

The copy and delete function arguments to `MPI_TYPE_KEYVAL_CREATE` should be declared like these:

```

SUBROUTINE TYPE_COPY_ATTR_FN(OLDTYPE, TYPE_KEYVAL, EXTRA_STATE,
    ATTRIBUTE_VAL_IN, ATTRIBUTE_VAL_OUT, FLAG, IERROR)
    INTEGER OLDTYPE, TYPE_KEYVAL, IERROR
    INTEGER(KIND=MPI_ADDRESS_KIND) EXTRA_STATE,
    ATTRIBUTE_VAL_IN, ATTRIBUTE_VAL_OUT
    LOGICAL FLAG

SUBROUTINE TYPE_DELETE_ATTR_FN(TYPE, TYPE_KEYVAL, ATTRIBUTE_VAL,
    EXTRA_STATE, IERROR)
    INTEGER TYPE, TYPE_KEYVAL, IERROR
    INTEGER(KIND=MPI_ADDRESS_KIND) ATTRIBUTE_VAL, EXTRA_STATE

```

The handler-function argument to `MPI_COMM_CREATE_ERRHANDLER` should be declared like this:

```

SUBROUTINE COMM_ERRHANDLER_FN(COMM, ERROR_CODE[ticket1.][, ...])
    INTEGER COMM, ERROR_CODE

```

The handler-function argument to `MPI_WIN_CREATE_ERRHANDLER` should be declared like this:

```

SUBROUTINE WIN_ERRHANDLER_FN(WIN, ERROR_CODE[ticket1.][, ...])
    INTEGER WIN, ERROR_CODE

```

The handler-function argument to `MPI_FILE_CREATE_ERRHANDLER` should be declared like this:

```

SUBROUTINE FILE_ERRHANDLER_FN(FILE, ERROR_CODE[ticket1.][, ...])
    INTEGER FILE, ERROR_CODE

```

The query, free, and cancel function arguments to `MPI_GREQUEST_START` should be declared like these:

```

SUBROUTINE GREQUEST_QUERY_FUNCTION(EXTRA_STATE, STATUS, IERROR)
    INTEGER STATUS(MPI_STATUS_SIZE), IERROR
    INTEGER(KIND=MPI_ADDRESS_KIND) EXTRA_STATE

SUBROUTINE GREQUEST_FREE_FUNCTION(EXTRA_STATE, IERROR)
    INTEGER IERROR
    INTEGER(KIND=MPI_ADDRESS_KIND) EXTRA_STATE

SUBROUTINE GREQUEST_CANCEL_FUNCTION(EXTRA_STATE, COMPLETE, IERROR)
    INTEGER IERROR
    INTEGER(KIND=MPI_ADDRESS_KIND) EXTRA_STATE
    LOGICAL COMPLETE

```

The extend and conversion function arguments to `MPI_REGISTER_DATAREP` should be declared like these:

```

SUBROUTINE DATAREP_EXTENT_FUNCTION(DATATYPE, EXTENT, EXTRA_STATE, IERROR)
    INTEGER DATATYPE, IERROR
    INTEGER(KIND=MPI_ADDRESS_KIND) EXTENT, EXTRA_STATE

SUBROUTINE DATAREP_CONVERSION_FUNCTION(USERBUF, DATATYPE, COUNT, FILEBUF,
    POSITION, EXTRA_STATE, IERROR)
    <TYPE> USERBUF(*), FILEBUF(*)
    INTEGER COUNT, DATATYPE, IERROR
    INTEGER(KIND=MPI_OFFSET_KIND) POSITION
    INTEGER(KIND=MPI_ADDRESS_KIND) EXTRA_STATE

```

The following are defined C++ typedefs, also included in the file `mpi.h`.

```

namespace MPI {
    typedef void User_function(const void* invec, void *inoutvec,
        int len, const Datatype& datatype);

    typedef int Comm::Copy_attr_function(const Comm& oldcomm,
        int comm_keyval, void* extra_state, void* attribute_val_in,
        void* attribute_val_out, bool& flag);
    typedef int Comm::Delete_attr_function(Comm& comm, int
        comm_keyval, void* attribute_val, void* extra_state);

    typedef int Win::Copy_attr_function(const Win& oldwin,
        int win_keyval, void* extra_state, void* attribute_val_in,
        void* attribute_val_out, bool& flag);
    typedef int Win::Delete_attr_function(Win& win, int
        win_keyval, void* attribute_val, void* extra_state);

    typedef int Datatype::Copy_attr_function(const Datatype& oldtype,
        int type_keyval, void* extra_state,
        const void* attribute_val_in, void* attribute_val_out,
        bool& flag);
    typedef int Datatype::Delete_attr_function(Datatype& type,
        int type_keyval, void* attribute_val, void* extra_state);

    typedef void Comm::Errhandler_fn(Comm &, int *, ...);
    typedef void Win::Errhandler_fn(Win &, int *, ...);
    typedef void File::Errhandler_fn(File &, int *, ...);

    typedef int Grequest::Query_function(void* extra_state, Status& status);
    typedef int Grequest::Free_function(void* extra_state);
    typedef int Grequest::Cancel_function(void* extra_state, bool complete);

    typedef void Datarep_extent_function(const Datatype& datatype,

```

```

1      Aint& file_extent, void* extra_state);
2      typedef void Datarep_conversion_function(void* userbuf,
3          Datatype& datatype, int count, void* filebuf,
4          Offset position, void* extra_state);
5  }

```

A.1.4 Deprecated prototype definitions

The following are defined C typedefs for deprecated user-defined functions, also included in the file `mpi.h`.

```

11 /* prototypes for user-defined functions */
12 typedef int MPI_Copy_function(MPI_Comm oldcomm, int keyval,
13     void *extra_state, void *attribute_val_in,
14     void *attribute_val_out, int *flag);
15 typedef int MPI_Delete_function(MPI_Comm comm, int keyval,
16     void *attribute_val, void *extra_state);
17 typedef void MPI_Handler_function(MPI_Comm *, int *, ...);

```

The following are deprecated Fortran user-defined callback subroutine prototypes. The deprecated copy and delete function arguments to `MPI_KEYVAL_CREATE` should be declared like these:

```

23 SUBROUTINE COPY_FUNCTION(OLDCOMM, KEYVAL, EXTRA_STATE,
24     ATTRIBUTE_VAL_IN, ATTRIBUTE_VAL_OUT, FLAG, IERR)
25     INTEGER OLDCOMM, KEYVAL, EXTRA_STATE, ATTRIBUTE_VAL_IN,
26         ATTRIBUTE_VAL_OUT, IERR
27     LOGICAL FLAG
28
29 SUBROUTINE DELETE_FUNCTION(COMM, KEYVAL, ATTRIBUTE_VAL, EXTRA_STATE, IERR)
30     INTEGER COMM, KEYVAL, ATTRIBUTE_VAL, EXTRA_STATE, IERR
31

```

The deprecated handler-function for error handlers should be declared like this:

```

34 SUBROUTINE HANDLER_FUNCTION(COMM, ERROR_CODE[ticket1.] [, .....])
35     INTEGER COMM, ERROR_CODE
36

```

A.1.5 Info Keys

```

38 access_style
39 appnum
40 arch
41 cb_block_size
42 cb_buffer_size
43 cb_nodes
44 chunked_item
45 chunked_size
46 chunked
47 collective_buffering
48

```