

Notify Objects

Introduction

A thread uses a **Notify** object to wait for event notification. For each thread intended to wait for events from an object (or objects), your application must create a Notify object. The source of firmware events are Motion, Sequence, and Recorder objects.

When it is desired to wait for event notifications from a single source, that source (i.e., object handle) can be passed as the second argument to [mpiNotifyCreate](#). After a Notify object is appended to the EventMgr list of Notify objects, make a call to [mpiNotifyEventWait](#) to instruct the Notify object to wait for event notification.

| [Error Messages](#) |

Implementation

Notify objects maintain a FIFO ("First In, First Out") buffer of events that have occurred. Each call to [mpiNotifyEventWait](#) removes one event from the buffer. If the event buffer is empty, [mpiNotifyEventWait\(...\)](#) will wait for an event to be sent to the **Notify** object. This ensures that events will not be missed in cases where multiple events have occurred between calls to [mpiNotifyEventWait\(...\)](#). However, the danger is that an application may not call [mpiNotifyEventWait\(...\)](#) for a long time. In this case, the event buffer may grow rather quickly and use a large amount of system memory. In order to prevent this problem from occurring, one should use [mpiNotifyEventMaskSet](#) to enable and disable event notification at the proper times.

Methods

Create, Delete, Validate Methods

mpiNotifyCreate	Create a Notify object
mpiNotifyDelete	Delete a Notify object
mpiNotifyValidate	Validate a Notify object

Event Methods

mpiNotifyEvent	Check to see if events have occurred
mpiNotifyEventFlush	Flush pending events from event queue
mpiNotifyEventMaskGet	Get event mask
mpiNotifyEventMaskSet	Set event mask
mpiNotifyEventWait	Get next event from queue or wait timeout msec for it to arrive
mpiNotifyEventWake	Wake up thread waiting for notify object

Relational Methods

List Methods for Event Sources

<u>mpiNotifySource</u>	Get the indexth event source in list
<u>mpiNotifySourceAppend</u>	Append an event source to list
<u>mpiNotifySourceCount</u>	Count number of event sources in list
<u>mpiNotifySourceFirst</u>	Get first event source in list
<u>mpiNotifySourceIndex</u>	Get index value for event source in list
<u>mpiNotifySourceInsert</u>	Place event source after source in list
<u>mpiNotifySourceLast</u>	Get last event source in list
<u>mpiNotifySourceListGet</u>	Get list of event sources
<u>mpiNotifySourceListSet</u>	Create a list of event sources
<u>mpiNotifySourceNext</u>	Get next event source after source in list
<u>mpiNotifySourcePrevious</u>	Get the event source before source in list
<u>mpiNotifySourceRemove</u>	Remove event source from list

Data Types

[MPINotifyMessage](#)

[MEINotifyTrace](#)

mpiNotifyCreate

Declaration

```
MPINotify mpiNotifyCreate(MPIEventMask mask,  
                           void *source)
```

Required Header: stdmpi.h

Description

mpiNotifyCreate creates a Notify object that will accept event notifications for the events that are specified in **mask**. The **source** argument specifies the initial element in the list of event sources, from which event notification will be accepted. If **source** is NULL, then event notification will be accepted from all event sources. *NotifyCreate* is the equivalent of a C++ constructor.

Return Values

handle	to a Notify object.
MPIHandleVOID	if the object could not be created.

See Also

[mpiNotifyDelete](#) | [mpiNotifyValidate](#)

mpiNotifyEventWait

Declaration

```
long mpiNotifyEventWait(MPINotify      notify,
                       MPIEventStatus *status,
                       MPIWait      timeout)
```

Required Header: stdmpi.h

Description

mpiNotifyEventWait sets the contents of the structure pointed to by status, using the status of the first event in the internal FIFO event queue (maintained by a Notify object (notify)), and then removes the first event from the queue. If no event is available in the internal FIFO event queue, NotifyEventWait will wait for timeout milliseconds.

<i>If "timeout" is</i>	<i>Then</i>
MPIWaitPOLL (0)	<i>NotifyEventWait</i> will not wait for an event to arrive
MPIWaitFOREVER (-1)	<i>NotifyEventWait</i> will wait forever for an event to arrive

Return Values

[MPIMessageOK](#)

[MPIMessageTIMEOUT](#)

See Also

[mpiNotifyEventWake](#)

mpiNotifyEventMaskSet

Declaration

```
long mpiNotifyEventMaskSet(MPINotify    notify,
                           MPIEventMask mask)
```

Required Header: stdmpi.h

Description

mpiNotifyEventMaskSet sets the event type(s) for which notification will be accepted by a Notify object (*notify*), as specified by *mask*.

Event notification is accepted for event types specified in *mask*, a bit mask of MPIEventMask bits (associated with the desired MPIEventType values). The MPIEventMask bits must be set or cleared using the MPIEventMask macros. Event notification is denied for event types not specified in *mask*.

Return Values

[MPIMessageOK](#)

Sample Code

```
/*
 * Disables event notification and copies the previously used
 * event mask to oldMask.  oldMask may then be used to re-enable
 * event notification via another call to mpiNotifyEventMaskSet().
 */
void NotifyDisable(MPINotify notify, MPIEventMask* oldMask)
{
    MPIEventMask newMask;
    long returnValue;

    returnValue = mpiNotifyEventMaskGet(notify, oldMask);
    msgCheck(returnValue);

    mpiEventMaskCLEAR(newMask);

    returnValue = mpiNotifyEventMaskSet(notify, newMask);
    msgCheck(returnValue);
}
```

See Also

[MPIEventType](#) | [mpiNotifyEventMaskGet](#)

mpiNotifyDelete

Declaration

```
long mpiNotifyDelete(MPINotify notify)
```

Required Header: stdmpi.h

Description

mpiNotifyDelete deletes a Notify object and invalidates its handle (*notify*). *NotifyDelete* is the equivalent of a C++ destructor.

Return Values

[MPIMessageOK](#)

See Also

[mpiNotifyCreate](#) | [mpiNotifyValidate](#)

mpiNotifyValidate

Declaration

```
long mpiNotifyValidate(MPINotify notify)
```

Required Header: stdmpi.h

Description

mpiNotifyValidate validates a Notify object and its handle (*notify*).

Return Values

[MPIMessageOK](#)

See Also

mpiNotifyEvent

Declaration

```
long mpiNotifyEvent(MPINotify notify,  
                   MPIEventStatus *status)
```

Required Header: stdmpi.h

Description

mpiNotifyEvent first checks to see if the type field of **status** matches a bit in the event mask maintained by a Notify object (**notify**).

IF

the type field of **status** matches a bit in the event mask,

AND

the event source list maintained by the Notify object (**notify**) is empty or the **source** field of **status** matches a source in the event source list,

THEN

a Notify object (**notify**) will place the event in a FIFO event queue and signal that an event has been received.

If a thread is waiting for event notification (after having called `mpiNotifyEventWait(notify)`), the signal will awaken it. Otherwise, the next call to `mpiNotifyEventWait(notify)` will return immediately with **status**.

Return Values

[MPIMessageOK](#)

See Also

[mpiNotifyEventWait](#)

mpiNotifyEventFlush

Declaration

```
long mpiNotifyEventFlush(MPINotify notify)
```

Required Header: stdmpi.h

Description

mpiNotifyEventFlush flushes any pending events from the internal FIFO event queue maintained by a Notify object (*notify*).

Return Values

[MPIMessageOK](#)

See Also

mpiNotifyEventMaskGet

Declaration

```
long mpiNotifyEventMaskGet(MPINotify    notify,  
                           MPIEventMask *mask)
```

Required Header: stdmpi.h

Description

mpiNotifyEventMaskGet writes an event mask (that specifies the event type(s) for which event notification is accepted by a Notify object (*notify*) to the location pointed to by *mask*.

Return Values

[MPIMessageOK](#)

Sample Code

```
/*  
  Disables event notification and copies the previously used  
  event mask to oldMask.  oldMask may then be used to re-enable  
  event notification via another call to mpiNotifyEventMaskSet().  
*/  
void NotifyDisable(MPINotify notify, MPIEventMask* oldMask)  
{  
    MPIEventMask newMask;  
    long returnValue;  
  
    returnValue = mpiNotifyEventMaskGet(notify, oldMask);  
    msgCheck(returnValue);  
  
    mpiEventMaskCLEAR(newMask);  
  
    returnValue = mpiNotifyEventMaskSet(notify, newMask);  
    msgCheck(returnValue);  
}
```

See Also

[mpiNotifyEventMaskSet](#)

mpiNotifyEventWake

Declaration

```
long mpiNotifyEventWake(MPINotify notify,  
                        MPIEventStatus *status)
```

Required Header: stdmpi.h

Description

mpiNotifyEventWake wakes a thread that is waiting for an event notification from a Notify object (*notify*). The awakened thread will return from its call to `mpiNotifyEventWait(notify, status, timeout)` with the contents of **status** set to the contents of `status`. If `status` is NULL, **status** will indicate an event of type `MPIEventTypeNONE`.

NotifyEventWake is different from *NotifyEvent*, because event notification is not accepted based on the event type or source (*NotifyEvent*); instead event notification is always accepted (*NotifyEventWake*).

Return Values

[MPIMessageOK](#)

See Also

[mpiNotifyEventWait](#) | [MPIEventStatus](#)

mpiNotifySource

Declaration

```
void* mpiNotifySource(MPINotify notify,
                    long index)
```

Required Header: stdmpi.h

Description

mpiNotifySource returns the element at the position on the list indicated by *index*.

notify	a handle to the Notify object.
index	a position in the list.

Return Values

<i>index</i> th event source	in the event source list maintained by a Notify object (<i>notify</i>)
NULL	if <i>notify</i> is invalid if <i>index</i> is less than 0 if <i>index</i> is greater than or equal to mpiNotifySourceCount (notify)
MPIMessageARG_INVALID	
MEIListMessageELEMENT_NOT_FOUND	
MPIMessageHANDLE_INVALID	

See Also

mpiNotifySourceAppend

Declaration

```
long mpiNotifySourceAppend(MPINotify notify,
                           void      *source)
```

Required Header: stdmpi.h

Description

mpiNotifySourceAppend appends an event source (**source**) to the list of event sources maintained by a Notify object (**notify**).

notify	a handle to the Notify object.
source	a pointer with an arbitrary (but non-NULL) value.

Return Values

[MPIMessageOK](#)

[MPIMessageHANDLE_INVALID](#)

[MPIMessageNO_MEMORY](#)

See Also

mpiNotifySourceCount

Declaration

```
long mpiNotifySourceCount(MPINotify notify)
```

Required Header: stdmpi.h

Description

mpiNotifySourceCount returns the number of elements on the list.

notify	a handle to the Notify object.
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Return Values

number of event sources	in the event source list maintained by a Notify object (<i>notify</i>)
-1	if <i>notify</i> is invalid
0	if the event source list is empty

See Also

mpiNotifySourceFirst

Declaration

```
void* mpiNotifySourceFirst(MPINotify notify)
```

Required Header: stdmpi.h

Description

mpiNotifySourceFirst returns the first element in the list. This function can be used in conjunction with `mpiNotifySourceNext()` in order to iterate through the list.

notify	a handle to the Notify object.
---------------	--------------------------------

Return Values

first event source	in the event source list maintained by a Notify object (<i>notify</i>)
NULL	if <i>notify</i> is invalid or if the event source list is empty
MPIMessageHANDLE_INVALID	if <i>notify</i> is an invalid handle.

See Also

[mpiNotifySourceNext](#) | [mpiNotifySourceLast](#)

mpiNotifySourceIndex

Declaration

```
long mpiNotifySourceIndex(MPINotify notify,
                          void          *source)
```

Required Header: stdmpi.h

Description

mpiNotifySourceIndex returns the position of **source** on the list.

notify	a handle to the Notify object.
source	a pointer with an arbitrary (but non-NULL) value.

Return Values

index of source	in the event source list maintained by a Notify object (notify)
-1	if notify is invalid if the event source (source) was not found in the event source list

See Also

mpiNotifySourceInsert

Declaration

```
long mpiNotifySourceInsert(MPINotify notify,  
                           void *source,  
                           void *insert)
```

Required Header: stdmpi.h

Description

mpiNotifySourceInsert places the event source (pointed to by *insert*) after a specified event source (*source*), in the list of event sources that are maintained by a Notify object (*notify*).

notify	a handle to the Notify object.
---------------	--------------------------------

Return Values

[MPIMessageOK](#)

See Also

mpiNotifySourceLast

Declaration

```
void* mpiNotifySourceLast(MPINotify notify)
```

Required Header: stdmpi.h

Description

mpiNotifySourceLast returns the last element in the list. This function can be used in conjunction with `mpiNotifySourcePrevious(...)` in order to iterate through the list backwards.

notify	a handle to the Notify object.
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Return Values

last event source	in the list maintained by a Notify object (<i>notify</i>)
NULL	if <i>notify</i> is invalid if the event source list is empty

See Also

[mpiNotifySourcePrevious](#) | [mpiNotifySourceFirst](#)

mpiNotifySourceListGet

Declaration

```
long mpiNotifySourceListGet(MPINotify notify,  
                             long      *sourceCount,  
                             void      **sourceList)
```

Required Header: stdmpi.h

Description

mpiNotifySourceListGet returns the event source list for a Notify object (*notify*). *NotifySourceListGet* writes the number of event sources in the event source list to the location (pointed to by *sourceCount*), and also writes an array of *sourceCount* event source pointers to the location (pointed to by *sourceList*).

Return Values

[MPIMessageOK](#)

See Also

[mpiNotifySourceListSet](#) | [NotifySourceAppend](#) / [NotifySourceInsert](#) / [mpiNotifyCreate](#)

mpiNotifySourceListSet

Declaration

```
long mpiNotifySourceListSet(MPINotify notify,  
                             long      sourceCount,  
                             void      **sourceList)
```

Required Header: stdmpi.h

Description

mpiNotifySourceListSet creates an event source list of length **sourceCount**, using the source pointers specified by **sourceList**. The **sourceList** argument is the address of an array of **sourceCount** event source pointers, or is NULL (if **sourceCount** = 0). Any existing event source list is completely replaced after using *NotifySourceListSet*.

You can also create an event source list incrementally (i.e., created one source at a time) by using *NotifySourceAppend/Insert* methods. To specify the first event source of a list, use the **source** argument of *mpiNotifyCreate(...)*. Use the *NotifySourceList* methods to examine and manipulate an event source list, regardless of how you created it.

Return Values

[MPIMessageOK](#)

See Also

[NotifySourceAppend](#) / [NotifySourceInsert](#) / [mpiNotifyCreate](#) | [mpiNotifySourceListGet](#)

mpiNotifySourceNext

Declaration

```
void * mpiNotifySourceNext(MPINotify notify,
                          void *source)
```

Required Header: stdmpi.h

Description

mpiNotifySourceNext returns the next element following "source" on the list. This function can be used in conjunction with mpiNotifySourceFirst() in order to iterate through the list.

notify	a handle to the Notify object.
source	a pointer with an arbitrary (but non-NULL) value.

Return Values

event source	before the event source (source) in the event source list maintained by a Notify object (notify)
NULL	if notify is invalid if the event source (source) is the first event source in the event source list
MPIMessageHANDLE_INVALID	

See Also

[mpiNotifySourcePrevious](#)

mpiNotifySourcePrevious

Declaration

```
void * mpiNotifySourcePrevious(MPINotify notify,
                               void      *source)
```

Required Header: stdmpi.h

Description

mpiNotifySourcePrevious returns the previous element prior to "source" on the list. This function can be used in conjunction with `mpiNotifySourceLast()` in order to iterate through the list backwards.

notify	a handle to the Notify object.
source	a pointer with an arbitrary (but non-NULL) value.

Return Values

event source	before the event source (source) in the event source list maintained by a Notify object (notify)
NULL	if notify is invalid if the event source (source) is the first event source in the event source list
MPIMessageHANDLE_INVALID	

See Also

[mpiNotifySourceNext](#)

mpiNotifySourceRemove

Declaration

```
long mpiNotifySourceRemove(MPINotify notify,  
                           void *source)
```

Required Header: stdmpi.h

Description

mpiNotifySourceRemove removes an event source (**source**) from the list of event sources maintained by a Notify object (**notify**).

Return Values

[MPIMessageOK](#)

See Also

MPINotifyMessage

Definition

```
typedef enum {  
  
    MPINotifyMessageNOTIFY_INVALID,  
    MPINotifyMessageWAIT_IN_PROGRESS,  
} MPINotifyMessage;
```

Description

MPINotifyMessage is an enumeration of the Notify error messages that can be returned by the MPI library.

MPINotifyMessageNOTIFY_INVALID

The notify object is not valid. This message code is returned by a notify method if the notify object handle is not valid. This problem can be caused by failed [mpiNotifyCreate\(...\)](#). To prevent this problem, check your notify objects after creation by using [mpiNotifyValidate\(...\)](#).

MPINotifyMessageWAIT_IN_PROGRESS

The notify object is waiting for an event. This message code is returned by [mpiNotifyEventWait\(...\)](#) if the notify object is already waiting for an event in another thread. To prevent this problem, make sure a thread does not share notify objects with other threads.

Sample Code

```
MPIControl    control;  
MPINotify     notify;  
long         returnValue;  
  
...  
  
notify =  
    mpiNotifyCreate(control);  
returnValue =  
    mpiNotifyValidate(notify);
```

See Also

[MPINotify](#) | [mpiNotifyCreate](#) | [mpiNotifyValidate](#)

MEINotifyTrace

Definition

```
typedef enum {  
    MEINotifyTraceTHREAD,  
} MEINotifyTrace;
```

Description

MEINotifyTrace holds information about a particular event that was generated by the XMP.

MEINotifyTraceTHREAD

will display trace information when notify objects are set to wait, are finished waiting, and when they are signaled to wake.

See Also