NAME

Constants − Meaning of MPI *s defined constants*

DATA TYPES

Note that the Fortran types should only be used in Fortran programs, and the C types should only be used in C programs. For example, it is in error to use MPI_INT *for a Fortran INTEGER.* Datatypes are of type MPI_Datatype *in C and of tyep* INTEGER *in Fortran.*

C DATATYPES

MPI_CHAR
- char

MPI_BYTE
- See standard; like unsigned char

MPI_SHORT
- short

MPI_INT
- int

MPI_LONG
- long

MPI_FLOAT
- float

MPI_DOUBLE
- double

MPI_UNSIGNED_CHAR
- unsigned char

MPI_UNSIGNED_SHORT
- unsigned short

MPI_UNSIGNED
- unsigned int

MPI_UNSIGNED_LONG
- unsigned long

MPI_LONG_DOUBLE
- long double (some systems may not implement)

MPI_LONG_LONG_INT
- long long (some systems may not implement)

The following are datatypes for the MPI functions MPI_MAXLOC *and* MPI_MINLOC .

MPI_FLOAT_INT
- struct { float, int }

MPI_LONG_INT
- struct { long, int }

MPI_DOUBLE_INT
- struct { double, int }

MPI_SHORT_INT
- struct { short, int }

MPI_2INT
- struct { int, int }

MPI_LONG_DOUBLE_INT
- struct { long double, int }; this is an OPTIONAL type, and may be set to NULL

Note that there is no *MPI_LONG_LONG_INT* type corresponding to a *struct { long long, int }* .

Special datatypes for C and Fortran

MPI_PACKED
- For *MPI_Pack* and *MPI_Unpack*



MPI_UB
- For *MPI_Type_struct* ; an upper-bound indicator

MPI_LB
- For *MPI_Type_struct* ; a lower-bound indicator

FORTRAN DATATYPES

MPI_REAL
- *REAL*

MPI_INTEGER
- *INTEGER*

MPI_LOGICAL
- *LOGICAL*

MPI_DOUBLE_PRECISION
- *DOUBLE PRECISION*

MPI_COMPLEX
- *COMPLEX*

MPI_DOUBLE_COMPLEX
- *complex*16* (or *complex*32*) where supported.

The following datatypes are optional

MPI_INTEGER1
- *integer*1* if supported

MPI_INTEGER2
- *integer*2* if supported

MPI_INTEGER4
- *integer*4* if supported

MPI_REAL4
- *real*4* if supported

MPI_REAL8
- *real*8* if supported

The following are datatypes for the MPI functions *MPI_MAXLOC* and *MPI_MINLOC* . In Fortran, these datatype always consist of two elements of the same Fortran type.

MPI_2INTEGER
- *INTEGER,INTEGER*

MPI_2REAL
- *REAL, REAL*

MPI_2DOUBLE_PRECISION
- *DOUBLE PRECISION, DOUBLE PRECISION*

MPI_2COMPLEX
- *COMPLEX, COMPLEX*

MPI_2DOUBLE_COMPLEX
- *complex*16, complex*16*

COMMUNICATORS

Communicators are of type *MPI_Comm* in C and *INTEGER* in Fortran



MPI_COMM_WORLD
- Contains all of the processes

MPI_COMM_SELF
- Contains only the calling process

GROUPS

Groups are of type *MPI_Group* in C and *INTEGER* in Fortran

MPI_GROUP_EMPTY
- A group containing no members.

RESULTS OF THE COMPARE OPERATIONS

MPI_IDENT
- Identical

MPI_CONGRUENT
- (only for *MPI_COMM_COMPARE*) The groups are identical

MPI_SIMILAR
- Same members, but in a different order

MPI_UNEQUAL
- Different

COLLECTIVE OPERATIONS

The collective combination operations (*MPI_REDUCE* , *MPI_ALLREDUCE* , *MPI_REDUCE_SCATTER* , and *MPI_SCAN*) take a combination operation. This operation is of type *MPI_Op* in C and of type *INTEGER* in Fortran. The predefined operations are

MPI_MAX
- return the maximum

MPI_MIN
- return the minumum

MPI_SUM
- return the sum

MPI_PROD
- return the product

MPI_LAND
- return the logical and

MPI_BAND
- return the bitwise and

MPI_LOR
- return the logical or

MPI_BOR
- return the bitwise of

MPI_LXOR
- return the logical exclusive or

MPI_BXOR
- return the bitwise exclusive or

MPI_MINLOC
- return the minimum and the location (actually, the value of the second element of the structure where the minimum of the first is found)

MPI_MAXLOC
- return the maximum and the location



NOTES ON COLLECTIVE OPERATIONS

The reduction functions (*MPI_Op*) do not return an error value. As a result, if the functions detect an error, all they can do is either call *MPI_Abort* or silently skip the problem. Thus, if you change the error handler from *MPI_ERRORS_ARE_FATAL* to something else, for example, *MPI_ERRORS_RETURN* , then no error may be indicated.

The reason for this is the performance problems in ensuring that all collective routines return the same error value.

Note that not all datatypes are valid for these functions. For example, *MPI_COMPLEX* is not valid for *MPI_MAX* and *MPI_MIN* . In addition, the MPI 1.1 standard did not include the C types *MPI_CHAR* and *MPI_UNSIGNED_CHAR* among the lists of arithmetic types for operations like *MPI_SUM* . However, since the C type *char* is an integer type (like *short*), it should have been included. The MPI Forum will probably include *char* and *unsigned char* as a clarification to MPI 1.1; until then, users are advised that MPI implementations may not accept *MPI_CHAR* and *MPI_UNSIGNED_CHAR* as valid datatypes for *MPI_SUM* , *MPI_PROD* , etc. MPICH does allow these datatypes.

PERMANENT KEY VALUES

These are the same in C and Fortran

MPI_TAG_UB
- Largest tag value

MPI_HOST
- Rank of process that is host, if any

MPI_IO
- Rank of process that can do I/O

MPI_WTIME_IS_GLOBAL
- Has value 1 if *MPI_WTIME* is globally synchronized.

NULL OBJECTS

MPI_COMM_NULL
- Null communicator

MPI_OP_NULL
- Null operation

MPI_GROUP_NULL
- Null group

MPI_DATATYPE_NULL
- Null datatype

MPI_REQUEST_NULL
- Null request

MPI_ERRHANDLER_NULL
- Null error handler

PREDEFINED CONSTANTS

MPI_MAX_PROCESSOR_NAME
- Maximum length of name returned by *MPI_GET_PROCESSOR_NAME*

MPI_MAX_ERROR_STRING
- Maximum length of string return by *MPI_ERROR_STRING*

MPI_UNDEFINED
- Used by many routines to indicated undefined or unknown integer value

MPI_UNDEFINED_RANK
- Unknown rank



MPI_KEYVAL_INVALID
- Special keyval that may be used to detect uninitialized keyvals.

MPI_BSEND_OVERHEAD
- Add this to the size of a *MPI_BSEND* buffer for each outstanding message

MPI_PROC_NULL
- This rank may be used to send or receive from no-one.

MPI_ANY_SOURCE
- In a receive, accept a message from anyone.

MPI_ANY_TAG
- In a receive, accept a message with any tag value.

MPI_BOTTOM
- May be used to indicate the bottom of the address space

TOPOLOGY TYPES

MPI_GRAPH
- General graph

MPI_CART
- Cartesian grid

MPI STATUS

The *MPI_Status* datatype is a structure. The three elements for use by programmers are

MPI_SOURCE
- Who sent the message

MPI_TAG
- What tag the message was sent with

MPI_ERROR
- Any error return

SPECIAL MPI TYPES AND FUNCTIONS

MPI_Aint
- C type that holds any valid address.

MPI_Handler_function
- C function for handling errors (see *MPI_Errhandler_create*) .

MPI_User_function
- C function to combine values (see collective operations and *MPI_Op_create*)

MPI_Copy_function
- Function to copy attributes (see *MPI_Keyval_create*)

MPI_NULL_COPY_FN
- Predefined copy function

MPI_Delete_function
- Function to delete attributes (see *MPI_Keyval_create*)

MPI_NULL_DELETE_FN
- Predefined delete function

MPI_DUP_FN
- Predefined duplication function

MPI_ERRORS_ARE_FATAL
- Error handler that forces exit on error

MPI_ERRORS_RETURN
- Error handler that returns error codes (as value of MPI routine in C and through last argument in Fortran)

MPI ERROR CLASSES



MPI_SUCCESS
- Successful return code

MPI_ERR_BUFFER
- Invalid buffer pointer

MPI_ERR_COUNT
- Invalid count argument

MPI_ERR_TYPE
- Invalid datatype argument

MPI_ERR_TAG
- Invalid tag argument

MPI_ERR_COMM
- Invalid communicator

MPI_ERR_RANK
- Invalid rank

MPI_ERR_ROOT
- Invalid root

MPI_ERR_GROUP
- Null group passed to function

MPI_ERR_OP
- Invalid operation

MPI_ERR_TOPOLOGY
- Invalid topology

MPI_ERR_DIMS
- Illegal dimension argument

MPI_ERR_ARG
- Invalid argument

MPI_ERR_UNKNOWN
- Unknown error

MPI_ERR_TRUNCATE
- message truncated on receive

MPI_ERR_OTHER
- Other error; use Error_string

MPI_ERR_INTERN
- internal error code

MPI_ERR_IN_STATUS
- Look in status for error value

MPI_ERR_PENDING
- Pending request

MPI_ERR_REQUEST
- illegal mpi_request handle

MPI_ERR_LASTCODE
- Last error code -- always at end

LOCATION

/home/MPI/mansrc/mpiconsts.txt

