hDB](#), HANDLE [hKey](#), char \*name, INT name\_size, INT \*type, INT \*num\_values, INT \*item\_size)
- INT [db\\_get\\_data](#) (HANDLE [hDB](#), HANDLE [hKey](#), void \*data, INT \*buf\_size, DWORD type)
- INT [db\\_get\\_data\\_index](#) (HANDLE [hDB](#), HANDLE [hKey](#), void \*data, INT \*buf\_size, INT index, DWORD type)
- INT [db\\_set\\_data](#) (HANDLE [hDB](#), HANDLE [hKey](#), void \*data, INT buf\_size, INT num\_values, DWORD type)
- INT [db\\_set\\_data\\_index](#) (HANDLE [hDB](#), HANDLE [hKey](#), void \*data, INT data\_size, INT index, DWORD type)
- INT [db\\_load](#) (HANDLE [hDB](#), HANDLE [hKeyRoot](#), char \*filename, BOOL bRemote)
- INT [db\\_copy](#) (HANDLE [hDB](#), HANDLE [hKey](#), char \*buffer, INT \*buffer\_size, char \*path)
- INT [db\\_paste](#) (HANDLE [hDB](#), HANDLE [hKeyRoot](#), char \*buffer)
- INT [db\\_paste\\_xml](#) (HANDLE [hDB](#), HANDLE [hKeyRoot](#), char \*buffer)
- INT [db\\_copy\\_xml](#) (HANDLE [hDB](#), HANDLE [hKey](#), char \*buffer, INT \*buffer\_size)
- INT [db\\_save](#) (HANDLE [hDB](#), HANDLE [hKey](#), char \*filename, BOOL bRemote)
- INT [db\\_save\\_xml](#) (HANDLE [hDB](#), HANDLE [hKey](#), char \*filename)
- INT [db\\_save\\_struct](#) (HANDLE [hDB](#), HANDLE [hKey](#), char \*file\_name, char \*struct\_name, BOOL append)
- INT [db\\_sprintf](#) (char \*string, void \*data, INT data\_size, INT index, DWORD type)
- INT [db\\_get\\_record\\_size](#) (HANDLE [hDB](#), HANDLE [hKey](#), INT align, INT \*buf\_size)

- INT [db\\_get\\_record](#) (HANDLE [hDB](#), HANDLE [hKey](#), void \*data, INT \*buf\_size, INT align)
- INT [db\\_set\\_record](#) (HANDLE [hDB](#), HANDLE [hKey](#), void \*data, INT buf\_size, INT align)
- INT [db\\_create\\_record](#) (HANDLE [hDB](#), HANDLE [hKey](#), char \*orig\_key\_name, char \*init\_str)
- INT [db\\_check\\_record](#) (HANDLE [hDB](#), HANDLE [hKey](#), char \*keyname, char \*rec\_str, BOOL correct)
- INT [db\\_open\\_record](#) (HANDLE [hDB](#), HANDLE [hKey](#), void \*ptr, INT rec\_size, WORD access\_mode, void(\*dispatcher)(INT, INT, void \*), void \*info)
- INT [db\\_close\\_record](#) (HANDLE [hDB](#), HANDLE [hKey](#))
- INT [db\\_close\\_all\\_records](#) ()
- INT [db\\_update\\_record](#) (INT [hDB](#), INT [hKey](#), int socket)
- INT [db\\_send\\_changed\\_records](#) ()

## 5.32 odbstruct.dox File Reference

## 5.33 quickstart.dox File Reference

## 5.34 scaler.c File Reference

### 5.34.1 Function Documentation

#### 5.34.1.1 INT [scaler\\_accum](#) ([EVENT\\_HEADER](#) \*, void \*)

Definition at line 66 of file scaler.c.

#### 5.34.1.2 INT [scaler\\_clear](#) (INT *run\_number*)

Definition at line 51 of file scaler.c.

#### 5.34.1.3 INT [scaler\\_eor](#) (INT *run\_number*)

Definition at line 59 of file scaler.c.

### 5.34.2 Variable Documentation

#### 5.34.2.1 double [scaler](#)[32]

Definition at line 47 of file `scaler.c`.

Referenced by `scaler_accum()`, and `scaler_clear()`.

#### 5.34.2.2 [ANA\\_MODULE scaler\\_accum\\_module](#)

**Initial value:**

```
{
    "Scaler accumulation",
    "Stefan Ritt",
    scaler_accum,
    scaler_clear,
    scaler_eor,
    NULL,
    NULL,
    NULL,
    0,
    NULL,
}
```

Definition at line 32 of file `scaler.c`.

## 5.35 system.c File Reference

### 5.35.1 Detailed Description

The Midas System file

Definition in file [system.c](#).

#### Functions

- `midas_thread_t ss\_thread\_create (INT(*thread_func)(void *), void *param)`
- `INT ss\_thread\_kill (midas_thread_t thread_id)`
- `DWORD ss\_millitime ()`
- `DWORD ss\_time ()`
- `INT ss\_sleep (INT millisec)`



## 5.36 utilities.dox File Reference

### 5.37 ybos.c File Reference

#### 5.37.1 Detailed Description

The YBOS file

Definition in file [ybos.c](#).

#### Functions

- void [ybk\\_init](#) (DWORD \*plrl)
- void [ybk\\_create](#) (DWORD \*plrl, char \*bkname, DWORD bktype, void \*pbkdat)
- INT [ybk\\_close](#) (DWORD \*plrl, void \*pbkdat)
- INT [ybk\\_size](#) (DWORD \*plrl)
- INT [ybk\\_list](#) (DWORD \*plrl, char \*bklist)
- INT [ybk\\_end](#) (DWORD \*plrl, char \*bkname, DWORD \*bklen, DWORD \*bktype, void \*\*pbk)
- INT [ybk\\_locate](#) (DWORD \*plrl, char \*bkname, void \*pdata)
- INT [ybk\\_iterate](#) (DWORD \*plrl, YBOS\_BANK\_HEADER \*\*pybkh, void \*\*pdata)

### 5.38 ybos.h File Reference

#### 5.38.1 Detailed Description

The YBOS include file

Definition in file [ybos.h](#).

#### Defines

- #define [YBOS\\_PHYREC\\_SIZE](#) 8192
- #define [YBOS\\_BUFFER\\_SIZE](#) 3\*(YBOS\_PHYREC\_SIZE<<2) + MAX\_EVENT\_SIZE + 128
- #define [YB\\_BANKLIST\\_MAX](#) 32
- #define [YB\\_STRING\\_BANKLIST\\_MAX](#) YB\_BANKLIST\_MAX \* 4
- #define [YB\\_SUCCESS](#) 1

- `#define YB_EVENT_NOT_SWAPPED 2`
- `#define YB_DONE 2`
- `#define YB_WRONG_BANK_TYPE -100`
- `#define YB_BANK_NOT_FOUND -101`
- `#define YB_SWAP_ERROR -102`
- `#define YB_NOMORE_SLOT -103`
- `#define YB_UNKNOWN_FORMAT -104`
- `#define H_BLOCK_SIZE 0`
- `#define H_BLOCK_NUM 1`
- `#define H_HEAD_LEN 2`
- `#define H_START 3`
- `#define D_RECORD 1`
- `#define D_HEADER 2`
- `#define D_EVTLEN 3`
- `#define YB_COMPLETE 1`
- `#define YB_INCOMPLETE 2`
- `#define YB_NO_RECOVER -1`
- `#define YB_NO_RUN 0`
- `#define YB_ADD_RUN 1`
- `#define DSP_RAW 1`
- `#define DSP_BANK 2`
- `#define DSP_UNK 0`
- `#define DSP_DEC 1`
- `#define DSP_HEX 2`
- `#define DSP_ASC 3`
- `#define SWAP_D2WORD(_d2w)`
- `#define EVID_TRINAT`
- `#define YBOS_EVID_BANK(__a, __b, __c, __d, __e)`
- `#define MIDAS_EVID_BANK(__a, __b, __c, __d, __e)`
- `#define I2_BKTYPE 1`
- `#define A1_BKTYPE 2`
- `#define I4_BKTYPE 3`
- `#define F4_BKTYPE 4`
- `#define D8_BKTYPE 5`
- `#define I1_BKTYPE 8`
- `#define MAX_BKTYPE I1_BKTYPE+1`

## 6 Midas Page Documentation

## 6.1 MIDAS Analyzer

- The Midas Analyzer application is composed of a collection of files providing a framework in which the user can gain access to the online data during data acquisition or offline data through a replay of a stored data save-set.
- The Midas distribution contains 2 directories where predefined set of analyzer files and their corresponding working demo code are available. The internal functionality of both example is similar and differ only on the histogram tool used for the data representation. These analyzer set are specific to 2 major data analysis tools i.e: **ROOT**, **HBOOK**:
  - **examples/experiment**: Analyzer tailored towards **ROOT** analysis
  - **examples/hbookexpt**: Analyzer tailored towards **HBOOK** with **PAW**.
- The purpose of the demo analyzer is to demonstrate the analyzer structure and to provide the user a set of code "template" for further development. The demo will run online or offline following the information given further down. The analysis goal is to:
  1. Initialize the ODB with predefined (user specific) structure ([experim.h](#)).
  2. Allocate memory space for histogram definition (booking).
  3. Acquire data from the frontend (or data file).
  4. Process the incoming data bank event-by-event through user specific code (module).
  5. Generate computed quantified banks (in module).
  6. Fill (increment) predefined histogram with data available within the user code.
  7. Produce a result file containing histogram results and computed data (if possible) for further replay through dedicated analysis tool (PAW, ROOT).
- The analyzer is structured with the following files:
  - [experim.h](#)
    - \* ODB experiment include file defining the ODB structure required by the analyzer.
  - [analyzer.c](#): main user core code.
    - \* Defines the incoming bank structures
    - \* Defines the analyzer modules
    - \* Initialize the ODB structure requirements
    - \* Provides Begin\_of\_Run and End\_of\_Run functions with run info logging example.

- [adccalib.c](#), [adcsum.c](#), [scaler.c](#) (Root example)
  - \* Three user analysis modules to where events from the demo [frontend.c](#) sends data to.
- **Makefile**
  - \* Specific makefile for building the corresponding frontend and analyzer code. The frontend code is build against the **camacnul.c** driver providing a simulated data stream.

- **ROOT** histogram booking code (excerpt of experiment/adcsum.c)

- Histogram under ROOT is supported from version 1.9.5. This provides a cleaner way to organize the histogram grouping. This functionality is implemented with the function `open_subfolder()` and `close_subfolder()`. Dedicated Macro is also now available for histogram booking.

```
INT adc_summing_init(void)
{
    /* book ADC sum histo */
    hAdcSum = H1_BOOK("ADCSUM", "ADC sum", 500, 0, 10000);

    /* book ADC average in separate subfolder */
    open_subfolder("Average");
    hAdcAvg = H1_BOOK("ADCAVG", "ADC average", 500, 0, 10000);
    close_subfolder();

    return SUCCESS;
}
```

- **HBOOK** histogram booking code (excerpt of hbookexpt/adccalib.c)

```
INT adc_calib_init(void)
{
    char name[256];
    int i;

    /* book CADC histos */
    for (i = 0; i < N_ADC; i++) {
        sprintf(name, "CADC%02d", i);
        HBOOK1(ADCCALIB_ID_BASE + i, name, ADC_N_BINS,
               (float) ADC_X_LOW, (float) ADC_X_HIGH, 0.f);
    }

    return SUCCESS;
}
```

- The build is also specific to the type of histogram package involved and requires the proper libraries to generate the executable. Each directory has its own **Makefile**:
  - **ROOT** (examples/experiment)

- \* The environment **\$ROOTSYS** is expected to point to a valid ROOT installed path.
- \* The analyzer build requires a Midas core analyzer object file which should be present in the standard midas/<os>/lib directory. In order to have this file (rmana.o), the ROOTSYS had to be valid at the time of the Midas build too (See [HAVE\\_HBOOK](#)).
- **HBOOK** (examples/hbookexpt)
  - \* The analyzer build requires a Midas core analyzer object file which should be present in the standard midas/<os>/lib directory. This file (hmana.o) doesn't require any specific library.
  - \* The analyzer build requires also at that stage to have access to some of the cernlib library files (See [HAVE\\_HBOOK](#)).
- **Analyzer Lite**
  - \* In the case private histogramming or simple analyzed data storage is requested, ROOT and HBOOK can be disabled by undefining both HAVE\_ROOT and HAVE\_HBOOK during the build.
  - \* This Lite version doesn't require any reference to the external histogramming package. Removal of specific definition histogram statement, function call from all the demo code ([analyzer.c](#), [adccalib.c](#), [adcsun.c](#)) needs to be done for successful build.
  - \* This Lite version will have no option of saving computed data from within the system analyzer framework, therefore this operation has to be performed by the user in the user code (module).

The following [MultiStage Concept](#) section describes in more details the analyzer concept and specific of the operation of the demo.

### 6.1.1 MultiStage Concept

In order to make data analysis more flexible, a multi-stage concept has been chosen for the analyzer. A raw event is passed through several stages in the analyzer, where each stage has a specific task. The stages read part of the event, analyze it and can add the results of the analysis back to the event. Therefore each stage in the chain can read all results from previous stages. The first stages in the chain typically deal with data calibration ([adccalib.c](#)), while the last stages contain the code which produces "physical" ([adcsun.c](#)) results like particle energies etc. The multi stage concept allows collaborations of people to use standard modules for the calibration stages which ensures that all members deal with the identical calibrated data, while the last stages can be modified by individuals to look at different aspects of the data. The stage system makes use of the MIDAS bank system. Each stage can read existing banks from an event and add more banks with calculated data. Following picture gives an example of an analyzer

consisting of three stages where the first two stages make an ADC and a MWPC calibration, respectively. They add a "Calibrated ADC" bank and a "MWPC" bank which are used by the third stage which calculates angles between particles:

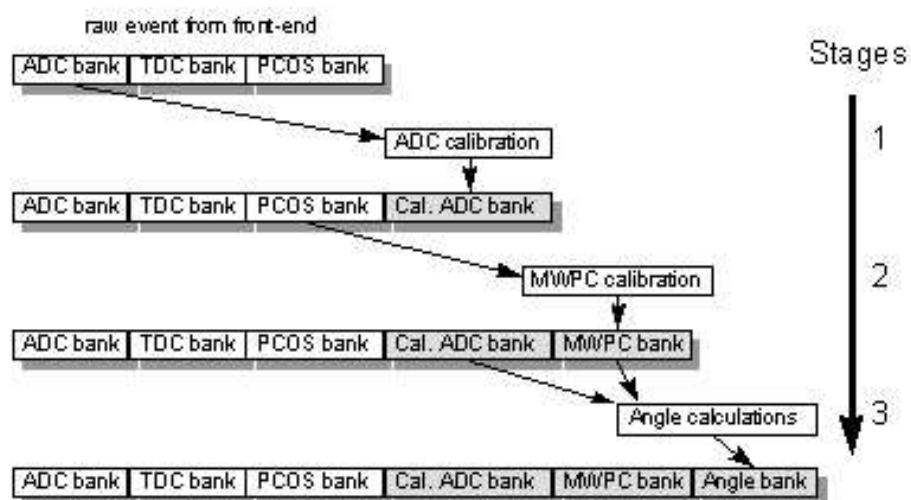


Figure 1: Three stage analyzer.

Since data is contained in MIDAS banks, the system knows how to interpret the data. By declaring new bank name in the `analyzer.c` as possible production data bank, a simple switch in the ODB gives the option to enable the recording of this bank into the result file. The user code for each stage is contained in a "module". Each module has a begin-of-run, end-of-run and an event routine. The BOR routine is typically used to book histograms, the EOR routine can do peak fitting etc. The event routine is called for each event that is received online or off-line.

**6.1.1.1 Analyzer parameters** Each analyzer has a dedicated directory in the ODB under which all the parameters relative to this analyzer can be accessed. The path name is given from the "Analyzer name" specified in the `analyzer.c` under the `analyzer_name`. In case of concurrent analyzer, make sure that no conflict in name is present. By default the name is "Analyzer".

```

/* The analyzer name (client name) as seen by other MIDAS clients */
char *analyzer_name = "Analyzer";

```

The ODB structure under it has the following fields

```

[host:expt:S]/Analyzer>ls -l
Key name                                     Type      #Val  Size  Last Opn Mode Value

```

---

Parameters	DIR						
Output	DIR						
Book N-tuples	BOOL	1	4	1m	0	RWD	y
Bank switches	DIR						
Module switches	DIR						
ODB Load	BOOL	1	4	19h	0	RWD	n
Trigger	DIR						
Scaler	DIR						

- **Parameters** : Created by the analyzer, contains all references to user parameters section.
- **Output** : System directory providing output control of the analyzer results.

```
[local:midas:S]/Analyzer>ls -lr output
```

Key name	Type	#Val	Size	Last	Opn	Mode	Value
<hr/>							
Output	DIR						
Filename	STRING	1	256	47h	0	RWD	run01100.root
RWNT	BOOL	1	4	47h	0	RWD	n
Histo Dump	BOOL	1	4	47h	0	RWD	n
Histo Dump Filename	STRING	1	256	47h	0	RWD	his%05d.root
Clear histos	BOOL	1	4	47h	0	RWD	y
Last Histo Filename	STRING	1	256	47h	0	RWD	last.root
Events to ODB	BOOL	1	4	47h	0	RWD	y
Global Memory Name	STRING	1	8	47h	0	RWD	ONLN

- **Filename** : Replay result file name.
- **RWNT** : To be ignored for **ROOT**, N-Tuple Raw-wise data type.
- **Histo Dump** : Enable the saving of the run results (see next field)
- **Histo Dump Filename** : Online Result file name
- **Clear Histos** : Boolean flag to enable the clearing of all histograms at the beginning of each run (online or offline).
- **Last Histo Filename** : Temporary results file for recovery procedure.
- **Event to ODB** : Boolean flag for debugging purpose allowing a copy of the data to be sent to the ODB at regular time interval (1 second).
- **Global Memory Name** : Shared memory name for communication between Midas and HBOOK. To be ignored for **ROOT** as the data sharing is done through a TCP/IP channel.

- **Bank switches** : Contains the list of all declared banks ([BANK\\_LIST](#) in [analyzer.c](#)) to be enabled for writing to the output result file. By default all the banks are disabled.

```
[local:midas:S]/Analyzer>ls "Bank switches" -l
```

Key name	Type	#Val	Size	Last	Opn	Mode	Value
<hr/>							

ADCO	DWORD	1	4	1h	0	RWD	0
TDC0	DWORD	1	4	1h	0	RWD	0
CADC	DWORD	1	4	1h	0	RWD	0
ASUM	DWORD	1	4	1h	0	RWD	0
SCLR	DWORD	1	4	1h	0	RWD	0
ACUM	DWORD	1	4	1h	0	RWD	0

- **Module switches** : Contains the list of all declared module ([ANA\\_MODULE](#) in [analyzer.c](#)) to be controlled (by default all modules are enabled)

```
[local:midas:S]/Analyzer>ls "module switches" -l
Key name                                Type    #Val  Size  Last Opn Mode Value
-----
ADC calibration                        BOOL    1     4    1h   0   RWD   y
ADC summing                           BOOL    1     4    1h   0   RWD   y
Scaler accumulation                   BOOL    1     4    1h   0   RWD   y
```

- **ODB Load** : Boolean switch to allow retrieval of the entire ODB structure from the input data file. Used only during offline, this option permits to replay the data in the same exact condition as during online. All the ODB parameter settings will be restored to their last value as at the end of the data acquisition of this particular run.
- **Trigger, Scaler** : Subdirectories of all the declared requested event. ([ANALYZE\\_REQUEST](#) in [analyzer.c](#))
- **BOOK N\_tuples** : Boolean flag for booking N-Tuples at the initialization of the module. This flag is specific to the **HBOOK** analyzer.
- **BOOK TTree** : Boolean flag for booking TTree at the initialization of the module. This flag is specific to the **ROOT** analyzer.

**6.1.1.2 Analyzer Module parameters** Each analyzer module can contain a set of parameters to either control its behavior, . These parameters are kept in the ODB under /Analyzer/Parameters/<module name> and mapped automatically to C structures in the analyzer modules. Changing these values in the ODB can therefore control the analyzer. In order to keep the ODB variables and the C structure definitions matched, the ODBEdit command **make** generates the file [experim.h](#) which contains C structures for all the analyzer parameters. This file is included in all analyzer source code files and provides access to the parameters from within the module file under the name <module name>\_param.

- Module name: adc\_calib\_module (extern [ANA\\_MODULE](#) adc\_calib\_module from [analyzer.c](#))
- Module file name: [adccalib.c](#)



- Module structure declaration in [adccalib.c](#):

```

ANA_MODULE adc_calib_module = {
    "ADC calibration",          /* module name          */
    "Stefan Ritt",              /* author                */
    adc_calib,                  /* event routine         */
    adc_calib_bor,              /* BOR routine           */
    adc_calib_eor,              /* EOR routine           */
    adc_calib_init,             /* init routine          */
    NULL,                       /* exit routine          */
    &adccalib_param,            /* parameter structure   */
    sizeof(adccalib_param),      /* structure size        */
    adc_calibration_param_str,   /* initial parameters    */
};

```

- ODB parameter variable in the code: `<module name>_param -> adccalib_param` (from `adc_calib_module`, the `_` is dropped, module is removed)
- ODB parameter path: `/<Analyzer>/Parameters/ADC calibration/` (using the module name from the structure)
- Access to the module parameter:

```

/* subtract pedestal */
for (i = 0; i < N_ADC; i++)
    cadc[i] = (float) ((double) pdata[i] - adccalib_param.pedestal[i] + 0.5);

```

- ODB module parameter declaration

```

[local:midas:S]Parameters>pwd
/Analyzer/Parameters
[local:midas:S]Parameters>ls -lr

```

Key name	Type	#Val	Size	Last	Opn	Mode	Value
Parameters	DIR						
ADC calibration	DIR						
Pedestal	INT	8	4	47h	0	RWD	
		[0]					174
		[1]					194
		[2]					176
		[3]					182
		[4]					185
		[5]					215
		[6]					202
		[7]					202
Software Gain	FLOAT	8	4	47h	0	RWD	
		[0]					1
		[1]					1
		[2]					1
		[3]					1
		[4]					1
		[5]					1
		[6]					1
		[7]					1
Histo threshold	DOUBLE	1	8	47h	0	RWD	20
ADC summing	DIR						

ADC threshold	GLOBAL	FLOAT	1	4	47h	0	RWD	5
Global		DIR						
ADC Threshold		FLOAT	1	4	47h	0	RWD	5

**6.1.1.3 Analyzer Flow chart** The general operation of the analyzer can be summarized as follow:

- The analyzer is a Midas client at the same level as the odb or any other Midas [Utilities](#) application.
- When the analyzer is started with the proper argument (experiment, host for remote connection or -i input\_file, -o output\_file for off-line use), the initialization phase will setup the following items:

1. Setup the internal list of defined module.

```
ANA_MODULE *trigger_module[] = {
    &adc_calib_module,
    &adc_summing_module,
    NULL
};
```

2. Setup the internal list of banks.

```
BANK_LIST ana_trigger_bank_list[] = {

    /* online banks */
    {"ADC0", TID_STRUCT, sizeof(ADC0_BANK), ana_adc0_bank_str}
    ,
    {"TDC0", TID_WORD, N_TDC, NULL}
    , ...
}
```

3. Define the internal event request structure and attaching the corresponding module and bank list.

```
ANALYZE_REQUEST analyze_request[] = {
{"Trigger", /* equipment name */
{1, /* event ID */
TRIGGER_ALL, /* trigger mask */
GET_SOME, /* get some events */
"SYSTEM", /* event buffer */
TRUE, /* enabled */
" ", " ", }
,
NULL, /* analyzer routine */
trigger_module, /* module list */
ana_trigger_bank_list, /* bank list */
1000, /* RWNT buffer size */
TRUE, /* Use tests for this event */
}
, ...
}
```

4. Setup the ODB path for each defined module.
5. Book the defined histograms of each module.
6. Book memory for N-Tuples or TTree.
7. Initialize the internal "hotlinks" to the defined ODB analyzer module parameter path.
  - Once the analyzer is in idle state (for online only), it will wakeup on the transition "Begin-of-Run" and go sequentially through all the modules BOR functions. which generally will ensure proper histogramming booking and possible clearing. It will resume its idle state waiting for the arrival of an event matching one of the event request structure declared during initialization ([analyzer.c](#))
- In case of off-line analysis, once the initialization phase successfully complete, it will go through the BOR and start the event-by-event acquisition.

```

INT analyzer_init()
{
    HNDLE hDB, hKey;
    char str[80];

    RUNINFO_STR(runinfo_str);
    EXP_PARAM_STR(exp_param_str);
    GLOBAL_PARAM_STR(global_param_str);
    TRIGGER_SETTINGS_STR(trigger_settings_str);

    /* open ODB structures */
    cm_get_experiment_database(&hDB, NULL);
    db_create_record(hDB, 0, "/Runinfo", strcomb(runinfo_str));
    db_find_key(hDB, 0, "/Runinfo", &hKey);
    if (db_open_record(hDB, hKey, &runinfo, sizeof(runinfo), MODE_READ, NULL, NULL) !=
        DB_SUCCESS) {
        cm_msg(MERROR, "analyzer_init", "Cannot open \"/Runinfo\" tree in ODB");
        return 0;
    }
}

```

1. When an event is received and matches one the the event request structure, it is passed in sequence to all the defined module for that event request (see in the ANALYZER\_REQUEST structure the line containing the comment module list.
  - If some of the module don't need to be invoked by the incoming event, it can be disabled interactively through ODB from the /analyzer/Module switches directory
 

```

[ladd00:p3a:Stopped]Module switches>ls
ADC calibration                Y
ADC summing                    Y
Scaler accumulation            Y
[ladd00:p3a:Stopped]Module switches>

```
  - if the module switch is enabled, the event will be presented in the module at the defined event-by-event function declared in the module structure ([adccalib.c](#)) in this case the function is [adc\\_calib\(\)](#).

- The Midas event header is accessible through the pointer **pheader** while the data is located by the pointer **pevent**

```

INT adc_calib(EVENT_HEADER * pheader, void *pevent)
{
    INT i;
    WORD *pdata;
    float *cadc;

    /* look for ADC0 bank, return if not present */
    if (!bk_locate(pevent, "ADC0", &pdata))
        return 1;

```

- Refer to the example found under **examples/experiment** directory for **ROOT** analyzer and **examples/hbookexpt** directory for **HBOOK** analyzer.

#### 6.1.1.4 HBOOK analyzer description (old doc) PAWC\_DEFINE(8000000);

This defines a section of 8 megabytes or 2 megawords of share memory for HBOOK/Midas data storage. This definition is found in [analyzer.c](#). In case many histograms are booked in the user code, this value probably has to be increased in order not to crash HBOOK. If the analyzer runs online, the section is kept in shared memory. In case the operating system only supports a smaller amount of shared memory, this value has to be decreased. Next, the file contains the analyzer name

```
char *analyzer_name = "Analyzer";
```

under which the analyzer appears in the ODB (via the ODBEdit command scl). This also determines the analyzer root tree name as /Analyzer. In case several analyzers are running simultaneously (in case of distributed analysis on different machines for example), they have to use different names like Analyzer1 and Analyzer2 which then creates two separate ODB trees /Analyzer1 and /Analyzer2 which is necessary to control the analyzers individually. Following structures are then defined in [analyzer.c](#): runinfo, global\_param, exp\_param and trigger\_settings. They correspond to the ODB trees /Runinfo, /Analyzer/Parameters/Global, /Experiment/Run parameters and /Equipment/Trigger/Settings, respectively. The mapping is done in the [analyzer\\_init\(\)](#) routine. Any analyzer module (via an extern statement) can use the contents of these structures. If the experiment parameters contain an flag to indicate the run type for example, the analyzer can analyze calibration and data runs differently. The module declaration section in [analyzer.c](#) defines two "chains" of modules, one for trigger events and one for scaler events. The framework calls these according to their order in these lists. The modules of type [ANA\\_MODULE](#) are defined in their source code file. The enabled flag for each module is copied to the ODB under /Analyzer/Module switches. By setting this flag zero in the ODB, modules can be disabled temporarily. Next, all banks have to be defined. This is necessary because the framework automatically books N-tuples for all banks at startup before any event is received. Online banks which come from the frontend are first defined, then banks created by the analyzer:

```

...
// online banks
{ "ADC0", TID_DWORD, N_ADC, NULL },
{ "TDC0", TID_DWORD, N_TDC, NULL },

// calculated banks
{ "CADC", TID_FLOAT, N_ADC, NULL },
{ "ASUM", TID_STRUCT, sizeof(ASUM_BANK),
  asum_bank_str },

```

The first entry is the bank name, the second the bank type. The type has to match the type which is created by the frontend. The type `TID_STRUCT` is a special bank type. These banks have a fixed length which matches a C structure. This is useful when an analyzer wants to access named variables inside a bank like `asum_bank.sum`. The third entry is the size of the bank in bytes in case of structured banks or the maximum number of items (not bytes!) in case of variable length banks. The last entry is the ASCII representation of the bank in case of structured banks. This is used to create the bank on startup under `/Equipment/Trigger/Variables/<bank name>`.

The next section in `analyzer.c` defines the `ANALYZE_REQUEST` list. This determines which events are received and which routines are called to analyze these events. A request can either contain an "analyzer routine" which is called to analyze the event or a "module list" which has been defined above. In the latter case all modules are called for each event. The requests are copied to the ODB under `/Analyzer/<equipment name>/Common`. Statistics like number of analyzed events is written under `/Analyzer/<equipment name>/Statistics`. This scheme is very similar to the frontend Common and Statistics tree under `/Equipment/<equipment name>/`. The last entry of the analyzer request determines the HBOOK buffer size for online N-tuples. The `analyzer_init()` and `analyzer_exit()` routines are called when the analyzer starts or exits, while the `ana_begin_of_run()` and `ana_end_of_run()` are called at the beginning and end of each run. The `ana_end_of_run()` routine in the example code writes a run log file `runlog.txt` which contains the current time, run number, run start time and number of received events.

If more parameters are necessary, perform the following procedure:

1. modify/add new parameters in the current ODB.

```

[host:expt:S]ADC calibration>set Pedestal[9] 3
[host:expt:S]ADC calibration>set "Software Gain[9]" 3
[host:expt:S]ADC calibration>create double "Upper threshold"
[host:expt:S]ADC calibration>set "Upper threshold" 400
[host:expt:S]ADC calibration>ls -lr

```

Key name	Type	#Val	Size	Last	Opn	Mode	Value
ADC calibration	DIR						
Pedestal	INT	10	4	2m	0	RWD	
		[0]					174
		[1]					194
		[2]					176
		[3]					182



```

db_create_record(hDB, 0, str, strcomb(global_param_str));
db_find_key(hDB, 0, str, &hKey);
if (db_open_record(hDB, hKey, &global_param
    , sizeof(global_param), MODE_READ, NULL, NULL) != DB_SUCCESS) {
    cm_msg(MERROR, "analyzer_init", "Cannot open \"%s\" tree in ODB", str);
    return 0;
}

```

### 3. Declare the parameter **extern** in the required module

```

---> adccalib.c
...
extern GLOBAL_PARAM  global_param;
...

```

#### 6.1.1.5 Online usage with PAW Once the analyzer is build, run it by entering: analyzer [-h <host name>] [-e <exp name>]

where <host name> and <exp name> are optional parameters to connect the analyzer to a remote back-end computer. This attaches the analyzer to the ODB, initializes all modules, creates the PAW shared memory and starts receiving events from the system buffer. Then start PAW and connect to the shared memory and display its contents

```

PAW > global_s onln
PAW > hist/list
  1  Trigger
  2  Scaler
1000 CADC00
1001 CADC01
1002 CADC02
1003 CADC03
1004 CADC04
1005 CADC05
1006 CADC06
1007 CADC07
2000 ADC sum

```

For each equipment, a N-tuple is created with a N-tuple ID equal to the event ID. The CADC histograms are created from the [adc\\_calib\\_bor\(\)](#) routine in [adccalib.c](#). The N-tuple contents is derived from the banks of the trigger event. Each bank has a switch under /Analyzer/Bank switches. If the switch is on (1), the bank is contained in the N-tuple. The switches can be modified during runtime causing the N-tuples to be rebooked. The N-tuples can be plotted with the standard PAW commands:

```

PAW > nt/print 1
...
PAW > nt/plot 1.sum
PAW > nt/plot 1.sum cadc0>3000

```

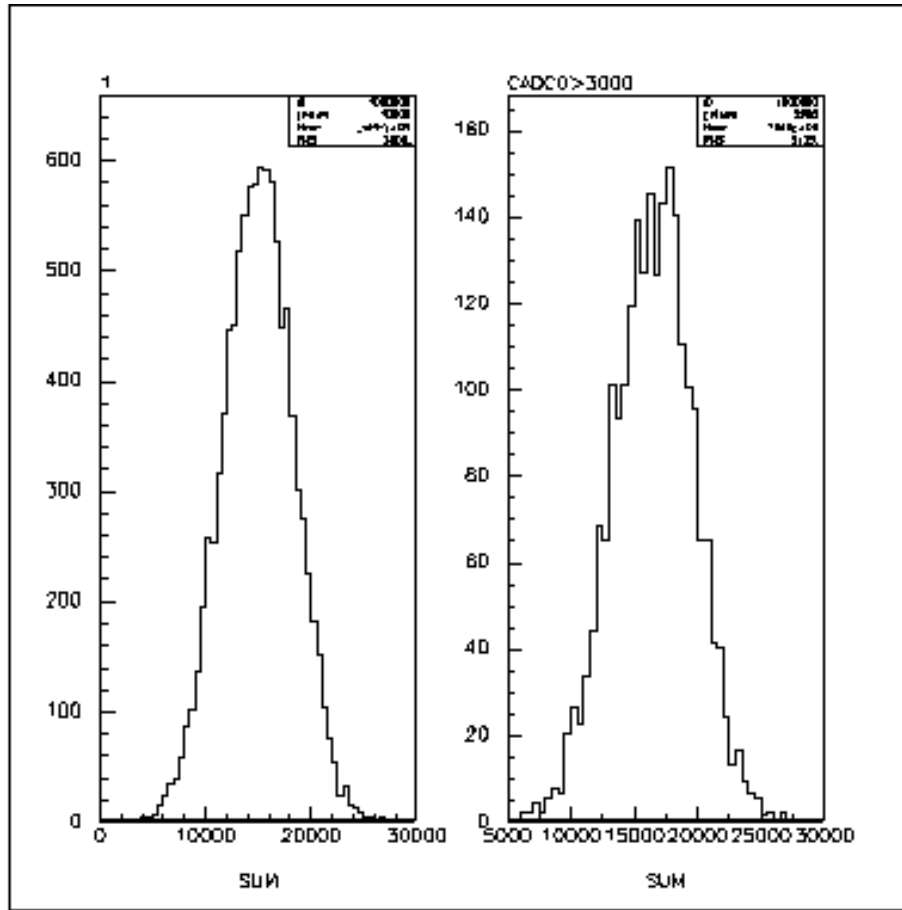


Figure 2: PAW output for online N-tuples.

While histograms contain the full statistics of a run, N-tuples are kept in a ring-buffer. The size of this buffer is defined in the [ANALYZE\\_REQUEST](#) structure as the last parameter. A value of 10000 creates a buffer which contains N-tuples for 10000 events. After 10000 events, the first events are overwritten. If the value is increased, it might be that the PAWC size (PAWC\_DEFINE in [analyzer.c](#)) has to be increased, too. An advantage of keeping the last 10000 events in a buffer is that cuts can be made immediately without having to wait for histograms to be filled. On the other hand care has to be taken in interpreting the data. If modifications in the hardware are made during a run, events which reflect the modifications are mixed with old data. To clear the ring-buffer for a N-tuple or a histogram during a run, the ODBedit command **[local]/>hi analyzer <id>**

where <id> is the N-tuple ID or histogram ID. An ID of zero clears all histograms but no N-tuples. The analyzer has two more ODB switches of interest when running on-



line. The `/Analyzer/Output/Histo Dump` flag and `/Analyzer/Output/Histo Dump File-name` determine if HBOOK histograms are written after a run. This file contains all histograms and the last ring-buffer of N-tuples. It can be read in with PAW:

```
PAW >hi/file 1 run00001.rz 8190
PAW > ldir
```

The `/Analyzer/Output/Clear histos` flag tells the analyzer to clear all histograms and N-tuples at the beginning of a run. If turned off, histograms can be accumulated over several runs.

**6.1.1.6 Offline usage with PAW** The analyzer can be used for off-line analysis without recompilation. It can read from MIDAS binary files (\*.mid), analyze the data the same way as online, and write the result to an output file in MIDAS binary format, ASCII format or HBOOK RZ format. If written to a RZ file, the output contains all histograms and N-tuples as online, with the difference that the N-tuples contain all events, not only the last 10000. The contents of the N-tuples can be a combination of raw event data and calculated data. Banks can be turned on and off in the output via the `/Analyzer/Bank` switches flags. Individual modules can be activated/deactivated via the `/Analyzer/Module` switches flags.

The RZ files can be analyzed and plotted with PAW. Following flags are available when the analyzer is started off-line:

- `-i [filename1] [filename2] ...` Input file name(s). Up to ten different file names can be specified in a `-i` statement. File names can contain the sequence "%05d" which is replaced with the current run number in conjunction with the `-r` flag. Following filename extensions are recognized by the analyzer: .mid (MIDAS binary), .asc (ASCII data), .mid.gz (MIDAS binary gnu-zipped) and .asc.gz (ASCII data gnu-zipped). Files are un-zipped on-the-fly.
- `-o [filename]` Output file name. The file names can contain the sequence "%05d" which is replaced with the current run number in conjunction with the `-r` flag. Following file formats can be generated: .mid (MIDAS binary), .asc (ASCII data), .rz (HBOOK RZ file), .mid.gz (MIDAS binary gnu-zipped) and .asc.gz (ASCII data gnu-zipped). For HBOOK files, CWNT are used by default. RWNT can be produced by specifying the `-w` flag. Files are zipped on-the-fly.
- `-r [range]` Range of run numbers to be analyzed like `-r 120 125` to analyze runs 120 to 125 (inclusive). The `-r` flag must be used with a "%05d" in the input file name.
- `-n [count]` Analyze only count events. Since the number of events for all event types is considered, one might get less than count trigger events if some scaler or other events are present in the data.
- `-n [first] [last]` Analyze only events with serial numbers between first and last.

- -n [first] [last] [n] Analyze every n-th event from first to last.
- -c [filename1] [filename2] ... Load configuration file name(s) before analyzing a run. File names may contain a "%05d" to be replaced with the run number. If more than one file is specified, parameters from the first file get superseded from the second file and so on. Parameters are stored in the ODB and can be read by the analyzer modules. They are conserved even after the analyzer has stopped. Therefore, only parameters which change between runs have to be loaded every time. To set a parameter like /Analyzer/Parameters/ADC summing/offset one would load a configuration file which contains:

```
[Analyzer/Parameters/ADC summing]
Offset = FLOAT : 123
```

Loaded parameters can be inspected with ODBEdit after the analyzer has been started.

- -p [param=value] Set individual parameters to a specific value. Overrides any setting in configuration files. Parameter names are relative to the /Analyzer/Parameters directory. To set the key /Analyzer/Parameters/ADC summing/offset to a specific value, one uses -p "ADC summing/offset"=123. The quotation marks are necessary since the key name contains a blank. To specify a parameter which is not under the /Analyzer/Parameters tree, one uses the full path (including the initial "/") of the parameter like -p "/Experiment/Run Parameters/Run mode"=1.
- -w Produce row-wise N-tuples in output RZ file. By default, column-wise N-tuples are used.
- -v Convert only input file to output file. Useful for format conversions. No data analysis is performed.
- -d Debug flag when started the analyzer from a debugger. Prevents the system to kill the analyzer when the debugger stops at a breakpoint.

## 6.2 Data format

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Midas supports two different data format so far. A possible new candidate would be the NeXus format, but presently no implementation has been developed.

- [Midas format](#)
- [YBOS format](#)

### 6.2.1 Midas format

Special formats are used in MIDAS for the event header, banks and when writing to disk or tape. This appendix explains these formats in detail. Each event carries a 16-byte header. The header is generated by the front-end with the `bm_compose_event()` routine and is used by consumers to distinguish between different events. The header is defined in the `EVENT_HEADER` structure in `midas.h`. It has following structure:

Event and bank headers with data block.

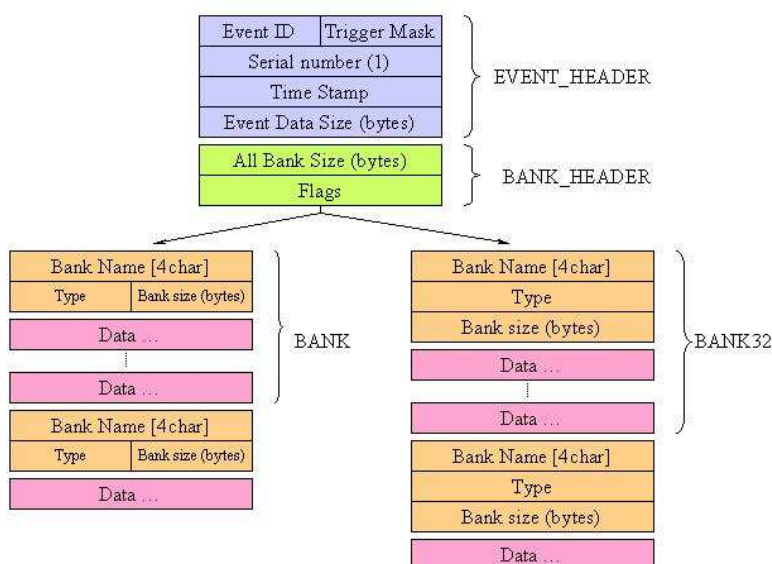


Figure 3: Event and bank headers with data block.

The event ID describes the type of event. Usually 1 is used for triggered events, 2 for scaler events, 3 for HV events etc. The trigger mask can be used to describe the sub-type of an event. A trigger event can have different trigger sources like "physics event", "calibration event", "clock event". These trigger sources are usually read in by the front-end in a pattern unit. Consumers can request events with a specific triggering mask. The serial number starts at one and is incremented by the front-end for each event. The time stamp is written by the front-end before an event is read out. It uses the `time()` function which returns the time in seconds since 1.1.1970 00:00:00 UTC. The data size contains the number of bytes that follows the event header. The data area of the event can contain information in any user format, although only certain formats

are supported when events are copied to the ODB or written by the logger in ASCII format. Event headers are always kept in the byte ordering of the local machine. If events are sent over the network between computers with different byte ordering, the event header is swapped automatically, but not the event contents.

- [Bank Format] Events in MIDAS format contain "MIDAS banks". A bank is a substructure of an event and can contain only one type of data, either a single value or an array of values. Banks have a name of exactly four characters, which are treated, as a bank ID. Banks in an event consist of a global bank header and an individual bank header for each bank. Following picture shows a MIDAS event containing banks:

The "data size total" is the size in bytes of all bank headers and bank data. Flags are currently not used. The bank header contains four characters as identification, a bank type that is one of the TID\_XXX values defined in [midas.h](#), and the data size in bytes. If the byte ordering of the contents of a complete event has to be swapped, the routine [bk\\_swap\(\)](#) can be used.

- [Tape Format] Events are written to disk files without any reformatting. For tapes, a fixed block size is used. The block size TAPE\_BUFFER\_SIZE is defined in [midas.h](#) and usually 32kB. Three special events are produced by the system. A begin-of-run (BOR) and end-of-run (EOR) event is produced which contains an ASCII dump of the ODB in its data area. Their IDs are 0x8000 (BOR) and 0x8001 (EOR). A message event (ID 0x8002) is created if Log messages is enabled in the logger channel setting. The message is contained in the data area as an ASCII string. The BOR event has the number MIDAS\_MAGIC (0x494d or 'MI') as the trigger mask and the current run number as the serial number. A tape can therefore be identified as a MIDAS formatted tape. The routine [tape\\_copy\(\)](#) in the utility [mtape.c](#) is an example of how to read a tape in MIDAS format.

### 6.2.2 YBOS format

As mentioned earlier the YBOS documentation is available at the following URL address: [Ybos site](#) Originally YBOS is a collection of FORTRAN functions which facilitate the manipulation of group of data. It also describes a mode of encoding/storing data in an organized way. YBOS defines specific ways for:

- Gathering related data (bank structure).
- Gathering banks structure (logical record).
- Gathering/Writing/Reading logical record from/to storage device such as disk or tape. (Physical record).

YBOS is organized on a 4-byte alignment structure.

The YBOS library function provides all the tools for manipulation of the above mentioned elements in a independent Operating System like. But the implementation of the YBOS part in Midas does not use any reference to the YBOS library code. Instead only the strict necessary functions have to be re-written in C and incorporated into the Midas package. This has been motivated by the fact that only a sub-set of function is essential to the operation of:

- The front-end code: for the composition of the YBOS event (bank structure, logical record).
- The data logger: for writing data to storage device (physical record).

This Midas/YBOS implementation restricts the user to a subset of the YBOS package only for the front-end part. It doesn't prevent him/her to use the full YBOS library for stand alone program accessing data file written by Midas.

The YBOS implementation under Midas has the following restrictions:

- Single leveled bank structures only (no recursive bank allowed).
- Bank structure of the following type: ASCII, BINARY, WORD, DOUBLE WORD, IEEE FLOATING.
- No mixed data type bank structure allowed.
- Logical Record format (Event Format) In the YBOS terminology a logical record refers to a collection of YBOS bank while in the Midas front-end, it can be referred to as an event. The logical record consists of a logical record length of a 32bit-word size followed by a single or collection of YBOS bank. The logical record length counts the number of double word (32bit word) composing the record without counting itself.

YBOS uses "double word" unit for all length references.

- [Bank Format] The YBOS bank is composed of a bank header 5 double long words followed by the data section which has to end on a 4 bytes boundary.

Ybos Event and bank headers with data block.

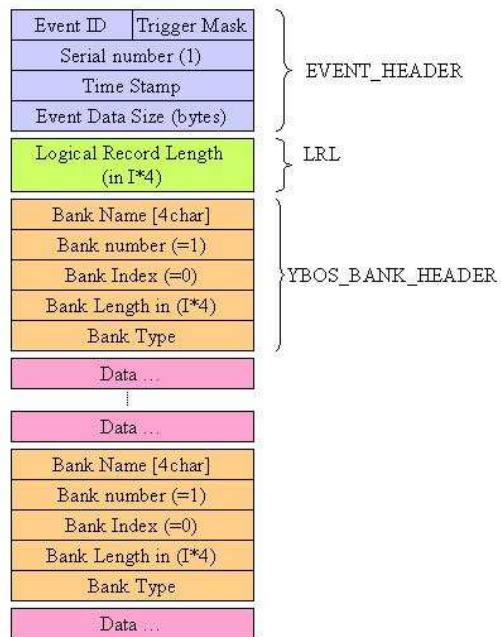


Figure 4: Ybos Event and bank headers with data block.

The bank length parameter corresponds to the size of the data section in double word count + 1. The supported bank type are defined in the [ybos.h](#) file see [YBOS Bank Types](#).

- [Physical Record (Tape/Disk Format)] The YBOS physical record structure is based on a fixed block size (8190 double words) composed of a physical record header followed by data from logical records.

Ybos Physical record structure with data block.

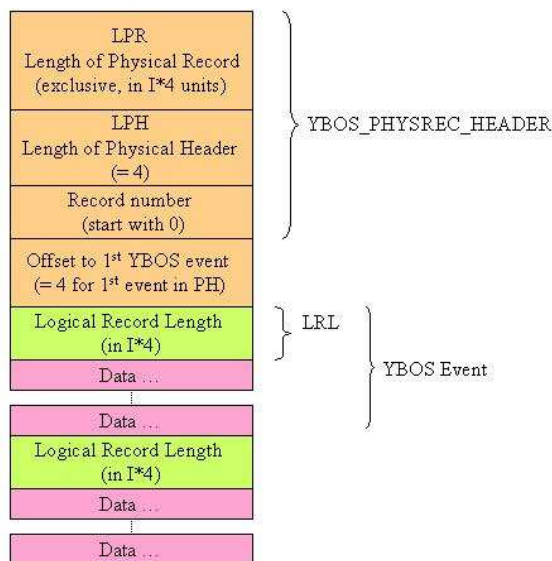


Figure 5: Ybos Physical record structure with data block..

The Offset is computed with the following rules:

- If the logical record fits completely in the space of the physical record, the offset value in the physical record header will be 4.
- If the block contains first the left over fragment of the previous event started in the previous block, the offset will be equal to the length of the physical record header + the left over fragment size.
- If the logical record extent beyond a full block, the offset will be set to -1.
- The mark of the end of file is defined with a logical record length set to -1.

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## 6.3 Supported hardware

[Data format](#) - [Top](#) - [CAMAC and VME access function call](#)

Drivers included in the driver's directory of the MIDAS distribution support various hardware modules. The driver library is continuously extended to suit the needs of

various experiments. For the slow control system, an example is available in the distribution under **examples/slowcont/frontend.c** including the **hv** and **multi** class with the **nulldev** device and **null** bus driver. Note not all the device drivers implement the triple layer (Class,Device,Bus) but includes directly the hardware calls. For some more explanation on the Slow control scheme, refer to [Slow Control System](#) Refer to the nulldev.c for a proper example.

Follows the class, device, bus and divers directory content under midas/drivers.

Class, Device, Bus and Divers Driver listing

Class	Device	Bus	Divers
generic.c	nulldev.c	null.c	caenv488.c
hv.c	epics_ca.c	vxVME.c	lrs1151.c
multi.c	lrs1454.c	camacrpc.c, camacnul.c	lrs1190.c
slowdev.c	dastemp.c	hyt1331.c	lrs2365.c
	lrs1440.c	kcs2926.c kcs2927.c	lrs2373.c
	bb_psi.c	jorway73a.c	ps7106.c
	lrs4032.c	wecc32.c	sis3803.c
	lcwp950.c	camaclx.c	sis3700.c
	mschdev.c	dsp004.c	vmeio.c
	lrs2415.c	ces8210.c	
	nitronic.c	rs232.c	
	caen170a.c	tcpip.c	
	das1600.c	cc7700pci.c	
		esone.c	
		ces2117.c	
		lrs1821.c	
		str340.c	
		bt617.c	

Figure 6: Class, Device, Bus and Divers Driver listing

- [CAMAC drivers](#)
- [VME drivers](#)
- [GPIB drivers](#)
- [Other drivers](#)



### 6.3.1 CAMAC drivers

The CAMAC drivers can be used in different configuration and may have special behaviors depending on the type of hardware involved. Below are summarized some remarks about these particular hardware modules.

- CAMAC controllers
  - [hyt1331.c] This interface uses an ISA board to connect to the crate controller. This card implement a "fast" readout cycle by re-triggering the CAMAC read at the end of the previous one. This feature is unfortunately not reliable when fast processor is used. Wrong returned data can be expected when CPU clocks is above 250MHz. Attempt on "slowing down" the IO through software has not guaranteed perfect result. Contact has been taken with HYTEC in order to see if possible fix can be applied to the interface. First revision of the PC-card PAL has been tested but did not show improvement. CVS version of the hyt1331.c until 1.2 contains "fast readout cycle" and should not be trusted. CVS 1.3 driver revision contains a patch to this problem. In the mean time you can apply your own patch (see [Frequently Asked Questions](#)) and also [Hytec](#))
  - [hyt1331.c Version >= 1.8.3] This version has been modified for 5331 PCI card support running under the [dio task](#).
  - [khyt1331.c Version >= 1.8.3] A full Linux driver is available for the 5331 PCI card interfacing to the hyt1331. The kernel driver has been written for the Linux kernel 2.4.2, which comes with RedHat 7.1. It could be ported back to the 2.2.x kernel because no special feature of 2.4.x are used, although many data structures and function parameters have changed between 2.2 and 2.4, which makes the porting a bit painful. The driver supports only one 5331 card with up to four CAMAC crates.
  - [kcs292x.c] The 2926 is an 8 bit ISA board, while the 2927 is a 16bit ISA board. An equivalent PCI interface (2915) exists but is not yet supported by Midas (See [KCS](#)). No support for Windows yet.  
Both cards can be used also through a proper Linux driver *camac1x.c*. This requires to first load a module *camac-kcs292x.o*. This software is available but not part of the Midas distribution yet. Please contact [midas@triumf.ca](mailto:midas@triumf.ca) for further information.
  - [wecc32.c] The CAMAC crate controller CC32 interface to a PCI card... you will need the proper Linux module... Currently under test. Windows-NT and W95 drivers available but not implemented under Midas. (see [CC32](#))
  - [dsp004.c] The dsp004 is an 8 bit ISA board PC interface which connect to the PC6002 CAMAC crate controller. This module is not being manufactured anymore, but somehow several labs still have that controller in use.

- [ces8210.c] The CAMAC crate controller CBD8210 interface is a VME module to give access up to 7 CAMAC crate. In conjunction with the [mvmestd.h](#) and [mcstd.h](#), this driver can be used on any Midas/VME interface.
- [jorway73a.c] The CAMAC crate controller Jorway73a is accessed through SCSI commands. This driver implement the [mcstd.h](#) calls.

- CAMAC drivers

- [camacnul.c] Handy fake CAMAC driver for code development.
- [camacrpc.c] Remote Procedure Call CAMAC driver used for accessing the CAMAC server part of the standard Midas frontend code. This driver is used for example in the [mcnaf task](#), [mhttpd task](#) utilities.

### 6.3.2 VME drivers

The VME modules drivers can be interfaced to any type of PCI/VME controller. This is done by dedicated Midas VME Standard calls from the [mvmestd.h](#) files.

- PCI/VME interface

- [sis1100.c] PCI/VME with optical fiber link. Driver is under development (March 2002). (see [SIS](#)).
- [bt617.c] Routines for accessing VME over SBS Bit3 Model 617 interface under Windows NT using the NT device driver Model 983 and under Linux using the vmehb device driver. The VME calls are implemented for the "mvmestd" Midas VME Standard. (see [Bit3](#)).
- [wevmemm.c] PCI/VME Wiener board supported. (see [Wiener PCI](#)).
- [vxVME.c] mvmestd implementation for VxWorks Operating System. Does require cross compiler for the VxWorks target hardware processor and proper WindRiver license.

- VME modules

- [lrs1190.c] LeCroy Dual-port memory ECL 32bits.
- [lrs1151.c] LeCroy 16 ECL 32bits scalers.
- [lrs2365.c] LeCroy Logic matrix.
- [lrs2373.c] LeCroy Memory Lookup unit.
- [sis3700.c] SIS FERA Fifo 32 bits.
- [sis3801.c] SIS MultiChannel Scalers 32 channels.

- [sis3803.c] SIS Standard 32 Scalers 32 bits.
- [ps7106.c] Phillips Scientific Discriminator.
- [ces8210.c] CES CAMAC crate controller.
- [vmeio.c] Triumf VMEIO General purpose I/O 24bits.

### 6.3.3 GPIB drivers

There is no specific GPIB driver part of the Midas package. But GPIB is used at Triumf under WindowsNT for several Slow Control frontends. The basic GPIB DLL library is provided by [National Instrument](#). Please contact [midas@triumf.ca](mailto:midas@triumf.ca) for further information.

For GPIB Linux support please refer to [The Linux Lab Project](#)

### 6.3.4 Other drivers

- **[Serial driver]** rs232.c communication routines.
- **[Network driver]** [tcpip.c/h](#) TCP/IP socket communication routines.
- **[SCSI driver]** Support for the jorway73a SCSI/CAMAC controller under Linux has been done by Greg Hackman (see [CAMAC drivers](#)).

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## 6.4 CAMAC and VME access function call

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Midas defines its own set of CAMAC, VME and FASTBUS calls in order to unify the different hardware modules that it supports. This interface method permits to be totally hardware as well as OS **independent**. The same user code developed on a system can be used as a template for another application on a different operating system.

While the file [mcstd.h](#) (Midas Camac Standard) provides the interface for the CAMAC access, the file [mvmestd.h](#) (Midas VME Standard) is for the VME access. An extra CAMAC interface built on the top of [mcstd](#) provides the ESONE standard CAMAC calls ([esone.c](#)).

Refers to the corresponding directories under **/drivers** to find out what module of each family is already supported by the current Midas distribution. **/drivers/drivers** contains older drivers which has not yet been converted to the latest API.

#### 6.4.1 Midas CAMAC standard functions

Please refer to [mcstd.h](#) for function description.

#### 6.4.2 ESONE CAMAC standard functions

**Not all the functionality of ESONE standard have been fully tested**

Please refer to [esone.c](#) for function description.

#### 6.4.3 Midas VME standard functions

This API provides basic VME access through a **simple** set of functions. Refer to [mvmestd.h](#) for more specific information. [mvme\\_open\(\)](#) contains a general access code sample summarizing most of the mvme commands.

#### 6.4.4 Computer Busy Logic

A "computer busy logic" has to be implemented for a front-end to work properly. The reason for this is that some ADC modules can be re-triggered. If they receive more than one gate pulse before being read out, they accumulate the input charge that leads to wrong results. Therefore only one gate pulse should be sent to the ADC's, additional pulses must be blocked before the event is read out by the front-end. This operation is usually performed by a latch module, which is set by the trigger signal and reset by the computer after it has read out the event:

The output of this latch is shaped (limited in its pulse width to match the ADC gate width) and distributed to the ADC's. This scheme has two problems. The computer generates the reset signal, usually by two CAMAC output functions to a CAMAC IO unit. Therefore the duration of the pulse is a couple of ms. There is a non-negligible probability that during the reset pulse there is another hardware trigger. If this happens and both inputs of the latch are active, its function is undefined. Usually it generates several output pulses that lead to wrong ADC values. The second problem lies in the fact that the latch can be just reset when a trigger input is active. This can happen since trigger signals usually have a width of a few tens of nanoseconds. In this case the latch output signal does not carry the timing of the trigger signal, but the timing of the reset signal. The wrong timing of the output can lead to false ADC and TDC signals. To

overcome this problem, a more elaborate scheme is necessary. One possible solution is the use of a latch module with edge-sensitive input and veto input. At PSI, the module "D. TRIGGER / DT102" can be used. The veto input is also connected to the computer:

Latched trigger layout.

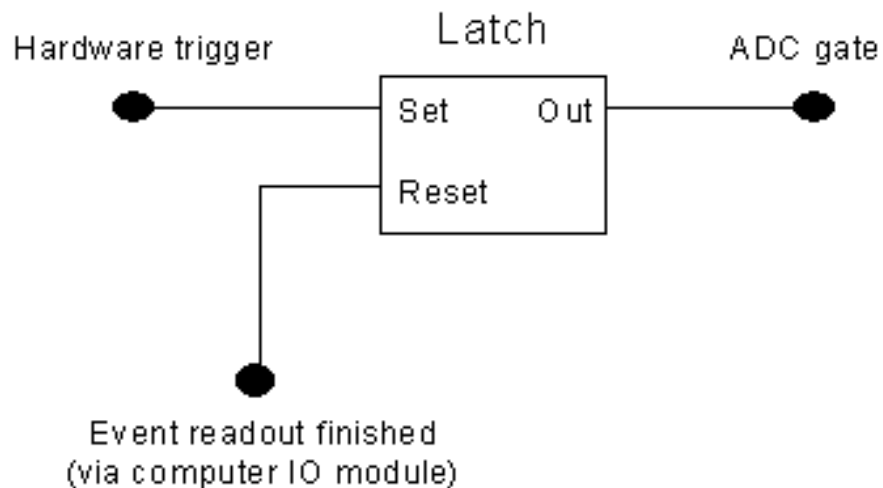


Figure 7: Latched trigger layout.

To reset this latch, following bit sequence is applied to the computer output (signals are displayed active low):

Improved Latched trigger layout.

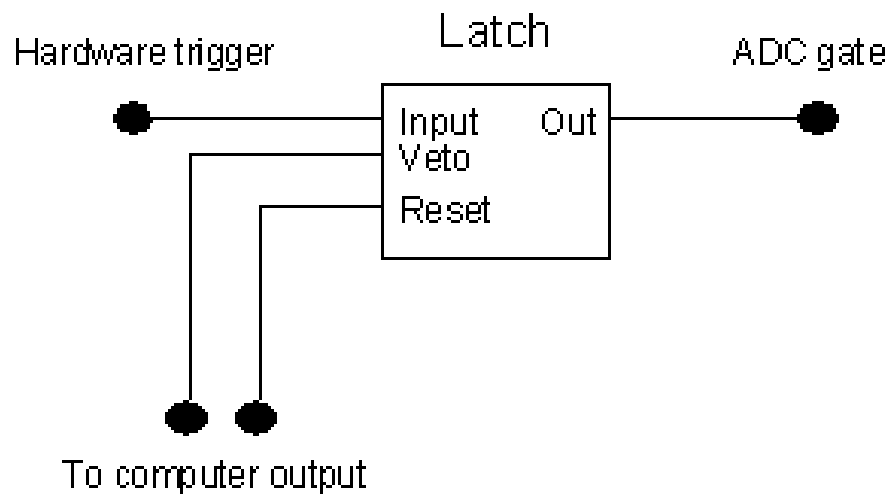


Figure 8: Improved Latched trigger layout.

The active veto signal during the reset pulse avoids that the latch can receive a "set" and a "reset" simultaneously. The edge sensitive input ensures that the latch can only trigger on a leading edge of a trigger signal, not on the removing of the veto signal. This ensures that the timing of the trigger is always carried at the ADC/TDC gate signal.

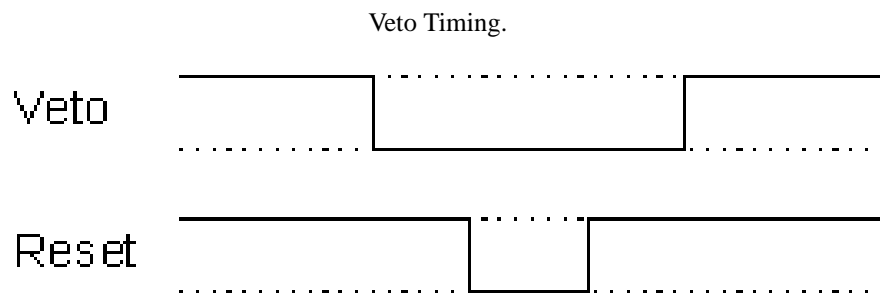


Figure 9: Veto Timing.

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## 6.5 Midas build options and operation considerations

[CAMAC and VME access function call](#) - [Top](#) - [Midas Code and Libraries](#)

The section covers the [Building Options](#) for customization of the DAQ system as well as the different [Environment variables](#) options for its operation.

### 6.5.1 Building Options

- By default Midas is build with a minimum of pre-compiler flags. But the Makefile contains options for the user to apply customization by enabling internal options already available in the package.

– [YBOS\\_VERSION\\_3\\_3](#) , [EVID\\_TWIST](#) , [INCLUDE\\_FTPLIB](#) ,  
[INCLUDE\\_ZLIB](#) , [SPECIFIC\\_OS\\_PRG](#)

- Other flags are available at the application level:

– [HAVE\\_CAMAC](#) , [HAVE\\_ROOT](#) , [HAVE\\_HBOOK](#) , [HAVE\\_MYSQL](#) ,  
[USE\\_EVENT\\_CHANNEL](#) , [DM\\_DUAL\\_THREAD](#) , [USE\\_INT](#)

- By default the midas applications are built for use with dynamic library **libmidas.so**. If static build is required the whole package can be built using the option **static**.

```
> make static
```

- The basic Midas package builds without external package library reference. But it does try to build an extra core analyzer application to be used in conjunction with ROOT if \$ROOTSYS is found. This is required ONLY if the examples/experiment makefile is used for generating a complete Midas/ROOT analyzer application.

- In case of HBOOK/PAW analyzer application, the build should be done from examples/hbookexpt directory and the environment variable CERNLIB\_PACK should be pointing to a valid cernpacklib.a library.

- For development it could be useful to built individual application in static. This can be done using the [USERFLAGS](#) option such as:

```
> rm linux/bin/mstat; make USERFLAGS=-static linux/bin/mstat
```

- The current OS support is done through `OS` flag established in the general Makefile. Currently the OS supported are:

– [OS\\_OSF1](#) , [OS\\_ULTRIX](#) , [OS\\_FREEBSD](#) , [OS\\_LINUX](#) , [OS-SOLARIS](#).

- For **OS\_IRIX** please contact Pierre. The **OS\_VMS** is not included in the Makefile as it requires a particular makefile and since several years now the VMS support has been dropped.

```
OSFLAGS = -DOS_LINUX ...
```

- Other OS supported are:
  - **OS\_WINNT** : See file makefile.nt.
  - **OS\_VXWORKS** : See file makefile.ppc\_tri.

### 6.5.2 USERFLAGS

This flag can be used at the command prompt for individual application build.

```
make USERFLAGS=-static linux/bin/mstat
```

### 6.5.3 MIDAS\_PREF\_FLAGS

This flag is for internal global Makefile preference. Included in the **OSFLAGS**.

```
MIDAS_PREF_FLAGS = -DYBOS_VERSION_3_3 -DEVID_TWIST
```

### 6.5.4 HAVE\_CAMAC

This flag enable the CAMAC RPC service within the frontend code. The application [mcnaf task](#) and the web [CNAF page](#) are by default not CAMAC enabled (**HAVE\_CAMAC** undefined).

### 6.5.5 HAVE\_ROOT

This flag is used for the midas [analyzer task](#) in the case **ROOT** environment is required. An example of the makefile resides in **examples/experiment/Makefile**. This flag is enabled by the presence of a valid **ROOTSYS** environment variable. In the case



**ROOTSYS** is not found the analyzer is build without **ROOT** support. In this later case, the application [rmidas task](#) will be missing. refer to [MIDAS Analyzer](#) for further details.

### 6.5.6 HAVE\_HBOOK

This flag is used for [examples/hbookexpt/Makefile](#) for building the [midas analyzer task](#) against **HBOOK** and **PAW**. The path to the cernlib is requested and expected to be found under /cern/pro/lib (see makefile). This can always be overwritten during the makefile using the following command:

```
make CERNLIB_PACK=<your path>/libpacklib.a
```

### 6.5.7 HAVE\_MYSQL

This flag is used for the [mlogger task](#) to building the application with *mySQL* support. The build requires to have access to the mysql include files as well as the mysql library. Refers to for further information on that option.

- For operation of the analyzer **without HBOOK** or **ROOT**, refer to [MIDAS Analyzer](#) for further details.

### 6.5.8 SPECIFIC\_OS\_PRG

This flag is for internal Makefile preference. Used in particular for additional applications build based on the OS selection. In the example below [mspeaker](#), [mlxspeaker tasks](#) and [dio task](#) are built only under OS\_LINUX.

```
SPECIFIC_OS_PRG = $(BIN_DIR)/mlxspeaker_task $(BIN_DIR)/dio_task
```

### 6.5.9 INCLUDE\_FTPLIB

FTP support "INCLUDE\_FTPLIB" Application such as the [mlogger task](#), [lazylogger task](#) can use the ftp channel for data transfer.

### 6.5.10 INCLUDE\_ZLIB

The applications [lazylogger task](#), [mdump task](#) can be built with **zlib.a** in order to gain direct access to the data within a file with extension **mid.gz** or **ybs.gz**. By default this option is disabled except for the system analyzer core code **mana.c**.

```
make USERFLAGS=-DINCLUDE_ZLIB linux/lib/ybos.o
make USERFLAGS=-static linux/bin/mdump
```

### 6.5.11 YBOS\_VERSION\_3\_3

The default built for ybos support is version 4.0. If lower version is required include **YBOS\_VERSION\_3\_3** during compilation of the [ybos.c](#)

```
make USERFLAGS=-DYBOS_VERSION_3_3 linux/lib/ybos.o
```

### 6.5.12 DM\_DUAL\_THREAD

Valid only under VxWorks. This flag enable the dual thread task when running the frontend code under VxWorks. The main function calls are the dm\_xxxx in [midas.c](#) (Contact Pierre for more information).

### 6.5.13 USE\_EVENT\_CHANNEL

To be used in conjunction with the [DM\\_DUAL\\_THREAD](#).

#### 6.5.14 USE\_INT

In [mfe.c](#). Enable the use of interrupt mechanism. This option is so far only valid under VxWorks Operating system. (Contact Stefan or Pierre for further information).

#### 6.5.15 Environment variables

Midas uses a several environment variables to facilitate the different application startup.

**6.5.15.1 MIDASSYS** From version 1.9.4 this environmental variable is required. It should point to the main path of the installed Midas package. The application odbedit will generate a warning message in the case this variable is not defined.

**6.5.15.2 MIDAS\_EXPTAB** This variable specify the location of the **exptab** file containing the predefined midas experiment. The default location is for OS\_UNIX: /etc, /. For OS\_WINNT: \system32, \system.

**6.5.15.3 MIDAS\_SERVER\_HOST** This variable predefinedes the names of the host on which the Midas experiment shared memories are residing. It is needed when connection to a remote experiment is requested. This variable is valid for Unix as well as Windows OS.

**6.5.15.4 MIDAS\_EXPT\_NAME** This variable predefinedes the name of the experiment to connect by default. It prevents the requested application to ask for the experiment name when multiple experiments are available on the host or to add the -e <expt\_name> argument to the application command. This variable is valid for Unix as well as Windows OS.

**6.5.15.5 MIDAS\_DIR** This variable predefinedes the LOCAL directory path where the shared memories for the experiment are located. It supersede the host\_name and the expt\_name as well as the [MIDAS\\_SERVER\\_HOST](#) and [MIDAS\\_EXPT\\_NAME](#) as a given directory path can only refer to a single experiment.

**6.5.15.6 MCHART\_DIR** This variable is ... for later... This variable is valid only under Linux as the -D is not supported under WindowsXX

[CAMAC and VME access function call - Top - Midas Code and Libraries](#)

## 6.6 Midas Code and Libraries

[Midas build options and operation considerations - Top - Frequently Asked Questions](#)

This section covers several aspect of the Midas system.

- [State Codes & Transition Codes](#)
- [Midas Data Types](#)
  - [Midas bank examples](#)
- [YBOS Bank Types](#)
  - [YBOS bank examples](#)
- [Midas Code and Libraries](#)

### 6.6.1 State Codes & Transition Codes

- State Codes : These number will be apparent in the ODB under the [ODB /RunInfo Tree](#).
  - STATE\_STOPPED
  - STATE\_PAUSED
  - STATE\_RUNNING
- Transition Codes These number will be apparent in the ODB under the [ODB /RunInfo Tree](#).
  - TR\_START
  - TR\_STOP
  - TR\_PAUSE
  - TR\_RESUME

### 6.6.2 Midas Data Types

Midas defined its own data type for OS compatibility. It is suggested to use them in order to insure a proper compilation when moving code from one OS to another. *float* and *double* retain OS definition.

- BYTE unsigned char
- WORD unsigned short int (16bits word)
- DWORD unsigned 32bits word
- INT signed 32bits word
- BOOL OS dependent.

When defining a data type either in the frontend code for bank definition or in user code to define ODB variables, Midas requires the use of its own data type declaration. The list below shows the main Type IDentification to be used (refers to [Midas Define](#) for complete listing):

- TID\_BYTE unsigned byte 0 255
- TID\_SBYTE signed BYTE -128 127
- TID\_CHAR single character 0 255
- TID\_WORD two BYTE 0 65535
- TID\_SHORT signed WORD -32768 32767
- TID\_DWORD four bytes 0  $2^{32}-1$
- TID\_INT signed DWORD  $-2^{31}$   $2^{31}-1$
- TID\_BOOL four bytes bool 0 1
- TID\_FLOAT four bytes float format
- TID\_DOUBLE eight bytes float format

### 6.6.3 Midas bank examples

There are several examples under the Midas source code that you can check. Please have a look at

- Frontend code midas/examples/experiment/frontend.c etc...
- Backend code midas/examples/experiment/analyzer.c etc...

### 6.6.4 YBOS Bank Types

YBOS defines several type but all types should be 4 bytes aligned. Distinction of signed and unsigned is not done. When mixing MIDAS and YBOS in the frontend for RO\_ODB see [The Equipment structure](#) make sure the bank types are compatible (see also [YBOS Define](#))

- **I1\_BKTYPE** Bank of Bytes
- **I2\_BKTYPE** Bank of 2 bytes data
- **I4\_BKTYPE** Bank of 4 bytes data
- **F4\_BKTYPE** Bank of float data
- **D8\_BKTYPE** Bank of double data
- **A1\_BKTYPE** Bank of ASCII char

### 6.6.5 YBOS bank examples

Basic examples using YBOS banks are available in the midas tree under examples/ybosexpt.

- **Frontend code** Example 1, 2 shows the bank creation with some CAMAC acquisition.

```

----- example 1 ----- Simple 16 bits bank construction

void read_cft (DWORD *pevent)
{
    DWORD *pbkdat, slot;

    ybk_create((DWORD *)pevent, "TDCP", I2_BKTYPE, &pbkdat);
    for (slot=FIRST_CFT;slot<=LAST_CFT;slot++)
    {
        cami(3,slot,1,6,(WORD *)pbkdat);
        ((WORD *)pbkdat)++;
        caml6i_rq(3,slot,0,4,(WORD **)&pbkdat,16);
    }
    ybk_close((DWORD *)pevent, I2_BKTYPE, pbkdat);
    return;
}
----- example 2 ----- Simple 32bit bank construction
{
    DWORD *pbkdat;

    ybk_create((DWORD *)pevent, "TICS", I4_BKTYPE, &pbkdat);

```

```

camo(2,22,0,17,ZERO);
cam24i_r(2,22,0,0,(DWORD **) &pbkdat,10);
cam24i_r(2,22,0,0,(DWORD **) &pbkdat,10);
cam24i_r(2,22,0,0,(DWORD **) &pbkdat,10);
cam24i_r(2,22,0,0,(DWORD **) &pbkdat,10);
cam24i_r(2,22,0,0,(DWORD **) &pbkdat,9);
ybk_close((DWORD *)pevent, I4_BKTYPE, pbkdat);
return 0;
}

```

Example 3 shows a creation of an EVID bank containing a duplicate of the midas header. As the Midas header is stripped out of the event when data are logged, it is necessary to compose such event to retain event information for off-line analysis. Uses of predefined macros (see [Midas Code and Libraries](#)) are available in order to extract from a pre-composed Midas event the internal header fields i.e. Event ID, Trigger mask, Serial number, Time stamp. In this EVID bank we added the current run number which is retrieved by the frontend at the begin of a run.

```

----- example 3 ----- Full equipment readout function

INT read_cum_scaler_event(char *pevent, INT off)
{
    INT i;
    DWORD *pbkdat, *pbktop, *podbvar;

    ybk_init((DWORD *) pevent);

    // collect user hardware SCALER data
    ybk_create((DWORD *)pevent, "EVID", I4_BKTYPE, (DWORD *)(&pbkdat));
    *(pbkdat)++ = gbl_tgt_counter++; // event counter
    *((WORD *)pbkdat) = EVENT_ID(pevent); ((WORD *)pbkdat)++;
    *((WORD *)pbkdat) = TRIGGER_MASK(pevent); ((WORD *)pbkdat)++;
    *(pbkdat)++ = SERIAL_NUMBER(pevent);
    *(pbkdat)++ = TIME_STAMP(pevent);
    *(pbkdat)++ = gbl_run_number; // run number
    ybk_close((DWORD *)pevent, pbkdat);

    // BEGIN OF CUMULATIVE SCALER EVENT
    ybk_create((DWORD *)pevent, "CUSC", I4_BKTYPE, (DWORD *)(&pbkdat));
    for (i=0 ; i<NSCALERS ; i++){
        *pbkdat++ = scaler[i].cuval[0];
        *pbkdat++ = scaler[i].cuval[1];
    }

    ybk_close((DWORD *)pevent, I4_BKTYPE, pbkdat);
    // END OF CUMULATIVE SCALER EVENT

    // event in bytes for Midas
    return (ybk_size ((DWORD *)pevent));
}

```

- **Backend code** If the data logging is done through YBOS format (see [ODB /Logger Tree](#) Format) the events on the storage media will have been

stripped from the MIDAS header used for transferring the event from the frontend to the backend. This means the logger data format is a "TRUE" YBOS format. Uses of standard YBOS library is then possible.

--- Example of YBOS bank extraction ---

```
void process_event(HANDLE hBuf, HANDLE request_id, EVENT_HEADER *pheader, void *pevent)
{
    INT status;
    DWORD *plrl, *pybk, *pdata, bklen, bktyp;
    char banklist[YB_STRING_BANKLIST_MAX];

    // pointer to data section
    plrl = (DWORD *) pevent;

    // Swap event
    yb_any_event_swap(FORMAT_YBOS,plrl);

    // bank name given through argument list
    if ((status = ybk_find (plrl, sbank_name, &bklen, &bktyp, (void *)&pybk)) == YB_SUCCESS)
    {
        // given bank found in list
        status = ybk_list (plrl, banklist);
        printf("#banks:%i Bank list:-%s-\n",status,banklist);
        printf("Bank:%s - Length (I*4):%i - Type:%i - pBk:0x%p\n",sbank_name, bklen, bktyp, pybk);

        // check id EVID found in event for id and msk selection
        if ((status = ybk_find (plrl, "EVID", &bklen, &bktyp, (void *)&pybk)) == YB_SUCCESS)
        {
            pdata = (DWORD *)((YBOS_BANK_HEADER *)pybk + 1);
            ...
        }

        // iterate through the event
        pybk = NULL;
        while ((bklen = ybk_iterate(plrl, &pybk, (void *)&pdata))
            && (pybk != NULL))
            printf("bank length in 4 bytes unit: %d\n",bklen);

    }
    else
    {
        status = ybk_list (plrl, banklist);
        printf("Bank -%s- not found (%i) in ",sbank_name, status);
        printf("#banks:%i Bank list:-%s-\n",status,banklist);
    }
    ...
    ... ...
}
```



### 6.6.6 Midas Code and Libraries

The Midas libraries are composed of 5 main source code and their corresponding header files.

1. [The midas.h & midas.c](#) : Midas abstract layer.
2. [The msystem.h & system.c](#) : Midas function implementation.
3. [The mrpc.h & mrpc.c](#) : Midas RPC functions.
4. [The odb.c](#) : Online Database functions.
5. [The ybos.h & ybos.c](#) : YBOS specific functions.

Within these files, all the functions have been categorized depending on their scope.

- **al\_XXX(...)** : Alarm system calls
- **bk\_XXX(...)** : Midas bank manipulation calls
- **bm\_XXX(...)** : Buffer management calls
- **cm\_XXX(...)** : Common system calls
- **db\_XXX(...)** : Database management calls
- **el\_XXX(...)** : Electronic Log book calls
- **hs\_XXX(...)** : History manipulation calls
- **ss\_XXX(...)** : System calls
- **ybk\_XXX(...)** : YBOS bank manipulation

### 6.6.7 MIDAS Macros

Several group of MACROS are available for simplifying user job on setting or getting Midas information. They are also listed in the [Midas Code and Libraries](#). All of them are defined in the [Midas Macros](#), [System Macros](#), [YBOS Macros](#) header files.

- **Message Macros.** These Macros compact the 3 first arguments of the [cm\\_msg\(\)](#) call. It replaces the type of message, the routine name and the line number in the C-code. See example in [cm\\_msg\(\)](#).
  - **MERROR** : For error (MT\_ERROR, \_\_FILE\_\_, \_\_LINE\_\_)

- [MINFO](#) : For info (MT\_INFO, \_\_FILE\_\_, \_\_LINE\_\_)
- [MDEBUG](#) : For debug (MT\_DEBUG, \_\_FILE\_\_, \_\_LINE\_\_)
- [MUSER](#) : Produced by interactive user (MT\_USER, \_\_FILE\_\_, \_\_LINE\_\_)
- [MLOG](#) : Info message which is only logged (MT\_LOG, \_\_FILE\_\_, \_\_LINE\_\_)
- [MTALK](#) : Info message for speech system (MT\_TALK, \_\_FILE\_\_, \_\_LINE\_\_)
- [MCALL](#) : Info message for telephone call (MT\_CALL, \_\_FILE\_\_, \_\_LINE\_\_)

- **DAQ Event/LAM Macros.** To be used in the frontend/analyzer code.

- **CAMAC LAM manipulation.** These Macros are used in the frontend code to interact with the LAM register. Usually the CAMAC Crate Controller has the feature to register one bit per slot and be able to present this register to the user. It may even have the option to mask off this register to allow to set a "general" LAM register containing either "1" (At least one LAM from the masked LAM is set) or "0" ( no LAM set from the masked LAM register). The [poll\\_event\(\)](#) uses this feature and return a variable which contains a bit-wise value of the current LAM register in the Crate Controller.
- [LAM\\_SOURCE](#)
- [LAM\\_STATION](#)
- [LAM\\_SOURCE\\_CRATE](#)
- [LAM\\_SOURCE\\_STATION](#)

- **BYTE swap manipulation.** These Macros can be used in the backend analyzer when **little-endian/big-endian** are mixed in the event.

- [WORD\\_SWAP](#)
- [DWORD\\_SWAP](#)
- [QWORD\\_SWAP](#)

- **MIDAS Event Header manipulation.** Every event travelling through the Midas system has a "Event Header" containing the minimum information required to identify its content. The size of the header has been kept as small as possible in order to minimize its impact on the data rate as well as on the data storage requirement. The following macros permit to read or override the content of the event header as long as the argument of the macro refers to the top of the Midas event (pevent). This argument is available in the frontend code in any of the user readout function (pevent). It is also available in the user analyzer code which retrieve the event and provide directly access to the event header (pheader) and to the user part of the event (pevent). Sub-function using pevent would then be able to get back the the header through the use of the macros.

- TRIGGER\_MASK
- EVENT\_ID
- SERIAL\_NUMBER
- TIME\_STAMP

\* from examples/experiment/adccalib.c

```

INT adc_calib(EVENT_HEADER *pheader, void *pevent)
{
    INT    i, n_adc;
    WORD   *pdata;
    float  *cadc;

    // look for ADC0 bank, return if not present
    n_adc = bk_locate(pevent, "ADC0", &pdata);
    if (n_adc == 0 || n_adc > N_ADC)
        return 1;

    // create calibrated ADC bank
    bk_create(pevent, "CADC", TID_FLOAT, &cadc);
    ...
}

```

\* from examples/experiment/frontend.c

```

INT read_trigger_event(char *pevent, INT off)
{
    WORD *pdata, a;
    INT  q, timeout;

    // init bank structure
    bk_init(pevent);
    ...
}

```

- Frontend C-code fragment from running experiment:

```

INT read_ge_event(char *pevent, INT offset)
{
    static WORD *pdata;
    INT i, x, q;
    WORD temp;

    // Change the time stamp in millisecond for the Super event
    TIME_STAMP(pevent) = ss_millitime();

    bk_init(pevent);
    bk_create(pevent, "GERM", TID_WORD, &pdata);
    ...
}

```

- Frontend C-code fragment from running experiment

```

...
lam = *((DWORD *)pevent);

if (lam & LAM_STATION(JW_N))
{

```

```

...
// compose event header
TRIGGER_MASK(pevent) = JW_MASK;
EVENT_ID(pevent)     = JW_ID;
SERIAL_NUMBER(pevent)= eq->serial_number++;
// read MCS event
size = read_mcs_event(pevent);
// Correct serial in case event is empty
if (size == 0)
    SERIAL_NUMBER(pevent) = eq->serial_number--;
...
}
...

```

**6.6.7.1 YBOS library** Exportable ybos functions through inclusion of [ybos.h](#)

[Midas build options and operation considerations - Top - Frequently Asked Questions](#)

## 6.7 Frequently Asked Questions

[Midas Code and Libraries - Top - Data format](#)

Feel free to ask questions to one of us ( [Stefan Ritt](#) , [Pierre-Andre Amaudruz](#)) or visit the [Midas Forum](#)

### 1. Why the CAMAC frontend generate a core dump (linux)?

- If you're not using a Linux driver for the CAMAC access, you need to start the CAMAC frontend application through the task launcher first. See [dio task](#) or [mcnaf task](#). This task launcher will grant you access permission to the IO port mapped to your CAMAC interface.

### 2. Where does Midas log file resides?

- As soon as any midas application is started, a file midas.log is produce. The location of this file depends on the setup of the experiment.
  - (a) if **exptab** is present and contains the experiment name with the corresponding directory, this is where the file **midas.log** will reside.
  - (b) if the midas logger [mlogger task](#) is running the midas.log will be in the directory pointed by the "Data Dir" key under the /logger key in the ODB tree.
  - (c) Otherwise the file midas.log will be created in the current directory in which the Midas application is started.

### 3. How do I protected my experiment from being controlled by aliases?

- Every experiment may have a dedicated password for accessing the experiment from the web browser. This is setup through the ODBedit program with the command **webpass**. This will create a **Security** tree under **/Experiment** with a new key **Web Password** with the encrypted word. By default Midas allows Full Read Access to all the Midas Web pages. Only when modification of a Midas field the web password will be requested. The password is stored as a cookie in the target web client for 24 hours See [ODB /Experiment Tree](#).
- Other options of protection are described in [ODB /Experiment Tree](#) which gives to dedicated hosts access to ODB or dedicated programs.

#### 4. Can I compose my own experimental web page?

- Only under 1.8.3 though. You can create your own html code using your favorite HTML editor. By including custom Midas Tags, you will have access to any field in the ODB of your experiment as well as the standard button for start/stop and page switch. See [mhttpd task](#) , [Custom page](#).

#### 5. How do I prevent user to modify ODB values while the run is in progress?

- By creating the particular **/Experiment/Lock** when running/ ODB tree, you can include symbolic links to any odb field which needs to be set to **Read Only** field while the run state is on. See [ODB /Experiment Tree](#).

#### 6. Is there a way to invoke my own scripts from the web?

- Yes, by creating the ODB tree **/Script** every entry in that tree will be available on the Web status page with the name of the key. Each key entry is then composed with a list of ODB field (or links) starting with the executable command followed by as many arguments as you wish to be passed to the script. See [ODB /Script Tree](#).

#### 7. I've seen the ODB prompt displaying the run state, how do you do that?

- Modify the **/System/prompt** field. The "S" is the trick.

```
Fri> odb -e bnmrl -h isdaq01
[host:expt:Stopped]/cd /System/
[host:expt:Stopped]/System>ls
Clients
Client Notify                                0
Prompt                                       [%h:%e:%S]%p
Tmp
[host:expt:Stopped]/System
[host:expt:Stopped]/Systemset prompt [%h:%e:%S]%p>
[host:expt:Stopped]/System>ls
Clients
Client Notify                                0
Prompt                                       [%h:%e:%S]%p>
Tmp
[host:expt:Stopped]/System>set Prompt [%h:%e:%s]%p>
[host:expt:S]/System>set Prompt [%h:%e:%S]%p>
[host:expt:Stopped]/System>
```

## 8. I've setup the alarm on one parameter in ODB but I can't make it trigger?

- The alarm scheme works only under **ONLINE**. See [ODB /RunInfo Tree](#) for **Online Mode**. This flag may have been turned off due to analysis replay using this ODB. Set this key back to 1 to get the alarm to work again.

## 9. How do I extend an array in ODB?

- When listing the array from ODB with the -l switch, you get a column indicating the index of the listed array. You can extend the array by setting the array value at the new index. The intermediate indices will be filled with the default value depending on the type of the array. This can easily be corrected by using the wildcard to access all or a range of indices.

```
[local:midas:S]/>mkdir tmp
[local:midas:S]/>cd tmp
[local:midas:S]/tmp>create int number
[local:midas:S]/tmp>create string foo
String length [32]:
[local:midas:S]/tmp>ls -l
```

Key name	Type	#Val	Size	Last	Opn	Mode	Value
number	INT	1	4	>99d	0	RWD	0
foo	STRING	1	32	1s	0	RWD	

```
[local:midas:S]/tmp>set number[4] 5
[local:midas:S]/tmp>set foo[3]
[local:midas:S]/tmp>ls -l
```

Key name	Type	#Val	Size	Last	Opn	Mode	Value
number	INT	5	4	12s	0	RWD	
		[0]			0		
		[1]			0		
		[2]			0		
		[3]			0		
		[4]			5		
foo	STRING	4	32	2s	0	RWD	
		[0]					
		[1]					
		[2]					
		[3]					

```
[local:midas:S]/tmp>set number[1..3] 9
[local:midas:S]/tmp>set foo[2] "A default string"
[local:midas:S]/tmp>ls -l
```

Key name	Type	#Val	Size	Last	Opn	Mode	Value
number	INT	5	4	26s	0	RWD	
		[0]			0		
		[1]			9		
		[2]			9		
		[3]			9		
		[4]			5		
foo	STRING	4	32	3s	0	RWD	
		[0]					
		[1]					
		[2]					A default string
		[3]					

1. How do I ...

- ...

[Midas Code and Libraries - Top - Data format](#)

## 6.8 Components

[Introduction - Top - Quick Start](#)

Midas system is based on a modular scheme that allows scalability and flexibility. Each component's operation is handled by a sub-set of functions. but all the components are grouped in a single library (libmidas.a, libmidas.so(UNIX), midas.dll(NT)).

The overall C-code is about 80'000 lines long and makes up over 450 functions (version 1.9.0). But from a user point of view, only a subset of these routines are needed for most operations.

Each Midas component is briefly described below but throughout the documentation more detailed information will be given regarding each of their capabilities. All these components are available from the "off-the-shelf" package. Basic components such as the [Buffer Manager](#), [Online Database](#), [Message System](#), [Run Control](#) are by default operational. The other needs are to be enabled by the user simply by either starting an application or by activation of the component through the [Online Database](#). A general picture of the Midas system is displayed below.



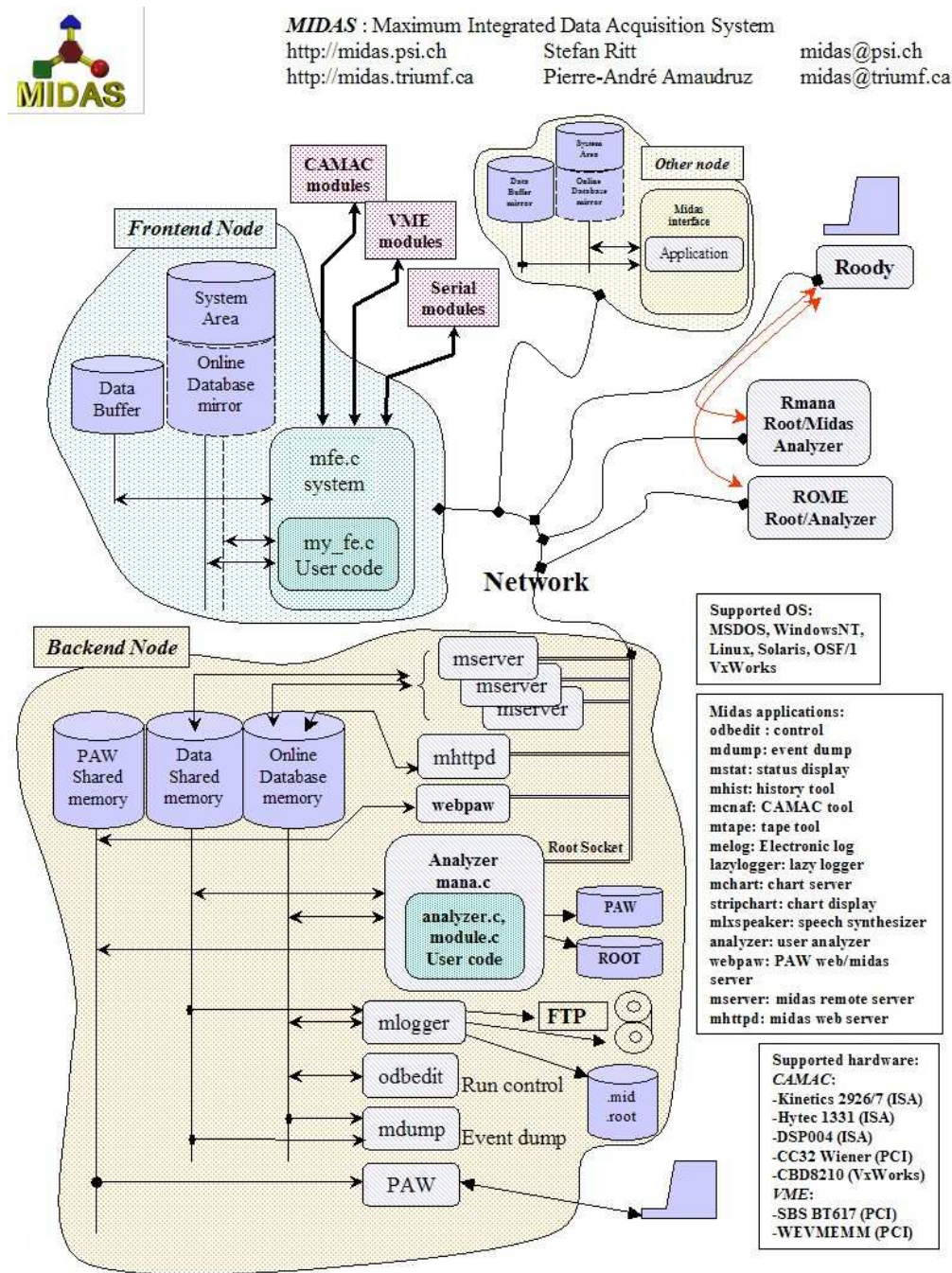


Figure 10: Components



The main elements of the **Midas** package are listed below with a short description of its functionality.

- **Buffer Manager** Data flow and messages passing mechanism.
- **Message System** Specific Midas messages flow.
- **Online Database** Central information area.
- **Frontend** Acquisition code.
- **Midas Server** Remote access server (RPC server).
- **Data Logger** Data storage.
- **Analyzer** Data analyzer.
- **Run Control** Data flow control.
- **Slow Control** system Device monitoring and control.
- **History system** Event history storage and retrieval.
- **Alarm System** Overall system and user alarm.
- **Electronic Logbook** Online User Logbook.

### 6.8.1 Buffer Manager

The "buffer manager" consists of a set of library functions for event collection and distribution. A buffer is a shared memory region in RAM, which can be accessed by several processes, called "clients". Processes sending events to a buffer are called "producers", processes reading events are called "consumers".

A buffer is organized as a FIFO (First-In-First-Out) memory. Consumers can specify which type of events they want to receive from a buffer. For this purpose each event contains a MIDAS header with an event ID and other pertinent information.

Buffers can be accessed locally or remotely via the MIDAS server. The data throughput for a local configuration composed of one producer and two consumers is about 10MB/sec on a 200 MHz Pentium PC running Windows NT. In the case of remote access, the network may be the essential speed limitation element.

A common problem in DAQ systems is the possible crash of a client, like a user analyzer. This can cause the whole system to hang up and may require a restart of the DAQ inducing a lost of time and eventually precious data. In order to address this problem, a special watchdog scheme has been implemented. Each client attached to the buffer

manager signals its presence periodically by storing a time stamp in the shared memory. Every other client connected to the same buffer manager can then check if the other parties are still alive. If not, proper action is taken consisting of removing the dead client hooks from the system leaving the system in a working condition.

### 6.8.2 Message System

Any client can produce status or error messages with a single call using the MIDAS library. These messages are then forwarded to any other clients who maybe susceptible to receive these messages as well as to a central log file system. The message system is based on the buffer manager scheme. A dedicated buffer is used to receive and distribute messages. Predefined message type contained in the Midas library covers most of the message requirement.

### 6.8.3 Online Database

In a distributed DAQ environment configuration data is usually stored in several files on different computers. MIDAS uses a different approach. All relevant data for a particular experiment are stored in a central database called "Online Database" (ODB). This database contains run parameters, logging channel information, condition parameters for front-ends and analyzers and slow control values as well as status and performance data.

The main advantage of this concept is that all programs participating in an experiment have full access to these data without having to contact different computers. The possible disadvantage could be the extra load put on the particular host serving the ODB.

The ODB is located completely in shared memory of the back-end computer. The access function to an element of the ODB has been optimized for speed. Measurement shows that up to 50,000 accesses per second local connection and around 500 accesses per second remotely over the MIDAS server can be obtained.

The ODB is hierarchically structured, similar to a file system, with directories and sub-directories. The data is stored in pairs of a key/data, similar to the Windows NT registry. Keys can be dynamically created and deleted. The data associated with a key can be of several types such as: byte, words, double words, float, strings, etc. or arrays of any of those. A key can also be a directory or a symbolic link (like on Unix).

The Midas library provides a complete set of functions to manage and operate on these keys. Furthermore any ODB client can register a [Hot Link](#) between a local C-structure and a element of the ODB. Whenever a client (program) changes a value in this subtree, the C-structure automatically receives an update of the changed data. Additionally, a client can register a callback function which will be executed as soon as the hot-link's update has been received. For more information see [ODB Structure](#).

### 6.8.4 Midas Server

For remote access to a MIDAS experiment a remote procedure call (RPC) server is available. It uses an optimized MIDAS RPC scheme for improved access speed. The server can be started manually or via `inetd` (UNIX) or as a service under Windows NT. For each incoming connection it creates a new sub-process which serves this connection over a TCP link. The Midas server not only serves client connection to a given experiment, but takes the experiment's name as a parameter meaning that only one Midas server is necessary to manage several experiments on the same node.

### 6.8.5 Frontend

The *frontend* program refers to a task running on a particular computer which has access to hardware equipment. Several *frontends* can be attached simultaneously to a given experiment. Each *frontend* can be composed of multiple *Equipment*. *Equipment* is a single or a collection of sub-task(s) meant to collect and regroup logically or physically data under a single and uniquely identified event.

This program is composed of a general framework which is experiment independent, and a set of template routines for the user to fill. This program will:

- Register the given *Equipment(s)* list to the Midas system.
- Provide the mean of collecting data from hardware source defined in each equipment.
- Gather these data in a known format (Fixed, Midas, Ybos) for each equipment.
- Send these data to the buffer manager.
- Collect periodically statistic of the acquisition task and send it to the Online Database.

The frontend framework takes care of sending events to the buffer manager and optionally a copy to the ODB. A "Data cache " in the frontend and on the server side reduces the amount of network operations pushing the transfer speed closer to the physical limit of the network configuration.

The data collection in the frontend framework can be triggered by several mechanisms. Currently the frontend supports four different kind of event trigger:

- *Periodic events*: Scheduled event based on a fixed time interval. They can be used to read information such as scaler values, temperatures etc.
- *Polled events*: Hardware trigger information read continuously which in turns if the signal is asserted it will trigger the equipment readout.
  - *LAM events*: Generated only when pre-defined LAM is asserted:

- *Interrupt events*: Generated by particular hardware device supporting interrupt mode.
- *Slow Control events*: Special class of events that are used in the slow control system.

Each of these types of triggering can be enabled/activated for a particular experiment state, Transition State or a combination of any of them. Examples such as "read scaler event only when running" or "read periodic event if a state is not paused and on all transitions" are possible.

Dedicated header and library files for hardware access to CAMAC, VME, Fast-bus, GPIB and RS232 are part of Midas distribution set. For more information see [Frontend code](#).

### 6.8.6 Data Logger

The data logger is a client usually running on the backend computer (can be running remotely but performance may suffer) receiving events from the buffer manager and saving them onto disk, tape or via FTP to a remote computer. It supports several parallel logging channels with individual event selection criteria. Data can currently be written in five different formats: *MIDAS binary*, *YBOS binary*, *ASCII*, *ROOT* and *DUMP* (see [Midas format](#), [YBOS format](#)).

Basic functionality of the logger includes:

- Run Control based on:
  - event limit
  - recorded byte limit
  - logging device full.
- Logging selection of particular events based on Event Identifier.
- Auto restart feature allowing logging of several runs of a given size without user intervention.
- Recording of ODB values to a so called [History system](#)
- Recording of the ODB to all or individual logging channel at the beginning and end of run state as well as to a separate disk file in a ASCII format. For more information see [ODB /Logger Tree](#).

### 6.8.7 Analyzer

As in the front-end section, the analyzer provided by Midas is a framework on which the user can develop his/her own application. This framework can be built for private analysis (no external analyzer hooks) or specific analysis packages such as HBOOK, ROOT from the CERN (none of those libraries are included in the MIDAS distribution). The analyzer takes care of receiving events (a few lines of code are necessary to receive events from the buffer manager), initializes the HBOOK or ROOT system and automatically books N-tuples/TTree for all events. Interface to user routines for event analysis is provided.

The analyzer is structured into "stages", where each stage analyzes a subset of the event data. Low level stages can perform ADC and TDC calibration, while high level stages can calculate "physics" results. The same analyzer executable can be used to run online (receive events from the buffer manager) and off-line (read events from file). When running online, generated N-tuples/TTree are stored in a ring-buffer in shared memory. They can be analyzed with PAW without stopping the run. For ROOT please refer to the documentation ...

When running off-line, the analyzer can read MIDAS binary files, analyze the events, add calculated data for each event and produce a HBOOK RZ output file which can be read in by PAW later. The analyzer framework also supports analyzer parameters. It automatically maps C-structures used in the analyzer to ODB records via [Hot Link](#). To control the analyzer, only the values in the ODB have to be changed which get automatically propagated to the analyzer parameters. If analysis software has been already developed, Midas provides the functionality necessary to interface the analyzer code to the Midas data channel. Support for languages such as C, FORTRAN, PASCAL is available.

### 6.8.8 Run Control

As mentioned earlier, the Online Database (ODB) contains all the pertinent information regarding an experiment. For that reason a run control program requires only to access the ODB. A basic program supplied in the package called ODBedit provides a simple and safe mean for interacting with ODB. Through that program essentially all the flexibility of the ODB is available to the user's fingertips.

Three "Run State" define the state of Midas *Stopped*, *Paused*, *Running*. In order to change from one state to another, Midas provides four basic "Transition" function *Tr\_Start*, *Tr\_pause*, *Tr\_resume*, *Tr\_Stop*. During these transition periods, any Midas client register to receive notification of such message will be able to perform its task within the overall run control of the experiment.

In Order to provide more flexibility to the transition sequence of all the midas clients connected to a given experiment, each transition function has a *transition sequence number* attached to it. This transition sequence is used to establish within a given transition the order of the invocation of the Midas clients (from the lower seq.# to the

largest).

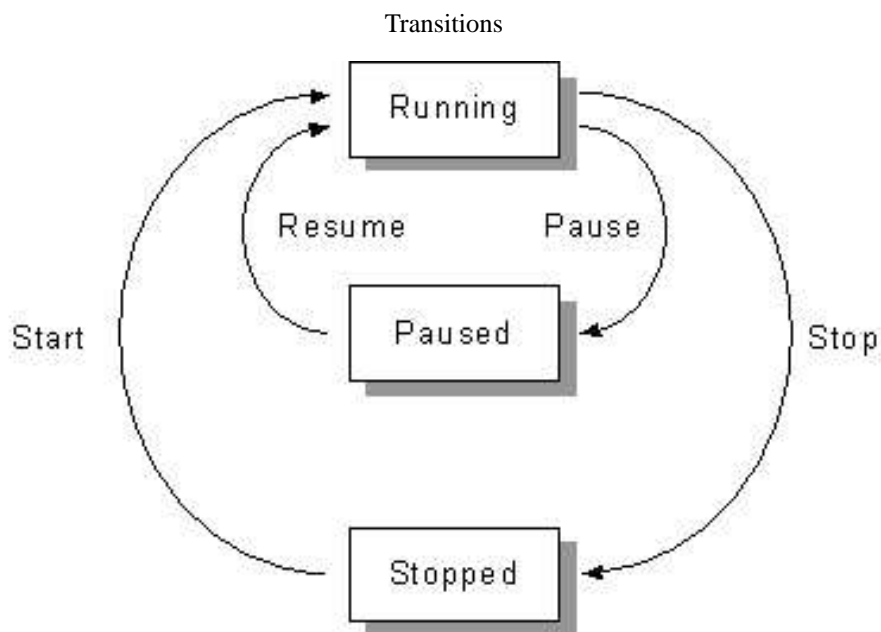


Figure 11: Transitions

### 6.8.9 Slow Control

The Slow control system is a special front-end equipment or program dedicated to the control of hardware module based on user parameters. It takes advantage of the Online Database and its [Hot Link](#) capability. Demand and measured values from slow control system equipment like high voltage power supplies or beam line magnets are stored directly in the ODB.

To control a device it is then enough to modify the demand values in the database. The modified value gets automatically propagated to the slow control system, which in turn uses specific device driver to control the particular hardware. Measured values from the hardware are periodically send back to the ODB to reflect the current status of the sub-system.

The Slow control system is organized in "Classes Driver ". Each Class driver refers to a particular set of functionality of that class i.e. High-Voltage, Temperature, General I/O, Magnet etc. The implementation of the device specific is done in a second stage "Device Driver" while the actual hardware implementation is done in a third layer "Bus

Driver". The current MIDAS distribution already has some device driver for general I/O and commercial High Voltage power supply system (see [Supported hardware](#)). The necessary code composing the hardware device driver is kept simple by only requiring a "set channel value" and "read channel value". For the High Voltage class driver, a graphical user interface under Windows or Qt is already available. It can set, load and print high voltages for any devices of that class.

#### 6.8.10 History system

The MIDAS history system is a recording function embedded in the [mlogger task](#). Parallel to its main data logging function of defined channels, the Midas logger can store slow control data and/or periodic events on disk file. Each history entry consists of the time stamp at which the event has occurred and the value[s] of the parameter to be recorded.

The activation of a recording is not controlled by the history function but by the actual equipment (see [Frontend code](#)). This permits a higher flexibility of the history system such as dynamic modification of the event structure without restarting the Midas logger. At any given time, data-over-time relation can be queried from the disk file through a Midas utility [mhist task](#) or displayed through the [mhttpd task](#).

The history data extraction from the disk file is done using low level file function giving similar result as a standard database mechanism but with faster access time. For instance, a query of a value, which was written once every minute over a period of one week, is performed in a few seconds. For more information see [History system, ODB /History Tree](#).

#### 6.8.11 Alarm System

The Midas alarm mechanism is a built-in feature of the Midas server. It acts upon the description of the required alarm set defined in the Online Database (ODB). Currently the internal alarms supports the following mechanism:

- ODB value over fixed threshold at regular time interval, a pre-defined ODB value will be compared to a fixed value.
- Midas client control During Run state transition, pre-defined Midas client name will be checked if currently present.
- General C-code alarm setting Alarm C function permitting to issue user defined alarm.

The action triggered by the alarm is left to the user through the mean of running a detached script. But basic alarm report is available such as:

- Logging the alarm message to the experiment log file.

- Sending a "Electronic Log message" (see [Electronic Logbook](#)).
- Interrupt data acquisition. For more information see [Alarm System, ODB /Alarms Tree](#).

#### 6.8.12 Electronic Logbook

The Electronic logbook is a feature which provides the experimenter an alternative way of logging his/her own information related to the current experiment. This electronic logbook may supplement or complement the standard paper logbook and in the mean time allow "web publishing" of this information. Indeed the electronic logbook information is accessible from any web browser as long as the [mhttpd task](#) is running in the background of the system. For more information see [Electronic Logbook, mhttpd task](#).

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## 6.9 Event Builder Functions

Midas supports event building operation through a dedicated [mevb task](#) application. Similar to the [Midas Frontend application](#), the [mevb task](#) application requires the definition of an equipment structure which describes its mode of operation. The set of parameter for this equipment is limited to:

- Equipment name (appears in the Equipment list).
- Equipment type (should be 0).
- Destination buffer name (SYSTEM if destination event goes to logger).
- Event ID and Trigger mask for the build event (destination event ID).
- Data format (should match the source data format).

Based on the given buffer name provided at the startup time through the *-b buffer\_name* argument, the [mevb task](#) will scan all the equipments and handle the building of an event based on the identical buffer name found in the equipment list **if the frontend equipment type includes the [EQ\\_EB](#) tag**.

### 6.9.1 Principle of the Event Builder and related frontend fragment

Possibly in case of multiple frontend, the same "fragment" code may run in the different hardware frontend. In order to prevent to build nFragment different frontend task, the -i index provided at the start of the frontend will replicate the same application image with



the necessary dynamic modification required for the proper Event Building operation. The "-i index" argument will provide the index to be appended to the minimal set of parameter to distinguish the different frontends. These parameters are:

- **frontend\_name** : Name of the frontend application.
- **equipment name** : Name of the equipment (from the Equipment structure).
- **event buffer**: Name of the destination buffer (from the Equipment structure).

Frontend code:

```
/* The frontend name (client name) as seen by other MIDAS clients */
char *frontend_name = "ebfe";
...
EQUIPMENT equipment[] = {
    {"Trigger",          /* equipment name */
     1, TRIGGER_ALL,     /* event ID, trigger mask */
     "BUF",              /* event buffer */
     EQ_POLLED | EQ_EB,  /* equipment type + EQ_EB flag <<<<<< */
     LAM_SOURCE(0, 0xFFFFF), /* event source crate 0, all stations */
     "MIDAS",           /* format */

```

Once the frontend is started with *-i 1*, the Midas client name, equipment name and buffer name will be modified.

```
> ebfe -i 1 -D
...
oddbedit
[local:midas:S]/Equipment>ls
Trigger01
[local:midas:S]Trigger01>ls -lr
Key name                                Type      #Val  Size  Last Opn Mode Value
-----
Trigger01                               DIR
  Common                               DIR
    Event ID                           WORD      1    2    18h 0   RWD  1
    Trigger mask                       WORD      1    2    18h 0   RWD  65535
    Buffer                             STRING    1   32    18h 0   RWD  BUF01
    Type                              INT       1    4    18h 0   RWD  66
    Source                             INT       1    4    18h 0   RWD  16777215
    Format                             STRING    1    8    18h 0   RWD  MIDAS
    Enabled                            BOOL      1    4    18h 0   RWD  y
    Read on                            INT       1    4    18h 0   RWD  257
    Period                             INT       1    4    18h 0   RWD  500
    Event limit                         DOUBLE    1    8    18h 0   RWD  0
    Num subevents                       DWORD     1    4    18h 0   RWD  0
    Log history                         INT       1    4    18h 0   RWD  0
    Frontend host                       STRING    1   32    18h 0   RWD  hostname
    Frontend name                       STRING    1   32    18h 0   RWD  ebfe01
    Frontend file name                  STRING    1  256    18h 0   RWD  ../eventbuilder/ebfe.c
...

```

Independently of the event ID, each fragment frontend will send its data to the composed event buffer (BUFxx). The event builder task will make up a list of all the equipment belonging to the same event buffer name (BUFxx). If multiple equipments exists in the same frontend, the equipment type (EQ\_EB) and the event buffer name will distinguish them.

The Event Builder flowchart below shows a general picture of the event process cycle of the task. The Event Builder runs in polling mode over all the source buffers collected at the begin of run procedure. Once a fragment has been received from all enabled source ("../Settings/Fragment Required y"), an internal event serial number check is performed prior passing all the fragment to the user code. Content of each fragment can be done within the user code for further consistency check.

Event Builder Flowchart.

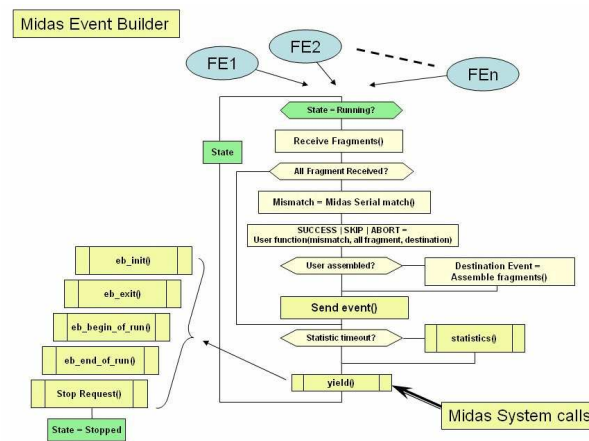


Figure 12: Event Builder Flowchart.

### 6.9.2 Event builder Tree

The Event builder tree will be created under the Equipment list and will appear as a standard equipment. The sub tree */Common* will contains the specific setting of the equipment while the */Variables* will remain empty. */Settings* will have particular parameter for the Event Builder itself. The **User Field** is an ASCII string passed from the ODB to the `eb_begin_of_run()` which can be used for steering the event builder.

```
[local:midas:S]EB>ls -lr
```

Key name	Type	#Val	Size	Last Opn	Mode	Value
----------	------	------	------	----------	------	-------

---

EB	DIR							
Common	DIR							
Event ID	WORD	1	2	5m	0	RWD	1	
Trigger mask	WORD	1	2	5m	0	RWD	0	
Buffer	STRING	1	32	5m	0	RWD	SYSTEM	
Type	INT	1	4	5m	0	RWD	0	
Source	INT	1	4	5m	0	RWD	0	
Format	STRING	1	8	5m	0	RWD	MIDAS	
Enabled	BOOL	1	4	5m	0	RWD	y	
Read on	INT	1	4	5m	0	RWD	0	
Period	INT	1	4	5m	0	RWD	0	
Event limit	DOUBLE	1	8	5m	0	RWD	0	
Num subevents	DWORD	1	4	5m	0	RWD	0	
Log history	INT	1	4	5m	0	RWD	0	
Frontend host	STRING	1	32	5m	0	RWD	hostname	
Frontend name	STRING	1	32	5m	0	RWD	Ebuilder	
Frontend file name	STRING	1	256	5m	0	RWD	c:\...\ebuser.c	
Variables	DIR							
Statistics	DIR							
Events sent	DOUBLE	1	8	3s	0	RWDE	944	
Events per sec.	DOUBLE	1	8	3s	0	RWDE	0	
kBytes per sec.	DOUBLE	1	8	3s	0	RWDE	0	
Settings	DIR							
Number of Fragment	INT	1	4	9s	0	RWD	2	
User build	BOOL	1	4	9s	0	RWD	n	
User Field	STRING	1	64	9s	0	RWD	100	
Fragment Required	BOOL	2	4	9s	0	RWD		
		[0]				y		
		[1]				y		

### 6.9.3 EB Operation

Using the "eb>" as the cwd for the example, the test procedure is the following: cwd :  
midas/examples/eventbuilder -> referred as eb>

- Build the mevb task:

```
eb> setenv MIDASSYS /home/midas/midas-1.9.5
eb> make
cc -g -I/usr/local/include -I../drivers -DOS_LINUX -Dextname -c ebuser.c
cc -g -I/usr/local/include -I../drivers -DOS_LINUX -Dextname -o mevb mevb.c \
    ebuser.o /usr/local/lib/libmidas.a -lm -lz -lutil -lnsl
cc -g -I/usr/local/include -I../drivers -DOS_LINUX -Dextname \
    -c ../drivers/bus/camacnul.c
cc -g -I/usr/local/include -I../drivers -DOS_LINUX -Dextname -o ebfe \
    ebfe.c camacnul.o /usr/local/lib/mfe.o /usr/local/lib/libmidas.a \
    -lm -lz -lutil -lnsl
eb>
```

- Start the following 4 applications in 4 different windows connecting to a defined experiment. – If no experiment defined yet, set the environment variable MIDAS\_DIR to your current directory before spawning the windows.

```
xterm1: eb> ebfe -i 1
xterm2: eb> ebfe -i 2
xterm3: eb> mevb -b BUF
xterm4: eb> odbedit

[local:Default:S]/>ls
System
Programs
Experiment
Logger
Runinfo
Alarms
Equipment
[local:Default:S]/>scl
N[local:midas:S]EB>scl
Name          Host
ebfe01         hostname
ebfe02         hostname
ODBEdit        hostname
Ebuilder       hostname
[local:Default:S]/>
[local:Default:S]/>start now
Starting run #2
```

- The xterm3 (mevb) should display something equivalent to the following, as the print statements are coming from the ebuser code.
- The same procedure can be repeated with the fe1 and fe2 started on remote nodes.

## 6.10 Internal features

### [Quick Start](#) - [Top](#) - [Utilities](#)

This section refers to the Midas built-in capabilities. The following sections describe in more details the essential aspect of each feature starting from the frontend to the Electronic Logbook.

- [Run Transition Sequence](#) : Transition Sequence

- [Frontend code](#)
  - [The Equipment structure](#) : Frontend acquisition characteristics
    - \* [MIDAS event construction](#) : Midas event description
    - \* [YBOS event construction](#) : YBOS event description
    - \* [FIXED event construction](#) : FIXED event description
  - [Deferred Transition](#) : Transition postpawning operation
  - [Super Event](#) : Short event compaction operation
  - [Event Builder Functions](#) : Event Builder operation
- [ODB Structure](#) : Online Database Trees
- [Hot Link](#) : Notification mechanism
- [Alarm System](#) : Alarm scheme
- [Slow Control System](#) : Specific Slow Control mechanism
- [Electronic Logbook](#) : Essential utility
- [Log file](#) : Message, error, report

### 6.10.1 Run Transition Sequence

The run transition sequence has been modified since Midas version 1.9.5. The new scheme utilize transition sequence level which provides the user a full control of the sequencing of any Midas client.

Midas defines 3 states of Data acquisition: *STOPPED*, *PAUSED*, *RUNNING*

These 3 states require 4 transitions : *TR\_START*, *TR\_PAUSE* , *TR\_RESUME*, *TR\_STOP*

Any Midas client can request notification for run transition. This notification is done by registering to the system for a given transition ( [cm\\_register\\_transition\(\)](#) ) by specifying the transition type and the sequencing number (1 to 1000). Multiple registration to a given transition can be requested. This last option permits for example to invoke two callback functions prior and after a given transition such as the start of the logger.

```
my_application.c
// Callback
INT before_logger(INT run_number, char *error)
{
    printf("Initialize ... before the logger gets the Start Transition");
    ...
    return CM_SUCCESS;
}
```

```
// Callback
INT after_logger(INT run_number, char *error)
{
    printf("Log initial info to file... after logger gets the Start Transition");
    ...
    return CM_SUCCESS;
}

INT main()
{
    ...
    cm_register_transition(TR_START, before_logger, 100);
    cm_register_transition(TR_START, after_logger, 300);
    ...
}
```

By Default the following sequence numbers are used:

- Frontend : TR\_START: 500, TR\_PAUSE: 500, TR\_RESUME: 500,TR\_STOP: 500
- Analyzer : TR\_START: 500, TR\_PAUSE: 500, TR\_RESUME: 500,TR\_STOP: 500
- Logger : TR\_START: 200, TR\_PAUSE: 500, TR\_RESUME: 500,TR\_STOP: 800
- EventBuilder : TR\_START: 300, TR\_PAUSE: 500, TR\_RESUME: 500,TR\_STOP: 700

The sequence number appears into the ODBedit under /System/Clients/

```
[local:midas:S]Clients>ls -lr
Key name                                     Type      #Val  Size  Last Opn Mode Value
-----
Clients                                     DIR
1832                                         DIR
      Name                                STRING    1    32   21h  0   R   ebfe01
      Host                                STRING    1   256   21h  0   R   pierre2
      Hardware type                        INT        1     4   21h  0   R    42
      Server Port                          INT        1     4   21h  0   R   2582
      Transition START                     INT        1     4   21h  0   R    500
      Transition STOP                      INT        1     4   21h  0   R    500
      Transition PAUSE                     INT        1     4   21h  0   R    500
      Transition RESUME                    INT        1     4   21h  0   R    500
      RPC                                  DIR
      17000                                BOOL       1     4   21h  0   R    y
3872                                         DIR
      Name                                STRING    1    32   21h  0   R   ebfe02
      Host                                STRING    1   256   21h  0   R   pierre2
      Hardware type                        INT        1     4   21h  0   R    42
      Server Port                          INT        1     4   21h  0   R   2585
      Transition START                     INT        1     4   21h  0   R    500
```

	Transition STOP	INT	1	4	21h	0	R	500
	Transition PAUSE	INT	1	4	21h	0	R	500
	Transition RESUME	INT	1	4	21h	0	R	500
	RPC	DIR						
	17000	BOOL	1	4	21h	0	R	y
2220		DIR	<----- ODBedit doesn't need transition					
	Name	STRING	1	32	42s	0	R	ODBedit
	Host	STRING	1	256	42s	0	R	pierre2
	Hardware type	INT	1	4	42s	0	R	42
	Server Port	INT	1	4	42s	0	R	3429
568		DIR	<----- Event Builder					
	Name	STRING	1	32	26s	0	R	Ebuilder
	Host	STRING	1	256	26s	0	R	pierre2
	Hardware type	INT	1	4	26s	0	R	42
	Server Port	INT	1	4	26s	0	R	3432
	Transition START	INT	1	4	26s	0	R	300
	Transition STOP	INT	1	4	26s	0	R	700
2848		DIR	<----- Logger					
	Name	STRING	1	32	5s	0	R	Logger
	Host	STRING	1	256	5s	0	R	pierre2
	Hardware type	INT	1	4	5s	0	R	42
	Server Port	INT	1	4	5s	0	R	3436
	Transition START	INT	1	4	5s	0	R	200
	Transition STOP	INT	1	4	5s	0	R	800
	Transition PAUSE	INT	1	4	5s	0	R	500
	Transition RESUME	INT	1	4	5s	0	R	500
	RPC	DIR						
	14000	BOOL	1	4	5s	0	R	y

The `/System/Clients/...` tree reflects the system at a given time. If a permanent change of a client sequence number is required, the system call `cm_set_transition_sequence()` can be used.

### 6.10.2 Frontend code

Under MIDAS, experiment hardware is structured into "equipment" which refers to a collection of hardware devices such as: a set of high voltage supplies, one or more crates of digitizing electronics like ADCs and TDCs or a set of scaler. On a software point of view, we keep that same equipment term to refer to the mean of collecting the data related to this "hardware equipment". The data from this equipment is then gathered into an "event" and send to the back-end computer for logging and/or analysis.

The frontend program (image) consists of a system framework contained in `mfe.c` (hidden from the user) and a user part contained in `frontend.c`. The hardware access is only apparent in the user code.

Several libraries and drivers exist for various bus systems like CAMAC, VME or RS232. They are located in the drivers directory of the MIDAS distribution. Some libraries consist only of a header file, others of a C file plus a header file. The file names usually refer to the manufacturer abbreviation followed by the model number of

the device. The libraries are continuously expanding to widen Midas support.

ESONE standard routines for CAMAC are supplied and permit to re-use the frontend code among different platforms as well as different CAMAC hardware interface without the need of modification of the code.

The user frontend code consists of several sections described in order below. Example of frontend code can be found under the `../examples/experiment` directory:

- **[Global declaration]** Up to the User global section the declarations are system wide and should not be removed.
  - `frontend_name` This value can be modified to reflect the purpose of the code.
  - `frontend_call_loop()` Enables the function `frontend_loop()` to run after every equipment loop.
  - `display_period` defined in millisecond the time interval between refresh of a frontend status display. The value of zero disable the display. If the frontend is started in a background with the display enabled, the stdout should be redirected to the null device to prevent process to hang.
  - `max_event_size` specify the maximum size of the expected event in byte.
  - `event_buffer_size` specify the maximum size of the buffer in byte to be allocated by the system. After these system parameters, the user may add his or her own declarations.

```
// The frontend name (client name) as seen by other MIDAS clients
char *frontend_name = "Sample Frontend";

// The frontend file name, don't change it
char *frontend_file_name = __FILE__;

// frontend_loop is called periodically if this variable is TRUE
BOOL frontend_call_loop = FALSE;

//a frontend status page is displayed with this frequency in ms
INT display_period = 3000;

//maximum event size produced by this frontend
INT max_event_size = 10000;

//buffer size to hold events
INT event_buffer_size = 10*10000;

// Global user section
// number of channels
#define N_ADC 8
#define N_TDC 8
#define N_SCLR 8

CAMAC crate and slots
#define CRATE 0
#define SLOT_C212 23
```



```
#define SLOT_ADC    1
#define SLOT_TDC    2
#define SLOT_SCLR   3
```

- **[Prototype functions]** The first group of prototype(7) declare the pre-defined system functions which should be present. The second group defines the user functions associated to the declared equipments. All the fields are described in detailed in the following section.

```
INT frontend_init();
INT frontend_exit();
INT begin_of_run(INT run_number, char *error);
INT end_of_run(INT run_number, char *error);
INT pause_run(INT run_number, char *error);
INT resume_run(INT run_number, char *error);
INT frontend_loop();

INT read_trigger_event(char *pevent, INT off);
INT read_scaler_event(char *pevent, INT off);
```

- [Remark] Each equipment has the option to force itself to run at individual transition time see [ro\\_mode](#) . At transition time the system functions [begin\\_of\\_run\(\)](#), [end\\_of\\_run\(\)](#), [pause\\_run\(\)](#), [resume\\_run\(\)](#) runs prior to the equipment functions. This gives the system the chance to take basic action on the transition request (Enable/disable LAM) before the equipment runs. The sequence of operation is the following:

- \* [frontend\\_init\(\)](#) : Runs once after system initialization, before equipment registration.
- \* [begin\\_of\\_run\(\)](#) : Runs after system statistics reset, before any other Equipments at each Beginning of Run request.
- \* [pause\\_run\(\)](#): Runs before any other Equipments at each Run Pause request.
- \* [resume\\_run\(\)](#): Runs before any other Equipments at each Run Resume request.
- \* [end\\_of\\_run\(\)](#): Runs before any other Equipments at each End of Run request.
- \* [frontend\\_exit\(\)](#): Runs once before Slow Control Equipment exit.

- **[Bank definition]** Since the introduction of **ROOT** , the frontend requires to have the definition of the banks in the case you desire to store the raw data in **ROOT** format. This procedure is equivalent to the bank declaration in the analyzer. In the case the format declared is MIDAS, the example below shows the a structured bank and a standard variable length bank declaration for the trigger bank list. The trigger\_bank\_list[] is declared in the equipment structure (see [Eq\\_example](#) ).

```
ADC0_BANK_STR(adc0_bank_str);
BANK_LIST trigger_bank_list[] = {
```

```

        {"ADC0", TID_STRUCT, sizeof(ADC0_BANK), adc0_bank_str},
        {"TDC0", TID_WORD, N_TDC, NULL},
        {""},
    };

    BANK_LIST scaler_bank_list[] = {
        {"SCLR", TID_DWORD, N_ADC, NULL},
        {""},
    };

```

- **[Equipment definition]** See [The Equipment structure](#) for further explanation.

```

#undef USE_INT
EQUIPMENT equipment[] = {

    { "Trigger",                                // equipment name
      1, 0,                                     // event ID, trigger mask
      "SYSTEM",                                 // event buffer
#ifdef USE_INT
      EQ_INTERRUPT,                             // equipment type
#else
      EQ_POLLED,                                // equipment type
#endif
      LAM_SOURCE(CRATE, LAM_STATION(SLOT_C212)), // event source crate 0
      "MIDAS",                                  // format
      TRUE,                                     // enabled
      RO_RUNNING |                              // read only when running
      RO_ODB,                                   // and update ODB
      500,                                     // poll for 500ms
      0,                                       // stop run after this event limit
      0,                                       // number of sub events
      0,                                       // don't log history
      "", "", "",
      ,
      read_trigger_event,                      // readout routine
      NULL, NULL,
      trigger_bank_list,                       // bank list
    },
    ...

```

- **[frontend\_init()]** This function run once only at the application startup. Allows hardware checking, loading/setting of global variables, hot-link settings to the ODB etc... In case of CAMAC the standard call can be:

```

cam_init();                                // Init CAMAC access
cam_crate_clear(CRATE);                    // Clear Crate
cam_crate_zinit(CRATE);                     // Z crate
cam_inhibit_set(CRATE);                     // Set I crate
return SUCCESS;

```

- **[begin\_of\_run()]** This function is called for every run start transition. Allows to update user parameter, load/setup/clear hardware. At the exit of this function

the acquisition should be armed and ready to test the LAM. In case of CAMAC frontend, the LAM has to be declared to the Crate Controller. The function **cam\_lam\_enable(CRATE, SLOT\_IO)** is then necessary in order to enable the proper LAM source station. The LAM source station has to also be enabled (F26).

The argument **run\_number** provides the current run number being started. The argument **error** can be used for returning a message to the system. This string will be logged into the {b midas.log file.

```
// clear units
camc(CRATE, SLOT_C212, 0, 9);
camc(CRATE, SLOT_2249A, 0, 9);
camc(CRATE, SLOT_SC2, 0, 9);
camc(CRATE, SLOT_SC3, 0, 9);

camc(CRATE, SLOT_C212, 0, 26);           // Enable LAM generation

cam_inhibit_clear(CRATE);               // Remove I

cam_lam_enable(CRATE, SLOT_C212);       // Declare Station to CC as LAM source

// set and clear OR1320 pattern bits
camo(CRATE, SLOT_OR1320, 0, 18, 0x0330);
camo(CRATE, SLOT_OR1320, 0, 21, 0x0663); // Open run gate, reset latch
return SUCCESS;
```

- [\[poll\\_event\(\)\]](#) If the equipment definition is **EQ\_POLLED** as an acquisition type, the [poll\\_event\(\)](#) will be called as often as possible over the corresponding poll time (ex:500ms see [The Equipment structure](#)) given by each polling equipment. The code below shows a typical CAMAC LAM polling loop. The **source** corresponds to a bitwise LAM station susceptible to generate LAM for that particular equipment. If the LAM is ORed for several stations and is independent of the equipment, the LAM test can be simplified (see example below)

```
// Trigger event routines -----
INT poll_event(INT source, INT count, BOOL test)
// Polling routine for events. Returns TRUE if event
// is available. If test equals TRUE, don't return. The test
// flag is used to time the polling.
{
    int i;
    DWORD lam;

    for (i=0 ; i<count ; i++)
    {
        cam_lam_read(LAM_SOURCE_CRATE(source), &lam);
        if (lam & LAM_SOURCE_STATION(source)) // Any of the equipment LAM
        // *** or ***
        if (lam)                               // Any LAM (independent of the equipment)
            if (!test)
                return lam;

    }

    return 0;
}
```

- **[Remark]** When multiple LAM sources are specified for a given equipment like:

```
LAM_SOURCE(JW_C,  LAM_STATION(GE_N)
           | LAM_STATION(JW_N)),
```

The polling function will pass to the readout function the actual LAM pattern read during the last polling. This pattern is a bitwise LAM station. The content of the **pevent** will be overwritten. This option allows you to determine which of the stations has been the real source of the LAM.

```
INT read_trigger_event(char *pevent, INT off)
{
    DWORD lam;

    lam = *((DWORD *)pevent);

    // check LAM versus MCS station
    // The clear is performed at the end of the readout function
    if (lam & LAM_STATION(JW_N))
    {
        ...
        ...
    }
}
```

- [\[read\\_trigger\\_event\(\)\]](#) Event readout function defined in the equipment list. Refer to further section for event composition explanation [FIXED event construction](#) , [MIDAS event construction](#) , [YBOS event construction](#) .

```
// Event readout -----
INT read_trigger_event(char *pevent, INT off)
{
    WORD *pdata, a;

    // init bank structure
    bk_init(pevent);

    // create ADC bank
    bk_create(pevent, "ADC0", TID_WORD, &pdata);
    ...
}
```

- [\[pause\\_run\(\) / resume\\_run\(\)\]](#) These two functions are called respectively upon "Pause" and "Resume" command. Any code relevant to the upcoming run state can be included. Possible commands when CAMAC is involved can be `cam_inhibit_set(CRATE)` and `cam_inhibit_clear(CRATE)`. The argument **run-number** provides the current run number being paused/resumed. The argument **error** can be used for returning a message to the system. This string will be logged into the `midas.log` file.

- [\[end\\_of\\_run\(\)\]](#) For every "stop run" transition this function is called and provides the opportunity to disable the hardware. In case of CAMAC frontend the LAM should be disabled.

The argument **run\_number** provides the current run number being ended. The argument **error** can be used for returning a message to the system. This string will be logged into the midas.log file.

```
// set and clear OR1320 pattern bits or close run gate.
camo(CRATE, SLOT_OR1320, 0, 18, 0x0CC3);
camo(CRATE, SLOT_OR1320, 0, 21, 0x0990);

camc(CRATE, SLOT_C212, 0, 26);           // Enable LAM generation
cam_lam_disable(CRATE, SLOT_C212);       // disable LAM in crate controller
cam_inhibit_set(CRATE);                  // set crate inhibit
```

- [\[frontend\\_exit\(\)\]](#) This function runs when the frontend is requested to terminate. Can be used for local statistic collection etc.

**6.10.2.1 The Equipment structure** To write a frontend program, the user section ([frontend.c](#)) has to have an equipment list organized as a structure definition. Here is the structure list for a trigger and scaler equipment from the sample experiment example [frontend.c](#).

```
#undef USE_INT
EQUIPMENT equipment[] = {

    { "Trigger",           // equipment name
      1, 0,                // event ID, trigger mask
      "SYSTEM",           // event buffer
#ifdef USE_INT
      EQ_INTERRUPT,       // equipment type #else
      EQ_POLLED,          // equipment type
#endif
      LAM_SOURCE(0,0xFFFFF), // event source crate 0, all stations
      "MIDAS",            // format
      TRUE,               // enabled
      RO_RUNNING |        // read only when running
      RO_ODB,             // and update ODB
      500,                // poll for 500ms
      0,                  // stop run after this event limit
      0,                  // number of sub events
      0,                  // don't log history
      "", "", "", },
    ,
    read_trigger_event,    // readout routine
    NULL, NULL,
    trigger_bank_list,     // bank list
    }
    ,
    ...
}
```

- **["trigger","scaler"]**: Each equipment has to have a unique equipment name defined under a given node. The name will be the reference name of the equipment generating the event.
- **[1, 0]**: Each equipment has to be associated to a unique event ID and a trigger mask. Both the event ID and the trigger mask will be part of the event header of that particular equipment. The trigger mask can be modified dynamically by the readout routine to define a sub-event type on an event-by-event basis. This can be used to mix "physics events" (from a physics trigger) and "calibration events" (from a clock for example) in one run and identify them later. Both parameters are declared as 16bit value. If the Trigger mask is used in a single bit-wise mode, only up to 16 masks are possible.
- **["SYSTEM"]** After composition of an "equipment", the Midas frontend [mfe.c](#) takes over the sending of this event to the "system buffer" on the back-end computer. Dedicated buffer can be specified on those lines allowing a secondary stage on the back-end (Event builder to collect and assemble these events coming from different buffers in order to compose a larger event. In this case the events coming from the frontend are called fragment). In this example both events are placed in the same buffer called "SYSTEM" (default).
  - **[Remark]** If this field is left empty ("") the readout function associated to that equipment will still be performed, but the actual event won't be sent to the buffer. The positive side-effect of that configuration is to allow that particular equipment to be mirrored in the ODB if the RO\_ODB is turned on.
- **[EQ\_xxx]** The field specify the type of equipment. It can be composed of several bitwise flags. The following [EQ\\_POLLED](#), [EQ\\_INTERRUPT](#) and [EQ\\_SLOW](#) flags cannot be Ored together. The possible options are:
  - **[EQ\_POLLED]** In this mode, the name of the routine performing the trigger check function is defaulted to [poll\\_event\(\)](#). As polling consists of checking a variable for a true condition, if the loop would be infinite, the frontend would not be able to respond to any network commands. Therefore the loop count is determined when the frontend starts so that it returns after a given time-out if no event is available. This time-out is usually in the order of 500 milliseconds. This flag is mainly used for data acquisition based on a "LAM".
 

```
EQUIPMENT equipment[] = {
    { "Trigger",          // equipment name    ...
      500,                // poll for 500ms
      ...
    }
}
```
  - **[EQ\_INTERRUPT]** For this mode, Midas requires complete configuration and control of the interrupt source. This is provided by an interrupt configuration routine [interrupt\\_configure\(\)](#) that has to be coded by the user in the

user section of the frontend code. A pointer to this routine is passed to the system instead of the polling routine. The interrupt configuration routine has the following declaration:

```
INT interrupt_configure(INT cmd, INT source [], PTYPE adr)
{
    switch(cmd)
    {
        case CMD_INTERRUPT_ENABLE:
            cam_interrupt_enable();
            break;
        case CMD_INTERRUPT_DISABLE:
            cam_interrupt_disable();
            break;
        case CMD_INTERRUPT_ATTACH:
            cam_interrupt_attach((void (*)())adr);
            break;
        case CMD_INTERRUPT_DETACH:
            cam_interrupt_detach();
            break;

        return CM_SUCCESS;
    }
}
```

- [EQ\_PERIODIC] In this mode the function associated to this equipment is called periodically. No hardware requirements is necessary to trigger the readout function. The "poll" field in the equipment declaration is in this case used for periodicity.
- [EQ\_SLOW] Declare the equipment as a Slow Control equipment. This will enable the call to the **idle** function part of the class driver.
- [EQ\_MANUAL\_TRIG] This flag enables the equipment to be triggered by remote procedure call (RPC). If present, the web interface will provide a button for that action.
- [EQ\_FRAGMENTED] This flag enables large events (beyond Midas configuration limit) to be handled by the system. This flag requires to have a valid **max\_event\_size\_frag** variable defined in the user frontend code (**frontend.c**). The **max\_event\_size** variable is used as fragment size in this case. This option is meant to be used in experiments where the event rate is not an issue but the size of the data needs to be extremely large. In any selected case, when the equipment is required to run, a declared function is called doing the actual user required operation. Under the four commands listed above, the user has to implement the adequate hardware operation performing the requested action. In **drivers** examples can be found on such an interrupt code. See source code such as **hyt1331.c**, **ces8210.c**.
  - \* CMD\_INTERRUPT\_ENABLE: to enable an interrupt
  - \* CMD\_INTERRUPT\_DISABLE: to disable an interrupt
  - \* CMD\_INTERRUPT\_INSTALL: to install an interrupt callback routine at address adr.
  - \* CMD\_INTERRUPT\_DEINSTALL: to de-install an interrupt.

- [EQ\_EB] This tag identifies the equipment as a **fragment event** and should be used with the EQ\_POLLED in order to be identified by the Event\_Builder.
- [LAM\_SOURCE(0,0xFFFFF)] This parameter is a bit-wise representation of the 24 CAMAC slots which may raise the LAM. It defines which CAMAC slot is allowed to trigger the call to the readout routine. (See [read\\_trigger\\_event\(\)](#) ).
- ["MIDAS"] This line specifies the data format used for generating the event. The following options are possible: MIDAS, YBOS and FIXED. The format has to agree with the way the event is composed in the user read-out routine. It tells the system how to interpret an event when it is copied to the ODB or displayed in a user-readable form.

**MIDAS and YBOS or FIXED and YBOS data format can be mixed at the frontend level, but the data logger (mlogger) is not able to handle this format diversity on a event-by-event basis. In practice a given experiment should keep the data format identical throughout the equipment definition.**

- [TRUE] "enable" switch for the equipment. Only when enable (TRUE) the related equipment is active.
- [ RO\_RUNNING] Specify when the read-out of an event should be occurring (transition state) or be enabled (state). Following options are possible:

RO_RUNNING	Read on state "running"
RO_STOPPED	Read on state "stopped"
RO_PAUSED	Read on state "paused"
RO_BOR	Read after begin-of-run
RO_EOR	Read before end-of-run
RO_PAUSE	Read when run gets paused
RO_RESUME	Read when run gets resumed
RO_TRANSITIONS	Read on all transitions
RO_ALWAYS	Read independently of the states and force a read for all transitions.
RO_ODB	Equipment event mirrored into ODB under variables

These tags can be combined with the logical OR operator. Trigger events in the above example are read out only when running while scaler events is read out when running and additionally on all transitions. A special tag RO\_ODB tells the system to copy the event to the /Equipment/<equipment name>/Variables ODB tree once every ten seconds for diagnostic. Later on, the event content can then be displayed with ODBedit.

- [500] Time interval for Periodic equipment (EQ\_PERIODIC) or time out value in case of EQ\_POLLING (unit in millisecond).



- [0 (stop after...)] Specify the number of events to be taken prior to forcing an End-Of-Run transition. The value 0 disables this option.
- [0 ([Super Event](#) )] Enable the Super event capability. Specify the maximum number of events in the Super event.
- [0 ([History system](#) )] Enable the MIDAS history system for that equipment. The value (positive in seconds) indicates the time interval for generating the event to be available for history logging by the mlogger task if running.
- ["" , "" , "" ] Reserved field for system. Should be present and remain empty.
- [[read\\_trigger\\_event\(\)](#)] User read-out routine declaration (could be any name). Every time the frontend is initialized, it copies the equipment settings to the ODB under /Equipment/<equipment name>/Common. A hot-link to that ODB tree is created allowing some of the settings to be changed during run-time. Modification of "Enabled" flag, RO\_XXX flags, "period" and "event limit" from the ODB is immediately reflected into the frontend which will act upon them. This function has to be present in the frontend code and will be called for every trigger under one of the two conditions:
  - [In polling mode] The poll\_event has detected a trigger request while polling on a trigger source.
  - [In interrupt mode] An interrupt source pre-defined through the interrupt\_configuration has occurred.
  - [Remark 1 ] The first argument of the readout function provides the pointer to the newly constructed event and points to the first valid location for storing the data.
  - [Remark 2 ] The content of the memory location pointed by **pevent** prior to its uses in the readout function contains the LAM source bitwise register. This feature can be exploited in order to identify which slot has triggered the readout when multiple LAM has been assigned to the same readout function. **Example:**

```
... in the equipment declaration
...
    LAM_SOURCE(JW_C,  LAM_STATION(GE_N) | LAM_STATION(JW_N)), // event source
    ...
    "", "", "",
    event_dispatcher,    // readout routine
...

INT event_dispatcher(char *pevent)
{
    DWORD lam, dword;
    INT    size=0;
    EQUIPMENT      *eq;

    // the *pevent contains the LAM pattern returned from poll_event
    // The value can be used to dispatch to the proper LAM function
```

```

// !!!! ONLY one of the LAM is processed in the loop !!!!
lam = *((DWORD *)pevent);

// check LAM versus MCS station
if (lam & LAM_STATION(JW_N))
{
    ...
    // read MCS event
    size = read_mcs_event(pevent);
    ...

else if (lam & LAM_STATION(GE_N))
{
    ...
    // read GE event
    size = read_ge_event(pevent);
    ...

return size;

```

- [Remark 3 ] In the example above, the Midas Event Header contains the same Event ID as the Trigger mask for both LAM. The event serial number will be incremented by one for every call to event\_dispatcher() as long as the returned size is non-zero.
- [Remark 4 ] The return value should represent the number of bytes collected in this function. If the returned value is set to zero, The event will be dismissed and the serial number to that event will be decremented by one.

**6.10.2.2 FIXED event construction** The FIXED format is the simplest event format. The event length is fixed and is mapped to a C structure that is filled by the readout routine. Since the standard MIDAS analyzer cannot work with this format, it is only recommended for experiment, which uses its own analyzer and wants to avoid the overhead of a bank structure. For fixed events, the structure has to be defined twice: Once for the compiler in form of a C structure and once for the ODB in form of an ASCII representation. The ASCII string is supplied to the system as the "init string" in the equipment list.

Following statements would define a fixed event with two ADC and TDC values:

```

typedef struct {
    int adc0;
    int adc1;
    int tdc0;
    int tdc1;
    TRIGGER_EVENT;
}
char *trigger_event_str[] = {
    "adc0 = INT : 0",
    "adc1 = INT : 0",

```

```
"tdc0 = INT : 0",
"tdc1 = INT : 0",
    ASUM_BANK;
```

The **trigger\_event\_str** has to be defined before the equipment list and a reference to it has to be placed in the equipment list like:

```
{
...
    read_trigger_event, // readout routine
    poll_trigger_event, // polling routine
    trigger_event_str, // init string
    ,
```

The readout routine could then look like this, where the <...> statements have to be filled with the appropriate code accessing the hardware:

```
INT read_trigger_event(char *pevent)
{
    TRIGGER_EVENT *ptrg;

    ptrg = (TRIGGER_EVENT *) pevent;
    ptrg->adc0 = <...>;
    ptrg->adc1 = <...>;
    ptrg->tdc0 = <...>;
    ptrg->tdc1 = <...>;

    return sizeof(TRIGGER_EVENT);
```

### 6.10.3 MIDAS event construction

The MIDAS event format is a variable length event format. It uses "banks" as subsets of an event. A bank is composed of a bank header followed by the data. The bank header itself is made of 3 fields i.e: bank name (4 char max), bank type, bank length. Usually a bank contains an array of values that logically belong together. For example, an experiment can generate an ADC bank, a TDC bank and a bank with trigger information. The length of a bank can vary from one event to another due to zero suppression from the hardware. Besides the variable data length support of the bank structure, another main advantage is the possibility for the analyzer to add more (calculated) banks during the analysis process to the event in process. After the first analysis stage, the event can contain additionally to the raw ADC bank a bank with calibrated ADC values called CADC bank for example. In this CADC bank the raw ADC values could be offset or gain corrected.

MIDAS banks are created in the frontend readout code with calls to the MIDAS library. Following routines exist:

- `bk_init()` , `bk_init32()` Initializes a bank structure in an event.
- `bk_create()` Creates a bank with a given name (exactly four characters)
- `bk_close()` Closes a bank previously opened with `bk_create()`.
- `bk_locate()` Locates a bank within an event by its name.
- `bk_iterate()` Returns bank and data pointers to each bank in the event.
- `bk_list()` Constructs a string with all the banks' names in the event.
- `bk_size()` Returns the size in bytes of all banks including the bank headers in an event. The following code composes a event containing two ADC and two TDC values, the `<...>` statements have to be filled with specific code accessing the hardware:

```
INT read_trigger_event(char *pevent)
{
    INT *pdata;

    bk_init(pevent);

    bk_create(pevent, "ADC0", TID_INT, &pdata);
    *pdata++ = <ADC0>
    *pdata++ = <ADC1>
    bk_close(pevent, pdata);

    bk_create(pevent, "TDC0", TID_INT, &pdata);
    *pdata++ = <TDC0>
    *pdata++ = <TDC1>
    bk_close(pevent, pdata);

    return bk_size(pevent);
}
```

Upon normal completion, the readout routine returns the event size in bytes. If the event is not valid, the routine can return zero. In this case no event is sent to the back-end. This can be used to implement a software event filter (sometimes called "third level trigger").

```
INT read_trigger_event(char *pevent)
{
    WORD *pdata, a;

    // init bank structure
    bk_init(pevent);

    // create ADC bank
    bk_create(pevent, "ADC0", TID_WORD, &pdata);

    // read ADC bank
    for (a=0 ; a<8 ; a++)
        cami(1, 1, a, 0, pdata++);
}
```

```

bk_close(pevent, pdata);

// create TDC bank
bk_create(pevent, "TDC0", TID_WORD, &pdata);

// read TDC bank
for (a=0 ; a<8 ; a++)
    cami(1, 2, a, 0, pdata++);

bk_close(pevent, pdata);

return bk_size(pevent);

```

#### 6.10.4 YBOS event construction

The YBOS event format is also a bank format used in other DAQ systems. The advantage of using this format is the fact that recorded data can be analyzed with pre-existing analyzers understanding YBOS format. The disadvantage is that it has a slightly larger overhead than the MIDAS format and it supports fewer bank types. An introduction to YBOS can be found under:

##### YBOS

The scheme of bank creation is exactly the same as for MIDAS events, only the routines are named differently. The YBOS format is double word oriented i.e. all incrementation are done in 4 bytes steps. Following routines exist:

- [ybk\\_init\(\)](#) Initializes a bank structure in an event.
- [ybk\\_create\(\)](#) Creates a bank with a given name (exactly four characters)
- [ybk\\_close\(\)](#) Closes a bank previously opened with [ybk\\_create\(\)](#).
- [ybk\\_size\(\)](#) Returns the size in bytes of all banks including the bank headers in an event.

The following code creates an ADC0 bank in YBOS format:

```

INT read_trigger_event(char *pevent)
{
    DWORD i;
    DWORD *pbkdat;

    ybk_init((DWORD *) pevent);

    // collect user hardware data
    ybk_create((DWORD *)pevent, "ADC0", I4_BKTYPE, (DWORD *)(&pbkdat));
    for (i=0 ; i<8 ; i++)

```

```

    *pbkdat++ = i & 0xFFF;
    ybk_close((DWORD *)pevent, pbkdat);

    ybk_create((DWORD *)pevent, "TDC0", I2_BKTYPE, (DWORD *)&pbkdat);
    for (i=0 ; i<8 ; i++)
        *((WORD *)pbkdat)++ = (WORD)(0x10+i) & 0xFFF;
    ybk_close((DWORD *) pevent, pbkdat);

    ybk_create((DWORD *)pevent, "SIMU", I2_BKTYPE, (DWORD *)&pbkdat);
    for (i=0 ; i<9 ; i++)
        *((WORD *)pbkdat)++ = (WORD) (0x20+i) & 0xFFF;
    ybk_close((DWORD *) pevent, I2_BKTYPE, pbkdat);

    return (ybk_size((DWORD *)pevent));

```

### 6.10.5 Deferred Transition

This option permits the user to postpone any transition issued by any requester until some condition are satisfied. As examples:

- It may not be advised to pause or stop a run until let say some hardware has turned off a particular valve.
- The start of the acquisition system is postponed until the beam rate has been stable for a given period of time.
- While active, a particular acquisition system should not be interrupted until the "cycle" is complete.

In these examples, any application having access to the state of the hardware can register to be a "transition Deferred" client. It will then catch any transition request and postpone the trigger of such transition until *condition* is satisfied. The Deferred\_Transition requires 3 steps for setup:

- Register the deferred transition.

```

/-- Frontend Init
INT frontend_init()
{
    INT    status, index, size;
    BOOL   found=FALSE;

    // register for deferred transition
    cm_register_deferred_transition(TR_STOP, wait_end_cycle);
    cm_register_deferred_transition(TR_PAUSE, wait_end_cycle);
    ...

```

- Provide callback function to serve the deferred transition

```

/-- Deferred transition callback
BOOL wait_end_cycle(int transition, BOOL first)
{
    if (first)
    {
        transition_PS_requested = TRUE;
        return FALSE;

        if (end_of_mcs_cycle)
        {
            transition_PS_requested = FALSE;
            end_of_mcs_cycle = FALSE;
            return TRUE;

        else
            return FALSE;
        ...
    }
}

```

- Implement the condition code

```

... In this case at the end of the readout function...
...
INT read_mcs_event(char *pevent, INT offset)
{
    ...

    if (transition_PS_requested)
    {
        // Prevent to get new MCS by skipping re_arm_cycle and GE by GE_DISABLE LAM
        cam_lam_disable(JW_C,JW_N);
        cam_lam_disable(GE_C,GE_N);
        cam_lam_clear(JW_C,JW_N);
        cam_lam_clear(GE_C,GE_N);
        camc(GE_C,GE_N,0,GE_DISABLE);
        end_of_mcs_cycle = TRUE;

        re_arm_cycle();
        return bk_size(pevent);
    }
}

```

In the example above the frontend code register for PAUSE and STOP. The second argument of the `cm_register` *wait\_end\_cycle* is the declaration of the callback function. The callback function will be called as soon as the transition is requested and will provide the Boolean flag `first` to be TRUE. By setting the *transition\_PS\_requested*, the user will have the acknowledgment of the transition request. By returning FALSE from the callback you will prevent the transition to occur. As soon as the user condition is satisfied (`end_of_mcs_cycle = TRUE`), the return code in the callback will be set to TRUE and the requested transition will be issued. The Deferred transition shows up in the ODB under **/runinfo/Requested transition** and will contain the transition code (see [State Codes & Transition Codes](#)). When the system is in deferred state, an ODBedit override command can be issued to **force** the transition to happen. eg: `odbedit> stop now, odbedit> start now`. This override will do the transition function regardless of the state of the hardware involved.

### 6.10.6 Super Event

The Super Event is an option implemented in the frontend code in order to reduce the amount of data to be transferred to the backend by removing the bank header for each event constructed. In other words, when an equipment readout in either *MIDAS* or *YBOS* format (bank format) is complete, the event is composed of the bank header followed by the data section. The overhead in bytes of the bank structure is 16 bytes for `bk_init()`, 20 bytes for `bk_init32()` and `ybk_init()`. If the data section size is close to the number above, the data transfer as well as the data storage has a non-negligible overhead. To address this problem, the equipment can be setup to generate a so called **Super Event** which is an event composed of the initial standard bank header for the first event of the super event and up to **number of sub event** maximum successive data section before the closing of the bank.

To demonstrate the use of it, let's see the following example:

- Define equipment to be able to generate *Super Event*

```
{ "GE",                // equipment name
  2, 0x0002,           // event ID, trigger mask
  "SYSTEM",            // event buffer
#ifdef USE_INT
  EQ_INTERRUPT,        // equipment type
#else
  EQ_POLLED,           // equipment type
#endif
  LAM_SOURCE(GE_C, LAM_STATION(GE_N)), // event source
  "MIDAS",             // format
  TRUE,                // enabled
  RO_RUNNING,          // read only when running
  200,                 // poll for 200ms
  0,                   // stop run after this event limit
  1000,                // -----> number of sub event <----- enable Super event
  0,                   // don't log history
  "", "", "",          //
  read_ge_event,       // readout routine
  ,
  ...
}
```

- Setup the readout function for Super Event collection.

```
//-- Event readout
// Global and fixed -- Expect NWORDS 16bits data readout per sub-event
#define NWORDS 3

INT read_ge_event(char *pevent, INT offset)
{
    static WORD *pdata;
```



```

// Super event structure
if (offset == 0)
{
    // FIRST event of the Super event
    bk_init(pevent);
    bk_create(pevent, "GERM", TID_WORD, &pdata);

else if (offset == -1)
{
    // close the Super event if offset is -1
    bk_close(pevent, pdata);

    // End of Super Event
    return bk_size(pevent);

// read GE sub event (ADC)
cam16i(GE_C, GE_N, 0, GE_READ, pdata++);
cam16i(GE_C, GE_N, 1, GE_READ, pdata++);
cam16i(GE_C, GE_N, 2, GE_READ, pdata++);

// clear hardware
re_arm_ge();

if (offset == 0)
{
    // Compute the proper event length on the FIRST event in the Super Event
    // NWORDS correspond to the !! NWORDS WORD above !!
    // sizeof(BANK_HEADER) + sizeof(BANK) will make the 16 bytes header
    // sizeof(WORD) is defined by the TID_WORD in bk_create()

    return NWORDS * sizeof(WORD) + sizeof(BANK_HEADER) + sizeof(BANK);

else
    // Return the data section size only
    // sizeof(WORD) is defined by the TID_WORD in bk_create()

    return NWORDS * sizeof(WORD);

```

The encoded description of the data section is left to the user. If the number of words per sub-event is fixed (NWORD), the sub-event extraction is simple. In the case of variable sub-event length, it is necessary to tag the first or the last word of each sub-event. The content of the sub-event is essentially the responsibility of the user.

- [Remark 1 ] The backend analyzer will have to be informed by the user on the content structure of the data section of the event as no particular tagging is applied to the **Super Event** by the Midas transfer mechanism.
- [Remark 2 ] If the **Super Event** is composed in a remote equipment running a different *Endian* mode than the backend processor, it would be necessary to insure the data type consistency throughout the **Super Event** in order to guarantee the proper byte swapping of the data content.
- [Remark 3 ] The event rate in the equipment statistic will indicate the rate of sub-events.

### 6.10.7 Slow Control System

Instead of talking directly to each other, frontend and control programs exchange information through the ODB. Each slow control equipment gets a corresponding ODB tree under /Equipment. This tree contains variables needed to control the equipment as well as variables measured by the equipment. In case of a high voltage equipment this is a Demand array which contains voltages to be set, a Measured array which contains read back voltages and a Current array which contains the current drawn from each channel. To change the voltage of a channel, a control program writes to the Demand array the desired value. This array is connected to the high voltage frontend via a ODB hot-link. Each time it gets modified, the frontend receives a notification and sets the new value. In the other direction the frontend continuously reads the voltage and current values from all channels and updates the according ODB arrays if there has been a significant change. This design has a possible inconvenience due to the fact that ODB is the key element of that control. Any failure or corruption of the database can result in wrong driver control. Therefore it is not recommended to use this system to control systems that need redundancy for safety purposes. On the other hand this system has several advantages:

- The control program does not need any knowledge of the frontend, it only talks to the ODB.
- The control variables only exist at one place that guarantees consistency among all clients.
- Basic control can be done through ODBEdit without the need of a special control program.
- A special control program can be tested without having a frontend running.
- In case of  $n$  frontend and  $m$  control programs, only  $n+m$  network connections are needed instead of  $n*m$  connection for point-to-point connections. Since all slow control values are contained in the ODB, they get automatically dumped to the logging channels. The slow control frontend uses the same framework as the normal frontend and behaves similar in many respects. They also create periodic events that contain the slow control variables and are logged together with trigger and scaler events. The only difference is that a routine is called periodically from the framework that has the task to read channels and to update the ODB. To access slow control hardware, a two-layer driver concept is used. The upper layer is a "class driver", which establishes the connection to the ODB variables and contains high level functionality like channel limits, ramping etc. It uses a "device driver" to access the channels. These drivers implement only very simple commands like "set channel" and "read channel". The device drivers themselves can use bus drivers like RS232 or GPIB to control the actual device.

Class driver, Device and Bus driver in the slow control system

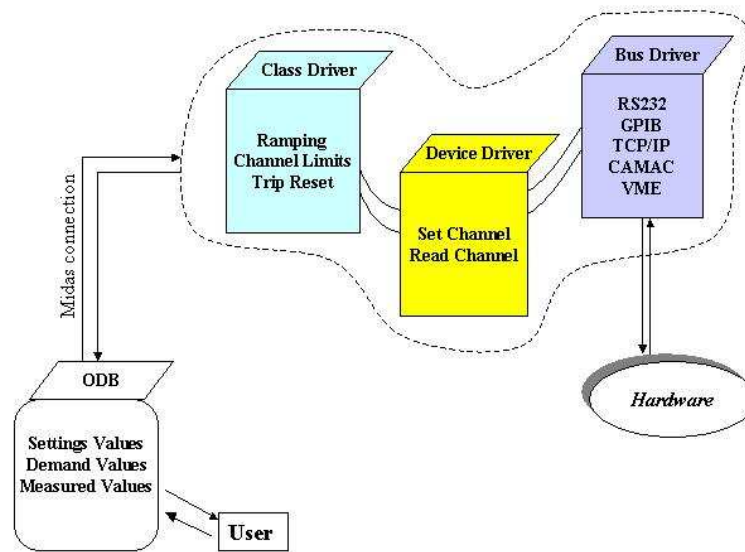


Figure 13: Class driver, Device and Bus driver in the slow control system

The separation into class and device drivers has the advantage that it is very easy to add new devices, because only the simple device driver needs to be written. All higher functionality is inherited from the class driver. The device driver can implement richer functionality, depending on the hardware. For some high voltage devices there is a current read-back for example. This is usually reflected by additional variables in the ODB, i.e. a Current array. Frontend equipment uses exactly one class driver, but a class driver can use more than one device driver. This makes it possible to control several high voltage devices for example with one frontend in one equipment. The number of channels for each device driver is defined in the slow control frontend. Several equipment with different class drivers can be defined in a single frontend.

Key name	Type	#Val	Size	Last	Opn	Mode	Value
Epics	DIR						
Settings	DIR						
Channels	DIR						
Epics	INT	1	4	25h	0	RWD	3
Devices	DIR						
Epics	DIR						
Channel name	STRING	10	32	25h	0	RWD	

					[0]		GPS:VAR1
					[1]		GPS:VAR2
					[2]		GPS:VAR3
Names	STRING	10	32	17h	1	RWD	
					[0]		Current
					[1]		Voltage
					[2]		Watchdog
Update Threshold Measure	FLOAT	10	4	17h	0	RWD	
					[0]		2
					[1]		2
					[2]		2
Common	DIR						
Event ID	WORD	1	2	17h	0	RWD	3
Trigger mask	WORD	1	2	17h	0	RWD	0
Buffer	STRING	1	32	17h	0	RWD	SYSTEM
Type	INT	1	4	17h	0	RWD	4
Source	INT	1	4	17h	0	RWD	0
Format	STRING	1	8	17h	0	RWD	FIXED
Enabled	BOOL	1	4	17h	0	RWD	y
Read on	INT	1	4	17h	0	RWD	121
Period	INT	1	4	17h	0	RWD	60000
Event limit	DOUBLE	1	8	17h	0	RWD	0
Num subevents	DWORD	1	4	17h	0	RWD	0
Log history	INT	1	4	17h	0	RWD	1
Frontend host	STRING	1	32	17h	0	RWD	hostname
Frontend name	STRING	1	32	17h	0	RWD	Epics
Frontend file name	STRING	1	256	17h	0	RWD	feepic.c
Variables	DIR						
Demand	FLOAT	10	4	0s	1	RWD	
					[0]		1.56
					[1]		120
					[2]		87
Measured	FLOAT	10	4	2s	0	RWD	
					[0]		1.56
					[1]		120
					[2]		87
Statistics	DIR						
Events sent	DOUBLE	1	8	17h	0	RWDE	26
Events per sec.	DOUBLE	1	8	17h	0	RWDE	0
kBytes per sec.	DOUBLE	1	8	17h	0	RWDE	0

### 6.10.8 Electronic Logbook

The Electronic logbook is an alternative way of recording experiment information. This is implemented through the Midas web server [mhttpd task](#) (see [Elog page](#)). The definition of the options can be found in the ODB data base under [ODB /Elog Tree](#).

### 6.10.9 Log file

Midas provides a general log file **midas.log** for recording system and user messages across the different components of the data acquisition clients. The location of this file is dependent on the mode of installation of the system.

1. [without [ODB /Logger Tree](#)] In this case the location is defined by either the [MIDAS\\_DIR](#) environment (see [Environment variables](#) ) or the definition of the experiment in the **exptab** file (see [Experiment Definition](#) ). In both cases the log file will be in the experiment specific directory.
2. [with /Logger Tree] The **midas.log** will be sitting into the defined directory specified by **Data Dir** .

**midas.log** file contains system and user messages generated by any application connected to the given experiment.

The [MIDAS Macros](#) definition provides a list of possible type of messages.

```
Fri Mar 24 10:48:40 2000 [CHAOS] Run 8362 started
Fri Mar 24 10:48:40 2000 [Logger] Run #8362 started
Fri Mar 24 10:55:04 2000 [Lazy_Tape] cni-043[10] (cp:383.6s) /dev/nst0/run08360.ybs 849.896MB file N
Fri Mar 24 11:24:03 2000 [MStatus] Program MStatus on host umelba started
Fri Mar 24 11:24:03 2000 [MStatus] Program MStatus on host umelba stopped
Fri Mar 24 11:27:02 2000 [Logger] stopping run after having received 1200000 events
Fri Mar 24 11:27:03 2000 [CHAOS] Run 8362 stopped
Fri Mar 24 11:27:03 2000 [SUSIYBOS] saving info in run log
Fri Mar 24 11:27:03 2000 [Logger] Run #8362 stopped
Fri Mar 24 11:27:13 2000 [Logger] starting new run
Fri Mar 24 11:27:14 2000 [CHAOS] Run 8363 started
Fri Mar 24 11:27:14 2000 [CHAOS] odb_access_file -I- /Equipment/kos_trigger/Dump not found
Fri Mar 24 11:27:14 2000 [Logger] Run #8363 started
Fri Mar 24 11:33:47 2000 [Lazy_Tape] cni-043[11] (cp:391.8s) /dev/nst0/run08361.ybs 850.209MB file N
Fri Mar 24 11:42:35 2000 [CHAOS] Run 8363 stopped
Fri Mar 24 11:42:40 2000 [SUSIYBOS] saving info in run log
Fri Mar 24 11:42:41 2000 [ODBEdit] Run #8363 stopped
Fri Mar 24 12:19:57 2000 [MChart] client [umelba.Triumf.CA]MChart failed watchdog test after 10 sec
Fri Mar 24 12:19:57 2000 [MChart] Program MChart on host koslx0 stopped
```

[Quick Start - Top - Utilities](#)

## 6.11 Introduction

[New Documented Features - Top - Components](#)

*... A few words...*

Acquiring, collecting and analyzing data is the essence of mankind to satisfy his urge for understanding natural phenomena by comparing "real" events to his own symbolic representation. These fundamental steps paved human evolution and in the world of

science they have been the keys to major steps forward in our understanding of nature. Until the last couple of decade's -when "Silicium" was still underground, the PPP protocol (Paper, Pencil and Patience) was the basic tool for this "unique" task. With the development of the "Central Processing Unit", data acquisition using computers wired to dedicated hardware instrumentation became available. This has allowed scientists to sit back and turn their minds towards finding solutions to problems such as "How do I analyze all these data?" Since the last decade or so when "connectivity" appeared to be a powerful word, the data acquisition system had to adapt itself to that new vocabulary.

Based on this sudden new technology, several successful systems using decentralization of information have been developed. But the task is not simple! If the hardware is available, implementing a true distributed intelligence environment for a particular application requires that each node have full knowledge of the capability of all the other nodes. Complexity rises quickly and generalization of such systems is tough. Recently more pragmatic approaches emerged from all this, suggesting that central database information on a system may be more adequate, especially since processing and networking speed are not a "real" concern these days. MIDAS and its predecessor HIX may be counted part of the precursor packages in the field.

The old question: "How do we analyze all these data?" still remains and may have been the driving force behind this evolution :-).

### 6.11.1 What is Midas?

The Maximum Integrated Data Acquisition System (MIDAS) is a general-purpose system for event based data acquisition in small and medium scale physics experiments. It has been developed at the Paul Scherrer Institute (Switzerland) and at TRIUMF (Canada) between 1993 and 2000 (Release of Version 1.8.0). Presently ongoing development are more focused on the interfacing capability of the Midas package to external applications such as ROOT for data analysis (see [MIDAS Analyzer](#)).

Midas is based on a modular networking capability and a central database system. MIDAS consists of a C library and several applications. They run on many different operating systems such as UNIX like, Windows NT, VxWorks, VMS and MS-DOS. While the system is already in use in several laboratories, the development continues with addition of new features and tools. Current development involves RTLinux for either dedicated frontend or composite frontend and backend system.

For the newest status, check the MIDAS home page: [Switzerland](#) , [Canada](#)

### 6.11.2 What can MIDAS do for you?

MIDAS has been designed for small and medium experiments. It can be used in distributed environments where one or more frontends are connected to the backend via Ethernet. The frontend might be an embedded system like a VME CPU running VxWorks or a PC running Windows NT or Linux. Data rates around 1MB/sec through

standard Ethernet and 6.1MB/sec over Fast Ethernet can be achieved.

For small experiments and test setups the front-end program can run on the back-end computer thus eliminating the need of network transfer, presuming that the back-end computer has direct access to the hardware. Device drivers for common PC-CAMAC interfaces have been written for Windows NT and Linux. Drivers for PC-VME interfaces are commercially available for Windows NT.

For data analysis, users can write a complete analyzer or use the standard MIDAS analyzer which uses HBOOK routines for histogramming and PAW for histogram display.

The MIDAS package contains also a slow control system which can be used to control high voltage supplies, temperature control units etc. The slow control system is fully integrated in the main data acquisition and act as a front-end with particular built-in control mechanism. Slow control values can be written together with event data to tape.

[New Documented Features - Top - Components](#)

## 6.12 mhttpd task

[Utilities - Top - Data format](#)

**mhttpd** is the Midas Web Server. It provides Midas DAQ control through the web using any web browser.

This daemon application has to run in order to allow the user to access from a Web browser any Midas experiment running on a given host. Full monitoring and "Almost" full control of a particular experiment can be achieved through this Midas Web server. The color coding is green for present/enabled, red for missing/disabled, yellow for inactive. It is important to note the refresh of the page is not "event driven" but is controlled by a timer (see **Conf**- button). This mean the information at any given time may reflect the experiment state of up to n second in the paste, where n is the timer setting of the refresh parameter. Its basic functionality are:

- Run control (start/stop).
- Frontend up-to-date status and statistics display.
- Logger up-to-date status and statistics display.
- Lazylogger up-to-date status and statistics display.
- Current connected client listing.
- Slow control data display.
- Basic access to ODB.
- Graphical history data display.

- Electronic LogBook recording/retrival messages
- Alarm monitoring/control
- ... and more ...

Each section is further described below:

- [Start page](#) - Run control page
- [ODB page](#) - Online Database manipulation (equivalent to ODBedit)
- [Equipment page](#) (Frontend info)
- [CNAF page](#) (CAMAC access page)
- [Message page](#) (Message Log)
- [Elog page](#) (Electronic Log)
- [Program page](#) (Program control)
- [History page](#) (History display)
- [Alarm page](#) (Alarm control)
- [Custom page](#) (User defined Web page)

**mhttpd** requires as argument the TCP/IP port number in order to listen to the web based request.

- **Arguments**

- [-h ] : help
- [-p port ] : port number, no default, should be 8081 for **Example** .
- [-D ] : start program as a daemon

- **Usage**

```
>mhttpd -p 8081 -D
```

- **Description** Once the connection to a given experiment is established, the main Midas status page is displayed with the current ODB information related to this experiment. The page is sub-divided in several sections:

-[Experiment/Date] Current Experiment, current date.

-[Action/Pages buttons] Run control button, Page switch button. At any web page level within the Midas Web page the main status page can be invoked with the <status> button.



- [Start... button] Depending on the run state, a single or the two first buttons will be showing the possible action (Start/Pause/Resume/Stop) (see [Start page](#)).
- [ODB button] Online DataBase access. Depending on the security, R/W access can be granted to operated on any ODB field (see [ODB page](#)).
- [CNAF button] If one of the equipment is a CAMAC frontend, it is possible to issue CAMAC command through this button. In this case the frontend is acting as a RPC CAMAC server for the request (see [CNAF page](#)).
- [Messages button] Shows the n last entries of the Midas system message log. The last entry is always present in the status page (see below) (see [Message page](#)).
- [Elog button] Electronic Log book. Permit to record permanently (file) comments/messages composed by the user (see [Elog page](#)).
- [Alarms button] Display current Alarm setting for the entire experiment. The activation of an alarm has to be done through ODB under the **/Alarms** tree (See [Alarm System](#))
- [Program button] Display current program (midas application) status. Each program has a specific information record associated to it. This record is tagged as a hyperlink in the listing (see [Program page](#)).
- [History button] Display History graphs of pre-defined variables. The history setting has to be done through ODB under the **/History** (see [History system](#) , [History page](#)).
- [Conf button] Allows to change the page refresh rate.
- [Help button] Help and link to the main Midas web pages.
- [User button(s)] If the user define a new tree in ODB named **Script** than any sub-tree name will appear as a button of that name. Each sub-tree (/Script/<button name>/) should contain at least one string key being the script command to be executed. Further keys will be passed as
  - **Arguments** to the script. Midas Symbolic link are permitted.
  - **Example** : The **Example** below defines a script names **doit** with 2 **Arguments** (run# device) which will be invoked when the button <doit> is pressed.

```
odbedit
mkdir Script
cd Script
mkdir doit
cd doit
create string cmd
ln "/runinfo/run number" run
create string dest
set dest /dev/hda
```

[Version >= 1.8.3 Alias Hyperlink] This line will be present on the status page only if the ODB tree **/Alias**. The distinction for spawning a secondary frame with the link request is done by default. For forcing the link in the current frame, add the terminal character "&" at the end of the link name.

- **Example** : The **Example** will create a shortcut to the defined location in the ODB.

```
odbedit
ls
create key Alias
cd Alias
ln /Equipment/Trigger/Common "Trig Setting"
ln /Analyzer/Output "Analyzer"

create key "Alias new window"                                <-- Version < 1.8.3
cd "Alias new window"
ln /equipment/Scalers/Variables "Scalers Var"

or
cd Alias
ln /Equipment/Trigger/Common "Trig Setting&"                <-- Version >= 1.8.3
```

- [General info] Current run number, state, General Enable flag for Alarm, Auto restart flag Condition of mlogger.
- [Equipment listing] Equipment name (see [Equipment page](#)), host on which its running, Statistics for that current run, analyzed percentage by the "analyzer" (The numbers are valid only if the name of the analyser is "Analyzer").
- [Logger listing] Logger list. Multiple logger channel can be active (single application). The hyperlink "0" will bring you to the odb tree /Logger/channels/0/Settings. This section is present only when the Midas application [mlogger task](#) is running.
- [Lazylogger listing] Lazylogger list. Multiple lazy application can be active. This section is present only when the Midas application [lazylogger task](#) is running.
- [Last system message] Display a single line containing the last system message received at the time of the last display refresh.
- [Current client listing] List of the current active Midas application with the host-name on which their running.

Midas Web server

The screenshot displays the MIDAS Web server interface with various components annotated on the left:

- Title**: MIDAS experiment "midas" Mon Dec 18 14:42:06 2000
- Action/Pages**: Start ODB CNAF Messages ELog Alarms Programs History Config Help
- User button(s)**: doit doit2
- Trigger button(s)**: Trigger Scaler event
- Alias/Alias new window**: Trig setting doit setting
- General Info**: Run #63 Stopped Alarms On Restart Yes Logging disabled  
Start: Wed Nov 22 10:00:37 2000 Stop: Wed Nov 22 10:01:48 2000
- Equipment listing**:
 

Equipment	FE Node	Events	Event rate[/s]	Data rate[kB/s]	Analyzed
Trigger	feFlash@midmes04	7111	0.0	0.0	75 %
Scaler	feFlash@midmes04	0	0.0	0.0	0.0 %
- Logger Channels**:
 

Channel	Active	Events	MB written	GB total
0 run00063.mid	Disabled	0	0.000	0.000
1 run00063.mid	Disabled	0	0.000	0.000
- Lazylogger application**:
 

Lazy Label	Progress	File Name	# Files	Total
Disk 01	0 %		0	0.0 %
Tape 01	0 %		0	0.0 %
- Last system message**: Mon Dec 18 14:40:06 2000 [mhttpd] Program mhttpd on host midmes04 started
- Client listing**:
 

feFlash [midmes04]	Logger [midmes04]	Lazy_Disk [midmes04]
Lazy_Tape [midmes04]	mhttpd [midmes04]	

Figure 14: Midas Web server

### 6.12.1 Start page

Once the **Start** button is pressed, you will be prompt for experiment specific parameters before starting the run. The minimum set of parameter is the run number, it will be incremented by one relative to the last value from the status page. In the case you have defined the ODB tree **/Experiment/Edit on Start** all the parameters sitting in this directory will be displayed for possible modification. The **Ok** button will proceed to the start of the run. The **Cancel** will abort the start procedure and return you to the status page.

Start run request page. In this case the user has multiple run parameters defined under **"/Experiment/Edit on Start"**

MIDAS experiment "e614"		Tue Dec 19 09:50:16 2000	
Start new run			
Run number	895		
Comment	Test, -150 mv th		
Write Data	y		
Exp type	3 mod test		
Operators	SCW RP		
Sc 1 HV (volts)	2300		
Sc 2 HV (volts)	1800		
GAS type	Ar 25 Iso 75		
U1 HV (volts)	-2000		
V1 HV (volts)	-2000		
U2 HV (volts)	-2000		
V2 HV (volts)	-1750		
U3 HV (volts)	-2000		
V3 HV (volts)	-2000		
Preampl (mV)	4200		
		Start	Cancel

Figure 15: Start run request page.

The title of each field is taken from the ODB key name itself. In the case this label has a poor meaning and extra explanation is required, you can do so by creating a new ODB tree under experiment **Parameter Comments/**. Then by creating a string entry named as the one in **Edit on Start-** you can place the extra information relative to that key (html tags accepted).

This "parameter comment" option is available and visible **ONLY** under the midas web page, the **odbedit start** command will not display this extra information.

```
[local:midas:S]/Experiment>ls -lr
Key name                                Type    #Val   Size   Last Opn Mode Value
-----
Experiment                              DIR
  Name                                  STRING  1      32    17s   0    RWD   midas
  Edit on Start                         DIR
    Write data                          BOOL    1      4     16m   0    RWD   y
    enable                             BOOL    1      4     16m   0    RWD   n
    nchannels                          INT     1      4     16m   0    RWD   0
    dwelling time (ns)                  INT     1      4     16m   0    RWD   0
  Parameter Comments                    DIR
    Write Data                          STRING  1      64    44m   0    RWD   Enable logging
    enable                             STRING  1      64     7m   0    RWD   Scaler for expt B1 only
    nchannels                          STRING  1      64    14m   0    RWD   <i>maximum 1024</i>
    dwelling time (ns)                  STRING  1      64     8m   0    RWD   <b>Check hardware now</b>

[local:midas:S]Edit on Start>ls -l
Key name                                Type    #Val   Size   Last Opn Mode Value
-----
Write Data                              LINK    1      19    50m   0    RWD   /logger/Write data
enable                                  LINK    1      12    22m   0    RWD   /sis/enable
number of channels                      LINK    1      15    22m   0    RWD   /sis/nchannels
dwelling time (ns)                     LINK    1      24    12m   0    RWD   /sis/dwelling time (ns)
```

Start run request page. Extra comment on the run condition is displayed below each entry.

MIDAS experiment "midas"		Fri Oct 12 10:33:15 2001	
Start new run			
Run number	<input type="text" value="2"/>		
Write Data	<input type="text" value="y"/>		
Enable logging	<input type="text" value="y"/>		
enable	<input type="text" value="n"/>		
Scaler for expt B1 only	<input type="text" value="n"/>		
number of channels	<input type="text" value="0"/>		
<i>maximum 1024</i>	<input type="text" value="0"/>		
dwelling time (ns)	<input type="text" value="0"/>		
Check hardware now	<input type="text" value="0"/>		
<input type="button" value="Start"/> <input type="button" value="Cancel"/>			

Figure 16: Start run request page.

### 6.12.2 ODB page

The ODB page shows the ODB root tree at first. Clicking on the hyperlink will walk you to the requested ODB field. The **Example** below show the sequence for changing the variable "PA" under the /equipment/PA/Settings/Channels ODB directory. A possible shortcut

If the ODB is Write protected, a first window will request the web password.

ODB page access.

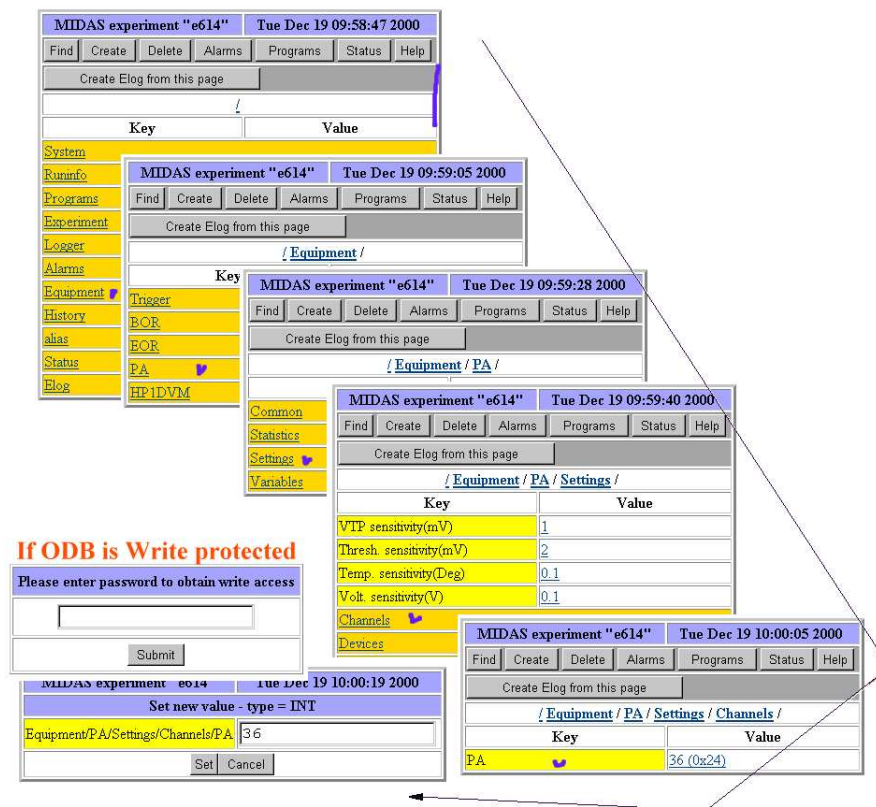


Figure 17: ODB page access.

### 6.12.3 Equipment page

The equipment names are linked to their respective **/Variables** sub-tree. This permit to access as a shortcut the current values of the equipment. In the case the equipment is a slow control equipment, the parameters list may be hyperlinked for parameter modification. This option is possible only if the parameter names have a particular name syntax (see [History system](#)).

Slow control page.

MIDAS experiment "e614"				Mon Dec 18 14:21:54 2000						
<div><div>ODB</div><div>Status</div><div>Help</div></div>										
Equipment: PA										
Groups: <a href="#">All</a> <a href="#">Crate0</a> <a href="#">Crate1</a>										
Names	D_VTp	M_VTp	D_Thres	M_ThresA	M_ThresB	D_TP	M_TP	Temp	Voltage+	Voltage-
Sl_0	<a href="#">0</a>	0	<a href="#">0</a>	0	0	<a href="#">n</a>	n	51	-0.018	-0.006
Sl_1	<a href="#">1850</a>	1852	<a href="#">1011</a>	-1002	-998	<a href="#">n</a>	n	31.3	5.061	-5.103
Sl_2	<a href="#">1793</a>	1793	<a href="#">1017</a>	-1002	-999	<a href="#">n</a>	n	33.8	5.099	-5.112
Sl_3	<a href="#">1775</a>	1774	<a href="#">1023</a>	-1001	-1000	<a href="#">n</a>	n	33.5	5.067	-5.093
Sl_4	<a href="#">1852</a>	1852	<a href="#">1017</a>	-1003	-999	<a href="#">n</a>	n	34.9	5.076	-5.104
Sl_5	<a href="#">1800</a>	1800	<a href="#">1014</a>	-1004	-1000	<a href="#">n</a>	n	38.5	5.055	-5.108
Sl_6	<a href="#">1786</a>	1785	<a href="#">1011</a>	-1001	-1000	<a href="#">n</a>	n	40.4	5.066	-5.098
Sl_7	<a href="#">1798</a>	1798	<a href="#">1011</a>	-1004	-1000	<a href="#">n</a>	n	37.3	5.083	-5.097
Sl_8	<a href="#">1795</a>	1795	<a href="#">1018</a>	-1002	-1002	<a href="#">n</a>	n	32	5.073	-5.092
Sl_9	<a href="#">1801</a>	1801	<a href="#">1016</a>	-1001	-1002	<a href="#">n</a>	n	35.1	5.09	-5.104
Sl_10	<a href="#">1797</a>	1798	<a href="#">1033</a>	-1001	-1000	<a href="#">n</a>	n	34.7	5.065	-5.104
Sl_11	<a href="#">1795</a>	1796	<a href="#">1019</a>	-1000	-1002	<a href="#">n</a>	n	31.3	5.057	-5.102
Sl_12	<a href="#">1797</a>	0	<a href="#">1013</a>	0	0	<a href="#">n</a>	n	0	-0.022	-0.006
Sl_13	<a href="#">1798</a>	1798	<a href="#">1016</a>	-1002	-1000	<a href="#">n</a>	n	34.3	5.067	-5.102
Sl_14	<a href="#">1793</a>	1793	<a href="#">1016</a>	-1000	-1000	<a href="#">n</a>	n	32.4	5.07	-5.095
Sl_15	<a href="#">1799</a>	1800	<a href="#">1015</a>	-1000	-1001	<a href="#">n</a>	n	28.9	5.068	-5.092
Sl_16	<a href="#">1782</a>	1783	<a href="#">1007</a>	-1002	-1001	<a href="#">n</a>	n	37.7	5.058	-5.099
Sl_17	<a href="#">1798</a>	1798	<a href="#">1011</a>	-1001	-999	<a href="#">n</a>	n	33.3	5.104	-5.094
Sl_18	<a href="#">1796</a>	1796	<a href="#">1017</a>	-1001	-1002	<a href="#">n</a>	n	30.6	5.078	-5.103
Sl_19	<a href="#">1798</a>	1797	<a href="#">1009</a>	-1000	-1001	<a href="#">n</a>	n	34.7	5.07	-5.106
Sl_20	<a href="#">1803</a>	1803	<a href="#">1014</a>	-1002	-1000	<a href="#">n</a>	n	37.6	5.066	-5.11
Sl_21	<a href="#">1799</a>	1799	<a href="#">1010</a>	-1000	-1002	<a href="#">n</a>	n	38.7	5.056	-5.11
Sl_22	<a href="#">1805</a>	1805	<a href="#">1015</a>	-1000	-1001	<a href="#">n</a>	n	33.1	5.066	-5.114
Sl_23	<a href="#">1793</a>	1793	<a href="#">1019</a>	-1000	-1001	<a href="#">n</a>	n	31.2	5.055	-5.096
Sl_24	<a href="#">1789</a>	1788	<a href="#">1018</a>	-1000	-1002	<a href="#">n</a>	n	38.1	5.047	-5.105

Figure 18: Slow control page.

**6.12.4 CNAF page**

If one of the active equipment is a CAMAC based data collector, it will be possible to remotely access CAMAC through this web based CAMAC page. The status of the connection is displayed in the top right hand side corner of the window.

CAMAC command pages.



MIDAS experiment "silicon"			CAMAC server: feSilicon	
Execute			ODB	Status Help
N	A	F	Data	
1	0	0	0	
Repeat		1	C cycle	Z cycle
Repeat delay [ms]		0	Set inhibit	Clear inhibit
Data increment		0	Branch	0
A increment		0	Crate	1

MIDAS experiment "trinat"			No CAMAC server running	
Execute			ODB	Status Help
N	A	F	Data	
1	0	0	0	
Repeat		1	C cycle	Z cycle
Repeat delay [ms]		0	Set inhibit	Clear inhibit
Data increment		0	Branch	0
A increment		0	Crate	1

Figure 19: CAMAC command pages.

### 6.12.5 Message page

This page display by block of 100 lines the content of the Midas System log file starting with the most recent messages. The Midas log file resides in the directory defined by the experiment.

Message page.

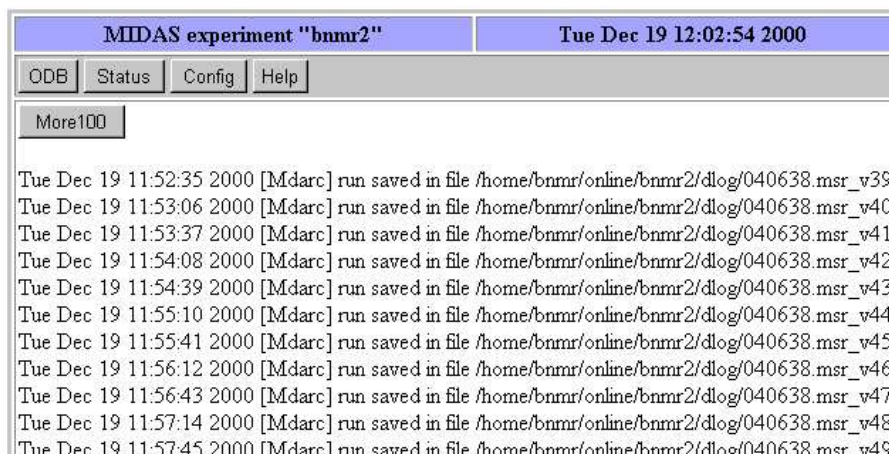


Figure 20: Message page.

### 6.12.6 Elog page

The Electronic Log page show the most recent Log message recorded in the system. The top buttons allows you to either Create/Edit/Reply/Query/Show a message.

From version 1.9.0, this page contains extra parameters for time selection and Email forwarding. Please refer to the ODB structure for further information.

main Elog page.

MIDAS Electronic Logbook		Experiment "chaos"	
New	Edit	Reply	Query
Last 10 entries		Shift Check	Runlog
Status			
Next	Previous	Last	
Check a category to browse only entries from that category			
Entry date: Sun Nov 19 06:10:20 2000		Run number: 13079	
<input type="checkbox"/> Author: rmeier		<input type="checkbox"/> Type: Shift Check	
<input type="checkbox"/> System: General		<input type="checkbox"/> Subject:	
1 Log beam channel : [X] adjusted B1 (.5 Gauss) 2 Target T-P Ok? : [X] MT running 3 All Chambers V-I Ok? : [X] 4 DAQ : [X] 5 Histograms, dotplots Ok? : [X]			

Figure 21: main Elog page.

The format of the message log can be written in HTML format.

HTML Elog message.

MIDAS Electronic Logbook		Experiment "tuda"	
New	Edit	Reply	Query
Last 24 hours		Runlog	Status
Next	Previous	Last	
Check a category to browse only entries from that category			
Entry date: Thu Sep 14 14:55:34 2000		Run number: 1	
<input type="checkbox"/> Author: midas@midmes02.triumf.ca		<input type="checkbox"/> Type: Info	
<input type="checkbox"/> System: General		<input type="checkbox"/> Subject: DAQ	
<b>Hello TUDA folks,</b> <ul style="list-style-type: none"> <li>The main components of the DAQ for upcoming run is "basically" installed.</li> <li>The VME crates contains the PPC and the <a href="#">CES CBD8210</a> CAMAC branch driver.</li> <li>This CBD is connected to two A2 CAMAC Crate Controllers.</li> <li>Acquisition for 16x8 ADCs + 4x32 TDCs.</li> </ul>			
CRATE 1		Modules	
Slot 01-16	ADC 4418 Silena		
Slot 17-20	TDC 3377 LeCroy or <a href="#">Command list</a>		
Slot 21	Output Register OR2027 SEN		
Slot 22-23	Pattern Unit C212		
Slot 24-25	Crate Controller A2 <a href="#">Jorway 71B Spec</a>		
CRATE 2		Modules	
Slot 01	Hex 24bit Scalers KCS3815		
Slot 22-23	Branch terminator BHT-002/D SEC		
Slot 24-25	Crate Controller A2 1302 BiRa system		
<b>System Status log:</b>			
Date	Successful	Unsuccessful or not done yet	
September 14/2000	Optical 100BaseT link to the Shack		

Figure 22: HTML Elog message.

The **runlog** button display the content of the file **runlog.txt** which is expected to be in the data directory specified by the ODB key **/Logger/Data Dir**. Regardless of its content, it will be displayed in the web page. Its common uses is to **append** lines after every run. The task appending this run information can be any of the midas application.

**Example** is available in the **Example** /experiment/analyzer.c which at each end-of-run (EOR) will write to the runlog.txt some statistical informations.

Elog page, Runlog display.

MIDAS File Display						Experiment "Itmo"					
ELog		Status									
Run#	Date	Time	Freq	RF	DVM	Still_H	MC_H	Film_H	Sec	Shunt	Terminal
40034	20001018	16:25:25	0.000000e+00	0.000	0.000001	0.000000	0.000000	0.000000	10	0.056076	0.006103
40035	20001018	16:25:40	7.000000e+07	0.000	0.000002	0.000000	0.000000	0.000000	10	0.058364	0.006027
40036	20001018	16:25:55	7.000000e+07	0.000	0.000006	0.000000	0.000000	0.000000	10	0.058364	0.006027
40037	20001018	16:26:09	7.000000e+07	0.000	0.000005	0.000000	0.000000	0.000000	10	0.058364	0.006027
40038	20001018	16:26:23	7.000000e+07	0.000	0.000006	0.000000	0.000000	0.000000	10	0.058364	0.006027
39000	20001018	17:21:31	7.000000e+07	0.000	0.000008	0.000000	0.102539	0.000000	10	0.059509	0.006256
39001	20001018	17:21:47	7.000000e+07	0.000	0.000005	0.000000	0.102539	0.000000	10	0.056076	0.006103
39002	20001018	17:22:04	7.000000e+07	0.000	0.000003	0.000000	0.102539	0.000000	10	0.056076	0.006103
39003	20001018	17:22:20	7.000000e+07	0.000	0.000002	0.000000	0.102539	0.000000	10	0.056076	0.006103
39004	20001018	17:22:35	7.000000e+07	0.000	0.000002	0.000000	0.102539	0.000000	10	0.056076	0.006103
39000	20001018	17:48:25	7.000000e+07	0.000	0.000006	0.000000	0.102539	0.000000	1000	0.054931	0.006179
39001	20001018	18:05:11	7.000000e+07	0.000	0.000007	0.000000	0.102539	0.000000	1000	0.057220	0.006332
39002	20001018	18:21:56	7.000000e+07	0.000	0.000006	0.000000	0.102539	0.000000	1000	0.056076	0.006256
39003	20001018	18:38:42	7.000000e+07	0.000	0.000008	0.000000	0.102539	0.000000	1000	0.056076	0.006179
39004	20001018	18:55:27	7.000000e+07	0.000	0.000004	0.000000	0.104960	0.000000	1000	0.058364	0.006103
39005	20001018	19:12:14	7.000000e+07	0.000	0.000006	0.000000	0.102539	0.000000	1000	0.053787	0.006332
39006	20001018	19:28:59	7.000000e+07	0.000	0.000005	0.000000	0.104960	0.000000	1000	0.053787	0.006332
39007	20001018	19:45:44	7.000000e+07	0.000	0.000005	0.000000	0.104960	0.000000	1000	0.057220	0.006179
39008	20001018	20:02:32	7.000000e+07	0.000	0.000004	0.000000	0.104960	0.000000	1000	0.062942	0.006256
39009	20001018	20:19:18	7.000000e+07	0.000	0.000005	0.000000	0.104960	0.000000	1000	0.057220	0.006332
39010	20001018	20:36:06	7.000000e+07	0.000	0.000005	0.000000	0.107422	0.000000	1000	0.053787	0.005874
39011	20001018	20:52:52	7.000000e+07	0.000	0.000008	0.000000	0.107422	0.000000	1000	0.057220	0.006256
39012	20001018	21:09:39	7.000000e+07	0.000	0.000006	0.000000	0.107422	0.000000	1000	0.057220	0.006332

Figure 23: Elog page, Runlog display.

When composing a new entry into the Elog, several fields are available to specify the nature of the message i.e: Author, Type, System, Subject. Under Type and System a pulldown menu provides multiple category. These categories are user definable through the odb under the tree **/Elog/Types**, **/Elog/Systems**. The number of category is fixed to 20 maximum but any remaining field can be left empty.

Elog page, New Elog entry form.

MIDAS Electronic Logbook		Experiment "chaos"	
<input type="button" value="Submit"/>			
Entry date: Tue Dec 19 12:09:13 2000		Run number: 13397	
Author: <input type="text"/>		Type: Routine	
System: General		Subject: <input type="text"/>	
<div> <div>General</div> <div>           DAQ            Detector            Electronics            Target            Beamline         </div> </div>		<div> <div>Routine</div> <div>           Shift summary            Minor error            Severe error            Fix            Info            Modification            Complaints            Reply            Alarm            Test            Other         </div> </div>	
Text: <div><div></div></div>			
<input type="checkbox"/> Submit as HTML text			
Enter attachment filename(s) or ODB tree(s), use "/" as an ODB directory separator:			
Attachment1: <input type="text"/>		<input <="" td="" type="button" value="Browse..."/>	
Attachment2: <input type="text"/>		<input <="" td="" type="button" value="Browse..."/>	
Attachment3: <input type="text"/>		<input <="" td="" type="button" value="Browse..."/>	

Figure 24: Elog page, New Elog entry form.

### 6.12.7 Program page

This page present the current active list of the task attached to the given experiment. On the right hand side a dedicated button allows to stop the program which is equivalent to the ODBedit command **odbedit> sh <task name>** .

The task name hyperlink pops a new window pointing to the ODB section related to that program. The ODB structure for each program permit to apply alarm on the task presence condition and automatic spawning at either the begining or the end of a run.

Program page.

**MIDAS experiment "ltno" Tue Dec 19 13:02:20 2000**

Program	Running on host	Alarm class	Autorestart	
ODBEdit	ltno01	-	No	Stop ODBEdit
Speaker	ltno01	-	No	Stop Speaker
MStatus	ltno01	-	No	Stop MStatus
ltnoRC	ltno01	-	No	Stop ltnoRC
Logger	ltno01	-	No	Stop Logger
Analyzer	ltno01	-	No	

**MIDAS experiment "ltno" Tue Dec 19 13:02:36 2000**

Find Create Delete Alarms Programs Status Help

Create Elog from this page

/ [Programs](#) / [ltnoRC](#) /

Key	Value
Auto start	<a href="#">n</a>
Auto stop	<a href="#">n</a>
Auto restart	<a href="#">n</a>
Required	<a href="#">n</a>
Start command	(empty)
Alarm Class	(empty)
Checked last	0 (0x0)
Alarm count	0 (0x0)
Watchdog timeout	10000 (0x2710)

Figure 25: Program page.

### 6.12.8 History page

This page reflects the [History system](#) settings (CVS r1.271). It lists on the top of the page the possible group names containing a list of panels defined in the ODB. Next a series of buttons defines the time scale of the graph with predefined time window, "<<","<" "+" "-" ">" ">>" buttons permit the shifting of the graph in the time direction. Other buttons will allow graph resizing, Elog attachment creation, configuration of the panel and custom time frame graph display. By default a single group is created "Default" containing the trigger rate for the "Trigger" equipment.

The configuration options for a given panel consists in:

- Zooming capability, run markers, logarithmic scale.
- Data query in time.
- Time scale in date format.
- Web based page creation ("new" button) for up to 10 history channels per page.

History page.



Figure 26: History page.

History channel selection Page.



MIDAS experiment "Itno"		Tue Jun 11 22:33:22 2002		
<input type="button" value="Save"/> <input type="button" value="Cancel"/> <input type="button" value="Refresh"/> <input type="button" value="Delete Panel"/>				
Panel "Bridge"				
Time scale: <input type="text" value="1h"/>				
<input checked="" type="checkbox"/> Zero Ylow				
<input type="checkbox"/> Logarithmic Y axis				
<input type="checkbox"/> Show run markers				
Col	Event	Variable	Factor	Offset
<div style="background-color: blue; width: 20px; height: 20px;"></div>	TempBridge	Bridge Ch 1 Measured	1	0
<div style="background-color: green; width: 20px; height: 20px;"></div>	TempBridge	Bridge Ch 2 Mea		0
<div style="background-color: red; width: 20px; height: 20px;"></div>	TempBridge	Bridge Ch 3 Mea		0
<div style="background-color: cyan; width: 20px; height: 20px;"></div>	TempBridge	Bridge Ch 4 Mea		0
<div style="background-color: magenta; width: 20px; height: 20px;"></div>	DYM Meters Cryostat	Bridge Ch 5 Mea		0
<div style="background-color: yellow; width: 20px; height: 20px;"></div>	TempBridge	Bridge Ch 6 Mea		0
<div style="background-color: gray; width: 20px; height: 20px;"></div>	TempBridge	Bridge Ch 7 Mea		0
<div style="background-color: lightgreen; width: 20px; height: 20px;"></div>				0
<div style="background-color: pink; width: 20px; height: 20px;"></div>				0
<div style="background-color: purple; width: 20px; height: 20px;"></div>				0

Bridge Ch 2 Measured  
 Bridge Ch 3 Measured  
 Bridge Ch 4 Measured  
 Bridge Ch 5 Measured  
 Bridge Ch 6 Measured  
 Bridge Ch 7 Measured  
 Bridge Ch 1 Excitation  
 Bridge Ch 2 Excitation  
 Bridge Ch 3 Excitation  
 Bridge Ch 4 Excitation  
 Bridge Ch 5 Excitation  
 Bridge Ch 6 Excitation  
 Bridge Ch 7 Excitation  
 Bridge Ch 1 BMES  
 Bridge Ch 2 BMES  
 Bridge Ch 3 BMES  
 Bridge Ch 4 BMES  
 Bridge Ch 5 BMES  
 Bridge Ch 6 BMES  
 Bridge Ch 7 BMES

Figure 27: History channel selection Page.

### 6.12.9 Alarm page

This page reflects the [Alarm System](#) settings. It presents the four type of alarms:

- [Evaluated alarms] Triggered by ODB value on given arithmetical condition.
- [Program alarms] Triggered on condition of the state of the defined task.
- [Internal alarms] Trigger on internal (program) alarm setting through the use of the `al_...()` functions.



- [Periodic alarms] Triggered by timeout condition defined in the alarm setting.

### 6.12.10 Custom page

The Custom page is available since version 1.8.3. It has been improved during version 1.9.5 (mhttpd.c CVS-1.288).

This custom web page provides to the user a mean of creating a secondary personal web page activated within the standard Midas web interface. This custom page can contain specific links to the ODB and therefore present in a more compact way the essential parameter of the controlled experiment. Two mode of operations are available:

- [Internal HTML document](#). : The html code is fully stored in the Online Database (ODB). This page is web editable.
- [External referenced HTML document](#). : ODB contains a link to an external html document.

The new [External referenced HTML document](#). feature remove the html code size restriction and support multiple custom web page. In addition, to each html document, a dynamic ODB linked image extend the display presentation capability of the controlled experiment.

**6.12.10.1 Internal HTML document.** This page reflects the html content of a given ODB key under the **/Custom/** key. If keys are defined in the ODB under the **/Custom/** the name of the key will appear in the main status page as the **Alias** keys. By clicking on the Custom page name, the content of the **/Custom/<page>** is interpreted as html content.

Custom web page with history graph.

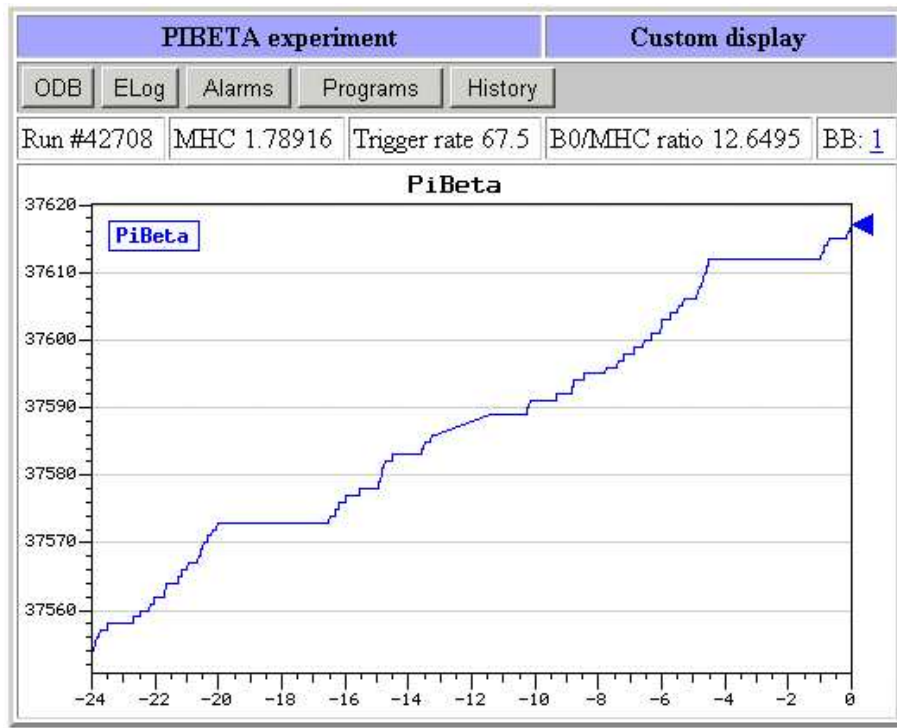


Figure 28: Custom web page with history graph.

The access to the ODB field is then possible using specific HTML tags:

- `<odb src="odb field">` Display ODB field.
- `<odb src="odb field" edit=1>` Display and Editable ODB field.
- `<form method="GET" action="http://hostname.domain:port/CS/<Custom_page_key">>` Define method for key access.
- `<meta http-equiv="Refresh" content="60">` Standard page refresh in second.
- `<input type="submit" name="cmd" value=<Midas_page>>` Define button for accessing Midas web pages. Valid values are the standard midas buttons (Start, Pause, Resume, Stop, ODB, Elog, Alarms, History, Programs, etc).
- `` Reference to an history page.

ODB /Custom/ html field.

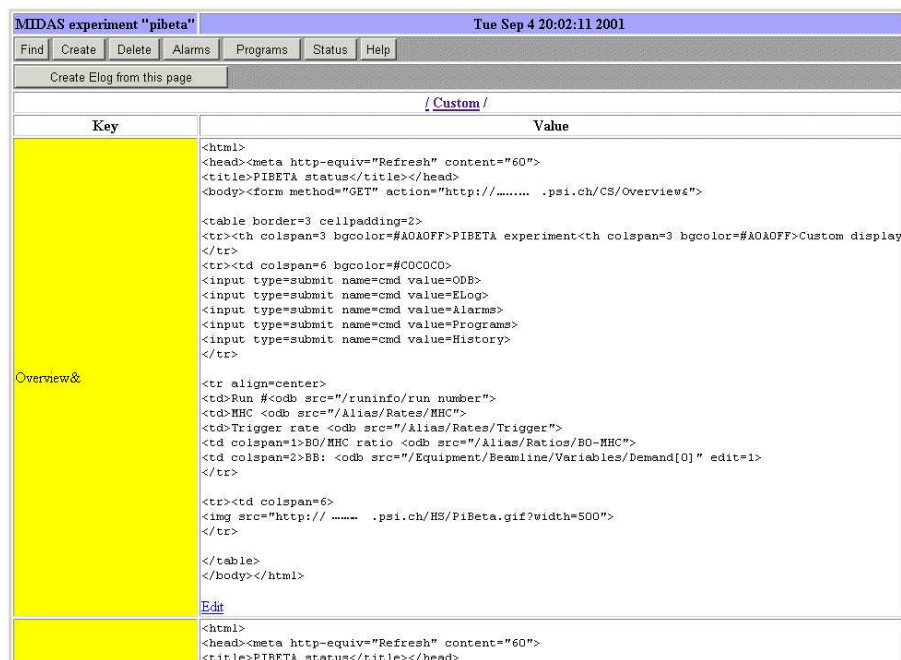


Figure 29: ODB /Custom/ html field.

The insertion of a new Custom page requires the following steps:

- Create an initial html file using your favorite HTML editor.
- Insert the ODB HTML tags at your wish.
- Invoke ODBedit, create the Custom directory, import the html file.
- **Example** of loading the file mcustom.html into odb.

```
Tue> odbedit
[local:midas:Stopped]/>ls
System
Programs
Experiment
Logger
Runinfo
Alarms
Equipment
[local:midas:Stopped]/>mkdir Custom
[local:midas:Stopped]/>cd Custom/
[local:midas:Stopped]/Custom>import mcustom.html
Key name: Test&
[local:midas:Stopped]/Custom>
```

- Once the file is loaded into ODB, you can **ONLY** edit it through the web (as long as the mhttpd is active). Clicking on the **ODB(button)** ... Custom(Key) ... Edit(Hyperlink at the bottom of the key). The Custom page can also be exported back to a ASCII file using the ODBedit command "export"

```
Tue> odbedit
[local:midas:Stopped]/>cd Custom/
[local:midas:Stopped]/Custom>export test&
File name: mcustom.html
[local:midas:Stopped]/Custom>
```

- The character "&" at the end of the custom key name forces the page to be open within the current frame. If this character is omitted, the page will be spawned into a new frame (default).
- If the custom page name is set to **Status** (no "&") it will become the default midas Web page!
- html code **Example** mcustom.html

```
<!doctype html public "-//w3c//dtd html 4.0 transitional//en">
<html>
<head>
<meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1">
<meta name="GENERATOR" content="Mozilla/4.76 [en] (Windows NT 5.0; U) [Netscape]">
<meta name="Author" content="Pierre-André Amaudruz">
<title>Set value</title>
</head>
<body text="#000000" bgcolor="#FFFFCC" link="#FF0000" vlink="#800080" alink="#0000FF">
<form method="GET" action="http://host.domain:port/CS/WebLtno&">
<input type="hidden" name="exp" value="ltno">
<center><table CELLSPACING=0 CELLPADDING=0 COLS=3 WIDTH="100%" BGCOLOR="#99FF99">
<caption><b><font face="Georgia"><font color="#000099"><font size=+2>LTNO
Custom Web Page</font></font></b></caption>
<tr BGCOLOR="#FFCC99">
<td><b><font color="#FF0000">Actions: </font></b>
<input type="submit" name="cmd" value="Status">
<input type="submit" name="cmd" value="Start">
<input type="submit" name="cmd" value="Stop">
<td>
<input type="submit" name="cmd" value="ODB">
<input type="submit" name="cmd" value="History">
<input type="submit" name="cmd" value="Elog"></td>
<td align="right"><b>LTNO experiment </b></td>
</tr>
<tr><td><b>Cryostat section:</b>
<br>LN2 Bath Level : <odb src="/equipment/cryostat/variables/measured[12]">
<br>Run# : <odb src="/runinfo/run number" edit=1>
<br>Run# : <odb src="/runinfo/run number"></td>
<td WIDTH="100%" BGCOLOR="#009900"><b>RF source section:</b>
<br>Run# : <odb src="/runinfo/run number"></td>
<td WIDTH="50%" BGCOLOR="#FF6600"><b>Run section:</b>
<br>Start Time: <odb src="/runinfo/start time">
```

```

<br>Stop Time: <odb src="/runinfo/stop time">
<br>Run#: <odb src="/runinfo/run number"></td>
</tr>
<tr>
<td BGCOLOR="#CC6600"><b>Sucon magnet section:</b>
<br>Run#: <odb src="/runinfo/run number"></td>

<td BGCOLOR="#FFCC33"><b>Scalars section:</b>
<br>Beam Current: <odb src="/equipment/epics/variables/measured[10]">
<br>Run#: <odb src="/runinfo/run number"></td>

<td BGCOLOR="#66FFFF"><b>Polarity section:</b>
<br>Run#: <odb src="/runinfo/run number"></td>
</tr>
</table></center>



<b><i><font color="#000099"><a href="http://host.domain/index.html">
<br> LTNO help</a></font></i></b>
</body>
</html>

```

**6.12.10.2 External referenced HTML document.** In the case the custom web page is rather large and complex, it becomes easier to handle such file through normal html editor and skip the reloading of the file in the ODB. (import/export). This is now possible by providing an external reference of the web page in the /Custom directory of the ODB. In addition special ODB settings are available to allow GIF image insertion and ODB fields bars and fillup area superimposed on the image. This powerful new extension brings the mhttpd capability closer to other experiment web control similar to EPICS.

The HTML examples below should operate in conjunction of the standard demo midas example found in midas/examples/experiment. myexpt.html, xcumstom.odb and myexpt.gif can be found in the midas/examples/custom directory.

Using your favorite html editor, you can create a custom page including any of the options described in the [Internal HTML document](#). Once the mhttpd application is started and connected to a valid Midas experiment, you can activate this page as follow:

```

[local:Default:Stopped]/>pwd
/
[local:Default:Stopped]/>mkdir Custom
[local:Default:Stopped]/>cd Custom
[local:Default:Stopped]/Custom>create string Dewpoint&
String length [32]: 256
[local:Default:Stopped]/Custom>set Dewpoint& \doc\cooling\dewpoint.html

```

**Note:** This link refers to a local html document. In the case an external HTML is requires, the definition should be placed under /Alias (see also [ODB /Alias Tree](#)).

```
[local:Default:Stopped]/>mkdir Alias
[local:Default:Stopped]/>cd alias
[local:Default:Stopped]/alias>create string WebDewpoint&
String length [32]: 256
[local:Default:Stopped]/alias>set WebDewpoint& "http://www.decaturn.de/javascript/dew/index.html"
```

After refreshing the Midas status web page, the link **Dewpoint** should be visible in the top area of the page. The "&" is to prevent a new frame to be displayed (see [ODB /Alias Tree](#)). Clicking on it will bring you to your custom html documentation. In the case you want to extend the flexibility of your page by including features such as:

- "live" ODB values position in a particular location of the page.
- "bar level" showing graphically levels or rate etc.
- "color level" where color is used as level indicator. you need to setup specific ODB tree related to a particular page. This overlay of the requested features is done on a GIF file representing your background experimental layout for example. myexpt.html can be found in the examples/custom directory. For the full operation of this custom demo, you'll need to have the frontend "sample frontend" (midas/example/experiment/frontend.c), mlogger, mhttpd running.

#### Html document myexpt.html

```
<html>
<head>
  <title>MyExperiment Demo Status</title>
  <meta http-equiv="Refresh" content="30">
</head>
<body>
  <form name="form1" method="Get" action="/CS/MyExpt">
    <table border=3 cellpadding=2>
      <tr><th bgcolor="#A0A0FF">Demo Experiment<th bgcolor="#A0A0FF">Custom Monitor/Control</tr>
      <tr><td> <b><font color="#ff0000">Actions: </font></b><input
        value="Status" name="cmd" type="submit"> <input type="submit"
        name="cmd" value="Start"><input type="submit" name="cmd" value="Stop">
      </td><td>
      <center> <a href="http://midas.triumf.ca/doc/html/index.html"> Help </a></center>
      </td></tr>
      <td>Current run #: <b><odb src="/Runinfo/run number"></b></td>
      <td>#events: <b><odb src="/Equipment/Trigger/Statistics/Events sent"></b></td>
      </tr><tr>
      <td>Event Rate [/sec]: <b><odb src="/Equipment/Trigger/Statistics/Events per sec."></b></td>
      <td>Data Rate [kB/s]: <b><odb src="/Equipment/Trigger/Statistics/kBytes per sec."></b></td>
      </tr><tr>
      <td>Cell Pressure: <b><odb src="/Equipment/NewEpics/Variables/CellPressure"></b></td>
      <td>FaradayCup : <b><odb src="/Equipment/NewEpics/Variables/ChargeFaradayCup"></b></td>
      </tr><tr>
      <td>Q1 Setpoint: <b><odb src="/Equipment/NewEpics/Variables/EpicsVars[17]" edit=1></b></td>
      <td>Q2 Setpoint: <b><odb src="/Equipment/NewEpics/Variables/EpicsVars[19]" edit=1></b></td>
      </tr><tr>
```

```

<th> 
</th>
<th> </th>
</tr>
<tr><td colspan=2>
<map name="myexpt.map">
  <area shape=rect coords="140,70, 420,170"
    href="http://midas.triumf.ca/doc/html/index.html" title="Midas Doc">
  <area shape=rect coords="200,200,400,400"
    href="http://localhost:8080" title="Switch pump">
  <area shape=rect coords="230,515,325,600"
    href="http://localhost:8080" title="Logger in color level (using Fill)">
</map>
</td></tr>
</table></form>
</body>
</html>

```

To activate this HTML document, it has to be defined in the ODB as follow:

```

[local:Default:Stopped]/>cd /Custom
[local:Default:Stopped]/Custom>create string Myexpt&
String length [32]: 256
[local:Default:Stopped]/Custom>set Myexpt& \midas\examples\custom\myexpt.html

```

After refresh, the ODB values will be displayed, the mapping is still not active. as no reference to the gif location has been given yet.

```

[local:Default:Stopped]/Custom>mkdir Images
[local:Default:Stopped]/Custom>cd Images/
[local:Default:Stopped]Images>mkdir myexpt.gif
[local:Default:Stopped]Images>cd myexpt.gif/
[local:Default:Stopped]myexpt.gif>create string Background
String length [32]: 256
[local:Default:Stopped]myexpt.gif>set Background \midas\examples\custom\myexpt.gif

```

After refresh, the file **myexpt.gif** should be visible. The mapping based on myexpt.map is active, hovering the mouse over the boxes will display the associated titles (Midas Doc, Switch pump, etc), By clicking on either box the browser will go to the defined html page specified by the map.

Custom web page with external reference to html document.

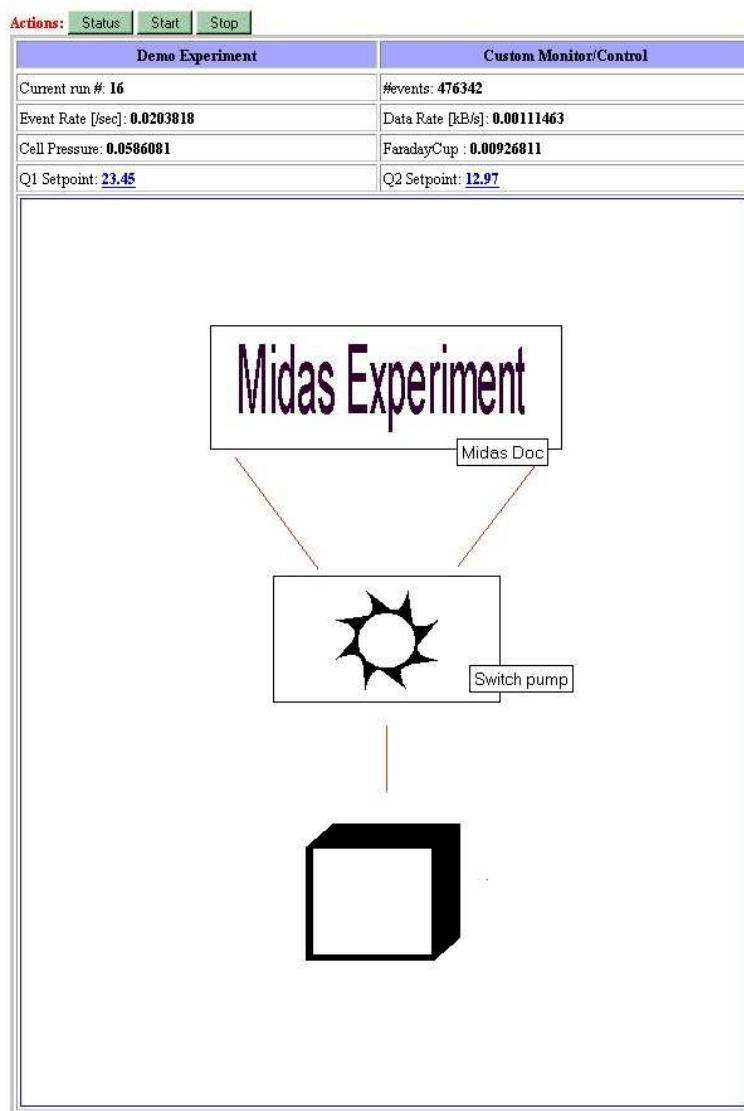


Figure 30: Custom web external to html document.

In addition of these initial features, multiple ODB values can be superimposed at definite location on the image. Each entry will have a ODB tree associated to it defining the ODB variable, X/Y position, color, etc...

```
[local:Default:Stopped]myexpt.gif>mkdir Labels
[local:Default:Stopped]myexpt.gif>cd labels
[local:Default:Stopped]Labels>mkdir Rate
```



```
>>>>>>> Refresh web page <<<<<<<<
```

```
12:32:38 [mhttpd] [mhttpd.c:5508:show_custom_gif] Empty Src key for label "Rate"
```

Creating "Labels/<label name>" sub-directory under the gif file name, will automatically at the **next** web page refresh complete its filling with default value for the structure for that label.

```
[local:Default:Stopped]Labels>cd Rate/
[local:Default:Stopped]Rate>ls -l
```

Key name	Type	#Val	Size	Last	Opn	Mode	Value
Src	STRING	1	256	2m	0	RWD	
Format	STRING	1	32	2m	0	RWD	%1.1f
Font	STRING	1	32	2m	0	RWD	Medium
X	INT	1	4	2m	0	RWD	0
Y	INT	1	4	2m	0	RWD	0
Align	INT	1	4	2m	0	RWD	0
FGColor	STRING	1	8	2m	0	RWD	000000
BGColor	STRING	1	8	2m	0	RWD	FFFFFF

The **Src** should point to a valid ODB Key variable. The X,Y fields position the top left corner of the label. The other fields associated to this label are self-explanatory.

```
[local:Default:Stopped]Rate>set src "/Equipment/Trigger/statistics/kbytes per sec."
[local:Default:Stopped]Rate>set x 330
[local:Default:Stopped]Rate>set y 250
[local:Default:Stopped]Rate>set format "Rate:%1.1f kB/s"
```

Once the initial label is created, the simplest way to extent to multiple labels is to copy the existing label sub-tree and modify the label parameters.

```
[local:Default:Stopped]Labels>cd ..
[local:Default:Stopped]Labels>copy Rate Event
[local:Default:Stopped]Labels>cd Events/
[local:Default:Stopped]Event>set src "/Equipment/Trigger/statistics/events per sec."
[local:Default:Stopped]Event>set Format "Rate:%1.1f evt/s"
[local:Default:Stopped]Event>set y 170
[local:Default:Stopped]Event>set x 250
```

In the same manner, you can create bars used for level representation. This code will setup two ODB values defined by the fields src.

```
[local:Default:Stopped]myexpt.gif>pwd
/Custom/Images/myexpt.gif
[local:Default:Stopped]myexpt.gif>mkdir Bars
[local:Default:Stopped]myexpt.gif>cd bars/
[local:Default:Stopped]Labels>mkdir Rate
```

```
>>>>>>> Refresh web page <<<<<<<<

14:05:58 [mhttpd] [mhttpd.c:5508:show_custom_gif] Empty Src key for bars "Rate"
[local:Default:Stopped]Labels>cd Rate/
[local:Default:Stopped]Rate>set src "/Equipment/Trigger/statistics/kbytes per sec."
[local:Default:Stopped]Rate>set x 4640
[local:Default:Stopped]Rate>set y 210
[local:Default:Stopped]Rate>set max 1e6
[local:Default:Stopped]Labels>cd ..
[local:Default:Stopped]Labels>copy Rate Events
[local:Default:Stopped]Labels>cd Events/
[local:Default:Stopped]Event>set src "/logger/channels/0/statistics/events written"
[local:Default:Stopped]Event>set direction 1
[local:Default:Stopped]Event>set y 240
[local:Default:Stopped]Event>set x 450
[local:Default:Stopped]Rate>set max 1e6
```

Following the same principle as for the labels, by creating Bars/<bar name>="", the structure for the rate will be filled with a default setting after refreshing the custom midas page. The different parameters are self-explanatory.

The last option available is the Fills where an area can be filled with different colors depending on the given ODB value (src parameter). The color selection is mapped by correspondance of the index of the Limit array to the Fillcolor array. Presently the structure is not pre-defined and need to be entered by hand.

```
[/Custom/Images/myexpt.gif/Fills/Level]
Src = STRING : [256] /equipment/Trigger/statistics/events sent
X = INT : 250
Y = INT : 550
Limits = DOUBLE[4] :
[0] 0
[1] 10
[2] 10000
[3] 100000
Fillcolors = STRING[4] :
[8] 00FF00
[8] AAFF00
[8] AA0000
[8] FF0000
```

Custom web page with external reference to html document.

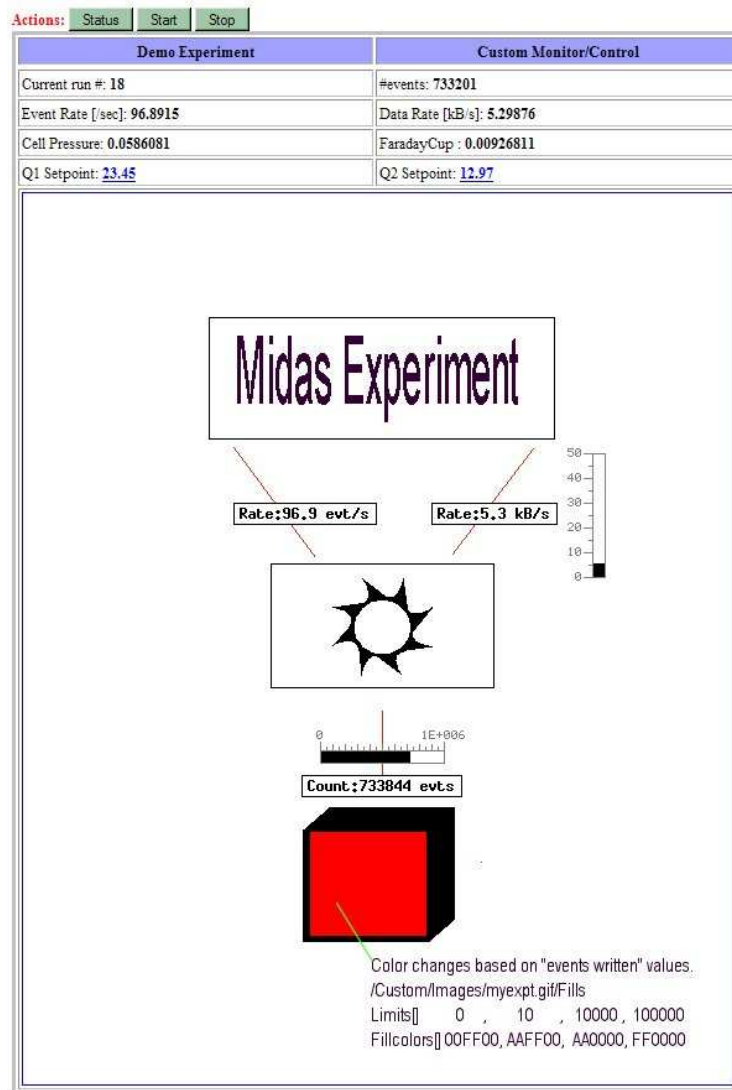


Figure 31: Custom web external to html document.

[Utilities](#) - [Top](#) - [Data format](#)

## 6.13 New Documented Features

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Some of the midas features are not yet fully documented or even referenced anywhere in the documentation.

This section will maintain an up-to-date information with a log of the latest documentation on past and current features. It will also mention the wish list documentation on current developments.

- Current doc revision: 1.9.5-3
- Software version: 1.9.5
- Latest tarball : [1.9.5-x](#) You can retrieve the daily tarball directly from the SVN web interface by clicking on the "tarball" link at the bottom of the main SVN-midas page.
- Latest RPM : [1.9.2-1](#)
- **[Before 1.9.6]**
  - Switch from CVS to Subversion for Version control, this change affects [Quick Start](#). Check the new checkout/update commands.
  - New [Midas VME standard functions](#) implementation in [mvmestd.h](#).
  - **MIDASSYS** environment variable now required for building /examples/experiment and /examples/hbookexpt
  - New **/drivers** tree structure includes **camac** , **vme** , **fastbus**.
  - New make option for minimal installation. This permits root installation of mserver, mcleanup, dio and mhttpd only.

```
> make minimal_install
```
- **[1.9.5-2]**
  - XML ODB format
  - Separate xml SVN path for building Midas required. This package can be extracted the same way as Midas. It has to reside at the same level as Midas.
- **[1.9.5-1]**
  - [Custom page](#) improvement. Implementation of external file.html and dynamic linked graphic to ODB values.
- **[1.9.5]**
  - When upgrading to 1.9.5 , *ALL* midas applications including user applications needs to be rebuild *AND* the **ODB.SHM** (.ODB.SHM) shared memory need to be removed. Prior the removal of the ODB.SHM, the ODB database can be saved in ASCII format for later restoration.

- [Run Transition Sequence](#) changed to multiple level scheme.
- `odbedit_task` support of XML format for ODB dump.
- Large File support (>2GB) from [mlogger task](#) application.
- [Folder](#) Root Histogram support within `mana`.
- [mevb task](#) application.
- New [Midas Frontend application](#) argument for Event Builder option (`-i index`).
- \* Documentation on "Tests" results from analyzer.
- [mySQL](#) support from [mlogger task](#).
- Increase system wide parameters values (see [midas.h](#)).
- Fix numerous small annoying bugs...
- Improve debugging messages in `mserver -d (/tmp/mserver.log)`.

- [**<1.9.5**]

- In writing
  - \* Epics Slow Control documentation

- Introduce [MIDASSYS](#) environment variable
- Analyzer documention revision [MIDAS Analyzer](#)
- Watchdog bug `£x` (RH9.0)

- **Restructured Midas distribution**

- In the same effort as the documentation, the midas tree and CVS have been modified. The [download area](#) now contains separate directories for doc, add-ons, publications etc.

**[DOCUMENTATION in progress]**

- A large effort has been put on the documentation for switching from the **DOC++** to [Doxygen](#). We feel the cross-referencing to the source code is excellent and hopefully will server better its purpose. Currently the [MIDAS Analyzer](#) is not complete as well as the [Quick Start](#). This **Doxygen** related `£les` will be made accessible for better update.

- **[Midas Short Course]**

- During the RealTime Conference 2003 held in Montreal, a short course was offered to introduce the Midas DAQ to the audience. This course (.ppt, .pdf) is now part of the Midas distribution and can be found under the doc/course/ directory as 2 files (part1, part2). The Part 1 describes the basic of the system and its implementation, while part 2 lists specific features. [Part1.pdf](#), [Part2.pdf](#) .

- [1.9.3]

- Support for ROOT files.
- [mlogger task](#) : New Data format **ROOT** and corresponding file extension **root**
- [rmidas task](#) : Initial Root/Midas GUI for Histogram and Run control.
- [MIDAS Analyzer](#) : New framework for Online/Offline Root analysis using socket connection.
- **Makefile** for ROOT, remove **MANA\_LITE**, create [HAVE\\_ROOT](#), [HAVE\\_HBOOK](#).
- New Analyzer **mana**, **hmana**, **rmana** depending on the type of package.

- [1.9.2]

- odbedit: <tab> completion is working with tags too, "Load" protect the data dir if changed.
- [lazylogger task](#) : This task has been improved for tape manipulation as well as messages display. It has also now extra fields for shell scripts when the tape rewinds. It supports also split run capability when running multiple instance of the task. Please refer to the documentation for explanation of the new fields.
- mlxspeaker: Added possible system call to wav file for "beeping" user before message.
- mhist: Add index range for -i with -v.
- eventbuilder: Revised version with user code scheme. Still in a development stage.
- [cm\\_cleanup\(\)](#) if you were using this call, you need now to provide an empty char arg to make it compatible.

- [1.9.1]

- This version addresses several bugs reported in the web interface, history, logger, odbedit and implements new features in particular for the history pages on web interface. The detail list of the modifications can be found in [CHANGELOG](#) .

- \* **[EQ\_FRAGMENTED]** Possibility to send extremely large event through the system without modification of the system configuration (see [The Equipment structure](#))
- \* **[logger subdir option]** Allows to redirect the data files to a sub-directory based on the time of the creation of the data file (see [ODB /Logger Tree](#)).
- \* Option for building an analyzer without the CERN library (HBOOK) (see [Midas build options and operation considerations](#)).
- \* **[MOD. REQ.]** This release requires several modifications in the user code in order to compile the 1.9.1.

1. **[db\_get\_value() function]** Requires an extra parameter see [Midas Code and Libraries](#).
2. **[max\_event\_size\_frag]** Required in all the frontend code as follow:

```
// maximum event size produced by this frontend
INT max_event_size = 10000;
// maximum event size for fragmented events (EQ_FRAGMENTED)
INT max_event_size_frag = 5*1024*1024;
```

- **[/Logger tree]** As this tree includes new field, you will need to recreate this tree.
- **[general]** It is wise to create a fresh ODB when switching to 1.9.1 version. This can be done by:
  1. removing all attached midas client to your experiment
  2. saving the current ODB to a file
  3. removing all shared memory files (hidden files \*.SHM)
  4. creating new ODB (odbedit -s size)
  5. trimming the odb save file to keep user specific structures (if any).
  6. restoring the trimmed odb file.

- **[<1.9.1]**

- Hopefully nobody is still running an older version.

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## 6.14 ODB Structure

[Internal features](#) - [Top](#) - [Data format](#)

The Online Database contains information that system and user wants to share. Basically all transactions for experiment setup and monitoring go through the ODB. It also contains some specific system information related to the "Midas client" currently involved in an experiment (/system).

Each ODB field or so called **KEY** is accessible by the user through either an interactive way (see [odbedit task](#)) or by C-programming (see functions `db_xxx` in [Midas Code and Libraries](#)).

The ODB information is stored in a "tree/branch" structure where each branch refers to a specific set of data. On the first invocation of the database (first Midas application) a minimal system record will be created. Later on each application will add its own set of parameters to the database depending on its requirement. For instance, starting the ODB for the first time, the tree **/RunInfo**, **/Experiment**, **/System** will be created. The application [mlogger task](#) will add its own tree **/Logger/...**

As mentioned earlier, ODB is the main communication platform between any Midas application. As such, the content of the ODB is application dependent. Several "dormant" trees can be awakened by the user in order to provide extra flexibility of the system. Such "dormant" trees are **Alias**, Script, Edit on Start, Security, Run parameters.

- [ODB /System Tree](#)
- [ODB /RunInfo Tree](#)
- [ODB /Equipment Tree](#)
- [ODB /Logger Tree](#)
- [ODB /Experiment Tree](#)
- [ODB /History Tree](#)
- [ODB /Alarms Tree](#)
- [ODB /Script Tree](#)
- [ODB /Alias Tree](#)
- [ODB /Elog Tree](#)
- [ODB /Programs Tree](#)
- [ODB /Lazy Tree](#)
- [ODB /EBuilder Tree](#)
- [ODB /Custom Tree](#)



## 6.14.1 ODB /System Tree

The system tree contains information specific to each "Midas client" currently connected to the experiment. This information is not primarily for the user but may be informative in some respect to the reader.

```
[host:expt:Stopped]/>ls -r -l /system
```

Key name	Type	#Val	Size	Last	Opn	Mode	Value
-----							
System	DIR						
Clients	DIR						
29580	DIR						
Name	STRING	1	32	17h	0	R	decay
Host	STRING	1	256	17h	0	R	host1
Hardware type	INT	1	4	17h	0	R	42
Server Port	INT	1	4	17h	0	R	1227
Transition Mask	DWORD	1	4	17h	0	R	329
Deferred Transition	DWORD	1	4	17h	0	R	6
RPC	DIR						
16000	BOOL	1	4	17h	0	R	y
16001	BOOL	1	4	17h	0	R	y
29638	DIR						
Name	STRING	1	32	17h	0	R	MStatus
Host	STRING	1	256	17h	0	R	host1
Hardware type	INT	1	4	17h	0	R	42
Server Port	INT	1	4	17h	0	R	1228
Transition Mask	DWORD	1	4	17h	0	R	0
Deferred Transition	DWORD	1	4	17h	0	R	0
29810	DIR						
Name	STRING	1	32	17h	0	R	Nova_029810
Host	STRING	1	256	17h	0	R	host
Hardware type	INT	1	4	17h	0	R	42
Server Port	INT	1	4	17h	0	R	1235
Transition Mask	DWORD	1	4	17h	0	R	0
29919	DIR						
Name	STRING	1	32	17h	0	R	Epics
Host	STRING	1	256	17h	0	R	host
Hardware type	INT	1	4	17h	0	R	42
Server Port	INT	1	4	17h	0	R	1237
Transition Mask	DWORD	1	4	17h	0	R	329
Deferred Transition	DWORD	1	4	17h	0	R	0
RPC	DIR						
16000	BOOL	1	4	17h	0	R	y
16001	BOOL	1	4	17h	0	R	y
12164	DIR						
Name	STRING	1	32	6s	0	R	ODBEdit
Host	STRING	1	256	6s	0	R	host2
Hardware type	INT	1	4	6s	0	R	42
Server Port	INT	1	4	6s	0	R	4893
Transition Mask	DWORD	1	4	6s	0	R	0
Deferred Transition	DWORD	1	4	6s	0	R	0
Link timeout	INT	1	4	6s	0	R	10000
Client Notify	INT	1	4	6s	0	RWD	0
Prompt	STRING	1	256	>99d	0	RWD	[%h:%e:%S]%p>
Tmp	DIR						

- [Remark 1] The key **Prompt** sets up the prompt of the ODBedit program.

```

odbedit
[local:midas:Stopped]/>cd /System/
[local:midas:Stopped]/System>ls
Clients
Tmp
Client Notify          0
Prompt                 [%h:%e:%S]%p>

[local:midas:Stopped]/System>set Prompt my_prompt>
my_prompt>set Prompt [Host:%h-Expt:%e:State:%s]Path:%p>
[Host:local-Expt:midas-State:S]Path:/System>set Prompt [Host:%h-Expt:%e-State:%S]Path:%p>
[Host:local-Expt:midas-State:Stopped]Path:/System>

```

### 6.14.2 ODB /RunInfo Tree

This branch contains system information related to the run information. Several time fields are available for run time statistics.

```

odb -e expt -h host
[host:expt:Running]/>ls -r -l /runinfo

```

Key name	Type	#Val	Size	Last	Opn	Mode	Value
Runinfo	DIR						
State	INT	1	4	2h	0	RWD	3
Online Mode	INT	1	4	2h	0	RWD	1
Run number	INT	1	4	2h	0	RWD	8521
Transition in progress	INT	1	4	2h	0	RWD	0
Requested transition	INT	1	4	2h	0	RWD	0
Start time	STRING	1	32	2h	0	RWD	Thu Mar 23 10:03:44 2000
Start time binary	DWORD	1	4	2h	0	RWD	953834624
Stop time	STRING	1	32	2h	0	RWD	Thu Mar 23 10:03:33 2000
Stop time binary	DWORD	1	4	2h	0	RWD	0

- **[State]** Specifies in which state the current run is. The possible states are 1: STOPPED, 2: RUNNING, 3: PAUSED.
- **[Online Mode]** Specifies the expected acquisition mode. This parameter allows the user to detect if the data are coming from a "real-time" hardware source or from a data save-set. Note that for analysis replay using "analyzer" this flag will be switched off.
- **[Run number]** Specifies the current run number. This number is automatically incremented by a successful run start procedure.
- **[Transition in progress]** Specifies the current internal state of the system. This parameter is used for multiple source of "run start" synchronization.

- **[Requested transition]** Specifies the current internal of the [Deferred Transition](#) state of the system.
- **[Start Time]** Specifies in an ASCII format the time at which the last run has been started.
- **[Start Time binary]** Specifies in a binary format at the time at which the last run has been started This field is useful for time interval computation.
- **[Stop Time]** Specifies in an ASCII format the time at which the last run has been stopped.
- **[Stop Time binary]** Specifies in a binary format the time at which the last run has been stopped. This field is useful for time interval computation.

### 6.14.3 ODB /Equipment Tree

Every frontend create a entry under the /Equipment tree. The name of the sub-tree is taken from the frontend source code in the equipment declaration ([frontend.c](#)). More detailed explanation of the composition of that tree will be found throughout this document.

```
{
  "DspecCheck",      // equipment name
  ...
  ,
  {
    "Scaler",        // equipment name
    ...
    ,

```

Example:

Key name	Type	#Val	Size	Last Opn	Mode	Value
HistoCheck	DIR					
DSpecCheck	DIR					
HistoPoll	DIR					
HistoEOR	DIR					
DSpecEOR	DIR					
Scaler	DIR					
SuconMagnet	DIR					
TempBridge	DIR					
Cryostat	DIR					
Meters	DIR					
RFSOURCE	DIR					
DSpec	DIR					

The equipment tree is then split in several sections which by default the system creates.

- Common : Contains the system information. Should not be overwritten by the user.
- Variables : Contains the equipment data if enabled (see below).
- Settings : Contains the equipment specific information that the user may want to maintain. In the case of a [Slow Control System](#) equipment, extended tree structure is created by the system.
- Statistics : Contains equipment statistics information such as event taken, event rate, data rate.

```
[local:Sl]ls -l -r /equipment/scaler
Key name                                Type      #Val  Size  Last Opn Mode Value
-----
Scaler                                  DIR
  Common                               DIR
    Event ID                           WORD      1     2    16h 0   RWD  1
    Trigger mask                       WORD      1     2    16h 0   RWD  256
    Buffer                              STRING    1    32    16h 0   RWD  SYSTEM
    Type                               INT       1     4    16h 0   RWD  1
    Source                             INT       1     4    16h 0   RWD  0
    Format                             STRING    1     8    16h 0   RWD  MIDAS
    Enabled                           BOOL      1     4    16h 0   RWD  y
    Read on                           INT       1     4    16h 0   RWD  377
    Period                            INT       1     4    16h 0   RWD  1000
    Event limit                       DOUBLE    1     8    16h 0   RWD  0
    Num subevents                     DWORD     1     4    16h 0   RWD  0
    Log history                       INT       1     4    16h 0   RWD  0
    Frontend host                     STRING    1    32    16h 0   RWD  midtis03
    Frontend name                     STRING    1    32    16h 0   RWD  feLTNO
    Frontend file name                STRING    1   256    16h 0   RWD  C:\online\sc_ltno.c
  Variables                            DIR
    SCLR                              DWORD     6     4     1s 0   RWD
                                     [0]
                                     [1]
                                     [2]
                                     [3]
                                     [4]
                                     [5]
    RATE                              FLOAT     6     4     1s 0   RWD
                                     [0]
                                     [1]
                                     [2]
                                     [3]
                                     [4]
                                     [5]
  Statistics                           DIR
    Events sent                       DOUBLE    1     8     1s 0   RWDE 370
    Events per sec.                   DOUBLE    1     8     1s 0   RWDE 0.789578
    kBytes per sec.                   DOUBLE    1     8     1s 0   RWDE 0.0678543
```

### 6.14.4 ODB /Logger Tree

The /Logger ODB tree contains all the relevant information for the Midas logger utility ([mlogger task](#)) to run properly. This utility provides the mean of storing the physical data retrieved by the frontend to a storage media. The user has no code to write in order for the system to operate correctly. Its general behavior can be customized and multiple logging channels can be defined. The application supports so far three type of storage devices i.e.: *Disk*, *Tape* and *FTP* channel.

Default settings are created automatically when the logger starts the first time:

Key name	Type	#Val	Size	Last	Opn	Mode	Value
-----							
Logger	DIR						
Data dir	STRING	1	256	4h	0	RWD	/scr0/spring2000
Message file	STRING	1	256	22h	0	RWD	midas.log
Write data	BOOL	1	4	2h	0	RWD	n
ODB Dump	BOOL	1	4	22h	0	RWD	y
ODB Dump File	STRING	1	256	22h	0	RWD	run%05d.odb
Auto restart	BOOL	1	4	22h	0	RWD	y
Tape message	BOOL	1	4	15h	0	RWD	y
Channels	DIR						
0	DIR						
Settings	DIR						
Active	BOOL	1	4	1h	0	RWD	y
Type	STRING	1	8	1h	0	RWD	Disk
Filename	STRING	1	256	1h	0	RWD	run%05d.ybs
Format	STRING	1	8	1h	0	RWD	YBOS
ODB Dump	BOOL	1	4	1h	0	RWD	y
Log messages	DWORD	1	4	1h	0	RWD	0
Buffer	STRING	1	32	1h	0	RWD	SYSTEM
Event ID	INT	1	4	1h	0	RWD	-1
Trigger Mask	INT	1	4	1h	0	RWD	-1
Event limit	DWORD	1	4	1h	0	RWD	0
Byte limit	DOUBLE	1	8	1h	0	RWD	0
Tape capacity	DOUBLE	1	8	1h	0	RWD	0
Subdir format	STRING	1	32	7h	0	RWD	%Y%m%d
Current filename	STRING	1	256	7h	0	RWD	20020605\run00078.mid
Statistics	DIR						
Events written	DOUBLE	1	8	1h	0	RWD	0
Bytes written	DOUBLE	1	8	1h	0	RWD	0
Bytes written to	DOUBLE	1	8	1h	0	RWD	3.24316e+11
Files written	INT	1	4	1h	0	RWD	334

From Midas version 1.9.5, the logger has the possibility to store information to a MySQL database. This is achieved by defining at build time the preprocessor tag [HAVE\\_MYSQL](#). This option when enabled will create a sub tree *SQL* under /Logger in the ODB. This tree contains information for MySQL access with predefined MySQL database name *Midas* and table *Runlog*. Under 2 dedicated sub directories i.e: BOR and EOR, predefined links exists which will be used respectively at BOR and EOR for storing into the database. These elements are ODB links allowing the user to extend the list with any parameter of the ODB database. This logger MySQL option is to replace

or complement the *runlog.txt* functionality of the [ana\\_end\\_of\\_run\(\)](#) function from the [analyzer.c](#).

```
[local:midas:S]/Logger>ls -lr SQL
Key name                                     Type      #Val  Size  Last Opn Mode Value
-----
SQL                                          DIR
  Create database                          BOOL      1     4    27s  0   RWD  n
  Write data                              BOOL      1     4    27s  0   RWD  n
  Hostname                                STRING    1    80    27s  0   RWD  localhost
  Username                                STRING    1    80    27s  0   RWD  root
  Password                                STRING    1    80    27s  0   RWD
  Database                                STRING    1    32    27s  0   RWD  midas
  Table                                  STRING    1    80    27s  0   RWD  Runlog
  Links BOR                               DIR
    Run number                            LINK      1    20    58s  0   RWD  /Runinfo/Run number
    Start time                            LINK      1    20    58s  0   RWD  /Runinfo/Start time
  Links EOR                               DIR
    Stop time                             LINK      1    19    4m   0   RWD  /Runinfo/Stop time
```

- [Data dir] Specifies in which directory files produced by the logger should be written. Once the Logger is running, this [Data\\_Dir](#) will be pointing to the location of the midas.log, ODB dump files, history files, message files. In the case of multiple logging channels, the data path for all the channels is defaulted to the same location. In the case where specific directory has to be assigned to each individual logging channel, the field **/logger/channel/<x>/Settings/Filename** can contain the full path of the location of the .mid, .ybs, .asc file. By finding the OS specific **SEPARATOR\_DIR** ("/", "\"). The field **Filename** will overwrite the global [Data\\_Dir](#) setting for that particular channel.
- [History Dir] This field is optional and doesn't appear by default in the logger. If present the location of the [History system](#) files is reassigned to the defined path instead of the default [Data\\_Dir](#).
- [Elog Dir] This field is optional and doesn't appear by default in the logger. If present the location of the [Electronic Logbook](#) files is reassigned to the defined path instead of the default [Data\\_Dir](#).
- [Message file] Specifies the file name for the log file which contains all messages from the MIDAS message system. The message log file is a simple ASCII file, which can be viewed at any time to see a history of what happened in an experiment.
- [Write data] Global flag which turns data logging on and off for all channels. It can be set to zero temporarily to make a short test run without data logging. The key "Write data?" is predefined logger key for enabling data logging. This action can be overridden by setting the active key to 1.

- [ODB Dump] Specifies if a dump of the complete ODB should be written to the file specified by ODB Dump File.
- [ODB Dump File] At the end of each run. If the file name contains a "%", this gets replaced by the current run number similar to the printf() C function. The format specifier 05d from above would be evaluated to a five digit run number with leading zeros like run00002.oddb. The ODB dump file is in ASCII format and can be used for off-line analysis to check run parameters etc. For a description of the ASCII format see [db\\_copy\(\)](#).
- [Auto restart] When this flag is one, a new run gets automatically restarted when the previous run has been stopped by the logger due to an event or byte limit.
- [Tape message] Specifies if tape messages during mounting and writing of EOF marks are generated. This can be useful for slow tapes to inform all users in a counting house about the tape status.
- [channels] Sub-directory which contains settings for individual channels. By default, only channel "0" is created. To define other channels, an existing channel can be copied:

```
[local]Logger>cd channels
[local]Channels>ls
0
[local]Channels>copy 0 1
[local]Channels>ls
0
1
```

The Settings part of the channel tree has the following meaning:

- [active] turns a channel on (1) or off (0). Data is only logged to channels that are active.
- [Type] Specify the type of media on which the logging should take place. It can be Disk, Tape or FTP to write directly to a remote computer via FTP.
- [Filename] Specify the name of a file in case of a disk logging, where 05d is replaced by the current run number the same way as for the ODB dump files. In the case of a tape logging, the filename specifies a tape device like /dev/nrmt0 or /dev/nst0 under UNIX or \\.\tape0 under Windows NT.

- In FTP mode, the filename specifies the access information for the FTP server. It has the following format:

```
<host name>, <port number>, <user name>, <password>, <directory>, <file name>
```

The normal FTP port number is 21 and 1021 for a Unitree Archive like the one used at the Paul Scherrer Institute. By using the FTP mode, a back-end computer can directly write to the archive.

```
myhost.my.domain,21,john,password,/usr/users/data,run%05d.mid
```

- [Format] Specifies the format to be used for writing the data to the logging channel. It can be one of the following values: MIDAS, YBOS, ROOT, ASCII and DUMP. The MIDAS and YBOS binary formats [Midas format](#) and [YBOS format](#), respectively. The extension for the file name has to match one of the following.
  - .mid for **MIDAS**
  - .ybs for **YBOS**
  - .root for **ROOT**
  - .asc for **ASCII**
  - .txt for **DUMP**
- The ASCII format converts events into readable text format which can be easily analyzed by programs which have problems reading binary data. While the ASCII format tries to minimize the file size by printing one event per line, the DUMP format gives a very detailed ASCII representation of the event including bank information, serial numbers etc, it should be used for diagnostics. Consistency of this type of format has to be maintained between the frontend declaration and the logger.
- [ODB Dump] Specifies the complete dump of the ODB to the logging channel before and after every run. The ODB content is dumped in one long ASCII string reflecting the status at begin-of-run event and at end-of-run event. These special events have an ID of EVENT\_ID\_BOR and EVENTID\_EOR and a serial number equals to the current run number. An analyzer in the off-line analysis stage can restore the ODB to its online state.
- [Log messages] This is a bit-field for logging system messages. If a bit in this field is set, the according system message is written to the logging channel as a message event with an ID of EVENT\_ID\_MESSAGE (0x8002). The bits are 1 for error, 2 for info, 4 for debug, 8 for user, 16 for log, 32 for talk, 64 for call messages and 255 to log all messages. For an explanation of these messages refer to [Buffer Manager](#), Event ID and Trigger .
- [Mask] Specify which events to log. See [Frontend code](#) to learn how events are selected by their ID and trigger mask. To receive all events, -1 is used for the event ID and the trigger mask. By using a buffer other than the "SYSTEM" buffer, event filters can be realized. An analyzer can request all events from the "SYSTEM" buffer, but only write acceptable events to a new buffer called "FILTERED". When the logger request now only events from the new buffer instead of the "SYSTEM" buffer, only filtered events get logged.



- [Event limit, Byte limit and Tape capacity] These fields can be used to stop a run when set to a non-zero value. The statistics values Events written, Bytes written and Bytes written total are checked respectively against these limits. When one of these condition is reached, the run is stopped automatically by the logger. Updates of the statistics branch is performed automatically every so often. This branch contains the number of events and bytes written. These two keys are cleared at the beginning of each run. The **Bytes written total** and **Files written** keys are only reset when a tape is rewound with the ODBEdit command rewind. The Bytes written total entry can therefore be used as an indicator if a tape is full. The Files written entry can be used off-line to determine how many files on tape have to be skipped in order to reach a specific run.
- [Subdir format, Current filename] In the case the **Subdir format** is not empty, this field will enable the placement of the data log file into a sub directory. The name of this subdirectory is composed by the given **Subdir** format string. Its format follows the definition of the system call strftime(). Ordinary characters placed in the format string are copied to s without conversion. Conversion specifiers are introduced by a ‘%’ character, and are replaced in s as follows for the most used one:
  - Y : Year (ex: 2002)
  - y : Year (range:00..99)
  - m : Month (range: 01..12)
  - d : Day (range: 00..31) The other characters are: a, A, b, B, c, C, d, D, e, E, G, g, h, H, I, i, j, k, l, m, M, n, O, o, p, P, r, R, s, S, t, T, u, U, V, w, W, x, X, y, Y, z, Z, +, %%. (See man strftime() for explanations).
- [Current filename] will reflect the full path of the saved data file.

#### 6.14.5 ODB /Experiment Tree

Under this tree, the Midas system stores special features for the user in order to facilitate his job on controlling a run. Initially only one empty key is defined labeled **Name** for the experiment name. The user can create four system keys in order to provide extra run control flexibility i.e.: **"Run Parameter/"**, **"Edit on Start/"**, **"Lock when running/"** and **"Security/"**.

Key name	Type	#Val	Size	Last	Opn	Mode	Value
Experiment	DIR						
Name	STRING	1	32	22s	0	RWD	chaos
Run Parameter	DIR						
Beam Polarity	STRING	1	256	2h	0	R	negative

Beam Momentum	FLOAT	1	4	2h	0	R	91
2LT: log file name?	STRING	1	256	2h	0	R	cni05
1LT: file name?	STRING	1	256	2h	0	R	files.cni.zero
Comment	STRING	1	256	2h	0	R	ch2 target
Target Angle	FLOAT	1	4	2h	0	R	0
Target Material	STRING	1	256	2h	0	R	ch2
Edit on start	DIR						
Beam Momentum	FLOAT	1	4	2h	0	R	91
Beam Polarity	STRING	1	256	2h	0	R	negative
Target Material	STRING	1	256	2h	0	R	ch2
Target Angle	FLOAT	1	4	2h	0	R	0
1LT: file name?	STRING	1	256	2h	0	R	files.cni.zero
Trigger 2	BOOL	1	4	2h	0	RWD	n
2LT: log file name?	STRING	1	256	2h	0	R	cni05
Comment	STRING	1	256	2h	0	R	ch2 target
Write data	BOOL	1	4	2h	0	RWD	y
Lock when running	DIR						
Run Parameter	DIR						
Beam Polarity	STRING	1	256	2h	0	R	negative
Beam Momentum	FLOAT	1	4	2h	0	R	91
2LT: log file name?	STRING	1	256	2h	0	R	cni05
1LT: file name?	STRING	1	256	2h	0	R	files.cni.zero
Comment	STRING	1	256	2h	0	R	ch2 target
Target Angle	FLOAT	1	4	2h	0	R	0
Target Material	STRING	1	256	2h	0	R	ch2
Security	DIR						
Password	STRING	1	32	16h	0	RWD	#@D&%F56
Allowed hosts	DIR						
host.sample.domain	INT	1	4	>99d	0	RWD	0
pierre.triumf.ca	INT	1	4	>99d	0	RWD	0
pcch02.triumf.ca	INT	1	4	>99d	0	RWD	0
koslx1.triumf.ca	INT	1	4	>99d	0	RWD	0
koslx2.triumf.ca	INT	1	4	>99d	0	RWD	0
vwchaos.triumf.ca	INT	1	4	>99d	0	RWD	0
koslx0.triumf.ca	INT	1	4	>99d	0	RWD	0
Allowed programs	DIR						
mstat	INT	1	4	>99d	0	RWD	0
mhttpd	INT	1	4	>99d	0	RWD	0
Web Password	STRING	1	32	16h	0	RWD	pon4@#%SSDF2

- [Name] Specifies the name of the experiment.
- [Run Parameters] Specifies a  $\$x$  directory name where you can create and define keys which can be presented at Run start for run condition selection. The actual activation of any of those line is done via a "logical link key" defined in the Edit on Start/ sub-tree. The links don't have to point to run parameters necessarily. They can point to any ODB key including the logger settings. It can make sense to create a link to the logger setting which enables/disables writing of data. A quick test run can then be made without data logging for example:

```
[local]>create key "/Experiment/Run parameters"
```

Then one or more run parameters can be created in that directory:

```
[local]Run parameters>create int "Run mode"
[local]Run parameters>create string Comment
```

[Edit on Start] Specifies a `fx` directory name where you can define an ODB link (similar to a symbolic link in UNIX) key to the pre-defined directory Run Parameters. Any link key present in this directory pointing to a valid ODB key will be requested for input during the run start procedure.

A new feature has been added to this section for the possibility of preventing the user to change the run number from the web interface during the start sequence. By defining the key **/Experiment/Edit on Start** Edit run number as a boolean variable the ability of editing the run number is enabled or disabled. By default if this key is not present the run number is editable.

```
[local]/>create key "Experiment/Edit on start"
[local]/>cd "Experiment/Edit on start"
[local]/>ln "/Experiment/Run parameters/Run mode" "Run mode"
```

When a run is started from ODBEdit, all links in `/Experiment/Edit on start` are scanned and read in:

```
[local]/>start
Run mode [0]:1
Run number [3]:<return to accept>
Are the above parameters correct?
([y]/n/q): <return to accept "y">
Starting run #2
Run #2 started

[local]/>cd "Experiment/Edit on start"
[local]/>create BOOL "Edit run number"
```

- [Lock when running] Specifies a `fx` directory for defining logical link keys to be set in Read only access mode while the run is in progress. The lock when running can contains logical link to key(s) for setting these keys protection to "read only" while running. In the example below, all the parameters under the declared tree will be switched to read only preventing any parameters modification during the run.

```
[local]/>create key "Experiment/Lock when running"
[local]/>cd "Experiment/Lock when running"
[local]/>ln "/Experiment/Run parameters" "Run parameter"
[local]/>ln "/Logger/Write Data" "Write Data?"
```

- [Security] Specifies a `fx` directory name where information regarding security can be setup. By default, there is no restriction for user to connect locally or remotely to a given experiment. If an access restriction has to be setup in order to protect the experiment from unwilling access, a password mechanism has to be defined.

- [Password] Specifies the encrypted password for accessing current experiment.

```
[local]/>passwd
Password:<xxxx>
Retype password:<xxxx>
```

To remove the full password checking mechanism, the ODB security sub-tree has to be entirely deleted using the following command:

```
[local]/>rm /Experiment/Security
Are you sure to delete the key
"/Experiment/Security"
and all its subkeys? (y/[n]) y
```

After running the odb command passwd, four new sub-`fields` will be present under the Security tree.

- Password
- Allowed hosts
- Allowed programs
- Web Password

- [Allowed hosts] Specifies a `fx` directory name where allowed remote hostname can be defined for free access to the current experiment. While the access restriction can make sense to deny access to outsider to a given experiment, it can be annoying for the people working directly at the back-end computer or for the automatic frontend reloading mechanism (MS-DOS, VxWorks configuration). To address this problem specific hosts can be exempt from having to supply a password and being granted of full access.

```
[local]/>cd "/Experiment/Security/Allowed hosts"
[local]rhosts>create int myhost.domain
[local]rhosts>
```

Where `<myhost>`, `<domain>` has to be replaced by the full IP address of the host requesting full clearance.

- [Allowed programs] Specifies a list of programs having full access to the ODB independently of the node they running from.

```
[local]/>cd "/Experiment/Security/Allowed programs"
[local]:S>create int mstat
[local]:S>
```

- [Web Password] Specifies a separate password for the Web server access ([mhttpd task](#)). If this `field` is active, the user will be requested to provide the "Web Password" when accessing the requested experiment in a "Write Access". In all condition the Read Only Access" is available.

### 6.14.6 ODB /History Tree

This tree is automatically created when the logger is started. The logger will create a default sub-tree containing the following structure:

```
[local:midas:S]/History>ls -l -r
Key name                                     Type      #Val  Size  Last Opn Mode Value
-----
History                                     DIR
  Links                                     DIR
    System                                 DIR
      Trigger per sec.  /Equipment/Trigger/Statistics/Events per sec.
      Trigger kB per sec. /Equipment/Trigger/Statistics/kBytes per sec.

[local:midas:S]/>cd /History/Links/System/
[local:midas:S]System>ls -l
Key name                                     Type      #Val  Size  Last Opn Mode Value
-----
Trigger per sec.  LINK  1    46  >99d 0   RWD  /Equipment/Trigger/Statistics/Events per sec.
Trigger kB per sec. LINK  1    46  >99d 0   RWD  /Equipment/Trigger/Statistics/kBytes per sec.
```

A second sub-tree is added to the /History by the [mhttpd task](#) Midas web server when the button "History" on the main status page is pressed.

```
[local:midas:S]/History>ls -l -r Display
Key name                                     Type      #Val  Size  Last Opn Mode Value
-----
Display                                     DIR
  Default                                   DIR
    Trigger rate                           DIR
      Variables                            STRING    2    32   36h 0   RWD
                                         [0]      System:Trigger per sec.
                                         [1]      System:Trigger kB per sec.
      Factor                                FLOAT     2     4   36h 0   RWD
                                         [0]      1
                                         [1]      1
      Timescale                             INT        1     4   36h 0   RWD  3600
      Zero ylow                             BOOL        1     4   36h 0   RWD   y
```

This define a default history display under the Midas web server as long as the reference to "System" is correct. See [History system](#) for more information regarding explanation on these fields.

Where the 2 trigger fields are symbolic links to the given path. The sub-tree **System** defines a "virtual" equipment and get by the system assigned a particular "History Event ID".

## 6.14.7 ODB /Alarms Tree

This branch contains system information related to alarms. Currently the overall alarm is checked once every minute. Once the alarm has been triggered, the message associated to the alarm can be repeated at a different rate. The structure is split in 2 sections. The "**Alarms**" itself which define the condition to be tested and the "**Classes**" which defines the action to be taken when the alarm occurs. In order to make the system flexible, beside some default message logging (Classes/Write system message), each action may have a particular "detached script" spawned by it (Classes/Execute command).

```
odb -e expt -h host
```

```
[host:expt:Stopped]/Alarms>ls -lr
```

Key name	Type	#Val	Size	Last	Opn	Mode	Value
Alarms	DIR						
Alarm system active	BOOL	1	4	6h	0	RWD	n
Alarms	DIR						
Test	DIR						
Active	BOOL	1	4	31h	0	RWD	n
Triggered	INT	1	4	31h	0	RWD	0
Type	INT	1	4	31h	0	RWD	3
Check interval	INT	1	4	31h	0	RWD	60
Checked last	DWORD	1	4	31h	0	RWD	0
Time triggered first	STRING	1	32	31h	0	RWD	
Time triggered last	STRING	1	32	31h	0	RWD	
Condition	STRING	1	256	31h	0	RWD	/Runinfo/Run number > 10
Alarm Class	STRING	1	32	31h	0	RWD	Alarm
Alarm Message	STRING	1	80	31h	0	RWD	Run number became too large
wc3_anode	DIR						
Active	BOOL	1	4	31h	0	RWD	n
Triggered	INT	1	4	31h	0	RWD	0
Type	INT	1	4	31h	0	RWD	3
Check interval	INT	1	4	31h	0	RWD	10
Checked last	DWORD	1	4	31h	0	RWD	958070825
Time triggered first	STRING	1	32	31h	0	RWD	
Time triggered last	STRING	1	32	31h	0	RWD	
Condition	STRING	1	256	31h	0	RWD	/equipment/chv/variables/chvv[6] <
Alarm Class	STRING	1	32	31h	0	RWD	Alarm
Alarm Message	STRING	1	80	31h	0	RWD	WC3 Anode voltage is too low
chaos	DIR						
Active	BOOL	1	4	31h	0	RWD	n
Triggered	INT	1	4	31h	0	RWD	0
Type	INT	1	4	31h	0	RWD	3
Check interval	INT	1	4	31h	0	RWD	10
Checked last	DWORD	1	4	31h	0	RWD	0
Time triggered first	STRING	1	32	31h	0	RWD	
Time triggered last	STRING	1	32	31h	0	RWD	
Condition	STRING	1	256	31h	0	RWD	/Equipment/B12Y/Variables/B12Y[2]
Alarm Class	STRING	1	32	31h	0	RWD	Alarm
Alarm Message	STRING	1	80	31h	0	RWD	CHAOS magnet has tripped.
Classes	DIR						
Alarm	DIR						
Write system message	BOOL	1	4	31h	0	RWD	y
Write Elog message	BOOL	1	4	31h	0	RWD	n
System message inter	INT	1	4	31h	0	RWD	60

System message last	DWORD	1	4	31h	0	RWD	0
Execute command	STRING	1	256	31h	0	RWD	
Execute interval	INT	1	4	31h	0	RWD	0
Execute last	DWORD	1	4	31h	0	RWD	0
Stop run	BOOL	1	4	31h	0	RWD	n
Warning	DIR						
Write system message	BOOL	1	4	31h	0	RWD	y
Write Elog message	BOOL	1	4	31h	0	RWD	n
System message inter	INT	1	4	31h	0	RWD	60
System message last	DWORD	1	4	31h	0	RWD	0
Execute command	STRING	1	256	31h	0	RWD	
Execute interval	INT	1	4	31h	0	RWD	0
Execute last	DWORD	1	4	31h	0	RWD	0
Stop run	BOOL	1	4	31h	0	RWD	n

- [Alarm system active] Overall Alarm enable flag.
- [Alarms] Sub-tree defining each individual alarm condition.
- [Classes] Sub-tree defining each individual action to be performed by a pre-defined and requested alarm.

#### 6.14.8 ODB /Script Tree

This branch permits to invoke scripts from the web page. By creating the ODB tree **/Script** every entry in that tree will be available on the Web status page with the name of the key. Each key entry is then composed with a list of ODB field (or links). The first ODB field should be the executable command followed by as many arguments as you wish to be passed to the script.

```
[host::expt:Stopped]/Script>ls
BNMR Hold
Continue
Real
Test
Kill
[host:expt:Stopped]/Script>ls -lr Continue
Key name          Type    #Val  Size  Last  Opn  Mode  Value
-----
Continue          DIR
  cmd             STRING  1     128   39h   0    RWD   /home/bnmr/perl/continue.pl
  Name            STRING  1     32    28s   0    RWD   bnmr1
  hold            BOOL    1     4     31h   0    RWD   n
```

### 6.14.9 ODB /Alias Tree

This branch is not present until the user creates it. It is meant to contain symbolic links list to any ODB location. It is used for the Midas web interface where all the sub-trees will appear in the main window. By default the clicking of the button in the web interface will spawn a new frame. To force the display of the alias link in the same frame, a "&" has to be added to the name of the alias.

```
odbedit
ls
create key Alias
cd Alias
ln /Equipment/Trigger/Common "Trig Setting" <-- New frame
ln /Equipment/Trigger/Common "Trig Setting&" <-- Same frame
```

### 6.14.10 ODB /Elog Tree

This branch describes the Elog settings used through the Midas web server. See [mhttpd task](#) for setting up the different Elog page display.

```
[local:midas:S]/Elog>ls -lr
```

Key name	Type	#Val	Size	Last	Opn	Mode	Value
Elog	DIR						
Email	STRING	1	64	25h	0	RWD	midas@triumf.ca
Display run number	BOOL	1	4	25h	0	RWD	y
Allow delete	BOOL	1	4	25h	0	RWD	n
Types	STRING	20	32	25h	0	RWD	
		[0]					Routine
		[1]					Shift summary
		[2]					Minor error
		[3]					Severe error
		[4]					Fix
		[5]					Question
		[6]					Info
		[7]					Modification
		[8]					Reply
		[9]					Alarm
		[10]					Test
		[11]					Other
		[12]					
		[13]					
		[14]					
		[15]					
		[16]					
		[17]					
		[18]					
		[19]					
Systems	STRING	20	32	25h	0	RWD	
		[0]					General



```

[1]      DAQ
[2]      Detector
[3]      Electronics
[4]      Target
[5]      Beamline
[6]
[7]
[8]
[9]
[10]
[11]
[12]
[13]
[14]
[15]
[16]
[17]
[18]
[19]

Buttons
      8h
      24h
      3d
      7d
Host name      myhost.triumf.ca
SMTP host      STRING 1      64      25h  0      RWD  trmail.triumf.ca

```

- [Email] Defines the Email address for Elog reply.
- [Display run number] Allows to disable the run number display in the Elog entries.
- [Allow delete] Flag for permitting the deletion of Elog entry.
- [Types] Pre-defined types displayed when composing an Elog entry. A maximum of 20 types are available. The list will be terminated by the encounter of the first blank type.
- [Systems] Pre-defined categories displayed when composing an Elog entry. A maximum of 20 types are available. The list will be terminated by the encounter of the first blank type.
- [SMTP host] Mail server address for routing the composed Elog message to the destination.
- [Buttons] Permits to recall up to four possible time span for the Elog command.
- [Host name] Host name.
- [Email <...>] Email address to where the message should be sent when composing it under "Systems" of the type <...>.

### 6.14.11 ODB /Programs Tree

System created tree containing task specific characteristics such as the watchdog and alarm condition. See [Alarm System](#).

Key name	Type	#Val	Size	Last	Opn	Mode	Value
Programs	DIR						
EBuilder	DIR						
Required	BOOL	1	4	0s	0	RWD	y
Watchdog timeout	INT	1	4	0s	0	RWD	10000
Check interval	DWORD	1	4	0s	0	RWD	10000
Start command	STRING	1	256	0s	0	RWD	mevb -D
Auto start	BOOL	1	4	0s	0	RWD	n
Auto stop	BOOL	1	4	0s	0	RWD	n
Auto restart	BOOL	1	4	0s	0	RWD	n
Alarm class	STRING	1	32	0s	0	RWD	Alarm
First failed	DWORD	1	4	0s	0	RWD	0

### 6.14.12 ODB /Lazy Tree

Backup facility Tree. Created with default parameters on the first activation of [lazylogger task](#). This task connects to a defined channel (i.e: Tape). when started. Multiple instance of the program can run contemporary.

Key name	Type	#Val	Size	Last	Opn	Mode	Value
Lazy	DIR						
Tape	DIR						
Settings	DIR						
Maintain free space	INT	1	4	23h	0	RWD	15
Stay behind	INT	1	4	23h	0	RWD	-1
Alarm Class	STRING	1	32	23h	0	RWD	
Running condition	STRING	1	128	23h	0	RWD	ALWAYS
Data dir	STRING	1	256	23h	0	RWD	/data_onl/current
Data format	STRING	1	8	23h	0	RWD	YBOS
Filename format	STRING	1	128	23h	0	RWD	run%05d.ybs
Backup type	STRING	1	8	23h	0	RWD	Tape
Execute after rewind	STRING	1	64	23h	0	RWD	ask_for_tape.sh
Path	STRING	1	128	23h	0	RWD	/dev/nst0
Capacity (Bytes)	FLOAT	1	4	23h	0	RWD	4.8e+10
List label	STRING	1	128	3h	0	RWD	tw0078
Execute before writi	STRING	1	64	23h	0	RWD	lazy_prewrite.csh
Execute after writin	STRING	1	64	23h	0	RWD	rundb_addrun.pl
Statistics	DIR						
Backup file	STRING	1	128	3h	0	RWDE	run05627.ybs
File size [Bytes]	FLOAT	1	4	3h	0	RWDE	2.00176e+09
KBytes copied	FLOAT	1	4	3h	0	RWDE	2.00176e+09
Total Bytes copied	FLOAT	1	4	3h	0	RWDE	2.00176e+09
Copy progress [%]	FLOAT	1	4	3h	0	RWDE	100

Copy Rate [bytes per	per	1	4	3h	0	RWDE	6.21462e+06
Backup status [%]	FLOAT	1	4	3h	0	RWDE	4.17034
Number of Files	INT	1	4	3h	0	RWDE	1
Current Lazy run	INT	1	4	3h	0	RWDE	5627
List	DIR						
TW0076	INT	15	4	3h	0	RWD	
		[0]				5575	
		[1]				5576	
		[2]				5577	

### 6.14.13 ODB /EBuilder Tree

The Event Builder tree is created by [mevb task](#) and is placed in the Equipment list.

Key name	Type	#Val	Size	Last	Opn	Mode	Value
-----							
EBuilder	DIR						
Settings	DIR						
Event ID	WORD	1	2	65h	0	RWD	1
Trigger mask	WORD	1	2	65h	0	RWD	1
Buffer	STRING	1	32	65h	0	RWD	SYSTEM
Format	STRING	1	32	65h	0	RWD	YBOS
Event mask	DWORD	1	4	65h	0	RWD	3
hostname	STRING	1	64	3h	0	RWD	myhost
Statistics	DIR						
Events sent	DOUBLE	1	8	3h	0	RWD	653423
Events per sec.	DOUBLE	1	8	3h	0	RWD	1779.17
kBytes per sec.	DOUBLE	1	8	3h	0	RWD	0
Channels	DIR						
Frag1	DIR						
Settings	DIR						
Event ID	WORD	1	2	65h	0	RWD	1
Trigger mask	WORD	1	2	65h	0	RWD	65535
Buffer	STRING	1	32	65h	0	RWD	YBUF1
Format	STRING	1	32	65h	0	RWD	YBOS
Event mask	DWORD	1	4	65h	0	RWD	1
Statistics	DIR						
Events sent	DOUBLE	1	8	3h	0	RWD	653423
Events per sec.	DOUBLE	1	8	3h	0	RWD	1779.17
kBytes per sec.	DOUBLE	1	8	3h	0	RWD	0
Frag2	DIR						
Settings	DIR						
Event ID	WORD	1	2	65h	0	RWD	5
Trigger mask	WORD	1	2	65h	0	RWD	65535
Buffer	STRING	1	32	65h	0	RWD	YBUF2
Format	STRING	1	32	65h	0	RWD	YBOS
Event mask	DWORD	1	4	65h	0	RWD	2
Statistics	DIR						
Events sent	DOUBLE	1	8	3h	0	RWD	653423
Events per sec.	DOUBLE	1	8	3h	0	RWD	1779.17
kBytes per sec.	DOUBLE	1	8	3h	0	RWD	0

### 6.14.14 ODB /Custom Tree

Web string for custom web page. **Editable ONLY** from your Web browser through [Custom page](#) .

Key name	Type	#Val	Size	Last	Opn	Mode	Value
WebLtno&	STRING	1	2976	25h	0	RWD	<multi-line>

```

<!doctype html public "-//w3c//dtd html 4.0 transitional//en">
<html>
<head>
  <meta http-equiv="Content-Type" content="text/html; charset=iso-8859-1">
  <meta name="GENERATOR" content="Mozilla/4.76 [en] (Windows NT 5.0; U) [Netscape]">
  <meta name="Author" content="Pierre-Andr?Amaudruz">
  <title>Set value</title>
</head>
<body text="#000000" bgcolor="#FFFFCC" link="#FF0000" vlink="#800080" alink="#0000FF">
<form method="GET" action="http://myhost.triumf.ca:8081/CS/WebLtno&">
<input type="hidden" name="exp" value="ltno">
<center><table CELLSPACING=1 CELLSPACING=1 COLS=3 WIDTH="100%" BGCOLOR="#99FF99" >
<caption><b><font face="Georgia"><font color="#000099"><font size=+2>LTNO
Custom Web Page</font></font></b></caption>

<tr BGCOLOR="#FFCC99">
<td><b><font color="#FF0000">Actions: </font></b>
<input type="submit" name="cmd" value="Status">
<input type="submit" name="cmd" value="Start">
<input type="submit" name="cmd" value="Stop">
...
<td BGCOLOR="#66FFFF"><b>Polarity section:</b>
<br>Run#: <odb src="/runinfo/run number">
<br>Run#: <odb src="/runinfo/run number">
<br>Run#: <odb src="/runinfo/run number">
<br>Run#: <odb src="/runinfo/run number" edit=1></td>
</tr>
</table></center>



<b><i><font color="#000099"><a href="http://myhost.triumf.ca/ltno/index.html">
<br>
LTNO help</a></font></i></b>
</body>
</html>

```

### 6.14.15 Hot Link

It is often desirable to modify hardware parameters like discriminator levels or trigger logic connected to the frontend computer. Given the according hardware is accessible from the frontend code, theses parameters are easily controllable when a hot-link ODB is established between the frontend and the ODB itself.

HotLink process

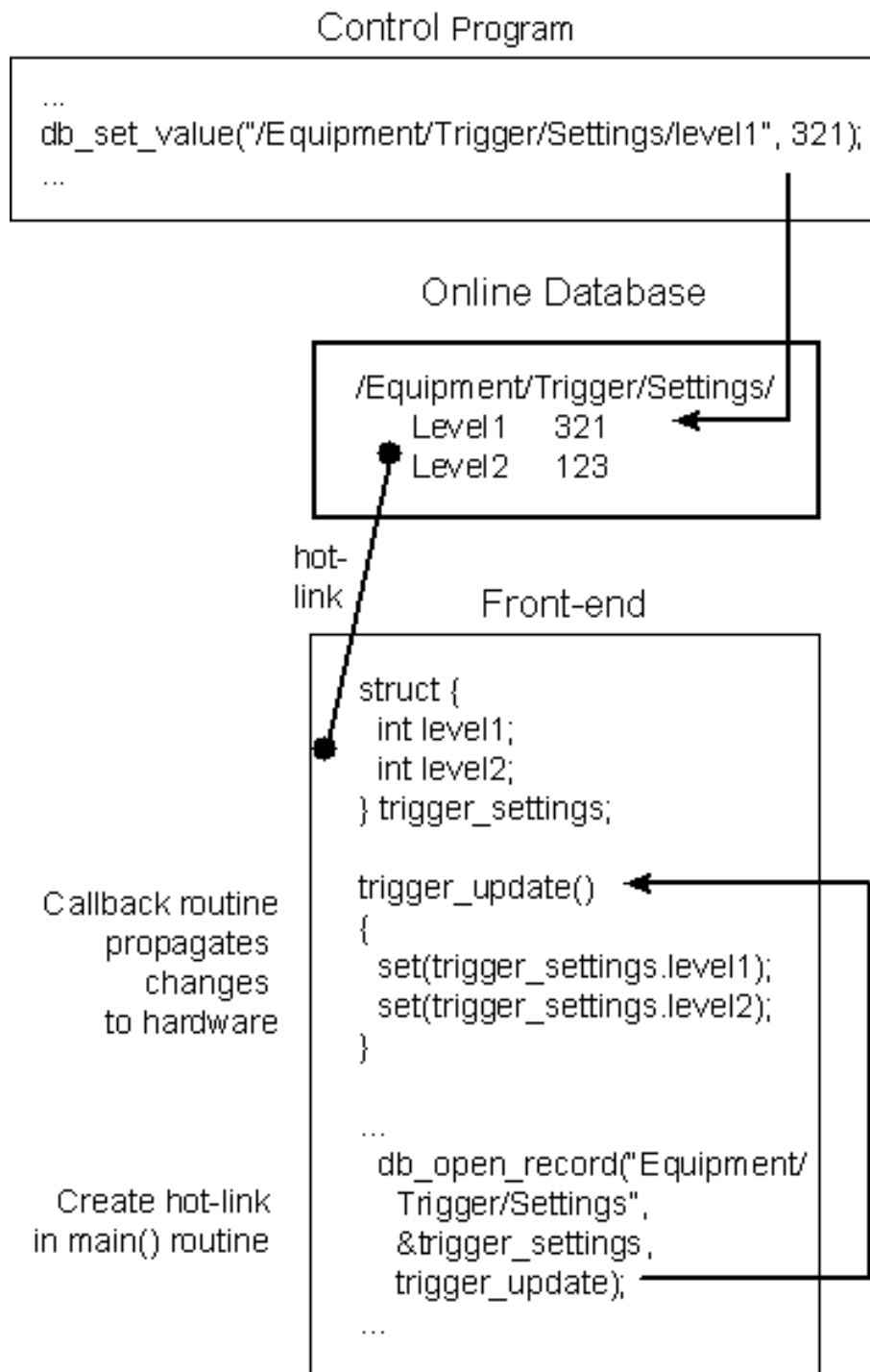


Figure 32: HotLink process

First the parameters have to be defined in the ODB under the Settings tree for the given equipment. Let's assume we have two discriminator levels belonging to the trigger electronics, which should be controllable. Following commands define these levels in the ODB:

```
[local]/>cd /Equipment/Trigger/
[local]Trigger>create key Settings
[local]Trigger>cd Settings
[local]Settings>create int level1
[local]Settings>create int level2
[local]Settings>ls
```

The frontend can now map a C structure to these settings. In order to simplify this process, ODBEdit can be requested to generate a header file containing this C structure. This file is usually called event.h. It can be generated in the current directory with the ODB command **make** which generates in the current directory the header file [experim.h](#) :

```
[local]Settings>make
```

Now this file can be copied to the frontend directory and included in the frontend source code. It contains a section with a C structure of the trigger settings and an ASCII representation:

```
typedef struct {
    INT      level1;
    INT      level2;
    TRIGGER_SETTINGS;

#define TRIGGER_SETTINGS_STR(_name) char *_name[] = {\
    "[.]",\
    "level1 = INT : 0",\
    "level2 = INT : 0",\
    "",\
    NULL
```

This definition can be used to define a C structure containing the parameters in [frontend.c](#):

```
#include <experim.h>

TRIGGER_SETTINGS trigger_settings;
```

A hot-link between the ODB values and the C structure is established in the [frontend\\_init\(\)](#) routine:

```
INT frontend_init()
{
```

```

HNDLE hDB, hkey;
TRIGGER_SETTINGS_STR(trigger_settings_str);

cm_get_experiment_database(&hDB, NULL);

db_create_record(hDB, 0,
    "/Equipment/Trigger/Settings",
    strcomb(trigger_settings_str));

db_find_key(hDB, 0,
    "/Equipment/Trigger/Settings", &hkey);

if (db_open_record(hDB, hkey,
    &trigger_settings,
    sizeof(trigger_settings), MODE_READ,
    trigger_update) != DB_SUCCESS)
{
    cm_msg(MERROR, "frontend_init",
        "Cannot open Trigger Settings in ODB");
    return -1;
}

return SUCCESS;

```

The `db_create_record()` function re-creates the settings sub-tree in the ODB from the ASCII representation in case it has been corrupted or deleted. The `db_open_record()` now establishes the hot-link between the settings in the ODB and the `trigger_settings` structure. Each time the ODB settings are modified, the changes are written to the `trigger_settings` structure and the callback routine `trigger_update()` is executed afterwards. This routine has the task to set the hardware according to the settings in the `trigger_settings` structure.

It may look like:

```

void trigger_update(INT hDB, INT hkey)
{
    printf("New levels: %d %d",
        trigger_settings.level1,
        trigger_settings.level2);
}

```

Of course the `printf()` function should be replaced by a function which accesses the hardware properly. Modifying the trigger values with ODBEdit can test the whole scheme:

```

[local]>cd /Equipment/Trigger/Settings
[local]Settings>set level1 123
[local]Settings>set level2 456

```

Immediately after each modification the frontend should display the new values. The settings can be saved to a file and loaded back later:

```

[local]>cd /Equipment/Trigger/Settings

```



```
[local]Settings>save settings.odb
[local]Settings>set level1 789
[local]Settings>load settings.odb
```

The settings can also be modified from any application just by accessing the ODB. Following listing is a complete user application that modifies the trigger level:

```
#include <midas.h>

main()
{
    HANDLE hDB;
    INT level;

    cm_connect_experiment("", "Sample", "Test",
                        NULL);
    cm_get_experiment_database(&hDB, NULL);

    level = 321;
    db_set_value(hDB, 0,
        "/Equipment/Trigger/Settings/Level1",
        &level, sizeof(INT), 1, TID_INT);

    cm_disconnect_experiment();
}
```

The following figure summarizes the involved components:

To make sure a hot-link exists, one can use the ODBEdit command **sor** (show open records):

```
[local]Settings>cd /
[local]/>sor
/Equipment/Trigger/Settings open 1 times by ...
```

#### 6.14.16 History system

The history system is an add-on capability build in the data logger (see [mlogger task](#)) to record information in parallel to the data logging. This information is recorded with a time stamp and saved into "data base file" like for later retrieval. One set of file is created per day containing all the requested history events.

The history is working only if the logger is running, but it is not necessary to have any channel enabled.

The definition of the history event is done through two different means:

- **frontend** history event: Each equipment has the capability to generate "history data" if the particular history field value is different then zero. The value will reflect the periodicity of the history logging (see [The Equipment structure](#)).

- **"Virtual History event"**: Composed within the Online Database under the specific tree "/History/Links" (see [ODB /History Tree](#))

Both definition mode takes effects when the data logger gets a "start run" transition. Any modification during the run is not applied until the next run is started.

- [frontend history event] As mentioned earlier, each equipment can be enabled to generate history event based on the periodicity of the history value (in second!). The content if the event will be completely copied into the history files using the definition of the event as tag names for every element of the event.

The history variable name for each element of the event is composed following one of the rules below:

- [bank event] **/equipment/<...>/Variables/<bank name>[]** is the only reference of the event, the history name is composed of the bank name followed by the corresponding index of the element.
- [bank event] **/equipment/<...>/Settings/Names <bank\_name>[]** is present, the history name is composed of the corresponding name found in the "Names <bank\_name>" array. The size of this array should match the size of the **/equipment/<...>/Variables/<bank name>[]** .

```
[host:chaos:Running]Target>ls -l -r
Key name                                Type      #Val  Size  Last Opn Mode Value
-----
Target                                  DIR
  settings                              DIR
    Names TGT_                           STRING    7      32    10h  0   RWD
                                           [0]                                Time
                                           [1]                                Cryostat vacuum
                                           [2]                                Heat Pipe pressure
                                           [3]                                Target pressure
                                           [4]                                Target temperature
                                           [5]                                Shield temperature
                                           [6]                                Diode temperature
    Common                               DIR
    ...
  Variables                              DIR
    TGT_                                FLOAT     7      4    10s  0   RWD
                                           [0]                                114059
                                           [1]                                4.661
                                           [2]                                23.16
                                           [3]                                -0.498
                                           [4]                                22.888
                                           [5]                                82.099
                                           [6]                                40
    Statistics                           DIR
    ...
```

- [Fixed event] The names of the individual element under **/equipment/<...>/variables/** will be used for the history name composition.
- [Fixed event with array] If the **/equipment/<...>/Settings/Names[]** exists, each element of the array will be referenced using the corresponding name of the **/Settings/Names[]** array.
- [ODB history event]

#### 6.14.17 Alarm System

The alarm system is built in and part of the main experiment scheduler. This means no separate task is necessary to benefit from it, but this feature is active during **ONLINE** mode **ONLY**. Alarm setup and activation is done through the Online Database. Alarm system includes several other features such as: sequencing control of the experiment. The alarm capabilities are:

- Alarm setting on any ODB variables against threshold parameter.
- Alarm check frequency
- Alarm trigger frequency
- Customizable alarm scheme, under this scheme multiple choice of alarm type can be selected.
- Program control on run transition.

Beside the setup through ODBEdit, the Alarm can also be setup through the Midas web page..

Midas Web Alarm setting display

MIDAS experiment "bnmr2"			Sat Aug 5 11:09:49 2000		
Reset all alarms	Alarms on/off	Status			
Evaluated alarms					
Alarm	State	First triggered	Class	Condition	Current value
Test	Disabled	-	Alarm	/Runinfo/Run number > 100	30327
RF trip	Disabled	-	Pause	/equipment/info odb/variables/RF state = 1	0
Flu monitor	OK	-	Pause	/equipment/info odb/variables/Fluor monitor counts < 0	0
Program alarms					
Alarm	State	First triggered	Class	Condition	
Internal alarms					
Alarm	State	First triggered	Class	Condition/Message	

Figure 33: Midas Web Alarm setting display

Midas Web Alarm setting display

MIDAS experiment "trinat"				Sat Aug 5 11:18:06 2000			
Find	Create	Delete	Alarms	Programs	Status	Help	
Create Elog from this page							
<a href="#">/ Programs / Nova 014019 /</a>							
Key				Value			
Auto start				<a href="#">n</a>			
Auto stop				<a href="#">n</a>			
Auto restart				<a href="#">n</a>			
Required				<a href="#">n</a>			
Start command				<a href="#">(empty)</a>			
Alarm Class				<a href="#">(empty)</a>			
Checked last				<a href="#">965499475 (0x398C5A53)</a>			
Alarm count				<a href="#">0 (0x0)</a>			
Watchdog timeout				<a href="#">10000 (0x2710)</a>			

Figure 34: Midas Web Alarm setting display

Midas Web Alarm Program status display

MIDAS experiment "trinat"			Sat Aug 5 11:17:30 2000	
Alarms		Status		
Program	Running on host	Alarm class	Autorestart	
<a href="#">ODBEEdit</a>	midtis01	-	No	Stop ODBEdit
<a href="#">TRINAT_FE</a>	codaq01	-	No	Stop TRINAT_FE
<a href="#">MStatus</a>	midtis01	-	No	Stop MStatus
<a href="#">Logger</a>	midtis01	-	No	Stop Logger
<a href="#">Nova_014019</a>	midtis01	-	No	Stop Nova_014019

Figure 35: Midas Web Alarm Program status display

[Internal features](#) - [Top](#) - [Data format](#)

## 6.15 Quick Start

[Components](#) - [Top](#) - [Internal features](#)

**This section is under revision to better reflect the latest installation and basic operation of the Midas package.**

... This section will... describes step-by-step the installation procedure of the Midas package on several platform as well as the procedure to run a demo sample experiment. In a second stage, the frontend or the analyzer can be moved to another computer to test the remote connection capability.

The Midas Package source and binaries can be found at : [PSI](#) or at [TRIUMF](#) . An [online SVN web site](#) is also available for the latest developments.

Even though Midas is available for multiple platforms, the following description are for [Linux installation](#) and [Windows installation](#).

### 6.15.1 Linux installation

#### 1. Extraction:

- **Compressed files** The compressed file contains the source and binary code. It does expand under the directory name of **midas**. This extraction can be done at the user level.

```
cd /home/mydir
tar -zxvf midas-1.9.x.tar.gz
```

The midas directory structure will be composed of several subdirectories such as:

```
>ls
COPYING  doc/      examples/ include/  linux/    makefile.nt  mscb/  utils/
CVS/     drivers/  gui/      java/    Makefile* mcleanup*  src/   vxworks/
```

- **RPM** Current RPM is not fully up-to-date. We suggest that you use the compressed files or the **SVN** repository. In the case of the **rpm**, the binaries are placed in the `/usr/local/bin`, `/usr/local/include`, `/usr/local/lib`.
- **SVN** The source code can be extracted from the **SVN repository**. An anonymous access is available under the username `svn` and password `svn` which may be required several time. SVN provides also a quick **tarball** creation within the web interface!

```
svn co svn+ssh://svn@savannah.psi.ch/afs/psi.ch/project/meg/svn/midas/trunk midas
svn co svn+ssh://svn@savannah.psi.ch/afs/psi.ch/project/meg/svn/mxml/trunk mxml
```

2. **Installation:** The installation consists in placing the image files in the `/usr/local/` directories. This operation requires superuser privilege. The open "install" from the Makefile will automatically do this installation for you.

```
cd /home/mydir/midas
su -
make install
```

3. **Configuration:** Several system files needs to be modified for the full Midas implementation.

- **/etc/services :** For remote access. Inclusion of the midas service. Add following line:

```
# midas service
midas          1175/tcp                # Midas server
```

- **/etc/xinetd.d/midas :** Daemon definition. Create new file named **midas**

```
service midas
{
    flags                = REUSE NOLIBWRAP
    socket_type          = stream
    wait                 = no
    user                  = root
    server                = /usr/local/bin/mserver
    log_on_success        += USERID HOST PID
    log_on_failure        += USERID HOST
    disable               = no
}
```

- **/etc/ld.so.conf :** Dynamic Linked library list. Add directory pointing to location of the midas.so file (add `/usr/local/lib`).

```
/usr/local/lib
```

The system is now build by default in static which prevent to have to setup the .so path through either the environment **LD\_LIBRARY\_PATH** or the ld.so.conf.

- **/etc/exptab** : Midas Experiment definition file (see below).

4. **Experiment definition:** Midas system supports multiple experiment running contemporary on the same computer. Even though it may not be efficient, this capability makes sense when the experiments are simple detector lab setups which shared hardware resources for data collection. In order to support this feature, Midas requires a uniquely identified set of parameter for each experiment that is used to define the location of the Online Database.

Every experiment under Midas has its own ODB. In order to differentiate them, an experiment name and directory are assigned to each experiment. This allows several experiments to run concurrently on the same host using a common Midas installation.

Whenever a program participating in an experiment is started, the experiment name can be specified as a command line argument or as an environment variable.

A list of all possible running experiments on a given machine is kept in the file **exptab**. This file **exptab** is expected by default to be located under **/etc/exptab**. This can be overwritten by the [Environment variables MIDAS\\_EXPTAB](#).

**exptab** file is composed of one line per experiment definition. Each line contains three parameters, i.e: **experiment name**, **experiment directory name** and **user name**. Example:

```
#
# Midas experiment list
midas    /home/midas/online      midas
decay    /home/slave/decay_daq    slave
```

Experiments not defined into **exptab** are not accessible remotely, but can still be accessed locally using the [Environment variables MIDAS\\_DIR](#) if defined. This environment superceed the **exptab** definition.

5. **Compilation & Build:** You should be able to rebuild the full package once the Midas tree structure has been placed in your temporary directory. The compilation and link will try to generate the **rmidas** application which requires **ROOT**. The application **mana** will also be compiled for **HBOOK** and **ROOT**. Look in the make listing below for the [HAVE\\_HBOOK](#), [HAVE\\_ROOT](#).

```
> cd /home/mydir/midas
> make
cc -c -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib -DINCLUDE_FTPLIB -DOS_LINUX -fPIC
-o linux/lib/midas.o src/midas.c
cc -c -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib -DINCLUDE_FTPLIB -DOS_LINUX -fPIC
-o linux/lib/system.o src/system.c
cc -c -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib -DINCLUDE_FTPLIB -DOS_LINUX -fPIC
```

```

-o linux/lib/mrpc.o src/mrpc.c
cc -c -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib -DINCLUDE_FTPLIB -DOS_LINUX -fPIC
-o linux/lib/odb.o src/odb.c
cc -c -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib -DINCLUDE_FTPLIB -DOS_LINUX -fPIC
-o linux/lib/ybos.o src/ybos.c
cc -c -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib -DINCLUDE_FTPLIB -DOS_LINUX -fPIC
-o linux/lib/ftplib.o src/ftplib.c
rm -f linux/lib/libmidas.a
ar -crv linux/lib/libmidas.a linux/lib/midas.o linux/lib/system.o linux/lib/mrpc.o
linux/lib/odb.o linux/lib/ybos.o linux/lib/ftplib.o
a - linux/lib/midas.o
a - linux/lib/system.o
a - linux/lib/mrpc.o
a - linux/lib/odb.o
a - linux/lib/ybos.o
a - linux/lib/ftplib.o
rm -f linux/lib/libmidas.so
ld -shared -o linux/lib/libmidas.so linux/lib/midas.o linux/lib/system.o
linux/lib/mrpc.o linux/lib/odb.o linux/lib/ybos.o linux/lib/ftplib.o -lutil
-lpthread -lc
cc -c -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib -DINCLUDE_FTPLIB -DOS_LINUX -fPIC
-o linux/lib/mana.o src/mana.c
cc -Dextname -DHAVE_HBOOK -c -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib
-DINCLUDE_FTPLIB -DOS_LINUX -fPIC -o linux/lib/hmana.o src/mana.c
...
g++ -DHAVE_ROOT -c -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib -DINCLUDE_FTPLIB
-DOS_LINUX -fPIC -D_REENTRANT -I/home1/midas/ root/include -o linux/lib/rmana.o
src/mana.c
g++ -c -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib -DINCLUDE_FTPLIB -DOS_LINU
-fPIC -o linux/lib/mfe.o src/mfe.c
cc -Dextname -c -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib
-DINCLUDE_FTPLIB -DOS_LINUX -fPIC -o linux/lib/fal.o src/fal.c
...
cc -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib -DINCLUDE_FTPLIB -DOS_LINUX -fPIC
-o linux/bin/mserver src/mserver.c -lmidas -lutil -lpthread
cc -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib -DINCLUDE_FTPLIB -DOS_LINUX -fPIC
-o linux/bin/mhttpd src/mhttpd.c src/mgd.c -lmidas -lutil -lpthread -lm
g++ -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib -DINCLUDE_FTPLIB -DOS_LINUX -fPIC
-DHAVE_ROOT -D_REENTRANT -I/home1/midas/root/include
-o linux/bin/mlogger src/mlogger.c -lmidas
-L/home1/midas/root/lib -lCore -lCint -lHist -lGraf -lGraf3d -lGpad -lTree
-lRint -lPostscript -lMatrix -lPhysics -lpthread -lm -ldl -rdynamic -lutil -lpthread
cc -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib -DINCLUDE_FTPLIB -DOS_LINUX -fPIC
-o linux/bin/odbedit src/odbedit.c src/cmdedit.c -lmidas -lutil -lpthread
cc -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib -DINCLUDE_FTPLIB -DOS_LINUX -fPIC
-o linux/bin/mtape utils/mtape.c -lmidas -lutil -lpthread
cc -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib -DINCLUDE_FTPLIB -DOS_LINUX -fPIC
-o linux/bin/mhist utils/mhist.c -lmidas -lutil -lpthread
cc -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib -DINCLUDE_FTPLIB -DOS_LINUX -fPIC
-o linux/bin/mstat utils/mstat.c -lmidas -lutil -lpthread
cc -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib -DINCLUDE_FTPLIB -DOS_LINUX -fPIC
-o linux/bin/mcnaf utils/mcnaf.c drivers/bus/camacrpc.c -lmidas -lutil -lpthread
cc -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib -DINCLUDE_FTPLIB -DOS_LINUX -fPIC
-o linux/bin/mdump utils/mdump.c -lmidas -lz -lutil -lpthread
cc -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib -DINCLUDE_FTPLIB -DOS_LINUX -fPIC
-o linux/bin/lazylogger src/lazylogger.c -lmidas -lz -lutil -lpthread
cc -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib -DINCLUDE_FTPLIB -DOS_LINUX -fPIC

```



```

-o linux/bin/mchart utils/mchart.c -lmidas -lutil -lpthread
cp -f utils/stripchart.tcl linux/bin/.
cc -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib -DINCLUDE_FTPLIB -DOS_LINUX -fPIC
-o linux/bin/webpaw utils/webpaw.c -lmidas -lutil -lpthread
cc -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib -DINCLUDE_FTPLIB -DOS_LINUX -fPIC
-o linux/bin/odbhist utils/odbhist.c -lmidas -lutil -lpthread
cc -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib -DINCLUDE_FTPLIB -DOS_LINUX -fPIC
-o linux/bin/melog utils/melog.c -lmidas -lutil -lpthread
cc -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib -DINCLUDE_FTPLIB -DOS_LINUX -fPIC
-o linux/bin/mlxspeaker utils/mlxspeaker.c -lmidas -lutil -lpthread
cc -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib -DINCLUDE_FTPLIB -DOS_LINUX -fPIC
-o linux/bin/dio utils/dio.c -lmidas -lutil -lpthread
g++ -g -O2 -Wall -Iinclude -Idrivers -Llinux/lib -DINCLUDE_FTPLIB -DOS_LINUX -fPIC
-DHAVE_ROOT -D_REENTRANT -I/home1/midas/root/include -o linux/bin/rmidas src/rmidas.c
-lmidas -L/home1/midas/root/lib -lCore -lCint -lHist -lGraf -lGraf3d -lGpad
-lTree -lRint -lPostscript -lMatrix -lPhysics -lGui -lpthread -lm -ldl -rdynamic
-lutil -lpthread

```

6. **Demo examples:** The midas file structure contains examples of code which can be (should be) used for template. In the **midas/examples/experiment** you will find a full set for frontend and analysis code. The building of this example is performed with the **Makefile** of this directory. The reference to the Midas package is done relative to your current location (`../include`). In the case the content of this directory is copied to a different location (template), you will need to modify the local parameters within the **Makefile**

```

#-----
# The following lines define directories. Adjust if necessary
#
DRV_DIR   = ../../drivers/bus
INC_DIR   = ../../include
LIB_DIR   = ../../linux/lib

```

Replace by:

```

#-----
# The following lines define directories. Adjust if necessary
#
DRV_DIR   = /home/mydir/midas/drivers/bus
INC_DIR   = /usr/local/include
LIB_DIR   = /usr/local/lib

> cd /home/mydir/midas/examples/experiment
> make
gcc -g -O2 -Wall -g -I../../include -I../../drivers/bus -DOS_LINUX -Dextname -c
-o camacnul.o ../../drivers/bus/camacnul.c
g++ -g -O2 -Wall -g -I../../include -I../../drivers/bus -DOS_LINUX -Dextname -o
frontend frontend.c
camacnul.o ../../linux/lib/mfe.o ../../linux/lib/libmidas.a -lm -lz -lutil
-lns1 -lpthread
g++ -D_REENTRANT -I/home1/midas/root/include -DHAVE_ROOT -g -O2 -Wall -g
-I../../include -I../../drivers/bus -DOS_LINUX -Dextname -o analyzer.o
-c analyzer.c

```

```

g++ -D_REENTRANT -I/home1/midas/root/include -DHAVE_ROOT -g -O2 -Wall -g
-I../../include -I../../drivers/bus -DOS_LINUX -Dexname -o adccalib.o -c adccalib.c
g++ -D_REENTRANT -I/home1/midas/root/include -DHAVE_ROOT -g -O2 -Wall -g
-I../../include -I../../drivers/bus -DOS_LINUX -Dexname -o adcsum.o -c adcsum.c
g++ -D_REENTRANT -I/home1/midas/root/include -DHAVE_ROOT -g -O2 -Wall -g
-I../../include -I../../drivers/bus -DOS_LINUX -Dexname -o scaler.o -c scaler.c
g++ -o analyzer ../../linux/lib/rmana.o analyzer.o adccalib.o adcsum.o scaler.o
../../linux/lib/libmidas.a -L/home1/midas/root/lib -lCore -lCint -lHist -lGraf
-lGraf3d -lGpad -lTree -lRint -lPostscript -lMatrix -lPhysics -lpthread -lm -ldl
-rdynamic -lThread -lm -lz -lutil -lnsl -lpthread
>

```

For testing the system, you can start the frontend as follow:

```

> frontend
Event buffer size      :      100000
Buffer allocation      : 2 x 100000
System max event size  :      524288
User max event size    :      10000
User max frag. size    :      5242880
# of events per buffer :      10

Connect to experiment ...Available experiments on local computer:
0 : midas
1 : root
Select number:0                      <---- predefined experiment from exptab file

Sample Frontend connected to <local>. Press "!" to exit                      17:27:47
=====
Run status:   Stopped      Run number 0
=====
Equipment     Status      Events      Events/sec Rate[kB/s] ODB->FE      FE->ODB
-----
Trigger       OK           0           0.0         0.0         0           0
Scaler        OK           0           0.0         0.0         0           0

```

In a different terminal window

```

>odbedit
Available experiments on local computer:
0 : midas
1 : root
Select number: 0
[local:midas:S]/>start now
Starting run #1
17:28:58 [ODBEdit] Run #1 started
[local:midas:R]/>

```

The run has been started as seen in the frontend terminal window. See the /examples/experiment/frontend.c for data generation code.

```

Sample Frontend connected to <local>. Press "!" to exit                      17:29:07
=====
Run status:   Running      Run number 1

```

Equipment	Status	Events	Events/sec	Rate[kB/s]	ODB->FE	FE->ODB
Trigger	OK	865	99.3	5.4	0	9
Scaler	OK	1	0.0	0.0	0	1

### 6.15.2 Windows installation

1. **Extraction:**
2. **Installation:**
3. **Configuration:**
4. **Experiment definition:**
5. **Compilation:**
6. **Demo examples:**

[Components](#) - [Top](#) - [Internal features](#) [Internal features](#) - [Top](#) - [Data format](#)

The Midas system provides several off-the-shelf programs to control, monitor, debug the data acquisition system. Starting with the main utility (odbedit) which provide access to the Online data base and run control.

- [odbedit task](#) : Online Database Editor
  - [ODB Structure](#)
- [Midas Frontend application](#) : Midas Frontend application
- [mstat task](#) : Midas ASCII status report
- [analyzer task](#) : Midas data analyzer

- [MIDAS Analyzer](#)

- [mlogger task](#) : Midas data logger
- [lazylogger task](#) : Background data logger
- [mdump task](#) : Event dump application
- [mevb task](#) : Event Builder application
- [mspeaker, mlxspeaker tasks](#) : Speech synthesizer
- [mcnaf task](#) : CAMAC standalone application
- [mhttpd task](#) : Midas Web server
- [melog task](#) : Electronic entry application
- [mhist task](#) : History retrieval application
- [mchart task](#) : Standalone Chart display application
- [mtape task](#) : Tape device manipulator
- [dio task](#) : Direct IO provider
- [stripchart.tcl file](#) : Tcl/Tk for chart display
- [rmidas task](#) : Root/Midas Simple GUI application
- [hvedit task](#) : High Voltage Slow Control GUI
- [Midas Remote server](#) : Midas Remote server

### 6.15.3 Midas Frontend application

The purpose of the [Midas Frontend application](#) is to collect data from hardware and transmit this information to a central place where data logging and analysis can be performed. This task is achieved with a) a specific code written by the user describing the sequence of action to acquire the hardware data and b) a framework code handling the data flow control, data transmission and run control operation. From Midas version 1.9.5 a new argument (-i index) has been introduced to facilitate the multiple frontend configuration operation required for the [Event Builder Functions](#).

- **Arguments**

- [-h ] : help
- [-h hostname ] : host name (see [odbedit task](#))

- [-e exptname ] : experiment name (see [odbedit task](#))
- [-D ] : Become a Daemon.
- [-O ] : Become a Daemon but keep stdout
- [-d ] : Used for debugging.
- [-i index] : Set frontend index (used with [mevb task](#)).

- **Usage**

#### 6.15.4 odbedit task

**odbedit** refers to the Online DataBase Editor. This is the main application to interact with the different components of the Midas system.

See [ODB Structure](#) for more information.

- **Arguments**

- [-h ] : help.
- [-h hostname ] : Specifies host to connect to. Must be a valid IP host name. This option supersedes the MIDAS\_SERVER\_HOST environment variable.
- [-e exptname ] : Specifies the experiment to connect to. This option supersedes the MIDAS\_EXPT\_NAME environment variable.
- [-c command ] : Perform a single command. Can be used to perform operations in script files.
- [-c @commandFile ] : Perform commands in sequence found in the commandFile.
- [-s size ] : size in byte (for creation). Specify the size of the ODB file to be created when no shared file is present in the experiment directory (default 128KB).
- [-d ODB tree] : Specify the initial entry ODB path to go to.

- **Usage** ODBedit is the MIDAS run control program. It has a simple command line interface with command line editing similar to the UNIX tcsh shell. Following edit keys are implemented:

- [Backspace] Erase the character left from cursor
- [Delete/Ctrl-D] Erase the character under cursor

- [Ctrl-W/Ctrl-U] Erase the current line
- [Ctrl-K] Erase the line from cursor to end
- [Left arrow/Ctrl-B] Move cursor left
- [Right arrow/Ctrl-F] Move cursor right
- [Home/Ctrl-A] Move cursor to beginning of line
- [End/Ctrl-E] Move cursor to end of line
- [Up arrow/Ctrl-P] Recall previous command
- [Down arrow/Ctrl-N] Recall next command
- [Ctrl-F] Find most recent command which starts with current line
- [Tab/Ctrl-I] Complete directory. The command `ls /Sy <tab>` yields to `ls /System`.

#### • Remarks

- ODBedit treats the hierarchical online database very much like a file system. Most commands are similar to UNIX file commands like `ls`, `cd`, `chmod`, `ln` etc. The help command displays a short description of all commands.
- From Midas version 1.9.5, the ODB content can be saved into XML format if the file extension is `.xml`

```
C:\odbedit
[local:midas:S]/>save odb.xml
[local:midas:S]/>q
more odb.xml
<?xml version="1.0" encoding="ISO-8859-1"?>
<!-- created by ODBedit on Wed Oct 06 22:48:26 2004 -->
<dir name="root">
  <dir name="System">
    <dir name="Clients">
      <dir name="3880">
        <key name="Name" type="STRING" size="32">ebfe01</key>
        <key name="Host" type="STRING" size="256">pierre2</key>
        <key name="Hardware type" type="INT">42</key>
        <key name="Server Port" type="INT">4658</key>
      ...
    ...
  ...
</dir>
</dir>
</dir>
```

```
[local:midas:Stopped]/>help
Database commands ([ ] are options, <> are placeholders):
```

```
alarm                - reset all alarms
cd <dir>              - change current directory
chat                 - enter chat mode
chmod <mode> <key>   - change access mode of a key
                      1=read | 2=write | 4=delete
cleanup              - delete hanging clients
copy <src> <dest>     - copy a subtree to a new location
create <type> <key>   - create a key of a certain type
```

```

create <type> <key>[n] - create an array of size [n]
del/rm [-l] [-f] \<key> - delete a key and its subkeys
    -l                follow links
    -f                force deletion without asking
exec <key>/<cmd>       - execute shell command (stored in key) on server
find <pattern>         - find a key with wildcard pattern
help/? [command]      - print this help [for a specific command]
hi [analyzer] [id]     - tell analyzer to clear histos
ln <source> <linkname> - create a link to <source> key
load <file>           - load database from .ODB file at current position
ls/dir [-lhvrp] [<pat>] - show database entries which match pattern
    -l                detailed info
    -h                hex format
    -v                only value
    -r                show database entries recursively
    -P                pause between screens
make [analyzer name] - create experim.h
mem                  - show memory <b> Usage </b>
mkdir <subdir>       - make new <subdir>
move <key> [top/bottom/[n]] - move key to position in keylist
msg [user] <msg>     - compose user message
old                  - display old messages
passwd              - change MIDAS password
pause               - pause current run
pwd                 - show current directory
resume              - resume current run
rename <old> <new>   - rename key
rewind [channel]    - rewind tapes in logger
save [-c -s] <file> - save database at current position
                    in ASCII format
                    -c                as a C structure
                    -s                as a #define'd string
set <key> <value>    - set the value of a key
set <key>[i] <value> - set the value of index i
set <key>[*] <value> - set the value of all indices of a key
set <key>[i..j] <value> - set the value of all indices i..j
scl [-w]             - show all active clients [with watchdog info]
shutdown <client>/all - shutdown individual or all clients
sor                  - show open records in current subtree
start [number] [now] [-v] - start a run [with a specific number], [without question]
                        [-v verbose the transaction to the different clients]
stop [-v]            - stop current run
                        [-v verbose the transaction to the different clients]
trunc <key> <index>  - truncate key to [index] values
ver                  - show MIDAS library version
webpasswd            - change WWW password for mhttpd
wait <key>           - wait for key to get modified
quit/exit            - exit

```

### • Example

```

>odbedit -c stop
>odbedit
[hostxxx:exptxxx:Running]/> ls /equipment/trigger

```

### 6.15.5 mstat task

**mstat** is a simple ASCII status display. It presents in a compact form the most valuable information of the current condition of the Midas Acquisition system. The display is composed at the most of 5 sections depending on the current status of the experiment. The section displayed in order from top to bottom refer to:

- Run information.
- Equipment listing and statistics if any frontend is active.
- Logger information and statistics if mlogger is active.
- Lazylogger status if lazylogger is active.
- Client listing.
- **Arguments**
  - [-h ] : help
  - [-h hostname ] : host name (see [odbedit task](#))
  - [-e exptname ] : experiment name (see [odbedit task](#))
  - [-l ] : loop. Forces mstat to remain in a display loop. Enter "!" to terminate the command.
  - [-w time ] : refresh rate in second. Specifies the delay in second before refreshing the screen with up to date information. Default: 5 seconds. Has to be used in conjunction with -l switch. Enter "R" to refresh screen on next update.
- **Usage**

```
>mstat -l
*-v1.8.0- MIDAS status page -----Mon Apr 3 11:52:52 2000-*
Experiment:chaos      Run#:8699      State:Running      Run time :00:11:34
Start time:Mon Apr 3 11:41:18 2000
```

FE Equip.	Node	Event Taken	Event Rate[/s]	Data Rate[Kb/s]
B12Y	pcch02	67	0.0	0.0
CUM_Scaler	vwchaos	23	0.2	0.2
CHV	pcch02	68	0.0	0.0
KOS_Scalers	vwchaos	330	0.4	0.6
KOS_Trigger	vwchaos	434226	652.4	408.3
KOS_File	vwchaos	0	0.0	0.0
Target	pcch02	66	0.0	0.0

```

Logger Data dir: /scr0/spring2000      Message File: midas.log
Chan.   Active Type      Filename      Events Taken  KBytes Taken
  0     Yes   Disk      run08699.ybs  434206        4.24e+06

```



Lazy Label	Progress	File name	#files	Total
cni-53	100[%]	run08696.ybs	15	44.3[%]
Clients:	MStatus/koslx0	Logger/koslx0		Lazy_Tape/koslx0
	CHV/pcch02	MChart1/umelba		ODBEdit/koslx0
	CHAOS/vwchaos	ec1/koslx0		Speaker/koslx0
	MChart/umelba	targetFE/pcch02		HV_MONITOR/umelba
	SUSIYBOS/koslx0	History/kosal2		MStatus1/dasdevpc

\*-----\*

### 6.15.6 analyzer task

**analyzer** is the main online / offline event analysis application. **analyzer** uses fully the **ODB** capabilities as all the analyzer parameters are dynamically controllable from the Online Database editor [odbedit task](#).

For more detailed information see [MIDAS Analyzer](#)

#### • Arguments

- c <filename1> <filename2> Configuration file name(s). May contain a '05d' to be replaced by the run number. Up to ten files can be specified in one "-c" statement.
- d Debug flag when starts the analyzer from a debugger. Prevents the system to kill the analyzer when the debugger stops at a breakpoint
- D Start analyzer as a daemon in the background (UNIX only).
- e <experiment> MIDAS experiment to connect to. (see [odbedit task](#))
- f Filter mode. Write original events to output file only if the analyzer accepts them (doesn't return ANA\_SKIP).
- h <hostname> MIDAS host to connect to when running the analyzer online (see [odbedit task](#))
- i <filename1> <filename2> Input file name. May contain a '05d' to be replaced by the run number. Up to ten input files can be specified in one "-i" statement.
- l If set, don't load histos from last histo file when running online.
- L HBOOK LREC size. Default is 8190.
- n <count> Analyze only "count" events.
- n <first> <last> Analyze only events from "first" to "last".
- n <first> <last> <n> Analyze every n-th event from "first" to "last".
- o <filename> Output file name. Extension may be .mid (MIDAS binary), .asc (ASCII) or .rz (HBOOK). If the name contains a '05d', one output file is generated for each run. Use "OFLN" as output file name to create a HBOOK shared memory instead of a file.

- p <param=value> Set individual parameters to a specific value. Overrides any setting in configuration files
- P <ODB tree> Protect an ODB subtree from being overwritten with the online data when ODB gets loaded from .mid file
- q Quiet flag. If set, don't display run progress in offline mode.
- r <range> Range of run numbers to analyzer like "-r 120 125" to analyze runs 120 to 125 (inclusive). The "-r" flag must be used with a '05d' in the input file name.
- s <port#> Specify the ROOT server TCP/IP port number (default 9090).
- v Verbose output.
- w Produce row-wise N-tuples in output .rz file. By default, column-wise N-tuples are used.

- **Remarks**

- The creation of the [experim.h](#) is done through the `odbedit> make <analyzer>`. In order to include your **analyzer** section, the ODB `/<Analyzer>/Parameters` has to be present.

- **Usage**

```
>analyzer
>analyzer -D -r 9092
>analyzer -i run00023.mid -o run00023.rz -w
>analyzer -i run%05d.mid -o runall.rz -r 23 75 -w
```

### 6.15.7 mlogger task

**mlogger** is the main application to collect data from the different frontends under certain conditions and store them onto physical device such as *disk* or *tape*. It also acts as a history event collector if either the history flags are enabled in the frontend equipment (see [The Equipment structure](#) or if the ODB tree `/History/Links` is defined (See [History system](#)). See the [ODB /Logger Tree](#) for reference on the tree structure.

- **Arguments**

- [-h ] : help
- [-e exptname ] : experiment name (see [odbedit task](#))
- [-D ] : start program as a daemon (UNIX only).
- [-s ] : Save mode (debugging: protect ODB).
- [-v ] : Verbose (not to be used in conjunction with -D).

- **Usage**

```
>mlogger -D
```

- **Remarks**

- The **mlogger** application requires to have an existing **/Equipment/** tree in the ODB!
- As soon as the mlogger starts to run, the history mechanism is enabled.
- The data channels as well as the history logging is rescanned automatically at each "begin of run" transition. In other word, additional channel can be defined while running but effect will take place only at the following begin of run transition.
- The default setting defines a data "Midas" format with a file name of the type "run\%05d.mid". Make sure this is the requested setting for your experiment.
- Once the mlogger is running, you should be able to monitor its state. through the [mstat task](#) or through the [mhttpd task](#) web browser.
- From version 1.9.5
  - \* mlogger will not run if started remotely (argument -h hostname has been removed).
  - \* The file size limitation (<2GB) has been removed for older OS version.
  - \* [mysql](#) data entry support.

### 6.15.8 lazylogger task

**lazylogger** is an application which decouples the data acquisition from the data logging mechanism. The need of such application has been dictated by the slow response time of some of the media logging devices (Tape devices). Delay due to tape mounting, retention, reposition implies that the data acquisition has to hold until operation completion. By using **mlogger** to log data to disk in a first stage and then using **lazylogger** to copy or move the stored files to the "slow device" we can keep the acquisition running without interruption.

- Multiple lazyloggers can be running contemporary on the same computer, each one taking care of a particular channel.
- Each lazylogger channels will have a dedicated ODB tree containing its own information.
- All the lazylogger channel will be under the ODB **/Lazy/<channel\_name>/...**

- Each channel tree is composed of three sub-tree **Settings**, Statistics, List.

Self-explanatory the **Settings** and Statistics contains the running operation of the channel. While the **List** will have a dynamic list of run number which has been successfully manipulated by the Lazylogger channel. This list won't exist until the first successful operation of the channel is completed.

- **Arguments**

- [-h ] : help.
- [-h hostname ] : host name.
- [-e exptname ] : experiment name.
- [-D ] : start program as a daemon.
- [-c channel ] : logging channel. Specify the lazylogger to activate.
- [-z ] : zap statistics. Clear the statistics tree of all the defined lazylogger channels.

- **ODB parameters (Settings/)**

Settings	DIR								
Maintain free space(%)	INT	1	4	3m	0	RWD	0		
Stay behind	INT	1	4	3m	0	RWD	-3		
Alarm Class	STRING	1	32	3m	0	RWD			
Running condition	STRING	1	128	3m	0	RWD	ALWAYS		
Data dir	STRING	1	256	3m	0	RWD	/home/midas/online		
Data format	STRING	1	8	3m	0	RWD	MIDAS		
Filename format	STRING	1	128	3m	0	RWD	run%05d.mid		
Backup type	STRING	1	8	3m	0	RWD	Tape		
Execute after rewind	STRING	1	64	3m	0	RWD			
Path	STRING	1	128	3m	0	RWD			
Capacity (Bytes)	FLOAT	1	4	3m	0	RWD	5e+09		
List label	STRING	1	128	3m	0	RWD			
Execute before writing file	STRING	1	64	11h	0	RWD	lazy_prewrite.csh		
Execute after writing file	STRING	1	64	11h	0	RWD	rundb_addrun.pl		
Modulo.Position	STRING	1	8	11h	0	RWD	2.1		
Tape Data Append	BOOL	1	4	11h	0	RWD	y		

- **[Maintain free space]** As the Data Logger (mlogger) runs independently from the Lazylogger, the disk contains all the recorded data files. Under this condition, Lazylogger can be instructed to "purge" the data logging device (disk) after successful backup of the data onto the "slow device". The *Maintain free space(%)* parameter controls (if none zero) the percentage of disk space required to be maintain free.

\* The condition for removing a data file is defined as:

**The data file corresponding to the given run number following the format declared under "Settings/Filename format" IS PRESENT on the "Settings/Data Dir" path. AND The given run**

**number appears anywhere under the "List/" directory of ALL the Lazy channel having the same "Settings/Filename format" as this channel. AND The given run number appears anywhere under the "List/" directory of that channel**

- **[Stay behind]** This parameter defines how many consecutive data files should be kept between the current run and the last lazylogger run.

\* **Example with "Stay behind = -3" :**

1. Current acquisition run number 253 -> run00253.mid is being logged by mlogger.
2. Files available on the disk corresponding to run #248, #249, #250, #251, #252.
3. Lazylogger will start backing up run #250 as soon as the new run 254 starts. -3 "Stay behind = -3" corresponds to 3 file untouched on the disk (#251, #252, #253). The negative sign instructs the lazylogger to **always** scan the entire "Data Dir" from the oldest to the most recent file sitting on the disk at the "Data Dir" path- for backup. If the "Stay behind" is positive, lazylogger will **backup** starting from- x behind the current acquisition run number. Run order will be ignored.

- **[Alarm Class]** Specify the Alarm class to be used in case of triggered alarm.
- **[Running condition]** Specify the type of condition for which the lazylogger should be activated. By default lazylogger is **ALWAYS** running. In the case of high data rate acquisition it could be necessary to activate the lazylogger only when the run is either paused, stopped or when some external condition is satisfied such as "Low beam intensity". In this latter case, condition based on a single field of the ODB can be given to establish when the application should be active.

\* **Example :**

```
odbedit> set "Running condition" WHILE_ACQ_NOT_RUNNING
odbedit> set "Running condition" "/alias/max_rate \< 200"
```

- **[Data dir]** Specify the Data directory path of the data files. By default if the "/Logger/Data Dir" is present, the pointed value is taken otherwise the current directory where lazylogger has been started is used.
- **[Data format]** Specify the Data format of the data files. Currently supported formats are: **MIDAS** and **YBOS**.
- **[Filename format]** Specify the file format of the data files. Same format as given for the data logger.
- **[Backup type]** Specify the "slow device" backup type. Default **Tape**. Can be **Disk** or **Ftp**.
- **[Execute after rewind]** Specify a script to run after completion of a lazylogger backup set (see below "Capacity (Bytes)").
- **[Path]** Specify the "slow device" path. Three possible types of Path:

- \* For Tape : **/dev/nst0-** (UNIX like).
- \* For Disk : **/data1/myexpt**
- \* For Ftp : **host,port,user,password,directory**
- **[Capacity (Bytes)]** Specify the maximum "slow device" capacity in bytes. When this capacity is reached, the lazylogger will close the backup device and clear the "List Label" field to prevent further backup (see below). It will also rewind the stream device if possible.
- **[List label]** Specify a label for a set of backed up files to the "slow device". This label is used only internally by the lazylogger for creating under the "/List" a new array composed of the backed up runs until the "Capacity" value has been reached. As the backup set is complete, lazylogger will clear this field and therefore prevent any further backup until a non empty label list is entered again. In the other hand the list label will remain under the "/List" key to display all runs being backed up until the corresponding files have been removed from the disk.
- **[Exec preW file]** Permits to run a script before the beginning of the lazy job. The **arguments** passed to the scripts are: input file name, output file name, current block number.
- **[Exec postW file]** Permits to run a script after the completion of the lazy job. The **arguments** passed to the scripts are: list label, current job number, source path, file name, file size in MB, current block number.
- **[Modulo.Position]** This field is for multiple instances of the lazylogger where each instance works on a sub-set of run number. By specifying the **Modulo.Position** you're telling the current lazy instance how many instances are simultaneously running (3.) and the position of which this instance is assigned to (.1). As an example for 3 lazyloggers running contemporaneously the field assignment should be :
 

Channel	Field	Run#
Lazy_1	3.0	21, 24, 27, ...
Lazy_2	3.1	22, 25, 28, ...
Lazy_3	3.2	23, 26, 29, ...
- **[Tape Data Append]** Enable the spooling of the Tape device to the End-of-Device (EOD) before starting the lazy job. This command is valid only for "Backup Type" Tape. If this flag is not enabled the lazy job starts at the current tape position.
- **[Statistics/]** ODB tree specifying general information about the status of the current lazylogger channel state.
- **[List/]** ODB tree, will contain arrays of run number associated with the array name backup-set label. Any run number appearing in any of the arrays is considered to have been backed up.

- **Usage** lazylogger requires to be setup prior data file can be moved. This setup consists of 4 steps:

- **[Step 1]** Invoking the lazylogger once for setting up the appropriate ODB tree and exit.

```
>lazylogger -c Tape
```

- **[Step 2]** Edit the newly created ODB tree. Correct the setting field to match your requirement.

```
> odbedit -e midas
[local:midas:Stopped]/>cd /Lazy/tape/
[local:midas:Stopped]tape>ls
[local:midas:Stopped]tape>ls -lr
```

Key name	Type	#Val	Size	Last	Opn	Mode	Value
tape	DIR						
Settings	DIR						
Maintain free space(%)	INT	1	4	3m	0	RWD	0
Stay behind	INT	1	4	3m	0	RWD	-3
Alarm Class	STRING	1	32	3m	0	RWD	
Running condition	STRING	1	128	3m	0	RWD	ALWAYS
Data dir	STRING	1	256	3m	0	RWD	/home/midas/online
Data format	STRING	1	8	3m	0	RWD	MIDAS
Filename format	STRING	1	128	3m	0	RWD	run%05d.mid
Backup type	STRING	1	8	3m	0	RWD	Tape
Execute after rewind	STRING	1	64	3m	0	RWD	
Path	STRING	1	128	3m	0	RWD	
Capacity (Bytes)	FLOAT	1	4	3m	0	RWD	5e+09
List label	STRING	1	128	3m	0	RWD	
Statistics	DIR						
Backup file	STRING	1	128	3m	0	RWD	none
File size [Bytes]	FLOAT	1	4	3m	0	RWD	0
KBytes copied	FLOAT	1	4	3m	0	RWD	0
Total Bytes copied	FLOAT	1	4	3m	0	RWD	0
Copy progress [%]	FLOAT	1	4	3m	0	RWD	0
Copy Rate [bytes per s]	FLOAT	1	4	3m	0	RWD	0
Backup status [%]	FLOAT	1	4	3m	0	RWD	0
Number of Files	INT	1	4	3m	0	RWD	0
Current Lazy run	INT	1	4	3m	0	RWD	0

```
[local:midas:Stopped]tape>cd Settings/
[local:midas:Stopped]Settings>set "Data dir" /data
[local:midas:Stopped]Settings>set "Capacity (Bytes)" 15e9
```

- **[Step 3]** Start lazylogger in the background

```
>lazylogger -c Tape -D
```

- **[Step 4]** At this point the lazylogger is running and waiting for the "list label" to be defined before starting the copy procedure. [mstat task](#) will display information regarding the status of the lazylogger.

```
> odbedit -e midas
[local:midas:Stopped]/>cd /Lazy/tape/Settings
[local:midas:Stopped]Settings>set "List label" cni-043
```

#### • Remarks

- For every major operation of the lazylogger a message is sent to the Message buffer and will be appended to the default Midas log file (midas.log). These messages are the only mean of finding out What/When/Where/How the lazylogger has operated on a data file. See below a fragment of the midas::log for the chaos experiment. In this case the **Maintain** free space(%) field was enabled which produces the cleanup of the data files and the entry in the **List** tree after copy.

```
Fri Mar 24 14:40:08 2000 [Lazy_Tape] 8351 (rm:16050ms) /scr0/spring2000/run08351.ybs file I
Fri Mar 24 14:40:08 2000 [Lazy_Tape] Tape run#8351 entry REMOVED
Fri Mar 24 14:59:55 2000 [Logger] stopping run after having received 1200000 events
Fri Mar 24 14:59:56 2000 [CHAOS] Run 8366 stopped
Fri Mar 24 14:59:56 2000 [Logger] Run #8366 stopped
Fri Mar 24 14:59:57 2000 [SUSIYBOS] saving info in run log
Fri Mar 24 15:00:07 2000 [Logger] starting new run
Fri Mar 24 15:00:07 2000 [CHAOS] Run 8367 started
Fri Mar 24 15:00:07 2000 [Logger] Run #8367 started
Fri Mar 24 15:06:59 2000 [Lazy_Tape] cni-043[15] (cp:410.6s) /dev/nst0/run08365.ybs 864.02
Fri Mar 24 15:07:35 2000 [Lazy_Tape] 8352 (rm:25854ms) /scr0/spring2000/run08352.ybs file I
Fri Mar 24 15:07:35 2000 [Lazy_Tape] Tape run#8352 entry REMOVED
Fri Mar 24 15:27:09 2000 [Lazy_Tape] 8353 (rm:23693ms) /scr0/spring2000/run08353.ybs file I
Fri Mar 24 15:27:09 2000 [Lazy_Tape] Tape run#8353 entry REMOVED
Fri Mar 24 15:33:22 2000 [Logger] stopping run after having received 1200000 events
Fri Mar 24 15:33:22 2000 [CHAOS] Run 8367 stopped
Fri Mar 24 15:33:23 2000 [Logger] Run #8367 stopped
Fri Mar 24 15:33:24 2000 [SUSIYBOS] saving info in run log
Fri Mar 24 15:33:33 2000 [Logger] starting new run
Fri Mar 24 15:33:34 2000 [CHAOS] Run 8368 started
Fri Mar 24 15:33:34 2000 [Logger] Run #8368 started
Fri Mar 24 15:40:18 2000 [Lazy_Tape] cni-043[16] (cp:395.4s) /dev/nst0/run08366.ybs 857.67
Fri Mar 24 15:50:15 2000 [Lazy_Tape] 8354 (rm:28867ms) /scr0/spring2000/run08354.ybs file I
Fri Mar 24 15:50:15 2000 [Lazy_Tape] Tape run#8354 entry REMOVED
...
```

- Once lazylogger has started a job on a data file, trying to terminate the application will result in producing a log message informing the actual percentage of the backup completed so far. This message will repeat it self until completion of the backup and only then the lazylogger application will terminate.
- If an interruption of the lazylogger is forced (kill...) The state of the backup device is undertermined. Recovery is not possible and the full backup set has to be redone. In order to do this, you need:
  - To rewind the backup device.
  - Delete the /Lazy/<channel\_name>/List/<list label> array.
  - Restart the lazylogger with the -z switch which will "zap" the statistics entries.
- In order to facilitate the recovery procedure, **lazylogger** produces an ODB ASCII file of the lazy channel tree after completion of successful operation. This file (**Tape\_recover.odb**) stored in [Data\\_Dir](#) can be used for ODB as well as lazylogger recovery.



### 6.15.9 mdump task

This application allows to "peep" into the data flow in order to display a snap-shot of the event. Its use is particularly powerful during experiment setup. In addition **mdump** has the capability to operate on data save-set files stored on disk or tape. The main **mdump** restriction is the fact that it works only for events formatted in banks (i.e.: MIDAS, YBOS bank).

- **Arguments** for Online

- [-h ] : help for online use.
- [-h hostname ] : Host name.
- [-e exptname ] : Experiment name.
- [-b bank name] : Display event containing only specified bank name.
- [-c compose] : Retrieve and compose file with either Add run# or Not (def:N).
- [-f format] : Data representation (x/d/ascii) def:hex.
- [-g type ] : Sampling mode either Some or All (def:S). >>> in case of -c it is recommended to use -g all.
- [-i id ] : Event Id.
- [-j ] : Display bank header only.
- [-k id ] : Event mask. >>> -i and -k are valid for YBOS ONLY if EVID bank is present in the event
- [-l number ] : Number of consecutive event to display (def:1).
- [-m mode] : Display mode either Bank or Raw (def:B)
- [-p path] : Path for file composition (see -c)
- [-s ] : Data transfer rate diagnostic.
- [-w time] : Insert wait in [sec] between each display.
- [-x filename ] : Input channel. data file name of data device. (def:online)
- [-y ] : Display consistency check only.
- [-z buffer name] : Midas buffer name to attach to (def:SYSTEM)

- Additional **Arguments** for Offline

- [-x -h ] : help for offline use.
- [-t type ] : Bank format (Midas/Ybos). >>> if -x is a /dev/xxx, -t has to be specified.

- [-r #] : skip record(YBOS) or event(MIDAS) to #.
- [-w what] : Header, Record, Length, Event, Jbank\_list (def:E) >>>  
Header & Record are not supported for MIDAS as it has no physical record structure.

- **Usage** mdump can operate on either data stream (online) or on save-set data file. Specific help is available for each mode.

```
> mdump -h
> mdump -x -h
```

```
Tue> mdump -x run37496.mid | more
----- Event# 0 -----
----- Event# 1 -----
Evid:0001- Mask:0100- Serial:1- Time:0x393c299a- Dsize:72/0x48
#banks:2 - Bank list:-SCLRRATE-

Bank:SCLR Length: 24(I*1)/6(I*4)/6(Type) Type:Integer*4
1-> 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000

Bank:RATE Length: 24(I*1)/6(I*4)/6(Type) Type:Real*4 (FMT machine dependent)
1-> 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
----- Event# 2 -----
Evid:0001- Mask:0004- Serial:1- Time:0x393c299a- Dsize:56/0x38
#banks:2 - Bank list:-MMESMMOD-

Bank:MMES Length: 24(I*1)/6(I*4)/6(Type) Type:Real*4 (FMT machine dependent)
1-> 0x3de35788 0x3d0b0e29 0x00000000 0x00000000 0x3f800000 0x00000000

Bank:MMOD Length: 4(I*1)/1(I*4)/1(Type) Type:Integer*4
1-> 0x00000001
----- Event# 3 -----
Evid:0001- Mask:0008- Serial:1- Time:0x393c299a- Dsize:48/0x30
#banks:1 - Bank list:-BMES-

Bank:BMES Length: 28(I*1)/7(I*4)/7(Type) Type:Real*4 (FMT machine dependent)
1-> 0x443d7333 0x444cf333 0x44454000 0x4448e000 0x43bca667 0x43ce0000 0x43f98000
----- Event# 4 -----
Evid:0001- Mask:0010- Serial:1- Time:0x393c299a- Dsize:168/0xa8
#banks:1 - Bank list:-CMES-

Bank:CMES Length: 148(I*1)/37(I*4)/37(Type) Type:Real*4 (FMT machine dependent)
1-> 0x3f2f9fe2 0x3ff77fd6 0x3f173fe6 0x3daeffe2 0x410f83e8 0x40ac07e3 0x3f6ebfd8 0x3c47ffde
9-> 0x3e60ffda 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x3f800000
17-> 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000 0x00000000
25-> 0x3f800000 0x3f800000 0x3f800000 0x00000000 0x3f800000 0x00000000 0x3f800000 0x3f800000
33-> 0x3f800000 0x3f800000 0x3f800000 0x3f800000 0x00000000
----- Event# 5 -----
Evid:0001- Mask:0020- Serial:1- Time:0x393c299a- Dsize:32/0x20
#banks:1 - Bank list:-METR-

Bank:METR Length: 12(I*1)/3(I*4)/3(Type) Type:Real*4 (FMT machine dependent)
1-> 0x00000000 0x39005d87 0x00000000
...
```

- **Example**

```
> mdump -j
```

### 6.15.10 mevb task

**mevb** is an event builder application taking several frontends Midas data source and assembles a new overall Midas event.

In the case where overall data collection is handled by multiple physically separated frontends, it could be necessary to assemble these data fragments into a dedicated event. The synchronization of the fragment collection is left to the user which is done usually through specific hardware mechanism. Once the fragments are composed in each frontend, they are sent to the "Event Builder" (eb) where the serial number (pheader->serial\_number) of each fragment is compared one event at a time for serial match. In case of match, a new event will be composed with its own event ID and serial number followed by all the expected fragments. The composed event is then sent to the next stage which is usually the data logger (mlogger).

The [mhttpd task](#) will present the status of the event builder as an extra equipment with its corresponding statistical information.

- **Arguments**

- [-h ] : help
- [-h hostname ] : host name
- [-e exptname ] : experiment name
- [-b ] : Buffer name
- [-v ] : Show wheel
- [-d ] : debug messages
- [-D ] : start program as a daemon

- **Usage**

```
Thu> mevb -e midas  
Program mevb/EBuilder version 2 started
```

- See [Event Builder Functions](#) for more details

### 6.15.11 mspeaker, mlxspeaker tasks

**mspeaker**, **mlxspeaker** are utilities which listen to the Midas messages system and pipe these messages to a speech synthesizer application. **mspeaker** is for the Windows based system and interface to the [FirstByte/ProVoice package](#). The **mlxspeaker** is for Linux based system and interface to the [Festival](#). In case of use of either package, the speech synthesis system has to be installed prior to the activation of the **mspeaker**, **mlxspeaker**.

- **Arguments**

- [-h ] : help
- [-h hostname ] : host name
- [-e exptname ] : experiment name
- [-t mt\_talk\_cmd] : Specify the talk alert command (ux only).
- [-u mt\_user\_cmd] : Specify the user alert command (ux only).
- [-s shut up time]: Specify the min time interval between alert [s] The -t & -u switch require a command equivalent to: '-t play -volume=0.3 file.wav'
- [-D ] : start program as a daemon

- **Usage**

```
> mlxspeaker -D
```

### 6.15.12 mcnaf task

**mcnaf** is an interactive CAMAC tool which allows "direct" access to the CAMAC hardware. This application is operational under either of the two following conditions:

1. **mcnaf** has been built against a particular CAMAC driver (see [CAMAC drivers](#)).
2. A user frontend code using a valid CAMAC driver is currently active. In this case the frontend acts as a RPC CAMAC server and will handle the CAMAC request. This last option is only available if the frontend code ([mfe.c](#)) from the [Building Options](#) has included the [HAVE\\_CAMAC](#) pre-compiler flag.

- **Arguments**

- [-h ] : help
- [-h hostname ] : host name

- [-e exptname ] : experiment name
- [-f frontend name] : Frontend name to connect to.
- [-s RPC server name] : CAMAC RPC server name for remote connection.

- **Building application** The `midas/utls/makefile.mcnaf` will build a collection of `mcnaf` applications which are hardware dependent, see **Example** below:

- **[miocnaf]** cnaf application using the declared CAMAC hardware DRIVER (kcs2927 in this case). To be used with **dio** CAMAC application starter (see [dio task](#)).
- **[mwecnaf]** cnaf application using the WI-E-N-ER PCI/CAMAC interface (see [CAMAC drivers](#)). Please contact: [midas@triumf.ca](mailto:midas@triumf.ca) for further information.
- **[mcnaf]** cnaf application using the CAMAC RPC capability of any Midas frontend program having CAMAC access.
- **[mdrvcnaf]** cnaf application using the Linux CAMAC driver for either kcs2927, kcs2926, dsp004. This application would require to have the proper Linux module loaded in the system first. Please contact <mailto:midas@triumf.ca> for further information.

```
Thu> cd /midas/utls
Thu> make -f makefile.mcnaf DRIVER=kcs2927
gcc -O3 -I../include -DOS_LINUX -c -o mcnaf.o mcnaf.c
gcc -O3 -I../include -DOS_LINUX -c -o kcs2927.o ../drivers/bus/kcs2927.c
gcc -O3 -I../include -DOS_LINUX -o miocnaf mcnaf.o kcs2927.o ../linux/lib/libmidas.a -lutil
gcc -O3 -I../include -DOS_LINUX -c -o wecc32.o ../drivers/bus/wecc32.c
gcc -O3 -I../include -DOS_LINUX -o mwecnaf mcnaf.o wecc32.o ../linux/lib/libmidas.a -lutil
gcc -O3 -I../include -DOS_LINUX -c -o camacrpc.o ../drivers/bus/camacrpc.c
gcc -O3 -I../include -DOS_LINUX -o mcnaf mcnaf.o camacrpc.o ../linux/lib/libmidas.a -lutil
gcc -O3 -I../include -DOS_LINUX -c -o camaclx.o ../drivers/bus/camaclx.c
gcc -O3 -I../include -DOS_LINUX -o mdrvcnaf mcnaf.o camaclx.o ../linux/lib/libmidas.a -lutil
rm *.o
```

- **Running application**

- Direct CAMAC access: This requires the computer to have the proper CAMAC interface installed and the **BASE ADDRESS** matching the value defined in the corresponding CAMAC driver. For kcs2926.c, kcs2927.c, dsp004.c, hyt1331.c, the base address (CAMAC\_BASE) is set to 0x280.

```
>dio miocnaf
```

- RPC CAMAC through frontend: This requires to have a frontend running which will be able to serve the CAMAC RPC request. Any Midas frontend has that capability built-in but it has to have the proper CAMAC driver included in it.

```
>mcnaf -e <expt> -h <host> -f <fe_name>
```

- **Usage**

.....

### 6.15.13 melog task

Electronic Log utility. Submit full Elog entry to the specified Elog port.

- **Arguments**

- [-h ] : help
- [-h hostname ] : host name
- [-l exptname or logbook ]
- [-u username password ]
- [-f <attachment> ] : up to 10 files.
- -a <attribute>=<value> : up to 20 attributes. The attribute "Author=..." must at least be present for submission of Elog.
- -m <textfile> | text> Arguments with blanks must be enclosed in quotes. The elog message can either be submitted on the command line or in a file with the -m flag. Multiple attributes and attachments can be supplied.

- **Usage** By default the attributes are "Author", "Type", "System" and "Subject". The "Author" attribute has to be present in the elog command in order to successfully submit the message. If multiple attributes are required append before "text" field the full specification of the attribute. In case of multiple attachments, only one "-f" is required followed by up to 10 file names.

```
>melog -h myhost -p 8081 -l myexpt -a author=pierre "Just a elog message"
>melog -h myhost -p 8081 -l myexpt -a author=pierre -f file2attach.txt \
    "Just this message with an attachment"
>melog -h myhost -p 8081 -l myexpt -a author=pierre -m file_containing_the_message.txt
>melog -h myhost -p 8081 -l myexpt -a Author=pierre -a Type=routine -a system=general \
    -a Subject="my test" "A full Elog message"
```

- **Remarks**

**6.15.14 mhist task**

History data retriever.

- **Arguments**

- [-h ] : help
- [-e Event ID] : specify event ID
- [-v Variable Name] : specify variable name for given Event ID
- [-i Index] : index of variables which are arrays
- [-i Index1:Index2] index range of variables which are arrays (max 50)
- [-t Interval] : minimum interval in sec. between two displayed records
- [-h Hours] : display between some hours ago and now
- [-d Days] : display between some days ago and now
- [-f File] : specify history file explicitly
- [-s Start date] : specify start date DDMMYY[.HHMM[SS]]
- [-p End date] : specify end date DDMMYY[.HHMM[SS]]
- [-l] : list available events and variables
- [-b] : display time stamp in decimal format
- [-z] : History directory (def: cwd).

- **Usage**

- **Example**

```

--- All variables of event ID 9 during last hour with at least 5 minutes interval.
> mhist
Available events:
ID 9: Target
ID 5: CHV
ID 6: B12Y
ID 20: System

Select event ID: 9

Available variables:
0: Time
1: Cryostat vacuum
2: Heat Pipe pressure
3: Target pressure
4: Target temperature
5: Shield temperature
6: Diode temperature

Select variable (0..6,-1 for all): -1

```

How many hours: 1

Interval [sec]: 300

Date	Time	Cryostat	vacuum	Heat	Pipe	pressure	Target	pressure	Target	temperature
Jun 19	10:26:23	2000	104444	4.614	23.16	-0.498	22.931	82.163	40	
Jun 19	10:31:24	2000	104956	4.602	23.16	-0.498	22.892	82.108	40	
Jun 19	10:36:24	2000	105509	4.597	23.099	-0.498	22.892	82.126	40	
Jun 19	10:41:33	2000	110021	4.592	23.16	-0.498	22.856	82.08	40	
Jun 19	10:46:40	2000	110534	4.597	23.147	-0.498	22.892	82.117	40	
Jun 19	10:51:44	2000	111046	4.622	23.172	-0.498	22.907	82.117	40	
Jun 19	10:56:47	2000	111558	4.617	23.086	-0.498	22.892	82.117	40	
Jun 19	11:01:56	2000	112009	4.624	23.208	-0.498	22.892	82.117	40	
Jun 19	11:07:00	2000	112521	4.629	23.172	-0.498	22.896	82.099	40	
Jun 19	11:12:05	2000	113034	4.639	23.074	-0.498	22.896	82.117	40	
Jun 19	11:17:09	2000	113546	4.644	23.172	-0.498	22.892	82.126	40	
Jun 19	11:22:15	2000	114059	4.661	23.16	-0.498	22.888	82.099	40	

- Single variable "I-WC1+\_Anode" of event 5 every hour over the full April 24/2000.

```

mhist -e 5 -v "I-WC1+_Anode" -t 3600 -s 240400 -p 250400
Apr 24 00:00:09 2000 160
Apr 24 01:00:12 2000 160
Apr 24 02:00:13 2000 160
Apr 24 03:00:14 2000 160
Apr 24 04:00:21 2000 180
Apr 24 05:00:26 2000 0
Apr 24 06:00:31 2000 160
Apr 24 07:00:37 2000 160
Apr 24 08:00:40 2000 160
Apr 24 09:00:49 2000 160
Apr 24 10:00:52 2000 160
Apr 24 11:01:01 2000 160
Apr 24 12:01:03 2000 160
Apr 24 13:01:03 2000 0
Apr 24 14:01:04 2000 0
Apr 24 15:01:05 2000 -20
Apr 24 16:01:11 2000 0
Apr 24 17:01:14 2000 0
Apr 24 18:01:19 2000 -20
Apr 24 19:01:19 2000 0
Apr 24 20:01:21 2000 0
Apr 24 21:01:23 2000 0
Apr 24 22:01:32 2000 0
Apr 24 23:01:39 2000 0

```

- **Remarks :** History data can be retrieved and displayed through the Midas web page (see [mhttpd task](#)).

- **Example**

Midas Web History display.





Figure 36: Midas Web History display.

#### 6.15.15 mchart task

mchart is a periodic data retriever of a specific path in the ODB which can be used in conjunction with a stripchart graphic program.

- In the first of two step procedure, a specific path in the ODB can be scanned for composing a configuration file by extracting all numerical data references **file.conf**.
- In the second step the mchart will produce at  $\Delta x$  time interval a refreshed data file containing the values of the numerical data specified in the configuration file. This file is then available for a stripchart program to be used for chart recording type of graph.

Two possible stripchart available are:

- **gstripchart** The configuration file generated by mchart is compatible with the GNU stripchart which permits sophisticated data equation manipulation. On the other hand, the data display is not very fancy and provides just a basic chart recorder.
- [stripchart.tcl](#) This tcl/tk application written by Gertjan Hofman provides a far better graphical chart recorder display tool, it also permits history save-set display, but the equation scheme is not implemented.

- **Arguments**

- [-h ] : help
- [-h hostname ] : host name.
- [-e exptname ] : experiment name.
- [-D ] : start program as a daemon.
- [-u time] : data update periodicity (def:5s).
- [-f file] : file name (+.conf: if using existing file).
- [-q ODBpath] : ODB tree path for extraction of the variables.
- [-c ] : ONLY creates the configuration file for later use.
- [-b lower\_value] : sets general lower limit for all variables.
- [-t upper\_value] : sets general upper limit for all variables.
- [-g ] : spawn the graphical stripchart if available.
- [-gg ] : force the use of gstripchart for graphic.
- [-gh ] : force the use of stripchart (tcl/tk) for graphic.

- **Usage** : The configuration contains one entry for each variable found under the ODBpath requested. The format is described in the gstripchart documentation.

Once the configuration file has been created, it is possible to apply any valid operation (equation) to the parameters of the file following the gstripchart syntax.

In the case of the use of the *stripchart* from G.Hofman, only the "filename", "pattern", "maximum", "minimum" fields are used.

When using mchart with -D Argument, it is necessary to have the [MCHART\\_DIR](#) defined in order to allow the daemon to find the location of the configuration and data files (see [Environment variables](#)).

```
chaos:~/chart> more trigger.conf
#Equipment:          >/equipment/kos_trigger/statistics
menu:                on
slider:              on
type:                gtk
minor_ticks:         12
```

```

major_ticks:          6
chart-interval:        1.000
chart-filter:          0.500
slider-interval:       0.200
slider-filter:         0.200
begin:                Events_sent
  filename:            /home/chaos/chart/trigger
  fields:              2
  pattern:             Events_sent
  equation:            \$2
  color:               \$blue
  maximum:             1083540.00
  minimum:             270885.00
  id_char:             1
end:                  Events_sent
begin:                Events_per_sec.
  filename:            /home/chaos/chart/trigger
  fields:              2
  pattern:             Events_per_sec.
  equation:            $2
  color:               \$red
  maximum:             1305.56
  minimum:             326.39
  id_char:             1
end:                  Events_per_sec.
begin:                kBytes_per_sec.
  filename:            /home/chaos/chart/trigger
  fields:              2
  pattern:             kBytes_per_sec.
  equation:            $2
  color:               \$brown
  maximum:             898.46
  minimum:             224.61
  id_char:             1
end:                  kBytes_per_sec.

```

A second file (data file) will be updated a fixed interval by the *{mchart}* utility.

```

chaos:~/chart> more trigger
Events_sent 6.620470e+05
Events_per_sec. 6.463608e+02
kBytes_per_sec. 4.424778e+02

```

- **Example**

- Creation with ODBpath being one array and one element of 2 sitting under variables/:

```

chaos:~/chart> mchart -f chvv -q /equipment/chv/variables/chvv -c
chaos:~/chart> ls -l chvv*
-rw-r--r--  1 chaos  users          474 Apr 18 14:37 chvv
-rw-r--r--  1 chaos  users        4656 Apr 18 14:37 chvv.conf

```

- Creation with ODBpath of all the sub-keys sittings in variables:

```
mchart -e myexpt -h myhost -f chv -q /equipment/chv/variables -c
```

- Creation and running in debug:

```
chaos:~/chart> mchart -f chv -q /equipment/chv/variables -d
CHVV : size:68
#name:17 #Values:17
CHVI : size:68
```

- Running a pre-existing conf file (chv.conf) debug:

```
chaos:~/chart> mchart -f chv.conf -d
CHVV : size:68
#name:17 #Values:17
CHVI : size:68
#name:17 #Values:17
```

- Running a pre-existing configuration file and spawning gstripchart:

```
chaos:~/chart> mchart -f chv.conf -gg
spawning graph with gstripchart -g 500x200-200-800 -f /home/chaos/chart/chv.conf ...
```

- Running a pre-existing configuration file and spawning stripchart, this will work only if Tcl/Tk and bltwish packages are installed and the stripchart.tcl has been installed through the Midas Makefile.

```
chaos:~/chart> mchart -f chv.conf -gh
spawning graph with stripchart /home/chaos/chart/chv.conf ...
```

### 6.15.16 mtape task

Tape manipulation utility.

- **Arguments**

- [-h ] : help
- [-h hostname ] : host name
- [-e exptname ] : experiment name
- [-D ] : start program as a daemon

- **Usage**

- **Example**

```
>mtape
```

### 6.15.17 dio task

Direct I/O task provider (LINUX).

If no particular Linux driver is installed for the CAMAC access, the **dio-** program will allow you to access the I/O ports to which the CAMAC interface card is connected to.

- **Arguments**

- [application name ] : Program name requiring I/O permission.

- **Usage**

```
>dio miocnaf
>dio frontend
```

- **Remark**

- This "hacking" utility restricts the access to a range of I/O ports from 0x200 to 0x3FF.
- As this mode if I/O access by-passes the driver (if any), concurrent access to the same I/O port may produce unexpected result and in the worst case it will freeze the computer. It is therefore important to ensure to run one and only one dio application to a given port in order to prevent potential hangup problem.
- Interrupt handling, DMA capabilities of the interface will not be accessible under this mode of operation.

### 6.15.18 stripchart.tcl file

Graphical stripchart data display. Operates on [mchart task](#) data or on Midas history save-set files. (see also [History system](#)).

- **Arguments**

- [-mhist ] : start stripchart for Midas history data.

- **Usage** : stripchart <-options> <config-file> -mhist: (look at history file -default) -dmhist: debug mhist -debug: debug stripchart -config\_file: see mchart\_task

```
> stripchart.tcl -debug
> stripchart.tcl
```

- **Example**

```
> stripchart.tcl -h
```

gstripchart display with parameters and data pop-up.

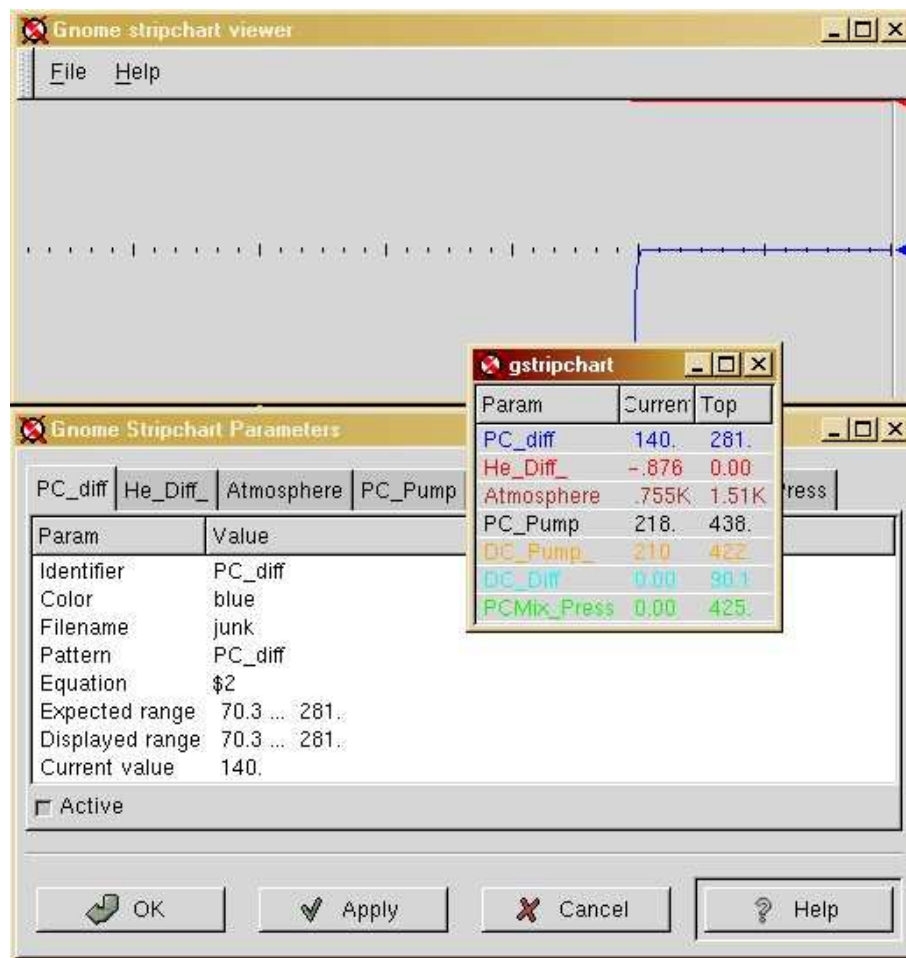


Figure 37: gstripchart display with parameters and data pop-up.

stripchart.tcl mhst mode: main window with pull-downs.

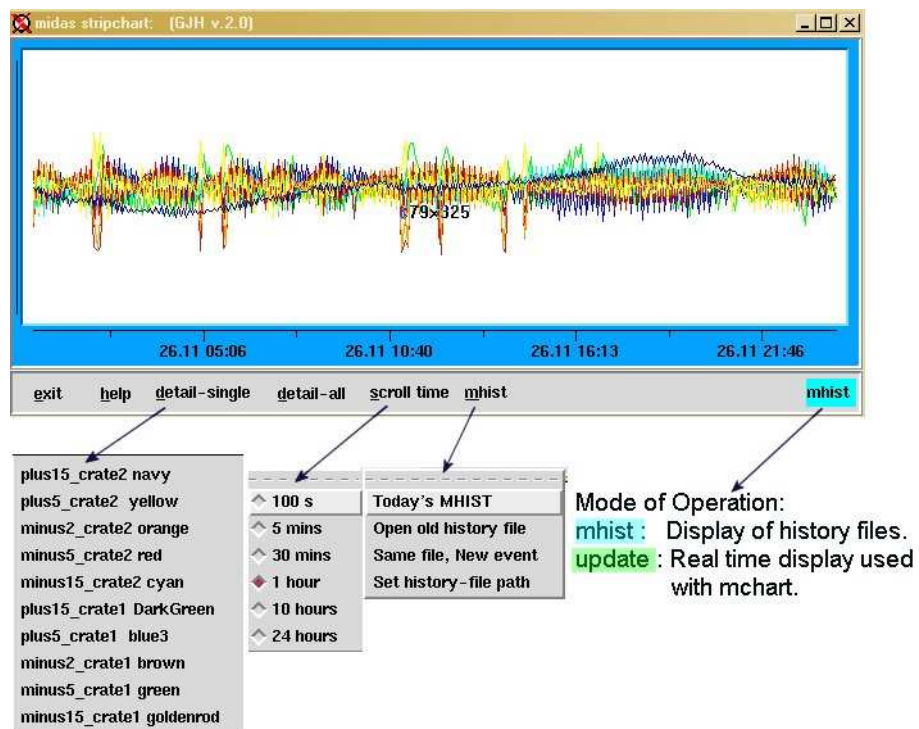


Figure 38: stripchart.tcl mhist mode: main window with pull-downs.

stripchart.tcl Online data, running in conjunction with mchart

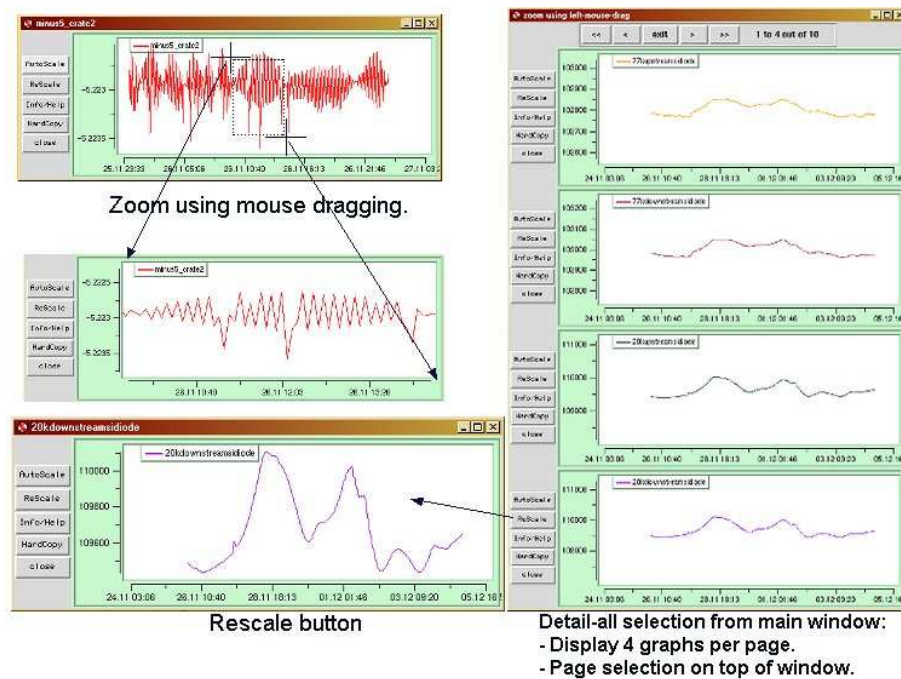


Figure 39: stripchart.tcl Online data, running in conjunction with mchart

### 6.15.19 rmidas task

Root/Midas remote GUI application for root histograms and possible run control under the ROOT. environment.

- **Arguments**

- [-h ] : help
- [-h hostname ] : host name
- [-e exptname ] : experiment name

- **Usage** to be written.

- **Example**

```
>rmidas midasserver.domain
```



rmidas display sample. Using the example/experiment/ demo setup.

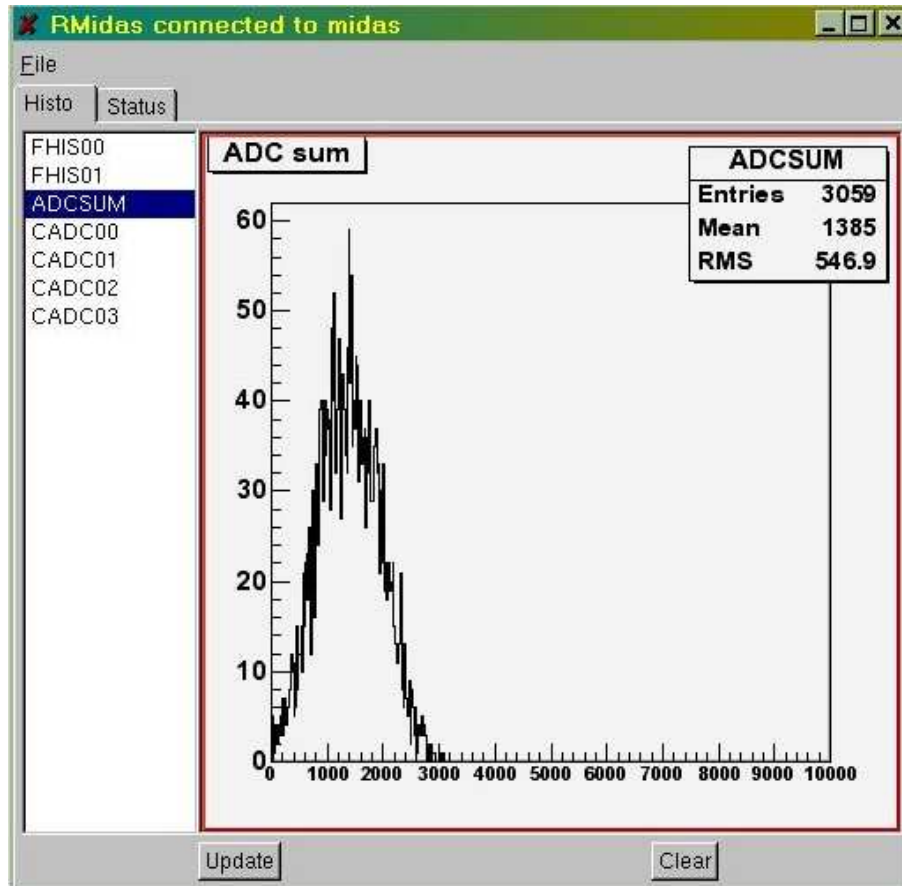


Figure 40: rmidas display sample. Using the example/experiment/ demo setup.

#### 6.15.20 hvedit task

High Voltage editor, graphical interface to the Slow Control System. Originally for Windows machines, but recently ported on Linux under Qt by Andreas Suter.

##### • Arguments

- [-h ] : help
- [-h hostname ] : host name

- [-e exptname ] : experiment name
- [-D ] : start program as a daemon

- **Usage** : To control the high voltage system, the program HVEEdit can be used under Windows 95/NT. It can be used to set channels, save and load values from disk and print them. The program can be started several times even on different computers. Since they are all linked to the same ODB arrays, the demand and measured values are consistent among them at any time. HVEEdit is started from the command line:

- **Example**

```
>hvedit
```

#### 6.15.21 Midas Remote server

*mserver* provides remote access to any midas client. This task usually runs in the background and doesn't need to be modified. In the case where debugging is required, the *mserver* can be started with the *-d* flag which will write an entry for each transaction appearing onto the *mserver*. This log entry contains the time stamp and RPC call request.

- **Arguments**

- [-h ] : help
- [-s ] : Single process server
- [-t ] : Multi thread server
- [-m ] : Milti process server (default)
- [-d ] : Write debug info to /tmp/mserver.log
- [-D ] : Become a Daemon

- **Usage**