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External Interfaces Reference

Version 7

The MathWorks

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MATLAB External Interfaces Reference

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Generic DLL Interface Functions

`calllib`	Call function in external library
`libfunctions`	Return information on functions in external library
`libfunctionsview`	Create window displaying information on functions in external library
`libisloaded`	Determine if external library is loaded
`libpointer`	Create pointer object for use with external libraries
`libstruct`	Construct a structure as defined in an external library
`loadlibrary`	Load an external library into MATLAB®
`unloadlibrary`	Unload an external library from memory

calllib

Purpose

Call function in external library

Syntax

```
[x1, ..., xN] = calllib('libname', 'funcname', arg1, ..., argN)
```

Description

`[x1, ..., xN] = calllib('libname', 'funcname', arg1, ..., argN)` calls the function `funcname` in library `libname`, passing input arguments `arg1` through `argN`. `calllib` returns output values obtained from function `funcname` in `x1` through `XN`.

If you used an alias when initially loading the library, then you must use that alias for the `libname` argument.

Examples

This example calls functions from the `libmx` library to test the value stored in `y`:

```
hfile = [matlabroot '\extern\include\matrix.h'];
loadlibrary('libmx', hfile)

y = rand(4, 7, 2);

calllib('libmx', 'mxGetNumberOfElements', y)
ans =
    56

calllib('libmx', 'mxGetClassID', y)
ans =
   mxDOUBLE_CLASS

unloadlibrary libmx
```

See Also

`loadlibrary`, `libfunctions`, `libfunctionsview`, `libpointer`, `libstruct`, `libisloaded`, `unloadlibrary`

Purpose Return information on functions in external library

Syntax

```
m = libfunctions('libname')
m = libfunctions('libname', '-full')
libfunctions libname -full
```

Description `m = libfunctions('libname')` returns the names of all functions defined in the external shared library, `libname`, that has been loaded into MATLAB with the `loadlibrary` function. The return value, `m`, is a cell array of strings.

If you used an alias when initially loading the library, then you must use that alias for the `libname` argument.

`m = libfunctions('libname', '-full')` returns a full description of the functions in the library, including function signatures. This includes duplicate function names with different signatures. The return value, `m`, is a cell array of strings.

`libfunctions libname -full` is the command format for this function.

Examples List the functions in the MATLAB `libmx` library:

```
hfile = [matlabroot '\extern\include\matrix.h'];
loadlibrary('libmx', hfile)

libfunctions libmx

Methods for class lib.libmx:
mxAddField                mxGetFieldNumber  mxIsLogicalScalarTrue
mxArrayToString           mxGetImagData     mxIsNaN
mxCalcSingleSubscript     mxGetInf          mxIsNumeric
mxCalloc                  mxGetIr           mxIsObject
mxClearScalarDoubleFlag   mxGetJc           mxIsOpaque
mxCreateCellArray       mxGetLogicals    mxIsScalarDoubleFlagSet
      .                        .                     .
      .                        .                     .
```

To list the functions along with their signatures, use the **-full** switch with libfunctions:

```
libfunctions libmx -full

Methods for class lib.libmx:
[mxClassID, MATLAB array] mxGetClassID(MATLAB array)
[lib.pointer, MATLAB array] mxGetData(MATLAB array)
[MATLAB array, voidPtr] mxSetData(MATLAB array, voidPtr)
[uint8, MATLAB array] mxIsNumeric(MATLAB array)
[uint8, MATLAB array] mxIsCell(MATLAB array)
[lib.pointer, MATLAB array] mxGetPr(MATLAB array)
[MATLAB array, doublePtr] mxSetPr(MATLAB array, doublePtr)
         .
         .

unloadlibrary libmx
```

See Also

loadlibrary, libfunctionsview, libpointer, libstruct, calllib, libisloaded, unloadlibrary

Purpose Create window displaying information on functions in external library

Syntax

```
libfunctionsview('libname')
libfunctionsview libname
```

Description

`libfunctionsview libname` displays the names of the functions in the external shared library, `libname`, that has been loaded into MATLAB with the `loadlibrary` function.

If you used an alias when initially loading the library, then you must use that alias for the `libname` argument.

MATLAB creates a new window in response to the `libfunctionsview` command. This window displays all of the functions defined in the specified library. For each of these functions, the following information is supplied:

- Data type returned by the function
- Name of the function
- Arguments passed to the function

An additional column entitled "Inherited From" is displayed at the far right of the window. The information in this column is not useful for external libraries.

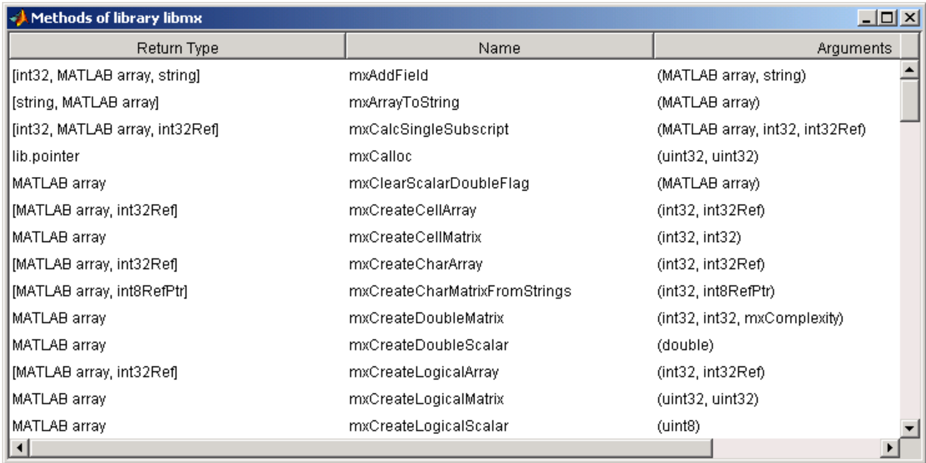
`libfunctionsview libname` is the command format for this function.

libfunctionsview

Examples

The following command opens the window shown below for the `libmx` library:

```
libfunctionsview libmx
```



Methods of library libmx

Return Type	Name	Arguments
[int32, MATLAB array, string]	mxAddField	(MATLAB array, string)
[string, MATLAB array]	mxArrayToString	(MATLAB array)
[int32, MATLAB array, int32Ref]	mxCalcSingleSubscript	(MATLAB array, int32, int32Ref)
lib.pointer	mxCalloc	(uint32, uint32)
MATLAB array	mxClearScalarDoubleFlag	(MATLAB array)
[MATLAB array, int32Ref]	mxCreateCellArray	(int32, int32Ref)
MATLAB array	mxCreateCellMatrix	(int32, int32)
[MATLAB array, int32Ref]	mxCreateCharArray	(int32, int32Ref)
[MATLAB array, int8RefPtr]	mxCreateCharMatrixFromStrings	(int32, int8RefPtr)
MATLAB array	mxCreateDoubleMatrix	(int32, int32, mxComplexity)
MATLAB array	mxCreateDoubleScalar	(double)
[MATLAB array, int32Ref]	mxCreateLogicalArray	(int32, int32Ref)
MATLAB array	mxCreateLogicalMatrix	(uint32, uint32)
MATLAB array	mxCreateLogicalScalar	(uint8)

See Also

`loadlibrary`, `libfunctions`, `libpointer`, `libstruct`, `calllib`, `libisloaded`, `unloadlibrary`

Purpose Determine if external library is loaded

Syntax

```
libisloaded('libname')
libisloaded libname
```

Description `libisloaded('libname')` returns `true` if the shared library `libname` is loaded and `false` otherwise.

`libisloaded libname` is the command format for this function.

If you used an alias when initially loading the library, then you must use that alias for the `libname` argument.

Examples

Example 1

Load the `shrlibsample` library and check to see if the load was successful before calling one of its functions:

```
addpath([matlabroot '\extern\examples\shrlib'])
loadlibrary shrlibsample.dll shrlibsample.h

if libisloaded('shrlibsample')
   x = calllib('shrlibsample', 'addDoubleRef', 1.78, 5.42, 13.3)
end
```

Since the library is successfully loaded, the call to `addDoubleRef` works as expected and returns

```
x =
   20.5000

unloadlibrary shrlibsample
```

Example 2

Load the same library, this time giving it an alias. If you use `libisloaded` with the library name, `shrlibsample`, it now returns `false`. Since you loaded the library using an alias, all further references to the library must also use that alias:

```
addpath([matlabroot '\extern\examples\shrlib'])
loadlibrary shrlibsample.dll shrlibsample.h alias lib
```

```
libisloaded shrlibsample
ans =
     0

libisloaded lib
ans =
     1

unloadlibrary lib
```

See Also `loadlibrary`, `libfunctions`, `libfunctionsview`, `libpointer`, `libstruct`, `calllib`, `unloadlibrary`

Purpose

Create pointer object for use with external libraries

Syntax

```
p = libpointer
p = libpointer('type')
p = libpointer('type', value)
```

Description

`p = libpointer` returns an empty (void) pointer.

`p = libpointer('type')` returns an empty pointer that contains a reference to the specified data `type`. This `type` can be any MATLAB numeric type, or a structure or enumerated type defined in an external library that has been loaded into MATLAB with the `loadlibrary` function. For valid `types`, see the table under "Primitive Types" in the MATLAB documentation.

`p = libpointer('type', value)` returns a pointer to the specified data `type` and initialized to the `value` supplied.

Examples

This example passes an `int16` pointer to a function that multiplies each value in a matrix by its index. The function `multiplyShort` is defined in the MATLAB sample shared library, `shrlibsample`.

Here is the C function:

```
void multiplyShort(short *x, int size)
{
    int i;
    for (i = 0; i < size; i++)
    *x++ *= i;
}
```

Load the `shrlibsample` library. Create the matrix, `v`, and also a pointer to it, `pv`:

```
addpath([matlabroot '\extern\examples\shrlib'])
loadlibrary shrlibsample shrlibsample.h

v = [4 6 8; 7 5 3];

pv = libpointer('int16Ptr', v);
```

```
get(pv, 'Value')
ans =
     4     6     8
     7     5     3
```

Now call the C function in the library, passing the pointer to v. If you were to pass a *copy* of v, the results would be lost once the function terminates. Passing a pointer to v enables you to get back the results:

```
calllib('shrlibsample', 'multiplyShort', pv, 6);
get(pv, 'Value')
ans =
     0    12    32
     7    15    15

unloadlibrary shrlibsample
```

Note In most cases, you can pass by value and MATLAB will automatically convert the argument to a pointer for you. See "Creating References", in the MATLAB documentation for more information.

See Also

`loadlibrary`, `libfunctions`, `libfunctionsview`, `libstruct`, `calllib`, `libisloaded`, `unloadlibrary`

Purpose Construct a structure as defined in an external library

Syntax

```
s = libstruct('structtype')
s = libstruct('structtype', mlstruct)
```

Description

`s = libstruct('type')` returns a libstruct object `s` that is a MATLAB object designed to resemble a C structure of type `structtype`. The structure type, `structtype`, is defined in an external library that must be loaded into MATLAB using the `loadlibrary` function. All fields of `s` are set to zero.

`s = libstruct('structtype', mlstruct)` returns a libstruct object `s` with its fields initialized from MATLAB structure, `mlstruct`.

The `libstruct` function essentially creates a C-like structure that you can pass to functions in an external library. You can handle this structure in MATLAB as you would a true MATLAB structure.

Examples

This example performs a simple addition of the fields of a structure. The function `addStructFields` is defined in the MATLAB sample shared library, `shrlibsample`.

Here is the C function:

```
double addStructFields(struct c_struct st)
{
    double t = st.p1 + st.p2 + st.p3;
    return t;
}
```

Start by loading the `shrlibsample` library and creating MATLAB structure, `sm`:

```
addpath([matlabroot '\extern\examples\shrlib'])
loadlibrary shrlibsample.dll shrlibsample.h

sm.p1 = 476;   sm.p2 = -299;   sm.p3 = 1000;
```

Construct a libstruct object sc that uses the c_struct template:

```
sc = libstruct('c_struct', sm);

get(sc)
    p1: 476
    p2: -299
    p3: 1000
```

Now call the function, passing the libstruct object, sc:

```
calllib('shrlibsample', 'addStructFields', sc)
ans =
    1177

unloadlibrary shrlibsample
```

Note In most cases, you can pass a MATLAB structure and MATLAB will automatically convert the argument to a C structure. See “Structures”, in the MATLAB documentation for more information.

See Also

loadlibrary, libfunctions, libfunctionsview, libpointer, calllib, libisloaded, unloadlibrary

Purpose Load an external library into MATLAB

Syntax

```
loadlibrary('shrlib', 'hfile')
loadlibrary('shrlib', @protofile)
loadlibrary('shrlib', ..., 'options')
loadlibrary shrlib hfile options
```

Description

`loadlibrary('shrlib', 'hfile')` loads the functions defined in header file `hfile` and found in shared library `shrlib` into MATLAB. On Windows systems, `shrlib` refers to the name of a dynamic link library (`.dll`) file. On UNIX systems, it refers to the name of a shared object (`.so`) file.

`loadlibrary('shrlib', @protofile)` uses the prototype M-file `protofile` in place of a header file in loading the library `shrlib`. The string `@protofile` specifies a function handle to the prototype M-file. (See the description of "Prototype M-Files" below).

If you do not include a file extension with the `shrlib` argument, `loadlibrary` uses `.dll` or `.so`, depending on the platform you are using. If you do not include a file extension with the second argument, and this argument is not a function handle, `loadlibrary` uses `.h` for the extension.

`loadlibrary('shrlib', ..., 'options')` loads the library `shrlib` with one or more of the following *options*.

Option	Description

addheader `hfileN`	Loads the functions defined in the additional header file, `hfileN`. Specify the string `hfileN` as a filename without a file extension. MATLAB does not verify the existence of the header files and ignores any that are not needed.
	
	You can specify as many additional header files as you need using the syntax
	
	`loadlibrary shrlib hfile ...`
	`    addheader hfile1 ...`
	`    addheader hfile2 ...      % and so on`

alias `name`	Associates the specified alias `name` with the library. All subsequent calls to MATLAB functions that reference this library must use this alias until the library is unloaded.
includepath `path`	Specifies an additional `path` in which to look for included header files.
mfilename `mfile`	Generates a prototype M-file `mfile` in the current directory. You can use this file in place of a header file when loading the library. (See the description of "Prototype M-Files" below).

Only the **`alias`** option is available when loading using a prototype M-file.

If you have more than one library file of the same name, load the first using the library filename, and load the additional libraries using the **`alias`** option.

`loadlibrary shrlib hfile options` is the command format for this function.

Remarks

Prototype M-Files

When you use the **mfilename** option with `loadlibrary`, MATLAB generates an M-file called a prototype file. This file can then be used on subsequent calls to `loadlibrary` in place of a header file.

Like a header file, the prototype file supplies MATLAB with function prototype information for the library. You can make changes to the prototypes by editing this file and reloading the library.

Here are some reasons for using a prototype file, along with the changes you would need to make to the file:

- You want to make temporary changes to signatures of the library functions.

  Edit the prototype file, changing the `fcns.LHS` or `fcns.RHS` field for that function. This changes the types of arguments on the left hand side or right hand side, respectively.

- You want to rename some of the library functions.

  Edit the prototype file, defining the `fcns.alias` field for that function.

- You expect to use only a small percentage of the functions in the library you are loading.

  Edit the prototype file, commenting out the unused functions. This reduces the amount of memory required for the library.

- You need to specify a number of include files when loading a particular library.

  Specify the full list of include files (plus the **mfilename** option) in the first call to `loadlibrary`. This puts all the information from the include files into the prototype file. After that, specify just the prototype file.

Examples

Example 1

Use `loadlibrary` to load the MATLAB sample shared library, `shrlibsample`:

```
addpath([matlabroot '\extern\examples\shrlib'])
loadlibrary shrlibsample shrlibsample.h
```

Example 2

Load sample library shrlibsample, giving it an alias name of lib. Once you have set an alias, you need to use this name in all further interactions with the library for this session:

```
addpath([matlabroot '\extern\examples\shrlib'])
loadlibrary shrlibsample shrlibsample.h alias lib

libfunctionsview lib

str = 'This was a Mixed Case string';
calllib('lib', 'stringToUpper', str)
ans =
   THIS WAS A MIXED CASE STRING

unloadlibrary lib
```

Example 3

Load the library, specifying an additional path in which to search for included header files:

```
addpath([matlabroot '\extern\examples\shrlib'])
loadlibrary('shrlibsample','shrlibsample.h','includepath', ...
            fullfile(matlabroot , 'extern', 'include'));
```

Example 4

Load the libmx library and generate a prototype M-file containing the prototypes defined in header file matrix.h:

```
hfile = [matlabroot '\extern\include\matrix.h'];
loadlibrary('libmx.dll', hfile, 'mfilename', 'mxproto')

dir mxproto.m
   mxproto.m
```

Edit the generated file mxproto.m and locate the function 'mxGetNumberOfDimensions'. Give it an alias of 'mxGetDims' by adding this line to the file:

```
fcns.alias{40}='mxGetDims';
```

Unload the library and then reload it using the prototype M-file.

```
unloadlibrary libmx

loadlibrary('libmx.dll', @mxproto)
```

Now call `mxGetNumberOfDimensions` using the alias function name:

```
y = rand(4, 7, 2);

calllib('libmx', 'mxGetDims', y)
ans =
     3

unloadlibrary libmx
```

See Also

`libisloaded`, `unloadlibrary`, `libfunctions`, `libfunctionsview`, `libpointer`, `libstruct`, `calllib`

unloadlibrary

Purpose

Unload an external library from memory

Syntax

```
unloadlibrary('libname')
unloadlibrary libname
```

Description

`unloadlibrary('libname')` unloads the functions defined in shared library `shrlib` from memory. If you need to use these functions again, you must first load them back into memory using `loadlibrary`.

`unloadlibrary libname` is the command format for this function.

If you used an alias when initially loading the library, then you must use that alias for the `libname` argument.

Examples

Load the MATLAB sample shared library, `shrlibsample`. Call one of its functions, and then unload the library:

```
addpath([matlabroot '\extern\examples\shrlib'])
loadlibrary shrlibsample shrlibsample.h

s.p1 = 476;   s.p2 = -299;   s.p3 = 1000;
calllib('shrlibsample', 'addStructFields', s)
ans =
    1177

unloadlibrary shrlibsample
```

See Also

`loadlibrary`, `libisloaded`, `libfunctions`, `libfunctionsview`, `libpointer`, `libstruct`, `calllib`

2

C MAT-File Functions

`matClose`	Close MAT-file
`matDeleteArray (Obsolete)`	Use `matDeleteVariable`
`matDeleteMatrix (Obsolete)`	Use `matDeleteVariable`
`matDeleteVariable`	Delete named `mxArray` from MAT-file
`matGetArray (Obsolete)`	Use `matGetVariable`
`matGetArrayHeader (Obsolete)`	Use `matGetVariableInfo`
`matGetDir`	Get directory of `mxArrays` in MAT-file
`matGetFp`	Get file pointer to MAT-file
`matGetFull (Obsolete)`	Use `matGetVariable` followed by the appropriate `mxGet` routines
`matGetMatrix (Obsolete)`	Use `matGetVariable`
`matGetNextArray (Obsolete)`	Use `matGetNextVariable`
`matGetNextArrayHeader (Obsolete)`	Use `matGetNextArrayHeaderFromMATfile`
`matGetNextMatrix (Obsolete)`	Use `matGetNextVariable`
`matGetNextVariable`	Read next `mxArray` from MAT-file
`matGetNextVariableInfo`	Load array header information only
`matGetString (Obsolete)`	Use `matGetVariable` and `mxGetString`
`matGetVariable`	Read `mxArray` from MAT-file
`matGetVariableInfo`	Load header array information only
`matOpen`	Open MAT-file
`matPutArray (Obsolete)`	Use `matPutVariable`
`matPutArrayAsGlobal (Obsolete)`	Use `matPutVariableAsGlobal`
`matPutFull (Obsolete)`	Use `mxCreateDoubleMatrix` and `matPutVariable`
`matPutMatrix (Obsolete)`	Use `matPutVariable`
`matPutString (Obsolete)`	Use `mxCreateString` and `matPutVariable`

`matPutVariable`	Write `mxArrays` into MAT-files
`matPutVariableAsGlobal`	Put `mxArrays` into MAT-files

Purpose Closes a MAT-file

C Syntax

```
#include "mat.h"
int matClose(MATFile *mfp);
```

Arguments

`mfp`
Pointer to MAT-file information.

Description

`matClose` closes the MAT-file associated with `mfp`. It returns `EOF` for a write error, and zero if successful.

Examples

See `matcreat.c` and `matdgns.c` in the `eng_mat` subdirectory of the `examples` directory for sample programs that illustrate how to use the MATLAB MAT-file routines in a C program.

matDeleteArray (Obsolete)

V5 Compatible

This API function is obsolete and should not be used in a program that interfaces with MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the `-V5` option of the `mex` script.

Use

```
matDeleteVariable(mfp, name)
```

instead of

```
matDeleteArray(mfp, name)
```

See Also

`matDeleteVariable`

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
matDeleteVariable(mfp, name)
```

instead of

```
matDeleteMatrix(mfp, name)
```

See Also

`matDeleteVariable`

matDeleteVariable

Purpose

Delete named mxArray from MAT-file

C Syntax

```
#include "mat.h"
int matDeleteVariable(MATFile *mfp, const char *name);
```

Arguments

mfp
Pointer to MAT-file information.

name
Name of mxArray to delete.

Description

matDeleteVariable deletes the named mxArray from the MAT-file pointed to by mfp. matDeleteVariable returns 0 if successful, and nonzero otherwise.

Examples

See matcreat.c and matdgns.c in the eng_mat subdirectory of the examples directory for sample programs that illustrate how to use the MATLAB MAT-file routines in a C program.

V5 Compatible

This API function is obsolete and should not be used in a program that interfaces with MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the `-V5` option of the `mex` script.

Use

```
mp = matGetVariable(mfp, name);
```

instead of

```
mp = matGetArray(mfp, name);
```

See Also

`matGetVariable`

matGetArrayHeader (Obsolete)

V5 Compatible

This API function is obsolete and should not be used in a program that interfaces with MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the `-V5` option of the `mex` script.

Use

```
mp = matGetVariableInfo(mfp, name);
```

instead of

```
mp = matGetArrayHeader(mfp, name);
```

See Also

`matGetVariableInfo`

Purpose

Get directory of mxArrays in a MAT-file

C Syntax

```
#include "mat.h"
char **matGetDir(MATFile *mfp, int *num);
```

Arguments

mfp
Pointer to MAT-file information.

num
Address of the variable to contain the number of mxArrays in the MAT-file.

Description

This routine allows you to get a list of the names of the mxArrays contained within a MAT-file.

matGetDir returns a pointer to an internal array containing pointers to the NULL-terminated names of the mxArrays in the MAT-file pointed to by mfp. The length of the internal array (number of mxArrays in the MAT-file) is placed into num. The internal array is allocated using a single mxCalloc and must be freed using mxFree when you are finished with it.

matGetDir returns NULL and sets num to a negative number if it fails. If num is zero, mfp contains no arrays.

MATLAB variable names can be up to length mxMAXNAM, where mxMAXNAM is defined in the file matrix.h.

Examples

See matcreat.c and matdgns.c in the eng_mat subdirectory of the examples directory for sample programs that illustrate how to use the MATLAB MAT-file routines in a C program.

matGetFp

Purpose

Get file pointer to a MAT-file

C Syntax

```
#include "mat.h"
FILE *matGetFp(MATFile *mfp);
```

Arguments

`mfp`
Pointer to MAT-file information.

Description

`matGetFp` returns the C file handle to the MAT-file with handle `mfp`. This can be useful for using standard C library routines like `ferror()` and `feof()` to investigate error situations.

Examples

See `matcreat.c` and `matdgns.c` in the `eng_mat` subdirectory of the `examples` directory for sample programs that illustrate how to use the MATLAB MAT-file routines in a C program.

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

`matGetVariable` followed by the appropriate `mxGet` routines

instead of

`matGetFull`

For example,

```
int matGetFull(MATFile *fp, char *name, int *m, int *n,
               double **pr, double **pi)
{
    mxArray *parr;
    /* Get the matrix. */
    parr = matGetVariable(fp, name);

    if (parr == NULL)
       return(1);

    if (!mxIsDouble(parr)) {
       mxDestroyArray(parr);
       return(1);
    }
    /* Set up return args. */

    *m  = mxGetM(parr);
    *n  = mxGetN(parr);
    *pr = mxGetPr(parr);
    *pi = mxGetPi(parr);
    /* Zero out pr & pi in array struct so the mxArray can be
       destroyed. */
    mxSetPr(parr, (void *)0);
    mxSetPi(parr, (void *)0);

    mxDestroyArray(parr);

    return(0);
}
```

matGetFull (Obsolete)

See Also `matGetVariable`

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
mp = matGetVariable(mfp, name)
```

instead of

```
mp = matGetMatrix(mfp, name);
```

See Also `matGetVariable`

matGetNextArray (Obsolete)

V5 Compatible This API function is obsolete and should not be used in a program that interfaces with MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the `-V5` option of the `mex` script.

Use

```
mp = matGetNextVariable(mfp, name);
```

instead of

```
mp = matGetNextArray(mfp);
```

See Also `matGetNextVariable`

V5 Compatible

This API function is obsolete and should not be used in a program that interfaces with MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the `-V5` option of the `mex` script.

Use

```
matGetNextVariableInfo
```

instead of

```
matGetNextArrayHeader
```

See Also

`matGetNextVariableInfo`

matGetNextMatrix (Obsolete)

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
matGetNextVariable
```

instead of

```
matGetNextMatrix
```

See Also `matGetNextVariable`

Purpose

Read next `mxArray` from MAT-file

C Syntax

```
#include "mat.h"
mxArray *matGetNextVariable(MATFile *mfp, const char *name);
```

Arguments

`mfp`
Pointer to MAT-file information.

`name`
Address of the variable to contain the `mxArray` name.

Description

`matGetNextVariable` allows you to step sequentially through a MAT-file and read all the `mxArrays` in a single pass. The function reads the next `mxArray` from the MAT-file pointed to by `mfp` and returns a pointer to a newly allocated `mxArray` structure. MATLAB returns the name of the `mxArray` in `name`.

Use `matGetNextVariable` immediately after opening the MAT-file with `matOpen` and not in conjunction with other MAT-file routines. Otherwise, the concept of the *next* `mxArray` is undefined.

`matGetNextVariable` returns `NULL` when the end-of-file is reached or if there is an error condition. Use `feof` and `ferror` from the Standard C Library to determine status.

Be careful in your code to free the `mxArray` created by this routine when you are finished with it.

Examples

See `matcreat.c` and `matdgns.c` in the `eng_mat` subdirectory of the `examples` directory for sample programs that illustrate how to use the MATLAB MAT-file routines in a C program.

matGetNextVariableInfo

Purpose

Load array header information only

C Syntax

```
#include "mat.h"
mxArray *matGetNextVariableInfo(MATFile *mfp, const char *name);
```

Arguments

`mfp`
Pointer to MAT-file information.

`name`
Address of the variable to contain the `mxArray` name.

Description

`matGetNextVariableInfo` loads only the array header information, including everything except `pr`, `pi`, `ir`, and `jc`, from the file's current file offset. MATLAB returns the name of the `mxArray` in `name`.

If `pr`, `pi`, `ir`, and `jc` are set to nonzero values when loaded with `matGetVariable`, `matGetNextVariableInfo` sets them to `-1` instead. These headers are for informational use only and should *never* be passed back to MATLAB or saved to MAT-files.

Examples

See `matcreat.c` and `matdgns.c` in the `eng_mat` subdirectory of the `examples` directory for sample programs that illustrate how to use the MATLAB MAT-file routines in a C program.

See Also

`matGetNextVariable`, `matGetVariableInfo`

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
#include "mat.h"
#include "matrix.h"
mxArray *matGetVariable(MATFile *mfp, const char *name);
int mxGetString(const mxArray *array_ptr, char *buf, int buflen)
```

instead of

```
matGetString
```

See Also

`matGetVariable`, `mxGetString`

matGetVariable

Purpose Read mxArrays from MAT-files

C Syntax

```
#include "mat.h"
mxArray *matGetVariable(MATFile *mfp, const char *name);
```

Arguments

mfp
Pointer to MAT-file information.

name
Name of mxArray to get from MAT-file.

Description This routine allows you to copy an mxArray out of a MAT-file.

matGetVariable reads the named mxArray from the MAT-file pointed to by mfp and returns a pointer to a newly allocated mxArray structure, or NULL if the attempt fails.

Be careful in your code to free the mxArray created by this routine when you are finished with it.

Examples See matcreat.c and matdgns.c in the eng_mat subdirectory of the examples directory for sample programs that illustrate how to use the MATLAB MAT-file routines in a C program.

Purpose

Load array header information only

C Syntax

```
#include "mat.h"
mxArray *matGetVariableInfo(MATFile *mfp, const char *name);
```

Arguments

`mfp`
Pointer to MAT-file information.

`name`
Name of `mxArray`.

Description

`matGetVariableInfo` loads only the array header information, including everything except `pr`, `pi`, `ir`, and `jc`. It recursively creates the cells and structures through their leaf elements, but does not include `pr`, `pi`, `ir`, and `jc`.

If `pr`, `pi`, `ir`, and `jc` are set to non`NULL` when loaded with `matGetVariable`, then matGetVariableInfo sets them to `-1` instead. These headers are for informational use only and should *never* be passed back to MATLAB or saved to MAT-files.

Examples

See `matcreat.c` and `matdgns.c` in the `eng_mat` subdirectory of the `examples` directory for sample programs that illustrate how to use the MATLAB MAT-file routines in a C program.

matOpen

Purpose Opens a MAT-file

C Syntax

```
#include "mat.h"
MATFile *matOpen(const char *filename, const char *mode);
```

Arguments

`filename`
Name of file to open.

`mode`
File opening mode. Valid values for `mode` are:

`r`	Open file for reading only; determines the current version of the MAT-file by inspecting the files and preserves the current version.
`u`	Open file for update, both reading and writing, but does not create the file if the file does not exist (equivalent to the `r+` mode of `fopen`); determines the current version of the MAT-file by inspecting the files and preserves the current version.
`w`	Open file for writing only; deletes previous contents, if any.
`w4`	Create a Level 4 MAT-file, compatible with MATLAB Versions 4 and earlier.
`wL`	Open file for writing character data using the default character set for your system. The resulting MAT-file can be read with MATLAB version 6 or 6.5. If you do not use the `wL` mode switch, MATLAB writes character data to the MAT-file using Unicode encoding by default.
`wz`	Open file for writing compressed data.

Description This routine allows you to open MAT-files for reading and writing.

`matOpen` opens the named file and returns a file handle, or `NULL` if the open fails.

See “Writing Character Data” in the External Interfaces documentation for more information on how MATLAB uses character data encoding.

Examples

See `matcreat.c` and `matdgns.c` in the `eng_mat` subdirectory of the `examples` directory for sample programs that illustrate how to use the MATLAB MAT-file routines in a C program.

matPutArray (Obsolete)

V5 Compatible

This API function is obsolete and should not be used in a program that interfaces with MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the `-V5` option of the `mex` script.

Use

```
matPutVariable(mfp, name, mp);
```

instead of

```
mxSetName(mp, name);
matPutArray(mfp, mp);
```

See Also

`matPutVariable`

V5 Compatible

This API function is obsolete and should not be used in a program that interfaces with MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the `-V5` option of the `mex` script.

Use

```
matPutVariableAsGlobal
```

instead of

```
matPutArrayAsGlobal
```

See Also

`matPutVariableAsGlobal`

matPutFull (Obsolete)

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

`mxCreateDoubleMatrix` and `matPutVariable`

instead of

`matPutFull`

For example,

```
int matPutFull(MATFile*ph, char *name, int m, int n, double *pr,
               double *pi)
{
   int         retval;
   mxArray     *parr;

   /* Get empty array struct to place inputs into. */
   parr = mxCreateDoubleMatrix(0, 0, 0);
   if (parr == NULL)
       return(1);

   /* Place inputs into array struct. */
   mxSetM(parr, m);
   mxSetN(parr, n);
   mxSetPr(parr, pr);
   mxSetPi(parr, pi);

   /* Use put to place array on file. */
   retval = matPutVariable(ph, name, parr);

   /* Zero out pr & pi in array struct so the mxArray can be
      destroyed. */
   mxSetPr(parr, (void *)0);
   mxSetPi(parr, (void *)0);

   mxDestroyArray(parr);

   return(retval);
}
```

See Also `mxCreateDoubleMatrix`, `matPutVariable`

matPutMatrix (Obsolete)

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
matPutVariable
```

instead of

```
matPutMatrix
```

See Also `matPutVariable`

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
#include "matrix.h"
#include "mat.h"
mp = mxCreateString(str);
matPutVariable(mfp, name, mp);
mxDestroyArray(mp);
```

instead of

```
matPutString(mfp, name, str);
```

See Also matPutVariable

matPutVariable

Purpose

Write mxArrays into MAT-files

C Syntax

```
#include "mat.h"
int matPutVariable(MATFile *mfp, const char *name, const mxArray
   *mp);
```

Arguments

mfp
Pointer to MAT-file information.

name
Name of mxArray to put into MAT-file.

mp
mxArray pointer.

Description

This routine allows you to put an mxArray into a MAT-file.

matPutVariable writes mxArray mp to the MAT-file mfp. If the mxArray does not exist in the MAT-file, it is appended to the end. If an mxArray with the same name already exists in the file, the existing mxArray is replaced with the new mxArray by rewriting the file. The size of the new mxArray can be different than the existing mxArray.

matPutVariable returns 0 if successful and nonzero if an error occurs. Use feof and ferror from the Standard C Library along with matGetFp to determine status.

Examples

See matcreat.c and matdgns.c in the eng_mat subdirectory of the examples directory for sample programs that illustrate how to use the MATLAB MAT-file routines in a C program.

Purpose

Put `mxArrays` into MAT-files as originating from the global workspace

C Syntax

```
#include "mat.h"
int matPutVariableAsGlobal(MATFile *mfp, const char *name, const
   mxArray *mp);
```

Arguments

`mfp`
Pointer to MAT-file information.

`name`
Name of `mxArray` to put into MAT-file.

`mp`
`mxArray` pointer.

Description

This routine allows you to put an `mxArray` into a MAT-file. `matPutVariableAsGlobal` is similar to `matPutVariable`, except the array, when loaded by MATLAB, is placed into the global workspace and a reference to it is set in the local workspace. If you write to a MATLAB 4 format file, `matPutVariableAsGlobal` will not load it as global, and will act the same as `matPutVariable`.

`matPutVariableAsGlobal` writes `mxArray mp` to the MAT-file `mfp`. If the `mxArray` does not exist in the MAT-file, it is appended to the end. If an `mxArray` with the same name already exists in the file, the existing `mxArray` is replaced with the new `mxArray` by rewriting the file. The size of the new `mxArray` can be different than the existing `mxArray`.

`matPutVariableAsGlobal` returns `0` if successful and nonzero if an error occurs. Use `feof` and `ferror` from the Standard C Library with `matGetFp` to determine status.

Examples

See `matcreat.c` and `matdgns.c` in the `eng_mat` subdirectory of the `examples` directory for sample programs that illustrate how to use the MATLAB MAT-file routines in a C program.

C MX-Functions

`mxAddField`	Add field to structure array
`mxArrayToString`	Convert arrays to strings
`mxAssert`	Check assertion value
`mxAssertS`	Check assertion value; doesn't print assertion's text
`mxCalcSingleSubscript`	Return offset from first element to desired element
`mxCalloc`	Allocate dynamic memory
`mxChar`	String `mxArrays` data type
`mxClassID`	Integer value that identifies `mxArray's` class
`mxClearLogical (Obsolete)`	Clear logical flag
`mxComplexity`	Specifies if `mxArray` has imaginary components
`mxCreateCellArray`	Create unpopulated N-dimensional cell `mxArray`
`mxCreateCellMatrix`	Create unpopulated two-dimensional cell `mxArray`
`mxCreateCharArray`	Create unpopulated N-dimensional string `mxArray`
`mxCreateCharMatrixFromStrings`	Create populated two-dimensional string `mxArray`
`mxCreateDoubleMatrix`	Create unpopulated two-dimensional, double-precision, floating-point `mxArray`
`mxCreateDoubleScalar`	Create scalar, double-precision array initialized to the specified value
`mxCreateLogicalArray`	Create N-dimensional, logical `mxArray` initialized to `false`
`mxCreateLogicalMatrix`	Create two-dimensional, logical `mxArray` initialized to `false`
`mxCreateLogicalScalar`	Create scalar, logical `mxArray` initialized to `false`
`mxCreateFull (Obsolete)`	Use `mxCreateDoubleMatrix`
`mxCreateNumericArray`	Create unpopulated N-dimensional numeric `mxArray`
`mxCreateNumericMatrix`	Create numeric matrix and initialize data elements to 0
`mxCreateScalarDouble`	Create scalar, double-precision array initialized to specified value

`mxCreateSparse`	Create two-dimensional unpopulated sparse `mxArray`
`mxCreateSparseLogicalMatrix`	Create unpopulated, two-dimensional, sparse, logical `mxArray`
`mxCreateString`	Create 1-by-n string `mxArray` initialized to specified string
`mxCreateStructArray`	Create unpopulated N-dimensional structure `mxArray`
`mxCreateStructMatrix`	Create unpopulated two-dimensional structure `mxArray`
`mxDestroyArray`	Free dynamic memory allocated by an `mxCreate` routine
`mxDuplicateArray`	Make deep copy of array
`mxFree`	Free dynamic memory allocated by `mxCalloc`
`mxFreeMatrix (Obsolete)`	Use `mxDestroyArray`
`mxGetCell`	Get cell's contents
`mxGetChars`	Get pointer to character array data
`mxGetClassID`	Get `mxArray's` class
`mxGetClassName`	Get `mxArray's` class
`mxGetData`	Get pointer to data
`mxGetDimensions`	Get pointer to dimensions array
`mxGetElementSize`	Get number of bytes required to store each data element
`mxGetEps`	Get value of `eps`
`mxGetField`	Get field value, given field name and index in structure array
`mxGetFieldByNumber`	Get field value, given field number and index in structure array
`mxGetFieldNameByNumber`	Get field name, given field number in structure array
`mxGetFieldNumber`	Get field number, given field name in structure array
`mxGetImagData`	Get pointer to imaginary data of `mxArray`
`mxGetInf`	Get value of infinity
`mxGetIr`	Get `ir` array of sparse matrix
`mxGetJc`	Get `jc` array of sparse matrix
`mxGetLogicals`	Get pointer to logical array data

`mxGetM`	Get number of rows
`mxGetN`	Get number of columns or number of elements
`mxGetName (Obsolete)`	Get name of specified `mxArray`
`mxGetNaN`	Get the value of `NaN`
`mxGetNumberOfDimensions`	Get number of dimensions
`mxGetNumberOfElements`	Get number of elements in array
`mxGetNumberOfFields`	Get number of fields in structure `mxArray`
`mxGetNzmax`	Get number of elements in `ir`, `pr`, and `pi` arrays
`mxGetPi`	Get `mxArray`'s imaginary data elements
`mxGetPr`	Get `mxArray`'s real data elements
`mxGetScalar`	Get real component of `mxArray's` first data element
`mxGetString`	Copy string `mxArray's` data into C-style string
`mxIsCell`	True if cell `mxArray`
`mxIsChar`	True if string `mxArray`
`mxIsClass`	True if `mxArray` is member of specified class
`mxIsComplex`	True if data is complex
`mxIsDouble`	True if `mxArray` represents its data as double-precision, floating-point numbers
`mxIsEmpty`	True if `mxArray` is empty
`mxIsFinite`	True if value is finite
`mxIsFromGlobalWS`	True if `mxArray` was copied from the MATLAB global workspace
`mxIsFull (Obsolete)`	Use `mxIsSparse`
`mxIsInf`	True if value is infinite
`mxIsInt8`	True if `mxArray` represents its data as signed 8-bit integers
`mxIsInt16`	True if `mxArray` represents its data as signed 16-bit integers
`mxIsInt32`	True if `mxArray` represents its data as signed 32-bit integers

`mxIsInt64`	True if `mxArray` represents its data as signed 64-bit integers
`mxIsLogical`	True if `mxArray` is Boolean
`mxIsLogicalScalar`	True if scalar `mxArray` of class `mxLogical`
`mxIsLogicalScalarTrue`	True if scalar `mxArray` of class `mxLogical` is true
`mxIsNaN`	True if value is `NaN`
`mxIsNumeric`	True if `mxArray` is numeric
`mxIsSingle`	True if `mxArray` represents its data as single-precision, floating-point numbers
`mxIsSparse`	True if sparse `mxArray`
`mxIsString (Obsolete)`	Use `mxIsChar`
`mxIsStruct`	True if structure `mxArray`
`mxIsUint8`	True if `mxArray` represents its data as unsigned 8-bit integers
`mxIsUint16`	True if `mxArray` represents its data as unsigned 16-bit integers
`mxIsUint32`	True if `mxArray` represents its data as unsigned 32-bit integers
`mxIsUint64`	True if `mxArray` represents its data as unsigned 64-bit integers
`mxMalloc`	Allocate dynamic memory using the MATLAB memory manager
`mxRealloc`	Reallocate memory
`mxRemoveField`	Remove field from structure array
`mxSetAllocFcns`	Register memory allocation/deallocation functions in stand-alone engine or MAT application
`mxSetCell`	Set value of one cell
`mxSetClassName`	Convert MATLAB structure array to MATLAB object array
`mxSetData`	Set pointer to data
`mxSetDimensions`	Modify number/size of dimensions

`mxSetField`	Set field value of structure array, given field name/index
`mxSetFieldByNumber`	Set field value in structure array, given field number/index
`mxSetImagData`	Set imaginary data pointer for `mxArray`
`mxSetIr`	Set `ir` array of sparse `mxArray`
`mxSetJc`	Set `jc` array of sparse `mxArray`
`mxSetLogical (Obsolete)`	Set logical flag
`mxSetM`	Set number of rows
`mxSetN`	Set number of columns
`mxSetName (Obsolete)`	Set name of `mxArray`
`mxSetNzmax`	Set storage space for nonzero elements
`mxSetPi`	Set new imaginary data for `mxArray`
`mxSetPr`	Set new real data for `mxArray`

mxAddField

Purpose

Add a field to a structure array

C Syntax

```
#include "matrix.h"
extern int mxAddField(mxArray array_ptr, const char *field_name);
```

Arguments

`array_ptr`
Pointer to a structure `mxArray`.

`field_name`
The name of the field you want to add.

Returns

Field number on success or -1 if inputs are invalid or an out of memory condition occurs.

Description

Call `mxAddField` to add a field to a structure array. You must then create the values with the `mxCreate*` functions and use `mxSetFieldByNumber` to set the individual values for the field.

See Also

`mxRemoveField`, `mxSetFieldByNumber`

Purpose Convert arrays to strings

C Syntax

```
#include "matrix.h"
char *mxArrayToString(const mxArray *array_ptr);
```

Arguments

`array_ptr`
Pointer to a string `mxArray`; that is, a pointer to an `mxArray` having the `mxCHAR_CLASS` class.

Returns A C-style string. Returns `NULL` on out of memory.

Description Call `mxArrayToString` to copy the character data of a string `mxArray` into a C-style string. The C-style string is always terminated with a `NULL` character.

If the string array contains several rows, they are copied, one column at a time, into one long string array. This function is similar to `mxGetString`, except that:

- It does not require the length of the string as an input.
- It supports multibyte character sets.

`mxArrayToString` does not free the dynamic memory that the `char` pointer points to. Consequently, you should typically free the string (using `mxFree`) immediately after you have finished using it.

Examples See `mexatexit.c` in the `mex` subdirectory of the `examples` directory.

For additional examples, see `mxcreatecharmatrixfromstr.c` and `mxislogical.c` in the `mx` subdirectory of the `examples` directory.

See Also `mxCreateCharArray`, `mxCreateCharMatrixFromStrings`, `mxCreateString`, `mxGetString`

mxAssert

Purpose

Check assertion value for debugging purposes

C Syntax

```
#include "matrix.h"
void mxAssert(int expr, char *error_message);
```

Arguments

`expr`
Value of assertion.

`error_message`
Description of why assertion failed.

Description

Similar to the ANSI C `assert()` macro, `mxAssert` checks the value of an assertion, and continues execution only if the assertion holds. If `expr` evaluates to `true`, `mxAssert` does nothing. If `expr` is `false`, `mxAssert` prints an error to the MATLAB command window consisting of the failed assertion's expression, the filename and line number where the failed assertion occurred, and the `error_message` string. The `error_message` string allows you to specify a better description of why the assertion failed. Use an empty string if you don't want a description to follow the failed assertion message.

After a failed assertion, control returns to the MATLAB command line.

Note that the MEX script turns off these assertions when building optimized MEX-functions, so you should use this for debugging purposes only. Build the mex file using the syntax, `mex -g filename`, in order to use `mxAssert`.

Assertions are a way of maintaining internal consistency of logic. Use them to keep yourself from misusing your own code and to prevent logical errors from propagating before they are caught; do not use assertions to prevent users of your code from misusing it.

Assertions can be taken out of your code by the C preprocessor. You can use these checks during development and then remove them when the code works properly, letting you use them for troubleshooting during development without slowing down the final product.

Purpose

Check assertion value for debugging purposes; doesn't print assertion's text

C Syntax

```
#include "matrix.h"
void mxAssertS(int expr, char *error_message);
```

Arguments

`expr`
Value of assertion.

`error_message`
Description of why assertion failed.

Description

Similar to `mxAssert`, except `mxAssertS` does not print the text of the failed assertion. `mxAssertS` checks the value of an assertion, and continues execution only if the assertion holds. If `expr` evaluates to `true`, `mxAssertS` does nothing. If `expr` is `false`, `mxAssertS` prints an error to the MATLAB command window consisting of the filename and line number where the assertion failed and the `error_message` string. The `error_message` string allows you to specify a better description of why the assertion failed. Use an empty string if you don't want a description to follow the failed assertion message.

After a failed assertion, control returns to the MATLAB command line.

Note that the `mex` script turns off these assertions when building optimized MEX-functions, so you should use this for debugging purposes only. Build the mex file using the syntax, `mex -g filename`, in order to use `mxAssert`.

mxCalcSingleSubscript

Purpose

Return the offset (index) from the first element to the desired element

C Syntax

```
#include <matrix.h>
int mxCalcSingleSubscript(const mxArray *array_ptr, int nsubs,
    int *subs);
```

Arguments

`array_ptr`
Pointer to an `mxArray`.

`nsubs`
The number of elements in the `subs` array. Typically, you set `nsubs` equal to the number of dimensions in the `mxArray` that `array_ptr` points to.

`subs`
An array of integers. Each value in the array should specify that dimension's subscript. The value in `subs[0]` specifies the row subscript, and the value in `subs[1]` specifies the column subscript. Note that `mxCalcSingleSubscript` views 0 as the first element of an `mxArray`, but MATLAB sees 1 as the first element of an `mxArray`. For example, in MATLAB, `(1,1)` denotes the starting element of a two-dimensional `mxArray`; however, to express the starting element of a two-dimensional `mxArray` in `subs`, you must set `subs[0]` to `0` and `subs[1]` to `0`.

Returns

The number of elements between the start of the `mxArray` and the specified subscript. This returned number is called an "index"; many `mx` routines (for example, `mxGetField`) require an index as an argument.

If `subs` describes the starting element of an `mxArray`, `mxCalcSingleSubscript` returns 0. If `subs` describes the final element of an `mxArray`, then `mxCalcSingleSubscript` returns `N-1` (where `N` is the total number of elements).

Description

Call `mxCalcSingleSubscript` to determine how many elements there are between the beginning of the `mxArray` and a given element of that `mxArray`. For example, given a subscript like `(5,7)`, `mxCalcSingleSubscript` returns the distance from the `(0,0)` element of the array to the `(5,7)` element. Remember that the `mxArray` data type internally represents all data elements in a one-dimensional array no matter how many dimensions the MATLAB `mxArray` appears to have.

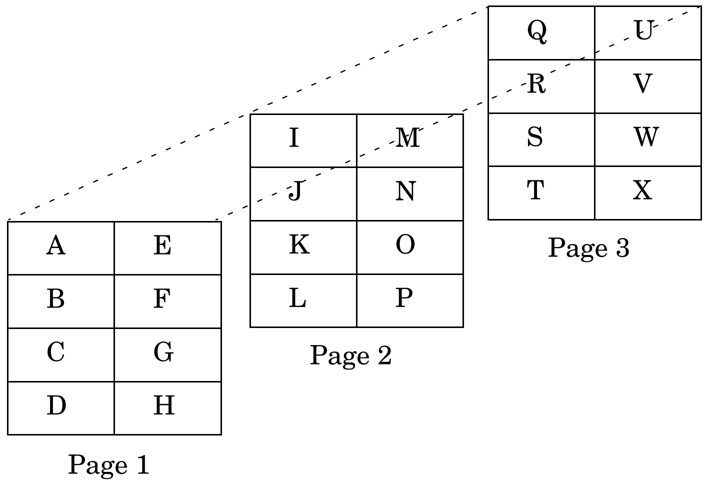
MATLAB uses a column-major numbering scheme to represent data elements internally. That means that MATLAB internally stores data elements from the first column first, then data elements from the second column second, and so on through the last column. For example, suppose you create a 4-by-2 variable. It is helpful to visualize the data as shown below.

A	E
B	F
C	G
D	H

Although in fact, MATLAB internally represents the data as the following:

A	B	C	D	E	F	G	H
Index 0	Index 1	Index 2	Index 3	Index 4	Index 5	Index 6	Index 7

If an `mxArray` is N-dimensional, then MATLAB represents the data in N-major order. For example, consider a three-dimensional array having dimensions 4-by-2-by-3. Although you can visualize the data as



MATLAB internally represents the data for this three-dimensional array in the order shown below:

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23

Avoid using `mxCalcSingleSubscript` to traverse the elements of an array. It is more efficient to do this by finding the array's starting address and then using pointer auto-incrementing to access successive elements. For example, to find the starting address of a numerical array, call `mxGetPr` or `mxGetPi`.

Examples

See `mxcalcsinglesubscript.c` in the `mx` subdirectory of the `examples` directory.

Purpose Allocate dynamic memory using the MATLAB memory manager

C Syntax

```
#include "matrix.h"
#include <stdlib.h>
void *mxCalloc(size_t n, size_t size);
```

Arguments

`n`
Number of elements to allocate. This must be a nonnegative number.

`size`
Number of bytes per element. (The C `sizeof` operator calculates the number of bytes per element.)

Returns A pointer to the start of the allocated dynamic memory, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, `mxCalloc` returns `NULL`. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt.

`mxCalloc` is unsuccessful when there is insufficient free heap space.

Description MATLAB applications should always call `mxCalloc` rather than `calloc` to allocate memory. Note that `mxCalloc` works differently in MEX-files than in stand-alone MATLAB applications.

In MEX-files, `mxCalloc` automatically

- Allocates enough contiguous heap space to hold `n` elements.
- Initializes all `n` elements to 0.
- Registers the returned heap space with the MATLAB memory management facility.

The MATLAB memory management facility maintains a list of all memory allocated by `mxCalloc`. The MATLAB memory management facility automatically frees (deallocates) all of a MEX-file's parcels when control returns to the MATLAB prompt.

In stand-alone MATLAB applications, `mxCalloc` defaults to calling the ANSI C `calloc` function. If this default behavior is unacceptable, you can write your own memory allocation routine, and then register this routine with `mxSetAllocFcns`. Then, whenever `mxCalloc` is called, `mxCalloc` calls your memory allocation routine instead of `calloc`.

By default, in a MEX-file, `mxCalloc` generates nonpersistent `mxCalloc` data. In other words, the memory management facility automatically deallocates the memory as soon as the MEX-file ends. If you want the memory to persist after the MEX-file completes, call `mexMakeMemoryPersistent` after calling `mxCalloc`. If you write a MEX-file with persistent memory, be sure to register a `mexAtExit` function to free allocated memory in the event your MEX-file is cleared.

When you finish using the memory allocated by `mxCalloc`, call `mxFree`. `mxFree` deallocates the memory.

Examples

See `explore.c` in the `mex` subdirectory of the `examples` directory, and `phonebook.c` and `revord.c` in the `refbook` subdirectory of the `examples` directory.

For additional examples, see `mxcalcsinglesubscript.c`, `mxsetallocfcns.c`, and `mxsetdimensions.c` in the `mx` subdirectory of the `examples` directory.

See Also

`mxFree`, `mxDestroyArray`, `mexMakeArrayPersistent`, `mexMakeMemoryPersistent`, `mxMalloc`, `mxSetAllocFcns`

Purpose

Data type that string `mxArrays` use to store their data elements

C Syntax

```
typedef Uint16 mxChar;
```

Description

All string `mxArrays` store their data elements as `mxChar` rather than as `char`. The MATLAB API defines an `mxChar` as a 16-bit unsigned integer.

Examples

See `mxmalloc.c` in the `mx` subdirectory of the `examples` directory.

For additional examples, see `explore.c` in the `mex` subdirectory of the `examples` directory and `mxcreatecharmatrixfromstr.c` in the `mx` subdirectory of the `examples` directory.

See Also

`mxCreateCharArray`

mxClassID

Purpose

Integer value that identifies an mxArray's class (category)

C Syntax

```
typedef enum {
        mxUNKNOWN_CLASS = 0,
        mxCELL_CLASS,
        mxSTRUCT_CLASS,
        mxLOGICAL_CLASS,
        mxCHAR_CLASS,
        <unused>,
        mxDOUBLE_CLASS,
        mxSINGLE_CLASS,
        mxINT8_CLASS,
        mxUINT8_CLASS,
        mxINT16_CLASS,
        mxUINT16_CLASS,
        mxINT32_CLASS,
        mxUINT32_CLASS,
        mxINT64_CLASS,
        mxUINT64_CLASS,
        mxFUNCTION_CLASS
} mxClassID;
```

Constants

`mxUNKNOWN_CLASS`
The class cannot be determined. You cannot specify this category for an `mxArray`; however, `mxGetClassID` can return this value if it cannot identify the class.

`mxCELL_CLASS`
Identifies a cell `mxArray`.

`mxSTRUCT_CLASS`
Identifies a structure `mxArray`.

`mxLOGICAL_CLASS`
Identifies a logical `mxArray`; that is, an `mxArray` that stores Boolean elements, `true` and `false`.

`mxCHAR_CLASS`
Identifies a string `mxArray`; that is an `mxArray` whose data is represented as `mxCHAR`'s.

`mxDOUBLE_CLASS`
Identifies a numeric `mxArray` whose data is stored as double-precision, floating-point numbers.

`mxSINGLE_CLASS`
Identifies a numeric `mxArray` whose data is stored as single-precision, floating-point numbers.

`mxINT8_CLASS`
Identifies a numeric `mxArray` whose data is stored as signed 8-bit integers.

`mxUINT8_CLASS`
Identifies a numeric `mxArray` whose data is stored as unsigned 8-bit integers.

`mxINT16_CLASS`
Identifies a numeric `mxArray` whose data is stored as signed 16-bit integers.

`mxUINT16_CLASS`
Identifies a numeric `mxArray` whose data is stored as unsigned 16-bit integers.

`mxINT32_CLASS`
Identifies a numeric `mxArray` whose data is stored as signed 32-bit integers.

`mxUINT32_CLASS`
Identifies a numeric `mxArray` whose data is stored as unsigned 32-bit integers.

`mxINT64_CLASS`
Identifies a numeric `mxArray` whose data is stored as signed 64-bit integers.

`mxUINT64_CLASS`
Identifies a numeric `mxArray` whose data is stored as unsigned 64-bit integers.

`mxFUNCTION_CLASS`
Identifies a function handle `mxArray`.

Description

Various `mx` calls require or return an `mxClassID` argument. `mxClassID` identifies the way in which the `mxArray` represents its data elements.

Examples

See `explore.c` in the `mex` subdirectory of the `examples` directory.

See Also

`mxCreateNumericArray`

mxClearLogical (Obsolete)

Purpose Clear the logical flag

Note As of MATLAB version 6.5, `mxClearLogical` is obsolete. Support for `mxClearLogical` may be removed in a future version.

C Syntax

```
#include "matrix.h"
void mxClearLogical(mxArray *array_ptr);
```

Arguments

`array_ptr`
Pointer to an `mxArray` having a numeric class.

Description

Use `mxClearLogical` to turn off the `mxArray`'s logical flag. This flag, when cleared, tells MATLAB to treat the `mxArray`'s data as numeric data rather than as Boolean data. If the logical flag is on, then MATLAB treats a 0 value as meaning false and a nonzero value as meaning true.

Call `mxCreateLogicalScalar`, `mxCreateLogicalMatrix`, `mxCreateNumericArray`, or `mxCreateSparseLogicalMatrix` to turn on the `mxArray`'s logical flag. For additional information on the use of logical variables in MATLAB, type `help logical` at the MATLAB prompt.

Examples

See `mxislogical.c` in the `mx` subdirectory of the `examples` directory.

See Also

`mxIsLogical`

Purpose Flag that specifies whether an mxArray has imaginary components

C Syntax

```
typedef enum mxComplexity {mxREAL=0, mxCOMPLEX};
```

Constants

mxREAL
Identifies an mxArray with no imaginary components.

mxCOMPLEX
Identifies an mxArray with imaginary components.

Description Various mx calls require an mxComplexity argument. You can set an mxComplex argument to either mxREAL or mxCOMPLEX.

Examples See mxcalcsinglesubscript.c in the mx subdirectory of the examples directory.

See Also mxCreateNumericArray, mxCreateDoubleMatrix, mxCreateSparse

mxCreateCellArray

Purpose

Create unpopulated N-dimensional cell mxArray

C Syntax

```
#include "matrix.h"
mxArray *mxCreateCellArray(int ndim, const int *dims);
```

Arguments

ndim
The desired number of dimensions in the created cell. For example, to create a three-dimensional cell mxArray, set ndim to 3.

dims
The dimensions array. Each element in the dimensions array contains the size of the mxArray in that dimension. For example, setting dims[0] to 5 and dims[1] to 7 establishes a 5-by-7 mxArray. In most cases, there should be ndim elements in the dims array.

Returns

A pointer to the created cell mxArray, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, mxCreateCellArray returns NULL. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. The most common cause of failure is insufficient free heap space.

Description

Use mxCreateCellArray to create a cell mxArray whose size is defined by ndim and dims. For example, to establish a three-dimensional cell mxArray having dimensions 4-by-8-by-7, set

```
ndim = 3;
dims[0] = 4; dims[1] = 8; dims[2] = 7;
```

The created cell mxArray is unpopulated; that is, mxCreateCellArray initializes each cell to NULL. To put data into a cell, call mxSetCell.

Examples

See phonebook.c in the refbook subdirectory of the examples directory.

See Also

mxCreateCellMatrix, mxGetCell, mxSetCell, mxIsCell

Purpose Create unpopulated two-dimensional cell `mxArray`

C Syntax

```
#include "matrix.h"
mxArray *mxCreateCellMatrix(int m, int n);
```

Arguments

`m`
The desired number of rows.

`n`
The desired number of columns.

Returns A pointer to the created cell `mxArray`, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, `mxCreateCellMatrix` returns `NULL`. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. Insufficient free heap space is the only reason for `mxCreateCellMatrix` to be unsuccessful.

Description Use `mxCreateCellMatrix` to create an `m`-by-`n` two-dimensional cell `mxArray`. The created cell `mxArray` is unpopulated; that is, `mxCreateCellMatrix` initializes each cell to `NULL`. To put data into cells, call `mxSetCell`.

`mxCreateCellMatrix` is identical to `mxCreateCellArray` except that `mxCreateCellMatrix` can create two-dimensional `mxArrays` only, but `mxCreateCellArray` can create `mxArrays` having any number of dimensions greater than 1.

Examples See `mxcreatecellmatrix.c` in the `mx` subdirectory of the `examples` directory.

See Also `mxCreateCellArray`

mxCreateCharArray

Purpose

Create unpopulated N-dimensional string mxArray

C Syntax

```
#include "matrix.h"
mxArray *mxCreateCharArray(int ndim, const int *dims);
```

Arguments

ndim
The desired number of dimensions in the string mxArray. You must specify a positive number. If you specify 0, 1, or 2, mxCreateCharArray creates a two-dimensional mxArray.

dims
The dimensions array. Each element in the dimensions array contains the size of the array in that dimension. For example, setting dims[0] to 5 and dims[1] to 7 establishes a 5-by-7 mxArray. The dims array must have at least ndim elements.

Returns

A pointer to the created string mxArray, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, mxCreateCharArray returns NULL. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. Insufficient free heap space is the only reason for mxCreateCharArray to be unsuccessful.

Description

Call mxCreateCharArray to create an unpopulated N-dimensional string mxArray.

Examples

See mxcreatecharmatrixfromstr.c in the mx subdirectory of the examples directory.

See Also

mxCreateCharMatrixFromStrings, mxCreateString

Purpose

Create populated two-dimensional string `mxArray`

C Syntax

```
#include "matrix.h"
mxArray *mxCreateCharMatrixFromStrings(int m, const char **str);
```

Arguments

`m`
The desired number of rows in the created string `mxArray`. The value you specify for `m` should equal the number of strings in `str`.

`str`
A pointer to a list of strings. The `str` array must contain at least `m` strings.

Returns

A pointer to the created string `mxArray`, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, `mxCreateCharMatrixFromStrings` returns `NULL`. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. Insufficient free heap space is the primary reason for `mxCreateCharArray` to be unsuccessful. Another possible reason for failure is that `str` contains fewer than `m` strings.

Description

Use `mxCreateCharMatrixFromStrings` to create a two-dimensional string `mxArray`, where each row is initialized to a string from `str`. The created `mxArray` has dimensions `m`-by-max, where max is the length of the longest string in `str`.

Note that string `mxArrays` represent their data elements as `mxChar` rather than as `char`.

Examples

See `mxcreatecharmatrixfromstr.c` in the `mx` subdirectory of the `examples` directory.

See Also

`mxCreateCharArray`, `mxCreateString`, `mxGetString`

mxCreateDoubleMatrix

Purpose

Create unpopulated two-dimensional, double-precision, floating-point `mxArray`

C Syntax

```
#include "matrix.h"
mxArray *mxCreateDoubleMatrix(int m, int n,
  mxComplexity ComplexFlag);
```

Arguments

`m`
The desired number of rows.

`n`
The desired number of columns.

`ComplexFlag`
Specify either `mxREAL` or `mxCOMPLEX`. If the data you plan to put into the `mxArray` has no imaginary components, specify `mxREAL`. If the data has some imaginary components, specify `mxCOMPLEX`.

Returns

A pointer to the created `mxArray`, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, `mxCreateDoubleMatrix` returns `NULL`. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. `mxCreateDoubleMatrix` is unsuccessful when there is not enough free heap space to create the `mxArray`.

Description

Use `mxCreateDoubleMatrix` to create an `m`-by-`n` `mxArray`. `mxCreateDoubleMatrix` initializes each element in the `pr` array to 0. If you set `ComplexFlag` to `mxCOMPLEX`, `mxCreateDoubleMatrix` also initializes each element in the `pi` array to 0.

If you set `ComplexFlag` to `mxREAL`, `mxCreateDoubleMatrix` allocates enough memory to hold `m`-by-`n` real elements. If you set `ComplexFlag` to `mxCOMPLEX`, `mxCreateDoubleMatrix` allocates enough memory to hold `m`-by-`n` real elements and `m`-by-`n` imaginary elements.

Call `mxDestroyArray` when you finish using the `mxArray`. `mxDestroyArray` deallocates the `mxArray` and its associated real and complex elements.

Examples

See `convec.c`, `findnz.c`, `sincall.c`, `timestwo.c`, `timestwoalt.c`, and `xtimesy.c` in the `refbook` subdirectory of the `examples` directory.

See Also

`mxCreateNumericArray`, `mxComplexity`

Purpose

Create scalar, double-precision array initialized to the specified value

---

Note This function replaces mxCreateScalarDouble in version 6.5 of MATLAB. mxCreateScalarDouble is still supported in version 6.5, but may be removed in a future version.

C Syntax

```
#include "matrix.h"
mxArray *mxCreateDoubleScalar(double value);
```

Arguments

value
The desired value to which you want to initialize the array.

Returns

A pointer to the created mxArray, if successful. mxCreateDoubleScalar is unsuccessful if there is not enough free heap space to create the mxArray. If mxCreateDoubleScalar is unsuccessful in a MEX-file, the MEX-file prints an "Out of Memory" message, terminates, and control returns to the MATLAB prompt. If mxCreateDoubleScalar is unsuccessful in a stand-alone (nonMEX-file) application, mxCreateDoubleScalar returns NULL.

Description

Call mxCreateDoubleScalar to create a scalar double mxArray. mxCreateDoubleScalar is a convenience function that can be used in place of the following code:

```
pa = mxCreateDoubleMatrix(1, 1, mxREAL);
*mxGetPr(pa) = value;
```

When you finish using the mxArray, call mxDestroyArray to destroy it.

See Also

mxGetPr, mxCreateDoubleMatrix

mxCreateFull (Obsolete)

This API function is obsolete and is not supported in MATLAB 5 or later.

Use

```
mxCreateDoubleMatrix
```

instead of

```
mxCreateFull
```

See Also `mxCreateDoubleMatrix`

Purpose

Create N-dimensional logical mxArray initialized to false

C Syntax

```
#include "matrix.h"
mxArray *mxCreateLogicalArray(int ndim, const int *dims);
```

Arguments

ndim
Number of dimensions. If you specify a value for ndim that is less than 2, mxCreateLogicalArray automatically sets the number of dimensions to 2.

dims
The dimensions array. Each element in the dimensions array contains the size of the array in that dimension. For example, setting dims[0] to 5 and dims[1] to 7 establishes a 5-by-7 mxArray. There should be ndim elements in the dims array.

Returns

A pointer to the created mxArray, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, mxCreateLogicalArray returns NULL. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. mxCreateLogicalArray is unsuccessful when there is not enough free heap space to create the mxArray.

Description

Call mxCreateLogicalArray to create an N-dimensional mxArray of logical (true and false) elements. After creating the mxArray, mxCreateLogicalArray initializes all its elements to false. mxCreateLogicalArray differs from mxCreateLogicalMatrix in that the latter can create two-dimensional arrays only.

mxCreateLogicalArray allocates dynamic memory to store the created mxArray. When you finish with the created mxArray, call mxDestroyArray to deallocate its memory.

See Also

mxCreateLogicalMatrix, mxCreateSparseLogicalMatrix, mxCreateLogicalScalar

mxCreateLogicalMatrix

Purpose Create two-dimensional, logical mxArray initialized to false

C Syntax

```
#include "matrix.h"
mxArray *mxCreateLogicalMatrix(int m, int n);
```

Arguments

m
The desired number of rows.

n
The desired number of columns.

Returns A pointer to the created mxArray, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, mxCreateLogicalMatrix returns NULL. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. mxCreateLogicalMatrix is unsuccessful when there is not enough free heap space to create the mxArray.

Description Use mxCreateLogicalMatrix to create an m-by-n mxArray of logical (true and false) elements. mxCreateLogicalMatrix initializes each element in the array to false.

Call mxDestroyArray when you finish using the mxArray. mxDestroyArray deallocates the mxArray.

See Also mxCreateLogicalArray, mxCreateSparseLogicalMatrix, mxCreateLogicalScalar

Purpose

Create scalar, logical `mxArray` initialized to `false`

C Syntax

```
#include "matrix.h"
mxArray *mxCreateLogicalScalar(mxLogical value);
```

Arguments

`value`
The desired logical value (`true` or `false`) to which you want to initialize the array.

Returns

A pointer to the created `mxArray`, if successful. `mxCreateLogicalScalar` is unsuccessful if there is not enough free heap space to create the `mxArray`. If `mxCreateLogicalScalar` is unsuccessful in a MEX-file, the MEX-file prints an "Out of Memory" message, terminates, and control returns to the MATLAB prompt. If `mxCreateLogicalScalar` is unsuccessful in a stand-alone (nonMEX-file) application, the function returns `NULL`.

Description

Call `mxCreateLogicalScalar` to create a scalar logical `mxArray`. `mxCreateLogicalScalar` is a convenience function that can be used in place of the following code:

```
pa = mxCreateLogicalMatrix(1, 1);
*mxGetLogicals(pa) = value;
```

When you finish using the `mxArray`, call `mxDestroyArray` to destroy it.

See Also

`mxIsLogicalScalar`, `mxIsLogicalScalarTrue`, `mxCreateLogicalMatrix`, `mxCreateLogicalArray`, `mxGetLogicals`

mxCreateNumericArray

Purpose Create unpopulated N-dimensional numeric mxArray

C Syntax

```
#include "matrix.h"
mxArray *mxCreateNumericArray(int ndim, const int *dims,
         mxClassID class, mxComplexity ComplexFlag);
```

Arguments

ndim
Number of dimensions. If you specify a value for ndim that is less than 2, mxCreateNumericArray automatically sets the number of dimensions to 2.

dims
The dimensions array. Each element in the dimensions array contains the size of the array in that dimension. For example, setting dims[0] to 5 and dims[1] to 7 establishes a 5-by-7 mxArray. In most cases, there should be ndim elements in the dims array.

class
The way in which the numerical data is to be represented in memory. For example, specifying mxINT16_CLASS causes each piece of numerical data in the mxArray to be represented as a 16-bit signed integer. You can specify any class except for mxNUMERIC_CLASS, mxSTRUCT_CLASS, or mxCELL_CLASS.

ComplexFlag
Specify either mxREAL or mxCOMPLEX. If the data you plan to put into the mxArray has no imaginary components, specify mxREAL. If the data will have some imaginary components, specify mxCOMPLEX.

Returns A pointer to the created mxArray, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, mxCreateNumericArray returns NULL. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. mxCreateNumericArray is unsuccessful when there is not enough free heap space to create the mxArray.

Description Call mxCreateNumericArray to create an N-dimensional mxArray in which all data elements have the numeric data type specified by class. After creating the mxArray, mxCreateNumericArray initializes all its real data elements to 0. If ComplexFlag equals mxCOMPLEX, mxCreateNumericArray also initializes all its imaginary data elements to 0. mxCreateNumericArray differs from mxCreateDoubleMatrix in two important respects:

- All data elements in mxCreateDoubleMatrix are double-precision, floating-point numbers. The data elements in mxCreateNumericArray could be any numerical type, including different integer precisions.
- mxCreateDoubleMatrix can create two-dimensional arrays only; mxCreateNumericArray can create arrays of two or more dimensions.

mxCreateNumericArray allocates dynamic memory to store the created mxArray. When you finish with the created mxArray, call mxDestroyArray to deallocate its memory.

Examples

See phonebook.c and doubleelement.c in the refbook subdirectory of the examples directory. For an additional example, see mxisfinite.c in the mx subdirectory of the examples directory.

See Also

mxClassID, mxCreateDoubleMatrix, mxCreateSparse, mxCreateString, mxComplexity

mxCreateNumericMatrix

Purpose Create numeric matrix and initialize all its data elements to 0

C Syntax

```
#include "matrix.h"
mxArray *mxCreateNumericMatrix(int m, int n, mxClassID class,
  mxComplexity ComplexFlag);
```

Arguments

m
The desired number of rows.

n
The desired number of columns.

class
The way in which the numerical data is to be represented in memory. For example, specifying mxINT16_CLASS causes each piece of numerical data in the mxArray to be represented as a 16-bit signed integer. You can specify any numeric class including mxDOUBLE_CLASS, mxSINGLE_CLASS, mxINT8_CLASS, mxUINT8_CLASS, mxINT16_CLASS, mxUINT16_CLASS, mxINT32_CLASS, mxUINT32_CLASS, mxINT64_CLASS, and mxUINT64_CLASS.

ComplexFlag
Specify either mxREAL or mxCOMPLEX. If the data you plan to put into the mxArray has no imaginary components, specify mxREAL. If the data has some imaginary components, specify mxCOMPLEX.

Returns A pointer to the created mxArray, if successful. mxCreateNumericMatrix is unsuccessful if there is not enough free heap space to create the mxArray. If mxCreateNumericMatrix is unsuccessful in a MEX-file, the MEX-file prints an "Out of Memory" message, terminates, and control returns to the MATLAB prompt. If mxCreateNumericMatrix is unsuccessful in a stand-alone (nonMEX-file) application, mxCreateNumericMatrix returns NULL.

Description Call mxCreateNumericMatrix to create an 2-dimensional mxArray in which all data elements have the numeric data type specified by class. After creating the mxArray, mxCreateNumericMatrix initializes all its real data elements to 0. If ComplexFlag equals mxCOMPLEX, mxCreateNumericMatrix also initializes all its imaginary data elements to 0. mxCreateNumericMatrix allocates dynamic memory to store the created mxArray. When you finish using the mxArray, call mxDestroyArray to destroy it.

See Also `mxCreateNumericArray`

mxCreateScalarDouble

Purpose Create scalar, double-precision array initialized to the specified value

---

Note This function is replaced by `mxCreateDoubleScalar` in version 6.5 of MATLAB. `mxCreateScalarDouble` is still supported in version 6.5, but may be removed in a future version.

C Syntax

```
#include "matrix.h"
mxArray *mxCreateScalarDouble(double value);
```

Arguments

`value`
The desired value to which you want to initialize the array.

Returns

A pointer to the created `mxArray`, if successful. `mxCreateScalarDouble` is unsuccessful if there is not enough free heap space to create the `mxArray`. If `mxCreateScalarDouble` is unsuccessful in a MEX-file, the MEX-file prints an "Out of Memory" message, terminates, and control returns to the MATLAB prompt. If `mxCreateScalarDouble` is unsuccessful in a stand-alone (nonMEX-file) application, `mxCreateScalarDouble` returns `NULL`.

Description

Call `mxCreateScalarDouble` to create a scalar double `mxArray`. `mxCreateScalarDouble` is a convenience function that can be used in place of the following code:

```
pa = mxCreateDoubleMatrix(1, 1, mxREAL);
*mxGetPr(pa) = value;
```

When you finish using the `mxArray`, call `mxDestroyArray` to destroy it.

See Also

`mxGetPr`, `mxCreateDoubleMatrix`

Purpose

Create two-dimensional unpopulated sparse mxArray

C Syntax

```
#include "matrix.h"
mxArray *mxCreateSparse(int m, int n, int nzmax,
          mxComplexity ComplexFlag);
```

Arguments

m
The desired number of rows.

n
The desired number of columns.

nzmax
The number of elements that mxCreateSparse should allocate to hold the pr, ir, and, if ComplexFlag is mxCOMPLEX, pi arrays. Set the value of nzmax to be greater than or equal to the number of nonzero elements you plan to put into the mxArray, but make sure that nzmax is less than or equal to m*n.

ComplexFlag
Set this value to mxREAL or mxCOMPLEX. If the mxArray you are creating is to contain imaginary data, then set ComplexFlag to mxCOMPLEX. Otherwise, set ComplexFlag to mxREAL.

Returns

A pointer to the created sparse mxArray if successful, and NULL otherwise. The most likely reason for failure is insufficient free heap space. If that happens, try reducing nzmax, m, or n.

Description

Call mxCreateSparse to create an unpopulated sparse mxArray. The returned sparse mxArray contains no sparse information and cannot be passed as an argument to any MATLAB sparse functions. In order to make the returned sparse mxArray useful, you must initialize the pr, ir, jc, and (if it exists) pi array.

mxCreateSparse allocates space for:

- A pr array of length nzmax.
- A pi array of length nzmax (but only if ComplexFlag is mxCOMPLEX).
- An ir array of length nzmax.
- A jc array of length n+1.

When you finish using the sparse `mxArray`, call `mxDestroyArray` to reclaim all its heap space.

Examples

See `fulltosparse.c` in the `refbook` subdirectory of the `examples` directory.

See Also

`mxDestroyArray`, `mxSetNzmax`, `mxSetPr`, `mxSetPi`, `mxSetIr`, `mxSetJc`, `mxComplexity`

Purpose

Create unpopulated two-dimensional, sparse, logical `mxArray`

C Syntax

```
#include "matrix.h"
mxArray *mxCreateSparseLogicalMatrix(int m, int n, int nzmax);
```

Arguments

`m`
The desired number of rows.

`n`
The desired number of columns.

`nzmax`
The number of elements that `mxCreateSparseLogicalMatrix` should allocate to hold the data. Set the value of `nzmax` to be greater than or equal to the number of nonzero elements you plan to put into the `mxArray`, but make sure that `nzmax` is less than or equal to `m*n`.

Returns

A pointer to the created `mxArray`, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, `mxCreateSparseLogicalMatrix` returns `NULL`. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. `mxCreateSparseLogicalMatrix` is unsuccessful when there is not enough free heap space to create the `mxArray`.

Description

Use `mxCreateSparseLogicalMatrix` to create an `m`-by-`n` `mxArray` of logical (`true` and `false`) elements. `mxCreateSparseLogicalMatrix` initializes each element in the array to `false`.

Call `mxDestroyArray` when you finish using the `mxArray`. `mxDestroyArray` deallocates the `mxArray` and its elements.

See Also

`mxCreateLogicalMatrix`, `mxCreateLogicalArray`, `mxCreateLogicalScalar`, `mxCreateSparse`, `mxIsLogical`

mxCreateString

Purpose

Create 1-by-n string `mxArray` initialized to the specified string

C Syntax

```
#include "matrix.h"
mxArray *mxCreateString(const char *str);
```

Arguments

`str`
The C string that is to serve as the `mxArray's` initial data.

Returns

A pointer to the created string `mxArray` if successful, and `NULL` otherwise. The most likely cause of failure is insufficient free heap space.

Description

Use `mxCreateString` to create a string `mxArray` initialized to `str`. Many MATLAB functions (for example, `strcmp` and `upper`) require string array inputs.

Free the string `mxArray` when you are finished using it. To free a string `mxArray`, call `mxDestroyArray`.

Examples

See `revord.c` in the `refbook` subdirectory of the `examples` directory.

For additional examples, see `mxcreatestructarray.c`, `mxisclass.c`, and `mxsetallocfcns.c` in the `mx` subdirectory of the `examples` directory.

See Also

`mxCreateCharMatrixFromStrings`, `mxCreateCharArray`

Purpose

Create unpopulated N-dimensional structure mxArray

C Syntax

```
#include "matrix.h"
mxArray *mxCreateStructArray(int ndim, const int *dims, int nfields,
         const char **field_names);
```

Arguments

ndim
Number of dimensions. If you set ndim to be less than 2, mxCreateNumericArray creates a two-dimensional mxArray.

dims
The dimensions array. Each element in the dimensions array contains the size of the array in that dimension. For example, setting dims[0] to 5 and dims[1] to 7 establishes a 5-by-7 mxArray. Typically, the dims array should have ndim elements.

nfields
The desired number of fields in each element.

field_names
The desired list of field names.

Returns

A pointer to the created structure mxArray if successful, and NULL otherwise. The most likely cause of failure is insufficient heap space to hold the returned mxArray.

Description

Call mxCreateStructArray to create an unpopulated structure mxArray. Each element of a structure mxArray contains the same number of fields (specified in nfields). Each field has a name; the list of names is specified in field_names. A structure mxArray in MATLAB is conceptually identical to an array of structs in the C language.

Each field holds one mxArray pointer. mxCreateStructArray initializes each field to NULL. Call mxSetField or mxSetFieldByNumber to place a non-NULL mxArray pointer in a field.

When you finish using the returned structure mxArray, call mxDestroyArray to reclaim its space.

Examples

See mxcreatestructarray.c in the mx subdirectory of the examples directory.

See Also `mxDestroyArray`, `mxSetNzmax`

Purpose

Create unpopulated two-dimensional structure mxArray

C Syntax

```
#include "matrix.h"
mxArray *mxCreateStructMatrix(int m, int n, int nfields,
         const char **field_names);
```

Arguments

m
The desired number of rows. This must be a positive integer.

n
The desired number of columns. This must be a positive integer.

nfields
The desired number of fields in each element.

field_names
The desired list of field names.

Returns

A pointer to the created structure mxArray if successful, and NULL otherwise. The most likely cause of failure is insufficient heap space to hold the returned mxArray.

Description

mxCreateStructMatrix and mxCreateStructArray are almost identical. The only difference is that mxCreateStructMatrix can only create two-dimensional mxArrays, while mxCreateStructArray can create mxArrays having two or more dimensions.

Examples

See phonebook.c in the refbook subdirectory of the examples directory.

See Also

mxCreateStructArray, mxGetFieldByNumber, mxGetFieldNameByNumber, mxGetFieldNumber, mxIsStruct

mxDestroyArray

Purpose Free dynamic memory allocated by an `mxCreate` routine

C Syntax

```
#include "matrix.h"
void mxDestroyArray(mxArray *array_ptr);
```

Arguments

`array_ptr`
Pointer to the `mxArray` that you want to free.

Description

`mxDestroyArray` deallocates the memory occupied by the specified `mxArray`. `mxDestroyArray` not only deallocates the memory occupied by the `mxArray's` characteristics fields (such as `m` and `n`), but also deallocates all the `mxArray's` associated data arrays (such as `pr`, `pi`, `ir`, and/or `jc`). You should not call `mxDestroyArray` on an `mxArray` you are returning on the left-hand side.

Examples

See `sincall.c` in the `refbook` subdirectory of the `examples` directory.

For additional examples, see `mexcallmatlab.c` and `mexgetarray.c` in the `mex` subdirectory of the `examples` directory; see `mxisclass.c` and `mxsetallocfcns.c` in the `mx` subdirectory of the `examples` directory.

See Also

`mxCalloc`, `mxFree`, `mexMakeArrayPersistent`, `mexMakeMemoryPersistent`

Purpose

Make a deep copy of an array

C Syntax

```
#include "matrix.h"
mxArray *mxDuplicateArray(const mxArray *in);
```

Arguments

`in`
Pointer to the `mxArray` that you want to copy.

Returns

Pointer to a copy of the array.

Description

`mxDuplicateArray` makes a deep copy of an array, and returns a pointer to the copy. A deep copy refers to a copy in which all levels of data are copied. For example, a deep copy of a cell array copies each cell, and the contents of the each cell (if any), and so on.

Examples

See `mexget.c` in the `mex` subdirectory of the `examples` directory and `phonebook.c` in the `refbook` subdirectory of the `examples` directory.

For additional examples, see `mxcreatecellmatrix.c`, `mxgetinf.c`, and `mxsetnzmax.c` in the `mx` subdirectory of the `examples` directory.

mxFree

Purpose

Free dynamic memory allocated by `mxCalloc`

C Syntax

```
#include "matrix.h"
void mxFree(void *ptr);
```

Arguments

`ptr`
Pointer to the beginning of any memory parcel allocated by `mxCalloc`.

Description

To deallocate heap space, MATLAB applications should always call `mxFree` rather than the ANSI C `free` function.

`mxFree` works differently in MEX-files than in stand-alone MATLAB applications.

In MEX-files, `mxFree` automatically

- Calls the ANSI C `free` function, which deallocates the contiguous heap space that begins at address `ptr`.
- Removes this memory parcel from the MATLAB memory management facility's list of memory parcels.

The MATLAB memory management facility maintains a list of all memory allocated by `mxCalloc` (and by the `mxCreate` calls). The MATLAB memory management facility automatically frees (deallocates) all of a MEX-file's parcels when control returns to the MATLAB prompt.

By default, when `mxFree` appears in stand-alone MATLAB applications, `mxFree` simply calls the ANSI C `free` function. If this default behavior is unacceptable, you can write your own memory deallocation routine and register this routine with `mxSetAllocFcns`. Then, whenever `mxFree` is called, `mxFree` calls your memory allocation routine instead of `free`.

In a MEX-file, your use of `mxFree` depends on whether the specified memory parcel is persistent or nonpersistent. By default, memory parcels created by `mxCalloc` are nonpersistent. However, if an application calls `mexMakeMemoryPersistent`, then the specified memory parcel becomes persistent.

The MATLAB memory management facility automatically frees all nonpersistent memory whenever a MEX-file completes. Thus, even if you do not call `mxFree`, MATLAB takes care of freeing the memory for you.

Nevertheless, it is a good programming practice to deallocate memory just as soon as you are through using it. Doing so generally makes the entire system run more efficiently.

When a MEX-file completes, the MATLAB memory management facility does not free persistent memory parcels. Therefore, the only way to free a persistent memory parcel is to call `mxFree`. Typically, MEX-files call `mexAtExit` to register a clean-up handler. Then, the clean-up handler calls `mxFree`.

Examples

See `mxcalcsinglesubscript.c` in the `mx` subdirectory of the `examples` directory.

For additional examples, see `phonebook.c` in the `refbook` subdirectory of the `examples` directory; see `explore.c` and `mexatexit.c` in the `mex` subdirectory of the `examples` directory; see `mxcreatecharmatrixfromstr.c`, `mxisfinite.c`, `mxmalloc.c`, `mxsetallocfcns.c`, and `mxsetdimensions.c` in the `mx` subdirectory of the `examples` directory.

See Also

`mxCalloc`, `mxDestroyArray`, `mxMalloc`, `mexMakeArrayPersistent`, `mexMakeMemoryPersistent`

mxFreeMatrix (Obsolete)

This API function is obsolete and is not supported in MATLAB 5 or later.

Use

```
mxDestroyArray
```

instead of

```
mxFreeMatrix
```

See Also `mxDestroyArray`

Purpose Get a cell's contents

C Syntax

```
#include "matrix.h"
mxArray *mxGetCell(const mxArray *array_ptr, int index);
```

Arguments

`array_ptr`
Pointer to a cell `mxArray`.

`index`
The number of elements in the cell `mxArray` between the first element and the desired one. See `mxCalcSingleSubscript` for details on calculating an index in a multidimensional cell array.

Returns A pointer to the `ith` cell `mxArray` if successful, and `NULL` otherwise. Causes of failure include:

- The indexed cell array element has not been populated.
- Specifying an `array_ptr` that does not point to a cell `mxArray`.
- Specifying an `index` greater than the number of elements in the cell.
- Insufficient free heap space to hold the returned cell `mxArray`.

Description Call `mxGetCell` to get a pointer to the `mxArray` held in the indexed element of the cell `mxArray`.

Note Inputs to a MEX-file are constant read-only `mxArrays` and should not be modified. Using `mxSetCell*` or `mxSetField*` to modify the cells or fields of an argument passed from MATLAB causes unpredictable results.

Examples See `explore.c` in the `mex` subdirectory of the `examples` directory.

See Also `mxCreateCellArray`, `mxIsCell`, `mxSetCell`

mxGetChars

Purpose Get pointer to character array data

C Syntax

```
#include "matrix.h"
mxCHAR *mxGetChars(const mxArray *array_ptr);
```

Arguments

`array_ptr`
Pointer to an `mxArray`.

Returns The address of the first character in the `mxArray`. Returns `NULL` if the specified array is not a character array.

Description Call `mxGetChars` to determine the address of the first character in the `mxArray` that `array_ptr` points to. Once you have the starting address, you can access any other element in the `mxArray`.

See Also `mxGetString`, `mxGetPr`, `mxGetPi`, `mxGetCell`, `mxGetField`, `mxGetLogicals`, `mxGetScalar`

Purpose

Get (as an integer identifier) an mxArray's class

C Syntax

```
#include "matrix.h"
mxClassID mxGetClassID(const mxArray *array_ptr);
```

Arguments

array_ptr
Pointer to an mxArray.

Returns

The class (category) of the mxArray that array_ptr points to. Classes are:

mxUNKNOWN_CLASS
The class cannot be determined. You cannot specify this category for an mxArray; however, mxGetClassID can return this value if it cannot identify the class.

mxCELL_CLASS
Identifies a cell mxArray.

mxSTRUCT_CLASS
Identifies a structure mxArray.

mxCHAR_CLASS
Identifies a string mxArray; that is an mxArray whose data is represented as mxCHAR's.

mxLOGICAL_CLASS
Identifies a logical mxArray; that is, an mxArray that stores logical values representing true and false.

mxDOUBLE_CLASS
Identifies a numeric mxArray whose data is stored as double-precision, floating-point numbers.

mxSINGLE_CLASS
Identifies a numeric mxArray whose data is stored as single-precision, floating-point numbers.

mxINT8_CLASS
Identifies a numeric mxArray whose data is stored as signed 8-bit integers.

mxUINT8_CLASS
Identifies a numeric mxArray whose data is stored as unsigned 8-bit integers.

`mxINT16_CLASS`
Identifies a numeric `mxArray` whose data is stored as signed 16-bit integers.

`mxUINT16_CLASS`
Identifies a numeric `mxArray` whose data is stored as unsigned 16-bit integers.

`mxINT32_CLASS`
Identifies a numeric `mxArray` whose data is stored as signed 32-bit integers.

`mxUINT32_CLASS`
Identifies a numeric `mxArray` whose data is stored as unsigned 32-bit integers.

`mxINT64_CLASS`
Identifies a numeric `mxArray` whose data is stored as signed 64-bit integers.

`mxUINT64_CLASS`
Identifies a numeric `mxArray` whose data is stored as unsigned 64-bit integers.

`mxFUNCTION_CLASS`
Identifies a function handle `mxArray`.

Description

Use `mxGetClassId` to determine the class of an `mxArray`. The class of an `mxArray` identifies the kind of data the `mxArray` is holding. For example, if `array_ptr` points to a logical `mxArray`, then `mxGetClassID` returns `mxLOGICAL_CLASS`.

`mxGetClassID` is similar to `mxGetClassName`, except that the former returns the class as an integer identifier and the latter returns the class as a string.

Examples

See `phonebook.c` in the `refbook` subdirectory of the `examples` directory and `explore.c` in the `mex` subdirectory of the `examples` directory.

See Also

`mxGetClassName`

Purpose Get (as a string) an mxArray's class

C Syntax

```
#include "matrix.h"
const char *mxGetClassName(const mxArray *array_ptr);
```

Arguments

array_ptr
Pointer to an mxArray.

Returns The class (as a string) of array_ptr.

Description Call mxGetClassName to determine the class of an mxArray. The class of an mxArray identifies the kind of data the mxArray is holding. For example, if array_ptr points to a logical mxArray, then mxGetClassName returns logical.

mxGetClassID is similar to mxGetClassName, except that the former returns the class as an integer identifier and the latter returns the class as a string.

Examples See mexfunction.c in the mex subdirectory of the examples directory. For an additional example, see mxisclass.c in the mx subdirectory of the examples directory.

See Also mxGetClassID

mxGetData

Purpose

Get pointer to data

C Syntax

```
#include "matrix.h"
void *mxGetData(const mxArray *array_ptr);
```

Arguments

`array_ptr`
Pointer to an `mxArray`.

Description

Similar to `mxGetPr`, except `mxGetData` returns a `void *`.

Examples

See `phonebook.c` in the `refbook` subdirectory of the `examples` directory.

For additional examples, see `mxcreatecharmatrixfromstr.c` and `mxisfinite.c` in the `mx` subdirectory of the `examples` directory.

See Also

`mxGetImagData`, `mxGetPr`

Purpose

Get a pointer to the dimensions array

C Syntax

```
#include "matrix.h"
const int *mxGetDimensions(const mxArray *array_ptr);
```

Arguments

`array_ptr`
Pointer to an `mxArray`.

Returns

The address of the first element in a dimension array. Each integer in the dimensions array represents the number of elements in a particular dimension. The array is not `NULL`-terminated.

Description

Use `mxGetDimensions` to determine how many elements are in each dimension of the `mxArray` that `array_ptr` points to. Call `mxGetNumberOfDimensions` to get the number of dimensions in the `mxArray`.

Examples

See `mxcalcsinglesubscript.c` in the `mx` subdirectory of the `examples` directory.

For additional examples, see `findnz.c` and `phonebook.c` in the `refbook` subdirectory of the `examples` directory; see `explore.c` in the `mex` subdirectory of the `examples` directory; see `mxgeteps.c` and `mxisfinite.c` in the `mx` subdirectory of the `examples` directory.

See Also

`mxGetNumberOfDimensions`

mxGetElementSize

Purpose Get the number of bytes required to store each data element

C Syntax

```
#include "matrix.h"
int mxGetElementSize(const mxArray *array_ptr);
```

Arguments

`array_ptr`
Pointer to an `mxArray`.

Returns The number of bytes required to store one element of the specified `mxArray`, if successful. Returns 0 on failure. The primary reason for failure is that `array_ptr` points to an `mxArray` having an unrecognized class. If `array_ptr` points to a cell `mxArray` or a structure `mxArray`, then `mxGetElementSize` returns the size of a pointer (not the size of all the elements in each cell or structure field).

Description Call `mxGetElementSize` to determine the number of bytes in each data element of the `mxArray`. For example, if the `mxClassID` of an `mxArray` is `mxINT16_CLASS`, then the `mxArray` stores each data element as a 16-bit (2 byte) signed integer. Thus, `mxGetElementSize` returns 2.

`mxGetElementSize` is particularly helpful when using a non-MATLAB routine to manipulate data elements. For example, `memcpy` requires (for its third argument) the size of the elements you intend to copy.

Examples See `doubleelement.c` and `phonebook.c` in the `refbook` subdirectory of the `examples` directory.

See Also `mxGetM`, `mxGetN`

Purpose Get value of `eps`

C Syntax

```
#include "matrix.h"
double mxGetEps(void);
```

Returns The value of the MATLAB `eps` variable.

Description Call `mxGetEps` to return the value of the MATLAB `eps` variable. This variable holds the distance from 1.0 to the next largest floating-point number. As such, it is a measure of floating-point accuracy. The MATLAB `PINV` and `RANK` functions use `eps` as a default tolerance.

Examples See `mxgeteps.c` in the `mx` subdirectory of the `examples` directory.

See Also `mxGetInf`, `mxGetNaN`

mxGetField

Purpose

Get a field value, given a field name and an index in a structure array

C Syntax

```
#include "matrix.h"
mxArray *mxGetField(const mxArray *array_ptr, int index,
         const char *field_name);
```

Arguments

`array_ptr`
Pointer to a structure `mxArray`.

`index`
The desired element. The first element of an `mxArray` has an `index` of `0`, the second element has an `index` of `1`, and the last element has an `index` of `N-1`, where `N` is the total number of elements in the structure `mxArray`.

`field_name`
The name of the field whose value you want to extract.

Returns

A pointer to the `mxArray` in the specified field at the specified `field_name`, on success. Returns `NULL` if passed an invalid argument or if there is no value assigned to the specified field. Common causes of failure include:

- Specifying an `array_ptr` that does not point to a structure `mxArray`. To determine if `array_ptr` points to a structure `mxArray`, call `mxIsStruct`.
- Specifying an out-of-range `index` to an element past the end of the `mxArray`. For example, given a structure `mxArray` that contains 10 elements, you cannot specify an `index` greater than 9.
- Specifying a nonexistent `field_name`. Call `mxGetFieldNameByNumber` or `mxGetFieldNumber` to get existing `field names`.
- Insufficient heap space to hold the returned `mxArray`.

Description

Call `mxGetField` to get the value held in the specified element of the specified field. In pseudo-C terminology, `mxGetField` returns the value at

```
array_ptr[index].field_name
```

`mxGetFieldByNumber` is similar to `mxGetField`. Both functions return the same value. The only difference is in the way you specify the field. `mxGetFieldByNumber` takes `field_num` as its third argument, and `mxGetField` takes `field_name` as its third argument.

Note Inputs to a MEX-file are constant read-only `mxArrays` and should not be modified. Using `mxSetCell*` or `mxSetField*` to modify the cells or fields of an argument passed from MATLAB causes unpredictable results.

Calling

```
mxGetField(pa, index, "field_name");
```

is equivalent to calling

```
field_num = mxGetFieldNumber(pa, "field_name");
mxGetFieldByNumber(pa, index, field_num);
```

where `index` is zero if you have a one-by-one structure.

See Also

`mxGetFieldByNumber`, `mxGetFieldNameByNumber`, `mxGetFieldNumber`, `mxGetNumberOfFields`, `mxIsStruct`, `mxSetField`, `mxSetFieldByNumber`

mxGetFieldByNumber

Purpose

Get a field value, given a field number and an index in a structure array

C Syntax

```
#include "matrix.h"
mxArray *mxGetFieldByNumber(const mxArray *array_ptr, int index,
        int field_number);
```

Arguments

`array_ptr`
Pointer to a structure `mxArray`.

`index`
The desired element. The first element of an `mxArray` has an `index` of `0`, the second element has an `index` of `1`, and the last element has an `index` of `N-1`, where `N` is the total number of elements in the structure `mxArray`. See `mxCalcSingleSubscript` for more details on calculating an `index`.

`field_number`
The position of the field whose value you want to extract. The first field within each element has a field number of `0`, the second field has a field number of `1`, and so on. The last field has a field number of `N-1`, where `N` is the number of fields.

Returns

A pointer to the `mxArray` in the specified field for the desired element, on success. Returns `NULL` if passed an invalid argument or if there is no value assigned to the specified field. Common causes of failure include:

- Specifying an `array_ptr` that does not point to a structure `mxArray`. Call `mxIsStruct` to determine if `array_ptr` points to is a structure `mxArray`.
- Specifying an index < 0 or >= the number of elements in the array.
- Specifying a nonexistent field number. Call `mxGetFieldNumber` to determine the field number that corresponds to a given field name.

Description

Call `mxGetFieldByNumber` to get the value held in the specified `field_number` at the indexed element.

Note Inputs to a MEX-file are constant read-only `mxArrays` and should not be modified. Using `mxSetCell*` or `mxSetField*` to modify the cells or fields of an argument passed from MATLAB causes unpredictable results.

Calling

```
mxGetField(pa, index, "field_name");
```

is equivalent to calling

```
field_num = mxGetFieldNumber(pa, "field_name");
mxGetFieldByNumber(pa, index, field_num);
```

where `index` is zero if you have a one-by-one structure.

Examples

See `phonebook.c` in the `refbook` subdirectory of the `examples` directory.

For additional examples, see `mxisclass.c` in the `mx` subdirectory of the `examples` directory and `explore.c` in the `mex` subdirectory of the `examples` directory.

See Also

`mxGetField`, `mxGetFieldNameByNumber`, `mxGetFieldNumber`, `mxGetNumberOfFields`, `mxSetField`, `mxSetFieldByNumber`

mxGetFieldNameByNumber

Purpose

Get a field name, given a field number in a structure array

C Syntax

```
#include "matrix.h"
const char *mxGetFieldNameByNumber(const mxArray *array_ptr,
            int field_number);
```

Arguments

`array_ptr`
Pointer to a structure `mxArray`.

`field_number`
The position of the desired field. For instance, to get the name of the first field, set `field_number` to 0; to get the name of the second field, set `field_number` to 1; and so on.

Returns

A pointer to the nth field name, on success. Returns `NULL` on failure. Common causes of failure include:

- Specifying an `array_ptr` that does not point to a structure `mxArray`. Call `mxIsStruct` to determine if `array_ptr` points to a structure `mxArray`.
- Specifying a value of `field_number` greater than or equal to the number of fields in the structure `mxArray`. (Remember that `field_number` 0 symbolizes the first field, so `index N-1` symbolizes the last field.)

Description

Call `mxGetFieldNameByNumber` to get the name of a field in the given structure `mxArray`. A typical use of `mxGetFieldNameByNumber` is to call it inside a loop in order to get the names of all the fields in a given `mxArray`.

Consider a MATLAB structure initialized to

```
patient.name = 'John Doe';
patient.billing = 127.00;
patient.test = [79 75 73; 180 178 177.5; 220 210 205];
```

The field number 0 represents the field `name`; field number 1 represents field `billing`; field number 2 represents field `test`. A field number other than 0, 1, or 2 causes `mxGetFieldNameByNumber` to return `NULL`.

Examples

See `phonebook.c` in the `refbook` subdirectory of the `examples` directory.

For additional examples, see `mxisclass.c` in the `mx` subdirectory of the `examples` directory and `explore.c` in the `mex` subdirectory of the `examples` directory.

See Also `mxGetField`, `mxIsStruct`, `mxSetField`

mxGetFieldNumber

Purpose Get a field number, given a field name in a structure array

C Syntax

```
#include "matrix.h"
int mxGetFieldNumber(const mxArray *array_ptr,
    const char *field_name);
```

Arguments

`array_ptr`
Pointer to a structure `mxArray`.

`field_name`
The name of a field in the structure `mxArray`.

Returns The field number of the specified `field_name`, on success. The first field has a field number of 0, the second field has a field number of 1, and so on. Returns `-1` on failure. Common causes of failure include:

- Specifying an `array_ptr` that does not point to a structure `mxArray`. Call `mxIsStruct` to determine if `array_ptr` points to a structure `mxArray`.
- Specifying the `field_name` of a nonexistent field.

Description If you know the name of a field but do not know its field number, call `mxGetFieldNumber`. Conversely, if you know the field number but do not know its field name, call `mxGetFieldNameByNumber`.

For example, consider a MATLAB structure initialized to

```
patient.name = 'John Doe';
patient.billing = 127.00;
patient.test = [79 75 73; 180 178 177.5; 220 210 205];
```

The field `name` has a field number of 0; the field `billing` has a field number of 1; and the field `test` has a field number of 2. If you call `mxGetFieldNumber` and specify a field name of anything other than `name`, `billing`, or `test`, then `mxGetFieldNumber` returns `-1`.

Calling

```
mxGetField(pa, index, "field_name");
```

is equivalent to calling

```
field_num = mxGetFieldNumber(pa, "field_name");
mxGetFieldByNumber(pa, index, field_num);
```

where `index` is zero if you have a one-by-one structure.

Examples

See `mxcreatestructarray.c` in the `mx` subdirectory of the `examples` directory.

See Also

`mxGetField`, `mxGetFieldByNumber`, `mxGetFieldNameByNumber`, `mxGetNumberOfFields`, `mxSetField`, `mxSetFieldByNumber`

mxGetImagData

Purpose Get pointer to imaginary data of an mxArray

C Syntax

```
#include "matrix.h"
void *mxGetImagData(const mxArray *array_ptr);
```

Arguments

array_ptr
Pointer to an mxArray.

Description Similar to mxGetPi, except it returns a void *.

Examples See mxisfinite.c in the mx subdirectory of the examples directory.

See Also mxGetData, mxGetPi

Purpose Get the value of infinity

C Syntax

```
#include "matrix.h"
double mxGetInf(void);
```

Returns The value of infinity on your system.

Description Call `mxGetInf` to return the value of the MATLAB internal `inf` variable. `inf` is a permanent variable representing IEEE arithmetic positive infinity. The value of `inf` is built into the system; you cannot modify it.

Operations that return infinity include:

- Division by 0. For example, 5/0 returns infinity.
- Operations resulting in overflow. For example, `exp(10000)` returns infinity because the result is too large to be represented on your machine.

Examples See `mxgetinf.c` in the `mx` subdirectory of the `examples` directory.

See Also `mxGetEps`, `mxGetNaN`

mxGetIr

Purpose

Get the ir array of a sparse matrix

C Syntax

```
#include "matrix.h"
int *mxGetIr(const mxArray *array_ptr);
```

Arguments

array_ptr
Pointer to a sparse mxArray.

Returns

A pointer to the first element in the ir array, if successful, and NULL otherwise. Possible causes of failure include:

- Specifying a full (nonsparse) mxArray.
- Specifying a NULL array_ptr. (This usually means that an earlier call to mxCreateSparse failed.)

Description

Use mxGetIr to obtain the starting address of the ir array. The ir array is an array of integers; the length of the ir array is typically nzmax values. For example, if nzmax equals 100, then the ir array should contain 100 integers.

Each value in an ir array indicates a row (offset by 1) at which a nonzero element can be found. (The jc array is an index that indirectly specifies a column where nonzero elements can be found.)

For details on the ir and jc arrays, see mxSetIr and mxSetJc.

Examples

See fulltosparse.c in the refbook subdirectory of the examples directory.

For additional examples, see explore.c in the mex subdirectory of the examples directory; see mxsetdimensions.c and mxsetnzmax.c in the mx subdirectory of the examples directory.

See Also

mxGetJc, mxGetNzmax, mxSetIr, mxSetJc, mxSetNzmax

Purpose
Get the jc array of a sparse matrix

C Syntax

```
#include "matrix.h"
int *mxGetJc(const mxArray *array_ptr);
```

Arguments

array_ptr
Pointer to a sparse mxArray.

Returns
A pointer to the first element in the jc array, if successful, and NULL otherwise. The most likely cause of failure is specifying an array_ptr that points to a full (nonsparse) mxArray.

Description
Use mxGetJc to obtain the starting address of the jc array. The jc array is an integer array having n+1 elements where n is the number of columns in the sparse mxArray. The values in the jc array indirectly indicate columns containing nonzero elements. For a detailed explanation of the jc array, see mxSetJc.

Examples
See fulltosparse.c in the refbook subdirectory of the examples directory.

For additional examples, see explore.c in the mex subdirectory of the examples directory; see mxgetnzmax.c, mxsetdimensions.c, and mxsetnzmax.c in the mx subdirectory of the examples directory.

See Also
mxGetIr, mxSetIr, mxSetJc

mxGetLogicals

Purpose Get pointer to logical array data

C Syntax

```
#include "matrix.h"
mxLogical *mxGetLogicals(const mxArray *array_ptr);
```

Arguments

`array_ptr`
Pointer to an `mxArray`.

Returns The address of the first logical in the `mxArray`. Returns `NULL` if the specified array is not a logical array.

Description Call `mxGetLogicals` to determine the address of the first logical element in the `mxArray` that `array_ptr` points to. Once you have the starting address, you can access any other element in the `mxArray`.

See Also `mxIsLogical`, `mxIsLogicalScalar`, `mxIsLogicalScalarTrue`, `mxCreateLogicalScalar`, `mxCreateLogicalMatrix`, `mxCreateLogicalArray`

Purpose

Get the number of rows

C Syntax

```
#include "matrix.h"
int mxGetM(const mxArray *array_ptr);
```

Arguments

`array_ptr`
Pointer to an array.

Returns

The number of rows in the `mxArray` to which `array_ptr` points.

Description

`mxGetM` returns the number of rows in the specified array. The term *rows* always means the first dimension of the array no matter how many dimensions the array has. For example, if `array_ptr` points to a four-dimensional array having dimensions 8-by-9-by-5-by-3, then `mxGetM` returns 8.

Examples

See `convec.c` in the `refbook` subdirectory of the `examples` directory.

For additional examples, see `fulltosparse.c`, `revord.c`, `timestwo.c`, and `xtimesy.c` in the `refbook` subdirectory of the `examples` directory; see `mxmalloc.c` and `mxsetdimensions.c` in the `mx` subdirectory of the `examples` directory; see `mexget.c`, `mexlock.c`, `mexsettrapflag.c`, and `yprime.c` in the `mex` subdirectory of the `examples` directory.

See Also

`mxGetN`, `mxSetM`, `mxSetN`

mxGetN

Purpose

Get the total number of columns in a two-dimensional mxArray or the total number of elements in dimensions 2 through N for an m-by-n array.

C Syntax

```
#include "matrix.h"
int mxGetN(const mxArray *array_ptr);
```

Arguments

array_ptr
Pointer to an mxArray.

Returns

The number of columns in the mxArray.

Description

Call mxGetN to determine the number of columns in the specified mxArray.

If array_ptr is an N-dimensional mxArray, mxGetN is the product of dimensions 2 through N. For example, if array_ptr points to a four-dimensional mxArray having dimensions 13-by-5-by-4-by-6, then mxGetN returns the value 120 (5x4x6). If the specified mxArray has more than two dimensions and you need to know exactly how many elements are in each dimension, then call mxGetDimensions.

If array_ptr points to a sparse mxArray, mxGetN still returns the number of columns, not the number of occupied columns.

Examples

See convec.c in the refbook subdirectory of the examples directory.

For additional examples,

- See fulltosparse.c, revord.c, timestwo.c, and xtimesy.c in the refbook subdirectory of the examples directory.
- See explore.c, mexget.c, mexlock.c, mexsettrapflag.c and yprime.c in the mex subdirectory of the examples directory.
- See mxmalloc.c, mxsetdimensions.c, mxgetnzmax.c, and mxsetnzmax.c in the mx subdirectory of the examples directory.

See Also

mxGetM, mxGetNumberOfDimensions, mxSetM, mxSetN

V5 Compatible This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the `-V5` option of the `mex` script.

mxGetNaN

Purpose

Get the value of NaN (Not-a-Number)

C Syntax

```
#include "matrix.h"
double mxGetNaN(void);
```

Returns

The value of NaN (Not-a-Number) on your system.

Description

Call mxGetNaN to return the value of NaN for your system. NaN is the IEEE arithmetic representation for Not-a-Number. Certain mathematical operations return NaN as a result, for example,

- 0.0/0.0
- Inf-Inf

The value of Not-a-Number is built in to the system. You cannot modify it.

Examples

See mxgetinf.c in the mx subdirectory of the examples directory.

See Also

mxGetEps, mxGetInf

Purpose Get the number of dimensions

C Syntax

```
#include "matrix.h"
int mxGetNumberOfDimensions(const mxArray *array_ptr);
```

Arguments

`array_ptr`
Pointer to an `mxArray`.

Returns The number of dimensions in the specified `mxArray`. The returned value is always 2 or greater.

Description Use `mxGetNumberOfDimensions` to determine how many dimensions are in the specified array. To determine how many elements are in each dimension, call `mxGetDimensions`.

Examples See `explore.c` in the `mex` subdirectory of the `examples` directory.

For additional examples, see `findnz.c`, `fulltosparse.c`, and `phonebook.c` in the `refbook` subdirectory of the `examples` directory; see `mxcalcsinglesubscript.c`, `mxgeteps.c`, and `mxisfinite.c` in the `mx` subdirectory of the `examples` directory.

See Also `mxSetM`, `mxSetN`, `mxGetDimensions`

mxGetNumberOfElements

Purpose Get number of elements in an array

C Syntax

```
#include "matrix.h"
int mxGetNumberOfElements(const mxArray *array_ptr);
```

Arguments

`array_ptr`
Pointer to an `mxArray`.

Returns Number of elements in the specified `mxArray`.

Description `mxGetNumberOfElements` tells you how many elements an array has. For example, if the dimensions of an array are 3-by-5-by-10, then `mxGetNumberOfElements` will return the number 150.

Examples See `findnz.c` and `phonebook.c` in the `refbook` subdirectory of the `examples` directory.

For additional examples, see `explore.c` in the `mex` subdirectory of the `examples` directory; see `mxcalcsinglesubscript.c`, `mxgeteps.c`, `mxgetinf.c`, `mxisfinite.c`, and `mxsetdimensions.c` in the `mx` subdirectory of the `examples` directory.

See Also `mxGetDimensions`, `mxGetM`, `mxGetN`, `mxGetClassID`, `mxGetClassName`

Purpose Get the number of fields in a structure `mxArray`

C Syntax

```
#include "matrix.h"
int mxGetNumberOfFields(const mxArray *array_ptr);
```

Arguments

`array_ptr`
Pointer to a structure `mxArray`.

Returns The number of fields, on success. Returns 0 on failure. The most common cause of failure is that `array_ptr` is not a structure `mxArray`. Call `mxIsStruct` to determine if `array_ptr` is a structure.

Description Call `mxGetNumberOfFields` to determine how many fields are in the specified structure `mxArray`.

Once you know the number of fields in a structure, it is easy to loop through every field in order to set or to get field values.

Examples See `phonebook.c` in the `refbook` subdirectory of the `examples` directory.

For additional examples, see `mxisclass.c` in the `mx` subdirectory of the `examples` directory; see `explore.c` in the `mex` subdirectory of the `examples` directory.

See Also `mxGetField`, `mxIsStruct`, `mxSetField`

mxGetNzmax

Purpose Get the number of elements in the `ir`, `pr`, and (if it exists) `pi` arrays

C Syntax

```
#include "matrix.h"
int mxGetNzmax(const mxArray *array_ptr);
```

Arguments

`array_ptr`
Pointer to a sparse `mxArray`.

Returns The number of elements allocated to hold nonzero entries in the specified sparse `mxArray`, on success. Returns an indeterminate value on error. The most likely cause of failure is that `array_ptr` points to a full (nonsparse) `mxArray`.

Description Use `mxGetNzmax` to get the value of the `nzmax` field. The `nzmax` field holds an integer value that signifies the number of elements in the `ir`, `pr`, and, if it exists, the `pi` arrays. The value of `nzmax` is always greater than or equal to the number of nonzero elements in a sparse `mxArray`. In addition, the value of `nzmax` is always less than or equal to the number of rows times the number of columns.

As you adjust the number of nonzero elements in a sparse `mxArray`, MATLAB often adjusts the value of the `nzmax` field. MATLAB adjusts `nzmax` in order to reduce the number of costly reallocations and in order to optimize its use of heap space.

Examples See `mxgetnzmax.c` and `mxsetnzmax.c` in the `mx` subdirectory of the `examples` directory.

See Also `mxSetNzmax`

Purpose

Get an mxArray's imaginary data elements

C Syntax

```
#include "matrix.h"
double *mxGetPi(const mxArray *array_ptr);
```

Arguments

array_ptr
Pointer to an mxArray.

Returns

The imaginary data elements of the specified mxArray, on success. Returns NULL if there is no imaginary data or if there is an error.

Description

The pi field points to an array containing the imaginary data of the mxArray. Call mxGetPi to get the contents of the pi field; that is, to get the starting address of this imaginary data.

The best way to determine if an mxArray is purely real is to call mxIsComplex.

The imaginary parts of all input matrices to a MATLAB function are allocated if any of the input matrices are complex.

Examples

See convec.c, findnz.c, and fulltosparse.c in the refbook subdirectory of the examples directory.

For additional examples, see explore.c and mexcallmatlab.c in the mex subdirectory of the examples directory; see mxcalcsinglesubscript.c, mxgetinf.c, mxisfinite.c, and mxsetnzmax.c in the mx subdirectory of the examples directory.

See Also

mxGetPr, mxSetPi, mxSetPr

mxGetPr

Purpose

Get an mxArray's real data elements

C Syntax

```
#include "matrix.h"
double *mxGetPr(const mxArray *array_ptr);
```

Arguments

array_ptr
Pointer to an mxArray.

Returns

The address of the first element of the real data. Returns NULL if there is no real data.

Description

Call mxGetPr to determine the starting address of the real data in the mxArray that array_ptr points to. Once you have the starting address, you can access any other element in the mxArray.

Examples

See convec.c, doubleelement.c, findnz.c, fulltosparse.c, sincall.c, timestwo.c, timestwoalt.c, and xtimesy.c in the refbook subdirectory of the examples directory.

See Also

mxGetPi, mxSetPi, mxSetPr

Purpose Get the real component of an mxArray's first data element

C Syntax

```
#include "matrix.h"
double mxGetScalar(const mxArray *array_ptr);
```

Arguments

array_ptr
Pointer to an mxArray other than a cell mxArray or a structure mxArray.

Returns

The value of the first real (nonimaginary) element of the mxArray. Notice that mxGetScalar returns a double. Therefore, if real elements in the mxArray are stored as something other than doubles, mxGetScalar automatically converts the scalar value into a double. To preserve the original data representation of the scalar, you must cast the return value to the desired data type.

If array_ptr points to a structure mxArray or a cell mxArray, mxGetScalar returns 0.0.

If array_ptr points to a sparse mxArray, mxGetScalar returns the value of the first nonzero real element in the mxArray.

If array_ptr points to an empty mxArray, mxGetScalar returns an indeterminate value.

Description

Call mxGetScalar to get the value of the first real (nonimaginary) element of the mxArray.

In most cases, you call mxGetScalar when array_ptr points to an mxArray containing only one element (a scalar). However, array_ptr can point to an mxArray containing many elements. If array_ptr points to an mxArray containing multiple elements, mxGetScalar returns the value of the first real element. If array_ptr points to a two-dimensional mxArray, mxGetScalar returns the value of the (1,1) element; if array_ptr points to a three-dimensional mxArray, mxGetScalar returns the value of the (1,1,1) element; and so on.

Examples

See timestwoalt.c and xtimesy.c in the refbook subdirectory of the examples directory.

For additional examples, see `mxsetdimensions.c` in the `mx` subdirectory of the `examples` directory; see `mexget.c`, `mexlock.c` and `mexsettrapflag.c` in the `mex` subdirectory of the `examples` directory.

See Also `mxGetM`, `mxGetN`

Purpose

Copy a string mxArray's data into a C-style string

C Syntax

```
#include "matrix.h"
int mxGetString(const mxArray *array_ptr, char *buf, int buflen);
```

Arguments

array_ptr
Pointer to a string mxArray; that is, a pointer to an mxArray having the mxCHAR_CLASS class.

buf
The starting location into which the string should be written. mxGetString writes the character data into buf and then terminates the string with a NULL character (in the manner of C strings). buf can either point to dynamic or static memory.

buflen
Maximum number of characters to read into buf. Typically, you set buflen to 1 plus the number of elements in the string mxArray to which array_ptr points. See the mxGetM and mxGetN reference pages to find out how to get the number of elements.

Note Users of multibyte character sets should be aware that MATLAB packs multibyte characters into an mxChar (16-bit unsigned integer). When allocating space for the return string, to avoid possible truncation you should set

```
buflen = (mxGetM(prhs[0]) * mxGetN(prhs[0]) * sizeof(mxChar)) + 1
```

Returns

0 on success, and 1 on failure. Possible reasons for failure include:

- Specifying an mxArray that is not a string mxArray.
- Specifying buflen with less than the number of characters needed to store the entire mxArray pointed to by array_ptr. If this is the case, 1 is returned and the string is truncated.

Description

Call mxGetString to copy the character data of a string mxArray into a C-style string. The copied C-style string starts at buf and contains no more than buflen-1 characters. The C-style string is always terminated with a NULL character.

If the string array contains several rows, they are copied, one column at a time, into one long string array.

Examples

See revord.c in the refbook subdirectory of the examples directory.

For additional examples, see explore.c in the mex subdirectory of the examples directory; see mxmalloc.c and mxsetallocfcns.c in the mx subdirectory of the examples directory.

See Also

mxCreateCharArray, mxCreateCharMatrixFromStrings, mxCreateString

Purpose True if a cell mxArray

C Syntax

```
#include "matrix.h"
bool mxIsCell(const mxArray *array_ptr);
```

Arguments

array_ptr
Pointer to an array.

Returns

true if array_ptr points to an array having the class mxCELL_CLASS, and false otherwise.

Description

Use mxIsCell to determine if the specified array is a cell array.

Calling mxIsCell is equivalent to calling

```
mxGetClassID(array_ptr) == mxCELL_CLASS
```

Note mxIsCell does not answer the question, “Is this mxArray a cell of a cell array?”. An individual cell of a cell array can be of any type.

See Also

mxIsClass

mxIsChar

Purpose True if a string `mxArray`

C Syntax

```
#include "matrix.h"
bool mxIsChar(const mxArray *array_ptr);
```

Arguments

`array_ptr`
Pointer to an `mxArray`.

Returns `true` if `array_ptr` points to an array having the class `mxCHAR_CLASS`, and `false` otherwise.

Description Use `mxIsChar` to determine if `array_ptr` points to string `mxArray`.

Calling `mxIsChar` is equivalent to calling

```
mxGetClassID(array_ptr) == mxCHAR_CLASS
```

Examples See `phonebook.c` and `revord.c` in the `refbook` subdirectory of the `examples` directory.

For additional examples, see `mxcreatecharmatrixfromstr.c`, `mxislogical.c`, and `mxmalloc.c` in the `mx` subdirectory of the `examples` directory.

See Also `mxIsClass`, `mxGetClassID`

Purpose

True if mxArray is a member of the specified class

C Syntax

```
#include "matrix.h"
bool mxIsClass(const mxArray *array_ptr, const char *name);
```

Arguments

array_ptr
Pointer to an array.

name
The array category that you are testing. Specify name as a string (not as an integer identifier). You can specify any one of the following predefined constants:

Value of Name	Corresponding Class
cell	mxCELL_CLASS
char	mxCHAR_CLASS
double	mxDOUBLE_CLASS
function handle	mxFUNCTION_CLASS
int8	mxINT8_CLASS
int16	mxINT16_CLASS
int32	mxINT32_CLASS
int64	mxINT64_CLASS
logical	mxLOGICAL_CLASS
single	mxSINGLE_CLASS
struct	mxSTRUCT_CLASS
uint8	mxUINT8_CLASS
uint16	mxUINT16_CLASS
uint32	mxUINT32_CLASS
uint64	mxUINT64_CLASS

Value of Name	Corresponding Class
<class_name>	*<class_id>*
unknown	`mxUNKNOWN_CLASS`

In the table, *<class_name>* represents the name of a specific MATLAB custom object.

Or, you can specify one of your own class names.

For example,

```
mxIsClass("double");
```

is equivalent to calling

```
mxIsDouble(array_ptr);
```

which is equivalent to calling

```
strcmp(mxGetClassName(array_ptr), "double");
```

Note that it is most efficient to use the `mxIsDouble` form.

Returns

`true` if `array_ptr` points to an array having category `name`, and `false` otherwise.

Description

Each `mxArray` is tagged as being a certain type. Call `mxIsClass` to determine if the specified `mxArray` has this type.

Examples

See `mxisclass.c` in the `mx` subdirectory of the `examples` directory.

See Also

`mxIsEmpty`, `mxGetClassID`, `mxClassID`

Purpose

True if data is complex

C Syntax

```
#include "matrix.h"
bool mxIsComplex(const mxArray *array_ptr);
```

Returns

`true` if `array_ptr` is a numeric array containing complex data, and `false` otherwise. If `array_ptr` points to a cell array or a structure array, then `mxIsComplex` returns `false`.

Description

Use `mxIsComplex` to determine whether or not an imaginary part is allocated for an `mxArray`. The imaginary pointer `pi` is `NULL` if an `mxArray` is purely real and does not have any imaginary data. If an `mxArray` is complex, `pi` points to an array of numbers.

Examples

See `mxisfinite.c` in the `mx` subdirectory of the `examples` directory.

For additional examples, see `convec.c`, `phonebook.c`, `timestwo.c`, and `xtimesy.c` in the `refbook` subdirectory of the `examples` directory; see `explore.c`, `yprime.c`, `mexlock.c`, and `mexsettrapflag.c` in the `mex` subdirectory of the `examples` directory; see `mxcalcsinglesubscript.c`, `mxgeteps.c`, and `mxgetinf.c` in the `mx` subdirectory of the `examples` directory.

See Also

`mxIsNumeric`

mxIsDouble

Purpose

True if mxArray represents its data as double-precision, floating-point numbers

C Syntax

```
#include "matrix.h"
bool mxIsDouble(const mxArray *array_ptr);
```

Arguments

array_ptr
Pointer to an mxArray.

Returns

true if the mxArray stores its data as double-precision, floating-point numbers, and false otherwise.

Description

Call mxIsDouble to determine whether or not the specified mxArray represents its real and imaginary data as double-precision, floating-point numbers.

Older versions of MATLAB store all mxArray data as double-precision, floating-point numbers. However, starting with MATLAB version 5, MATLAB can store real and imaginary data in a variety of numerical formats.

Calling mxIsDouble is equivalent to calling

```
mxGetClassID(array_ptr == mxDOUBLE_CLASS)
```

Examples

See findnz.c, fulltosparse.c, timestwo.c, and xtimesy.c in the refbook subdirectory of the examples directory.

For additional examples, see mexget.c, mexlock.c, mexsettrapflag.c, and yprime.c in the mex subdirectory of the examples directory; see mxcalcsinglesubscript.c, mxgeteps.c, mxgetinf.c, and mxisfinite.c in the mx subdirectory of the examples directory.

See Also

mxIsClass, mxGetClassID

Purpose True if mxArray is empty

C Syntax

```
#include "matrix.h"
bool mxIsEmpty(const mxArray *array_ptr);
```

Arguments

array_ptr
Pointer to an array.

Returns true if the mxArray is empty, and false otherwise.

Description Use mxIsEmpty to determine if an mxArray contains no data. An mxArray is empty if the size of any of its dimensions is 0.

Note that mxIsEmpty is not the opposite of mxIsFull.

Examples See mxisfinite.c in the mx subdirectory of the examples directory.

See Also mxIsClass

mxIsFinite

Purpose True if value is finite

C Syntax

```
#include "matrix.h"
bool mxIsFinite(double value);
```

Arguments

`value`
The double-precision, floating-point number that you are testing.

Returns `true` if `value` is finite, and `false` otherwise.

Description Call `mxIsFinite` to determine whether or not `value` is finite. A number is finite if it is greater than `-Inf` and less than `Inf`.

Examples See `mxisfinite.c` in the `mx` subdirectory of the `examples` directory.

See Also `mxIsInf`, `mxIsNaN`

Purpose

True if the `mxArray` was copied from the MATLAB global workspace

C Syntax

```
#include "matrix.h"
bool mxIsFromGlobalWS(const mxArray *array_ptr);
```

Arguments

`array_ptr`
Pointer to an `mxArray`.

Returns

`true` if the array was copied out of the global workspace, and `false` otherwise.

Description

`mxIsFromGlobalWS` is useful for stand-alone MAT programs. `mexIsGlobal` tells you if the pointer you pass actually points into the global workspace.

Examples

See `matdgns.c` and `matcreat.c` in the `eng_mat` subdirectory of the `examples` directory.

See Also

`mexIsGlobal`

mxIsFull (Obsolete)

This API function is obsolete and is not supported in MATLAB 5 or later.

Use

```
if(!mxIsSparse(prhs[0]))
```

instead of

```
if(mxIsFull(prhs[0]))
```

See Also

mxIsSparse

Purpose True if value is infinite

C Syntax

```
#include "matrix.h"
bool mxIsInf(double value);
```

Arguments

`value`
The double-precision, floating-point number that you are testing.

Returns

`true` if value is infinite, and `false` otherwise.

Description

Call `mxIsInf` to determine whether or not `value` is equal to infinity or minus infinity. MATLAB stores the value of infinity in a permanent variable named `Inf`, which represents IEEE arithmetic positive infinity. The value of the variable, `Inf`, is built into the system; you cannot modify it.

Operations that return infinity include:

- Division by 0. For example, `5/0` returns infinity.
- Operations resulting in overflow. For example, `exp(10000)` returns infinity because the result is too large to be represented on your machine.

If `value` equals `NaN` (Not-a-Number), then `mxIsInf` returns `false`. In other words, `NaN` is not equal to infinity.

Examples

See `mxisfinite.c` in the `mx` subdirectory of the `examples` directory.

See Also

`mxIsFinite`, `mxIsNaN`

mxIsInt8

Purpose

True if mxArray represents its data as signed 8-bit integers

C Syntax

```
#include "matrix.h"
bool mxIsInt8(const mxArray *array_ptr);
```

Arguments

array_ptr
Pointer to an mxArray.

Returns

true if the array stores its data as signed 8-bit integers, and false otherwise.

Description

Use mxIsInt8 to determine whether or not the specified array represents its real and imaginary data as 8-bit signed integers.

Calling mxIsInt8 is equivalent to calling

```
mxGetClassID(array_ptr) == mxINT8_CLASS
```

See Also

mxIsClass, mxGetClassID, mxIsInt16, mxIsInt32, mxIsInt64, mxIsUint8, mxIsUint16, mxIsUint32, mxIsUint64

Purpose True if mxArray represents its data as signed 16-bit integers

C Syntax

```
#include "matrix.h"
bool mxIsInt16(const mxArray *array_ptr);
```

Arguments

array_ptr
Pointer to an mxArray.

Returns true if the array stores its data as signed 16-bit integers, and false otherwise.

Description Use mxIsInt16 to determine whether or not the specified array represents its real and imaginary data as 16-bit signed integers.

Calling mxIsInt16 is equivalent to calling

```
mxGetClassID(array_ptr) == mxINT16_CLASS
```

See Also mxIsClass, mxGetClassID, mxIsInt8, mxIsInt32, mxIsInt64, mxIsUint8, mxIsUint16, mxIsUint32, mxIsUint64

mxIsInt32

Purpose

True if `mxArray` represents its data as signed 32-bit integers

C Syntax

```
#include "matrix.h"
bool mxIsInt32(const mxArray *array_ptr);
```

Arguments

`array_ptr`
Pointer to an `mxArray`.

Returns

`true` if the array stores its data as signed 32-bit integers, and `false` otherwise.

Description

Use `mxIsInt32` to determine whether or not the specified array represents its real and imaginary data as 32-bit signed integers.

Calling `mxIsInt32` is equivalent to calling

```
mxGetClassID(array_ptr) == mxINT32_CLASS
```

See Also

`mxIsClass`, `mxGetClassID`, `mxIsInt8`, `mxIsInt16`, `mxIsInt64`, `mxIsUint8`, `mxIsUint16`, `mxIsUint32`, `mxIsUint64`

Purpose

True if mxArray represents its data as signed 64-bit integers

C Syntax

```
#include "matrix.h"
bool mxIsInt64(const mxArray *array_ptr);
```

Arguments

array_ptr
Pointer to an mxArray.

Returns

true if the array stores its data as signed 64-bit integers, and false otherwise.

Description

Use mxIsInt64 to determine whether or not the specified array represents its real and imaginary data as 64-bit signed integers.

Calling mxIsInt64 is equivalent to calling

```
mxGetClassID(array_ptr) == mxINT64_CLASS
```

See Also

mxIsClass, mxGetClassID, mxIsInt8, mxIsInt16, mxIsInt32, mxIsUint8, mxIsUint16, mxIsUint32, mxIsUint64

mxIsLogical

Purpose True if mxArray is of class mxLogical

C Syntax

```
#include "matrix.h"
bool mxIsLogical(const mxArray *array_ptr);
```

Arguments

array_ptr
Pointer to an mxArray.

Returns true if array_ptr points to a logical mxArray, and false otherwise.

Description Use mxIsLogical to determine whether MATLAB treats the data in the mxArray as Boolean (logical). If an mxArray is logical, then MATLAB treats all zeros as meaning false and all nonzero values as meaning true. For additional information on the use of logical variables in MATLAB, type help logical at the MATLAB prompt.

Examples See mxislogical.c in the mx subdirectory of the examples directory.

See Also mxIsClass, mxSetLogical (Obsolete)

mxIsLogicalScalar

Purpose

True if scalar mxArray of class mxLogical

C Syntax

```
#include "matrix.h"
bool mxIsLogicalScalar(const mxArray *array_ptr);
```

Arguments

`array_ptr`
Pointer to an mxArray.

Returns

`true` if the `mxArray` is of class `mxLogical` and has 1-by-1 dimensions, and `false` otherwise.

Description

Use `mxIsLogicalScalar` to determine whether MATLAB treats the scalar data in the `mxArray` as logical or numerical. For additional information on the use of logical variables in MATLAB, type `help logical` at the MATLAB prompt.

`mxIsLogicalScalar(pa)` is equivalent to

```
mxIsLogical(pa) && mxGetNumberOfElements(pa) == 1
```

See Also

`mxIsLogicalScalarTrue`, `mxIsLogical`, `mxGetLogicals`, `mxGetScalar`

mxIsLogicalScalarTrue

Purpose

True if scalar mxArray of class mxLogical is true

C Syntax

```
#include "matrix.h"
bool mxIsLogicalScalarTrue(const mxArray *array_ptr);
```

Arguments

array_ptr
Pointer to an mxArray.

Returns

true if the value of the mxArray's logical, scalar element is true, and false otherwise.

Description

Use mxIsLogicalScalarTrue to determine whether the value of a scalar mxArray is true or false. For additional information on the use of logical variables in MATLAB, type help logical at the MATLAB prompt.

mxIsLogicalScalarTrue(pa) is equivalent to

```
mxIsLogical(pa) && mxGetNumberOfElements(pa) == 1 &&
mxGetLogicals(pa)[0] == true
```

See Also

mxIsLogicalScalar, mxIsLogical, mxGetLogicals, mxGetScalar

Purpose

True if value is `NaN` (Not-a-Number)

C Syntax

```
#include "matrix.h"
bool mxIsNaN(double value);
```

Arguments

`value`
The double-precision, floating-point number that you are testing.

Returns

`true` if `value` is `NaN` (Not-a-Number), and `false` otherwise.

Description

Call `mxIsNaN` to determine whether or not `value` is `NaN`. `NaN` is the IEEE arithmetic representation for Not-a-Number. A `NaN` is obtained as a result of mathematically undefined operations such as

- `0.0/0.0`
- `Inf-Inf`

The system understands a family of bit patterns as representing `NaN`. In other words, `NaN` is not a single value, rather it is a family of numbers that MATLAB (and other IEEE-compliant applications) use to represent an error condition or missing data.

Examples

See `mxisfinite.c` in the `mx` subdirectory of the `examples` directory.

For additional examples, see `findnz.c` and `fulltosparse.c` in the `refbook` subdirectory of the `examples` directory.

See Also

`mxIsFinite`, `mxIsInf`

mxIsNumeric

Purpose

True if mxArray is numeric

C Syntax

```
#include "matrix.h"
bool mxIsNumeric(const mxArray *array_ptr);
```

Arguments

array_ptr
Pointer to an mxArray.

Returns

true if the array's storage type is:

- mxDOUBLE_CLASS
- mxSINGLE_CLASS
- mxINT8_CLASS
- mxUINT8_CLASS
- mxINT16_CLASS
- mxUINT16_CLASS
- mxINT32_CLASS
- mxUINT32_CLASS
- mxINT64_CLASS
- mxUINT64_CLASS

false if the array's storage type is:

- mxCELL_CLASS
- mxCHAR_CLASS
- mxFUNCTION_CLASS
- mxLOGICAL_CLASS
- mxSTRUCT_CLASS
- mxUNKNOWN_CLASS

Description

Call mxIsNumeric to determine if the specified array contains numeric data. If the specified array is a cell, string, or a structure, then mxIsNumeric returns false. Otherwise, mxIsNumeric returns true.

Call mxGetClassID to determine the exact storage type.

Examples

See phonebook.c in the refbook subdirectory of the examples directory.

See Also

mxGetClassID

Purpose

True if `mxArray` represents its data as single-precision, floating-point numbers

C Syntax

```
#include "matrix.h"
bool mxIsSingle(const mxArray *array_ptr);
```

Arguments

`array_ptr`
Pointer to an `mxArray`.

Returns

`true` if the array stores its data as single-precision, floating-point numbers, and `false` otherwise.

Description

Use `mxIsSingle` to determine whether or not the specified array represents its real and imaginary data as single-precision, floating-point numbers.

Calling `mxIsSingle` is equivalent to calling

```
mxGetClassID(array_ptr) == mxSINGLE_CLASS
```

See Also

`mxIsClass`, `mxGetClassID`

mxIsSparse

Purpose

True if a sparse mxArray

C Syntax

```
#include "matrix.h"
bool mxIsSparse(const mxArray *array_ptr);
```

Arguments

array_ptr
Pointer to an mxArray.

Returns

true if array_ptr points to a sparse mxArray, and false otherwise. A false return value means that array_ptr points to a full mxArray or that array_ptr does not point to a legal mxArray.

Description

Use mxIsSparse to determine if array_ptr points to a sparse mxArray. Many routines (for example, mxGetIr and mxGetJc) require a sparse mxArray as input.

Examples

See phonebook.c in the refbook subdirectory of the examples directory.

For additional examples, see mxgetnzmax.c, mxsetdimensions.c, and mxsetnzmax.c in the mx subdirectory of the examples directory.

See Also

mxGetIr, mxGetJc

This API function is obsolete and is not supported in MATLAB 5 or later.

Use

```
mxIsChar
```

instead of

```
mxIsString
```

See Also `mxChar`, `mxIsChar`

mxIsStruct

Purpose True if a structure `mxArray`

C Syntax

```
#include "matrix.h"
bool mxIsStruct(const mxArray *array_ptr);
```

Arguments

`array_ptr`
Pointer to an `mxArray`.

Returns `true` if `array_ptr` points to a structure `array`, and `false` otherwise.

Description Use `mxIsStruct` to determine if `array_ptr` points to a structure `mxArray`. Many routines (for example, `mxGetFieldName` and `mxSetField`) require a structure `mxArray` as an argument.

Examples See `phonebook.c` in the `refbook` subdirectory of the `examples` directory.

See Also `mxCreateStructArray`, `mxCreateStructMatrix`, `mxGetNumberOfFields`, `mxGetField`, `mxSetField`

Purpose True if mxArray represents its data as unsigned 8-bit integers

C Syntax

```
#include "matrix.h"
bool mxIsInt8(const mxArray *array_ptr);
```

Arguments

array_ptr
Pointer to an mxArray.

Returns true if the mxArray stores its data as unsigned 8-bit integers, and false otherwise.

Description Use mxIsInt8 to determine whether or not the specified mxArray represents its real and imaginary data as 8-bit unsigned integers.

Calling mxIsUint8 is equivalent to calling

```
mxGetClassID(array_ptr) == mxUINT8_CLASS
```

See Also mxIsClass, mxGetClassID, mxIsUint16, mxIsUint32, mxIsUint64, mxIsInt8, mxIsInt16, mxIsInt32, mxIsInt64

mxIsUint16

Purpose

True if mxArray represents its data as unsigned 16-bit integers

C Syntax

```
#include "matrix.h"
bool mxIsUint16(const mxArray *array_ptr);
```

Arguments

array_ptr
Pointer to an mxArray.

Returns

true if the mxArray stores its data as unsigned 16-bit integers, and false otherwise.

Description

Use mxIsUint16 to determine whether or not the specified mxArray represents its real and imaginary data as 16-bit unsigned integers.

Calling mxIsUint16 is equivalent to calling

```
mxGetClassID(array_ptr) == mxUINT16_CLASS
```

See Also

mxIsClass, mxGetClassID, mxIsUint8, mxIsUint32, mxIsUint64, mxIsInt8, mxIsInt16, mxIsInt32, mxIsInt64

Purpose

True if mxArray represents its data as unsigned 32-bit integers

C Syntax

```
#include "matrix.h"
bool mxIsUint32(const mxArray *array_ptr);
```

Arguments

array_ptr
Pointer to an mxArray.

Returns

true if the mxArray stores its data as unsigned 32-bit integers, and false otherwise.

Description

Use mxIsUint32 to determine whether or not the specified mxArray represents its real and imaginary data as 32-bit unsigned integers.

Calling mxIsUint32 is equivalent to calling

```
mxGetClassID(array_ptr) == mxUINT32_CLASS
```

See Also

mxIsClass, mxGetClassID, mxIsUint8, mxIsUint16, mxIsUint64, mxIsInt8, mxIsInt16, mxIsInt32, mxIsInt64

mxIsUint64

Purpose

True if mxArray represents its data as unsigned 64-bit integers

C Syntax

```
#include "matrix.h"
bool mxIsUint64(const mxArray *array_ptr);
```

Arguments

array_ptr
Pointer to an mxArray.

Returns

true if the mxArray stores its data as unsigned 64-bit integers, and false otherwise.

Description

Use mxIsUint64 to determine whether or not the specified mxArray represents its real and imaginary data as 64-bit unsigned integers.

Calling mxIsUint64 is equivalent to calling

```
mxGetClassID(array_ptr) == mxUINT64_CLASS
```

See Also

mxIsClass, mxGetClassID, mxIsUint8, mxIsUint16, mxIsUint32, mxIsInt8, mxIsInt16, mxIsInt32, mxIsInt64

Purpose

Allocate dynamic memory using the MATLAB memory manager

C Syntax

```
#include "matrix.h"
#include <stdlib.h>
void *mxMalloc(size_t n);
```

Arguments

`n`
Number of bytes to allocate.

Returns

A pointer to the start of the allocated dynamic memory, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, `mxMalloc` returns `NULL`. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt.

`mxMalloc` is unsuccessful when there is insufficient free heap space.

Description

MATLAB applications should always call `mxMalloc` rather than `malloc` to allocate memory. Note that `mxMalloc` works differently in MEX-files than in stand-alone MATLAB applications.

In MEX-files, `mxMalloc` automatically

- Allocates enough contiguous heap space to hold `n` bytes.
- Registers the returned heap space with the MATLAB memory management facility.

The MATLAB memory management facility maintains a list of all memory allocated by `mxMalloc`. The MATLAB memory management facility automatically frees (deallocates) all of a MEX-file's parcels when control returns to the MATLAB prompt.

In stand-alone MATLAB applications, `mxMalloc` defaults to calling the ANSI C `malloc` function. If this default behavior is unacceptable, you can write your own memory allocation routine, and then register this routine with `mxSetAllocFcns`. Then, whenever `mxMalloc` is called, `mxMalloc` calls your memory allocation routine instead of `malloc`.

By default, in a MEX-file, `mxMalloc` generates nonpersistent `mxMalloc` data. In other words, the memory management facility automatically deallocates the memory as soon as the MEX-file ends. If you want the memory to persist after the MEX-file completes, call `mexMakeMemoryPersistent` after calling `mxMalloc`. If you write a MEX-file with persistent memory, be sure to register a `mexAtExit` function to free allocated memory in the event your MEX-file is cleared.

When you finish using the memory allocated by `mxMalloc`, call `mxFree`. `mxFree` deallocates the memory.

Examples

See `mxmalloc.c` in the `mx` subdirectory of the `examples` directory. For an additional example, see `mxsetdimensions.c` in the `mx` subdirectory of the `examples` directory.

See Also

`mxCalloc`, `mxFree`, `mxDestroyArray`, `mexMakeArrayPersistent`, `mexMakeMemoryPersistent`, `mxSetAllocFcns`

Purpose Reallocate memory

C Syntax

```
#include "matrix.h"
#include <stdlib.h>
void *mxRealloc(void *ptr, size_t size);
```

Arguments

`ptr`
Pointer to a block of memory allocated by `mxCalloc`, or by a previous call to `mxRealloc`.

`size`
New size of allocated memory, in bytes.

Returns A pointer to the reallocated block of memory on success, and `0` on failure.

Description `mxRealloc` reallocates the memory routine for the managed list. If `mxRealloc` fails to allocate a block, you must free the block since the ANSI definition of `realloc` states that the block remains allocated. `mxRealloc` returns `NULL` in this case, and in subsequent calls to `mxRealloc` of the form:

```
x = mxRealloc(x, size);
```

Note Failure to reallocate memory with `mxRealloc` can result in memory leaks.

Examples See `mxsetnzmax.c` in the `mx` subdirectory of the `examples` directory.

See Also `mxCalloc`, `mxFree`, `mxMalloc`, `mxSetAllocFcns`

mxRemoveField

Purpose

Remove a field from a structure array

C Syntax

```
#include "matrix.h"
extern void mxRemoveField(mxArray array_ptr, int field_number);
```

Arguments

`array_ptr`
Pointer to a structure `mxArray`.

`field_number`
The number of the field you want to remove. For instance, to remove the first field, set `field_number` to 0; to remove the second field, set `field_number` to 1; and so on.

Description

Call `mxRemoveField` to remove a field from a structure array. If the field does not exist, nothing happens. This function does not destroy the field values. Use `mxDestroyArray` to destroy the actual field values.

Consider a MATLAB structure initialized to

```
patient.name = 'John Doe';
patient.billing = 127.00;
patient.test = [79 75 73; 180 178 177.5; 220 210 205];
```

The field number 0 represents the field `name`; field number 1 represents field `billing`; field number 2 represents field `test`.

See Also

`mxAddField`, `mxDestroyArray`, `mxGetFieldByNumber`

Purpose

Register your own memory allocation and deallocation functions in a stand-alone engine or MAT application

C Syntax

```
#include "matrix.h"
#include <stdlib.h>
void mxSetAllocFcns(calloc_proc callocfcn, free_proc freefcn,
    realloc_proc reallocfcn, malloc_proc mallocfcn);
```

Arguments

`callocfcn`
The name of the function that `mxCalloc` uses to perform memory allocation operations. The function you specify is ordinarily a wrapper around the ANSI C `calloc` function. The `callocfcn` you write must have the prototype:

```
void * callocfcn(size_t nmemb, size_t size);
```

`nmemb`	The number of contiguous elements that you want the matrix library to allocate on your behalf.
`size`	The size of each element. To get the size, you typically use the `sizeof` operator or the `mxGetElementSize` routine.

The `callocfcn` you specify must create memory in which all allocated memory has been initialized to zero.

`freefcn`
The name of the function that `mxFree` uses to perform memory deallocation (freeing) operations. The `freefcn` you write must have the prototype:

```
void freefcn(void *ptr);
```

`ptr`	Pointer to beginning of the memory parcel to deallocate.

The `freefcn` you specify must contain code to determine if `ptr` is `NULL`. If `ptr` is `NULL`, then your `freefcn` must not attempt to deallocate it.

`reallocfcn`
The name of the function that `mxRealloc` uses to perform memory reallocation operations. The `reallocfcn` you write must have the prototype:

```
void * reallocfcn(void *ptr, size_t size);
```

`ptr`	Pointer to beginning of the memory parcel to reallocate.
`size`	The size of each element. To get the size, you typically use the `sizeof` operator or the `mxGetElementSize` routine.

`mallocfcn`
The name of the function that API functions call in place of `malloc` to perform memory reallocation operations. The `mallocfcn` you write must have the prototype:

```
void * mallocfcn(size_t n);
```

`n`	The number of bytes to allocate.

The `mallocfcn` you specify doesn't need to initialize the memory it allocates.

Description

Call `mxSetAllocFcns` to establish your own memory allocation and deallocation routines in a stand-alone (nonMEX) application.

It is illegal to call `mxSetAllocFcns` from a MEX-file; doing so causes a compiler error.

In a stand-alone application, if you do not call `mxSetAllocFcns`, then

- `mxCalloc` simply calls the ANSI C `calloc` routine.
- `mxFree` calls a free function, which calls the ANSI C `free` routine if a `NULL` pointer is not passed.
- `mxRealloc` simply calls the ANSI C `realloc` routine.

Writing your own `callocfcn`, `mallocfcn`, `freefcn`, and `reallocfcn` allows you to customize memory allocation and deallocation.

Examples

See `mxsetallocfcns.c` in the `mx` subdirectory of the `examples` directory.

See Also

`mxCalloc`, `mxFree`, `mxMalloc`, `mxRealloc`

Purpose Set the value of one cell

C Syntax

```
#include "matrix.h"
void mxSetCell(mxArray *array_ptr, int index, mxArray *value);
```

Arguments

`array_ptr`
Pointer to a cell `mxArray`.

`index`
Index from the beginning of the `mxArray`. Specify the number of elements between the first cell of the `mxArray` and the cell you want to set. The easiest way to calculate `index` in a multidimensional cell array is to call `mxCalcSingleSubscript`.

`value`
The new value of the cell. You can put any kind of `mxArray` into a cell. In fact, you can even put another cell `mxArray` into a cell.

Description Call `mxSetCell` to put the designated `value` into a particular cell of a cell `mxArray`. You can assign new values to unpopulated cells or overwrite the value of an existing cell. To do the latter, first use `mxDestroyArray` to free what is already there and then `mxSetCell` to assign the new value.

Note Inputs to a MEX-file are constant read-only `mxArrays` and should not be modified. Using `mxSetCell*` or `mxSetField*` to modify the cells or fields of an argument passed from MATLAB causes unpredictable results.

Examples See `phonebook.c` in the `refbook` subdirectory of the `examples` directory. For an additional example, see `mxcreatecellmatrix.c` in the `mx` subdirectory of the `examples` directory.

See Also `mxCreateCellArray`, `mxCreateCellMatrix`, `mxGetCell`, `mxIsCell`

mxSetClassName

Purpose

Convert a MATLAB structure array to a MATLAB object array by specifying a class name to associate with the object

C Syntax

```
#include "matrix.h"
int mxSetClassName(mxArray *array_ptr, const char *classname);
```

Arguments

`array_ptr`
Pointer to an `mxArray` of class `mxSTRUCT_CLASS`.

`classname`
The object class to which to convert `array_ptr`.

Returns

0 if successful, and nonzero otherwise.

Description

`mxSetClassName` converts a structure array to an object array, to be saved subsequently to a MAT-file. The object is not registered or validated by MATLAB until it is loaded via the `LOAD` command. If the specified classname is an undefined class within MATLAB, `LOAD` converts the object back to a simple structure array.

See Also

`mxIsClass`, `mxGetClassID`

Purpose

Set pointer to data

C Syntax

```
#include "matrix.h"
void mxSetData(mxArray *array_ptr, void *data_ptr);
```

Arguments

`array_ptr`
Pointer to an `mxArray`.

`data_ptr`
Pointer to data.

Description

`mxSetData` is similar to `mxSetPr`, except its `data_ptr` argument is a `void *`. Use this on numeric arrays with contents other than `double`.

See Also

`mxSetPr`

mxSetDimensions

Purpose

Modify the number of dimensions and/or the size of each dimension

C Syntax

```
#include "matrix.h"
int mxSetDimensions(mxArray *array_ptr, const int *dims, int ndim);
```

Arguments

`array_ptr`
Pointer to an `mxArray`.

`dims`
The dimensions array. Each element in the dimensions array contains the size of the array in that dimension. For example, setting `dims[0]` to 5 and `dims[1]` to 7 establishes a 5-by-7 `mxArray`. In most cases, there should be `ndim` elements in the `dims` array.

`ndim`
The desired number of dimensions.

Returns

0 on success, and 1 on failure. `mxSetDimensions` allocates heap space to hold the input size array. So it is possible (though extremely unlikely) that increasing the number of dimensions can cause the system to run out of heap space.

Description

Call `mxSetDimensions` to reshape an existing `mxArray`. `mxSetDimensions` is similar to `mxSetM` and `mxSetN`; however, `mxSetDimensions` provides greater control for reshaping `mxArrays` that have more than two-dimensions.

`mxSetDimensions` does not allocate or deallocate any space for the `pr` or `pi` arrays. Consequently, if your call to `mxSetDimensions` increases the number of elements in the `mxArray`, then you must enlarge the `pr` (and `pi`, if it exists) arrays accordingly.

If your call to `mxSetDimensions` reduces the number of elements in the `mxArray`, then you can optionally reduce the size of the `pr` and `pi` arrays using mxRealloc.

Examples

See `mxsetdimensions.c` in the `mx` subdirectory of the `examples` directory.

See Also

`mxGetNumberOfDimensions`, `mxSetM`, `mxSetN`

Purpose

Set a field value of a structure array, given a field name and an index

C Syntax

```
#include "matrix.h"
void mxSetField(mxArray *array_ptr, int index,
    const char *field_name, mxArray *value);
```

Arguments

`array_ptr`
Pointer to a structure `mxArray`. Call `mxIsStruct` to determine if `array_ptr` points to a structure `mxArray`.

`index`
The desired element. The first element of an `mxArray` has an index of 0, the second element has an index of 1, and the last element has an index of `N-1`, where `N` is the total number of elements in the structure `mxArray`. See `mxCalcSingleSubscript` for details on calculating an index.

`field_name`
The name of the field whose value you are assigning. Call `mxGetFieldNameByNumber` or `mxGetFieldNumber` to determine existing field names.

`value`
Pointer to the `mxArray` you are assigning.

Description

Use `mxSetField` to assign a `value` to the specified element of the specified field. In pseudo-C terminology, `mxSetField` performs the assignment

```
array_ptr[index].field_name = value;
```

If there is already a value at the given position, the `value` pointer you specified overwrites the old value pointer. However, `mxSetField` does not free the dynamic memory that the old value pointer pointed to. Consequently, you should free this old `mxArray` immediately before or after calling `mxSetField`.

Note Inputs to a MEX-file are constant read-only `mxArrays` and should not be modified. Using `mxSetCell*` or `mxSetField*` to modify the cells or fields of an argument passed from MATLAB causes unpredictable results.

Calling

```
mxSetField(pa, index, "field_name", new_value_pa);
```

is equivalent to calling

```
field_num = mxGetFieldNumber(pa, "field_name");
mxSetFieldByNumber(pa, index, field_num, new_value_pa);
```

Examples

See `mxcreatestructarray.c` in the `mx` subdirectory of the `examples` directory.

See Also

`mxCreateStructArray`, `mxCreateStructMatrix`, `mxGetField`, `mxGetFieldByNumber`, `mxGetFieldNameByNumber`, `mxGetFieldNumber`, `mxGetNumberOfFields`, `mxIsStruct`, `mxSetFieldByNumber`

Purpose Set a field value in a structure array, given a field number and an index

C Syntax

```
#include "matrix.h"
void mxSetFieldByNumber(mxArray *array_ptr, int index,
    int field_number, mxArray *value);
```

Arguments

`array_ptr`
Pointer to a structure `mxArray`. Call `mxIsStruct` to determine if `array_ptr` points to a structure `mxArray`.

`index`
The desired element. The first element of an `mxArray` has an index of 0, the second element has an index of 1, and the last element has an index of `N-1`, where `N` is the total number of elements in the structure `mxArray`. See `mxCalcSingleSubscript` for details on calculating an index.

`field_number`
The position of the field whose value you want to extract. The first field within each element has a `field_number` of 0, the second field has a `field_number` of 1, and so on. The last field has a `field_number` of `N-1`, where `N` is the number of fields.

`value`
The value you are assigning.

Note Inputs to a MEX-file are constant read-only `mxArrays` and should not be modified. Using `mxSetCell*` or `mxSetField*` to modify the cells or fields of an argument passed from MATLAB causes unpredictable results.

Description Use `mxSetFieldByNumber` to assign a `value` to the specified element of the specified field. `mxSetFieldByNumber` is almost identical to `mxSetField`; however, the former takes a field number as its third argument and the latter takes a field name as its third argument.

Calling

```
mxSetField(pa, index, "field_name", new_value_pa);
```

is equivalent to calling

```
field_num = mxGetFieldNumber(pa, "field_name");
mxSetFieldByNumber(pa, index, field_num, new_value_pa);
```

Examples

See `mxcreatestructarray.c` in the `mx` subdirectory of the `examples` directory. For an additional example, see `phonebook.c` in the `refbook` subdirectory of the `examples` directory.

See Also

`mxCreateStructArray`, `mxCreateStructMatrix`, `mxGetField`, `mxGetFieldByNumber`, `mxGetFieldNameByNumber`, `mxGetFieldNumber`, `mxGetNumberOfFields`, `mxIsStruct`, `mxSetField`

Purpose Set imaginary data pointer for an mxArray

C Syntax

```
#include "matrix.h"
void mxSetImagData(mxArray *array_ptr, void *pi);
```

Arguments

array_ptr
Pointer to an mxArray.

pi
Pointer to the first element of an array. Each element in the array contains the imaginary component of a value. The array must be in dynamic memory; call mxCalloc to allocate this dynamic memory. If pi points to static memory, memory errors will result when the array is destroyed.

Description mxSetImagData is similar to mxSetPi, except its pi argument is a void *. Use this on numeric arrays with contents other than double.

Examples See mxisfinite.c in the mx subdirectory of the examples directory.

See Also mxSetPi

mxSetIr

Purpose

Set the ir array of a sparse mxArray

C Syntax

```
#include "matrix.h"
void mxSetIr(mxArray *array_ptr, int *ir);
```

Arguments

array_ptr
Pointer to a sparse mxArray.

ir
Pointer to the ir array. The ir array must be sorted in column-major order.

Description

Use mxSetIr to specify the ir array of a sparse mxArray. The ir array is an array of integers; the length of the ir array should equal the value of nzmax.

Each element in the ir array indicates a row (offset by 1) at which a nonzero element can be found. (The jc array is an index that indirectly specifies a column where nonzero elements can be found. See mxSetJc for more details on jc.)

For example, suppose you create a 7-by-3 sparse mxArray named Sparrow containing six nonzero elements by typing

```
Sparrow = zeros(7,3);
Sparrow(2,1) = 1;
Sparrow(5,1) = 1;
Sparrow(3,2) = 1;
Sparrow(2,3) = 2;
Sparrow(5,3) = 1;
Sparrow(6,3) = 1;
Sparrow = sparse(Sparrow);
```

The pr array holds the real data for the sparse matrix, which in Sparrow is the five 1s and the one 2. If there is any nonzero imaginary data, then it is in a pi array.

Subscript	ir	pr	jc	Comments
(2,1)	1	1	0	Column 1; ir is 1 because row is 2.
(5,1)	4	1	2	Column 1; ir is 4 because row is 5.
(3,2)	2	1	3	Column 2; ir is 2 because row is 3.
(2,3)	1	2	6	Column 3; ir is 1 because row is 2.
(5,3)	4	1		Column 3; ir is 4 because row is 5.
(6,3)	5	1		Column 3; ir is 5 because row is 6.

Notice how each element of the `ir` array is always 1 less than the row of the corresponding nonzero element. For instance, the first nonzero element is in row 2; therefore, the first element in `ir` is 1 (that is, 2-1). The second nonzero element is in row 5; therefore, the second element in `ir` is 4 (5-1).

The `ir` array must be in column-major order. That means that the `ir` array must define the row positions in column 1 (if any) first, then the row positions in column 2 (if any) second, and so on through column N. Within each column, row position 1 must appear prior to row position 2, and so on.

`mxSetIr` does not sort the `ir` array for you; you must specify an `ir` array that is already sorted.

Examples

See `mxsetnzmax.c` in the `mx` subdirectory of the `examples` directory. For an additional example, see `explore.c` in the `mex` subdirectory of the `examples` directory.

See Also

`mxCreateSparse`, `mxGetIr`, `mxGetJc`, `mxSetJc`

mxSetJc

Purpose

Set the jc array of a sparse mxArray

C Syntax

```
#include "matrix.h"
void mxSetJc(mxArray *array_ptr, int *jc);
```

Arguments

array_ptr
Pointer to a sparse mxArray.

jc
Pointer to the jc array.

Description

Use mxSetJc to specify a new jc array for a sparse mxArray. The jc array is an integer array having n+1 elements where n is the number of columns in the sparse mxArray. The values in the jc array have the meanings:

- jc[j] is the index in ir, pr (and pi if it exists) of the first nonzero entry in the jth column.
- jc[j+1]-1 is the index of the last nonzero entry in the jth column.
- jc[number of columns + 1] is equal to nnz, which is the number of nonzero entries in the entire spare mxArray.

The number of nonzero elements in any column (denoted as column C) is

```
jc[C] - jc[C-1];
```

For example, consider a 7-by-3 sparse mxArray named Sparrow containing six nonzero elements, created by typing

```
Sparrow = zeros(7,3);
Sparrow(2,1) = 1;
Sparrow(5,1) = 1;
Sparrow(3,2) = 1;
Sparrow(2,3) = 2;
Sparrow(5,3) = 1;
Sparrow(6,3) = 1;
Sparrow = sparse(Sparrow);
```

The contents of the `ir`, `jc`, and `pr` arrays are:

Subscript	ir	pr	jc	Comment
(2,1)	1	1	0	Column 1 contains two entries, at `ir[0]`,`ir[1]`
(5,1)	4	1	2	Column 2 contains one entry, at `ir[2]`
(3,2)	2	1	3	Column 3 contains three entries, at `ir[3]`,`ir[4]`, `ir[5]`
(2,3)	1	2	6	There are six nonzero elements.
(5,3)	4	1		
(6,3)	5	1		

As an example of a much sparser `mxArray`, consider an 8,000 element sparse `mxArray` named `Spacious` containing only three nonzero elements. The `ir`, `pr`, and `jc` arrays contain:

Subscript	ir	pr	jc	Comment
(73,2)	72	1	0	Column 1 contains zero entries
(50,3)	49	1	0	Column 2 contains one entry, at `ir[0]`
(64,5)	63	1	1	Column 3 contains one entry, at `ir[1]`
			2	Column 4 contains zero entries.
			2	Column 5 contains one entry, at `ir[3]`
			3	Column 6 contains zero entries.
			3	Column 7 contains zero entries.
			3	Column 8 contains zero entries.
			3	There are three nonzero elements.

Examples

See `mxsetdimensions.c` in the `mx` subdirectory of the `examples` directory. For an additional example, see `explore.c` in the `mex` subdirectory of the `examples` directory.

See Also

`mxGetIr`, `mxGetJc`, `mxSetIr`

mxSetLogical (Obsolete)

Purpose

Convert an mxArray to logical type

Note As of MATLAB version 6.5, mxSetLogical is obsolete. Support for mxSetLogical may be removed in a future version.

C Syntax

```
#include "matrix.h"
void mxSetLogical(mxArray *array_ptr);
```

Arguments

array_ptr
Pointer to an mxArray having a numeric class.

Description

Use mxSetLogical to turn on an mxArray's logical flag. This flag tells MATLAB that the array's data is to be treated as Boolean. If the logical flag is on, then MATLAB treats a 0 value as meaning false and a nonzero value as meaning true. For additional information on the use of logical variables in MATLAB, type help logical at the MATLAB prompt.

Examples

See mxislogical.c in the mx subdirectory of the examples directory.

See Also

mxCreateLogicalScalar, mxCreateLogicalMatrix, mxCreateLogicalArray, mxCreateSparseLogicalMatrix

mxSetM

Purpose
Set the number of rows

C Syntax

```
#include "matrix.h"
void mxSetM(mxArray *array_ptr, int m);
```

Arguments

`m`
The desired number of rows.

`array_ptr`
Pointer to an `mxArray`.

Description

Call `mxSetM` to set the number of rows in the specified `mxArray`. The term "rows" means the first dimension of an `mxArray`, regardless of the number of dimensions. Call `mxSetN` to set the number of columns.

You typically use `mxSetM` to change the shape of an existing `mxArray`. Note that `mxSetM` does not allocate or deallocate any space for the `pr`, `pi`, `ir`, or `jc` arrays. Consequently, if your calls to `mxSetM` and `mxSetN` increase the number of elements in the `mxArray`, then you must enlarge the `pr`, `pi`, `ir`, and/or `jc` arrays. Call `mxRealloc` to enlarge them.

If your calls to `mxSetM` and `mxSetN` end up reducing the number of elements in the `mxArray`, then you may want to reduce the sizes of the `pr`, `pi`, `ir`, and/or `jc` arrays in order to use heap space more efficiently. However, reducing the size is not mandatory.

Examples

See `mxsetdimensions.c` in the `mx` subdirectory of the `examples` directory. For an additional example, see `sincall.c` in the `refbook` subdirectory of the `examples` directory.

See Also

`mxGetM`, `mxGetN`, `mxSetN`

Purpose Set the number of columns

C Syntax

```
#include "matrix.h"
void mxSetN(mxArray *array_ptr, int n);
```

Arguments

`array_ptr`
Pointer to an `mxArray`.

`n`
The desired number of columns.

Description

Call `mxSetN` to set the number of columns in the specified `mxArray`. The term "columns" always means the second dimension of a matrix. Calling `mxSetN` forces an `mxArray` to have two dimensions. For example, if `array_ptr` points to an `mxArray` having three dimensions, calling `mxSetN` reduces the `mxArray` to two dimensions.

You typically use `mxSetN` to change the shape of an existing `mxArray`. Note that `mxSetN` does not allocate or deallocate any space for the `pr`, `pi`, `ir`, or `jc` arrays. Consequently, if your calls to `mxSetN` and `mxSetM` increase the number of elements in the `mxArray`, then you must enlarge the `pr`, `pi`, `ir`, and/or `jc` arrays.

If your calls to `mxSetM` and `mxSetN` end up reducing the number of elements in the `mxArray`, then you may want to reduce the sizes of the `pr`, `pi`, `ir`, and/or `jc` arrays in order to use heap space more efficiently. However, reducing the size is not mandatory.

Examples

See `mxsetdimensions.c` in the `mx` subdirectory of the `examples` directory. For an additional example, see `sincall.c` in the `refbook` subdirectory of the `examples` directory.

See Also

`mxGetM`, `mxGetN`, `mxSetM`

mxSetName (Obsolete)

V5 Compatible

This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the `-V5` option of the `mex` script.

Replacing mxSetName when used with mexPutArray

To copy an `mxArray` to a workspace, use

```
mexPutVariable(workspace, var_name, array_ptr);
```

instead of

```
mxSetName(array_ptr, var_name);
mexPutArray(array_ptr, workspace);
```

Replacing mxSetName when used with matPutArray

To write an `mxArray` to a MAT-file, use

```
matPutVariable(mfp, var_name, array_ptr);
```

instead of

```
mxSetName(array_ptr, var_name);
matPutArray(mfp, array_ptr);
```

Replacing mxSetName when used with engPutArray

To copy an `mxArray` into the workspace of a MATLAB engine, use

```
engPutVariable(ep, var_name, array_ptr);
```

instead of

```
mxSetName(array_ptr, var_name);
engPutArray(ep, array_ptr);
```

Purpose

Set the storage space for nonzero elements

C Syntax

```
#include "matrix.h"
void mxSetNzmax(mxArray *array_ptr, int nzmax);
```

Arguments

`array_ptr`
Pointer to a sparse `mxArray`.

`nzmax`
The number of elements that `mxCreateSparse` should allocate to hold the arrays pointed to by `ir`, `pr`, and `pi` (if it exists). Set `nzmax` greater than or equal to the number of nonzero elements in the `mxArray`, but set it to be less than or equal to the number of rows times the number of columns. If you specify an `nzmax` value of 0, `mxSetNzmax` sets the value of `nzmax` to 1.

Description

Use `mxSetNzmax` to assign a new value to the `nzmax` field of the specified sparse `mxArray`. The `nzmax` field holds the maximum possible number of nonzero elements in the sparse `mxArray`.

The number of elements in the `ir`, `pr`, and `pi` (if it exists) arrays must be equal to `nzmax`. Therefore, after calling `mxSetNzmax`, you must change the size of the `ir`, `pr`, and `pi` arrays. To change the size of one of these arrays:

1. Call `mxCalloc`, setting `n` to the new value of `nzmax`.
2. Call the ANSI C routine `memcpy` to copy the contents of the old array to the new area allocated in Step 1.
3. Call `mxFree` to free the memory occupied by the old array.
4. Call the appropriate `mxSet` routine (`mxSetIr`, `mxSetPr`, or `mxSetPi`) to establish the new memory area as the current one.

Two ways of determining how big you should make `nzmax` are

- Set `nzmax` equal to or slightly greater than the number of nonzero elements in a sparse `mxArray`. This approach conserves precious heap space.
- Make `nzmax` equal to the total number of elements in an `mxArray`. This approach eliminates (or, at least reduces) expensive reallocations.

Examples

See `mxsetnzmax.c` in the `mx` subdirectory of the `examples` directory.

See Also `mxGetNzmax`

Purpose

Set new imaginary data for an mxArray

C Syntax

```
#include "matrix.h"
void mxSetPi(mxArray *array_ptr, double *pi);
```

Arguments

`array_ptr`
Pointer to a full (nonsparse) mxArray.

`pi`
Pointer to the first element of an array. Each element in the array contains the imaginary component of a value. The array must be in dynamic memory; call `mxCalloc` to allocate this dynamic memory. If `pi` points to static memory, memory leaks and other memory errors may result.

Description

Use `mxSetPi` to set the imaginary data of the specified `mxArray`.

Most `mxCreate` functions optionally allocate heap space to hold imaginary data. If you tell an `mxCreate` function to allocate heap space (for example, by setting the `ComplexFlag` to `mxComplex` or by setting `pi` to a non-`NULL` value), then you do not ordinarily use `mxSetPi` to initialize the created `mxArray's` imaginary elements. Rather, you call `mxSetPi` to replace the initial imaginary values with new ones.

Examples

See `mxisfinite.c` and `mxsetnzmax.c` in the `mx` subdirectory of the `examples` directory.

See Also

`mxSetImagData`, `mxGetPi`, `mxGetPr`, `mxSetPr`

mxSetPr

Purpose Set new real data for an `mxArray`

C Syntax

```
#include "matrix.h"
void mxSetPr(mxArray *array_ptr, double *pr);
```

Arguments

`array_ptr`
Pointer to a full (nonsparse) `mxArray`.

`pr`
Pointer to the first element of an array. Each element in the array contains the real component of a value. The array must be in dynamic memory; call `mxCalloc` to allocate this dynamic memory. If `pr` points to static memory, then memory leaks and other memory errors may result.

Description Use `mxSetPr` to set the real data of the specified `mxArray`.

All `mxCreate` calls allocate heap space to hold real data. Therefore, you do not ordinarily use `mxSetPr` to initialize the real elements of a freshly-created `mxArray`. Rather, you call `mxSetPr` to replace the initial real values with new ones.

Examples See `mxsetnzmax.c` in the `mx` subdirectory of the `examples` directory.

See Also `mxGetPr`, `mxGetPi`, `mxSetPi`

C MEX-Functions

`mexAddFlops (Obsolete)`	Update the MATLAB internal floating-point operations counter
`mexAtExit`	Register function to be called when MATLAB is cleared or terminates
`mexCallMATLAB`	Call MATLAB function or user-defined M-file or MEX-file
`mexErrMsgIdAndTxt`	Issue error message with identifier and return to MATLAB
`mexErrMsgTxt`	Issue error message and return to MATLAB
`mexEvalString`	Execute MATLAB command in caller's workspace
`mexFunction`	Entry point to C MEX-file
`mexFunctionName`	Name of current MEX-function
`mexGet`	Get value of Handle Graphics® property
`mexGetArray (Obsolete)`	Use `mexGetVariable`
`mexGetArrayPtr (Obsolete)`	Use `mexGetVariablePtr`
`mexGetEps (Obsolete)`	Use `mxGetEps`
`mexGetFull (Obsolete)`	Use `mexGetVariable`, `mxGetM`, `mxGetN`, `mxGetPr`, `mxGetPi`
`mexGetGlobal (Obsolete)`	Use `mexGetVariablePtr`
`mexGetInf (Obsolete)`	Use `mxGetInf`
`mexGetMatrix (Obsolete)`	Use `mexGetVariable`
`mexGetMatrixPtr (Obsolete)`	Use `mexGetVariablePtr`
`mexGetNaN (Obsolete)`	Use `mxGetNaN`
`mexGetVariable`	Get copy of variable from another workspace
`mexGetVariablePtr`	Get read-only pointer to variable from another workspace
`mexIsFinite (Obsolete)`	Use `mxIsFinite`
`mexIsGlobal`	True if `mxArray` has global scope
`mexIsInf (Obsolete)`	Use `mxIsInf`
`mexIsLocked`	True if MEX-file is locked

`mexIsNaN (Obsolete)`	Use `mxIsNaN`
`mexLock`	Lock MEX-file so it cannot be cleared from memory
`mexMakeArrayPersistent`	Make `mxArray` persist after MEX-file completes
`mexMakeMemoryPersistent`	Make memory allocated by MATLAB memory allocation routines persist after MEX-file completes
`mexPrintf`	ANSI C `printf`-style output routine
`mexPutArray (Obsolete)`	Use `mexPutVariable`
`mexPutFull (Obsolete)`	Use `mxCreateDoubleMatrix`, `mxSetPr`, `mxSetPi`, `mexPutVariable`
`mexPutMatrix (Obsolete)`	Use `mexPutVariable`
`mexPutVariable`	Copy `mxArray` from your MEX-file into another workspace
`mexSet`	Set value of Handle Graphics property
`mexSetTrapFlag`	Control response of `mexCallMATLAB` to errors
`mexUnlock`	Unlock MEX-file so it can be cleared from memory
`mexWarnMsgIdAndTxt`	Issue warning message with identifier
`mexWarnMsgTxt`	Issue warning message

Compatibility This API function is obsolete and should not be used in any MATLAB program. This function will not be available in a future version of MATLAB.

mexAtExit

Purpose Register a function to be called when the MEX-function is cleared or when MATLAB terminates

C Syntax

```
#include "mex.h"
int mexAtExit(void (*ExitFcn)(void));
```

Arguments

`ExitFcn`
Pointer to function you want to run on exit.

Returns Always returns 0.

Description Use `mexAtExit` to register a C function to be called just before the MEX-function is cleared or MATLAB is terminated. `mexAtExit` gives your MEX-function a chance to perform tasks such as freeing persistent memory and closing files. Typically, the named `ExitFcn` performs tasks like closing streams or sockets.

Each MEX-function can register only one active exit function at a time. If you call `mexAtExit` more than once, MATLAB uses the `ExitFcn` from the more recent `mexAtExit` call as the exit function.

If a MEX-function is locked, all attempts to clear the MEX-file will fail. Consequently, if a user attempts to clear a locked MEX-file, MATLAB does not call the `ExitFcn`.

Examples See `mexatexit.c` in the `mex` subdirectory of the `examples` directory.

See Also `mexLock`, `mexUnlock`

Purpose

Call a MATLAB function, or a user-defined M-file or MEX-file

C Syntax

```
#include "mex.h"
int mexCallMATLAB(int nlhs, mxArray *plhs[], int nrhs,
    mxArray *prhs[], const char *command_name);
```

Arguments

`nlhs`
Number of desired output arguments. This value must be less than or equal to 50.

`plhs`
Pointer to an array of `mxArrays`. The called command puts pointers to the resultant `mxArrays` into `plhs`. Note that the called command allocates dynamic memory to store the resultant `mxArrays`. By default, MATLAB automatically deallocates this dynamic memory when you clear the MEX-file. However, if heap space is at a premium, you may want to call `mxDestroyArray` as soon as you are finished with the `mxArrays` that `plhs` points to.

`nrhs`
Number of input arguments. This value must be less than or equal to 50.

`prhs`
Pointer to an array of input arguments.

`command_name`
Character string containing the name of the MATLAB built-in, operator, M-file, or MEX-file that you are calling. If `command_name` is an operator, just place the operator inside a pair of single quotes; for example, `'+'`.

Returns

0 if successful, and a nonzero value if unsuccessful.

Description

Call `mexCallMATLAB` to invoke internal MATLAB numeric functions, MATLAB operators, M-files, or other MEX-files. See `mexFunction` for a complete description of the arguments.

By default, if `command_name` detects an error, MATLAB terminates the MEX-file and returns control to the MATLAB prompt. If you want a different error behavior, turn on the trap flag by calling `mexSetTrapFlag`.

Note that it is possible to generate an object of type `mxUNKNOWN_CLASS` using `mexCallMATLAB`. For example, if you create an M-file that returns two variables but only assigns one of them a value,

```
function [a,b]=foo(c)
a=2*c;
```

you get this warning message in MATLAB:

```
Warning: One or more output arguments not assigned during call to
'foo'.
```

MATLAB assigns output `b` to an empty matrix. If you then call `foo` using `mexCallMATLAB`, the unassigned output variable is given type `mxUNKNOWN_CLASS`.

Examples

See `mexcallmatlab.c` in the `mex` subdirectory of the `examples` directory.

For additional examples, see `sincall.c` in the `refbook` subdirectory of the `examples` directory; see `mexevalstring.c` and `mexsettrapflag.c` in the `mex` subdirectory of the `examples` directory; see `mxcreatecellmatrix.c` and `mxisclass.c` in the `mx` subdirectory of the `examples` directory.

See Also

`mexFunction`, `mexSetTrapFlag`

Purpose

Issue error message with identifier and return to the MATLAB prompt

C Syntax

```
#include "mex.h"
void mexErrMsgIdAndTxt(const char *identifier,
  const char *error_msg, ...);
```

Arguments

`identifier`
String containing a MATLAB message identifier. See “Message Identifiers” in the MATLAB documentation for information on this topic.

`error_msg`
String containing the error message to be displayed. The string may include formatting conversion characters, such as those used with the ANSI C `sprintf` function.

`...`
Any additional arguments needed to translate formatting conversion characters used in `error_msg`. Each conversion character in `error_msg` is converted to one of these values.

Description

Call `mexErrMsgIdAndTxt` to write an error message and its corresponding identifier to the MATLAB window. After the error message prints, MATLAB terminates the MEX-file and returns control to the MATLAB prompt.

Calling `mexErrMsgIdAndTxt` does not clear the MEX-file from memory. Consequently, `mexErrMsgIdAndTxt` does not invoke the function registered through `mexAtExit`.

If your application called `mxCalloc` or one of the `mxCreate` routines to allocate memory, `mexErrMsgIdAndTxt` automatically frees the allocated memory.

Note If you get warnings when using `mexErrMsgIdAndTxt`, you may have a memory management compatibility problem. For more information, see “Memory Management Compatibility Issues” in the External Interfaces documentation.

See Also

`mexErrMsgTxt`, `mexWarnMsgIdAndTxt`, `mexWarnMsgTxt`

mexErrMsgTxt

Purpose

Issue error message and return to the MATLAB prompt

C Syntax

```
#include "mex.h"
void mexErrMsgTxt(const char *error_msg);
```

Arguments

`error_msg`
String containing the error message to be displayed.

Description

Call `mexErrMsgTxt` to write an error message to the MATLAB window. After the error message prints, MATLAB terminates the MEX-file and returns control to the MATLAB prompt.

Calling `mexErrMsgTxt` does not clear the MEX-file from memory. Consequently, `mexErrMsgTxt` does not invoke the function registered through `mexAtExit`.

If your application called `mxCalloc` or one of the `mxCreate` routines to allocate memory, `mexErrMsgTxt` automatically frees the allocated memory.

Note If you get warnings when using `mexErrMsgTxt`, you may have a memory management compatibility problem. For more information, see Memory Management Compatibility Issues.

Examples

See `xtimesy.c` in the `refbook` subdirectory of the `examples` directory.

For additional examples, see `convec.c`, `findnz.c`, `fulltosparse.c`, `phonebook.c`, `revord.c`, and `timestwo.c` in the `refbook` subdirectory of the `examples` directory.

See Also

`mexErrMsgIdAndTxt`, `mexWarnMsgTxt`, `mexWarnMsgIdAndTxt`

Purpose

Execute a MATLAB command in the workspace of the caller

C Syntax

```
#include "mex.h"
int mexEvalString(const char *command);
```

Arguments

`command`
A string containing the MATLAB command to execute.

Returns

0 if successful, and a nonzero value if unsuccessful.

Description

Call `mexEvalString` to invoke a MATLAB `command` in the workspace of the caller.

`mexEvalString` and `mexCallMATLAB` both execute MATLAB commands. However, `mexCallMATLAB` provides a mechanism for returning results (left-hand side arguments) back to the MEX-file; `mexEvalString` provides no way for return values to be passed back to the MEX-file.

All arguments that appear to the right of an equals sign in the `command` string must already be current variables of the caller's workspace.

Examples

See `mexevalstring.c` in the `mex` subdirectory of the `examples` directory.

See Also

`mexCallMATLAB`

mexFunction

Purpose Entry point to a C MEX-file

C Syntax

```
#include "mex.h"
void mexFunction(int nlhs, mxArray *plhs[], int nrhs,
     const mxArray *prhs[]);
```

Arguments

`nlhs`
MATLAB sets `nlhs` with the number of expected `mxArrays`.

`plhs`
MATLAB sets `plhs` to a pointer to an array of NULL pointers.

`nrhs`
MATLAB sets `nrhs` to the number of input `mxArrays`.

`prhs`
MATLAB sets `prhs` to a pointer to an array of input `mxArrays`. `These mxArrays` are declared as `constant`; they are read only and should not be modified by your MEX-file. Changing the data in these `mxArrays` may produce undesired side effects.

Description

`mexFunction` is not a routine you call. Rather, `mexFunction` is the generic name of the function entry point that must exist in every C source MEX-file. When you invoke a MEX-function, MATLAB finds and loads the corresponding MEX-file of the same name. MATLAB then searches for a symbol named `mexFunction` within the MEX-file. If it finds one, it calls the MEX-function using the address of the `mexFunction` symbol. If MATLAB cannot find a routine named `mexFunction` inside the MEX-file, it issues an error message.

When you invoke a MEX-file, MATLAB automatically seeds `nlhs`, `plhs`, `nrhs`, and `prhs` with the caller's information. In the syntax of the MATLAB language, functions have the general form

```
[a,b,c,...] = fun(d,e,f,...)
```

where the   denotes more items of the same format. The `a,b,c...` are left-hand side arguments and the `d,e,f...` are right-hand side arguments. The arguments `nlhs` and `nrhs` contain the number of left-hand side and right-hand side arguments, respectively, with which the MEX-function is called. `prhs` is a pointer to a length `nrhs` array of pointers to the right-hand side `mxArrays`. `plhs` is a pointer to a length `nlhs` array where your C function must put pointers for the returned left-hand side `mxArrays`.

Examples

See `mexfunction.c` in the `mex` subdirectory of the `examples` directory.

mexFunctionName

Purpose Gives the name of the current MEX-function

C Syntax

```
#include "mex.h"
const char *mexFunctionName(void);
```

Arguments `none`

Returns The name of the current MEX-function.

Description `mexFunctionName` returns the name of the current MEX-function.

Examples See `mexgetarray.c` in the `mex` subdirectory of the `examples` directory.

Purpose Get the value of the specified Handle Graphics® property

C Syntax

```
#include "mex.h"
const mxArray *mexGet(double handle, const char *property);
```

Arguments

`handle`
Handle to a particular graphics object.

`property`
A Handle Graphics property.

Returns The value of the specified property in the specified graphics object on success. Returns `NULL` on failure. The return argument from `mexGet` is declared as `constant`, meaning that it is read only and should not be modified. Changing the data in these `mxArrays` may produce undesired side effects.

Description Call `mexGet` to get the value of the property of a certain graphics object. `mexGet` is the API equivalent of the MATLAB `get` function. To set a graphics property value, call `mexSet`.

Examples See `mexget.c` in the `mex` subdirectory of the `examples` directory.

See Also `mexSet`

mexGetArray (Obsolete)

V5 Compatible

This API function is obsolete and should not be used in a program that interfaces with MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the `-V5` option of the `mex` script.

Use

```
mexGetVariable(workspace, var_name);
```

instead of

```
mexGetArray(var_name, workspace);
```

See Also

`mexGetVariable`

V5 Compatible

This API function is obsolete and should not be used in a program that interfaces with MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the `-V5` option of the `mex` script.

Use

```
mexGetVariablePtr(workspace, var_name);
```

instead of

```
mexGetArrayPtr(var_name, workspace);
```

See Also

`mexGetVariable`

mexGetEps (Obsolete)

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
eps = mxGetEps();
```

instead of

```
eps = mexGetEps();
```

See Also mxGetEps

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
array_ptr = mexGetVariable("caller", name);
m = mxGetM(array_ptr);
n = mxGetN(array_ptr);
pr = mxGetPr(array_ptr);
pi = mxGetPi(array_ptr);
```

instead of

```
mexGetFull(name, m, n, pr, pi);
```

See Also `mexGetVariable`, `mxGetPr`, `mxGetPi`

mexGetGlobal (Obsolete)

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
mexGetVariablePtr("global", name);
```

instead of

```
mexGetGlobal(name);
```

See Also mexGetVariable, mxGetName (Obsolete), mxGetPr, mxGetPi

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
inf = mxGetInf();
```

instead of

```
inf = mexGetInf();
```

See Also

mxGetInf

mexGetMatrix (Obsolete)

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
mexGetVariable("caller", name);
```

instead of

```
mexGetMatrix(name);
```

See Also `mexGetVariable`

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
mexGetVariablePtr("caller", name);
```

instead of

```
mexGetMatrixPtr(name);
```

See Also

mexGetVariablePtr

mexGetNaN (Obsolete)

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
NaN = mxGetNaN();
```

instead of

```
NaN = mexGetNaN();
```

See Also mxGetNaN

Purpose Get a copy of a variable from the specified workspace

C Syntax

```
#include "mex.h"
mxArray *mexGetVariable(const char *workspace, const char
   *var_name);
```

Arguments

workspace
Specifies where mexGetVariable should search in order to find array, var_name. The possible values are

base	Search for the variable in the base workspace
caller	Search for the variable in the caller's workspace
global	Search for the variable in the global workspace

var_name
Name of the variable to copy.

Returns A copy of the variable on success. Returns NULL on failure. A common cause of failure is specifying a variable that is not currently in the workspace. Perhaps the variable was in the workspace at one time but has since been cleared.

Description Call mexGetVariable to get a copy of the specified variable. The returned mxArray contains a copy of all the data and characteristics that the variable had in the other workspace. Modifications to the returned mxArray do not affect the variable in the workspace unless you write the copy back to the workspace with mexPutVariable.

Examples See mexgetarray.c in the mex subdirectory of the examples directory.

See Also mexGetVariablePtr, mexPutVariable

mexGetVariablePtr

Purpose Get a read-only pointer to a variable from another workspace

C Syntax

```
#include "mex.h"
const mxArray *mexGetVariablePtr(const char *workspace,
  const char *var_name);
```

Arguments

workspace
Specifies which workspace you want mexGetVariablePtr to search. The possible values are:

base	Search for the variable in the base workspace
caller	Search for the variable in the caller's workspace
global	Search for the variable in the global workspace

var_name
Name of a variable in another workspace. (Note that this is a variable name, not an mxArray pointer.)

Returns A read-only pointer to the mxArray on success. Returns NULL on failure.

Description Call mexGetVariablePtr to get a read-only pointer to the specified variable, var_name, into your MEX-file's workspace. This command is useful for examining an mxArray's data and characteristics. If you need to change data or characteristics, use mexGetVariable (along with mexPutVariable) instead of mexGetVariablePtr.

If you simply need to examine data or characteristics, mexGetVariablePtr offers superior performance as the caller need pass only a pointer to the array.

Examples See mxislogical.c in the mx subdirectory of the examples directory.

See Also mexGetVariable

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
answer = mxIsFinite(value);
```

instead of

```
answer = mexIsFinite(value);
```

See Also mxIsFinite

mexIsGlobal

Purpose True if `mxArray` has global scope

C Syntax

```
#include "matrix.h"
bool mexIsGlobal(const mxArray *array_ptr);
```

Arguments

`array_ptr`
Pointer to an `mxArray`.

Returns `True` if the `mxArray` has global scope, and `false` otherwise.

Description Use `mexIsGlobal` to determine if the specified `mxArray` has global scope.

Examples See `mxislogical.c` in the `mx` subdirectory of the `examples` directory.

See Also `mexGetVariable`, `mexGetVariablePtr`, `mexPutVariable`, `global`

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
answer = mxIsInf(value);
```

instead of

```
answer = mexIsInf(value);
```

See Also mxIsInf

mexIsLocked

Purpose Determine if this MEX-file is locked

C Syntax

```
#include "mex.h"
bool mexIsLocked(void);
```

Returns `True` if the MEX-file is locked; `False` if the file is unlocked.

Description Call `mexIsLocked` to determine if the MEX-file is locked. By default, MEX-files are unlocked, meaning that users can clear the MEX-file at any time.

To unlock a MEX-file, call `mexUnlock`.

Examples See `mexlock.c` in the `mex` subdirectory of the `examples` directory.

See Also `mexLock`, `mexMakeArrayPersistent`, `mexMakeMemoryPersistent`, `mexUnlock`

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
answer = mxIsNaN(value);
```

instead of

```
answer = mexIsNaN(value);
```

See Also mxIsInf

mexLock

Purpose Lock a MEX-file so that it cannot be cleared from memory

C Syntax

```
#include "mex.h"
void mexLock(void);
```

Description By default, MEX-files are unlocked, meaning that a user can clear them at any time. Call `mexLock` to prohibit a MEX-file from being cleared.

To unlock a MEX-file, call `mexUnlock`.

`mexLock` increments a lock count. If you call `mexLock` `n` times, you must call `mexUnlock` `n` times to unlock your MEX-file.

Examples See `mexlock.c` in the `mex` subdirectory of the `examples` directory.

See Also `mexIsLocked`, `mexMakeArrayPersistent`, `mexMakeMemoryPersistent`, `mexUnlock`

Purpose Make an `mxArray` persist after the MEX-file completes

C Syntax

```
#include "mex.h"
void mexMakeArrayPersistent(mxArray *array_ptr);
```

Arguments

`array_ptr`
Pointer to an `mxArray` created by an `mxCreate*` routine.

Description By default, `mxArrays` allocated by `mxCreate*` routines are not persistent. The MATLAB memory management facility automatically frees nonpersistent `mxArrays` when the MEX-function finishes. If you want the `mxArray` to persist through multiple invocations of the MEX-function, you must call `mexMakeArrayPersistent`.

Note If you create a persistent `mxArray`, you are responsible for destroying it when the MEX-file is cleared. If you do not destroy a persistent `mxArray`, MATLAB will leak memory. See `mexAtExit` to see how to register a function that gets called when the MEX-file is cleared. See `mexLock` to see how to lock your MEX-file so that it is never cleared.

See Also `mexAtExit`, `mexLock`, `mexMakeMemoryPersistent`, and the `mxCreate` functions.

Purpose

Make memory allocated by MATLAB memory allocation routines (`mxCalloc`, `mxMalloc`, `mxRealloc`) persist after the MEX-function completes

C Syntax

```
#include "mex.h"
void mexMakeMemoryPersistent(void *ptr);
```

Arguments

`ptr`
Pointer to the beginning of memory allocated by one of the MATLAB memory allocation routines.

Description

By default, memory allocated by MATLAB is nonpersistent, so it is freed automatically when the MEX-file finishes. If you want the memory to persist, you must call `mexMakeMemoryPersistent`.

Note If you create persistent memory, you are responsible for freeing it when the MEX-function is cleared. If you do not free the memory, MATLAB will leak memory. To free memory, use `mxFree`. See `mexAtExit` to see how to register a function that gets called when the MEX-function is cleared. See `mexLock` to see how to lock your MEX-function so that it is never cleared.

See Also

`mexAtExit`, `mexLock`, `mexMakeArrayPersistent`, `mxCalloc`, `mxFree`, `mxMalloc`, `mxRealloc`

Purpose

ANSI C `printf`-style output routine

C Syntax

```
#include "mex.h"
int mexPrintf(const char *format, ...);
```

Arguments

`format, ...`
ANSI C `printf`-style format string and optional arguments.

Returns

The number of characters printed. This includes characters specified with backslash codes, such as `\n` and `\b`.

Description

This routine prints a string on the screen and in the diary (if the diary is in use). It provides a callback to the standard C `printf` routine already linked inside MATLAB, and avoids linking the entire `stdio` library into your MEX-file.

In a MEX-file, you must call `mexPrintf` instead of `printf`.

Examples

See `mexfunction.c` in the `mex` subdirectory of the `examples` directory. For an additional example, see `phonebook.c` in the `refbook` subdirectory of the `examples` directory.

See Also

`mexErrMsgTxt`, `mexWarnMsgTxt`

mexPutArray (Obsolete)

V5 Compatible

This API function is obsolete and should not be used in a program that interfaces with MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the `-V5` option of the `mex` script.

Use

```
mexPutVariable(workspace, var_name, array_ptr);
```

instead of

```
mxSetName(array_ptr, var_name);
mexPutArray(array_ptr, workspace);
```

See Also

`mexPutVariable`

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
array_ptr = mxCreateDoubleMatrix(m, n, mxREAL/mxCOMPLEX);
mxSetPr(array_ptr, pr);
mxSetPi(array_ptr, pi);
mexPutVariable("caller", name, array_ptr);
```

instead of

```
mexPutFull(name, m, n, pr, pi);
```

See Also

mxSetM, mxSetN, mxSetPr, mxSetPi, mexPutVariable

mexPutMatrix (Obsolete)

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
mexPutVariable("caller", var_name, array_ptr);
```

instead of

```
mexPutMatrix(matrix_ptr);
```

See Also

mexPutVariable

Purpose

Copy an mxArray from your MEX-function into the specified workspace

C Syntax

```
#include "mex.h"
int mexPutVariable(const char *workspace, const char *var_name,
   const mxArray *array_ptr);
```

Arguments

workspace
Specifies the scope of the array that you are copying. The possible values are

base	Copy mxArray to the base workspace
caller	Copy mxArray to the caller's workspace
global	Copy mxArray to the list of global variables

var_name
Name given to the mxArray in the workspace.

array_ptr
Pointer to the mxArray.

Returns

0 on success; 1 on failure. A possible cause of failure is that array_ptr is NULL.

Description

Call mexPutVariable to copy the mxArray, at pointer array_ptr, from your MEX-function into the specified workspace. MATLAB gives the name, var_name, to the copied mxArray in the receiving workspace.

mexPutVariable makes the array accessible to other entities, such as MATLAB, M-files or other MEX-functions.

If a variable of the same name already exists in the specified workspace, mexPutVariable overwrites the previous contents of the variable with the contents of the new mxArray. For example, suppose the MATLAB workspace defines variable Peaches as

```
Peaches
1     2     3     4
```

and you call mexPutVariable to copy Peaches into the same workspace:

```
mexPutVariable("base", "Peaches", array_ptr)
```

Then the old value of `Peaches` disappears and is replaced by the value passed in by `mexPutVariable`.

Examples See `mexgetarray.c` in the `mex` subdirectory of the `examples` directory.

See Also `mexGetVariable`

Purpose

Set the value of the specified Handle Graphics property

C Syntax

```
#include "mex.h"
int mexSet(double handle, const char *property,
           mxArray *value);
```

Arguments

`handle`
Handle to a particular graphics object.

`property`
String naming a Handle Graphics property.

`value`
Pointer to an `mxArray` holding the new value to assign to the property.

Returns

0 on success; 1 on failure. Possible causes of failure include:

- Specifying a nonexistent property.
- Specifying an illegal value for that property. For example, specifying a string value for a numerical property.

Description

Call `mexSet` to set the value of the property of a certain graphics object. `mexSet` is the API equivalent of the MATLAB `set` function. To get the value of a graphics property, call `mexGet`.

Examples

See `mexget.c` in the `mex` subdirectory of the `examples` directory.

See Also

`mexGet`

mexSetTrapFlag

Purpose Control response of mexCallMATLAB to errors

C Syntax

```
#include "mex.h"
void mexSetTrapFlag(int trap_flag);
```

Arguments trap_flag

Control flag. Currently, the only legal values are:

0 On error, control returns to the MATLAB prompt.

1 On error, control returns to your MEX-file.

Description Call mexSetTrapFlag to control the MATLAB response to errors in mexCallMATLAB.

If you do not call mexSetTrapFlag, then whenever MATLAB detects an error in a call to mexCallMATLAB, MATLAB automatically terminates the MEX-file and returns control to the MATLAB prompt. Calling mexSetTrapFlag with trap_flag set to 0 is equivalent to not calling mexSetTrapFlag at all.

If you call mexSetTrapFlag and set the trap_flag to 1, then whenever MATLAB detects an error in a call to mexCallMATLAB, MATLAB does not automatically terminate the MEX-file. Rather, MATLAB returns control to the line in the MEX-file immediately following the call to mexCallMATLAB. The MEX-file is then responsible for taking an appropriate response to the error.

Examples See mexsettrapflag.c in the mex subdirectory of the examples directory.

See Also mexAtExit, mexErrMsgTxt

Purpose Unlock this MEX-file so that it can be cleared from memory

C Syntax

```
#include "mex.h"
void mexUnlock(void);
```

Description By default, MEX-files are unlocked, meaning that a user can clear them at any time. Calling `mexLock` locks a MEX-file so that it cannot be cleared. Calling `mexUnlock` removes the lock so that the MEX-file can be cleared.

`mexLock` increments a lock count. If you called `mexLock` `n` times, you must call `mexUnlock` `n` times to unlock your MEX-file.

Examples See `mexlock.c` in the `mex` subdirectory of the `examples` directory.

See Also `mexIsLocked`, `mexLock`, `mexMakeArrayPersistent`, `mexMakeMemoryPersistent`

mexWarnMsgIdAndTxt

Purpose

Issue warning message with identifier

C Syntax

```
#include "mex.h"
void mexWarnMsgIdAndTxt(const char *identifier,
  const char *warning_msg, ...);
```

Arguments

`identifier`
String containing a MATLAB message identifier. See "Message Identifiers" in the MATLAB documentation for information on this topic.

`warning_msg`
String containing the warning message to be displayed. The string may include formatting conversion characters, such as those used with the ANSI C `sprintf` function.

`...`
Any additional arguments needed to translate formatting conversion characters used in `warning_msg`. Each conversion character in `warning_msg` is converted to one of these values.

Description

Call `mexWarnMsgIdAndTxt` to write a warning message and its corresponding identifier to the MATLAB window.

Unlike `mexErrMsgIdAndTxt`, `mexWarnMsgIdAndTxt` does not cause the MEX-file to terminate.

See Also

`mexWarnMsgTxt`, `mexErrMsgIdAndTxt`, `mexErrMsgTxt`

Purpose Issue warning message

C Syntax

```
#include "mex.h"
void mexWarnMsgTxt(const char *warning_msg);
```

Arguments

`warning_msg`
String containing the warning message to be displayed.

Description

`mexWarnMsgTxt` causes MATLAB to display the contents of `warning_msg`.

Unlike `mexErrMsgTxt`, `mexWarnMsgTxt` does not cause the MEX-file to terminate.

Examples

See `yprime.c` in the `mex` subdirectory of the `examples` directory.

For additional examples, see `explore.c` in the `mex` subdirectory of the `examples` directory; see `fulltosparse.c` and `revord.c` in the `refbook` subdirectory of the `examples` directory; see `mxisfinite.c` and `mxsetnzmax.c` in the `mx` subdirectory of the `examples` directory.

See Also

`mexWarnMsgIdAndTxt`, `mexErrMsgTxt`, `mexErrMsgIdAndTxt`

C Engine Functions

`engClose`	Quit MATLAB engine session
`engEvalString`	Evaluate expression in string
`engGetArray (Obsolete)`	Use `engGetVariable`
`engGetFull (Obsolete)`	Use `engGetVariable` followed by appropriate `mxGet` routines
`engGetMatrix (Obsolete)`	Use `engGetVariable`
`engGetVariable`	Copy variable from engine workspace
`engGetVisible`	Determine visibility of engine session
`engOpen`	Start MATLAB engine session
`engOpenSingleUse`	Start MATLAB engine session for single, nonshared use
`engOutputBuffer`	Specify buffer for MATLAB output
`engPutArray (Obsolete)`	Use `engPutVariable`
`engPutFull (Obsolete)`	Use `mxCreateDoubleMatrix` and `engPutVariable`
`engPutMatrix (Obsolete)`	Use `engPutVariable`
`engPutVariable`	Put variables into engine workspace
`engSetEvalCallback (Obsolete)`	Function is obsolete
`engSetEvalTimeout (Obsolete)`	Function is obsolete
`engSetVisible`	Show or hide engine session
`engWinInit (Obsolete)`	Function is obsolete

engClose

Purpose Quit a MATLAB engine session

C Syntax

```
#include "engine.h"
int engClose(Engine *ep);
```

Arguments

`ep`
Engine pointer.

Description

This routine allows you to quit a MATLAB engine session.

`engClose` sends a quit command to the MATLAB engine session and closes the connection. It returns 0 on success, and 1 otherwise. Possible failure includes attempting to terminate a MATLAB engine session that was already terminated.

Examples

UNIX

See `engdemo.c` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a C program.

Windows

See `engwindemo.c` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a C program for Windows.

Purpose

Evaluate expression in string

C Syntax

```
#include "engine.h"
int engEvalString(Engine *ep, const char *string);
```

Arguments

`ep`
Engine pointer.

`string`
String to execute.

Description

`engEvalString` evaluates the expression contained in `string` for the MATLAB engine session, `ep`, previously started by `engOpen`. It returns a nonzero value if the MATLAB session is no longer running, and zero otherwise.

On UNIX systems, `engEvalString` sends commands to MATLAB by writing down a pipe connected to the MATLAB *stdin*. Any output resulting from the command that ordinarily appears on the screen is read back from *stdout* into the buffer defined by `engOutputBuffer`. To turn off output buffering, use

```
engOutputBuffer(ep, NULL, 0);
```

Under Windows on a PC, `engEvalString` communicates with MATLAB using a Component Object Model (COM) interface.

Examples

UNIX

See `engdemo.c` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a C program.

Windows

See `engwindemo.c` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a C program for Windows.

engGetArray (Obsolete)

V5 Compatible

This API function is obsolete and should not be used in a program that interfaces with MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the `-V5` option of the `mex` script.

Use

```
array_ptr = engGetVariable(ep, var_name);
```

instead of

```
array_ptr = engGetArray(ep, var_name);
```

See Also

`engGetVariable`, `engPutVariable`, and examples in the `eng_mat` subdirectory of the `examples` directory

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

`engGetVariable` followed by appropriate `mxGet` routines (`mxGetM`, `mxGetN`, `mxGetPr`, `mxGetPi`)

instead of

`engGetFull`

For example,

```
int engGetFull(
   Engine      *ep,    /* engine pointer */
   char        *name,  /* full array name */
   int         *m,     /* returned number of rows */
   int         *n,     /* returned number of columns */
   double      **pr,   /* returned pointer to real part */
   double      **pi    /* returned pointer to imaginary part */
   )
{
   mxArray     *pmat;

   pmat = engGetVariable(ep, name);

   if (!pmat)
           return(1);

   if (!mxIsDouble(pmat)) {
           mxDestroyArray(pmat);
           return(1);
   }

   *m  = mxGetM(pmat);
   *n  = mxGetN(pmat);
   *pr = mxGetPr(pmat);
   *pi = mxGetPi(pmat);

   /* Set pr & pi in array struct to NULL so it can be cleared. */
   mxSetPr(pmat, NULL);
```

```
    mxSetPi(pmat, NULL);

    mxDestroyArray(pmat);

    return(0);
}
```

See Also

engGetVariable and examples in the eng_mat subdirectory of the examples directory

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
array_ptr = engGetVariable(ep, var_name);
```

instead of

```
array_ptr = engGetMatrix(ep, var_name);
```

See Also

engGetVariable, engPutVariable, and examples in the eng_mat subdirectory of the examples directory

engGetVariable

Purpose Copy a variable from a MATLAB engine's workspace

C Syntax

```
#include "engine.h"
mxArray *engGetVariable(Engine *ep, const char *var_name);
```

Arguments

`ep`
Engine pointer.

`var_name`
Name of `mxArray` to get from MATLAB.

Description

`engGetVariable` reads the named `mxArray` from the MATLAB engine session associated with `ep` and returns a pointer to a newly allocated `mxArray` structure, or `NULL` if the attempt fails. `engGetVariable` fails if the named variable does not exist.

Be careful in your code to free the `mxArray` created by this routine when you are finished with it.

Examples

UNIX

See `engdemo.c` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a C program.

Windows

See `engwindemo.c` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a C program for Windows.

See Also

`engPutVariable`

Purpose Determine visibility of MATLAB engine session

C Syntax

```
#include "engine.h"
int engGetVisible(Engine *ep, bool *value);
```

Arguments

`ep`
Engine pointer.

`value`
Pointer to value returned from `engGetVisible`.

Description

Windows Only

`engGetVisible` returns the current visibility setting for MATLAB engine session, `ep`. A *visible* engine session runs in a window on the Windows desktop, thus making the engine available for user interaction. An invisible session is hidden from the user by removing it from the desktop.

`engGetVisible` returns 0 on success, and 1 otherwise.

Examples The following code opens engine session `ep` and disables its visibility.

```
Engine *ep;
bool vis;

ep = engOpen(NULL);
engSetVisible(ep, 0);
```

To determine the current visibility setting, use

```
engGetVisible(ep, &vis);
```

See Also `engSetVisible`

engOpen

Purpose

Start a MATLAB engine session

C Syntax

```
#include "engine.h"
Engine *engOpen(const char *startcmd);
```

Arguments

`startcmd`
String to start MATLAB process. On Windows, the `startcmd` string must be `NULL`.

Returns

A pointer to an engine handle.

Description

This routine allows you to start a MATLAB process for the purpose of using MATLAB as a computational engine.

`engOpen(startcmd)` starts a MATLAB process using the command specified in the string `startcmd`, establishes a connection, and returns a unique engine identifier, or `NULL` if the open fails.

On UNIX systems, if `startcmd` is `NULL` or the empty string, `engOpen` starts MATLAB on the current host using the command `matlab`. If `startcmd` is a hostname, `engOpen` starts MATLAB on the designated host by embedding the specified hostname string into the larger string:

```
"rsh hostname \"/bin/csh -c 'setenv DISPLAY\
    hostname:0; matlab'\""
```

If `startcmd` is any other string (has white space in it, or nonalphanumeric characters), the string is executed literally to start MATLAB.

On UNIX systems, `engOpen` performs the following steps:

1. Creates two pipes.
2. Forks a new process and sets up the pipes to pass *stdin* and *stdout* from MATLAB (parent) to two file descriptors in the engine program (child).
3. Executes a command to run MATLAB (`rsh` for remote execution).

Under Windows on a PC, `engOpen` opens a COM channel to MATLAB. This starts the MATLAB that was registered during installation. If you did not register during installation, on the command line you can enter the command:

```
matlab /regserver
```

See "Introducing MATLAB COM Integration" for additional details.

Examples

UNIX

See `engdemo.c` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a C program.

Windows

See `engwindemo.c` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a C program for Windows.

engOpenSingleUse

Purpose

Start a MATLAB engine session for single, nonshared use

C Syntax

```
#include "engine.h"
Engine *engOpenSingleUse(const char *startcmd, void *dcom,
   int *retstatus);
```

Arguments

`startcmd`
String to start MATLAB process. On Windows, the `startcmd` string must be `NULL`.

`dcom`
Reserved for future use; must be `NULL`.

`retstatus`
Return status; possible cause of failure.

Description

Windows

This routine allows you to start multiple MATLAB processes for the purpose of using MATLAB as a computational engine. `engOpenSingleUse` starts a MATLAB process, establishes a connection, and returns a unique engine identifier, or `NULL` if the open fails. `engOpenSingleUse` starts a new MATLAB process each time it is called.

`engOpenSingleUse` opens a COM channel to MATLAB. This starts the MATLAB that was registered during installation. If you did not register during installation, on the command line you can enter the command:

```
matlab /regserver
```

`engOpenSingleUse` allows single-use instances of a MATLAB engine server. `engOpenSingleUse` differs from `engOpen`, which allows multiple users to use the same MATLAB engine server.

See Introducing MATLAB COM Integration for additional details.

UNIX

This routine is not supported and simply returns.

Purpose

Specify buffer for MATLAB output

C Syntax

```
#include "engine.h"
int engOutputBuffer(Engine *ep, char *p, int n);
```

Arguments

`ep`
Engine pointer.

`p`
Pointer to character buffer of length `n`.

`n`
Length of buffer `p`.

Description

`engOutputBuffer` defines a character buffer for `engEvalString` to return any output that ordinarily appears on the screen.

The default behavior of `engEvalString` is to discard any standard output caused by the command it is executing. `engOutputBuffer(ep, p, n)` tells any subsequent calls to `engEvalString` to save the first `n` characters of output in the character buffer pointed to by `p`.

To turn off output buffering, use `engOutputBuffer(ep, NULL, 0);`

Note The buffer returned by `engEvalString` is not guaranteed to be `NULL` terminated.

Examples

UNIX

See `engdemo.c` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a C program.

Windows

See `engwindemo.c` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a C program for Windows.

engPutArray (Obsolete)

V5 Compatible

This API function is obsolete and should not be used in a program that interfaces with MATLAB 6.5 or later. This function may not be available in a future version of MATLAB. If you need to use this function in existing code, use the -V5 option of the mex script.

Use

```
engPutVariable(ep, var_name, array_ptr);
```

instead of

```
mxSetName(array_ptr, var_name);
engPutArray(ep, array_ptr);
```

See Also

engPutVariable, engGetVariable, and examples in the eng_mat subdirectory of the examples directory

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

`mxCreateDoubleMatrix` and `engPutVariable`

instead of

`engPutFull`

For example,

```
int engPutFull(
   Engine      *ep,        /* engine pointer */
   char        *name,      /* full array name */
   int         m,          /* number of rows */
   int         n,          /* number of columns */
   double      *pr,        /* pointer to real part */
   double      *pi         /* pointer to imaginary part */
   )
{
   mxArray     *pmat;
   int         retval;

   pmat = mxCreateDoubleMatrix(0, 0, mxCOMPLEX);

   mxSetM(pmat, m);
   mxSetN(pmat, n);
   mxSetPr(pmat, pr);
   mxSetPi(pmat, pi);

   retval = engPutVariable(ep, name, pmat);

   /* Set pr & pi in array struct to NULL so it can be cleared. */
   mxSetPr(pmat, NULL);
   mxSetPi(pmat, NULL);

   mxDestroyArray(pmat);

   return(retval);
}
```

See Also engGetVariable, mxCreateDoubleMatrix

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Use

```
engPutVariable(ep, var_name, array_ptr);
```

instead of

```
mxSetName(array_ptr, var_name);
engPutMatrix(ep, array_ptr);
```

See Also engPutVariable

engPutVariable

Purpose Put variables into a MATLAB engine's workspace

C Syntax

```
#include "engine.h"
int engPutVariable(Engine *ep, const char *var_name, const mxArray
  *array_ptr);
```

Arguments

`ep`
Engine pointer.

`var_name`
Name given to the `mxArray` in the engine's workspace.

`array_ptr`
`mxArray` pointer.

Description

`engPutVariable` writes `mxArray` `array_ptr` to the engine `ep`, giving it the variable name, `var_name`. If the `mxArray` does not exist in the workspace, it is created. If an `mxArray` with the same name already exists in the workspace, the existing `mxArray` is replaced with the new `mxArray`.

`engPutVariable` returns `0` if successful and `1` if an error occurs.

Examples

UNIX

See `engdemo.c` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a C program.

Windows

See `engwindemo.c` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a C program for Windows.

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

engSetEvalTimeout (Obsolete)

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later.

Purpose

Show or hide MATLAB engine session

C Syntax

```
#include "engine.h"
int engSetVisible(Engine *ep, bool value);
```

Arguments

`ep`
Engine pointer.

`value`
Value to set the Visible property to. Set `value` to `1` to make the engine window visible, or to `0` to make it invisible.

Description

Windows Only

`engSetVisible` makes the window for the MATLAB engine session, `ep`, either visible or invisible on the Windows desktop. You can use this function to enable or disable user interaction with the MATLAB engine session.

`engSetVisible` returns 0 on success, and 1 otherwise.

Examples

The following code opens engine session `ep` and disables its visibility.

```
Engine *ep;
bool vis;

ep = engOpen(NULL);
engSetVisible(ep, 0);
```

To determine the current visibility setting, use

```
engGetVisible(ep, &vis);
```

See Also

`engGetVisible`

engWinInit (Obsolete)

This API function is obsolete and should not be used in a program that interfaces with MATLAB 5 or later. This function is not necessary in MATLAB 5 or later engine programs.

6

Fortran MAT-File Functions

matClose	Close MAT-file
matDeleteArray (Obsolete)	Use matDeleteVariable
matDeleteMatrix (Obsolete)	Use matDeleteVariable
matDeleteVariable	Delete named mxArray from MAT-file
matGetArray (Obsolete)	Use matGetVariable
matGetArrayHeader (Obsolete)	Use matGetVariableInfo
matGetDir	Get directory of mxArrays in MAT-file
matGetFull (Obsolete)	Use matGetVariable followed by the appropriate mxGet routines
matGetMatrix (Obsolete)	Use matGetVariable
matGetNextArray (Obsolete)	Use matGetNextVariable
matGetNextArrayHeader (Obsolete)	Use matGetNextVariableInfo
matGetNextMatrix (Obsolete)	Use matGetNextVariable
matGetNextVariable	Read next mxArray from MAT-file
matGetNextVariableInfo	Load array header information only
matGetString (Obsolete)	Use matGetVariable and mxGetString
matGetVariable	Read mxArray from MAT-file
matGetVariableInfo	Load array header information only
matOpen	Open MAT-file
matPutArray (Obsolete)	Use matPutVariable
matPutArrayAsGlobal (Obsolete)	Use matPutVariableAsGlobal
matPutFull (Obsolete)	Use mxCreateDoubleMatrix and matPutVariable
matPutMatrix (Obsolete)	Use matPutVariable
matPutString (Obsolete)	Use mxCreateString and matPutArray

`matPutVariable`	Write `mxArrays` into MAT-files
`matPutVariableAsGlobal`	Put `mxArrays` into MAT-files

Purpose Closes a MAT-file

Fortran Syntax

```
integer*4 function matClose(mfp)
integer*4 mfp
```

Arguments

`mfp`
Pointer to MAT-file information.

Description

`matClose` closes the MAT-file associated with `mfp`. It returns -1 for a write error, and 0 if successful.

Examples

See `matdemo1.f` and `matdemo2.f` in the `eng_mat` subdirectory of the `examples` directory for sample programs that illustrate how to use this MAT-file routine in a Fortran program.

matDeleteArray (Obsolete)

Purpose Reads `mxArrays` from MAT-files

Description This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Use `matDeleteVariable` instead.

Purpose Delete named `mxArray` from MAT-file

Description This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `matDeleteVariable` instead.

matDeleteVariable

Purpose Delete named mxArray from MAT-file

Fortran Syntax

```
integer*4 function matDeleteVariable(mfp, name)
integer*4 mfp
character*(*) name
```

Arguments

`mfp`
Pointer to MAT-file information.

`name`
Name of `mxArray` to delete.

Description

`matDeleteVariable` deletes the named `mxArray` from the MAT-file pointed to by `mfp`. The function returns `0` if successful, and nonzero otherwise.

Purpose Reads `mxArrays` from MAT-files

Description This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Use `matGetVariable` instead.

matGetArrayHeader (Obsolete)

Purpose Reads mxArrays from MAT-files

Description This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Use matGetVariableInfo instead.

Purpose Get directory of mxArrays in a MAT-file

Fortran Syntax

```
integer*4 function matGetDir(mfp, num)
integer*4 mfp, num
```

Arguments

mfp
Pointer to MAT-file information.

num
Address of the variable to contain the number of mxArrays in the MAT-file.

Description This routine allows you to get a list of the names of the mxArrays contained within a MAT-file.

matGetDir returns a pointer to an internal array containing pointers to the names of the mxArrays in the MAT-file pointed to by mfp. The length of the internal array (number of mxArrays in the MAT-file) is placed into num. The internal array is allocated using a single mxCalloc. Use mxFree to free the array when you are finished with it.

matGetDir returns 0 and sets num to a negative number if it fails. If num is zero, mfp contains no mxArrays.

MATLAB variable names can be up to length 32.

Example See matdemo2.f in the eng_mat subdirectory of the examples directory for a sample program that illustrates how to use this MAT-file routine in a Fortran program.

matGetFull (Obsolete)

Purpose Reads full `mxArrays` from MAT-files

Description This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use

```
pm = matGetVariable(mfp, name)
m  = mxGetM(pm)
n  = mxGetN(pm)
pr = mxGetPr(pm)
pi = mxGetPi(pm)

mxDestroyArray(pm)
```

instead of

```
matGetFull(mfp, name, m, n, pr, pi)
```

See Also `matGetVariable`, `mxGetM`, `mxGetN`, `mxGetPr`, `mxGetPi`, `mxDestroyArray`

Purpose

Reads `mxArrays` from MAT-files

Description

This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `matGetVariable` instead.

matGetNextArray (Obsolete)

Purpose

Reads mxArrays from MAT-files

Description

This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Use matGetNextVariable instead.

matGetNextArrayHeader (Obsolete)

Purpose Reads `mxArrays` from MAT-files

Description This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Use `matGetNextVariableInfo` instead.

matGetNextMatrix (Obsolete)

Purpose Get next `mxArray` from MAT-file

Description This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `matGetNextVariable` instead.

Purpose

Read next mxArray from MAT-file

Fortran Syntax

```
integer*4 function matGetNextVariable(mfp, name)
integer*4 mfp
character*(*) name
```

Arguments

mfp
Pointer to MAT-file information.

name
Address of the variable to contain the mxArray name.

Description

matGetNextVariable allows you to step sequentially through a MAT-file and read all the mxArrays in a single pass. The function reads the next mxArray from the MAT-file pointed to by mfp and returns a pointer to a newly allocated mxArray structure. MATLAB returns the name of the mxArray in name.

Use matGetNextVariable immediately after opening the MAT-file with matOpen and not in conjunction with other MAT-file routines. Otherwise, the concept of the *next* mxArray is undefined.

matGetNextVariable returns 0 when the end-of-file is reached or if there is an error condition.

Be careful in your code to free the mxArray created by this routine when you are finished with it.

matGetNextVariableInfo

Purpose Load array header information only

Fortran Syntax

```
integer*4 function matGetNextVariableInfo(mfp, name)
integer*4 mfp
character*(*) name
```

Arguments

`mfp`
Pointer to MAT-file information.

`name`
Address of the variable to contain the `mxArray` name.

Description

`matGetNextVariableInfo` loads only the array header information, including everything except `pr`, `pi`, `ir`, and `jc`, from the file's current file offset. MATLAB returns the name of the `mxArray` in `name`.

If `pr`, `pi`, `ir`, and `jc` are set to nonzero values when loaded with `matGetVariable`, matGetNextVariableInfo sets them to `-1` instead. These headers are for informational use only and should *never* be passed back to MATLAB or saved to MAT-files.

matGetString (Obsolete)

Purpose

Copy `character` `mxArrays` from MAT-files

Description

This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use

```
pm = matGetVariable(mfp, name)
mxGetString(pm, str, strlen)
```

instead of

```
matGetString(mfp, name, str, strlen)
```

matGetVariable

Purpose Read mxArrays from MAT-files

Fortran Syntax

```
integer*4 function matGetVariable(mfp, name)
integer*4 mfp
character*(*) name
```

Arguments

mfp
Pointer to MAT-file information.

name
Name of mxArray to get from MAT-file.

Description This routine allows you to copy an mxArray out of a MAT-file.

matGetVariable reads the named mxArray from the MAT-file pointed to by mfp and returns a pointer to a newly allocated mxArray structure, or 0 if the attempt fails.

Be careful in your code to free the mxArray created by this routine when you are finished with it.

Purpose

Load array header information only

Fortran Syntax

```
integer*4 function matGetVariableInfo(mfp, name);
integer*4 mfp
character*(*) name
```

Arguments

`mfp`
Pointer to MAT-file information.

`name`
Name of `mxArray`.

Description

`matGetVariableInfo` loads only the array header information, including everything except `pr`, `pi`, `ir`, and `jc`. It recursively creates the cells/structures through their leaf elements, but does not include `pr`, `pi`, `ir`, and `jc`.

If `pr`, `pi`, `ir`, and `jc` are set to nonzero values when loaded with `matGetVariable`, matGetVariableInfo sets them to `-1` instead. These headers are for informational use only and should *never* be passed back to MATLAB or saved to MAT-files.

matOpen

Purpose Opens a MAT-file

Fortran Syntax

```
integer*4 function matOpen(filename, mode)
integer*4 mfp
character*(*) filename, mode
```

Arguments

`filename`
Name of file to open.

`mode`
File opening mode. Legal values for `mode` are:

Table 1-1:

`r`	Open file for reading only. Determines the current version of the MAT-file by inspecting the files and preserves the current version.
`u`	Open file for update, both reading and writing, but does not create the file if the file does not exist (equivalent to the `r+` mode of `fopen`). Determines the current version of the MAT-file by inspecting the files and preserves the current version.
`w`	Open file for writing only. Deletes previous contents, if any.
`w4`	Create a Level 4 MAT-file, compatible with MATLAB Versions 4 and earlier.
`wL`	Open file for writing character data using the default character set for your system. The resulting MAT-file can be read with MATLAB version 6 or 6.5. If you do not use the `wL` mode switch, MATLAB writes character data to the MAT-file using Unicode encoding by default.
`wz`	Open file for writing compressed data.

`mfp`
Pointer to MAT-file information.

Description This routine allows you to open MAT-files for reading and writing.

`matOpen` opens the named file and returns a file handle, or 0 if the open fails.

Examples

See `matdemo1.f` and `matdemo2.f` in the `eng_mat` subdirectory of the `examples` directory for sample programs that illustrate how to use the MATLAB MAT-file routines in a Fortran program.

matPutArray (Obsolete)

Purpose Reads `mxArrays` from MAT-files

Description This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Use

```
matPutVariable(mfp, name, pm)
```

instead of

```
mxSetName(pm, name);
matPutArray(pm, mfp);
```

Purpose

Reads `mxArrays` from MAT-files

Description

This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Use `matPutVariableAsGlobal` instead.

matPutFull (Obsolete)

Purpose Writes full mxArrays into MAT-files

Description This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use

```
pm = mxCreateDoubleMatrix(m, n, 1)
mxSetPr(pm, pr)
mxSetPi(pm, pi)
matPutVariable(mfp, name, pm)

mxDestroyArray(pm)
```

instead of

```
matPutFull(mfp, name, m, n, pr, pi)
```

See Also mxCreateDoubleMatrix, mxSetName (Obsolete), mxSetPr, mxSetPi, matPutVariable, mxDestroyArray

Purpose Writes `mxArrays` into MAT-files

Description This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `matPutVariable` instead.

matPutString (Obsolete)

Purpose Write `character` `mxArrays` into MAT-files

Description This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use

```
pm = mxCreateString(str)
matPutVariable(mfp, name, pm)
mxDestroyArray(pm)
```

instead of

```
matPutString(mfp, name, str)
```

Purpose

Write mxArrays into MAT-files

Fortran Syntax

```
integer*4 function matPutVariable(mfp, name, pm)
integer*4 mfp, pm
character*(*) name
```

Arguments

mfp
Pointer to MAT-file information.

name
Name of mxArray to put into MAT-file.

pm
mxArray pointer.

Description

This routine allows you to put an mxArray into a MAT-file.

matPutVariable writes mxArray pm to the MAT-file mfp. If the mxArray does not exist in the MAT-file, it is appended to the end. If an mxArray with the same name already exists in the file, the existing mxArray is replaced with the new mxArray by rewriting the file. The size of the new mxArray can be different than the existing mxArray.

matPutVariable returns 0 if successful and nonzero if an error occurs.

matPutVariableAsGlobal

Purpose Put mxArrays into MAT-files as originating from the global workspace

Fortran Syntax

```
integer*4 function matPutVariableAsGlobal(mfp, name, pm)
integer*4 mfp, pm
character*(*) name
```

Arguments

mfp
Pointer to MAT-file information.

name
Name of mxArray to put into MAT-file.

pm
mxArray pointer.

Description This routine allows you to put an mxArray into a MAT-file. matPutVariableAsGlobal is similar to matPutVariable, except the array, when loaded by MATLAB, is placed into the global workspace and a reference to it is set in the local workspace. If you write to a MATLAB 4 format file, matPutVariableAsGlobal will not load it as global, and will act the same as matPutVariable.

matPutVariableAsGlobal writes mxArray pm to the MAT-file mfp. If the mxArray does not exist in the MAT-file, it is appended to the end. If an mxArray with the same name already exists in the file, the existing mxArray is replaced with the new mxArray by rewriting the file. The size of the new mxArray can be different than the existing mxArray.

matPutVariableAsGlobal returns 0 if successful and nonzero if an error occurs.

Fortran MX-Functions

`mxAddField`	Add field to structure array
`mxCalcSingleSubscript`	Return offset from first element to desired element
`mxCalloc`	Allocate dynamic memory using the MATLAB memory manager
`mxClassIDFromClassName`	Get identifier that corresponds to a class
`mxClearLogical (Obsolete)`	Clear logical flag
`mxCopyCharacterToPtr`	Copy `character` values from Fortran array to pointer array
`mxCopyComplex8ToPtr`	Copy `COMPLEX*8` values from Fortran array to pointer array
`mxCopyComplex16ToPtr`	Copy `COMPLEX*16` values from Fortran array to pointer array
`mxCopyInteger1ToPtr`	Copy `INTEGER*1` values from Fortran array to pointer array
`mxCopyInteger2ToPtr`	Copy `INTEGER*2` values from Fortran array to pointer array
`mxCopyInteger4ToPtr`	Copy `INTEGER*4` values from Fortran array to pointer array
`mxCopyPtrToCharacter`	Copy `character` values from pointer array to Fortran array
`mxCopyPtrToComplex8`	Copy `COMPLEX*8` values from pointer array to Fortran array
`mxCopyPtrToComplex16`	Copy `COMPLEX*16` values from pointer array to Fortran array
`mxCopyPtrToInteger1`	Copy `INTEGER*1` values from pointer array to Fortran array
`mxCopyPtrToInteger2`	Copy `INTEGER*2` values from pointer array to Fortran array
`mxCopyPtrToInteger4`	Copy `INTEGER*4` values from pointer array to Fortran array
`mxCopyPtrToPtrArray`	Copy pointer values from pointer array to Fortran array
`mxCopyPtrToReal4`	Copy `REAL*4` values from pointer array to Fortran array
`mxCopyPtrToReal8`	Copy `REAL*8` values from pointer array to Fortran array
`mxCopyReal4ToPtr`	Copy `REAL*4` values from Fortran array to pointer array
`mxCopyReal8ToPtr`	Copy `REAL*8` values from Fortran array to pointer array
`mxCreateCellArray`	Create unpopulated N-dimensional cell `mxArray`
`mxCreateCellMatrix`	Create unpopulated two-dimensional cell `mxArray`
`mxCreateCharArray`	Create unpopulated N-dimensional string `mxArray`

mxCreateCharMatrixFromStrings	Create populated two-dimensional string mxArray
mxCreateDoubleMatrix	Create unpopulated two-dimensional, double-precision, floating-point mxArray
mxCreateFull (Obsolete)	Create unpopulated two-dimensional mxArray
mxCreateNumericArray	Create unpopulated N-dimensional numeric mxArray
mxCreateNumericMatrix	Create numeric matrix and initialize data elements to 0
mxCreateScalarDouble	Create scalar, double-precision array initialized to specified value
mxCreateSparse	Create two-dimensional unpopulated sparse mxArray
mxCreateString	Create 1-by-n character array initialized to specified string
mxCreateStructArray	Create unpopulated N-dimensional structure mxArray
mxCreateStructMatrix	Create unpopulated two-dimensional structure mxArray
mxDestroyArray	Free dynamic memory allocated by an mxCreate routine
mxDuplicateArray	Make deep copy of array
mxFree	Free dynamic memory allocated by mxCalloc
mxFreeMatrix (Obsolete)	Free dynamic memory allocated by mxCreateFull and mxCreateSparse
mxGetCell	Get cell's contents
mxGetClassID	Get mxArray's class
mxGetClassName	Get mxArray's class
mxGetData	Get pointer to data
mxGetDimensions	Get pointer to dimensions array
mxGetElementSize	Get number of bytes required to store each data element
mxGetEps	Get value of eps
mxGetField	Get field value, given field name and index in structure array
mxGetFieldByNumber	Get field value, given field number and index in structure array

mxGetFieldNameByNumber	Get field name, given field number in structure array
mxGetFieldNumber	Get field number, given field name in structure array
mxGetImagData	Get pointer to imaginary data of mxArray
mxGetInf	Get value of infinity
mxGetIr	Get ir array
mxGetJc	Get jc array
mxGetM	Get number of rows
mxGetN	Get total number of columns
mxGetName (Obsolete)	Get name of specified mxArray
mxGetNaN	Get the value of NaN
mxGetNumberOfDimensions	Get number of dimensions
mxGetNumberOfElements	Get number of elements in array
mxGetNumberOfFields	Get number of fields in structure mxArray
mxGetNzmax	Get number of elements in ir, pr, and pi arrays
mxGetPi	Get mxArray's imaginary data elements
mxGetPr	Get mxArray's real data elements
mxGetScalar	Get real component of mxArray's first data element
mxGetString	Create character array from mxArray
mxIsCell	True if cell mxArray
mxIsChar	True if string mxArray
mxIsClass	True if mxArray is member of specified class
mxIsComplex	Inquire if mxArray is complex
mxIsDouble	Inquire if mxArray is of type double
mxIsEmpty	True if mxArray is empty
mxIsFinite	True if value is finite
mxIsFromGlobalWS	True if mxArray was copied from the MATLAB global workspace

`mxIsFull (Obsolete)`	Inquire if `mxArray` is full
`mxIsInf`	True if value is infinite
`mxIsInt8`	True if `mxArray` represents its data as signed 8-bit integers
`mxIsInt16`	True if `mxArray` represents its data as signed 16-bit integers
`mxIsInt32`	True if `mxArray` represents its data as signed 32-bit integers
`mxIsLogical`	True if `mxArray` is Boolean
`mxIsNaN`	True if value is `NaN`
`mxIsNumeric`	Inquire if `mxArray` contains numeric data
`mxIsSingle`	True if `mxArray` represents its data as single-precision, floating-point numbers
`mxIsSparse`	Inquire if `mxArray` is sparse
`mxIsString (Obsolete)`	Inquire if `mxArray` contains `character` array
`mxIsStruct`	True if structure `mxArray`
`mxIsUint8`	True if `mxArray` represents its data as unsigned 8-bit integers
`mxIsUint16`	True if `mxArray` represents its data as unsigned 16-bit integers
`mxIsUint32`	True if `mxArray` represents its data as unsigned 32-bit integers
`mxMalloc`	Allocate dynamic memory using the MATLAB memory manager
`mxRealloc`	Reallocate memory
`mxRemoveField`	Remove field from structure array
`mxSetCell`	Set value of one cell
`mxSetData`	Set pointer to data
`mxSetDimensions`	Modify number/size of dimensions
`mxSetField`	Set field value of structure array, given field name/index
`mxSetFieldByNumber`	Set field value in structure array, given field number/index

`mxSetImagData`	Set imaginary data pointer for `mxArray`
`mxSetIr`	Set `ir` array of sparse `mxArray`
`mxSetJc`	Set `jc` array of sparse `mxArray`
`mxSetLogical (Obsolete)`	Set logical flag
`mxSetM`	Set number of rows
`mxSetN`	Set number of columns
`mxSetName (Obsolete)`	Set name of `mxArray`
`mxSetNzmax`	Set storage space for nonzero elements
`mxSetPi`	Set new imaginary data for an mxArray
`mxSetPr`	Set new real data for an mxArray

mxAddField

Purpose

Add a field to a structure array

Fortran Syntax

```
integer*4 function mxAddField(pm, fieldname)
integer*4 pm
character*(*) fieldname
```

Arguments

`pm`
Pointer to a structure `mxArray`.

`fieldname`
The name of the field you want to add.

Returns

Field number on success, or `0` if inputs are invalid or an out-of-memory condition occurs.

Description

Call `mxAddField` to add a field to a structure array. You must then create the values with the `mxCreate*` functions and use `mxSetFieldByNumber` to set the individual values for the field.

See Also

`mxRemoveField`, `mxSetFieldByNumber`

Purpose

Return the offset (index) from the first element to the desired element

Fortran Syntax

```
integer*4 function mxCalcSingleSubscript(pm, nsubs, subs)
integer*4 pm, nsubs, subs
```

Arguments

`pm`
Pointer to an `mxArray`.

`nsubs`
The number of elements in the `subs` array. Typically, you set `nsubs` equal to the number of dimensions in the `mxArray` that `pm` points to.

`subs`
An array of integers. Each value in the array should specify that dimension's subscript. The value in `subs(1)` specifies the row subscript, and the value in `subs(2)` specifies the column subscript. Use 1-based indexing to specify the desired array element. For example, to express the starting element of a two-dimensional `mxArray` in `subs`, set `subs(1)` to 1 and `subs(2)` to `1`.

Returns

The number of elements between the start of the `mxArray` and the specified subscript. This returned number is called an "index"; many `mx` routines (for example, `mxGetField`) require an index as an argument.

If `subs` describes the starting element of an `mxArray`, `mxCalcSingleSubscript` returns 0. If `subs` describes the final element of an `mxArray`, then `mxCalcSingleSubscript` returns `N-1` (where `N` is the total number of elements).

Description

Call `mxCalcSingleSubscript` to determine how many elements there are between the beginning of the `mxArray` and a given element of that `mxArray`. For example, given a subscript like `(5,7)`, `mxCalcSingleSubscript` returns the distance from the `(1,1)` element of the array to the `(5,7)` element. Remember that the `mxArray` data type internally represents all data elements in a one-dimensional array no matter how many dimensions the MATLAB `mxArray` appears to have.

Use `mxCalcSingleSubscript` with functions that interact with multidimensional cells and structures. `mxGetCell` and `mxSetCell` are two such functions.

See Also

`mxGetCell`, `mxSetCell`

mxCalloc

Purpose

Allocate dynamic memory using the MATLAB memory manager

Fortran Syntax

```
integer*4 function mxCalloc(n, size)
integer*4 n, size
```

Arguments

`n`
Number of elements to allocate. This must be a nonnegative number.

`size`
Number of bytes per element.

Returns

A pointer to the start of the allocated dynamic memory, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, `mxCalloc` returns 0. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt.

`mxCalloc` is unsuccessful when there is insufficient free heap space.

Description

The MATLAB memory management facility maintains a list of all memory allocated by `mxCalloc` (and by the `mxCreate` calls). The MATLAB memory management facility automatically frees (deallocates) all of a MEX-file's parcels when control returns to the MATLAB prompt.

By default, in a MEX-file, `mxCalloc` generates nonpersistent `mxCalloc` data. In other words, the memory management facility automatically deallocates the memory as soon as the MEX-file ends. When you finish using the memory allocated by `mxCalloc`, call `mxFree`. `mxFree` deallocates the memory.

`mxCalloc` works differently in MEX-files than in stand-alone MATLAB applications. In MEX-files, `mxCalloc` automatically

- Allocates enough contiguous heap space to hold `n` elements.
- Initializes all `n` elements to 0.
- Registers the returned heap space with the MATLAB memory management facility.

In stand-alone MATLAB applications, the MATLAB memory manager is not used.

See Also

`mxFree`

Purpose

Get identifier that corresponds to a class

Fortran Syntax

```
integer*4 function mxClassIDFromClassName(classname)
character*(*) classname
```

Arguments

classname
A `character` array specifying a MATLAB class name. Use one of the strings from the table below.

Returns

A numeric identifier used internally by MATLAB to represent the MATLAB class, *classname*. Returns `0` if *classname* is not a recognized MATLAB class.

Description

Use `mxClassIDFromClassName` to obtain an identifier for any class that is recognized by MATLAB. This function is most commonly used to provide a `classid` argument to `mxCreateNumericArray` and `mxCreateNumericMatrix`.

Valid choices for *classname* are shown below. MATLAB returns `0` if *classname* is unrecognized.

cell	char	double	function_handle
int8	int16	int32	logical
object	single	struct	uint8
uint16	uint32		

See Also

`mxGetClassName`, `mxCreateNumericArray`, `mxCreateNumericMatrix`

mxClearLogical (Obsolete)

Purpose

Clear the logical flag

Note As of MATLAB version 6.5, `mxClearLogical` is obsolete. Support for `mxClearLogical` may be removed in a future version.

Fortran Syntax

```
subroutine mxClearLogical(pm)
integer*4 pm
```

Arguments

`pm`
Pointer to an `mxArray` having a numeric class.

Description

Use `mxClearLogical` to turn off the `mxArray`'s logical flag. This flag, when cleared, tells MATLAB that the `mxArray`'s data is to be treated as numeric data rather than as Boolean data. If the logical flag is on, then MATLAB treats a 0 value as meaning `false` and a nonzero value as meaning `true`.

Call `mxSetLogical` to turn on the `mxArray`'s logical flag. For additional information on the use of logical variables in MATLAB, type `help logical` at the MATLAB prompt.

See Also

`mxIsLogical`, `mxSetLogical (Obsolete)`, `logical`

Purpose

Copy `character` values from a Fortran array to a pointer array

Fortran Syntax

```
subroutine mxCopyCharacterToPtr(y, px, n)
character*(*) y
integer*4 px, n
```

Arguments

`y`
`character` Fortran array.

`px`
Pointer to `character` or `name` array.

`n`
Number of elements to copy.

Description

`mxCopyCharacterToPtr` copies `n` `character` values from the Fortran `character` array `y` into the MATLAB string array pointed to by `px`. This subroutine is essential for copying character data between MATLAB pointer arrays and ordinary Fortran `character` arrays.

See Also

`mxCopyPtrToCharacter`, `mxCreateCharArray`, `mxCreateString`, `mxCreateCharMatrixFromStrings`

mxCopyComplex8ToPtr

Purpose

Copy COMPLEX*8 values from a Fortran array to a pointer array

Fortran Syntax

```
subroutine mxCopyComplex8ToPtr(y, pr, pi, n)
complex*8 y(n)
integer*4 pr, pi, n
```

Arguments

y
COMPLEX*8 Fortran array.

pr
Pointer to the real data of a single-precision MATLAB array.

pi
Pointer to the imaginary data of a single-precision MATLAB array.

n
Number of elements to copy.

Description

mxCopyComplex8ToPtr copies n COMPLEX*8 values from the Fortran COMPLEX*8 array y into the MATLAB arrays pointed to by pr and pi. This subroutine is essential for use with Fortran compilers that do not support the %VAL construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

See Also

mxCopyPtrToComplex8, mxCreateNumericArray, mxCreateNumericMatrix, mxGetData, mxGetImagData

mxCopyComplex16ToPtr

Purpose

Copy COMPLEX*16 values from a Fortran array to a pointer array

Fortran Syntax

```
subroutine mxCopyComplex16ToPtr(y, pr, pi, n)
complex*16 y(n)
integer*4 pr, pi, n
```

Arguments

y
COMPLEX*16 Fortran array.

pr
Pointer to the real data of a double-precision MATLAB array.

pi
Pointer to the imaginary data of a double-precision MATLAB array.

n
Number of elements to copy.

Description

mxCopyComplex16ToPtr copies n COMPLEX*16 values from the Fortran COMPLEX*16 array y into the MATLAB arrays pointed to by pr and pi. This subroutine is essential for use with Fortran compilers that do not support the %VAL construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

See Also

mxCopyPtrToComplex16, mxCreateNumericArray, mxCreateNumericMatrix, mxGetData, mxGetImagData

mxCopyInteger1ToPtr

Purpose Copy INTEGER*1 values from a Fortran array to a pointer array

Fortran Syntax

```
subroutine mxCopyInteger1ToPtr(y, px, n)
integer*1 y(n)
integer*4 px, n
```

Arguments

y
INTEGER*1 Fortran array.

px
Pointer to ir or jc array.

n
Number of elements to copy.

Description mxCopyInteger1ToPtr copies n INTEGER*1 values from the Fortran INTEGER*1 array y into the MATLAB array pointed to by px, either an ir or jc array. This subroutine is essential for use with Fortran compilers that do not support the %VAL construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

Note This function can only be used with sparse matrices.

See Also mxCopyPtrToInteger1, mxCreateNumericArray, mxCreateNumericMatrix

Purpose

Copy `INTEGER*2` values from a Fortran array to a pointer array

Fortran Syntax

```
subroutine mxCopyInteger2ToPtr(y, px, n)
integer*2 y(n)
integer*4 px, n
```

Arguments

`y`
`INTEGER*2` Fortran array.

`px`
Pointer to `ir` or `jc` array.

`n`
Number of elements to copy.

Description

`mxCopyInteger2ToPtr` copies `n` `INTEGER*2` values from the Fortran `INTEGER*2` array `y` into the MATLAB array pointed to by `px`, either an `ir` or `jc` array. This subroutine is essential for use with Fortran compilers that do not support the `%VAL` construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

Note This function can only be used with sparse matrices.

See Also

`mxCopyPtrToInteger2`, `mxCreateNumericArray`, `mxCreateNumericMatrix`

mxCopyInteger4ToPtr

Purpose
Copy INTEGER*4 values from a Fortran array to a pointer array

Fortran Syntax

```
subroutine mxCopyInteger4ToPtr(y, px, n)
integer*4 y(n)
integer*4 px, n
```

Arguments

y
INTEGER*4 Fortran array.

px
Pointer to ir or jc array.

n
Number of elements to copy.

Description

mxCopyInteger4ToPtr copies n INTEGER*4 values from the Fortran INTEGER*4 array y into the MATLAB array pointed to by px, either an ir or jc array. This subroutine is essential for use with Fortran compilers that do not support the %VAL construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

Note This function can only be used with sparse matrices.

See Also

mxCopyPtrToInteger4, mxCreateNumericArray, mxCreateNumericMatrix

Purpose

Copy `character` values from a pointer array to a Fortran array

Fortran Syntax

```
subroutine mxCopyPtrToCharacter(px, y, n)
character*(*) y
integer*4 px, n
```

Arguments

`px`
Pointer to `character` or `name` array.

`y`
`character` Fortran array.

`n`
Number of elements to copy.

Description

`mxCopyPtrToCharacter` copies `n` `character` values from the MATLAB array pointed to by `px` into the Fortran `character` array `y`. This subroutine is essential for copying character data from MATLAB pointer arrays into ordinary Fortran `character` arrays.

Example

See `matdemo2.f` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to use this routine in a Fortran program.

See Also

`mxCopyCharacterToPtr`, `mxCreateCharArray`, `mxCreateString`, `mxCreateCharMatrixFromStrings`

mxCopyPtrToComplex8

Purpose Copy `COMPLEX*8` values from a pointer array to a Fortran array

Fortran Syntax

```
subroutine mxCopyPtrToComplex8(pr, pi, y, n)
complex*8 y(n)
integer*4 pr, pi, n
```

Arguments

`pr`
Pointer to the real data of a single-precision MATLAB array.

`pi`
Pointer to the imaginary data of a single-precision MATLAB array.

`y`
`COMPLEX*8` Fortran array.

`n`
Number of elements to copy.

Description `mxCopyPtrToComplex8` copies `n` `COMPLEX*8` values from the MATLAB arrays pointed to by `pr` and `pi` into the Fortran `COMPLEX*8` array `y`. This subroutine is essential for use with Fortran compilers that do not support the `%VAL` construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

See Also `mxCopyComplex8ToPtr`, `mxCreateNumericArray`, `mxCreateNumericMatrix`, `mxGetData`, `mxGetImagData`

Purpose

Copy COMPLEX*16 values from a pointer array to a Fortran array

Fortran Syntax

```
subroutine mxCopyPtrToComplex16(pr, pi, y, n)
complex*16 y(n)
integer*4 pr, pi, n
```

Arguments

pr
Pointer to the real data of a double-precision MATLAB array.

pi
Pointer to the imaginary data of a double-precision MATLAB array.

y
COMPLEX*16 Fortran array.

n
Number of elements to copy.

Description

mxCopyPtrToComplex16 copies n COMPLEX*16 values from the MATLAB arrays pointed to by pr and pi into the Fortran COMPLEX*16 array y. This subroutine is essential for use with Fortran compilers that do not support the %VAL construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

See Also

mxCopyComplex16ToPtr, mxCreateNumericArray, mxCreateNumericMatrix, mxGetData, mxGetImagData

mxCopyPtrToInteger1

Purpose Copy INTEGER*1 values from a pointer array to a Fortran array

Fortran Syntax

```
subroutine mxCopyPtrToInteger1(px, y, n)
integer*1 y(n)
integer*4 px, n
```

Arguments

px
Pointer to ir or jc array.

y
INTEGER*1 Fortran array.

n
Number of elements to copy.

Description

mxCopyPtrToInteger1 copies n INTEGER*1 values from the MATLAB array pointed to by px, either an ir or jc array, into the Fortran INTEGER*1 array y. This subroutine is essential for use with Fortran compilers that do not support the %VAL construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

Note This function can only be used with sparse matrices.

See Also mxCopyInteger1ToPtr, mxCreateNumericArray, mxCreateNumericMatrix

Purpose Copy `INTEGER*2` values from a pointer array to a Fortran array

Fortran Syntax

```
subroutine mxCopyPtrToInteger2(px, y, n)
integer*2 y(n)
integer*4 px, n
```

Arguments

`px`
Pointer to `ir` or `jc` array.

`y`
`INTEGER*2` Fortran array.

`n`
Number of elements to copy.

Description

`mxCopyPtrToInteger2` copies `n` `INTEGER*2` values from the MATLAB array pointed to by `px`, either an `ir` or `jc` array, into the Fortran `INTEGER*2` array `y`. This subroutine is essential for use with Fortran compilers that do not support the `%VAL` construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

Note This function can only be used with sparse matrices.

See Also

`mxCopyInteger2ToPtr`, `mxCreateNumericArray`, `mxCreateNumericMatrix`

mxCopyPtrToInteger4

Purpose

Copy INTEGER*4 values from a pointer array to a Fortran array

Fortran Syntax

```
subroutine mxCopyPtrToInteger4(px, y, n)
integer*4 y(n)
integer*4 px, n
```

Arguments

px
Pointer to ir or jc array.

y
INTEGER*4 Fortran array.

n
Number of elements to copy.

Description

mxCopyPtrToInteger4 copies n INTEGER*4 values from the MATLAB array pointed to by px, either an ir or jc array, into the Fortran INTEGER*4 array y. This subroutine is essential for use with Fortran compilers that do not support the %VAL construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

Note This function can only be used with sparse matrices.

See Also

mxCopyInteger4ToPtr, mxCreateNumericArray, mxCreateNumericMatrix

mxCopyPtrToPtrArray

Purpose

Copy pointer values from a pointer array to a Fortran array

Fortran Syntax

```
subroutine mxCopyPtrToPtrArray(px, y, n)
integer*4 y(n)
integer*4 px, n
```

Arguments

`px`
Pointer to pointer array.

`y`
`INTEGER*4` Fortran array.

`n`
Number of pointers to copy.

Description

`mxCopyPtrToPtrArray` copies `n` pointers from the MATLAB array pointed to by `px` into the Fortran array `y`. This subroutine is essential for copying the output of `matGetDir` into an array of pointers. After calling this function, each element of `y` contains a pointer to a string. You can convert these strings to Fortran character arrays by passing each element of `y` as the first argument to `mxCopyPtrToCharacter`.

Example

See `matdemo2.f` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to use this routine in a Fortran program.

See Also

`matGetDir`, `mxCopyPtrToCharacter`

mxCopyPtrToReal4

Purpose

Copy `REAL*4` values from a pointer array to a Fortran array

Fortran Syntax

```
subroutine mxCopyPtrToReal4(px, y, n)
real*4 y(n)
integer*4 px, n
```

Arguments

`px`
Pointer to the real or imaginary data of a single-precision MATLAB array.

`y`
`REAL*4` Fortran array.

`n`
Number of elements to copy.

Description

`mxCopyPtrToReal4` copies `n` `REAL*4` values from the MATLAB array pointed to by `px`, either a `pr` or `pi` array, into the Fortran `REAL*4` array `y`. This subroutine is essential for use with Fortran compilers that do not support the `%VAL` construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

See Also

`mxCopyReal4ToPtr`, `mxCreateNumericArray`, `mxCreateNumericMatrix`, `mxGetData`, `mxGetImagData`

Purpose

Copy `REAL*8` values from a pointer array to a Fortran array

Fortran Syntax

```
subroutine mxCopyPtrToReal8(px, y, n)
real*8 y(n)
integer*4 px, n
```

Arguments

`px`
Pointer to the real or imaginary data of a double-precision MATLAB array.

`y`
`REAL*8` Fortran array.

`n`
Number of elements to copy.

Description

`mxCopyPtrToReal8` copies `n` `REAL*8` values from the MATLAB array pointed to by `px`, either a `pr` or `pi` array, into the Fortran `REAL*8` array `y`. This subroutine is essential for use with Fortran compilers that do not support the `%VAL` construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

Example

See `fengdemo.f` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to use this routine in a Fortran program.

See Also

`mxCopyReal8ToPtr`, `mxCreateNumericArray`, `mxCreateNumericMatrix`, `mxGetData`, `mxGetImagData`

mxCopyReal4ToPtr

Purpose Copy REAL*4 values from a Fortran array to a pointer array

Fortran Syntax

```
subroutine mxCopyReal4ToPtr(y, px, n)
real*4 y(n)
integer*4 px, n
```

Arguments

y
REAL*4 Fortran array.

px
Pointer to the real or imaginary data of a single-precision MATLAB array.

n
Number of elements to copy.

Description mxCopyReal4ToPtr(y,px,n) copies n REAL*4 values from the Fortran REAL*4 array y into the MATLAB array pointed to by px, either a pr or pi array. This subroutine is essential for use with Fortran compilers that do not support the %VAL construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

See Also mxCopyPtrToReal4, mxCreateNumericArray, mxCreateNumericMatrix, mxGetData, mxGetImagData

mxCopyReal8ToPtr

Purpose

Copy REAL*8 values from a Fortran array to a pointer array

Fortran Syntax

```
subroutine mxCopyReal8ToPtr(y, px, n)
real*8 y(n)
integer*4 px, n
```

Arguments

y
REAL*8 Fortran array.

px
Pointer to the real or imaginary data of a double-precision MATLAB array.

n
Number of elements to copy.

Description

mxCopyReal8ToPtr(y,px,n) copies n REAL*8 values from the Fortran REAL*8 array y into the MATLAB array pointed to by px, either a pr or pi array. This subroutine is essential for use with Fortran compilers that do not support the %VAL construct in order to set up standard Fortran arrays for passing as arguments to the computation routine of a MEX-file.

Example

See matdemo1.f and fengdemo.f in the eng_mat subdirectory of the examples directory for a sample program that illustrates how to use this routine in a Fortran program.

See Also

mxCopyPtrToReal8, mxCreateNumericArray, mxCreateNumericMatrix, mxGetData, mxGetImagData

mxCreateCellArray

Purpose

Create an unpopulated N-dimensional cell mxArray

Fortran Syntax

```
integer*4 function mxCreateCellArray(ndim, dims)
integer*4 ndim, dims
```

Arguments

ndim
The desired number of dimensions in the created cell. For example, to create a three-dimensional cell mxArray, set ndim to 3.

dims
The dimensions array. Each element in the dimensions array contains the size of the mxArray in that dimension. For example, setting dims(1) to 5 and dims(2) to 7 establishes a 5-by-7 mxArray. In most cases, there should be ndim elements in the dims array.

Returns

A pointer to the created cell mxArray, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, mxCreateCellArray returns 0. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. The most common cause of failure is insufficient free heap space.

Description

Use mxCreateCellArray to create a cell mxArray whose size is defined by ndim and dims. For example, to establish a three-dimensional cell mxArray having dimensions 4-by-8-by-7, set

```
ndim = 3;
dims(1) = 4; dims(2) = 8; dims(3) = 7;
```

The created cell mxArray is unpopulated; that is, mxCreateCellArray initializes each cell to 0. To put data into a cell, call mxSetCell.

See Also

mxCreateCellMatrix, mxGetCell, mxSetCell, mxIsCell

Purpose

Create an unpopulated two-dimensional cell `mxArray`

Fortran Syntax

```
integer*4 function mxCreateCellMatrix(m, n)
integer*4 m, n
```

Arguments

`m`
The desired number of rows.

`n`
The desired number of columns.

Returns

A pointer to the created cell `mxArray`, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, `mxCreateCellMatrix` returns `0`. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. Insufficient free heap space is the only reason for `mxCreateCellMatrix` to be unsuccessful.

Description

Use `mxCreateCellMatrix` to create an `m`-by-`n` two-dimensional cell `mxArray`. The created cell `mxArray` is unpopulated; that is, `mxCreateCellMatrix` initializes each cell to `0`. To put data into the cells, call `mxSetCell`.

`mxCreateCellMatrix` is identical to `mxCreateCellArray` except that `mxCreateCellMatrix` can create two-dimensional `mxArrays` only, but `mxCreateCellArray` can create `mxArrays` having any number of dimensions greater than 1.

See Also

`mxCreateCellArray`

mxCreateCharArray

Purpose

Create an unpopulated N-dimensional character `mxArray`

Fortran Syntax

```
integer*4 function mxCreateCharArray(ndim, dims)
integer*4 ndim, dims
```

Arguments

`ndim`
The desired number of dimensions in the character `mxArray`. You must specify a positive number. If you specify `0`, `1`, or `2`, `mxCreateCharArray` creates a two-dimensional `mxArray`.

`dims`
The dimensions array. Each element in the dimensions array contains the size of the array in that dimension. For example, setting `dims(1)` to `5` and `dims(2)` to `7` establishes a 5-by-7 character `mxArray`. The `dims` array must have at least `ndim` elements.

Returns

A pointer to the created character `mxArray`, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, `mxCreateCharArray` returns `0`. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. Insufficient free heap space is the only reason for `mxCreateCharArray` to be unsuccessful.

Description

Use `mxCreateCharArray` to create an `mxArray` of characters whose size is defined by `ndim` and `dims`. For example, to establish a two-dimensional `mxArray` of characters having dimensions 12-by-3, set

```
ndim = 2;
dims(1) = 12; dims(2) = 3;
```

The created `mxArray` is unpopulated; that is, `mxCreateCharArray` initializes each character to `INTEGER*2 0`.

See Also

`mxCreateString`

Purpose

Create a populated two-dimensional char mxArray

Fortran Syntax

```
integer*4 function mxCreateCharMatrixFromStrings(m, str)
integer*4 m
character*(*) str(m)
```

Arguments

m
The desired number of rows in the created string mxArray. The value you specify for m should equal the size of the str array.

str
A Fortran character*n array of size m, where each element of the array is n bytes.

Returns

A pointer to the created char mxArray, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, mxCreateCharMatrixFromStrings returns 0. If unsuccessful in a MEX-file, the MEX-file terminates, and control returns to the MATLAB prompt. Insufficient free heap space is the primary reason for mxCreateCharMatrixFromStrings to be unsuccessful. Another possible reason for failure is that str contains fewer than m strings.

Description

Use mxCreateCharMatrixFromStrings to create a two-dimensional string mxArray, where each row is initialized to str. The created mxArray has dimensions m-by-n, where n is the length of the number of characters in str(i).

See Also

mxCreateCharArray, mxCreateString

mxCreateDoubleMatrix

Purpose

Create an unpopulated two-dimensional, double-precision, floating-point `mxArray`

Fortran Syntax

```
integer*4 function mxCreateDoubleMatrix(m, n, ComplexFlag)
integer*4 m, n, ComplexFlag
```

Arguments

`m`
The desired number of rows.

`n`
The desired number of columns.

`ComplexFlag`
If the data you plan to put into the `mxArray` has no imaginary component, specify `0`. If the data has some imaginary components, specify `1`.

Returns

A pointer to the created `mxArray`, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, `mxCreateDoubleMatrix` returns `0`. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. `mxCreateDoubleMatrix` is unsuccessful when there is not enough free heap space to create the `mxArray`.

Description

Use `mxCreateDoubleMatrix` to create an `m`-by-`n` `mxArray`.

If you set `ComplexFlag` to `0`, `mxCreateDoubleMatrix` allocates enough memory to hold `m`-by-`n` real elements and initializes each element to 0.0.

If you set `ComplexFlag` to `1`, `mxCreateDoubleMatrix` allocates enough memory to hold `m`-by-`n` real elements and `m`-by-`n` imaginary elements. It initializes each real and imaginary element to 0.0.

Call `mxDestroyArray` when you finish using the `mxArray`. `mxDestroyArray` deallocates the `mxArray` and its associated real and complex elements.

See Also

`mxCreateNumericArray`

Purpose Create an unpopulated two-dimensional `mxArray`

Description This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `mxCreateDoubleMatrix` instead.

See Also `mxCreateSparse`

mxCreateNumericArray

Purpose Create an unpopulated N-dimensional numeric mxArray

Fortran Syntax

```
integer*4 function mxCreateNumericArray(ndim, dims, classid,
   ComplexFlag)
integer*4 ndim, dims, classid, ComplexFlag
```

Arguments

ndim
Number of dimensions. If you specify a value for ndim that is less than 2, mxCreateNumericArray automatically sets the number of dimensions to 2.

dims
The dimensions array. Each element in the dimensions array contains the size of the array in that dimension. For example, setting dims(1) to 5 and dims(2) to 7 establishes a 5-by-7 mxArray. In most cases, there should be ndim elements in the dims array.

classid
A numerical identifier that represents a particular MATLAB class. Use the function, mxClassIDFromClassName, to derive the classid value from a class name character array.

The classid tells MATLAB how you want the numerical array data to be represented in memory. For example, specifying the int32 class causes each piece of numerical data in the mxArray to be represented as a 32-bit signed integer.

mxCreateNumericArray accepts any of the MATLAB signed numeric classes, shown to the left in the table below.

ComplexFlag
If the data you plan to put into the mxArray has no imaginary components, specify 0. If the data will have some imaginary components, specify 1.

Returns A pointer to the created mxArray, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, mxCreateNumericArray returns 0. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt. mxCreateNumericArray is unsuccessful when there is not enough free heap space to create the mxArray.

Description

Call mxCreateNumericArray to create an N-dimensional mxArray in which all data elements have the numeric data type specified by classid. After creating the mxArray, mxCreateNumericArray initializes all its real data elements to 0. If ComplexFlag is set to 1, mxCreateNumericArray also initializes all its imaginary data elements to 0.

The following table shows the Fortran data types that are equivalent to MATLAB classes. Use these as shown in the example below.

MATLAB Class Name	Fortran Type
int8	INTEGER*1
int16	INTEGER*2
int32	INTEGER*4
single	REAL*4
double	REAL*8
single, with imaginary components	COMPLEX*8
double, with imaginary components	COMPLEX*16

mxCreateNumericArray differs from mxCreateDoubleMatrix in two important respects:

- All data elements in mxCreateDoubleMatrix are double-precision, floating-point numbers. The data elements in mxCreateNumericArray could be any numerical type, including different integer precisions.
- mxCreateDoubleMatrix can create two-dimensional arrays only; mxCreateNumericArray can create arrays of two or more dimensions.

mxCreateNumericArray allocates dynamic memory to store the created mxArray. When you finish with the created mxArray, call mxDestroyArray to deallocate its memory.

Example

To create a 4-by-4-by-2 array of `REAL*8` elements having no imaginary components, use

```
C      Create 4x4x2 mxArray of REAL*8
       data dims / 4, 4, 2 /
       mxCreateNumericArray(3, dims,
     +                 mxClassIDFromClassName('double'), 0)
```

See Also

`mxCreateDoubleMatrix`, `mxCreateNumericMatrix`, `mxCreateSparse`, `mxCreateString`

Purpose Create a numeric matrix and initialize all its data elements to 0

Fortran Syntax

```
integer*4 function mxCreateNumericMatrix(m, n, classid,
   ComplexFlag)
integer*4 m, n, classid, ComplexFlag
```

Arguments

`m`
The desired number of rows.

`n`
The desired number of columns.

`classid`
A numerical identifier that represents a particular MATLAB class. Use the function, `mxClassIDFromClassName`, to derive the `classid` value from a class name `character` array.

The `classid` tells MATLAB how you want the numerical array data to be represented in memory. For example, specifying the `int32` class causes each piece of numerical data in the `mxArray` to be represented as a 32-bit signed integer.

`mxCreateNumericMatrix` accepts any of the MATLAB signed numeric classes, shown to the left in the table below.

`ComplexFlag`
If the data you plan to put into the `mxArray` has no imaginary components, specify `0`. If the data has some imaginary components, specify `1`.

Returns A pointer to the created `mxArray`, if successful. `mxCreateNumericMatrix` is unsuccessful if there is not enough free heap space to create the `mxArray`. If `mxCreateNumericMatrix` is unsuccessful in a MEX-file, the MEX-file prints an `Out of Memory` message, terminates, and control returns to the MATLAB prompt. If `mxCreateNumericMatrix` is unsuccessful in a stand-alone (nonMEX-file) application, `mxCreateNumericMatrix` returns `0`.

Description Call `mxCreateNumericMatrix` to create an two-dimensional `mxArray` in which all data elements have the numeric data type specified by `classid`. After creating the `mxArray`, `mxCreateNumericMatrix` initializes all its real data elements to 0. If `ComplexFlag` is set to `1`, `mxCreateNumericMatrix` also initializes all its imaginary data elements to 0. `mxCreateNumericMatrix` allocates dynamic memory to store the created `mxArray`. When you finish using the `mxArray`, call `mxDestroyArray` to destroy it.

The following table shows the Fortran data types that are equivalent to MATLAB classes. Use these as shown in the example below.

MATLAB Class Name	Fortran Type
`int8`	`BYTE`
`int16`	`INTEGER*2`
`int32`	`INTEGER*4`
`single`	`REAL*4`
`double`	`REAL*8`
`single`, with imaginary components	`COMPLEX*8`
`double`, with imaginary components	`COMPLEX*16`

Example

To create a 4-by-3 matrix of `REAL*4` elements having no imaginary components, use

```
C      Create 4x3 mxArray of REAL*4
       mxCreateNumericMatrix(4, 3,
     +                 mxClassIDFromClassName('single'), 0)
```

See Also

`mxCreateDoubleMatrix`, `mxCreateNumericArray`

Purpose Create a scalar, double-precision array initialized to the specified value

Fortran Syntax

```
integer*4 function mxCreateScalarDouble(value)
real*4 value
```

Arguments

`value`
The desired value to which you want to initialize the array.

Returns A pointer to the created `mxArray`, if successful. `mxCreateScalarDouble` is unsuccessful if there is not enough free heap space to create the `mxArray`. If `mxCreateScalarDouble` is unsuccessful in a MEX-file, the MEX-file prints an `Out of Memory` message, terminates, and control returns to the MATLAB prompt. If `mxCreateScalarDouble` is unsuccessful in a stand-alone (nonMEX-file) application, `mxCreateScalarDouble` returns `0`.

Description Call `mxCreateScalarDouble` to create a scalar double `mxArray`. `mxCreateScalarDouble` is a convenience function that can be used in place of the following code.

```
pm = mxCreateDoubleMatrix(1, 1, 0)
mxCopyReal8ToPtr(value, mxGetPr(pm), 1)
```

When you finish using the `mxArray`, call `mxDestroyArray` to destroy it.

See Also `mxGetPr`, `mxCreateDoubleMatrix`

mxCreateSparse

Purpose

Create a two-dimensional unpopulated sparse mxArray

Fortran Syntax

```
integer*4 function mxCreateSparse(m, n, nzmax, ComplexFlag)
integer*4 m, n, nzmax, ComplexFlag
```

Arguments

m
The desired number of rows.

n
The desired number of columns.

nzmax
The number of elements that mxCreateSparse should allocate to hold the pr, ir, and, if ComplexFlag = 1, pi arrays. Set the value of nzmax to be greater than or equal to the number of nonzero elements you plan to put into the mxArray, but make sure that nzmax is less than or equal to m*n.

ComplexFlag
Specify REAL = 0 if the data has no imaginary components; specify COMPLEX = 1 if the data has some imaginary components.

Returns

An unpopulated, sparse mxArray if successful, and 0 otherwise.

Description

Call mxCreateSparse to create an unpopulated sparse mxArray. The returned sparse mxArray contains no sparse information and cannot be passed as an argument to any MATLAB sparse functions. In order to make the returned sparse mxArray useful, you must initialize the pr, ir, jc, and (if it exists) pi array.

mxCreateSparse allocates space for

- A pr array of length nzmax.
- A pi array of length nzmax (but only if ComplexFlag is COMPLEX = 1).
- An ir array of length nzmax.
- A jc array of length n+1.

When you finish using the sparse mxArray, call mxDestroyArray to reclaim all its heap space.

See Also

mxDestroyArray, mxSetNzmax, mxSetPr, mxSetIr, mxSetJc

Purpose

Create a 1-by-n `character` array initialized to the specified string

Fortran Syntax

```
integer*4 function mxCreateString(str)
character*(*) str
```

Arguments

`str`
The string that is to serve as the `mxArray's` initial data.

Returns

A `character` array initialized to `str` if successful, and 0 otherwise.

Description

Use `mxCreateString` to create a `character` `mxArray` initialized to `str`. Many MATLAB functions (for example, `strcmp` and `upper`) require `character` `mxArray` inputs.

Free the `character` `mxArray` when you are finished using it. To free a `character` `mxArray`, call `mxDestroyArray`.

Example

See `matdemo1.f` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to use this routine in a Fortran program.

mxCreateStructArray

Purpose Create an unpopulated N-dimensional structure mxArray

Fortran Syntax

```
integer*4 function mxCreateStructArray(ndim, dims, nfields,
  fieldnames)
integer*4 ndim, dims, nfields
character*(*) fieldnames(nfields)
```

Arguments

ndim
Number of dimensions. If you set ndim to be less than 2, mxCreateStructArray creates a two-dimensional mxArray.

dims
The dimensions array. Each element in the dimensions array contains the size of the array in that dimension. For example, setting dims[1] to 5 and dims[2] to 7 establishes a 5-by-7 mxArray. Typically, the dims array should have ndim elements.

nfields
The desired number of fields in each element.

fieldnames
The desired list of field names.

Returns A pointer to the created structure mxArray if successful, and zero otherwise. The most likely cause of failure is insufficient heap space to hold the returned mxArray.

Description Call mxCreateStructArray to create an unpopulated structure mxArray. Each element of a structure mxArray contains the same number of fields (specified in nfields). Each field has a name; the list of names is specified in fieldnames.

Each field holds one mxArray pointer. mxCreateStructArray initializes each field to zero. Call mxSetField or mxSetFieldByNumber to place a non-zero mxArray pointer in a field.

When you finish using the returned structure mxArray, call mxDestroyArray to reclaim its space.

See Also mxDestroyArray, mxCreateStructMatrix, mxIsStruct, mxAddField, mxSetField, mxGetField, mxRemoveField

Purpose Create an unpopulated two-dimensional structure mxArray

Fortran Syntax

```
integer*4 function mxCreateStructMatrix(m, n, nfields, fieldnames)
integer*4 m, n, nfields
character*(*) fieldnames(nfields)
```

Arguments

m
The desired number of rows. This must be a positive integer.

n
The desired number of columns. This must be a positive integer.

nfields
The desired number of fields in each element.

fieldnames
The desired list of field names.

Returns A pointer to the created structure mxArray if successful, and 0 otherwise. The most likely cause of failure is insufficient heap space to hold the returned mxArray.

Description mxCreateStructMatrix and mxCreateStructArray are almost identical. The only difference is that mxCreateStructMatrix can only create two-dimensional mxArrays, while mxCreateStructArray can create mxArrays having two or more dimensions.

See Also mxCreateStructArray, mxIsStruct, mxAddField, mxSetField, mxGetField, mxRemoveField

mxDestroyArray

Purpose Free dynamic memory allocated by an mxCreate routine

Fortran Syntax

```
subroutine mxDestroyArray(pm)
integer*4 pm
```

Arguments

pm
Pointer to the mxArray that you want to free.

Description mxDestroyArray deallocates the memory occupied by the specified mxArray. mxDestroyArray not only deallocates the memory occupied by the mxArray's characteristics fields (such as m and n), but also deallocates all the mxArray's associated data arrays (such as pr, pi, ir, and/or jc). You should not call mxDestroyArray on an mxArray you are returning on the left-hand side.

See Also mxCalloc, mxFree, mexMakeArrayPersistent, mexMakeMemoryPersistent

Purpose

Make a deep copy of an array

Fortran Syntax

```
integer*4 function mxDuplicateArray(in)
integer*4 in
```

Arguments

`in`
Pointer to the `mxArray` that you want to copy.

Returns

Pointer to a copy of the array.

Description

`mxDuplicateArray` makes a deep copy of an array, and returns a pointer to the copy. A deep copy refers to a copy in which all levels of data are copied. For example, a deep copy of a cell array copies each cell, and the contents of the each cell (if any), and so on.

mxFree

Purpose

Free dynamic memory allocated by `mxCalloc`

Fortran Syntax

```
subroutine mxFree(ptr)
integer*4 ptr
```

Arguments

`ptr`
Pointer to the beginning of any memory parcel allocated by `mxCalloc`.

Description

`mxFree` deallocates heap space. `mxFree` frees memory using the MATLAB memory management facility. This ensures correct memory management in error and abort (**Ctrl-C**) conditions.

`mxFree` works differently in MEX-files than in stand-alone MATLAB applications. With MEX-files, `mxFree` returns to the heap any memory allocated using `mxCalloc`. If you do not free memory with this command, MATLAB frees it automatically on return from the MEX-file. In stand-alone MATLAB applications, you have to explicitly free memory, and MATLAB memory management is not used.

In a MEX-file, your use of `mxFree` depends on whether the specified memory parcel is persistent or nonpersistent. By default, memory parcels created by `mxCalloc` are nonpersistent.

The MATLAB memory management facility automatically frees all nonpersistent memory whenever a MEX-file completes. Thus, even if you do not call `mxFree`, MATLAB takes care of freeing the memory for you. Nevertheless, it is a good programming practice to deallocate memory just as soon as you are through using it. Doing so generally makes the entire system run more efficiently.

When a MEX-file completes, the MATLAB memory management facility does not free persistent memory parcels. Therefore, the only way to free a persistent memory parcel is to call `mxFree`. Typically, MEX-files call `mexAtExit` to register a clean-up handler. Then, the clean-up handler calls `mxFree`.

See Also

`mxCalloc`, `mxDestroyArray`

Purpose Free dynamic memory allocated by `mxCreateFull` and `mxCreateSparse`

Description This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `mxDestroyArray` instead.

See Also `mxCalloc`, `mxFree`

mxGetCell

Purpose

Get a cell's contents

Fortran Syntax

```
integer*4 function mxGetCell(pm, index)
integer*4 pm, index
```

Arguments

`pm`
Pointer to a cell `mxArray`.

`index`
The number of elements in the cell `mxArray` between the first element and the desired one. See `mxCalcSingleSubscript` for details on calculating an index in a multidimensional cell array.

Returns

A pointer to the `i`th cell `mxArray` if successful, and `0` otherwise. Causes of failure include:

- The indexed cell array element has not been populated.
- Specifying an array pointer, `pm`, that does not point to a cell `mxArray`.
- Specifying an `index` greater than the number of elements in the cell.
- Insufficient free heap space to hold the returned cell `mxArray`.

Description

Call `mxGetCell` to get a pointer to the `mxArray` held in the indexed element of the cell `mxArray`.

Note Inputs to a MEX-file are constant read-only `mxArrays` and should not be modified. Using `mxSetCell*` or `mxSetField*` to modify the cells or fields of an argument passed from MATLAB causes unpredictable results.

See Also

`mxCreateCellArray`, `mxIsCell`, `mxSetCell`

Purpose Get an `mxArray`'s class identifier

Fortran Syntax

```
integer*4 function mxGetClassID(pm)
integer*4 pm
```

Arguments

`pm`
Pointer to an `mxArray`.

Returns A numeric identifier that represents the class (category) of the `mxArray` that `pm` points to.

Description Use `mxGetClassId` to determine the class of an `mxArray`. The class of an `mxArray` identifies the kind of data the `mxArray` is holding.

See Also `mxGetClassName`

mxGetClassName

Purpose
Get (as a character array) an mxArray's class

Fortran Syntax

```
character*(*) function mxGetClassName(pm)
integer*4 pm
```

Arguments
pm
Pointer to an mxArray.

Returns
The class (as a character array) of mxArray, pm.

Description
Call mxGetClassName to determine the class of an mxArray. The class of an mxArray identifies the kind of data the mxArray is holding. For example, if pm points to a logical mxArray, then mxGetClassName returns logical.

See Also
mxGetClassID

Purpose

Get pointer to data

Fortran Syntax

```
integer*4 function mxGetData(pm)
integer*4 pm
```

Arguments

`pm`
Pointer to an `mxArray`.

Returns

The address of the first element of the real data, on success. Returns `0` if there is no real data or if there is an error.

Description

Call `mxGetData` to get a pointer to the real data in the `mxArray` that `pm` points to. To copy values from the pointer to Fortran, use one of the `mxCopyPtrTo*` functions in the manner shown here.

```
C      Get the data in mxArray, pm
       mxCopyPtrToReal8(mxGetData(pm), data,
     +                     mxGetNumberOfElements(pm))
```

`mxGetData` is equivalent to using `mxGetPr`.

See Also

`mxGetImagData`, `mxSetData`, `mxSetImagData`, `mxCopyPtrToReal4`, `mxCopyPtrToReal8`, `mxGetPr`

mxGetDimensions

Purpose

Get a pointer to the dimensions array

Fortran Syntax

```
integer*4 function mxGetDimensions(pm)
integer*4 pm
```

Arguments

`pm`
Pointer to an `mxArray`.

Returns

A pointer to the first element in a dimension array. Each integer in the dimensions array represents the number of elements in a particular dimension.

Description

Use `mxGetDimensions` to determine how many elements are in each dimension of the `mxArray` that `pm` points to. Call `mxGetNumberOfDimensions` to get the number of dimensions in the `mxArray`.

`mxGetDimensions` returns a pointer to the dimension array. To copy the values to Fortran, use `mxCopyPtrToInteger4` in the manner shown here.

```
C      Get dimensions of mxArray, pm
       mxCopyPtrToInteger4(mxGetDimensions(pm), dims,
     +                          mxGetNumberOfDimensions(pm))
```

See Also

`mxGetNumberOfDimensions`

Purpose

Get the number of bytes required to store each data element

Fortran Syntax

```
integer*4 function mxGetElementSize(pm)
integer*4 pm
```

Arguments

`pm`
Pointer to an `mxArray`.

Returns

The number of bytes required to store one element of the specified `mxArray`, if successful. Returns `0` on failure. The primary reason for failure is that `pm` points to an `mxArray` having an unrecognized class. If `pm` points to a cell `mxArray` or a structure `mxArray`, then `mxGetElementSize` returns the size of a pointer (not the size of all the elements in each cell or structure field).

Description

Call `mxGetElementSize` to determine the number of bytes in each data element of the `mxArray`. For example, if the class of an `mxArray` is `int16`, then the `mxArray` stores each data element as a 16-bit (2 byte) signed integer. Thus, `mxGetElementSize` returns `2`.

See Also

`mxGetM`, `mxGetN`

mxGetEps

Purpose Get value of `eps`

Fortran Syntax

```
real*8 function mxGetEps
```

Returns The value of the MATLAB `eps` variable.

Description Call `mxGetEps` to return the value of the MATLAB `eps` variable. This variable holds the distance from 1.0 to the next largest floating-point number. As such, it is a measure of floating-point accuracy. The MATLAB `pinv` and `rank` functions use `eps` as a default tolerance.

See Also `mxGetInf`, `mxGetNaN`

Purpose Get a field value, given a field name and an index in a structure array

Fortran Syntax

```
integer*4 function mxGetField(pm, index, fieldname)
integer*4 pm, index
character*(*) fieldname
```

Arguments

pm
Pointer to a structure mxArray.

index
The desired element. The first element of an mxArray has an index of 1, the second element has an index of 2, and the last element has an index of N, where N is the total number of elements in the structure mxArray.

fieldname
The name of the field whose value you want to extract.

Returns A pointer to the mxArray in the specified field at the specified fieldname, on success. Returns zero if passed an invalid argument or if there is no value assigned to the specified field. Common causes of failure include:

- Specifying a pm that does not point to a structure mxArray. To determine if pm points to a structure mxArray, call mxIsStruct.
- Specifying an out-of-range index to an element past the end of the mxArray. For example, given a structure mxArray that contains 10 elements, you cannot specify an index greater than 10.
- Specifying a nonexistent fieldname. Call mxGetFieldNameByNumber to get existing field names.
- Insufficient heap space to hold the returned mxArray.

Description Call mxGetField to get the value held in the specified element of the specified field.

mxGetFieldByNumber is similar to mxGetField. Both functions return the same value. The only difference is in the way you specify the field. mxGetFieldByNumber takes fieldnumber as its third argument, and mxGetField takes fieldname as its third argument.

Note Inputs to a MEX-file are constant read-only `mxArrays` and should not be modified. Using `mxSetCell*` or `mxSetField*` to modify the cells or fields of an argument passed from MATLAB causes unpredictable results.

Calling

```
mxGetField(pm, index, 'fieldname')
```

is equivalent to calling

```
fieldnum = mxGetFieldNumber(pm, 'fieldname')
mxGetFieldByNumber(pm, index, fieldnum)
```

where `index` is `1` if you have a one-by-one structure.

See Also

`mxGetFieldByNumber`, `mxGetFieldNameByNumber`, `mxGetNumberOfFields`, `mxIsStruct`, `mxSetField`, `mxSetFieldByNumber`

Purpose Get a field value, given a field number and an index in a structure array

Fortran Syntax

```
integer*4 function mxGetFieldByNumber(pm, index, fieldnumber)
integer*4 pm, index, fieldnumber
```

Arguments

`pm`
Pointer to a structure `mxArray`.

`index`
The desired element. The first element of an `mxArray` has an `index` of `1`, the second element has an `index` of `2`, and the last element has an `index` of `N`, where `N` is the total number of elements in the structure `mxArray`.

`fieldnumber`
The position of the field whose value you want to extract. The first field within each element has a field number of `1`, the second field has a field number of `2`, and so on. The last field has a field number of `N`, where `N` is the number of fields.

Returns A pointer to the `mxArray` in the specified field for the desired element, on success. Returns zero if passed an invalid argument or if there is no value assigned to the specified field. Common causes of failure include:

- Specifying a `pm` that does not point to a structure `mxArray`. Call `mxIsStruct` to determine if `pm` points to is a structure `mxArray`.
- Specifying an index < `1` or > the number of elements in the array.
- Specifying a nonexistent field number. Call `mxGetFieldNumber` to determine the field number that corresponds to a given field name.

Description Call `mxGetFieldByNumber` to get the value held in the specified `fieldnumber` at the indexed element.

Note Inputs to a MEX-file are constant read-only `mxArrays` and should not be modified. Using `mxSetCell*` or `mxSetField*` to modify the cells or fields of an argument passed from MATLAB causes unpredictable results.

Calling

```
mxGetField(pm, index, 'fieldname')
```

is equivalent to calling

```
fieldnum = mxGetFieldNumber(pm, 'fieldname')
mxGetFieldByNumber(pm, index, fieldnum)
```

where `index` is `1` if you have a one-by-one structure.

See Also

`mxGetField`, `mxGetFieldNameByNumber`, `mxGetNumberOfFields`, `mxSetField`, `mxSetFieldByNumber`

Purpose

Get a field name, given a field number in a structure array

Fortran Syntax

```
character*(*) function mxGetFieldNameByNumber(pm, fieldnumber)
integer*4 pm, fieldnumber
```

Arguments

`pm`
Pointer to a structure `mxArray`.

`fieldnumber`
The position of the desired field. For instance, to get the name of the first field, set `fieldnumber` to `1`; to get the name of the second field, set `fieldnumber` to `2`; and so on.

Returns

The `n`th field name, on success. Returns `0` on failure. Common causes of failure include:

- Specifying a `pm` that does not point to a structure `mxArray`. Call `mxIsStruct` to determine if `pm` points to a structure `mxArray`.
- Specifying a value of `fieldnumber` greater than the number of fields in the structure `mxArray`. (Remember that `fieldnumber` `1` represents the first field, so `index N` represents the last field.)

Description

Call `mxGetFieldNameByNumber` to get the name of a field in the given structure `mxArray`. A typical use of `mxGetFieldNameByNumber` is to call it inside a loop to get the names of all the fields in a given `mxArray`.

Consider a MATLAB structure initialized to

```
patient.name = 'John Doe';
patient.billing = 127.00;
patient.test = [79 75 73; 180 178 177.5; 220 210 205];
```

The field number `1` represents the field `name`; field number `2` represents field `billing`; field number `3` represents field `test`. A field number other than `1`, `2`, or `3` causes `mxGetFieldNameByNumber` to return `0`.

See Also

`mxGetField`, `mxIsStruct`, `mxSetField`

mxGetFieldNumber

Purpose

Get a field number, given a field name in a structure array

Fortran Syntax

```
integer*4 function mxGetFieldNumber(pm, fieldname)
integer*4 pm
character*(*) fieldname
```

Arguments

`pm`
Pointer to a structure `mxArray`.

`fieldname`
The name of a field in the structure `mxArray`.

Returns

The field number of the specified `fieldname`, on success. The first field has a field number of `1`, the second field has a field number of `2`, and so on. Returns `0` on failure. Common causes of failure include:

- Specifying a `pm` that does not point to a structure `mxArray`. Call `mxIsStruct` to determine if `pm` points to a structure `mxArray`.
- Specifying the `fieldname` of a nonexistent field.

Description

If you know the name of a field but do not know its field number, call `mxGetFieldNumber`. Conversely, if you know the field number but do not know its field name, call `mxGetFieldNameByNumber`.

For example, consider a MATLAB structure initialized to

```
patient.name = 'John Doe';
patient.billing = 127.00;
patient.test = [79 75 73; 180 178 177.5; 220 210 205];
```

The field `name` has a field number of `1`; the field `billing` has a field number of `2`; and the field `test` has a field number of `3`. If you call `mxGetFieldNumber` and specify a field name of anything other than `'name'`, `'billing'`, or `'test'`, then `mxGetFieldNumber` returns `0`.

Calling

```
mxGetField(pm, index, 'fieldname');
```

is equivalent to calling

```
fieldnum = mxGetFieldNumber(pm, 'fieldname');
mxGetFieldByNumber(pm, index, fieldnum);
```

where `index` is `1` if you have a `1-by-1` structure.

See Also

`mxGetField`, `mxGetFieldByNumber`, `mxGetFieldNameByNumber`, `mxGetNumberOfFields`, `mxSetField`, `mxSetFieldByNumber`

mxGetImagData

Purpose Get pointer to imaginary data of an mxArray

Fortran Syntax

```
integer*4 function mxGetImagData(pm)
integer*4 pm
```

Arguments

pm
Pointer to an mxArray.

Returns The address of the first element of the imaginary data, on success. Returns 0 if there is no imaginary data or if there is an error.

Description Call mxGetImagData to determine the starting address of the imaginary data in the mxArray that pm points to. To copy values from the pointer to Fortran, use one of the mxCopyPtrToComplex* functions in the manner shown here.

```
C      Get the real and imaginary data in mxArray, pm
       mxCopyPtrToComplex16(mxGetData(pm), mxGetImagData(pm),
     +              data, mxGetNumberOfElements(pm))
```

mxGetImagData is equivalent to using mxGetPi.

See Also mxGetData, mxSetImagData, mxSetData, mxCopyPtrToComplex8, mxCopyPtrToComplex16, mxGetPi

Purpose Get the value of infinity

Fortran Syntax

```
real*8 function mxGetInf
```

Returns The value of infinity on your system.

Description Call `mxGetInf` to return the value of the MATLAB internal `inf` variable. `inf` is a permanent variable representing IEEE arithmetic positive infinity. The value of `inf` is built into the system. You cannot modify it.

Operations that return infinity include:

- Division by 0. For example, 5/0 returns infinity.
- Operations resulting in overflow. For example, `exp(10000)` returns infinity because the result is too large to be represented on your machine.

See Also `mxGetEps`, `mxGetNaN`

mxGetIr

Purpose

Get the `ir` array

Fortran Syntax

```
integer*4 function mxGetIr(pm)
integer*4 pm
```

Arguments

`pm`
Pointer to a sparse `mxArray`.

Returns

A pointer to the first element in the `ir` array if successful, and zero otherwise. Possible causes of failure include:

- Specifying a full (nonsparse) `mxArray`.
- An earlier call to `mxCreateSparse` failed.

Description

Use `mxGetIr` to obtain the starting address of the `ir` array. The `ir` array is an array of integers; the length of the `ir` array is typically `nzmax` values. For example, if `nzmax` equals 100, then the `ir` array should contain 100 integers.

Each value in an `ir` array indicates a row (offset by 1) at which a nonzero element can be found. (The `jc` array is an index that indirectly specifies a column where nonzero elements can be found.)

For details on the `ir` and `jc` arrays, see `mxSetIr` and `mxSetJc`.

See Also

`mxGetJc`, `mxGetNzmax`, `mxSetIr`, `mxSetJc`, `mxSetNzmax`

Purpose Get the `jc` array

Fortran Syntax

```
integer*4 function mxGetJc(pm)
integer*4 pm
```

Arguments

`pm`
Pointer to a sparse `mxArray`.

Returns

A pointer to the first element in the `jc` array if successful, and zero otherwise. The most likely cause of failure is specifying a pointer that points to a full (nonsparse) `mxArray`.

Description

Use `mxGetJc` to obtain the starting address of the `jc` array. The `jc` array is an integer array having `n+1` elements where `n` is the number of columns in the sparse `mxArray`. The values in the `jc` array indirectly indicate columns containing nonzero elements. For a detailed explanation of the `jc` array, see `mxSetJc`.

See Also

`mxGetIr`, `mxSetIr`, `mxSetJc`

mxGetM

Purpose

Get the number of rows

Fortran Syntax

```
integer*4 function mxGetM(pm)
integer*4 pm
```

Arguments

`pm`
Pointer to an `mxArray`.

Returns

The number of rows in the `mxArray` to which `pm` points.

Description

`mxGetM` returns the number of rows in the specified array.

Example

See `matdemo2.f` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to use this routine in a Fortran program.

See Also

`mxGetN`, `mxSetM`, `mxSetN`

Purpose Get the total number of columns

Fortran Syntax

```
integer*4 function mxGetN(pm)
integer*4 pm
```

Arguments

pm
Pointer to an mxArray.

Returns The number of columns in the mxArray.

Description Call mxGetN to determine the number of columns in the specified mxArray.

If pm points to a sparse mxArray, mxGetN still returns the number of columns, not the number of occupied columns.

Example See matdemo2.f in the eng_mat subdirectory of the examples directory for a sample program that illustrates how to use this routine in a Fortran program.

See Also mxGetM, mxSetM, mxSetN

mxGetName (Obsolete)

Purpose Get the name of the specified `mxArray`

Description This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Purpose
Get the value of `NaN` (Not-a-Number)

Fortran Syntax

```
real*8 function mxGetNaN
```

Returns
The value of `NaN` (Not-a-Number) on your system.

Description
Call `mxGetNaN` to return the value of `NaN` for your system. `NaN` is the IEEE arithmetic representation for Not-a-Number. Certain mathematical operations return `NaN` as a result, for example:

- `0.0/0.0`
- `Inf-Inf`

The value of Not-a-Number is built in to the system. You cannot modify it.

See Also
`mxGetEps`, `mxGetInf`

mxGetNumberOfDimensions

Purpose
Get the number of dimensions

Fortran Syntax
```
integer*4 function mxGetNumberOfDimensions(pm)
integer*4 pm
```

Arguments
`pm`
Pointer to an `mxArray`.

Returns
The number of dimensions in the specified `mxArray`. The returned value is always 2 or greater.

Description
Use `mxGetNumberOfDimensions` to determine how many dimensions are in the specified array. To determine how many elements are in each dimension, call `mxGetDimensions`.

See Also
`mxSetM`, `mxSetN`, `mxGetDimensions`

Purpose Get number of elements in an array

Fortran Syntax

```
integer*4 function mxGetNumberOfElements(pm)
integer*4 pm
```

Arguments

pm
Pointer to an mxArray.

Returns Number of elements in the specified mxArray.

Description mxGetNumberOfElements tells you how many elements an mxArray has. For example, if the dimensions of an array are 3-by-5-by-10, then mxGetNumberOfElements will return the number 150.

See Also mxGetDimensions, mxGetM, mxGetN, mxGetClassName

mxGetNumberOfFields

Purpose

Get the number of fields in a structure mxArray

Fortran Syntax

```
integer*4 function mxGetNumberOfFields(pm)
integer*4 pm
```

Arguments

pm
Pointer to a structure mxArray.

Returns

The number of fields, on success. Returns 0 on failure of if no fields exist. The most common cause of failure is that pm is not a structure mxArray. Call mxIsStruct to determine if pm is a structure.

Description

Call mxGetNumberOfFields to determine how many fields are in the specified structure mxArray.

Once you know the number of fields in a structure, it is easy to loop through every field to set or to get field values.

See Also

mxGetField, mxIsStruct, mxSetField

Purpose Get the number of elements in the ir, pr, and (if it exists) pi arrays

Fortran Syntax

```
integer*4 function mxGetNzmax(pm)
integer*4 pm
```

Arguments

pm
Pointer to a sparse mxArray.

Returns The number of elements allocated to hold nonzero entries in the specified sparse mxArray, on success. Returns an indeterminate value on error. The most likely cause of failure is that pm points to a full (nonsparse) mxArray.

Description Use mxGetNzmax to get the value of the nzmax field. The nzmax field holds an integer value that signifies the number of elements in the ir, pr, and, if it exists, the pi arrays. The value of nzmax is always greater than or equal to the number of nonzero elements in a sparse mxArray. In addition, the value of nzmax is always less than or equal to the number of rows times the number of columns.

As you adjust the number of nonzero elements in a sparse mxArray, MATLAB often adjusts the value of the nzmax field. MATLAB adjusts nzmax in order to reduce the number of costly reallocations and in order to optimize its use of heap space.

See Also mxSetNzmax

mxGetPi

Purpose

Get an mxArray's imaginary data elements

Fortran Syntax

```
integer*4 function mxGetPi(pm)
integer*4 pm
```

Arguments

pm
Pointer to an mxArray.

Returns

The imaginary data elements of the specified mxArray, on success. Returns 0 if there is no imaginary data or if there is an error.

Description

Use mxGetPi to determine the starting address of the imaginary data in the mxArray that pm points to.

See the description for mxGetImagData, which is an equivalent function to mxGetPi.

See Also

mxGetPr, mxSetPi, mxSetPr, mxGetImagData

Purpose Get an mxArray's real data elements

Fortran Syntax

```
integer*4 function mxGetPr(pm)
integer*4 pm
```

Arguments

pm
Pointer to an mxArray.

Returns The address of the first element of the real data. Returns 0 if there is no real data.

Description Use mxGetPr to determine the starting address of the real data in the mxArray that pm points to.

See the description for mxGetData, which is an equivalent function to mxGetPr.

Example See matdemo1.f and fengdemo.f in the eng_mat subdirectory of the examples directory for a sample program that illustrates how to use this routine in a Fortran program.

See Also mxGetPi, mxSetPr, mxSetPi, mxGetData

mxGetScalar

Purpose Get the real component of an mxArray's first data element

Fortran Syntax

```
real*8 function mxGetScalar(pm)
integer*4 pm
```

Arguments

pm
Pointer to an mxArray.

Returns The value of the first real (nonimaginary) element of the mxArray. If pm points to a sparse mxArray, mxGetScalar returns the value of the first nonzero real element in the mxArray.

If pm points to an empty mxArray, mxGetScalar returns an indeterminate value.

Description Call mxGetScalar to get the value of the first real (nonimaginary) element of the mxArray.

In most cases, you call mxGetScalar when pm points to an mxArray containing only one element (a scalar). However, pm can point to an mxArray containing many elements. If pm points to an mxArray containing multiple elements, mxGetScalar returns the value of the first real element. If pm points to a two-dimensional mxArray, mxGetScalar returns the value of the (1,1) element.

See Also mxGetM, mxGetN

Purpose

Create a `character` array from an `mxArray`

Fortran Syntax

```
integer*4 function mxGetString(pm, str, strlen)
integer*4 pm, strlen
character*(*) str
```

Arguments

`pm`
Pointer to an `mxArray`.

`str`
Fortran `character` array.

`strlen`
Number of characters to retrieve from the `mxArray`.

Returns

0 on success, and 1 otherwise.

Description

Call `mxGetString` to copy a `character` array from an `mxArray`. `mxGetString` copies and converts the `character` array from the `mxArray` `pm` into the `character` array `str`. Storage space for `character` array `str` must be allocated previously.

Only up to `strlen` characters are copied, so ordinarily, `strlen` is set to the dimension of the `character` array to prevent writing past the end of the array. Check the length of the `character` array in advance using `mxGetM` and `mxGetN`. If the `character` array contains several rows, they are copied, one column at a time, into one long `character` array.

See Also

`mxCalloc`

mxIsCell

Purpose True if a cell mxArray

Fortran Syntax

```
integer*4 function mxIsCell(pm)
integer*4 pm
```

Arguments

pm
Pointer to an array.

Returns 1 if pm points to an array of the MATLAB cell class, and 0 otherwise.

Description Use mxIsCell to determine if the specified mxArray is a cell array.

Calling mxIsCell is equivalent to calling

```
mxGetClassName(pm) .eq. 'cell'
```

Note mxIsCell does not answer the question, “Is this mxArray a cell of a cell array?”. An individual cell of a cell array can be of any type.

See Also mxIsClass

Purpose True if a character `mxArray`

Fortran Syntax

```
integer*4 function mxIsChar(pm)
integer*4 pm
```

Arguments

`pm`
Pointer to an `mxArray`.

Returns `1` if `pm` points to an array of the MATLAB `char` class, and `0` otherwise.

Description Use `mxIsChar` to determine if the specified array is a character `mxArray`.

Calling `mxIsChar` is equivalent to calling

```
mxGetClassName(pm) .eq. 'char'
```

See Also `mxIsClass`, `mxGetClassID`

mxIsClass

Purpose

True if mxArray is a member of the specified class

Fortran Syntax

```
integer*4 function mxIsClass(pm, classname)
integer*4 pm
character*(*) classname
```

Arguments

pm
Pointer to an array.

classname
A character array specifying the class name you are testing for. You can specify any one of the following predefined constants.

cell	char	double	function_handle
int8	int16	int32	logical
object	single	struct	uint8
uint16	uint32	<class_name>	unknown

In the table, <class_name> represents the name of a specific MATLAB custom object. You can also specify one of your own class names.

Returns

1 if pm points to an array having category *classname*, and 0 otherwise.

Description

Each mxArray is tagged as being a certain type. Call mxIsClass to determine if the specified mxArray has this type.

Example

```
mxIsClass(pm, 'double')
```

is equivalent to calling either one of the following

```
mxIsDouble(pm)

mxGetClassName(pm) .eq. 'double'
```

It is more efficient to use the mxIsDouble form.

See Also

mxIsEmpty, mxGetClassID

Purpose

Inquire if an mxArray is complex

Fortran Syntax

```
integer*4 function mxIsComplex(pm)
integer*4 pm
```

Arguments

pm
Pointer to an mxArray.

Returns

1 if complex, and 0 otherwise.

Description

Use mxIsComplex to determine whether or not an imaginary part is allocated for an mxArray. The imaginary pointer pi is 0 if an mxArray is purely real and does not have any imaginary data. If an mxArray is complex, pi points to an array of numbers.

See Also

mxIsNumeric

mxIsDouble

Purpose Inquire if an mxArray is of type double

Fortran Syntax

```
integer*4 function mxIsDouble(pm)
integer*4 pm
```

Arguments

pm
Pointer to an mxArray.

Returns 1 if true, 0 if false. If mxIsDouble returns 0, the array has no Fortran access functions and your Fortran program cannot use it.

Description Call mxIsDouble to determine whether or not the specified mxArray represents its real and imaginary data as double-precision, floating-point numbers.

Older versions of MATLAB store all mxArray data as double-precision, floating-point numbers. However, starting with MATLAB 5, MATLAB can store real and imaginary data in a variety of numerical formats.

Calling mxIsDouble is equivalent to calling

```
mxGetClassName(pm) .eq. 'double'
```

Purpose

True if `mxArray` is empty

Fortran Syntax

```
integer*4 function mxIsEmpty(pm)
integer*4 pm
```

Arguments

`pm`
Pointer to an array.

Returns

`1` if the `mxArray` is empty, and `0` otherwise.

Description

Use `mxIsEmpty` to determine if an `mxArray` contains no data. An `mxArray` is empty if the size of any of its dimensions is 0.

Note that `mxIsEmpty` is not the opposite of `mxIsFull`.

See Also

`mxIsClass`

mxIsFinite

Purpose True if value is finite

Fortran Syntax

```
integer*4 function mxIsFinite(value)
real*8 value
```

Arguments

`value`
The double-precision, floating-point number that you are testing.

Returns `1` if `value` is finite, and `0` otherwise.

Description Call `mxIsFinite` to determine whether or not `value` is finite. A number is finite if it is greater than `-Inf` and less than `Inf`.

See Also `mxIsInf`, `mxIsNaN`

Purpose True if the `mxArray` originated from the MATLAB global workspace

Fortran Syntax

```
integer*4 function mxIsFromGlobalWS(pm)
integer*4 pm
```

Arguments

`pm`
Pointer to an `mxArray`.

Returns `1` if the array originated from the global workspace, and `0` otherwise.

Description Use `mxIsFromGlobalWS` with stand-alone MAT programs to determine if an array was a global variable when it was saved.

See Also `mexIsGlobal`

mxIsFull (Obsolete)

Purpose Inquire if an `mxArray` is full

Description This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use

```
if (mxIsSparse(prhs(1)) .eq. 0)
```

instead of

```
if (mxIsFull(prhs(1)) .eq. 1)
```

See Also `mxIsSparse`

Purpose True if value is infinite

Fortran Syntax

```
integer*4 function mxIsInf(value)
integer*4 value
```

Arguments

`value`
The double-precision, floating-point number that you are testing.

Returns

`1` if value is infinite, and `0` otherwise.

Description

Call `mxIsInf` to determine whether or not `value` is equal to infinity or minus infinity. MATLAB stores the value of infinity in a permanent variable named `Inf`, which represents IEEE arithmetic positive infinity. The value of the variable, `Inf`, is built into the system. You cannot modify it.

Operations that return infinity include:

- Division by 0. For example, `5/0` returns infinity.
- Operations resulting in overflow. For example, `exp(10000)` returns infinity because the result is too large to be represented on your machine.

See Also

`mxIsFinite`, `mxIsNaN`

mxIsInt8

Purpose

True if `mxArray` represents its data as signed 8-bit integers

Fortran Syntax

```
integer*4 function mxIsInt8(pm)
integer*4 pm
```

Arguments

`pm`
Pointer to an `mxArray`.

Returns

`1` if the array stores its data as signed 8-bit integers, and `0` otherwise.

Description

Use `mxIsInt8` to determine whether or not the specified array represents its real and imaginary data as 8-bit signed integers.

Calling `mxIsInt8` is equivalent to calling

```
mxGetClassName(pm) .eq. 'int8'
```

See Also

`mxIsClass`, `mxGetClassID`, `mxIsInt16`, `mxIsInt32`, `mxIsInt64`, `mxIsUint8`, `mxIsUint16`, `mxIsUint32`, `mxIsUint64`

Purpose

True if mxArray represents its data as signed 16-bit integers

Fortran Syntax

```
integer*4 function mxIsInt16(pm)
integer*4 pm
```

Arguments

pm
Pointer to an mxArray.

Returns

1 if the array stores its data as signed 16-bit integers, and 0 otherwise.

Description

Use mxIsInt16 to determine whether or not the specified array represents its real and imaginary data as 16-bit signed integers.

Calling mxIsInt16 is equivalent to calling

```
mxGetClassName(pm) == 'int16'
```

See Also

mxIsClass, mxGetClassID, mxIsInt8, mxIsInt32, mxIsInt64, mxIsUint8, mxIsUint16, mxIsUint32, mxIsUint64

mxIsInt32

Purpose True if mxArray represents its data as signed 32-bit integers

Fortran Syntax

```
integer*4 function mxIsInt32(pm)
integer*4 pm
```

Arguments

m
Pointer to an mxArray.

Returns 1 if the array stores its data as signed 32-bit integers, and 0 otherwise.

Description Use mxIsInt32 to determine whether or not the specified array represents its real and imaginary data as 32-bit signed integers.

Calling mxIsInt32 is equivalent to calling

```
mxGetClassName(pm) == 'int32'
```

See Also mxIsClass, mxGetClassID, mxIsInt8, mxIsInt16, mxIsInt64, mxIsUint8, mxIsUint16, mxIsUint32, mxIsUint64

Purpose True if mxArray represents its data as signed 64-bit integers

Fortran Syntax

```
integer*4 function mxIsInt64(pm)
integer*4 pm
```

Arguments

m
Pointer to an mxArray.

Returns

1 if the array stores its data as signed 64-bit integers, and 0 otherwise.

Description

Use mxIsInt64 to determine whether or not the specified array represents its real and imaginary data as 64-bit signed integers.

Calling mxIsInt64 is equivalent to calling

```
mxGetClassName(pm) == 'int64'
```

See Also

mxIsClass, mxGetClassID, mxIsInt8, mxIsInt16, mxIsInt32, mxIsUint8, mxIsUint16, mxIsUint32, mxIsUint64

mxIsLogical

Purpose True if `mxArray` is Boolean

Fortran Syntax

```
integer*4 function mxIsLogical(pm)
integer*4 pm
```

Arguments

`pm`
Pointer to an `mxArray`.

Returns `1` if `pm` points to a logical `mxArray`, and 0 otherwise.

Description Use `mxIsLogical` to determine whether MATLAB treats the data in the `mxArray` as Boolean (logical). If an `mxArray` is logical, then MATLAB treats all zeros as meaning `false` and all nonzero values as meaning `true`. For additional information on the use of logical variables in MATLAB, type `help logical` at the MATLAB prompt.

See Also `mxIsClass`, `mxSetLogical (Obsolete)`, `logical`

Purpose True if value is NaN (Not-a-Number)

Fortran Syntax

```
integer*4 function mxIsNaN(value)
integer*4 value
```

Arguments

`value`
The double-precision, floating-point number that you are testing.

Returns `1` if `value` is `NaN` (Not-a-Number), and `0` otherwise.

Description Call `mxIsNaN` to determine whether or not `value` is `NaN`. `NaN` is the IEEE arithmetic representation for Not-a-Number. A `NaN` is obtained as a result of mathematically undefined operations such as:

- `0.0/0.0`
- `Inf-Inf`

The system understands a family of bit patterns as representing `NaN`. In other words, `NaN` is not a single value, rather it is a family of numbers that MATLAB (and other IEEE-compliant applications) uses to represent an error condition or missing data.

See Also `mxIsFinite`, `mxIsInf`

mxIsNumeric

Purpose Inquire if an mxArray contains numeric data

Fortran Syntax

```
integer*4 function mxIsNumeric(pm)
integer*4 pm
```

Arguments

pm
Pointer to an mxArray.

Returns 1 if the mxArray contains numeric data, and 0 otherwise.

Description Call mxIsNumeric to inquire whether or not the mxArray contains numeric data, such as data of class double or uint16. Note that logical data is not numeric.

Example See matdemo1.f in the eng_mat subdirectory of the examples directory for a sample program that illustrates how to use this routine in a Fortran program.

See Also mxIsString (Obsolete)

Purpose True if mxArray represents its data as single-precision, floating-point numbers

Fortran Syntax

```
integer*4 function mxIsSingle(pm)
integer*4 pm
```

Arguments

pm
Pointer to an mxArray.

Returns 1 if the array stores its data as single-precision, floating-point numbers, and 0 otherwise.

Description Use mxIsSingle to determine whether or not the specified array represents its real and imaginary data as single-precision, floating-point numbers.

Calling mxIsSingle is equivalent to calling

```
mxGetClassName(pm) .eq. 'single'
```

See Also mxIsClass, mxGetClassID

mxIsSparse

Purpose

Inquire if an `mxArray` is sparse

Fortran Syntax

```
integer*4 function mxIsSparse(pm)
integer*4 pm
```

Arguments

`pm`
Pointer to an `mxArray`.

Returns

1 if the `mxArray` is sparse, and 0 otherwise.

Description

Use `mxIsSparse` to determine if an `mxArray` is stored in sparse form. Many routines (for example, `mxGetIr` and `mxGetJc`) require a sparse `mxArray` as input.

There are no corresponding set routines. Use `mxCreateSparse` to create sparse `mxArrays`.

See Also

`mxGetIr`, `mxGetJc`, `mxCreateSparse`

Purpose Inquire if an `mxArray` contains a `character` array

Description This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `mxIsChar` instead.

See Also `mxCreateString`, `mxGetString`

mxIsStruct

Purpose True if a structure mxArray

Fortran Syntax

```
integer*4 function mxIsStruct(pm)
integer*4 pm
```

Arguments

pm
Pointer to an mxArray.

Returns 1 if pm points to a structure array; otherwise, 0.

Description Use mxIsStruct to determine if pm points to a structure mxArray. Many routines (for example, mxGetFieldName and mxSetField) require a structure mxArray as an argument.

See Also mxCreateStructArray, mxCreateStructMatrix, mxGetNumberOfFields, mxGetField, mxSetField

Purpose True if mxArray represents its data as unsigned 8-bit integers

Fortran Syntax

```
integer*4 function mxIsInt8(pm)
integer*4 pm
```

Arguments

m
Pointer to an mxArray.

Returns

1 if the mxArray stores its data as unsigned 8-bit integers, and 0 otherwise.

Description

Use mxIsInt8 to determine whether or not the specified mxArray represents its real and imaginary data as 8-bit unsigned integers.

Calling mxIsUint8 is equivalent to calling

```
mxGetClassName(pm) == 'uint8'
```

See Also

mxIsClass, mxGetClassID, mxIsUint16, mxIsUint32, mxIsUint64, mxIsInt8, mxIsInt16, mxIsInt32, mxIsInt64

mxIsUint16

Purpose
True if `mxArray` represents its data as unsigned 16-bit integers

Fortran Syntax

```
integer*4 function mxIsUint16(pm)
integer*4 pm
```

Arguments

`pm`
Pointer to an `mxArray`.

Returns
`1` if the `mxArray` stores its data as unsigned 16-bit integers, and `0` otherwise.

Description
Use `mxIsUint16` to determine whether or not the specified `mxArray` represents its real and imaginary data as 16-bit unsigned integers.

Calling `mxIsUint16` is equivalent to calling

```
mxGetClassName(pm) == 'uint16'
```

See Also
`mxIsClass`, `mxGetClassID`, `mxIsUint8`, `mxIsUint32`, `mxIsUint64`, `mxIsInt8`, `mxIsInt16`, `mxIsInt32`, `mxIsInt64`

Purpose True if mxArray represents its data as unsigned 32-bit integers

Fortran Syntax

```
integer*4 function mxIsUint32(pm)
integer*4 pm
```

Arguments

pm
Pointer to an mxArray.

Returns 1 if the mxArray stores its data as unsigned 32-bit integers, and 0 otherwise.

Description Use mxIsUint32 to determine whether or not the specified mxArray represents its real and imaginary data as 32-bit unsigned integers.

Calling mxIsUint32 is equivalent to calling

```
mxGetClassName(pm) == 'uint32'
```

See Also mxIsClass, mxGetClassID, mxIsUint8, mxIsUint16, mxIsUint64, mxIsInt8, mxIsInt16, mxIsInt32, mxIsInt64

mxIsUint64

Purpose True if mxArray represents its data as unsigned 64-bit integers

Fortran Syntax

```
integer*4 function mxIsUint64(pm)
integer*4 pm
```

Arguments

pm
Pointer to an mxArray.

Returns 1 if the mxArray stores its data as unsigned 64-bit integers, and 0 otherwise.

Description Use mxIsUint64 to determine whether or not the specified mxArray represents its real and imaginary data as 64-bit unsigned integers.

Calling mxIsUint64 is equivalent to calling

```
mxGetClassName(pm) == 'uint64'
```

See Also mxIsClass, mxGetClassID, mxIsUint8, mxIsUint16, mxIsUint32, mxIsInt8, mxIsInt16, mxIsInt32, mxIsInt64

Purpose

Allocate dynamic memory using the MATLAB memory manager

Fortran Syntax

```
integer*4 function mxMalloc(n)
integer*4 n
```

Arguments

`n`
Number of bytes to allocate.

Returns

A pointer to the start of the allocated dynamic memory, if successful. If unsuccessful in a stand-alone (nonMEX-file) application, `mxMalloc` returns `0`. If unsuccessful in a MEX-file, the MEX-file terminates and control returns to the MATLAB prompt.

`mxMalloc` is unsuccessful when there is insufficient free heap space.

Description

Use `mxMalloc` to allocate dynamic memory using the MATLAB memory management facility.

MATLAB maintains a list of all memory allocated by `mxMalloc`. MATLAB automatically frees (deallocates) all of a MEX-file's memory when the MEX-file completes and control returns to the MATLAB prompt.

If you want the memory to persist after a MEX-file completes, call `mexMakeMemoryPersistent` after calling `mxMalloc`. If you write a MEX-file with persistent memory, be sure to register a `mexAtExit` function to free allocated memory in the event your MEX-file is cleared.

When you finish using the memory allocated by `mxMalloc`, call `mxFree`. `mxFree` deallocates the memory.

Note that `mxMalloc` works differently in MEX-files than in stand-alone MATLAB applications.

In MEX-files, `mxMalloc` automatically:

- Allocates enough contiguous heap space to hold `n` bytes.
- Registers the returned heap space with the MATLAB memory management facility.

See Also

`mxCalloc`, `mxFree`, `mxDestroyArray`, `mexMakeArrayPersistent`, `mexMakeMemoryPersistent`

mxRealloc

Purpose Reallocate memory

Fortran Syntax

```
integer*4 function mxRealloc(ptr, size)
integer*4 ptr, size
```

Arguments

`ptr`
Pointer to a block of memory allocated by `mxCalloc`, or by a previous call to `mxRealloc`.

`size`
New size of allocated memory, in bytes.

Returns A pointer to the reallocated block of memory on success, and `0` on failure.

Description `mxRealloc` reallocates the memory routine for the managed list. If `mxRealloc` fails to allocate a block, you must free the block since the ANSI definition of `realloc` states that the block remains allocated. `mxRealloc` returns `0` in this case, and in subsequent calls to `mxRealloc` of the form

```
x = mxRealloc(x, size)
```

Note Failure to reallocate memory with `mxRealloc` can result in memory leaks.

See Also `mxCalloc`, `mxFree`, `mxMalloc`

Purpose

Remove a field from a structure array

Fortran Syntax

```
subroutine mxRemoveField(pm, fieldnumber)
integer*4 pm, fieldnumber
```

Arguments

`pm`
Pointer to a structure `mxArray`.

`fieldnumber`
The number of the field you want to remove. For instance, to remove the first field, set `fieldnumber` to `1`; to remove the second field, set `fieldnumber` to `2`; and so on.

Description

Call `mxRemoveField` to remove a field from a structure array. If the field does not exist, nothing happens. This function does not destroy the field values. Use `mxDestroyArray` to destroy the actual field values.

Consider a MATLAB structure initialized to

```
patient.name = 'John Doe';
patient.billing = 127.00;
patient.test = [79 75 73; 180 178 177.5; 220 210 205];
```

The field number `1` represents the field `name`; field number `2` represents field `billing`; field number `3` represents field `test`.

See Also

`mxAddField`, `mxDestroyArray`, `mxGetFieldByNumber`

mxSetCell

Purpose Set the value of one cell

Fortran Syntax

```
subroutine mxSetCell(pm, index, value)
integer*4 pm, index, value
```

Arguments

`pm`
Pointer to a cell `mxArray`.

`index`
Index from the beginning of the `mxArray`. Specify the number of elements between the first cell of the `mxArray` and the cell you want to set. The easiest way to calculate the `index` in a multidimensional cell array is to call `mxCalcSingleSubscript`.

`value`
The new value of the cell. You can put any kind of `mxArray` into a cell. In fact, you can even put another cell `mxArray` into a cell. Use one of the `mxCreate*` functions to create the `value` `mxArray`.

Description Call `mxSetCell` to put the designated `value` into a particular cell of a cell `mxArray`. You can assign new values to unpopulated cells or overwrite the value of an existing cell. To do the latter, first use `mxDestroyArray` to free what is already there and then `mxSetCell` to assign the new value.

Note Inputs to a MEX-file are constant read-only `mxArrays` and should not be modified. Using `mxSetCell*` or `mxSetField*` to modify the cells or fields of an argument passed from MATLAB causes unpredictable results.

See Also `mxCreateCellArray`, `mxCreateCellMatrix`, `mxGetCell`, `mxIsCell`

Purpose

Set pointer to data

Fortran Syntax

```
subroutine mxSetData(pm, pr)
integer*4 pm, pr
```

Arguments

`pm`
Pointer to an `mxArray`.

`pr`
Pointer to the first element of an array. Each element in the array contains the real component of a value. The array must be in dynamic memory; call `mxCalloc` to allocate this dynamic memory.

Description

Use `mxSetData` to set the real data of the specified `mxArray`.

All `mxCreate*` calls allocate heap space to hold real data. Therefore, you do not ordinarily use `mxSetData` to initialize the real elements of a freshly created `mxArray`. Rather, you call `mxSetData` to replace the initial real values with new ones.

Free the memory used by `pr` by calling `mxDestroyArray` to destroy the entire `mxArray`.

`mxSetData` is equivalent to using `mxSetPr`.

See Also

`mxSetImagData`, `mxGetData`, `mxGetImagData`, `mxSetPr`

mxSetDimensions

Purpose Modify the number of dimensions and/or the size of each dimension

Fortran Syntax

```
integer*4 function mxSetDimensions(pm, dims, ndim)
integer*4 pm, dims, ndim
```

Arguments

`pm`
Pointer to an `mxArray`.

`dims`
The dimensions array. Each element in the dimensions array contains the size of the array in that dimension. For example, setting `dims(1)` to `5` and `dims(2)` to `7` establishes a 5-by-7 `mxArray`. In most cases, there should be `ndim` elements in the `dims` array.

`ndim`
The desired number of dimensions.

Returns

`0` on success, and `1` on failure. `mxSetDimensions` allocates heap space to hold the input size array. So it is possible (though extremely unlikely) that increasing the number of dimensions can cause the system to run out of heap space.

Description

Call `mxSetDimensions` to reshape an existing `mxArray`. `mxSetDimensions` is similar to `mxSetM` and `mxSetN`; however, `mxSetDimensions` provides greater control for reshaping `mxArrays` that have more than two-dimensions.

`mxSetDimensions` does not allocate or deallocate any space for the `pr` or `pi` array. Consequently, if your call to `mxSetDimensions` increases the number of elements in the `mxArray`, then you must enlarge the `pr` (and `pi`, if it exists) array accordingly.

If your call to `mxSetDimensions` reduces the number of elements in the `mxArray`, then you can optionally reduce the size of the `pr` and `pi` arrays using `mxRealloc`.

See Also

`mxGetNumberOfDimensions`, `mxSetM`, `mxSetN`

Purpose Set a field value of a structure array, given a field name and an index

Fortran Syntax

```
subroutine mxSetField(pm, index, fieldname, value)
integer*4 pm, index, value
character*(*) fieldname
```

Arguments

`pm`
Pointer to a structure `mxArray`. Call `mxIsStruct` to determine if `pm` points to a structure `mxArray`.

`index`
The desired element. The first element of an `mxArray` has an index of `1`, the second element has an index of `2`, and the last element has an index of `N`, where `N` is the total number of elements in the structure `mxArray`.

`fieldname`
The name of the field whose value you are assigning. Call `mxGetFieldNameByNumber` to determine existing field names.

`value`
Pointer to the `mxArray` you are assigning. Use one of the `mxCreate*` functions to create the `value` `mxArray`.

Note Inputs to a MEX-file are constant read-only `mxArrays` and should not be modified. Using `mxSetCell*` or `mxSetField*` to modify the cells or fields of an argument passed from MATLAB causes unpredictable results.

Description Use `mxSetField` to assign a `value` to the specified element of the specified field. If there is already a value at the given position, the `value` pointer you specified overwrites the old value pointer. However, `mxSetField` does not free the dynamic memory that the old value pointer pointed to. Consequently, you are responsible for destroying this `mxArray`.

`mxSetField` is almost identical to `mxSetFieldByNumber`; however, the former takes a field name as its third argument, and the latter takes a field number as its third argument.

Calling

```
mxSetField(pm, index, 'fieldname', newvalue)
```

is equivalent to calling

```
fieldnum = mxGetFieldNumber(pm, 'fieldname')
mxSetFieldByNumber(pm, index, fieldnum, newvalue)
```

See Also

`mxCreateStructArray`, `mxCreateStructMatrix`, `mxGetField`, `mxGetFieldByNumber`, `mxGetFieldNameByNumber`, `mxGetNumberOfFields`, `mxIsStruct`, `mxSetFieldByNumber`

Purpose Set a field value in a structure array, given a field number and an index

Fortran Syntax

```
subroutine mxSetFieldByNumber(pm, index, fieldnumber, value)
integer*4 pm, index, fieldnumber, value
```

Arguments

`pm`
Pointer to a structure `mxArray`. Call `mxIsStruct` to determine if `pm` points to a structure `mxArray`.

`index`
The desired element. The first element of an `mxArray` has an index of `1`, the second element has an index of `2`, and the last element has an index of `N`, where `N` is the total number of elements in the structure `mxArray`.

`fieldnumber`
The position of the field whose value you want to extract. The first field within each element has a `fieldnumber` of `1`, the second field has a `fieldnumber` of `2`, and so on. The last field has a `fieldnumber` of `N`, where `N` is the number of fields.

`value`
The value you are assigning. Use one of the `mxCreate*` functions to create the `value` `mxArray`.

Note Inputs to a MEX-file are constant read-only `mxArrays` and should not be modified. Using `mxSetCell*` or `mxSetField*` to modify the cells or fields of an argument passed from MATLAB causes unpredictable results.

Description Use `mxSetFieldByNumber` to assign a `value` to the specified element of the specified field. If there is already a value at the given position, the `value` pointer you specified overwrites the old value pointer. However, `mxSetFieldByNumber` does not free the dynamic memory that the old value pointer pointed to. Consequently, you are responsible for destroying this `mxArray`.

`mxSetFieldByNumber` is almost identical to `mxSetField`; however, the former takes a field number as its third argument, and the latter takes a field name as its third argument.

Calling

```
mxSetField(pm, index, 'fieldname', newvalue)
```

is equivalent to calling

```
fieldnum = mxGetFieldNumber(pm, 'fieldname')
mxSetFieldByNumber(pm, index, fieldnum, newvalue)
```

See Also

`mxCreateStructArray`, `mxCreateStructMatrix`, `mxGetField`, `mxGetFieldByNumber`, `mxGetFieldNameByNumber`, `mxGetNumberOfFields`, `mxIsStruct`, `mxSetField`

Purpose

Set imaginary data pointer for an mxArray

Fortran Syntax

```
subroutine mxSetImagData(pm, pi)
integer*4 pm, pi
```

Arguments

pm
Pointer to an mxArray.

pi
Pointer to the first element of an array. Each element in the array contains the imaginary component of a value. The array must be in dynamic memory; call mxCalloc to allocate this dynamic memory. If pi points to static memory, memory errors will result when the array is destroyed.

Description

Use mxSetImagData to set the imaginary data of the specified mxArray.

Most mxCreate* functions optionally allocate heap space to hold imaginary data. If you tell an mxCreate* function to allocate heap space (for example, by setting the ComplexFlag to COMPLEX = 1 or by setting pi to a nonzero value), then you do not ordinarily use mxSetImagData to initialize the created mxArray's imaginary elements. Rather, you call mxSetImagData to replace the initial imaginary values with new ones.

Free the memory used by pi by calling mxDestroyArray to destroy the entire mxArray.

mxSetImagData is equivalent to using mxSetPi.

See Also

mxSetData, mxGetImagData, mxGetData, mxSetPi

mxSetIr

Purpose

Set the `ir` array of a sparse `mxArray`

Fortran Syntax

```
subroutine mxSetIr(pm, ir)
integer*4 pm,ir
```

Arguments

`pm`
Pointer to a sparse `mxArray`.

`ir`
Pointer to the `ir` array. The `ir` array must be sorted in column-major order.

Description

Use `mxSetIr` to specify the `ir` array of a sparse `mxArray`. The `ir` array is an array of integers; the length of the `ir` array should equal the value of `nzmax`.

Each element in the `ir` array indicates a row (offset by 1) at which a nonzero element can be found. (The `jc` array is an index that indirectly specifies a column where nonzero elements can be found. See `mxSetJc` for more details on `jc`.)

The `ir` array must be in column-major order. That means that the `ir` array must define the row positions in column 1 (if any) first, then the row positions in column 2 (if any) second, and so on through column N. Within each column, row position 1 must appear prior to row position 2, and so on.

`mxSetIr` does not sort the `ir` array for you; you must specify an `ir` array that is already sorted.

See Also

`mxCreateSparse`, `mxGetIr`, `mxGetJc`, `mxSetJc`

Purpose

Set the `jc` array of a sparse `mxArray`

Fortran Syntax

```
subroutine mxSetJc(pm, jc)
integer*4 pm, jc
```

Arguments

`pm`
Pointer to a sparse `mxArray`.

`jc`
Pointer to the `jc` array.

Description

Use `mxSetJc` to specify a new `jc` array for a sparse `mxArray`. The `jc` array is an integer array having `n+1` elements where `n` is the number of columns in the sparse `mxArray`.

See Also

`mxGetIr`, `mxGetJc`, `mxSetIr`

mxSetLogical (Obsolete)

Purpose Set the logical flag

Note As of MATLAB version 6.5, `mxSetLogical` is obsolete. Support for `mxSetLogical` may be removed in a future version.

Fortran Syntax

```
subroutine mxSetLogical(pm)
integer*4 pm
```

Arguments

`pm`
Pointer to an `mxArray` having a numeric class.

Description

Use `mxSetLogical` to turn on an `mxArray`'s logical flag. This flag, when set, tells MATLAB that the array's data is to be treated as Boolean. If the logical flag is on, then MATLAB treats a 0 value as meaning `false` and a nonzero value as meaning `true`. For additional information on the use of logical variables in MATLAB, type `help logical` at the MATLAB prompt.

See Also

`mxClearLogical (Obsolete)`, `mxIsLogical`, `logical`

Purpose

Set the number of rows

Fortran Syntax

```
subroutine mxSetM(pm, m)
integer*4 pm, m
```

Arguments

`pm`
Pointer to an `mxArray`.

`m`
The desired number of rows.

Description

Call `mxSetM` to set the number of rows in the specified `mxArray`. Call `mxSetN` to set the number of columns.

You can use `mxSetM` to change the shape of an existing `mxArray`. Note that `mxSetM` does not allocate or deallocate any space for the `pr`, `pi`, `ir`, or `jc` arrays. Consequently, if your calls to `mxSetM` and `mxSetN` increase the number of elements in the `mxArray`, then you must enlarge the `pr`, `pi`, `ir`, and/or `jc` arrays.

If your calls to `mxSetM` and `mxSetN` end up reducing the number of elements in the array, then you may want to reduce the sizes of the `pr`, `pi`, `ir`, and/or `jc` arrays in order to use heap space more efficiently.

See Also

`mxGetM`, `mxGetN`, `mxSetN`

mxSetN

Purpose

Set the number of columns

Fortran Syntax

```
subroutine mxSetN(pm, n)
integer*4 pm, n
```

Arguments

`pm`
Pointer to an `mxArray`.

`n`
The desired number of columns.

Description

Call `mxSetN` to set the number of columns in the specified `mxArray`. Call `mxSetM` to set the number of rows in the specified `mxArray`.

You typically use `mxSetN` to change the shape of an existing `mxArray`. Note that `mxSetN` does not allocate or deallocate any space for the `pr`, `pi`, `ir`, or `jc` arrays. Consequently, if your calls to `mxSetN` and `mxSetM` increase the number of elements in the `mxArray`, then you must enlarge the `pr`, `pi`, `ir`, and/or `jc` arrays.

If your calls to `mxSetM` and `mxSetN` end up reducing the number of elements in the `mxArray`, then you may want to reduce the sizes of the `pr`, `pi`, `ir`, and/or `jc` arrays in order to use heap space more efficiently. However, reducing the size is not mandatory.

See Also

`mxGetM`, `mxGetN`, `mxSetM`

mxSetName (Obsolete)

Purpose Set the name of an `mxArray`

Description This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Use

```
mexPutVariable(workspace, name, pm)
```

instead of

```
mxSetName(pm, name);
mexPutArray(pm, workspace);
```

mxSetNzmax

Purpose

Set the storage space for nonzero elements

Fortran Syntax

```
subroutine mxSetNzmax(pm, nzmax)
integer*4 pm, nzmax
```

Arguments

`pm`
Pointer to a sparse `mxArray`.

`nzmax`
The number of elements that `mxCreateSparse` should allocate to hold the arrays pointed to by `ir`, `pr`, and `pi` (if it exists). Set `nzmax` greater than or equal to the number of nonzero elements in the `mxArray`, but set it to be less than or equal to the number of rows times the number of columns. If you specify an `nzmax` value of 0, `mxSetNzmax` sets the value of `nzmax` to 1.

Description

Use `mxSetNzmax` to assign a new value to the `nzmax` field of the specified sparse `mxArray`. The `nzmax` field holds the maximum possible number of nonzero elements in the sparse `mxArray`.

The number of elements in the `ir`, `pr`, and `pi` (if it exists) arrays must be equal to `nzmax`. Therefore, after calling `mxSetNzmax`, you must change the size of the `ir`, `pr`, and `pi` arrays.

How big should `nzmax` be? One thought is that you set `nzmax` equal to or slightly greater than the number of nonzero elements in a sparse `mxArray`. This approach conserves precious heap space. Another technique is to make `nzmax` equal to the total number of elements in an `mxArray`. This approach eliminates (or, at least reduces) expensive reallocations.

See Also

`mxGetNzmax`

Purpose Set new imaginary data for an mxArray

Fortran Syntax

```
subroutine mxSetPi(pm, pi)
integer*4 pm, pi
```

Arguments

pm
Pointer to a full (nonsparse) mxArray.

pi
Pointer to the first element of an array. Each element in the array contains the imaginary component of a value. The array must be in dynamic memory; call mxCalloc to allocate this dynamic memory. If pi points to static memory, memory errors will result when the array is destroyed.

Description Use mxSetPi to set the imaginary data of the specified mxArray.

See the description for mxSetImagData, which is an equivalent function to mxSetPi.

See Also mxSetPr, mxGetPi, mxGetPr, mxSetImagData

mxSetPr

Purpose Set new real data for an `mxArray`

Fortran Syntax

```
subroutine mxSetPr(pm, pr)
integer*4 pm, pr
```

Arguments

`pm`
Pointer to a full (nonsparse) `mxArray`.

`pr`
Pointer to the first element of an array. Each element in the array contains the real component of a value. The array must be in dynamic memory; call `mxCalloc` to allocate this dynamic memory.

Description Use `mxSetPr` to set the real data of the specified `mxArray`.

See the description for `mxSetData`, which is an equivalent function to `mxSetPr`.

See Also `mxSetPi`, `mxGetPr`, `mxGetPi`, `mxSetData`

8

Fortran MEX-Functions

`mexAtExit`	Register function to be called when MATLAB is cleared or terminates
`mexCallMATLAB`	Call MATLAB function or user-defined M-file or MEX-file
`mexErrMsgIdAndTxt`	Issue error message with identifier and return to MATLAB
`mexErrMsgTxt`	Issue error message and return to MATLAB
`mexEvalString`	Execute MATLAB command in caller's workspace
`mexFunction`	Entry point to Fortran MEX-file
`mexFunctionName`	Name of current MEX-function
`mexGetArray (Obsolete)`	Use `mexGetVariable`
`mexGetArrayPtr (Obsolete)`	Use `mexGetVariablePtr`
`mexGetEps (Obsolete)`	Use `mxGetEps`
`mexGetFull (Obsolete)`	Use `mexGetVariable`, `mxGetM`, `mxGetN`, `mxGetPr`, `mxGetPi`
`mexGetGlobal (Obsolete)`	Use `mexGetVariablePtr`
`mexGetInf (Obsolete)`	Use `mxGetInf`
`mexGetMatrix (Obsolete)`	Use `mexGetVariable`
`mexGetMatrixPtr (Obsolete)`	Use `mexGetVariablePtr`
`mexGetNaN (Obsolete)`	Use `mxGetNaN`
`mexGetVariable`	Get copy of variable from another workspace
`mexGetVariablePtr`	Get read-only pointer to variable from another workspace
`mexIsFinite (Obsolete)`	Use `mxIsFinite`
`mexIsGlobal`	True if mxArray has global scope
`mexIsInf (Obsolete)`	Use `mxIsInf`
`mexIsLocked`	True if MEX-file is locked
`mexIsNaN (Obsolete)`	Use `mxIsNaN`
`mexLock`	Lock MEX-file so it cannot be cleared from memory
`mexMakeArrayPersistent`	Make `mxArray` persist after MEX-file completes

`mexMakeMemoryPersistent`	Make memory allocated by MATLAB memory allocation routines persist after MEX-file completes
`mexPrintf`	ANSI C printf-style output routine
`mexPutArray (Obsolete)`	Use `mexPutVariable`
`mexPutFull (Obsolete)`	Use `mxCreateDoubleMatrix`, `mxSetPr`, `mxSetPi`, `mexPutVariable`
`mexPutMatrix (Obsolete)`	Use `mexPutVariable`
`mexPutVariable`	Copy mxArray from your MEX-file into another workspace
`mexSetTrapFlag`	Control response of `mexCallMATLAB` to errors
`mexUnlock`	Unlock MEX-file so it can be cleared from memory
`mexWarnMsgIdAndTxt`	Issue warning message with identifier
`mexWarnMsgTxt`	Issue warning message

Purpose Register a subroutine to be called when the MEX-file is cleared or when MATLAB terminates

Fortran Syntax

```
integer*4 function mexAtExit(ExitFcn)
subroutine ExitFcn()
```

Arguments

`ExitFcn`
The exit function. This function must be declared as `external`.

Returns Always returns 0.

Description Use `mexAtExit` to register a subroutine to be called just before the MEX-file is cleared or MATLAB is terminated. `mexAtExit` gives your MEX-file a chance to perform an orderly shutdown of anything under its control.

Each MEX-file can register only one active exit subroutine at a time. If you call `mexAtExit` more than once, MATLAB uses the `ExitFcn` from the more recent `mexAtExit` call as the exit function.

If a MEX-file is locked, all attempts to clear the MEX-file will fail. Consequently, if a user attempts to clear a locked MEX-file, MATLAB does not call the `ExitFcn`.

You must declare the `ExitFcn` as `external` in the Fortran routine that calls `mexAtExit` if it is not within the scope of the file.

See Also `mexSetTrapFlag`

mexCallMATLAB

Purpose Call a MATLAB function or operator, a user-defined M-file, or other MEX-file

Fortran Syntax

```
integer*4 function mexCallMATLAB(nlhs, plhs, nrhs, prhs, name)
integer*4 nlhs, nrhs, plhs(*), prhs(*)
character*(*) name
```

Arguments

`nlhs`
Number of desired output arguments. This value must be less than or equal to 50.

`plhs`
Array of `mxArray` pointers that can be used to access the returned data from the function call. Once the data is accessed, you can then call `mxFree` to free the `mxArray` pointer. By default, MATLAB frees the pointer and any associated dynamic memory it allocates when you return from the `mexFunction` call.

`nrhs`
Number of input arguments. This value must be less than or equal to 50.

`prhs`
Array of pointers to input data.

`name`
`Character` array containing the name of the MATLAB function, operator, M-file, or MEX-file that you are calling. If `name` is an operator, place the operator inside a pair of single quotes; for example, `'+'`.

Returns 0 if successful, and a nonzero value if unsuccessful and `mexSetTrapFlag` was previously called.

Description Call `mexCallMATLAB` to invoke internal MATLAB functions, MATLAB operators, M-files, or other MEX-files.

By default, if `name` detects an error, MATLAB terminates the MEX-file and returns control to the MATLAB prompt. If you want a different error behavior, turn on the trap flag by calling `mexSetTrapFlag`.

See Also `mexFunction`, `mexSetTrapFlag`

Purpose

Issue error message with identifier and return to the MATLAB prompt

Fortran Syntax

```
subroutine mexErrMsgIdAndTxt(errorid, errormsg)
character*(*) errorid, errormsg
```

Arguments

`errorid`
Character array containing a MATLAB message identifier. See “Message Identifiers” in the MATLAB documentation for information on this topic.

`errormsg`
`Character` array containing the error message to be displayed.

Description

Call `mexErrMsgIdAndTxt` to write an error message and its corresponding identifier to the MATLAB window. After the error message prints, MATLAB terminates the MEX-file and returns control to the MATLAB prompt.

Calling `mexErrMsgIdAndTxt` does not clear the MEX-file from memory. Consequently, `mexErrMsgIdAndTxt` does not invoke any registered exit routine to allocate memory.

If your application calls `mxCalloc` or one of the `mxCreate` routines to create `mxArray` pointers, `mexErrMsgIdAndTxt` automatically frees any associated memory allocated by these calls.

See Also

`mexErrMsgTxt`, `mexWarnMsgIdAndTxt`, `mexWarnMsgTxt`

mexErrMsgTxt

Purpose Issue error message and return to the MATLAB prompt

Fortran Syntax

```
subroutine mexErrMsgTxt(errormsg)
character*(*) errormsg
```

Arguments

`errormsg`
`Character` array containing the error message to be displayed.

Description

Call `mexErrMsgTxt` to write an error message to the MATLAB window. After the error message prints, MATLAB terminates the MEX-file and returns control to the MATLAB prompt.

Calling `mexErrMsgTxt` does not clear the MEX-file from memory. Consequently, `mexErrMsgTxt` does not invoke any registered exit routine to allocate memory.

If your application calls `mxCalloc` or one of the `mxCreate` routines to create `mxArray` pointers, `mexErrMsgTxt` automatically frees any associated memory allocated by these calls.

See Also

`mexErrMsgIdAndTxt`, `mexWarnMsgTxt`, `mexWarnMsgIdAndTxt`

Purpose

Execute a MATLAB command in the workspace of the caller

Fortran Syntax

```
integer*4 function mexEvalString(command)
character*(*) command
```

Arguments

`command`
A `character` array containing the MATLAB command to execute.

Returns

0 if successful, and a nonzero value if unsuccessful.

Description

Call `mexEvalString` to invoke a MATLAB command in the workspace of the caller.

`mexEvalString` and `mexCallMATLAB` both execute MATLAB commands. However, `mexCallMATLAB` provides a mechanism for returning results (left-hand side arguments) back to the MEX-file; `mexEvalString` provides no way for return values to be passed back to the MEX-file.

All arguments that appear to the right of an equals sign in the `command` array must already be current variables of the caller's workspace.

See Also

`mexCallMATLAB`

mexFunction

Purpose

MATLAB entry point to a Fortran MEX-file

Fortran Syntax

```
subroutine mexFunction(nlhs, plhs, nrhs, prhs)
integer*4 nlhs, nrhs, plhs(*), prhs(*)
```

Arguments

`nlhs`
The number of expected outputs.

`plhs`
Array of pointers to expected outputs.

`nrhs`
The number of inputs.

`prhs`
Array of pointers to input data. The input data is read only and should not be altered by your `mexFunction`.

Description

`mexFunction` is not a routine you call. Rather, `mexFunction` is the name of a subroutine you must write in every MEX-file. When you invoke a MEX-file, MATLAB searches for a subroutine named `mexFunction` inside the MEX-file. If it finds one, then the first executable line in `mexFunction` becomes the starting point of the MEX-file. If MATLAB cannot find a subroutine named `mexFunction` inside the MEX-file, MATLAB issues an error message.

When you invoke a MEX-file, MATLAB automatically loads `nlhs`, `plhs`, `nrhs`, and `prhs` with the caller's information. In the syntax of the MATLAB language, functions have the general form

```
[a,b,c, ] = fun(d,e,f, )
```

where the denotes more items of the same format. The `a,b,c` are left-hand side arguments and the `d,e,f` are right-hand side arguments. The arguments `nlhs` and `nrhs` contain the number of left-hand side and right-hand side arguments, respectively, with which the MEX-file is called. `prhs` is an array of `mxArray` pointers whose length is `nrhs`. `plhs` is a pointer to an array whose length is `nlhs`, where your function must set pointers for the returned left-hand side `mxArrays`.

Purpose Get the name of the current MEX-function

Fortran Syntax

```
character*(*) function mexFunctionName()
```

Arguments None

Returns The name of the current MEX-function.

Description `mexFunctionName` returns the name of the current MEX-function.

mexGetArray (Obsolete)

Purpose

Get a copy of a variable from the specified workspace

Description

This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Use

```
mexGetVariable(workspace, name)
```

instead of

```
mexGetArray(name, workspace)
```

See Also

`mexGetVariable`

Purpose Get a read-only pointer to a variable from the specified workspace

Description This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Use

```
mexGetVariablePtr(workspace, varname)
```

instead of

```
mexGetArrayPtr(varname, workspace)
```

See Also `mexGetVariable`

mexGetEps (Obsolete)

Purpose Get the value of `eps`

Description This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `mxGetEps` instead.

Purpose Routine to get component parts of a double-precision `mxArray` into a Fortran workspace

Description This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use

```
pm = mexGetVariable("caller", name)
m = mxGetM(pm)
n = mxGetN(pm)
pr = mxGetPr(pm)
pi = mxGetPi(pm)
```

instead of

```
mexGetFull(name, m, n, pr, pi)
```

See Also `mexGetVariable`, `mxGetM`, `mxGetN`, `mxGetPr`, `mxGetPi`

mexGetGlobal (Obsolete)

Purpose Get a pointer to an `mxArray` from the MATLAB global workspace

Description This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use

```
mexGetVariablePtr("global", name)
```

instead of

```
mexGetGlobal(name)
```

See Also `mexGetVariablePtr`, `mxGetPr`, `mxGetPi`

Purpose

Get the value of infinity

Description

This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `mxGetInf` instead.

mexGetMatrix (Obsolete)

Purpose Copies an mxArray from the caller's workspace

Description This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use

```
mexGetVariable("caller", name)
```

instead of

```
mexGetMatrix(name)
```

See Also mexGetVariable

Purpose Get the pointer to an `mxArray` in the caller's workspace

Description This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use

```
mexGetVariablePtr("caller", name)
```

instead of

```
mexGetMatrixPtr(name)
```

See Also `mexGetVariablePtr`

mexGetNaN (Obsolete)

Purpose Get the value of `NaN` (Not-a-Number)

Description This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `mxGetNaN` instead.

Purpose

Get a copy of a variable from the specified workspace

Fortran Syntax

```
integer*4 function mexGetVariable(workspace, varname)
character*(*) workspace, varname
```

Arguments

`workspace`
Specifies where `mexGetVariable` should search in order to find variable `varname`. The possible values are:

`base`	Search for the variable in the base workspace
`caller`	Search for the variable in the caller's workspace
`global`	Search for the variable in the global workspace

`varname`
Name of the variable to copy.

Returns

A copy of the variable on success. Returns `0` on failure. A common cause of failure is specifying a variable that is not currently in the workspace.

Description

Call `mexGetVariable` to get a copy of the specified variable. The returned `mxArray` contains a copy of all the data and characteristics that the variable had in the other workspace. Modifications to the returned `mxArray` do not affect the variable in the workspace unless you write the copy back to the workspace with `mexPutVariable`.

See Also

`mexGetVariablePtr`, `mexPutVariable`

mexGetVariablePtr

Purpose Get a read-only pointer to a variable from the specified workspace

Fortran Syntax

```
integer*4 function mexGetVariablePtr(workspace, varname)
character*(*) workspace, varname
```

Arguments

`workspace`
Specifies which workspace you want `mexGetVariablePtr` to search. The possible values are:

`base`	Search for the variable in the base workspace
`caller`	Search for the variable in the caller's workspace
`global`	Search for the variable in the global workspace

`varname`
Name of the variable to copy. (Note that this is a variable name, not an `mxArray` pointer.)

Returns A read-only pointer to the `mxArray` on success. Returns `0` on failure.

Description Call `mexGetVariablePtr` to get a read-only pointer to the specified variable `varname` from the specified workspace. This command is useful for examining an `mxArray`'s data and characteristics. If you need to change data or characteristics, use `mexGetVariable` (along with `mexPutVariable`) instead of `mexGetVariablePtr`.

See Also `mexGetVariable`

Purpose Determine whether or not a value is finite

Description This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `mxIsFinite` instead.

mexIsGlobal

Purpose True if mxArray has global scope

Fortran Syntax

```
integer*4 function mexIsGlobal(pm)
integer*4 pm
```

Arguments

pm
Pointer to an mxArray.

Returns 1 if the mxArray has global scope, and 0 otherwise.

Description Use mexIsGlobal to determine if the specified mxArray has global scope.

See Also mexGetVariable, mexGetVariablePtr, mexPutVariable, global

Purpose Determine whether or not a value is infinite

Description This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `mxIsInf` instead.

mexIsLocked

Purpose Determine if this MEX-file is locked

Fortran Syntax `integer*4 function mexIsLocked()`

Arguments `none`

Returns `1` if the MEX-file is locked; `0` if the file is unlocked.

Description Call `mexIsLocked` to determine if the MEX-file is locked. By default, MEX-files are unlocked, meaning that users can clear the MEX-file at any time.

To unlock a MEX-file, call `mexUnlock`.

See Also `mexLock`, `mexUnlock`, `mexMakeArrayPersistent`, `mexMakeMemoryPersistent`

Purpose Determine whether or not a value is `NaN` (Not-a-Number)

Description This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `mxIsNaN` instead.

mexLock

Purpose Lock a MEX-file so that it cannot be cleared from memory

Fortran Syntax

```
subroutine mexLock()
```

Arguments `none`

Description By default, MEX-files are unlocked, meaning that a user can clear them at any time. Call `mexLock` to prohibit a MEX-file from being cleared.

To unlock a MEX-file, call `mexUnlock`.

`mexLock` increments a lock count. If you call `mexLock` `n` times, you must call `mexUnlock` `n` times to unlock your MEX-file.

See Also `mexIsLocked`, `mexMakeArrayPersistent`, `mexMakeMemoryPersistent`, `mexUnlock`

Purpose Make an `mxArray` persist after the MEX-file completes

Fortran Syntax

```
subroutine mexMakeArrayPersistent(pm)
integer*4 pm
```

Arguments

`pm`
Pointer to an `mxArray` created by an `mxCreate*` routine.

Description By default, `mxArrays` allocated by `mxCreate*` routines are not persistent. The MATLAB memory management facility automatically frees nonpersistent `mxArrays` when the MEX-file finishes. If you want the `mxArray` to persist through multiple invocations of the MEX-file, you must call `mexMakeArrayPersistent`.

Note If you create a persistent `mxArray`, you are responsible for destroying it when the MEX-file is cleared. If you do not destroy a persistent `mxArray`, MATLAB will leak memory. See `mexAtExit` on how to register a function that gets called when the MEX-file is cleared. See `mexLock` on how to lock your MEX-file so that it is never cleared.

See Also `mexAtExit`, `mexLock`, `mexMakeMemoryPersistent`, and the `mxCreate` functions.

mexMakeMemoryPersistent

Purpose

Make memory allocated by MATLAB memory allocation routines (`mxCalloc`, `mxMalloc`, `mxRealloc`) persist after the MEX-file completes

Fortran Syntax

```
subroutine mexMakeMemoryPersistent(ptr)
integer*4 ptr
```

Arguments

`ptr`
Pointer to the beginning of memory allocated by one of the MATLAB memory allocation routines.

Description

By default, memory allocated by MATLAB is nonpersistent, so it is freed automatically when the MEX-file finishes. If you want the memory to persist, you must call `mexMakeMemoryPersistent`.

Note If you create persistent memory, you are responsible for freeing it when the MEX-file is cleared. If you do not free the memory, MATLAB will leak memory. To free memory, use `mxFree`. See `mexAtExit` on how to register a function that gets called when the MEX-file is cleared. See `mexLock` on how to lock your MEX-file so that it is never cleared.

See Also

`mexAtExit`, `mexLock`, `mexMakeArrayPersistent`, `mxCalloc`, `mxFree`, `mxMalloc`, `mxRealloc`

Purpose

Print a character array

Fortran Syntax

```
integer*4 function mexPrintf(message)
character*(*) message
```

Arguments

`message`
Character array containing message to be displayed.

Note Optional arguments to `mexPrintf`, such as format strings, are not supported in Fortran.

Note If you want the literal `%` in your message, you must use `%%` in your message string since `%` has special meaning to `mexPrintf`. Failing to do so causes unpredictable results.

Returns

The number of characters printed. This includes characters specified with backslash codes, such as `\n` and `\b`.

Description

`mexPrintf` prints a `character` array on the screen and in the diary (if the diary is in use). It provides a callback to the standard C `printf` routine already linked inside MATLAB.

See Also

`mexErrMsgTxt`

mexPutArray (Obsolete)

Purpose Copy an mxArray into the specified workspace

Description This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Use

```
mexPutVariable(workspace, name, pm)
```

instead of

```
mxSetName(pm, name);
mexPutArray(pm, workspace);
```

See Also mexPutVariable

Purpose

Routine to create an `mxArray` from its component parts into a Fortran workspace

Description

This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use

```
pm = mxCreateDoubleMatrix(m, n, 1)
mxSetPr(pm, pr)
mxSetPi(pm, pi)
mexPutVariable("caller", name, pm)
```

instead of

```
mexPutFull(name, m, n, pr, pi)
```

See Also

`mxCreateDoubleMatrix`, `mxSetName (Obsolete)`, `mxSetPr`, `mxSetPi`, `mexPutVariable`

mexPutMatrix (Obsolete)

Purpose Writes an mxArray to the caller's workspace

Description This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use

```
mexPutVariable("caller", name, pm)
```

instead of

```
mexPutMatrix(pm)
```

Purpose

Copy an mxArray into the specified workspace

Fortran Syntax

```
integer*4 function mexPutVariable(workspace, varname, pm)
character*(*) workspace, varname
integer*4 pm
```

Arguments

workspace
Specifies the scope of the array that you are copying. The possible values are:

base	Copy the mxArray to the base workspace
caller	Copy the mxArray to the caller's workspace
global	Copy the mxArray to the list of global variables

varname
Name given to the mxArray in the workspace.

pm
Pointer to an mxArray.

Returns

0 on success; 1 on failure. A possible cause of failure is that the pm argument is zero.

Description

Call mexPutVariable to copy the mxArray, at pointer pm, from your MEX-file into the specified workspace. MATLAB gives the name, varname, to the copied mxArray in the receiving workspace.

mexPutVariable makes the array accessible to other entities, such as MATLAB, M-files or other MEX-files.

If a variable of the same name already exists in the specified workspace, mexPutVariable overwrites the previous contents of the variable with the contents of the new mxArray. For example, suppose the MATLAB workspace defines variable Peaches as

```
Peaches
1      2      3      4
```

and you call mexPutVariable to copy Peaches into the MATLAB workspace.

```
mexPutVariable("base", "Peaches", pm)
```

Then the old value of `Peaches` disappears and is replaced by the value passed in by `mexPutVariable`.

See Also `mexGetVariable`

Purpose

Control response of `mexCallMATLAB` to errors

Fortran Syntax

```
subroutine mexSetTrapFlag(trapflag)
integer*4 trapflag
```

Arguments

`trapflag`
Control flag. Currently, the only legal values are:

`0`	On error, control returns to the MATLAB prompt.
`1`	On error, control returns to your MEX-file.

Description

Call `mexSetTrapFlag` to control the MATLAB response to errors in `mexCallMATLAB`.

If you do not call `mexSetTrapFlag`, then whenever MATLAB detects an error in a call to `mexCallMATLAB`, MATLAB automatically terminates the MEX-file and returns control to the MATLAB prompt. Calling `mexSetTrapFlag` with `trapflag` set to `0` is equivalent to not calling `mexSetTrapFlag` at all.

If you call `mexSetTrapFlag` and set the `trapflag` to `1`, then whenever MATLAB detects an error in a call to `mexCallMATLAB`, MATLAB does not automatically terminate the MEX-file. Rather, MATLAB returns control to the line in the MEX-file immediately following the call to `mexCallMATLAB`. The MEX-file is then responsible for taking an appropriate response to the error.

See Also

`mexAtExit`, `mexErrMsgTxt`

mexUnlock

Purpose Unlock this MEX-file so that it can be cleared from memory

Fortran Syntax

```
subroutine mexUnlock()
```

Arguments `none`

Description By default, MEX-files are unlocked, meaning that a user can clear them at any time. Calling `mexLock` locks a MEX-file so that it cannot be cleared. Calling `mexUnlock` removes the lock so that the MEX-file can be cleared.

`mexLock` increments a lock count. If you called `mexLock` `n` times, you must call `mexUnlock` `n` times to unlock your MEX-file.

See Also `mexIsLocked`, `mexLock`, `mexMakeArrayPersistent`, `mexMakeMemoryPersistent`

Purpose Issue warning message with identifier

Fortran Syntax

```
subroutine mexWarnMsgIdAndTxt(warningid, warningmsg)
character*(*) warningid, warningmsg
```

Arguments

`errorid`
Character array containing a MATLAB message identifier. See “Message Identifiers” in the MATLAB documentation for information on this topic.

`warningmsg`
String containing the warning message to be displayed.

Description `mexWarnMsgIdAndTxt` causes MATLAB to display the contents of `warningmsg`.

Unlike `mexErrMsgIdAndTxt`, `mexWarnMsgIdAndTxt` does not cause the MEX-file to terminate.

See Also `mexWarnMsgTxt`, `mexErrMsgIdAndTxt`, `mexErrMsgTxt`

mexWarnMsgTxt

Purpose

Issue warning message

Fortran Syntax

```
subroutine mexWarnMsgTxt(warningmsg)
character*(*) warningmsg
```

Arguments

`warningmsg`
String containing the warning message to be displayed.

Description

`mexWarnMsgTxt` causes MATLAB to display the contents of `warningmsg`.

Unlike `mexErrMsgTxt`, `mexWarnMsgTxt` does not cause the MEX-file to terminate.

See Also

`mexWarnMsgIdAndTxt`, `mexErrMsgTxt`, `mexErrMsgIdAndTxt`

9

Fortran Engine Functions

`engClose`	Quit MATLAB engine session
`engEvalString`	Evaluate expression in `character` array
`engGetArray (Obsolete)`	Use `engGetVariable`
`engGetFull (Obsolete)`	Use `engGetVariable` followed by appropriate `mxGet` routines
`engGetMatrix (Obsolete)`	Use `engGetVariable`
`engGetVariable`	Copy variable from engine workspace
`engOpen`	Start MATLAB engine session
`engOutputBuffer`	Specify buffer for MATLAB output
`engPutArray (Obsolete)`	Use `engPutVariable`
`engPutFull (Obsolete)`	Use `mxCreateDoubleMatrix` and `engPutVariable`
`engPutMatrix (Obsolete)`	Use `engPutVariable`
`engPutVariable`	Put variables into engine workspace

engClose

Purpose

Quit a MATLAB engine session

Fortran Syntax

```
integer*4 function engClose(ep)
integer*4 ep
```

Arguments

`ep`
Engine pointer.

Description

This routine allows you to quit a MATLAB engine session.

`engClose` sends a quit command to the MATLAB engine session and closes the connection. It returns 0 on success, and 1 otherwise. Possible failure includes attempting to terminate a MATLAB engine session that was already terminated.

Example

See `fengdemo.f` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a Fortran program.

Purpose Evaluate expression in `character` array

Fortran Syntax

```
integer*4 function engEvalString(ep, command)
integer*4 ep
character*(*) command
```

Arguments

`ep`
Engine pointer.

`command`
`character` array to execute.

Description

`engEvalString` evaluates the expression contained in `command` for the MATLAB engine session, `ep`, previously started by `engOpen`. It returns a nonzero value if the MATLAB session is no longer running, and zero otherwise.

On UNIX systems, `engEvalString` sends commands to MATLAB by writing down a pipe connected to the MATLAB *`stdin`*. Any output resulting from the command that ordinarily appears on the screen is read back from *`stdout`* into the buffer defined by `engOutputBuffer`.

Example

See `fengdemo.f` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a Fortran program.

engGetArray (Obsolete)

Purpose Read `mxArrays` from a MATLAB engine's workspace

Description This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Use `engGetVariable` instead.

engGetFull (Obsolete)

Purpose Read full `mxArrays` from an engine

Description This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use

```
mp = engGetVariable(ep, name)
m  = mxGetM(pm)
n  = mxGetN(pm)
pr = mxGetPr(pm)
pi = mxGetPi(pm)
mxDestroyArray(pm)
```

instead of

```
engGetFull(ep, name, m, n, pr, pi)
```

See Also `engGetVariable`, `mxGetM`, `mxGetN`, `mxGetPr`, `mxGetPi`, `mxDestroyArray`

engGetMatrix (Obsolete)

Purpose

Read `mxArrays` from a MATLAB engine's workspace

Description

This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `engGetVariable` instead.

engGetVariable

Purpose

Copy a variable from a MATLAB engine's workspace

Fortran Syntax

```
integer*4 function engGetVariable(ep, name)
integer*4 ep
character*(*) name
```

Arguments

`ep`
Engine pointer.

`name`
Name of `mxArray` to get from MATLAB.

Description

`engGetVariable` reads the named `mxArray` from the MATLAB engine session associated with `ep` and returns a pointer to a newly allocated `mxArray` structure, or `0` if the attempt fails. `engGetVariable` fails if the named variable does not exist.

Be careful in your code to free the `mxArray` created by this routine when you are finished with it.

See Also

`engPutVariable`

engOpen

Purpose Start a MATLAB engine session

Fortran Syntax

```
integer*4 function engOpen(startcmd)
integer*4 ep
character*(*) startcmd
```

Arguments

`ep`
Engine pointer.

`startcmd`
`Character` array to start MATLAB process.

Description This routine allows you to start a MATLAB process to use MATLAB as a computational engine.

`engOpen(startcmd)` starts a MATLAB process using the command specified in `startcmd`, establishes a connection, and returns a unique engine identifier, or 0 if the open fails.

On the UNIX system, if `startcmd` is empty, `engOpen` starts MATLAB on the current host using the command `matlab`. If `startcmd` is a hostname, `engOpen` starts MATLAB on the designated host by embedding the specified hostname string into the larger string:

```
"rsh hostname \"/bin/csh -c 'setenv DISPLAY\
   hostname:0; matlab'\""
```

If `startcmd` is anything else (has white space in it, or nonalphanumeric characters), it is executed literally to start MATLAB.

`engOpen` performs the following steps:

1. Creates two pipes.
2. Forks a new process and sets up the pipes to pass *`stdin`* and *`stdout`* from the child to two file descriptors in the parent.
3. Executes a command to run MATLAB (`rsh` for remote execution).

Example See `fengdemo.f` in the `eng_mat` subdirectory of the `examples` directory for a sample program that illustrates how to call the MATLAB engine functions from a Fortran program.

Purpose

Specify buffer for MATLAB output

Fortran Syntax

```
integer*4 function engOutputBuffer(ep, p)
integer*4 ep
character*n p
```

Arguments

`ep`
Engine pointer.

`p`
Character buffer of length `n`, where `n` is the length of buffer `p`.

Description

`engOutputBuffer` defines a character buffer for `engEvalString` to return any output that would appear on the screen. It returns `1` if you pass it a NULL engine pointer. Otherwise, it returns `0`.

The default behavior of `engEvalString` is to discard any standard output caused by the command it is executing. `engOutputBuffer(ep, p)` tells any subsequent calls to `engEvalString` to save the first `n` characters of output in the character buffer `p`.

engPutArray (Obsolete)

Purpose Read `mxArrays` from a MATLAB engine's workspace

Description This API function is obsolete and is not supported in MATLAB 6.5 or later. This function may not be available in a future version of MATLAB.

Use

```
engPutVariable(ep, name, pm)
```

instead of

```
mxSetName(pm, name);
engPutArray(pm, ep);
```

engPutFull (Obsolete)

Purpose

Write full `mxArrays` into the workspace of an engine

Description

This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use

```
mp = mxCreateDoubleMatrix(m, n, 1)
mxSetPr(pm, pr)
mxSetPi(pm, pi)
engPutVariable(ep, name, pm)

mxDestroyArray(pm)
```

instead of

```
engPutFull(ep, name, m, n, pr, pi)
```

See Also

`engPutVariable`, `mxCreateDoubleMatrix`, `mxSetPr`, `mxSetPi`, `mxDestroyArray`

engPutMatrix (Obsolete)

Purpose Write `mxArrays` into a MATLAB engine's workspace

Description This API function is obsolete and is not supported in MATLAB 6.1 or later. This function may not be available in a future version of MATLAB.

Use `engPutVariable` instead.

Purpose

Put variables into a MATLAB engine's workspace

Fortran Syntax

```
integer*4 function engPutVariable(ep, name, pm)
integer*4 ep, pm
character*(*) name
```

Arguments

`ep`
Engine pointer.

`name`
Name given to the `mxArray` in the engine's workspace.

`pm`
`mxArray` pointer.

Description

`engPutVariable` writes `mxArray` `mp` to the engine `ep`. If the `mxArray` does not exist in the workspace, it is created. If an `mxArray` with the same name already exists in the workspace, the existing `mxArray` is replaced with the new `mxArray`.

`engPutVariable` returns `0` if successful and `1` if an error occurs.

See Also

`engGetVariable`

Java Interface Functions

`class`	Create object or return class of object
`fieldnames`	Return property names of an object
`import`	Add a package or class to the current Java import list
`inspect`	Display graphical interface to list and modify property values
`isa`	Determine if input is object of given class
`isjava`	Test whether an object is a Java object
`ismethod`	Determine if an input is a method of an object
`isprop`	Determine if an input is a property of an object
`javaaddpath`	Add entries to dynamic Java class path
`javaArray`	Construct Java array
`javachk`	Generate an error message based on Java feature support
`javaclasspath`	Set and get dynamic Java class path
`javaMethod`	Invoke Java method
`javaObject`	Construct Java object
`javarmpath`	Remove entries from dynamic Java class path
`methods`	Display information on class methods
`methodsview`	Display information on class methods in separate window
`usejava`	Determine if a Java feature is supported in MATLAB

import

Purpose

Add package or class to current Java import list

Syntax

```
import package_name.*
import class_name
import cls_or_pkg_name1 cls_or_pkg_name2...
import
L = import
```

Description

`import package_name.*` adds all the classes in *package_name* to the current import list. Note that *package_name* must be followed by `.*`.

`import class_name` adds a single class to the current import list. Note that *class_name* must be fully qualified (that is, it must include the package name).

`import cls_or_pkg_name1 cls_or_pkg_name2...` adds all named classes and packages to the current import list. Note that each class name must be fully qualified, and each package name must be followed by `.*`.

`import` with no input arguments displays the current import list, without adding to it.

`L = import` with no input arguments returns a cell array of strings containing the current import list, without adding to it.

The `import` command operates exclusively on the import list of the function from which it is invoked. When invoked at the command prompt, `import` uses the import list for the MATLAB command environment. If `import` is used in a script invoked from a function, it affects the import list of the function. If `import` is used in a script that is invoked from the command prompt, it affects the import list for the command environment.

The import list of a function is persistent across calls to that function and is only cleared when the function is cleared.

To clear the current import list, use the following command.

```
clear import
```

This command may only be invoked at the command prompt. Attempting to use `clear import` within a function results in an error.

Remarks

The only reason for using `import` is to allow your code to refer to each imported class with the immediate class name only, rather than with the fully qualified class name. `import` is particularly useful in streamlining calls to constructors, where most references to Java classes occur.

Examples

This example shows importing and using the single class, `java.lang.String`, and two complete packages, `java.util` and `java.awt`.

```
import java.lang.String
import java.util.* java.awt.*
f = Frame;               % Create java.awt.Frame object
s = String('hello');     % Create java.lang.String object
methods Enumeration      % List java.util.Enumeration methods
```

See Also

`clear`

isjava

Purpose

Determine if input is Java object

Syntax

```
tf = isjava(A)
```

Description

`tf = isjava(A)` returns logical true (`1`) if `A` is a Java object, and logical false (`0`) otherwise.

Examples

Create an instance of the Java Frame class and `isjava` indicates that it is a Java object.

```
frame = java.awt.Frame('Frame A');

isjava(frame)

ans =

     1
```

Note that, `isobject`, which tests for MATLAB objects, returns false (`0`).

```
isobject(frame)

ans =

     0
```

See Also

`isobject`, `javaArray`, `javaMethod`, `javaObject`, `isa`, `is*`

Purpose Add entries to dynamic Java class path

Syntax

```
javaaddpath('dpath')
javaaddpath('dpath', '-end')
```

Description `javaaddpath('dpath')` adds one or more directories or files to the beginning of the current dynamic Java path. `dpath` is a string or cell array of strings containing the directory or file specifications. (See the Remarks section, below, for a description of static and dynamic Java paths.)

`javaaddpath('dpath', '-end')` adds one or more directories or files to the end of the current dynamic Java path.

Remarks The Java path consists of two segments: a static path and a dynamic path. MATLAB always searches the static path before the dynamic path. Java classes on the static path should not have dependencies on classes on the dynamic path.

Path Type	Description
Static	Loaded at the start of each MATLAB session from the file `classpath.txt`. The static Java path offers better Java class loading performance than the dynamic Java path. However, to modify the static Java path you need to edit the file `classpath.txt` and restart MATLAB.
Dynamic	Loaded at any time during a MATLAB session using the `javaclasspath` function. You can define the dynamic path (using `javaclasspath`), modify the path (using `javaaddpath` and `javarmpath`), and refresh the Java class definitions for all classes on the dynamic path (using `clear java`) without restarting MATLAB.

Examples

Create a function to set your initial dynamic Java class path:

```
function setdynpath
javaclasspath({
   'User4:\Work\Java\ClassFiles', ...
   'User4:\Work\JavaTest\curvefit.jar', ...
   'User4:\Work\JavaTest\timer.jar', ...
   'User4:\Work\JavaTest\patch.jar'});
%             end of file
```

Call this function to set up your dynamic class path. Then, use the `javaclasspath` function with no arguments to display all current static and dynamic paths:

```
setdynpath;

javaclasspath

       STATIC JAVA PATH

   D:\Sys0\Java\util.jar
   D:\Sys0\Java\widgets.jar
   D:\Sys0\Java\beans.jar
             .
             .

       DYNAMIC JAVA PATH

   User4:\Work\Java\ClassFiles
   User4:\Work\JavaTest\curvefit.jar
   User4:\Work\JavaTest\timer.jar
   User4:\Work\JavaTest\patch.jar
```

At some later time, add the following two entries to the dynamic path. One entry specifies a directory and the other a Java Archive (JAR) file. When you add a directory to the path, MATLAB includes all files in that directory as part of the path:

```
javaaddpath({
   'User4:\Work\Java\Curvefit\Test', ...
   'User4:\Work\Java\mywidgets.jar'});
```

Use `javaclasspath` with just an output argument to return the dynamic path alone:

```
p = javaclasspath
p =
    'User4:\Work\Java\ClassFiles'
    'User4:\Work\JavaTest\curvefit.jar'
    'User4:\Work\JavaTest\timer.jar'
    'User4:\Work\JavaTest\patch.jar'
    'User4:\Work\Java\Curvefit\Test'
    'User4:\Work\Java\mywidgets.jar'
```

Create an instance of the `mywidgets` class that is defined on the dynamic path:

```
h = mywidgets.calendar;
```

If, at some time, you modify one or more classes that are defined on the dynamic path, you will need to clear the former definition for those classes from MATLAB memory. You can clear all dynamic Java class definitions from memory using,

```
clear java
```

If you then create a new instance of one of these classes, MATLAB uses the latest definition of the class to create the object.

Use `javarmpath` to remove a file or directory from the current dynamic class path:

```
javarmpath('User4:\Work\Java\mywidgets.jar');
```

See Also

`javaclasspath`, `javarmpath`, `clear`

javaArray

Purpose

Construct Java array

Syntax

```
javaArray('package_name.class_name',x1,...,xn)
```

Description

`javaArray('package_name.class_name',x1,...,xn)` constructs an empty Java array capable of storing objects of Java class, `'class_name'`. The dimensions of the array are `x1` by `...` by `xn`. You must include the package name when specifying the class.

The array that you create with `javaArray` is equivalent to the array that you would create with the Java code

```
A = new class_name[x1]...[xn];
```

Examples

The following example constructs and populates a 4-by-5 array of `java.lang.Double` objects.

```
dblArray = javaArray ('java.lang.Double', 4, 5);

for m = 1:4
   for n = 1:5
   dblArray(m,n) = java.lang.Double((m*10) + n);
   end
end

dblArray

dblArray =
java.lang.Double[][]:
    [11]    [12]    [13]    [14]    [15]
    [21]    [22]    [23]    [24]    [25]
    [31]    [32]    [33]    [34]    [35]
    [41]    [42]    [43]    [44]    [45]
```

See Also

`javaObject`, `javaMethod`, `class`, `methodsview`, `isjava`

Purpose

Generate error message based on Java feature support

Syntax

```
javachk(feature)
javachk(feature, component)
```

Description

`javachk(feature)` returns a generic error message if the specified Java `feature` is not available in the current MATLAB session. If it is available, `javachk` returns an empty matrix. Possible `feature` arguments are shown in the following table.

Feature	Description
`'awt'`	Abstract Window Toolkit components[1] are available.
`'desktop'`	The MATLAB interactive desktop is running.
`'jvm'`	The Java Virtual Machine is running.
`'swing'`	Swing components[2] are available.

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`javachk(feature, component)` works the same as the above syntax, except that the specified `component` is also named in the error message. (See the example below.)

Examples

The following M-file displays an error with the message `"CreateFrame is not supported on this platform."` when run in a MATLAB session in which the AWT's GUI components are not available. The second argument to `javachk` specifies the name of the M-file, which is then included in the error message generated by MATLAB.

```
javamsg = javachk('awt', mfilename);
if isempty(javamsg)
   myFrame = java.awt.Frame;
   myFrame.setVisible(1);
else
   error(javamsg);
end
```

See Also usejava

Purpose Set and get dynamic Java class path

Syntax

```
javaclasspath
javaclasspath(dpath)
dpath = javaclasspath
spath = javaclasspath('-static')
jpath = javaclasspath('-all')
javaclasspath(statusmsg)
```

Description

`javaclasspath` displays the static and dynamic segments of the Java path. (See the Remarks section, below, for a description of static and dynamic Java paths.)

`javaclasspath(dpath)` sets the dynamic Java path to one or more directory or file specifications given in `dpath`, where `dpath` can be a string or cell array of strings.

`dpath = javaclasspath` returns the dynamic segment of the Java path in cell array, `dpath`. If no dynamic paths are defined, `javaclasspath` returns an empty cell array.

`spath = javaclasspath('-static')` returns the static segment of the Java path in cell array, `spath`. No path information is displayed unless you specify an output variable. If no static paths are defined, `javaclasspath` returns an empty cell array.

`jpath = javaclasspath('-all')` returns the entire Java path in cell array, `jpath`. The returned cell array contains first the static segment of the path, and then the dynamic segment. No path information is displayed unless you specify an output variable. If no dynamic paths are defined, `javaclasspath` returns an empty cell array.

`javaclasspath(statusmsg)` enables or disables the display of status messages from the `javaclasspath`, `javaaddpath`, and `javarmpath` functions. Values for the *`statusmsg`* argument are

statusmsg	Description
`'-v1'`	Display status messages while loading the Java path from the file system
`'-v0'`	Do not display status messages. This is the default.

Remarks

The Java path consists of two segments: a static path and a dynamic path. MATLAB always searches the static path before the dynamic path. Java classes on the static path should not have dependencies on classes on the dynamic path.

Path Type	Description
Static	Loaded at the start of each MATLAB session from the file `classpath.txt`. The static Java path offers better Java class loading performance than the dynamic Java path. However, to modify the static Java path you need to edit the file `classpath.txt` and restart MATLAB.
Dynamic	Loaded at any time during a MATLAB session using the `javaclasspath` function. You can define the dynamic path (using `javaclasspath`), modify the path (using `javaaddpath` and `javarmpath`), and refresh the Java class definitions for all classes on the dynamic path (using `clear java`) without restarting MATLAB.

Examples

Create a function to set your initial dynamic Java class path:

```
function setdynpath
javaclasspath({
   'User4:\Work\Java\ClassFiles', ...
   'User4:\Work\JavaTest\curvefit.jar', ...
   'User4:\Work\JavaTest\timer.jar', ...
   'User4:\Work\JavaTest\patch.jar'});
%              end of file
```

Call this function to set up your dynamic class path. Then, use the `javaclasspath` function with no arguments to display all current static and dynamic paths:

```
setdynpath;

javaclasspath

       STATIC JAVA PATH

   D:\Sys0\Java\util.jar
   D:\Sys0\Java\widgets.jar
   D:\Sys0\Java\beans.jar
             .
             .

       DYNAMIC JAVA PATH

   User4:\Work\Java\ClassFiles
   User4:\Work\JavaTest\curvefit.jar
   User4:\Work\JavaTest\timer.jar
   User4:\Work\JavaTest\patch.jar
```

At some later time, add the following two entries to the dynamic path. One entry specifies a directory and the other a Java Archive (JAR) file. When you add a directory to the path, MATLAB includes all files in that directory as part of the path:

```
javaaddpath({
   'User4:\Work\Java\Curvefit\Test', ...
   'User4:\Work\Java\mywidgets.jar'});
```

Use `javaclasspath` with just an output argument to return the dynamic path alone:

```
p = javaclasspath
p =
    'User4:\Work\Java\ClassFiles'
    'User4:\Work\JavaTest\curvefit.jar'
    'User4:\Work\JavaTest\timer.jar'
    'User4:\Work\JavaTest\patch.jar'
    'User4:\Work\Java\Curvefit\Test'
    'User4:\Work\Java\mywidgets.jar'
```

Create an instance of the `mywidgets` class that is defined on the dynamic path:

```
h = mywidgets.calendar;
```

If, at some time, you modify one or more classes that are defined on the dynamic path, you will need to clear the former definition for those classes from MATLAB memory. You can clear all dynamic Java class definitions from memory using,

```
clear java
```

If you then create a new instance of one of these classes, MATLAB uses the latest definition of the class to create the object.

Use `javarmpath` to remove a file or directory from the current dynamic class path:

```
javarmpath('User4:\Work\Java\mywidgets.jar');
```

See Also `javaaddpath`, `javarmpath`, `clear`

Purpose

Invoke Java method

Syntax

```
X = javaMethod('method_name','class_name',x1,...,xn)
X = javaMethod('method_name',J,x1,...,xn)
```

Description

`javaMethod('method_name','class_name',x1,...,xn)` invokes the `static` method `method_name` in the class `class_name`, with the argument list that matches `x1,...,xn`.

`javaMethod('method_name',J,x1,...,xn)` invokes the non`static` method `method_name` on the object `J`, with the argument list that matches `x1,...,xn`.

Remarks

Using the `javaMethod` function enables you to

- Use methods having names longer than 31 characters
- Specify the method you want to invoke at run-time, for example, as input from an application user

The `javaMethod` function enables you to use methods having names longer than 31 characters. This is the only way you can invoke such a method in MATLAB. For example:

```
javaMethod('DataDefinitionAndDataManipulationTransactions', T);
```

With `javaMethod`, you can also specify the method to be invoked at run-time. In this situation, your code calls `javaMethod` with a string variable in place of the `method name` argument. When you use `javaMethod` to invoke a static method, you can also use a string variable in place of the class name argument.

Note Typically, you do not need to use `javaMethod`. The default MATLAB syntax for invoking a Java method is somewhat simpler and is preferable for most applications. Use `javaMethod` primarily for the two cases described above.

Examples

To invoke the `static` Java method `isNaN` on class, `java.lang.Double`, use

```
javaMethod('isNaN','java.lang.Double',2.2)
```

The following example invokes the nonstatic method `setTitle`, where `frameObj` is a `java.awt.Frame` object.

```
frameObj = java.awt.Frame;
javaMethod('setTitle', frameObj, 'New Title');
```

See Also

`javaArray`, `javaObject`, `import`, `methods`, `isjava`

Purpose Construct Java object

Syntax

```
J = javaObject('class_name',x1,...,xn)
```

Description `javaObject('class_name',x1,...,xn)` invokes the Java constructor for class `'class_name'` with the argument list that matches `x1,...,xn`, to return a new object.

If there is no constructor that matches the class name and argument list passed to `javaObject`, an error occurs.

Remarks Using the `javaObject` function enables you to

- Use classes having names with more than 31 consecutive characters
- Specify the class for an object at run-time, for example, as input from an application user

The default MATLAB constructor syntax requires that no segment of the input class name be longer than 31 characters. (A *name segment*, is any portion of the class name before, between, or after a period. For example, there are three segments in class, `java.lang.String`.) Any class name segment that exceeds 31 characters is truncated by MATLAB. In the rare case where you need to use a class name of this length, you must use `javaObject` to instantiate the class.

The `javaObject` function also allows you to specify the Java class for the object being constructed at run-time. In this situation, you call `javaObject` with a string variable in place of the class name argument.

```
class  = 'java.lang.String';
text = 'hello';
strObj = javaObject(class, text);
```

In the usual case, when the class to instantiate is known at development time, it is more convenient to use the MATLAB constructor syntax. For example, to create a `java.lang.String` object, you would use

```
strObj = java.lang.String('hello');
```

Note Typically, you will not need to use `javaObject`. The default MATLAB syntax for instantiating a Java class is somewhat simpler and is preferable for most applications. Use `javaObject` primarily for the two cases described above.

Examples

The following example constructs and returns a Java object of class `java.lang.String`:

```
strObj = javaObject('java.lang.String','hello')
```

See Also

`javaArray`, `javaMethod`, `import`, `methods`, `fieldnames`, `isjava`

Purpose

Remove entries from dynamic Java class path

Syntax

```
javarmpath('dpath')
javarmpath dpath1 dpath2 ... dpathN
javarmpath(v1, v2, ..., vN)
```

Description

`javarmpath('dpath')` removes a directory or file from the current dynamic Java path. `dpath` is a string containing the directory or file specification. (See the Remarks section, below, for a description of static and dynamic Java paths.)

`javarmpath dpath1 dpath2 ... dpathN` removes those directories and files specified by `dpath1`, `dpath2`, `...`, `dpathN` from the dynamic Java path. Each input argument is a string containing a directory or file specification.

`javarmpath(v1, v2, ..., vN)` removes those directories and files specified by `v1`, `v2`, `...`, `vN` from the dynamic Java path. Each input argument is a variable to which a directory or file specification is assigned.

Remarks

The Java path consists of two segments: a static path and a dynamic path. MATLAB always searches the static path before the dynamic path. Java classes on the static path should not have dependencies on classes on the dynamic path.

Path Type	Description
Static	Loaded at the start of each MATLAB session from the file `classpath.txt`. The static Java path offers better Java class loading performance than the dynamic Java path. However, to modify the static Java path you need to edit the file `classpath.txt` and restart MATLAB.
Dynamic	Loaded at any time during a MATLAB session using the `javaclasspath` function. You can define the dynamic path (using `javaclasspath`), modify the path (using `javaaddpath` and `javarmpath`), and refresh the Java class definitions for all classes on the dynamic path (using `clear java`) without restarting MATLAB.

Examples

Create a function to set your initial dynamic Java class path:

```
function setdynpath
javaclasspath({
   'User4:\Work\Java\ClassFiles', ...
   'User4:\Work\JavaTest\curvefit.jar', ...
   'User4:\Work\JavaTest\timer.jar', ...
   'User4:\Work\JavaTest\patch.jar'});
%             end of file
```

Call this function to set up your dynamic class path. Then, use the `javaclasspath` function with no arguments to display all current static and dynamic paths:

```
setdynpath;

javaclasspath

       STATIC JAVA PATH

   D:\Sys0\Java\util.jar
   D:\Sys0\Java\widgets.jar
   D:\Sys0\Java\beans.jar
             .
             .

       DYNAMIC JAVA PATH

   User4:\Work\Java\ClassFiles
   User4:\Work\JavaTest\curvefit.jar
   User4:\Work\JavaTest\timer.jar
   User4:\Work\JavaTest\patch.jar
```

At some later time, add the following two entries to the dynamic path. One entry specifies a directory and the other a Java Archive (JAR) file. When you add a directory to the path, MATLAB includes all files in that directory as part of the path:

```
javaaddpath({
   'User4:\Work\Java\Curvefit\Test', ...
   'User4:\Work\Java\mywidgets.jar'});
```

Use `javaclasspath` with just an output argument to return the dynamic path alone:

```
p = javaclasspath
p =
    'User4:\Work\Java\ClassFiles'
    'User4:\Work\JavaTest\curvefit.jar'
    'User4:\Work\JavaTest\timer.jar'
    'User4:\Work\JavaTest\patch.jar'
    'User4:\Work\Java\Curvefit\Test'
    'User4:\Work\Java\mywidgets.jar'
```

Create an instance of the `mywidgets` class that is defined on the dynamic path:

```
h = mywidgets.calendar;
```

If, at some time, you modify one or more classes that are defined on the dynamic path, you will need to clear the former definition for those classes from MATLAB memory. You can clear all dynamic Java class definitions from memory using,

```
clear java
```

If you then create a new instance of one of these classes, MATLAB uses the latest definition of the class to create the object.

Use `javarmpath` to remove a file or directory from the current dynamic class path:

```
javarmpath('User4:\Work\Java\mywidgets.jar');
```

See Also

`javaclasspath`, `javaaddpath`, `clear`

usejava

Purpose

Determine if Java feature is supported in MATLAB

Syntax

```
usejava(feature)
```

Description

`usejava(feature)` returns 1 if the specified feature is supported and 0 otherwise. Possible `feature` arguments are shown in the following table.

Feature	Description
`'awt'`	Abstract Window Toolkit components[1] are available
`'desktop'`	The MATLAB interactive desktop is running
`'jvm'`	The Java Virtual Machine is running
`'swing'`	Swing components[2] are available

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Examples

The following conditional code ensures that the AWT's GUI components are available before the M-file attempts to display a Java Frame.

```
if usejava('awt')
   myFrame = java.awt.Frame;
else
   disp('Unable to open a Java Frame');
end
```

The next example is part of an M-file that includes Java code. It fails gracefully when run in a MATLAB session that does not have access to a JVM.

```
if ~usejava('jvm')
   error([mfilename ' requires Java to run.']);
end
```

See Also

`javachk`

COM Functions

This section describes the functions that support the MATLAB interface to Component Object Model (COM) technology. These fall into the following two categories.

COM Client Functions (p. 11-2)	Functions that enable a MATLAB client application to start a COM server or control, and to interact with its properties, methods, and events.
COM Server Functions (p. 11-50)	Functions called from a client application that execute in the MATLAB server enabling the client to execute commands and access data on the server.

COM Client Functions

`actxcontrol`	Create ActiveX control in figure window
`actxcontrollist`	List all currently installed ActiveX controls
`actxcontrolselect`	Display graphical interface for creating an ActiveX control
`actxserver`	Create COM Automation server
`addproperty`	Add custom property to an object
`class`	Create object or return class of object
`delete (COM)`	Delete COM control or server
`deleteproperty`	Remove custom property from object
`eventlisteners`	Return list of events attached to listeners
`events`	Return list of events the control can trigger
`fieldnames`	Return property names of an object
`get (COM)`	Get property value from an interface, or display properties
`inspect`	Display graphical interface to list and modify property values
`interfaces`	List custom interfaces to COM server
`invoke`	Invoke method on object or interface, or display methods
`isa`	Detect an object of a given MATLAB class or Java class
`iscom`	Determine if input is a COM object
`isevent`	Determine if input is an event
`isinterface`	Determine if input is a COM interface
`ismethod`	Determine if input is an object method
`isprop`	Determine if input is an object property
`load (COM)`	Initialize control object from a file
`methods`	List all methods for the control or server
`methodsview`	Display graphical interface to list method information
`move`	Move or resize control in parent window

`propedit`	Display built-in property page for control
`registerevent`	Register event handler with control's event
`release`	Release an interface
`save (COM)`	Serialize control object to a file
`send`	Obsolete — duplicate of `events`
`set (COM)`	Set object or interface property to specified value
`unregisterallevents`	Unregister all events for a control
`unregisterevent`	Unregister event handler with a control's event

actxcontrol

Purpose

Create ActiveX control in figure window

Syntax

```
h = actxcontrol('progid')
h = actxcontrol('progid', position)
h = actxcontrol('progid', position, fig_handle)
h = actxcontrol('progid', position, fig_handle, event_handler)
h = actxcontrol('progid', position, fig_handle, ...
   event_handler, 'filename')
```

Description

`h = actxcontrol('progid')` creates an ActiveX control in a figure window. The type of control created is determined by the string `progid`, the programmatic identifier (ProgID) for the control. (See the documentation provided by the control vendor to get this string.) The returned object, `h`, represents the default interface for the control.

`h = actxcontrol('progid', position)` creates an ActiveX control having the location and size specified in the vector, `position`. The format of this vector is

```
[x y width height]
```

The first two elements of the vector determine where the control is placed in the figure window, with `x` and `y` being offsets, in pixels, from the bottom left corner of the figure window to the same corner of the control. The last two elements, `width` and `height`, determine the size of the control itself.

The default `position` vector is `[20 20 60 60]`.

`h = actxcontrol('progid', position, fig_handle)` creates an ActiveX control at the specified `position` in an existing figure window. This window is identified by the Handle Graphics handle, `fig_handle`.

The default figure handle is `gcf`.

Note If the figure window designated by `fig_handle` is invisible, the control will be invisible. If you want the control you are creating to be invisible, use the handle of an invisible figure window.

`h = actxcontrol('progid', position, fig_handle, event_handler)` creates an ActiveX control that responds to events. Controls respond to events by invoking an M-file function whenever an event (such as clicking a mouse button) is fired. The `event_handler` argument identifies one or more M-file functions to be used in handling events (see "Specifying Event Handlers" below).

`h = actxcontrol('progid', position, fig_handle, ...`
`event_handler, 'filename')` creates an ActiveX control with the first four arguments, and sets its initial state to that of a previously saved control. MATLAB loads the initial state from the file specified in the string `filename`.

If you don't want to specify an `event_handler`, you can use an empty string (`''`) as the fourth argument.

The `progid` argument must match the `progid` of the saved control.

Specifying Event Handlers

There is more than one valid format for the `event_handler` argument. Use this argument to specify one of the following:

- A different event handler routine for each event supported by the control
- One common routine to handle selected events
- One common routine to handle all events

In the first case, use a cell array for the `event_handler` argument, with each row of the array specifying an event and handler pair:

```
{'event' 'eventhandler'; 'event2' 'eventhandler2'; ...}
```

`event` can be either a string containing the event name or a numeric event identifier (see Example 2 below), and `eventhandler` is a string identifying the M-file function you want the control to use in handling the event. Include only those events that you want enabled.

In the second case, use the same cell array syntax just described, but specify the same `eventhandler` for each event. Again, include only those events that you want enabled.

In the third case, make event_handler a string (instead of a cell array) that contains the name of the one M-file function that is to handle all events for the control.

There is no limit to the number of event and handler pairs you can specify in the event_handler cell array.

Event handler functions should accept a variable number of arguments.

Strings used in the event_handler argument are not case sensitive.

Note Although using a single handler for all events may be easier in some cases, specifying an individual handler for each event creates more efficient code that results in better performance.

Remarks

If the control implements any custom interfaces, use the interfaces function to list them, and the invoke function to get a handle to a selected interface.

When you no longer need the control, call release to release the interface and free memory and other resources used by the interface. Note that releasing the interface does not delete the control itself. Use the delete function to do this.

For more information on handling control events, see the section, “Writing Event Handlers” in the External Interfaces documentation.

For an example event handler, see the file sampev.m in the toolbox\matlab\winfun\comcli directory.

Examples

Example 1 — Basic Control Methods

Start by creating a figure window to contain the control. Then create a control to run a Microsoft Calendar application in the window. Position the control at a [0 0] x-y offset from the bottom left of the figure window, and make it the same size (600 x 500 pixels) as the figure window.

```
f = figure('position', [300 300 600 500]);
cal = actxcontrol('mscal.calendar', [0 0 600 500], f)
cal =
    COM.mscal.calendar
```

Call the get method on cal to list all properties of the calendar:

```
cal.get
             BackColor: 2.1475e+009
                   Day: 23
               DayFont: [1x1 Interface.Standard_OLE_Types.Font]
                 Value: '8/20/2001'
                      .
                      .
```

Read just one property to record today's date:

```
date = cal.Value
date =
   8/23/2001
```

Set the Day property to a new value:

```
cal.Day = 5;
date = cal.Value
date =
   8/5/2001
```

Call invoke with no arguments to list all available methods:

```
meth = cal.invoke
meth =
          NextDay: 'HRESULT NextDay(handle)'
        NextMonth: 'HRESULT NextMonth(handle)'
         NextWeek: 'HRESULT NextWeek(handle)'
         NextYear: 'HRESULT NextYear(handle)'
               .
               .
```

Invoke the NextWeek method to advance the current date by one week:

```
cal.NextWeek;
date = cal.Value
date =
   8/12/2001
```

Call events to list all calendar events that can be triggered:

```
cal.events
ans =
   Click = void Click()
```

```
DblClick = void DblClick()
KeyDown = void KeyDown(int16 KeyCode, int16 Shift)
KeyPress = void KeyPress(int16 KeyAscii)
KeyUp = void KeyUp(int16 KeyCode, int16 Shift)
BeforeUpdate = void BeforeUpdate(int16 Cancel)
AfterUpdate = void AfterUpdate()
NewMonth = void NewMonth()
NewYear = void NewYear()
```

Example 2 — Event Handling

The `event_handler` argument specifies how you want the control to handle any events that occur. The control can handle all events with one common handler function, selected events with a common handler function, or each type of event can be handled by a separate function.

This command creates an `mwsamp` control that uses one event handler, `sampev`, to respond to all events:

```
h = actxcontrol('mwsamp.mwsampctrl.2', [0 0 200 200], ...
   gcf, 'sampev')
```

The next command also uses a common event handler, but will only invoke the handler when selected events, `Click` and `DblClick` are fired:

```
h = actxcontrol('mwsamp.mwsampctrl.2', [0 0 200 200], ...
   gcf, {'Click' 'sampev'; 'DblClick' 'sampev'})
```

This command assigns a different handler routine to each event. For example, `Click` is an event, and `myclick` is the routine that executes whenever a `Click` event is fired:

```
h = actxcontrol('mwsamp.mwsampctrl.2', [0 0 200 200], ...
   gcf, {'Click', 'myclick'; 'DblClick' 'my2click'; ...
   'MouseDown' 'mymoused'});
```

The next command does the same thing, but specifies the events using numeric event identifiers:

```
h = actxcontrol('mwsamp.mwsampctrl.2', [0 0 200 200], ...
   gcf, {-600, 'myclick'; -601 'my2click'; -605 'mymoused'});
```

See the section, “Sample Event Handlers” in the External Interfaces documentation for examples of event handler functions and how to register them with MATLAB.

See Also

`actxserver`, `release`, `delete`, `save`, `load`, `interfaces`

actxcontrollist

Purpose List all currently installed ActiveX controls

Syntax

```
C = actxcontrollist
```

Description `C = actxcontrollist` returns a list of each control, including its name, programmatic identifier (or ProgID), and filename, in output cell array `C`.

Examples Here is an example of the information that might be returned for several controls:

```
list = actxcontrollist;

for k = 1:2
   sprintf(' Name = %s\n ProgID = %s\n File = %s\n', list{k,:})
end

ans =
   Name = ActiveXPlugin Object
   ProgID = Microsoft.ActiveXPlugin.1
   File = C:\WINNT\System32\plugin.ocx

ans =
   Name = Adaptec CD Guide
   ProgID = Adaptec.EasyCDGuide
   File = D:\APPLIC~1\Adaptec\Shared\CDGuide\CDGuide.ocx
```

See Also `actxcontrolselect`, `actxcontrol`

Purpose

Display graphical interface for creating an ActiveX control

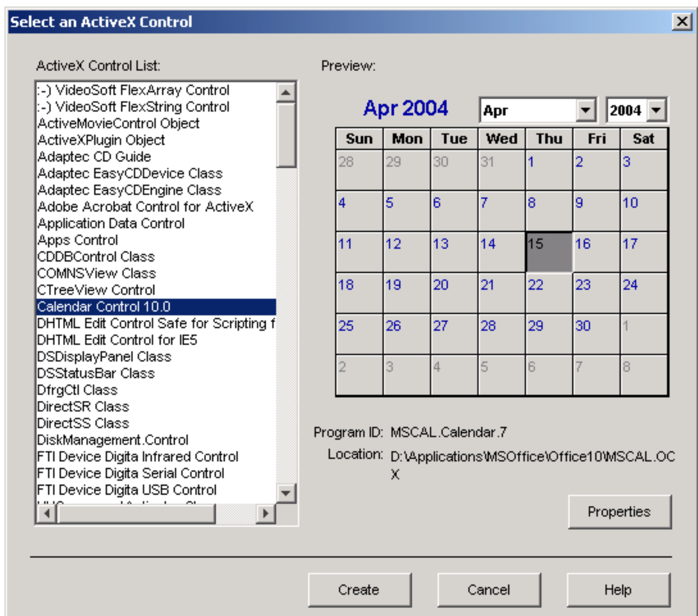
Syntax

```
h = actxcontrolselect
[h, info] = actxcontrolselect
```

Description

`h = actxcontrolselect` displays a graphical interface that lists all ActiveX controls installed on the system and creates the one that you select from the list. The function returns a handle `h` for the object. Use the handle to identify this particular control object when calling other MATLAB COM functions.

`[h, info] = actxcontrolselect` returns the handle `h` and also the 1-by-3 cell array `info` containing information about the control. The information returned in the cell array shows the name, programmatic identifier (or ProgID), and filename for the control.

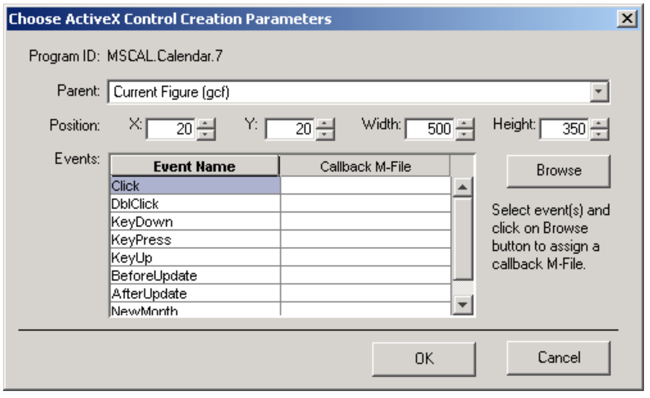


The `actxcontrolselect` interface has a selection panel at the left of the window and a preview panel at the right. Click on one of the control names in the selection panel to see a preview of the control displayed. (If MATLAB cannot create the control, an error message is displayed in the preview panel.) Select an item from the list and click the **Create** button at the bottom.

Remarks

Click the **Properties** button on the `actxcontrolselect` window to enter nondefault values for properties when creating the control. You can select which figure window to put the control in (**Parent** field), where to position it in the window (**X** and **Y** fields), and what size to make the control (**Width** and **Height**).

You can also register any events you want the control to respond to and what event handling routines to use when any of these events fire. Do this by entering the name of the appropriate event handling routine to the right of the event, or clicking the **Browse** button to search for the event handler file.



Examples

Select `Calendar Control 9.0` in the `actxcontrolselect` window and then click **Properties** to open the window shown above. Enter new values for the size of the control, setting **Width** to `500` and **Height** to `350`, then click **OK**. Click **Create** in the `actxcontrolselect` window to create the control.

The control appears in a MATLAB figure window and the `actxcontrolselect` function returns these values:

```
h =
   COM.mscal.calendar.7
info =
    [1x20 char]    'MSCAL.Calendar.7'    [1x41 char]
```

Expand the `info` cell array to show the control name, ProgID, and filename:

```
info{:}
ans =
   Calendar Control 9.0
ans =
   MSCAL.Calendar.7
ans =
   D:\Applications\MSOffice\Office\MSCAL.OCX
```

See Also `actxcontrollist`, `actxcontrol`

Purpose

Create COM Automation server

Syntax

```
h = actxserver('progid')
h = actxserver('progid', 'systemname')
```

Description

`h = actxserver(progid)` creates a COM server, and returns COM object, `h`, representing the server's default interface. `progid` is the programmatic identifier of the component to instantiate in the server. This string is provided by the control or server vendor and should be obtained from the vendor's documentation. For example, the `progid` for MATLAB is `matlab.application`.

`h = actxserver(progid, systemname)` creates a COM server running on the remote system named by the `systemname` argument. This can be an IP address or a DNS name. Use this syntax only in environments that support Distributed Component Object Model (DCOM).

Remarks

For components implemented in a dynamic link library (DLL), `actxserver` creates an in-process server. For components implemented as an executable (EXE), `actxserver` creates an out-of-process server. Out-of-process servers can be created either on the client system or any other system on a network that supports DCOM.

If the control implements any custom interfaces, use the `interfaces` function to list them, and the `invoke` function to get a handle to a selected interface.

There is currently no support for events generated from automation servers.

Examples

Create a COM server running Microsoft Excel and make the main frame window visible:

```
e = actxserver ('Excel.Application')
e =
    COM.excel.application
e.Visible = 1;
```

Call the `get` method on the `excel` object to list all properties of the application:

```
e.get
ans =
        Application: [1x1Interface.Microsoft_Excel_9.0_Object_
Library._Application]
```

```
              Creator: 'xlCreatorCode'
            Workbooks: [1x1 Interface.Microsoft_Excel_9.0_Object_
Library.Workbooks]
              Caption: 'Microsoft Excel - Book1'
      CellDragAndDrop: 0
    ClipboardFormats: {3x1 cell}
               Cursor: 'xlNorthwestArrow'
                 .
                 .
```

Create an interface:

```
eWorkbooks = e.Workbooks
eWorkbooks =
    Interface.Microsoft_Excel_9.0_Object_Library.Workbooks
```

List all methods for that interface by calling `invoke` with just the handle argument:

```
eWorkbooks.invoke
ans =
         Add: 'handle Add(handle, [Optional]Variant)'
       Close: 'void Close(handle)'
        Item: 'handle Item(handle, Variant)'
        Open: 'handle Open(handle, string, [Optional]Variant)'
    OpenText: 'void OpenText(handle, string, [Optional]Variant)'
```

Invoke the `Add` method on `workbooks` to add a new workbook, also creating a new interface:

```
w = eWorkbooks.Add
w =
    Interface.Microsoft_Excel_9.0_Object_Library._Workbook
```

Quit the application and delete the object:

```
e.Quit;
e.delete;
```

See Also

`actxcontrol`, `release`, `delete`, `save`, `load`, `interfaces`

Purpose Add custom property to an object

Syntax

```
h.addproperty('propertyname')
addproperty(h, 'propertyname')
```

Description `h.addproperty('propertyname')` adds the custom property specified in the string, `propertyname`, to the object or interface, `h`. Use `set` to assign a value to the property.

`addproperty(h, 'propertyname')` is an alternate syntax for the same operation.

Examples Create an `mwsamp` control and add a new property named `Position` to it. Assign an array value to the property:

```
f = figure('position', [100 200 200 200]);
h = actxcontrol('mwsamp.mwsampctrl.2', [0 0 200 200], f);
h.get
     Label: 'Label'
    Radius: 20

h.addproperty('Position');
h.Position = [200 120];
h.get
     Label: 'Label'
    Radius: 20
  Position: [200 120]

h.get('Position')
ans =
   200   120
```

Delete the custom `Position` property:

```
h.deleteproperty('Position');
h.get
     Label: 'Label'
    Radius: 20
```

See Also `deleteproperty`, `get`, `set`, `inspect`

Purpose Delete COM control or server

Syntax

```
h.delete
delete(h)
```

Description `h.delete` releases all interfaces derived from the specified COM server or control, and then deletes the server or control itself. This is different from releasing an interface, which releases and invalidates only that interface.

`delete(h)` is an alternate syntax for the same operation.

Examples Create a Microsoft Calender application. Then create a `TitleFont` interface and use it to change the appearance of the font of the calendar's title:

```
f = figure('position',[300 300 500 500]);
cal = actxcontrol('mscal.calendar', [0 0 500 500], f);

TFont = cal.TitleFont
TFont =
   Interface.Standard_OLE_Types.Font

TFont.Name = 'Viva BoldExtraExtended';
TFont.Bold = 0;
```

When you're finished working with the title font, release the `TitleFont` interface:

```
TFont.release;
```

Now create a `GridFont` interface and use it to modify the size of the calendar's date numerals:

```
GFont = cal.GridFont
GFont =
   Interface.Standard_OLE_Types.Font

GFont.Size = 16;
```

When you're done, delete the `cal` object and the figure window. Deleting the `cal` object also releases all interfaces to the object (e.g., `GFont`):

```
cal.delete;
```

```
delete(f);
clear f;
```

Note that, although the object and interfaces themselves have been destroyed, the variables assigned to them still reside in the MATLAB workspace until you remove them with `clear`:

```
whos
  Name        Size                   Bytes  Class

  GFont       1x1                        0  handle
  TFone       1x1                        0  handle
  cal         1x1                        0  handle

Grand total is 3 elements using 0 bytes
```

See Also

`release`, `save`, `load`, `actxcontrol`, `actxserver`

Purpose Remove custom property from object

Syntax

```
h.deleteproperty('propertyname')
deleteproperty(h, 'propertyname')
```

Description `h.deleteproperty('propertyname')` deletes the property specified in the string `propertyname` from the custom properties belonging to object or interface, `h`.

`deleteproperty(h, 'propertyname')` is an alternate syntax for the same operation.

Note You can only delete properties that have been created with `addproperty`.

Examples Create an `mwsamp` control and add a new property named `Position` to it. Assign an array value to the property:

```
f = figure('position', [100 200 200 200]);
h = actxcontrol('mwsamp.mwsampctrl.2', [0 0 200 200], f);
h.get
     Label: 'Label'
    Radius: 20

h.addproperty('Position');
h.Position = [200 120];
h.get
       Label: 'Label'
      Radius: 20
    Position: [200 120]
```

Delete the custom `Position` property:

```
h.deleteproperty('Position');
h.get
     Label: 'Label'
    Radius: 20
```

See Also

`addproperty`, `get`, `set`, `inspect`

Purpose Return list of events attached to listeners

Syntax

```
C = h.eventlisteners
C = eventlisteners(h)
```

Description `C = h.eventlisteners` lists any events, along with their event handler routines, that have been registered with control, `h`. The function returns cell array of strings `C`, with each row containing the name of a registered event and the handler routine for that event. If the control has no registered events, then `eventlisteners` returns an empty cell array.

Events and their event handler routines must be registered in order for the control to respond to them. You can register events either when you create the control, using `actxcontrol`, or at any time afterwards, using `registerevent`.

`C = eventlisteners(h)` is an alternate syntax for the same operation.

Examples Create an `mwsamp` control, registering only the `Click` event. `eventlisteners` returns the name of the event and its event handler routine, `myclick`:

```
f = figure('position', [100 200 200 200]);
h = actxcontrol('mwsamp.mwsampctrl.2', [0 0 200 200], f, ...
    {'Click' 'myclick'});

h.eventlisteners
ans =
    'click'    'myclick'
```

Register two more events: `DblClick` and `MouseDown`. `eventlisteners` returns the names of the three registered events along with their respective handler routines:

```
h.registerevent({'DblClick', 'my2click'; ...
    'MouseDown' 'mymoused'});

h.eventlisteners
ans =
    'click'        'myclick'
    'dblclick'     'my2click'
    'mousedown'    'mymoused'
```

Now unregister all events for the control. `eventlisteners` returns an empty cell array, indicating that no events have been registered for the control:

```
h.unregisterallevents

h.eventlisteners
ans =
     {}
```

See Also

`events`, `registerevent`, `unregisterevent`, `unregisterallevents`, `isevent`

Purpose

Return list of events the control can trigger

Syntax

```
S = h.events
S = events(h)
```

Description

`S = h.events` returns structure array `S` containing all events, both registered and unregistered, known to the control, and the function prototype used when calling the event handler routine. For each array element, the structure field is the event name and the contents of that field is the function prototype for that event's handler.

`S = events(h)` is an alternate syntax for the same operation.

Note The `send` function is identical to `events`, but support for `send` will be removed in a future release of MATLAB.

Examples

Create an `mwsamp` control and list all events:

```
f = figure ('position', [100 200 200 200]);
h = actxcontrol ('mwsamp.mwsampctrl.2', [0 0 200 200], f);

h.events
   Click = void Click()
   DblClick = void DblClick()
   MouseDown = void MouseDown(int16 Button, int16 Shift,
      Variant x, Variant y)
```

Assign the output to a variable and get one field of the returned structure:

```
ev = h.events;

ev.MouseDown
ans =
void MouseDown(int16 Button, int16 Shift, Variant x, Variant y)
```

See Also

`isevent`, `eventlisteners`, `registerevent`, `unregisterevent`, `unregisterallevents`

get (COM)

Purpose

Get property value from an interface, or display properties

Syntax

```
V = h.get
V = h.get('propertyname')
V = get(h, ...)
```

Description

`V = h.get` returns a list of all properties and their values for the object or interface, `h`.

`V = h.get('propertyname')` returns the value of the property specified in the string, `propertyname`.

`V = get(h, ...)` is an alternate syntax for the same operation.

Remarks

The meaning and type of the return value is dependent upon the specific property being retrieved. The object's documentation should describe the specific meaning of the return value. MATLAB may convert the data type of the return value. See "Converting Data" in the External Interfaces documentation for a description of how MATLAB converts COM data types.

Examples

Create a COM server running Microsoft Excel:

```
e = actxserver ('Excel.Application');
```

Retrieve a single property value:

```
e.Path
ans =
   D:\Applications\MSOffice\Office
```

Retrieve a list of all properties for the `CommandBars` interface:

```
c = e.CommandBars.get
ans =
              Application: [1x1
Interface.excel.application.CommandBars.Application]
                  Creator: 1.4808e+009
            ActionControl: []
            ActiveMenuBar: [1x1
Interface.excel.application.CommandBars.ActiveMenuBar]
                    Count: 94
```

```
            DisplayTooltips: 1
      DisplayKeysInTooltips: 0
               LargeButtons: 0
         MenuAnimationStyle: 'msoMenuAnimationNone'
                     Parent: [1x1
Interface.excel.application.CommandBars.Parent]
              AdaptiveMenus: 0
               DisplayFonts: 1
```

See Also

`set`, `inspect`, `isprop`, `addproperty`, `deleteproperty`

interfaces

Purpose

List custom interfaces to COM server

Syntax

```
C = h.interfaces
C = interfaces(h)
```

Description

`C = h.interfaces` returns cell array of strings `C` listing all custom interfaces implemented by the component in a specific COM server. The server is designated by input argument, `h`, which is the handle returned by the `actxcontrol` or `actxserver` function when creating that server.

`C = interfaces(h)` is an alternate syntax for the same operation.

Note `interfaces` only lists the custom interfaces; it does not return any interfaces. Use the `invoke` function to return a handle to a specific custom interface.

Examples

Once you have created a COM server, you can query the server component to see if any custom interfaces are implemented. Use the `interfaces` function to return a list of all available custom interfaces:

```
h = actxserver('mytestenv.calculator')
h =
   COM.mytestenv.calculator

customlist = h.interfaces
customlist =
   ICalc1
   ICalc2
   ICalc3
```

To get a handle to the custom interface you want, use the `invoke` function, specifying the handle returned by `actxcontrol` or `actxserver` and also the name of the custom interface:

```
c1 = h.invoke('ICalc1')
c1 =
   Interface.Calc_1.0_Type_Library.ICalc_Interface
```

You can now use this handle with most of the COM client functions to access the properties and methods of the object through the selected custom interface. For example, to list the properties available through the `ICalc1` interface, use

```
c1.get
     background: 'Blue'
         height: 10
          width: 0
```

To list the methods, use

```
c1.invoke
   Add = double Add(handle, double, double)
   Divide = double Divide(handle, double, double)
   Multiply = double Multiply(handle, double, double)
   Subtract = double Subtract(handle, double, double)
```

Add and multiply numbers using the `Add` and `Multiply` methods of the custom object `c1`:

```
sum = c1.Add(4, 7)
sum =
    11

prod = c1.Multiply(4, 7)
prod =
    28
```

See Also

`actxcontrol`, `actxserver`, `invoke`, `get`

invoke

Purpose

Invoke method on object or interface, or display methods

Syntax

```
S = h.invoke
S = h.invoke('methodname')
S = h.invoke('methodname', arg1, arg2, ...)
S = h.invoke('custominterfacename')
S = invoke(h, ...)
```

Description

`S = h.invoke` returns structure array `S` containing a list of all methods supported by the object or interface, `h`, along with the prototypes for these methods.

`S = h.invoke('methodname')` invokes the method specified in the string `methodname`, and returns an output value, if any, in `v`. The data type of the return value is dependent upon the specific method being invoked and is determined by the specific control or server.

`S = h.invoke('methodname', arg1, arg2, ...)` invokes the method specified in the string `methodname` with input arguments `arg1`, `arg2`, etc.

`S = h.invoke('custominterfacename')` returns an `Interface` object that serves as a handle to a custom interface implemented by the COM component. The `h` argument is a handle to the COM object. The `custominterfacename` argument is a quoted string returned by the `interfaces` function.

`S = invoke(h, ...)` is an alternate syntax for the same operation.

Remarks

If the method returns a COM interface, then `invoke` returns a new MATLAB COM object that represents the interface returned. See “Converting Data” in the External Interfaces documentation for a description of how MATLAB converts COM data types.

Examples

Example 1 — Invoking a Method

Create an `mwsamp` control and invoke its `Redraw` method:

```
f = figure ('position', [100 200 200 200]);
h = actxcontrol ('mwsamp.mwsampctrl.1', [0 0 200 200], f);

h.Radius = 100;
```

```
h.invoke('Redraw');
```

Here is a simpler way to use `invoke`. Just call the method directly, passing the handle, and any arguments:

```
h.Redraw;
```

Call `invoke` with only the handle argument to display a list of all `mwsamp` methods:

```
h.invoke
ans =
   AboutBox = void AboutBox(handle)
   Beep = void Beep(handle)
   FireClickEvent = void FireClickEvent(handle)
             .
             .
            etc.
```

Example 2 — Getting a Custom Interface

Once you have created a COM server, you can query the server component to see if any custom interfaces are implemented. Use the `interfaces` function to return a list of all available custom interfaces:

```
h = actxserver('mytestenv.calculator')
h =
   COM.mytestenv.calculator

customlist = h.interfaces
customlist =
   ICalc1
   ICalc2
   ICalc3
```

To get a handle to the custom interface you want, use the `invoke` function, specifying the handle returned by `actxcontrol` or `actxserver` and also the name of the custom interface:

```
c1 = h.invoke('ICalc1')
c1 =
   Interface.Calc_1.0_Type_Library.ICalc_Interface
```

You can now use this handle with most of the COM client functions to access the properties and methods of the object through the selected custom interface.

See Also

`methods`, `ismethod`, `interfaces`

Purpose

Determine if input is a COM object

Syntax

```
tf = h.iscom
tf = iscom(h)
```

Description

`tf = h.iscom` returns a logical `1` (`true`) if the input handle, `h`, is a COM or ActiveX object. Otherwise, `iscom` returns logical `0` (`false`).

`tf = iscom(h)` is an alternate syntax for the same operation.

Examples

Create a COM server running Microsoft Excel. The `actxserver` function returns a handle `h` to the server object. Testing this handle with `iscom` returns `true`:

```
h = actxserver('excel.application');

h.iscom
ans =
   1
```

Create an interface to `workbooks`, returning handle `w`. Testing this handle with `iscom` returns `false`:

```
w = h.get('workbooks');

w.iscom
ans =
   0
```

See Also

`isinterface`

isevent

Purpose Determine if input is an event

Syntax

```
tf = h.isevent('name')
tf = isevent(h, 'name')
```

Description `tf = h.isevent('name')` returns a logical `1` (`true`) if the specified `name` is an event that can be recognized and responded to by object `h`. Otherwise, `isevent` returns logical `0` (`false`).

`tf = isevent(h, 'name')` is an alternate syntax for the same operation.

Remarks The string specified in the `name` argument is not case sensitive.

For COM control objects, `isevent` returns the same value regardless of whether the specified event is registered with the control or not. In order for the control to respond to the event, you must first register the event using either `actxcontrol` or `registerevent`.

Examples Create an `mwsamp` control and test to see if `DblClick` is an event recognized by the control. `isevent` returns `true`:

```
f = figure ('position', [100 200 200 200]);
h = actxcontrol ('mwsamp.mwsampctrl.2', [0 0 200 200], f);

h.isevent('DblClick')
ans =
     1
```

Try the same test on `Redraw`, which is a method, and `isevent` returns `false`:

```
h.isevent('Redraw')
ans =
     0
```

See Also `events`, `eventlisteners`, `registerevent`, `unregisterevent`, `unregisterallevents`

Purpose Determine if input is a COM interface

Syntax

```
tf = h.isinterface
tf = isinterface(h)
```

Description `tf = h.isinterface` returns a logical `1` (`true`) if the input handle, `h`, is a COM interface. Otherwise, `isinterface` returns logical `0` (`false`).

`tf = isinterface(h)` is an alternate syntax for the same operation.

Examples Create a COM server running Microsoft Excel. The `actxserver` function returns a handle `h` to the server object. Testing this handle with `isinterface` returns `false`:

```
h = actxserver('excel.application');

h.isinterface
ans =
   0
```

Create an interface to `workbooks`, returning handle `w`. Testing this handle with `isinterface` returns `true`:

```
w = h.get('workbooks');

w.isinterface
ans =
   1
```

See Also `iscom`, `interfaces`, `get (COM)`

load (COM)

Purpose Initialize control object from a file

Syntax

```
h.load('filename')
load(h, 'filename')
```

Description `h.load('filename')` initializes the COM object associated with the interface represented by the MATLAB COM object `h` from file specified in the string `filename`. The file must have been created previously by serializing an instance of the same control.

`load(h, 'filename')` is an alternate syntax for the same operation.

Note The COM `load` function is only supported for controls at this time.

Examples Create an `mwsamp` control and save its original state to the file `mwsample`:

```
f = figure('position', [100 200 200 200]);
h = actxcontrol('mwsamp.mwsampctrl.2', [0 0 200 200], f);
h.save('mwsample')
```

Now, alter the figure by changing its label and the radius of the circle:

```
h.Label = 'Circle';
h.Radius = 50;
h.Redraw;
```

Using the `load` function, you can restore the control to its original state:

```
h.load('mwsample');
h.get
ans =
     Label: 'Label'
    Radius: 20
```

See Also `save`, `actxcontrol`, `actxserver`, `release`, `delete`

Purpose Move or resize control in parent window

Syntax

```
V = h.move(position)
V = move(h, position)
```

Description `V = h.move(position)` moves the control to the position specified by the `position` argument. When you use move with only the handle argument, `h`, it returns a four-element vector indicating the current position of the control.

`V = move(h, position)` is an alternate syntax for the same operation.

The position argument is a four-element vector specifying the position and size of the control in the parent figure window. The elements of the vector are

```
[x, y, width, height]
```

where `x` and `y` are offsets, in pixels, from the bottom left corner of the figure window to the same corner of the control, and `width` and `height` are the size of the control itself.

Examples This example moves the control:

```
f = figure('Position', [100 100 200 200]);
h = actxcontrol('mwsamp.mwsampctrl.1', [0 0 200 200], f);
pos = h.move([50 50 200 200])
pos =
    50    50   200   200
```

The next example resizes the control to always be centered in the figure as you resize the figure window. Start by creating the script `resizectrl.m` that contains

```
% Get the new position and size of the figure window
  fpos = get(gcbo, 'position');

% Resize the control accordingly
  h.move([0 0 fpos(3) fpos(4)]);
```

Now execute the following in MATLAB or in an M-file:

```
f = figure('Position', [100 100 200 200]);
h = actxcontrol('mwsamp.mwsampctrl.1', [0 0 200 200]);
```

```
set(f, 'ResizeFcn', 'resizectrl');
```

As you resize the figure window, notice that the circle moves so that it is always positioned in the center of the window.

See Also `set`, `get`

Purpose Display built-in property page for control

Syntax

```
h.propedit
propedit(h)
```

Description `h.propedit` requests the control to display its built-in property page. Note that some controls do not have a built-in property page. For those controls, this command fails.

`propedit(h)` is an alternate syntax for the same operation.

Examples Create a Microsoft Calendar control and display its property page:

```
cal = actxcontrol('mscal.calendar', [0 0 500 500]);
cal.propedit
```

See Also `inspect`, `get`

registerevent

Purpose Register event handler with control's event

Syntax

```
h.registerevent(event_handler)
registerevent(h, event_handler)
```

Description `h.registerevent(event_handler)` registers certain event handler routines with their corresponding events. Once an event is registered, the control responds to the occurrence of that event by invoking its event handler routine.

`registerevent(h, event_handler)` is an alternate syntax for the same operation.

You can either register events at the time you create the control (using `actxcontrol`), or register them dynamically at any time after the control has been created (using `registerevent`). Both events and event handlers are specified in the `event_handler` argument (see "Specifying Event Handlers" in the External Interfaces documentation).

Examples Create an `mwsamp` control and list all events associated with the control:

```
f = figure ('position', [100 200 200 200]);
h = actxcontrol ('mwsamp.mwsampctrl.2', [0 0 200 200], f);

h.events
ans =
   Click = void Click()
   DblClick = void DblClick()
   MouseDown = void MouseDown(int16 Button, int16 Shift,
      Variant x, Variant y)
```

Register all events with the same event handler routine, `sampev`. Use the `eventlisteners` function to see the event handler used by each event:

```
h.registerevent('sampev');
h.eventlisteners
ans =
    'click'        'sampev'
    'dblclick'     'sampev'
    'mousedown'    'sampev'

h.unregisterallevents;
```

Register the `Click` and `DblClick` events with event handlers `myclick` and `my2click`, respectively:

```
h.registerevent({'click' 'myclick'; 'dblclick' 'my2click'});
h.eventlisteners
ans =
    'click'        'myclick'
    'dblclick'     'my2click'
```

See Also

`events`, `eventlisteners`, `unregisterevent`, `unregisterallevents`, `isevent`

release

Purpose Release an interface

Syntax

```
h.release
release(h)
```

Description `h.release` releases the interface and all resources used by the interface. Each interface handle must be released when you are finished manipulating its properties and invoking its methods. Once an interface has been released, it is no longer valid. Subsequent operations on the MATLAB object that represents that interface will result in errors.

`release(h)` is an alternate syntax for the same operation.

Note Releasing the interface does not delete the control itself (see `delete`), since other interfaces on that object may still be active. See "Releasing Interfaces" in the External Interfaces documentation for more information.

Examples Create a Microsoft Calender application. Then create a `TitleFont` interface and use it to change the appearance of the font of the calendar's title:

```
f = figure('position',[300 300 500 500]);
cal = actxcontrol('mscal.calendar', [0 0 500 500], f);

TFont = cal.TitleFont
TFont =
   Interface.Standard_OLE_Types.Font

TFont.Name = 'Viva BoldExtraExtended';
TFont.Bold = 0;
```

When you're finished working with the title font, release the `TitleFont` interface:

```
TFont.release;
```

Now create a `GridFont` interface and use it to modify the size of the calendar's date numerals:

```
GFont = cal.GridFont
```

```
GFont =
   Interface.Standard_OLE_Types.Font

GFont.Size = 16;
```

When you're done, delete the `cal` object and the figure window:

```
cal.delete;
delete(f);
clear f;
```

See Also

`delete`, `save`, `load`, `actxcontrol`, `actxserver`

save (COM)

Purpose

Serialize a control object to a file

Syntax

```
h.save('filename')
save(h, 'filename')
```

Description

`h.save('filename')` saves the COM control object, `h`, to the file specified in the string, `filename`.

`save(h, 'filename')` is an alternate syntax for the same operation.

Note The COM `save` function is only supported for controls at this time.

Examples

Create an `mwsamp` control and save its original state to the file `mwsample`:

```
f = figure('position', [100 200 200 200]);
h = actxcontrol('mwsamp.mwsampctrl.2', [0 0 200 200], f);
h.save('mwsample')
```

Now, alter the figure by changing its label and the radius of the circle:

```
h.Label = 'Circle';
h.Radius = 50;
h.Redraw;
```

Using the `load` function, you can restore the control to its original state:

```
h.load('mwsample');
h.get
ans =
     Label: 'Label'
    Radius: 20
```

See Also

`load`, `actxcontrol`, `actxserver`, `release`, `delete`

Purpose Return list of events the control can trigger

Note Support for `send` will be removed in a future release of MATLAB. Use the `events` function instead of `send`.

---

set (COM)

Purpose Set object or interface property to specified value

Syntax

```
h.set('pname', value)
h.set('pname1', value1, 'pname2', value2, ...)
set(h, ...)
```

Description

`h.set('pname', value)` sets the property specified in the string `pname` to the given `value`.

`h.set('pname1', value1, 'pname2', value2, ...)` sets each property specified in the `pname` strings to the given `value`.

`set(h, ...)` is an alternate syntax for the same operation.

See "Converting Data" in the External Interfaces documentation for information on how MATLAB converts workspace matrices to COM data types.

Examples

Create an `mwsamp` control and use `set` to change the `Label` and `Radius` properties:

```
f = figure ('position', [100 200 200 200]);
h = actxcontrol ('mwsamp.mwsampctrl.1', [0 0 200 200], f);

h.set('Label', 'Click to fire event', 'Radius', 40);
h.invoke('Redraw');
```

Here is another way to do the same thing, only without `set` and `invoke`:

```
h.Label = 'Click to fire event';
h.Radius = 40;
h.Redraw;
```

See Also

`get`, `inspect`, `isprop`, `addproperty`, `deleteproperty`

Purpose Unregister all events for a control

Syntax

```
h.unregisterallevents
unregisterallevents(h)
```

Description

`h.unregisterallevents` unregisters all events that have previously been registered with control, `h`. After calling `unregisterallevents`, the control will no longer respond to any events until you register them again using the `registerevent` function.

`unregisterallevents(h)` is an alternate syntax for the same operation.

Examples

Create an `mwsamp` control, registering three events and their respective handler routines. Use the `eventlisteners` function to see the event handler used by each event:

```
f = figure ('position', [100 200 200 200]);
h = actxcontrol('mwsamp.mwsampctrl.2', [0 0 200 200], f, ...
    {'Click' 'myclick'; 'DblClick' 'my2click'; ...
    'MouseDown' 'mymoused'});

h.eventlisteners
ans =
    'click'        'myclick'
    'dblclick'     'my2click'
    'mousedown'    'mymoused'
```

Unregister all of these events at once with `unregisterallevents`. Now, calling `eventlisteners` returns an empty cell array, indicating that there are no longer any events registered with the control:

```
h.unregisterallevents;
h.eventlisteners
ans =
     {}
```

To unregister specific events, use the `unregisterevent` function. First, create the control and register three events:

```
f = figure ('position', [100 200 200 200]);
```

```
h = actxcontrol('mwsamp.mwsampctrl.2', [0 0 200 200], f, ...
    {'Click' 'myclick'; 'DblClick' 'my2click'; ...
    'MouseDown' 'mymoused'});
```

Next, unregister two of the three events. The `mousedown` event remains registered:

```
h.unregisterevent({'click' 'myclick'; 'dblclick' 'my2click'});
h.eventlisteners
ans =
    'mousedown'    'mymoused'
```

See Also `events`, `eventlisteners`, `registerevent`, `unregisterevent`, `isevent`

unregisterevent

Purpose Unregister event handler with a control's event

Syntax

```
h.unregisterevent(event_handler)
unregisterevent(h, event_handler)
```

Description `h.unregisterevent(event_handler)` unregisters certain event handler routines with their corresponding events. Once you unregister an event, the control no longer responds to any further occurrences of the event.

`unregisterevent(h, event_handler)` is an alternate syntax for the same operation.

You can unregister events at any time after a control has been created. Both events and event handlers are specified in the `event_handler` argument (see "Specifying Event Handlers" in the External Interfaces documentation).

You must specify events in the `event_handler` argument using the names of the events. Unlike the `actxcontrol` and `registerevent` functions, `unregisterevent` does not accept numeric event identifiers.

Examples Create an `mwsamp` control and register all events with the same handler routine, `sampev`. Use the `eventlisteners` function to see the event handler used by each event. In this case, each event, when fired, will call `sampev.m`:

```
f = figure ('position', [100 200 200 200]);
h = actxcontrol('mwsamp.mwsampctrl.2', [0 0 200 200], f, ...
    'sampev');

h.eventlisteners
ans =
    'click'        'sampev'
    'dblclick'     'sampev'
    'mousedown'    'sampev'
```

Unregister just the `dblclick` event. Now, when you list the registered events using `eventlisteners`, you see that `dblclick` is no longer registered. The control will no longer respond when you double-click the mouse over it:

```
h.unregisterevent({'dblclick' 'sampev'});
h.eventlisteners
ans =
```

```
    'click'         'sampev'
    'mousedown'     'sampev'
```

This time, register the `click` and `dblclick` events with a different event handler for `myclick` and `my2click`, respectively:

```
h.unregisterallevents;
h.registerevent({'click' 'myclick'; 'dblclick' 'my2click'});
h.eventlisteners
ans =

    'click'        'myclick'
    'dblclick'     'my2click'
```

You can unregister these same events by specifying event names and their handler routines in a cell array. Note that `eventlisteners` now returns an empty cell array, meaning that no events are registered for the `mwsamp` control:

```
h.unregisterevent({'click' 'myclick'; 'dblclick' 'my2click'});
h.eventlisteners
ans =
     {}
```

In this last example, you could have used `unregisterallevents` instead:

```
h.unregisterallevents;
```

See Also `events`, `eventlisteners`, `registerevent`, `unregisterallevents`, `isevent`

COM Server Functions

`Execute`	Execute MATLAB command in server
`Feval`	Evaluate MATLAB function in server
`GetCharArray`	Get character array from server
`GetFullMatrix`	Get matrix from server
`GetWorkspaceData`	Get data from server workspace
`MaximizeCommandWindow`	Display server window on Windows desktop
`MinimizeCommandWindow`	Minimize size of server window
`PutCharArray`	Store character array in server
`PutFullMatrix`	Store matrix in server
`PutWorkspaceData`	Store data in server workspace
`Quit`	Terminate MATLAB server

Purpose Execute MATLAB command in server

Syntax

MATLAB Client

```
result = h.Execute('command')
result = Execute(h, 'command')
result = invoke(h, 'Execute', 'command')
```

Visual Basic Client

```
[out] BSTR result = Execute([in] BSTR "command")
```

Description The `Execute` function executes the MATLAB statement specified by the string `command` in the Automation server attached to handle `h`.

The server returns output from the command in the string, `result`. The `result` string also contains any warning or error messages that may have been issued to the server as a result of the command.

Remarks If you want output from `Execute` to be displayed at the client window, you must specify an output variable (e.g., `result`).

Server function names, like `Execute`, are case sensitive when using the first syntax shown.

There is no difference in the operation of the three syntaxes shown above for the MATLAB client.

Examples Execute the MATLAB `version` function in the server and return the output to the MATLAB client.

MATLAB Client

```
h = actxserver('matlab.application');

server_version = h.Execute('version')
server_version =
ans =
   6.5.0.180913a (R13)
```

Visual Basic Client

```
Dim Matlab As Object
```

```
Dim server_version As String

Set Matlab = CreateObject("matlab.application")
server_version = Matlab.Execute("version")
```

See Also `Feval`, `PutFullMatrix`, `GetFullMatrix`, `PutCharArray`, `GetCharArray`

Purpose

Evaluate MATLAB function in server

Syntax

MATLAB Client

```
result = h.Feval('functionname', numout, arg1, arg2, ...)
result = Feval(h, 'functionname', numout, arg1, arg2, ...)
result = invoke(h, 'Feval', 'functionname', numout, ...
   arg1, arg2, ...)
```

Visual Basic Client

```
void Feval([in] BSTR functionname, [in] long numout,
   [out] VARIANT* result, [in] VARIANT arg1, arg2, ...)
```

Description

`Feval` executes the MATLAB function specified by the string `functionname` in the Automation server attached to handle `h`. Indicate the number of outputs to be returned by the function in a 1-by-1 `double` array, `numout`. The server returns output from the function in the cell array, `result`.

You can specify as many as 32 input arguments to be passed to the function. These arguments follow `numout` in the `Feval` argument list. There are four ways to pass an argument to the function being evaluated.

Passing Mechanism	Description
Pass the value itself	To pass any numeric or string value, specify the value in the `Feval` argument list: `a = h.Feval('sin', 1, -pi:0.01:pi);`

Pass a client variable	To pass an argument that is assigned to a variable in the client, specify the variable name alone:
	`x = -pi:0.01:pi;`
	`a = h.Feval('sin', 1, x);`

Passing Mechanism	Description

Reference a server variable	To reference a variable that is defined in the server, specify the variable name followed by an equals (=) sign:
	`h.PutWorkspaceData('x', 'base', -pi:0.01:pi);`
	`a = h.Feval('sin', 1, 'x=');`

Reference and overwrite a server variable	To reference a variable defined in the server and overwrite that variable in the server, specify the variable name, an equals (=) sign, and the new value to be assigned to the variable:
	`h.PutWorkspaceData('x', 'base', -pi:0.01:pi);`
	`a = h.Feval('sin', 1, 'x=-5:0.01:5');`

Remarks

If you want output from `Feval` to be displayed at the client window, you must specify an output variable in the command.

Server function names, like `Feval`, are case sensitive when using the first two syntaxes shown.

There is no difference in the operation of the three syntaxes shown above for the MATLAB client.

Examples

Passing Arguments — MATLAB Client

1. Concatenate two words in the server by passing the input strings in a call to `strcat` through `Feval`:

```
a = h.Feval('strcat', 1, 'hello ', 'world')
a =
    'hello world'
```

2. Perform the same concatenation, passing a string and a local variable `clistr` that contains the second string:

```
clistr = 'world';
a = h.Feval('strcat', 1, 'hello ', clistr)
a =
    'hello world'
```

3 This next example is different in that variable `srvstr` is defined in the server, not the client. Putting an equals sign after a variable name (`srvstr=`) tells MATLAB that this a server variable, and that MATLAB should not expect the variable to be defined locally:

```
% Define the variable srvstr on the server.
h.PutCharArray('srvstr', 'base', 'world');

% Pass the name of the server variable using 'name=' syntax.
a = h.Feval('strcat', 1, 'hello ', 'srvstr=')
a =
    'hello world'
```

4 This last `strcat` example is similar to the last, except that it assigns a new value to the server variable and then uses this new value in the concatenation:

```
% Define the variable srvstr on the server.
h.PutCharArray('srvstr', 'base', 'world');

% Assign a new string to srvstr and concatenate.
a = h.Feval('strcat', 1, 'hello ', 'srvstr=everyone')
a =
    'hello everyone'

% Verify that srvstr now has the new value.
s = h.GetCharArray('srvstr', 'base')
s =
    'everyone'
```

Visual Basic Client

Here are the same examples shown above, but written for a Visual Basic client. These examples return the same strings as shown above.

1 Pass the two strings:

```
Dim Matlab As Object
Set Matlab = CreateObject("matlab.application")
Call Matlab.Feval("strcat", 1, out, "hello ", "world")
```

2 Define `clistr` locally and pass this variable:

```
Dim Matlab As Object
Dim clistr As String
Set Matlab = CreateObject("matlab.application")

clistr = "world"
Call Matlab.Feval("strcat", 1, out, "hello ", "clistr")
```

3 Pass the name of a variable defined on the server:

```
Dim Matlab As Object
Set Matlab = CreateObject("matlab.application")
Call Matlab.PutCharArray("srvstr", "base", "world")

Call Matlab.Feval("strcat", 1, out, "hello ", "srvstr=")
```

4 Pass the name of a variable defined on the server, also supplying a new value for that variable:

```
Dim Matlab As Object
Set Matlab = CreateObject("matlab.application")
Call Matlab.PutCharArray("srvstr", "base", "world")

Call Matlab.Feval("strcat", 1, out, "hello ", "srvstr=",
   "everyone")

Call Matlab.GetCharArray("srvstr", "base", s)
```

Feval Return Values — MATLAB Client

`Feval` returns data from the evaluated function in a cell array. The cell array has one row for every return value. You can control how many values are returned using the second input argument to `Feval`, as shown in this example. This number requests that `Feval` return `3` outputs from `fileparts`. As is the case here, you can request fewer than the maximum number of return values for a function (`fileparts` can return `4`), but not more:

```
a = h.Feval('fileparts', 3, 'd:\work\ConsoleApp.cpp')
a =
    'd:\work'
    'ConsoleApp'
    '.cpp'
```

Feval Return Values — Visual Basic Client

Here is the same example, but coded in Visual Basic:

```
Dim Matlab As Object
Set Matlab = CreateObject("matlab.application")
Call Matlab.Feval("fileparts", 4, out, "d:\work\ConsoleApp.cpp")
```

See Also

`Execute`, `PutFullMatrix`, `GetFullMatrix`, `PutCharArray`, `GetCharArray`

GetCharArray

Purpose Get character array from server

Syntax

MATLAB Client

```
string = h.GetCharArray('varname', 'workspace')
string = GetCharArray(h, 'varname', 'workspace')
string = invoke(h, 'GetCharArray', 'varname', 'workspace')
```

Visual Basic Client

```
void GetCharArray([in] BSTR varname, [in] BSTR workspace,
  [out] BSTR string);
```

Description `GetCharArray` gets the character array stored in the variable `varname` from the specified `workspace` of the server attached to handle `h` and returns it in `string`. The *`workspace`* argument can be either `base` or `global`.

Remarks If you want output from `GetCharArray` to be displayed at the client window, you must specify an output variable (e.g., `string`).

Server function names, like `GetCharArray`, are case sensitive when using the first syntax shown.

There is no difference in the operation of the three syntaxes shown above for the MATLAB client.

Examples Assign a string to variable `str` in the base workspace of the server using `PutCharArray`. Read it back in the client with `GetCharArray`.

MATLAB Client

```
h = actxserver('matlab.application');
h.PutCharArray('str', 'base', ...
   'He jests at scars that never felt a wound.');

S = h.GetCharArray('str', 'base')
S =
  He jests at scars that never felt a wound.
```

Visual Basic Client

```
Dim Matlab As Object
Dim S As String
```

```
Set Matlab = CreateObject("matlab.application")
Call Matlab.PutCharArray("str", "base", 
   "He jests at scars that never felt a wound.")

Call Matlab.GetCharArray("str", "base", S)
```

See Also

`PutCharArray`, `GetWorkspaceData`, `PutWorkspaceData`, `Execute`

GetFullMatrix

Purpose

Get matrix from server

Syntax

MATLAB Client

```
[xreal ximag] = h.GetFullMatrix('varname', 'workspace',
  zreal, zimag)
[xreal ximag] = GetFullMatrix(h, 'varname', 'workspace',
  zreal, zimag)
[xreal ximag] = invoke(h, 'GetFullMatrix', 'varname', 'workspace',
  zreal, zimag)
```

Visual Basic Client

```
void GetFullMatrix([in] BSTR varname, [in] BSTR workspace,
   [in, out] SAFEARRAY(double)* xreal,
   [in, out] SAFEARRAY(double)* ximag);
```

Description

`GetFullMatrix` gets the matrix stored in the variable `varname` from the specified `workspace` of the server attached to handle `h` and returns the real part in `xreal` and the imaginary part in `ximag`. The *`workspace`* argument can be either `base` or `global`.

The `zreal` and `zimag` arguments are matrices of the same size as the real and imaginary matrices (`xreal` and `ximag`) being returned from the server. The `zreal` and `zimag` matrices are commonly set to zero (see example below).

Remarks

If you want output from `GetFullMatrix` to be displayed at the client window, you must specify one or both output variables (e.g., `xreal` and/or `ximag`).

Server function names, like `GetFullMatrix`, are case sensitive when using the first syntax shown.

There is no difference in the operation of the three syntaxes shown above for the MATLAB client.

For VBScript clients, use the `GetWorkspaceData` and `PutWorkspaceData` functions to pass numeric data to and from the MATLAB workspace. These functions use the `variant` data type instead of `safearray`, which is not supported by VBScript.

Examples

Assign a 5-by-5 real matrix to the variable `M` in the base workspace of the server, and then read it back with `GetFullMatrix`.

MATLAB Client

```
h = actxserver('matlab.application');
h.PutFullMatrix('M', 'base', rand(5), zeros(5));

MReal = h.GetFullMatrix('M', 'base', zeros(5), zeros(5))
MReal =
    0.9501    0.7621    0.6154    0.4057    0.0579
    0.2311    0.4565    0.7919    0.9355    0.3529
    0.6068    0.0185    0.9218    0.9169    0.8132
    0.4860    0.8214    0.7382    0.4103    0.0099
    0.8913    0.4447    0.1763    0.8936    0.1389
```

Visual Basic Client

```
Dim MatLab As Object
Dim Result As String
Dim XReal(1, 3) As Double
Dim XImag() As Double
Dim RealValue As Double
Dim i, j As Integer

Set Matlab = CreateObject("matlab.application")
Result = MatLab.Execute("M = rand(5);")
Call MatLab.GetFullMatrix("M", "base", XReal, XImag)
```

See Also

`PutFullMatrix`, `GetWorkspaceData`, `PutWorkspaceData`, `Execute`

GetWorkspaceData

Purpose Get data from server workspace

Syntax

MATLAB Client

```
D = h.GetWorkspaceData('varname', 'workspace')
D = GetWorkspaceData(h, 'varname', 'workspace')
D = invoke(h, 'GetWorkspaceData', 'varname', 'workspace')
```

Visual Basic Client

```
void GetWorkspaceData([in] BSTR varname, [in] BSTR workspace,
   [out] BSTR retdata);
```

Description

`GetWorkspaceData` gets the data stored in the variable `varname` from the specified `workspace` of the server attached to handle `h` and returns it in output argument `D`. The *`workspace`* argument can be either `base` or `global`.

Note `GetWorkspaceData` works on all MATLAB data types except sparse arrays and function handles. You can use `GetWorkspaceData` in place of `GetFullMatrix` and `GetCharArray` to get numeric and character array data respectively.

Remarks

If you want output from `GetWorkspaceData` to be displayed at the client window, you must specify an output variable.

Server function names, like `GetWorkspaceData`, are case sensitive when using the first syntax shown.

There is no difference in the operation of the three syntaxes shown above for the MATLAB client.

The `GetWorkspaceData` and `PutWorkspaceData` functions pass numeric data as a `variant` data type. These functions are especially useful for VBScript clients as VBScript does not support the `safearray` data type used by `GetFullMatrix` and `PutFullMatrix`.

Examples

Assign a cell array to variable `C1` in the base workspace of the server, and then read it back with `GetWorkspaceData`.

MATLAB Client

```
h = actxserver('matlab.application');
h.PutWorkspaceData('C1', 'base', {25.72, 'hello', rand(4)});

C2 = h.GetWorkspaceData('C1', 'base')
C2 =
    [25.7200]    'hello'    [4x4 double]
```

Visual Basic Client

```
Dim Matlab As Object

Set Matlab = CreateObject("matlab.application")
Result = MatLab.Execute("C1 = {25.72, 'hello', rand(4)};")

Call Matlab.GetWorkspaceData("C1", "base", C2)
```

See Also

PutWorkspaceData, GetFullMatrix, PutFullMatrix, GetCharArray, PutCharArray, Execute

MaximizeCommandWindow

Purpose Display server window on Windows desktop

Syntax

MATLAB Client

```
h.MaximizeCommandWindow
MaximizeCommandWindow(h)
invoke(h, 'MaximizeCommandWindow')
```

Visual Basic Client

```
void MaximizeCommandWindow;
```

Description `MaximizeCommandWindow` displays the window for the server attached to handle `h`, and makes it the currently active window on the desktop. If the server window was not in a minimized state to begin with, then `MaximizeCommandWindow` does nothing.

Note `MaximizeCommandWindow` does not maximize the server window to its maximum possible size on the desktop. It restores the window to the size it had at the time it was minimized.

Remarks Server function names, like `MaximizeCommandWindow`, are case sensitive when using the first syntax shown.

There is no difference in the operation of the three syntaxes shown above for the MATLAB client.

Examples Create a COM server and minimize its window. Then maximize the window and make it the currently active window.

MATLAB Client

```
h = actxserver('matlab.application');
h.MinimizeCommandWindow;

% Now return the server window to its former state on
% the desktop and make it the currently active window.
h.MaximizeCommandWindow;
```

Visual Basic Client

```
Dim Matlab As Object

Set Matlab = CreateObject("matlab.application")
Call Matlab.MinimizeCommandWindow

Rem   Now return the server window to its former state on
Rem   the desktop and make it the currently active window.

Call Matlab.MaximizeCommandWindow
```

See Also `MinimizeCommandWindow`

MinimizeCommandWindow

Purpose Minimize size of server window

Syntax

MATLAB Client

```
h.MinimizeCommandWindow
MinimizeCommandWindow(h)
invoke(h, 'MinimizeCommandWindow')
```

Visual Basic Client

```
void MinimizeCommandWindow;
```

Description

`MinimizeCommandWindow` minimizes the window for the server attached to handle `h`, and makes it inactive. If the server window was already in a minimized state to begin with, then `MinimizeCommandWindow` does nothing.

Remarks

Server function names, like `MinimizeCommandWindow`, are case sensitive when using the first syntax shown.

There is no difference in the operation of the three syntaxes shown above for the MATLAB client.

Examples

Create a COM server and minimize its window. Then maximize the window and make it the currently active window.

MATLAB Client

```
h = actxserver('matlab.application');
h.MinimizeCommandWindow;

% Now return the server window to its former state on
% the desktop and make it the currently active window.
h.MaximizeCommandWindow;
```

Visual Basic Client

Create a COM server and minimize its window.

```
Dim Matlab As Object

Set Matlab = CreateObject("matlab.application")
Call Matlab.MinimizeCommandWindow
```

```
Rem   Now return the server window to its former state on
Rem   the desktop and make it the currently active window.

Call Matlab.MaximizeCommandWindow
```

See Also `MaximizeCommandWindow`

PutCharArray

Purpose

Store character array in server

Syntax

MATLAB Client

```
h.PutCharArray('varname', 'workspace', 'string')
PutCharArray(h, 'varname', 'workspace', 'string')
invoke(h, 'PutCharArray', 'varname', 'workspace', 'string')
```

Visual Basic Client

```
void PutCharArray([in] BSTR name, [in] BSTR workspace,
   [in] BSTR string);
```

Description

`PutCharArray` stores the character array in `string` in the specified `workspace` of the server attached to handle `h`, assigning to it the variable `varname`. The `workspace` argument can be either **`base`** or **`global`**.

Remarks

The character array specified in the `string` argument can have any dimensions.

Server function names, like `PutCharArray`, are case sensitive when using the first syntax shown.

There is no difference in the operation of the three syntaxes shown above for the MATLAB client.

Examples

Store string `str` in the base workspace of the server using `PutCharArray`. Retrieve the string with `GetCharArray`.

MATLAB Client

```
h = actxserver('matlab.application');
h.PutCharArray('str', 'base', ...
   'He jests at scars that never felt a wound.')

S = h.GetCharArray('str', 'base')
S =
    He jests at scars that never felt a wound.
```

Visual Basic Client

```
Dim Matlab As Object
Dim S As String
```

```
Set Matlab = CreateObject("matlab.application")
Call Matlab.PutCharArray("str", "base",
   "He jests at scars that never felt a wound.")

Call Matlab.GetCharArray("str", "base", "S")
```

See Also GetCharArray, PutWorkspaceData, GetWorkspaceData, Execute

PutFullMatrix

Purpose

Store matrix in server

Syntax

MATLAB Client

```
h.PutFullMatrix('varname', 'workspace', xreal, ximag)
PutFullMatrix(h, 'varname', 'workspace', xreal, ximag)
invoke(h, 'PutFullMatrix', 'varname', 'workspace',
   xreal, ximag)
```

Visual Basic Client

```
void PutFullMatrix([in] BSTR name, [in] BSTR workspace,
   [in] SAFEARRAY(double) xreal, [in] SAFEARRAY(double) ximag);
```

Description

`PutFullMatrix` stores a matrix in the specified `workspace` of the server attached to handle `h`, assigning to it the variable `varname`. Enter the real and imaginary parts of the matrix in the `xreal` and `ximag` input arguments. The `workspace` argument can be either **`base`** or **`global`**.

Remarks

The matrix specified in the `xreal` and `ximag` arguments cannot be scalar, an empty array, or have more than two dimensions.

Server function names, like `PutFullMatrix`, are case sensitive when using the first syntax shown.

There is no difference in the operation of the three syntaxes shown above for the MATLAB client.

For VBScript clients, use the `GetWorkspaceData` and `PutWorkspaceData` functions to pass numeric data to and from the MATLAB workspace. These functions use the `variant` data type instead of `safearray` which is not supported by VBScript.

Examples

Example 1 — Writing to the Base Workspace

Assign a 5-by-5 real matrix to the variable `M` in the base workspace of the server, and then read it back with `GetFullMatrix`. The real and (optional) imaginary parts are passed in through separate arrays of doubles.

MATLAB Client

```
h = actxserver('matlab.application');
h.PutFullMatrix('M', 'base', rand(5), zeros(5))
```

```
xreal = h.GetFullMatrix('M', 'base', zeros(5), zeros(5))
xreal =
    0.9501    0.7621    0.6154    0.4057    0.0579
    0.2311    0.4565    0.7919    0.9355    0.3529
    0.6068    0.0185    0.9218    0.9169    0.8132
    0.4860    0.8214    0.7382    0.4103    0.0099
    0.8913    0.4447    0.1763    0.8936    0.1389
```

Visual Basic Client

```
Dim MatLab As Object
Dim XReal(5, 5) As Double
Dim XImag(5, 5) As Double
Dim ZReal(5, 5) As Double
Dim ZImag(5, 5) As Double
Dim i, j As Integer

For i = 0 To 4
   For j = 0 To 4
   XReal(i, j)  = Rnd * 6
   XImag(i, j) = 0
   Next j
Next i

Set Matlab = CreateObject("matlab.application")
Call MatLab.PutFullMatrix("M", "base", XReal, XImag)

Call MatLab.GetFullMatrix("M", "base", ZReal, ZImag)
```

Example 2 — Writing to the Global Workspace

Write a matrix to the global workspace of the server and then examine the server's global workspace from the client.

MATLAB Client

```
h.PutFullMatrix('X', 'global', [1 3 5; 2 4 6], [0 0 0; 0 0 0])

h.invoke('Execute', 'whos global')
ans =
  Name      Size                   Bytes  Class
```

```
  X          2x3                  96  double array (global complex)

Grand total is 6 elements using 96 bytes
```

Visual Basic Client

```
Dim MatLab As Object
Dim XReal(1, 3) As Double
Dim XImag(1, 3) As Double
Dim gblvar As String
Dim i, j As Integer

XReal(0)  = 1
XReal(1)  = 3
XReal(2)  = 5

Set Matlab = CreateObject("matlab.application")
Call MatLab.PutFullMatrix("M", "global", XReal, XImag)
gblvar = Matlab.Execute("whos global")
```

See Also

`GetFullMatrix`, `PutWorkspaceData`, `GetWorkspaceData`, `Execute`

Purpose

Store data in server workspace

Syntax

MATLAB Client

```
h.PutWorkspaceData('varname', 'workspace', data)
PutWorkspaceData(h, 'varname', 'workspace', data)
invoke(h, 'PutWorkspaceData', 'varname', 'workspace', data)
```

Visual Basic Client

```
void PutWorkspaceData([in] BSTR name, [in] BSTR workspace,
   [in] BSTR data);
```

Description

`PutWorkspaceData` stores `data` in the specified `workspace` of the server attached to handle `h`, assigning to it the variable `varname`. The `workspace` argument can be either **`base`** or **`global`**.

Note `PutWorkspaceData` works on all MATLAB data types except sparse arrays and function handles. You can use `PutWorkspaceData` in place of `PutFullMatrix` and `PutCharArray` to get numeric and character array data respectively.

Remarks

The character array specified in the `string` argument can have any dimensions.

Server function names, like `PutWorkspaceData`, are case sensitive when using the first syntax shown.

There is no difference in the operation of the three syntaxes shown above for the MATLAB client.

The `GetWorkspaceData` and `PutWorkspaceData` functions pass numeric data as a `variant` data type. These functions are especially useful for VBScript clients as VBScript does not support the `safearray` data type used by `GetFullMatrix` and `PutFullMatrix`.

Examples

Create an array in the client and assign it to variable `A` in the base workspace of the server:

MATLAB Client

```
h = actxserver('matlab.application');

for i = 1:6
   data(i)  = i .* 15;
end

h.PutWorkspaceData('A', 'base', data);
```

Visual Basic Client

```
Dim Matlab As Object
Dim data(7) As Double

Set Matlab = CreateObject("matlab.application")
For i = 0 To 6
   data(i)  = i * 15;
Next i

Call Matlab.PutWorkspaceData("A", "base", data)
```

See Also

`GetWorkspaceData`, `PutFullMatrix`, `GetFullMatrix`, `PutCharArray`, `GetCharArray`, `Execute`

Purpose Terminate MATLAB server

Syntax

MATLAB Client

```
h.Quit
Quit(h)
invoke(h, 'Quit')
```

Visual Basic Client

```
void Quit
```

Description `Quit` terminates the MATLAB server session to which handle `h` is attached.

Remarks Server function names, like `Quit`, are case sensitive when using the first syntax shown.

There is no difference in the operation of the three syntaxes shown above for the MATLAB client.

12

DDE Functions

`ddeadv`	Set up advisory link
`ddeexec`	Send string for execution
`ddeinit`	Initiate DDE conversation
`ddepoke`	Send data to application
`ddereq`	Request data from application
`ddeterm`	Terminate DDE conversation
`ddeunadv`	Release advisory link

ddeadv

Purpose

Set up advisory link

Syntax

```
rc = ddeadv(channel,'item','callback')
rc = ddeadv(channel,'item','callback','upmtx')
rc = ddeadv(channel,'item','callback','upmtx',format)
rc = ddeadv(channel,'item','callback','upmtx',format,timeout)
```

Description

`ddeadv` sets up an advisory link between MATLAB and a server application. When the data identified by the `item` argument changes, the string specified by the `callback` argument is passed to the `eval` function and evaluated. If the advisory link is a hot link, DDE modifies `upmtx`, the update matrix, to reflect the data in `item`.

If you omit optional arguments that are not at the end of the argument list, you must substitute the empty matrix for the missing argument(s).

If successful, `ddeadv` returns 1 in variable, `rc`. Otherwise it returns 0.

Arguments

`channel`	Conversation channel from `ddeinit`.
`item`	String specifying the DDE item name for the advisory link. Changing the data identified by `item` at the server triggers the advisory link.
`callback`	String specifying the callback that is evaluated on update notification. Changing the data identified by `item` at the server causes `callback` to get passed to the `eval` function to be evaluated.
`upmtx` (*optional*)	String specifying the name of a matrix that holds data sent with an update notification. If `upmtx` is included, changing `item` at the server causes `upmtx` to be updated with the revised data. Specifying `upmtx` creates a hot link. Omitting `upmtx` or specifying it as an empty string creates a warm link. If `upmtx` exists in the workspace, its contents are overwritten. If `upmtx` does not exist, it is created.

`format` (*optional*)	Two-element array specifying the format of the data to be sent on update. The first element specifies the Windows clipboard format to use for the data. The only currently supported format is `cf_text`, which corresponds to a value of 1. The second element specifies the type of the resultant matrix. Valid types are `numeric` (the default, which corresponds to a value of `0`) and `string` (which corresponds to a value of `1`). The default format array is `[1 0]`.
`timeout` (*optional*)	Scalar specifying the time-out limit for this operation. `timeout` is specified in milliseconds. (1000 milliseconds = 1 second). If advisory link is not established within `timeout` milliseconds, the function fails. The default value of `timeout` is three seconds.

Examples

Set up a hot link between a range of cells in Excel (Row 1, Column 1 through Row 5, Column 5) and the matrix `x`. If successful, display the matrix:

```
rc = ddeadv(channel, 'r1c1:r5c5', 'disp(x)', 'x');
```

Communication with Excel must have been established previously with a `ddeinit` command.

See Also

`ddeexec`, `ddeinit`, `ddepoke`, `ddereq`, `ddeterm`, `ddeunadv`

ddeexec

Purpose Send string for execution

Syntax

```
rc = ddeexec(channel,'command')
rc = ddeexec(channel,'command','item')
rc = ddeexec(channel,'command','item',timeout)
```

Description

ddeexec sends a string for execution to another application via an established DDE conversation. Specify the string as the command argument.

If you omit optional arguments that are not at the end of the argument list, you must substitute the empty matrix for the missing argument(s).

If successful, ddeexec returns 1 in variable, rc. Otherwise it returns 0.

Arguments

channel	Conversation channel from ddeinit.
command	String specifying the command to be executed.
item (*optional*)	String specifying the DDE item name for execution. This argument is not used for many applications. If your application requires this argument, it provides additional information for command. Consult your server documentation for more information.
timeout (*optional*)	Scalar specifying the time-out limit for this operation. timeout is specified in milliseconds. (1000 milliseconds = 1 second). The default value of timeout is three seconds.

Examples

Given the channel assigned to a conversation, send a command to Excel:

```
rc = ddeexec(channel,'[formula.goto("r1c1")]')
```

Communication with Excel must have been established previously with a ddeinit command.

See Also

ddeadv, ddeinit, ddepoke, ddereq, ddeterm, ddeunadv

Purpose Initiate DDE conversation

Syntax

```
channel = ddeinit('service','topic')
```

Description `channel = ddeinit('service','topic')` returns a channel handle assigned to the conversation, which is used with other MATLAB DDE functions. `'service'` is a string specifying the service or application name for the conversation. `'topic'` is a string specifying the topic for the conversation.

Examples To initiate a conversation with Excel for the spreadsheet `'stocks.xls'`:

```
channel = ddeinit('excel','stocks.xls')

channel =
        0.00
```

See Also `ddeadv`, `ddeexec`, `ddepoke`, `ddereq`, `ddeterm`, `ddeunadv`

ddepoke

Purpose

Send data to application

Syntax

```
rc = ddepoke(channel,'item',data)
rc = ddepoke(channel,'item',data,format)
rc = ddepoke(channel,'item',data,format,timeout)
```

Description

`ddepoke` sends data to an application via an established DDE conversation. `ddepoke` formats the data matrix as follows before sending it to the server application:

- String matrices are converted, element by element, to characters and the resulting character buffer is sent.
- Numeric matrices are sent as tab-delimited columns and carriage-return, line-feed delimited rows of numbers. Only the real part of nonsparse matrices are sent.

If you omit optional arguments that are not at the end of the argument list, you must substitute the empty matrix for the missing argument(s).

If successful, `ddepoke` returns 1 in variable, `rc`. Otherwise it returns 0.

Arguments

`channel`	Conversation channel from `ddeinit`.
`item`	String specifying the DDE item for the data sent. Item is the server data entity that is to contain the data sent in the `data` argument.
`data`	Matrix containing the data to send.
`format` (*optional*)	Scalar specifying the format of the data requested. The value indicates the Windows clipboard format to use for the data transfer. The only format currently supported is `cf_text`, which corresponds to a value of `1`.
`timeout` (*optional*)	Scalar specifying the time-out limit for this operation. `timeout` is specified in milliseconds. (1000 milliseconds = 1 second). The default value of `timeout` is three seconds.

Examples

Assume that a conversation channel with Excel has previously been established with `ddeinit`. To send a 5-by-5 identity matrix to Excel, placing the data in Row 1, Column 1 through Row 5, Column 5:

```
rc = ddepoke(channel, 'r1c1:r5c5', eye(5));
```

See Also

`ddeadv`, `ddeexec`, `ddeinit`, `ddereq`, `ddeterm`, `ddeunadv`

ddereq

Purpose

Request data from application

Syntax

```
data = ddereq(channel,'item')
data = ddereq(channel,'item',format)
data = ddereq(channel,'item',format,timeout)
```

Description

`ddereq` requests data from a server application via an established DDE conversation. `ddereq` returns a matrix containing the requested data or an empty matrix if the function is unsuccessful.

If you omit optional arguments that are not at the end of the argument list, you must substitute the empty matrix for the missing argument(s).

If successful, `ddereq` returns a matrix containing the requested data in variable, `data`. Otherwise, it returns an empty matrix.

Arguments

`channel`	Conversation channel from `ddeinit`.
`item`	String specifying the server application's DDE item name for the data requested.
`format` (*optional*)	Two-element array specifying the format of the data requested. The first element specifies the Windows clipboard format to use. The only currently supported format is `cf_text`, which corresponds to a value of 1. The second element specifies the type of the resultant matrix. Valid types are `numeric` (the default, which corresponds to `0`) and `string` (which corresponds to a value of `1`). The default format array is `[1 0]`.
`timeout` (*optional*)	Scalar specifying the time-out limit for this operation. `timeout` is specified in milliseconds. (1000 milliseconds = 1 second). The default value of `timeout` is three seconds.

Examples

Assume that we have an Excel spreadsheet `stocks.xls`. This spreadsheet contains the prices of three stocks in row 3 (columns 1 through 3) and the number of shares of these stocks in rows 6 through 8 (column 2). Initiate conversation with Excel with the command:

```
channel = ddeinit('excel','stocks.xls')
```

DDE functions require the *rxcy* reference style for Excel worksheets. In Excel terminology the prices are in `r3c1:r3c3` and the shares in `r6c2:r8c2`.

To request the prices from Excel:

```
prices = ddereq(channel,'r3c1:r3c3')

prices =
         42.50        15.00        78.88
```

To request the number of shares of each stock:

```
shares = ddereq(channel, 'r6c2:r8c2')

shares =
        100.00
        500.00
        300.00
```

See Also

`ddeadv`, `ddeexec`, `ddeinit`, `ddepoke`, `ddeterm`, `ddeunadv`

ddeterm

Purpose Terminate DDE conversation

Syntax

```
rc = ddeterm(channel)
```

Description `rc = ddeterm(channel)` accepts a channel handle returned by a previous call to `ddeinit` that established the DDE conversation. `ddeterm` terminates this conversation. `rc` is a return code where `0` indicates failure and `1` indicates success.

Examples To close a conversation channel previously opened with `ddeinit`:

```
rc = ddeterm(channel)

rc =

      1.00
```

See Also `ddeadv`, `ddeexec`, `ddeinit`, `ddepoke`, `ddereq`, `ddeunadv`

Purpose Release advisory link

Syntax

```
rc = ddeunadv(channel,'item')
rc = ddeunadv(channel,'item',format)
rc = ddeunadv(channel,'item',format,timeout)
```

Description `ddeunadv` releases the advisory link between MATLAB and the server application established by an earlier `ddeadv` call. The `channel`, *`item`*, and `format` must be the same as those specified in the call to `ddeadv` that initiated the link. If you include the `timeout` argument but accept the default `format`, you must specify `format` as an empty matrix.

If successful, `ddeunadv` returns 1 in variable, `rc`. Otherwise it returns 0.

Arguments

`channel`	Conversation channel from `ddeinit`.
`item`	String specifying the DDE item name for the advisory link. Changing the data identified by `item` at the server triggers the advisory link.
`format` (*optional*)	Two-element array. This must be the same as the `format` argument for the corresponding `ddeadv` call.
`timeout` (*optional*)	Scalar specifying the time-out limit for this operation. `timeout` is specified in milliseconds. (1000 milliseconds = 1 second). The default value of `timeout` is three seconds.

Example To release an advisory link established previously with `ddeadv`:

```
rc = ddeunadv(channel, 'r1c1:r5c5')
rc =

     1.00
```

See Also `ddeadv`, `ddeexec`, `ddeinit`, `ddepoke`, `ddereq`, `ddeterm`

createClassFromWSDL

Purpose Create MATLAB classes from Web Services Description Language (WSDL)

Syntax

```
createClassFromWSDL('source')
```

Description `createClassFromWSDL('source')` creates MATLAB classes based on a WSDL application program interface (API). The `source` argument specifies a URL or file path to a WSDL API, which defines web service methods, arguments, and transactions.

Based on the WSDL API, the `createClassFromWSDL` function creates a new folder in the current directory. The folder contains an M-file for each web service method. In addition, two default M-files are created that display method results (`display.m`) and that initialize the web service MATLAB object (`servicename.m`).

For example, if `myWebService` offers two methods (`method1` and `method2`), the `createClassFromWSDL` function creates

- `@myWebService` folder in the current directory
- `method1.m` — M-file for `method1`
- `method2.m` — M-file for `method2`
- `display.m` — Default M-file for display method
- `myWebService.m` — Default M-file for the `myWebService` MATLAB object

Remarks For more information about WSDL and web services, see the following resources:

- World Wide Web Consortium (W3C) WSDL specification
- W3C SOAP specification
- `XMethods.net`

Example The following example calls a web service that returns the book price for an International Standard Bibliographic Number (ISBN).

```
% The createClassFromWSDL function takes the WSDL URL as an
% argument.
createclassfromwsdl('http://www.xmethods.net/sd/2001/BNQuoteServ
ice.wsdl');
bq = bnquoteservice;
```

```
% getQuote is the web service method. The first argument,
% bq, is an instance of the bnquoteservice class. The
% second argument, 0735712719, is an ISBN number.
getprice(bq, '0735712719');
```

13

Serial Port I/O Functions

`clear (serial)`	Remove serial port object from MATLAB workspace
`delete (serial)`	Remove serial port object from memory
`disp (serial)`	Display serial port object summary information
`fclose (serial)`	Disconnect serial port object from the device
`fgetl (serial)`	Read from device and discard the terminator
`fgets (serial)`	Read from device and include the terminator
`fopen (serial)`	Connect serial port object to the device
`fprintf (serial)`	Write text to the device
`fread (serial)`	Read binary data from the device
`fscanf (serial)`	Read data from device and format as text
`fwrite (serial)`	Write binary data to the device
`get (serial)`	Return serial port object properties
`instrcallback`	Display event information when an event occurs
`instrfind`	Return serial port objects from memory to the MATLAB workspace
`isvalid`	Determine if serial port objects are valid
`length (serial)`	Length of serial port object array
`load (serial)`	Load serial port objects and variables into MATLAB workspace
`readasync`	Read data asynchronously from the device
`record`	Record data and event information to a file
`save (serial)`	Save serial port objects and variables to MAT-file
`serial`	Create a serial port object
`serialbreak`	Send break to device connected to the serial port
`set (serial)`	Configure or display serial port object properties
`size (serial)`	Size of serial port object array
`stopasync`	Stop asynchronous read and write operations

clear (serial)

Purpose Remove a serial port object from the MATLAB workspace

Syntax

```
clear obj
```

Arguments

`obj`	A serial port object or an array of serial port objects.

Description `clear obj` removes `obj` from the MATLAB workspace.

Remarks If `obj` is connected to the device and it is cleared from the workspace, then `obj` remains connected to the device. You can restore `obj` to the workspace with the `instrfind` function. A serial port object connected to the device has a `Status` property value of `open`.

To disconnect `obj` from the device, use the `fclose` function. To remove `obj` from memory, use the `delete` function. You should remove invalid serial port objects from the workspace with `clear`.

Example This example creates the serial port object `s`, copies `s` to a new variable `scopy`, and clears `s` from the MATLAB workspace. `s` is then restored to the workspace with `instrfind` and is shown to be identical to `scopy`.

```
s = serial('COM1');
scopy = s;
clear s
s = instrfind;
isequal(scopy,s)
ans =
     1
```

See Also

Functions

`delete`, `fclose`, `instrfind`, `isvalid`

Properties

`Status`

Purpose Remove a serial port object from memory

Syntax

```
delete(obj)
```

Arguments

`obj`	A serial port object or an array of serial port objects.

Description `delete(obj)` removes `obj` from memory.

Remarks When you delete `obj`, it becomes an *invalid* object. Because you cannot connect an invalid serial port object to the device, you should remove it from the workspace with the `clear` command. If multiple references to `obj` exist in the workspace, then deleting one reference invalidates the remaining references.

If `obj` is connected to the device, it has a `Status` property value of `open`. If you issue `delete` while `obj` is connected, then the connection is automatically broken. You can also disconnect `obj` from the device with the `fclose` function.

If you use the `help` command to display help for `delete`, then you need to supply the pathname shown below.

```
help serial/delete
```

Example This example creates the serial port object `s`, connects `s` to the device, writes and reads text data, disconnects `s` from the device, removes `s` from memory using `delete`, and then removes `s` from the workspace using `clear`.

```
s = serial('COM1');
fopen(s)
fprintf(s,'*IDN?')
idn = fscanf(s);
fclose(s)
delete(s)
clear s
```

See Also

Functions

`clear`, `fclose`, `isvalid`

Properties

`Status`

disp (serial)

Purpose Display serial port object summary information

Syntax

```
obj
disp(obj)
```

Arguments

`obj`	A serial port object or an array of serial port objects.

Description `obj` or `disp(obj)` displays summary information for `obj`.

Remarks In addition to the syntax shown above, you can display summary information for `obj` by excluding the semicolon when:

- Creating a serial port object
- Configuring property values using the dot notation

Use the display summary to quickly view the communication settings, communication state information, and information associated with read and write operations.

Example The following commands display summary information for the serial port object `s`.

```
s = serial('COM1')
s.BaudRate = 300
s
```

fclose (serial)

Purpose Disconnect a serial port object from the device

Syntax `fclose(obj)`

Arguments

`obj`	A serial port object or an array of serial port objects.

Description `fclose(obj)` disconnects `obj` from the device.

Remarks If `obj` was successfully disconnected, then the `Status` property is configured to `closed` and the `RecordStatus` property is configured to `off`. You can reconnect `obj` to the device using the `fopen` function.

An error is returned if you issue `fclose` while data is being written asynchronously. In this case, you should abort the write operation with the `stopasync` function, or wait for the write operation to complete.

If you use the `help` command to display help for `fclose`, then you need to supply the pathname shown below.

```
help serial/fclose
```

Example This example creates the serial port object `s`, connects `s` to the device, writes and reads text data, and then disconnects `s` from the device using `fclose`.

```
s = serial('COM1');
fopen(s)
fprintf(s, '*IDN?')
idn = fscanf(s);
fclose(s)
```

At this point, the device is available to be connected to a serial port object. If you no longer need `s`, you should remove from memory with the `delete` function, and remove it from the workspace with the `clear` command.

See Also **Functions**

`clear`, `delete`, `fopen`, `stopasync`

Properties

`RecordStatus`, `Status`

fgetl (serial)

Purpose

Read one line of text from the device and discard the terminator

Syntax

```
tline = fgetl(obj)
[tline,count] = fgetl(obj)
[tline,count,msg] = fgetl(obj)
```

Arguments

`obj`	A serial port object.
`tline`	Text read from the instrument, excluding the terminator.
`count`	The number of values read, including the terminator.
`msg`	A message indicating if the read operation was unsuccessful.

Description

`tline = fgetl(obj)` reads one line of text from the device connected to `obj`, and returns the data to `tline`. The returned data does not include the terminator with the text line. To include the terminator, use `fgets`.

`[tline,count] = fgetl(obj)` returns the number of values read to `count`.

`[tline,count,msg] = fgetl(obj)` returns a warning message to `msg` if the read operation was unsuccessful.

Remarks

Before you can read text from the device, it must be connected to `obj` with the `fopen` function. A connected serial port object has a `Status` property value of `open`. An error is returned if you attempt to perform a read operation while `obj` is not connected to the device.

If `msg` is not included as an output argument and the read operation was not successful, then a warning message is returned to the command line.

The `ValuesReceived` property value is increased by the number of values read – including the terminator – each time `fgetl` is issued.

If you use the `help` command to display help for `fgetl`, then you need to supply the pathname shown below.

```
help serial/fgetl
```

Rules for Completing a Read Operation with fgetl

A read operation with `fgetl` blocks access to the MATLAB command line until:

- The terminator specified by the `Terminator` property is reached.
- The time specified by the `Timeout` property passes.
- The input buffer is filled.

Example

Create the serial port object `s`, connect `s` to a Tektronix TDS 210 oscilloscope, and write the `RS232?` command with the `fprintf` function. `RS232?` instructs the scope to return serial port communications settings.

```
s = serial('COM1');
fopen(s)
fprintf(s,'RS232?')
```

Because the default value for the `ReadAsyncMode` property is `continuous`, data is automatically returned to the input buffer.

```
s.BytesAvailable
ans =
    17
```

Use `fgetl` to read the data returned from the previous write operation, and discard the terminator.

```
settings = fgetl(s)
settings =
9600;0;0;NONE;LF
length(settings)
ans =
    16
```

Disconnect `s` from the scope, and remove `s` from memory and the workspace.

```
fclose(s)
delete(s)
clear s
```

See Also

Functions

`fgets`, `fopen`

Properties

`BytesAvailable`, `InputBufferSize`, `ReadAsyncMode`, `Status`, `Terminator`, `Timeout`, `ValuesReceived`

Purpose Read one line of text from the device and include the terminator

Syntax

```
tline = fgets(obj)
[tline,count] = fgets(obj)
[tline,count,msg] = fgets(obj)
```

Arguments

`obj`	A serial port object.
`tline`	Text read from the instrument, including the terminator.
`count`	The number of bytes read, including the terminator.
`msg`	A message indicating if the read operation was unsuccessful.

Description `tline = fgets(obj)` reads one line of text from the device connected to `obj`, and returns the data to `tline`. The returned data includes the terminator with the text line. To exclude the terminator, use `fgetl`.

`[tline,count] = fgets(obj)` returns the number of values read to `count`.

`[tline,count,msg] = fgets(obj)` returns a warning message to `msg` if the read operation was unsuccessful.

Remarks Before you can read text from the device, it must be connected to `obj` with the `fopen` function. A connected serial port object has a `Status` property value of `open`. An error is returned if you attempt to perform a read operation while `obj` is not connected to the device.

If `msg` is not included as an output argument and the read operation was not successful, then a warning message is returned to the command line.

The `ValuesReceived` property value is increased by the number of values read – including the terminator – each time `fgets` is issued.

If you use the `help` command to display help for `fgets`, then you need to supply the pathname shown below.

```
help serial/fgets
```

Rules for Completing a Read Operation with fgets

A read operation with `fgets` blocks access to the MATLAB command line until:

- The terminator specified by the `Terminator` property is reached.
- The time specified by the `Timeout` property passes.
- The input buffer is filled.

Example

Create the serial port object `s`, connect `s` to a Tektronix TDS 210 oscilloscope, and write the `RS232?` command with the `fprintf` function. `RS232?` instructs the scope to return serial port communications settings.

```
s = serial('COM1');
fopen(s)
fprintf(s,'RS232?')
```

Because the default value for the `ReadAsyncMode` property is `continuous`, data is automatically returned to the input buffer.

```
s.BytesAvailable
ans =
    17
```

Use `fgets` to read the data returned from the previous write operation, and include the terminator.

```
settings = fgets(s)
settings =
9600;0;0;NONE;LF
length(settings)
ans =
    17
```

Disconnect `s` from the scope, and remove `s` from memory and the workspace.

```
fclose(s)
delete(s)
clear s
```

See Also

Functions

`fgetl`, `fopen`

Properties

`BytesAvailable`, `BytesAvailableFcn`, `InputBufferSize`, `Status`, `Terminator`, `Timeout`, `ValuesReceived`

fopen (serial)

Purpose Connect a serial port object to the device

Syntax

```
fopen(obj)
```

Arguments

`obj`	A serial port object or an array of serial port objects.

Description `fopen(obj)` connects `obj` to the device.

Remarks Before you can perform a read or write operation, `obj` must be connected to the device with the `fopen` function. When `obj` is connected to the device:

- Data remaining in the input buffer or the output buffer is flushed.
- The `Status` property is set to `open`.
- The `BytesAvailable`, `ValuesReceived`, `ValuesSent`, and `BytesToOutput` properties are set to 0.

An error is returned if you attempt to perform a read or write operation while `obj` is not connected to the device. You can connect only one serial port object to a given device.

Some properties are read-only while the serial port object is open (connected), and must be configured before using `fopen`. Examples include `InputBufferSize` and `OutputBufferSize`. Refer to the property reference pages to determine which properties have this constraint.

The values for some properties are verified only after `obj` is connected to the device. If any of these properties are incorrectly configured, then an error is returned when `fopen` is issued and `obj` is not connected to the device. Properties of this type include `BaudRate`, and are associated with device settings.

If you use the `help` command to display help for `fopen`, then you need to supply the pathname shown below.

```
help serial/fopen
```

Example

This example creates the serial port object `s`, connects `s` to the device using `fopen`, writes and reads text data, and then disconnects `s` from the device.

```
s = serial('COM1');
fopen(s)
fprintf(s,'*IDN?')
idn = fscanf(s);
fclose(s)
```

See Also

Functions

`fclose`

Properties

`BytesAvailable`, `BytesToOutput`, `Status`, `ValuesReceived`, `ValuesSent`

fprintf (serial)

Purpose

Write text to the device

Syntax

```
fprintf(obj,'cmd')
fprintf(obj,'format','cmd')
fprintf(obj,'cmd','mode')
fprintf(obj,'format','cmd','mode')
```

Arguments

`obj`	A serial port object.
`'cmd'`	The string written to the device.
`'format'`	C language conversion specification.
`'mode'`	Specifies whether data is written synchronously or asynchronously.

Description

`fprintf(obj,'cmd')` writes the string `cmd` to the device connected to `obj`. The default format is `%s\n`. The write operation is synchronous and blocks the command line until execution is complete.

`fprintf(obj,'format','cmd')` writes the string using the format specified by *`format`*. *`format`* is a C language conversion specification. Conversion specifications involve the `%` character and the conversion characters d, i, o, u, x, X, f, e, E, g, G, c, and s. Refer to the `sprintf` file I/O format specifications or a C manual for more information.

`fprintf(obj,'cmd','mode')` writes the string with command line access specified by *`mode`*. If *`mode`* is `sync`, `cmd` is written synchronously and the command line is blocked. If *`mode`* is `async`, `cmd` is written asynchronously and the command line is not blocked. If *`mode`* is not specified, the write operation is synchronous.

`fprintf(obj,'format','cmd','mode')` writes the string using the specified format. If *`mode`* is `sync`, `cmd` is written synchronously. If *`mode`* is `async`, `cmd` is written asynchronously.

Remarks

Before you can write text to the device, it must be connected to `obj` with the `fopen` function. A connected serial port object has a `Status` property value of `open`. An error is returned if you attempt to perform a write operation while `obj` is not connected to the device.

The `ValuesSent` property value is increased by the number of values written each time `fprintf` is issued.

An error occurs if the output buffer cannot hold all the data to be written. You can specify the size of the output buffer with the `OutputBufferSize` property.

If you use the `help` command to display help for `fprintf`, then you need to supply the pathname shown below.

```
help serial/fprintf
```

Synchronous Versus Asynchronous Write Operations

By default, text is written to the device synchronously and the command line is blocked until the operation completes. You can perform an asynchronous write by configuring the *`mode`* input argument to be `async`. For asynchronous writes:

- The `BytesToOutput` property value is continuously updated to reflect the number of bytes in the output buffer.
- The M-file callback function specified for the `OutputEmptyFcn` property is executed when the output buffer is empty.

You can determine whether an asynchronous write operation is in progress with the `TransferStatus` property.

Synchronous and asynchronous write operations are discussed in more detail in Controlling Access to the MATLAB Command Line.

Rules for Completing a Write Operation with fprintf

A synchronous or asynchronous write operation using `fprintf` completes when:

- The specified data is written.
- The time specified by the `Timeout` property passes.

Additionally, you can stop an asynchronous write operation with the `stopasync` function.

Rules for Writing the Terminator

All occurrences of `\n` in `cmd` are replaced with the `Terminator` property value. Therefore, when using the default format `%s\n`, all commands written to the device will end with this property value. The terminator required by your device will be described in its documentation.

Example

Create the serial port object `s`, connect `s` to a Tektronix TDS 210 oscilloscope, and write the `RS232?` command with the `fprintf` function. `RS232?` instructs the scope to return serial port communications settings.

```
s = serial('COM1');
fopen(s)
fprintf(s,'RS232?')
```

Because the default format for `fprintf` is `%s\n`, the terminator specified by the `Terminator` property was automatically written. However, in some cases you might want to suppress writing the terminator. To do so, you must explicitly specify a format for the data that does not include the terminator, or configure the terminator to empty.

```
fprintf(s,'%s','RS232?')
```

See Also

Functions

`fopen`, `fwrite`, `stopasync`

Properties

`BytesToOutput`, `OutputBufferSize`, `OutputEmptyFcn`, `Status`, `TransferStatus`, `ValuesSent`

Purpose Read binary data from the device

Syntax

```
A = fread(obj,size)
A = fread(obj,size,'precision')
[A,count] = fread(...)
[A,count,msg] = fread(...)
```

Arguments

`obj`	A serial port object.
`size`	The number of values to read.
`'precision'`	The number of bits read for each value, and the interpretation of the bits as character, integer, or floating-point values.
`A`	Binary data returned from the device.
`count`	The number of values read.
`msg`	A message indicating if the read operation was unsuccessful.

Description `A = fread(obj,size)` reads binary data from the device connected to `obj`, and returns the data to `A`. The maximum number of values to read is specified by `size`. Valid options for `size` are:

`n`	Read at most `n` values into a column vector.
`[m,n]`	Read at most m-by-n values filling an m–by–n matrix in column order.

`size` cannot be `inf`, and an error is returned if the specified number of values cannot be stored in the input buffer. You specify the size, in bytes, of the input buffer with the `InputBufferSize` property. A value is defined as a byte multiplied by the *`precision`* (see below).

`A = fread(obj,size,'precision')` reads binary data with precision specified by *`precision`*.

precision controls the number of bits read for each value and the interpretation of those bits as integer, floating-point, or character values. If *precision* is not specified, `uchar` (an 8-bit unsigned character) is used. By default, numeric values are returned in double-precision arrays. The supported values for *precision* are listed below in Remarks.

`[A,count] = fread(...)` returns the number of values read to `count`.

`[A,count,msg] = fread(...)` returns a warning message to `msg` if the read operation was unsuccessful.

Remarks

Before you can read data from the device, it must be connected to `obj` with the `fopen` function. A connected serial port object has a `Status` property value of `open`. An error is returned if you attempt to perform a read operation while `obj` is not connected to the device.

If `msg` is not included as an output argument and the read operation was not successful, then a warning message is returned to the command line.

The `ValuesReceived` property value is increased by the number of values read, each time `fread` is issued.

If you use the `help` command to display help for `fread`, then you need to supply the pathname shown below.

```
help serial/fread
```

Rules for Completing a Binary Read Operation

A read operation with `fread` blocks access to the MATLAB command line until:

- The specified number of values are read.
- The time specified by the `Timeout` property passes.

Note The `Terminator` property is not used for binary read operations.

Supported Precisions

The supported values for *precision* are listed below.

Data Type	Precision	Interpretation
Character	uchar	8-bit unsigned character
	schar	8-bit signed character
	char	8-bit signed or unsigned character
Integer	int8	8-bit integer
	int16	16-bit integer
	int32	32-bit integer
	uint8	8-bit unsigned integer
	uint16	16-bit unsigned integer
	uint32	32-bit unsigned integer
	short	16-bit integer
	int	32-bit integer
	long	32- or 64-bit integer
	ushort	16-bit unsigned integer
	uint	32-bit unsigned integer
	ulong	32- or 64-bit unsigned integer
Floating-point	single	32-bit floating point
	float32	32-bit floating point
	float	32-bit floating point
	double	64-bit floating point
	float64	64-bit floating point

See Also

Functions

fgetl, fgets, fopen, fscanf

Properties

BytesAvailable, BytesAvailableFcn, InputBufferSize, Status, Terminator, ValuesReceived

Purpose

Read data from the device, and format as text

Syntax

```
A = fscanf(obj)
A = fscanf(obj,'format')
A = fscanf(obj,'format',size)
[A,count] = fscanf(...)
[A,count,msg] = fscanf(...)
```

Arguments

`obj`	A serial port object.
`'format'`	C language conversion specification.
`size`	The number of values to read.
`A`	Data read from the device and formatted as text.
`count`	The number of values read.
`msg`	A message indicating if the read operation was unsuccessful.

Description

`A = fscanf(obj)` reads data from the device connected to `obj`, and returns it to `A`. The data is converted to text using the `%c` format.

`A = fscanf(obj,'format')` reads data and converts it according to *`format`*. *`format`* is a C language conversion specification. Conversion specifications involve the `%` character and the conversion characters d, i, o, u, x, X, f, e, E, g, G, c, and s. Refer to the `sscanf` file I/O format specifications or a C manual for more information.

`A = fscanf(obj,'format',size)` reads the number of values specified by `size`. Valid options for `size` are:

`n`	Read at most `n` values into a column vector.
`[m,n]`	Read at most m-by-n values filling an m–by–n matrix in column order.

`size` cannot be `inf`, and an error is returned if the specified number of values cannot be stored in the input buffer. If `size` is not of the form `[m,n]`, and a character conversion is specified, then `A` is returned as a row vector. You specify the size, in bytes, of the input buffer with the `InputBufferSize` property. An ASCII value is one byte.

`[A,count] = fscanf(...)` returns the number of values read to `count`.

`[A,count,msg] = fscanf(...)` returns a warning message to `msg` if the read operation did not complete successfully.

Remarks

Before you can read data from the device, it must be connected to `obj` with the `fopen` function. A connected serial port object has a `Status` property value of `open`. An error is returned if you attempt to perform a read operation while `obj` is not connected to the device.

If `msg` is not included as an output argument and the read operation was not successful, then a warning message is returned to the command line.

The `ValuesReceived` property value is increased by the number of values read – including the terminator – each time `fscanf` is issued.

If you use the `help` command to display help for `fscanf`, then you need to supply the pathname shown below.

```
help serial/fscanf
```

Rules for Completing a Read Operation with fscanf

A read operation with `fscanf` blocks access to the MATLAB command line until:

- The terminator specified by the `Terminator` property is read.
- The time specified by the `Timeout` property passes.
- The number of values specified by `size` is read.
- The input buffer is filled (unless `size` is specified)

Example

Create the serial port object `s` and connect `s` to a Tektronix TDS 210 oscilloscope, which is displaying sine wave.

```
s = serial('COM1');
fopen(s)
```

Use the `fprintf` function to configure the scope to measure the peak-to-peak voltage of the sine wave, return the measurement type, and return the peak-to-peak voltage.

```
fprintf(s,'MEASUREMENT:IMMED:TYPE PK2PK')
fprintf(s,'MEASUREMENT:IMMED:TYPE?')
fprintf(s,'MEASUREMENT:IMMED:VALUE?')
```

Because the default value for the `ReadAsyncMode` property is `continuous`, data associated with the two query commands is automatically returned to the input buffer.

```
s.BytesAvailable
ans =
    21
```

Use `fscanf` to read the measurement type. The operation will complete when the first terminator is read.

```
meas = fscanf(s)
meas =
PK2PK
```

Use `fscanf` to read the peak-to-peak voltage as a floating-point number, and exclude the terminator.

```
pk2pk = fscanf(s,'%e',14)
pk2pk =
    2.0200
```

Disconnect `s` from the scope, and remove `s` from memory and the workspace.

```
fclose(s)
delete(s)
clear s
```

See Also

Functions

`fgetl`, `fgets`, `fopen`, `fread`, `strread`

Properties

`BytesAvailable`, `BytesAvailableFcn`, `InputBufferSize`, `Status`, `Terminator`, `Timeout`

fwrite (serial)

Purpose Write binary data to the device

Syntax

```
fwrite(obj,A)
fwrite(obj,A,'precision')
fwrite(obj,A,'mode')
fwrite(obj,A,'precision','mode')
```

Arguments

`obj`	A serial port object.
`A`	The binary data written to the device.
'*precision*'	The number of bits written for each value, and the interpretation of the bits as character, integer, or floating-point values.
'*mode*'	Specifies whether data is written synchronously or asynchronously.

Description

`fwrite(obj,A)` writes the binary data `A` to the device connected to `obj`.

`fwrite(obj,A,'`*precision*`')` writes binary data with precision specified by *precision*.

precision controls the number of bits written for each value and the interpretation of those bits as integer, floating-point, or character values. If *precision* is not specified, `uchar` (an 8-bit unsigned character) is used. The supported values for *precision* are listed below in Remarks.

`fwrite(obj,A,'`*mode*`')` writes binary data with command line access specified by *mode*. If *mode* is `sync`, `A` is written synchronously and the command line is blocked. If *mode* is `async`, `A` is written asynchronously and the command line is not blocked. If *mode* is not specified, the write operation is synchronous.

`fwrite(obj,A,'`*precision*`','`*mode*`')` writes binary data with precision specified by *precision* and command line access specified by *mode*.

Remarks

Before you can write data to the device, it must be connected to `obj` with the `fopen` function. A connected serial port object has a `Status` property value of `open`. An error is returned if you attempt to perform a write operation while `obj` is not connected to the device.

The `ValuesSent` property value is increased by the number of values written each time `fwrite` is issued.

An error occurs if the output buffer cannot hold all the data to be written. You can specify the size of the output buffer with the `OutputBufferSize` property.

If you use the `help` command to display help for `fwrite`, then you need to supply the pathname shown below.

```
help serial/fwrite
```

Synchronous Versus Asynchronous Write Operations

By default, data is written to the device synchronously and the command line is blocked until the operation completes. You can perform an asynchronous write by configuring the *`mode`* input argument to be `async`. For asynchronous writes:

- The `BytesToOutput` property value is continuously updated to reflect the number of bytes in the output buffer.
- The M-file callback function specified for the `OutputEmptyFcn` property is executed when the output buffer is empty.

You can determine whether an asynchronous write operation is in progress with the `TransferStatus` property.

Synchronous and asynchronous write operations are discussed in more detail in Writing Data.

Rules for Completing a Write Operation with fwrite

A binary write operation using `fwrite` completes when:

- The specified data is written.
- The time specified by the `Timeout` property passes.

Note The `Terminator` property is not used with binary write operations.

Supported Precisions

The supported values for *`precision`* are listed below.

Data Type	Precision	Interpretation
Character	`uchar`	8-bit unsigned character
	`schar`	8-bit signed character
	`char`	8-bit signed or unsigned character
Integer	`int8`	8-bit integer
	`int16`	16-bit integer
	`int32`	32-bit integer
	`uint8`	8-bit unsigned integer
	`uint16`	16-bit unsigned integer
	`uint32`	32-bit unsigned integer
	`short`	16-bit integer
	`int`	32-bit integer
	`long`	32- or 64-bit integer
	`ushort`	16-bit unsigned integer
	`uint`	32-bit unsigned integer
	`ulong`	32- or 64-bit unsigned integer

Data Type	Precision	Interpretation
Floating-point	single	32-bit floating point
	float32	32-bit floating point
	float	32-bit floating point
	double	64-bit floating point
	float64	64-bit floating point

See Also

Functions

`fopen`, `fprintf`

Properties

`BytesToOutput`, `OutputBufferSize`, `OutputEmptyFcn`, `Status`, `Timeout`, `TransferStatus`, `ValuesSent`

get (serial)

Purpose Return serial port object properties

Syntax

```
get(obj)
out = get(obj)
out = get(obj,'PropertyName')
```

Arguments

`obj`	A serial port object or an array of serial port objects.
`'PropertyName'`	A property name or a cell array of property names.
`out`	A single property value, a structure of property values, or a cell array of property values.

Description

`get(obj)` returns all property names and their current values to the command line for `obj`.

`out = get(obj)` returns the structure `out` where each field name is the name of a property of `obj`, and each field contains the value of that property.

`out = get(obj,'PropertyName')` returns the value `out` of the property specified by *`PropertyName`* for `obj`. If *`PropertyName`* is replaced by a 1-by-n or n-by-1 cell array of strings containing property names, then `get` returns a 1-by-n cell array of values to `out`. If `obj` is an array of serial port objects, then `out` will be a m-by-n cell array of property values where m is equal to the length of `obj` and n is equal to the number of properties specified.

Remarks

Refer to "Displaying Property Names and Property Values" for a list of serial port object properties that you can return with `get`.

When you specify a property name, you can do so without regard to case, and you can make use of property name completion. For example, if `s` is a serial port object, then these commands are all valid.

```
out = get(s,'BaudRate');
out = get(s,'baudrate');
out = get(s,'BAUD');
```

If you use the `help` command to display help for `get`, then you need to supply the pathname shown below.

```
help serial/get
```

Example

This example illustrates some of the ways you can use `get` to return property values for the serial port object `s`.

```
s = serial('COM1');
out1 = get(s);
out2 = get(s,{'BaudRate','DataBits'});
get(s,'Parity')
ans =
none
```

See Also

Functions

`set`

instrcallback

Purpose

Display event information when an event occurs

Syntax

```
instrcallback(obj,event)
```

Arguments

`obj`	An serial port object.
`event`	The event that caused the callback to execute.

Description

`instrcallback(obj,event)` displays a message that contains the event type, the time the event occurred, and the name of the serial port object that caused the event to occur.

For error events, the error message is also displayed. For pin status events, the pin that changed value and its value are also displayed.

Remarks

You should use `instrcallback` as a template from which you create callback functions that suit your specific application needs.

Example

The following example creates the serial port objects `s`, and configures `s` to execute `instrcallback` when an output-empty event occurs. The event occurs after the `*IDN?` command is written to the instrument.

```
s = serial('COM1');
set(s,'OutputEmptyFcn',@instrcallback)
fopen(s)
fprintf(s,'*IDN?','async')
```

The resulting display from `instrcallback` is shown below.

```
OutputEmpty event occurred at 08:37:49 for the object:
Serial-COM1.
```

Read the identification information from the input buffer and end the serial port session.

```
idn = fscanf(s);
fclose(s)
delete(s)
clear s
```

Purpose

Return serial port objects from memory to the MATLAB workspace

Syntax

```
out = instrfind
out = instrfind('PropertyName',PropertyValue,...)
out = instrfind(S)
out = instrfind(obj,'PropertyName',PropertyValue,...)
```

Arguments

`'PropertyName'`	A property name for `obj`.
`PropertyValue`	A property value supported by *`PropertyName`*.
`S`	A structure of property names and property values.
`obj`	A serial port object, or an array of serial port objects.
`out`	An array of serial port objects.

Description

`out = instrfind` returns all valid serial port objects as an array to `out`.

`out = instrfind('PropertyName',PropertyValue,...)` returns an array of serial port objects whose property names and property values match those specified.

`out = instrfind(S)` returns an array of serial port objects whose property names and property values match those defined in the structure `S`. The field names of `S` are the property names, while the field values are the associated property values.

`out = instrfind(obj,'PropertyName',PropertyValue,...)` restricts the search for matching property name/property value pairs to the serial port objects listed in `obj`.

Remarks

Refer to "Displaying Property Names and Property Values" for a list of serial port object properties that you can use with `instrfind`.

You must specify property values using the same format as the `get` function returns. For example, if `get` returns the `Name` property value as `MyObject`, `instrfind` will not find an object with a `Name` property value of `myobject`. However, this is not the case for properties that have a finite set of string values. For example, `instrfind` will find an object with a `Parity` property value of `Even` or `even`.

You can use property name/property value string pairs, structures, and cell array pairs in the same call to `instrfind`.

Example

Suppose you create the following two serial port objects.

```
s1 = serial('COM1');
s2 = serial('COM2');
set(s2,'BaudRate',4800)
fopen([s1 s2])
```

You can use `instrfind` to return serial port objects based on property values.

```
out1 = instrfind('Port','COM1');
out2 = instrfind({'Port','BaudRate'},{'COM2',4800});
```

You can also use `instrfind` to return cleared serial port objects to the MATLAB workspace.

```
clear s1 s2
newobjs = instrfind

   Instrument Object Array
   Index:   Type:          Status:     Name:
   1        serial         open        Serial-COM1
   2        serial         open        Serial-COM2
```

To close both `s1` and `s2`

```
fclose(newobjs)
```

See Also

Functions

`clear`, `get`

Purpose Determine if serial port objects are valid

Syntax

```
out = isvalid(obj)
```

Arguments

`obj`	A serial port object or array of serial port objects.
`out`	A logical array.

Description `out = isvalid(obj)` returns the logical array `out`, which contains a `0` where the elements of `obj` are invalid serial port objects and a `1` where the elements of `obj` are valid serial port objects.

Remarks `obj` becomes invalid after it is removed from memory with the `delete` function. Because you cannot connect an invalid serial port object to the device, you should remove it from the workspace with the `clear` command.

Example Suppose you create the following two serial port objects.

```
s1 = serial('COM1');
s2 = serial('COM1');
```

`s2` becomes invalid after it is deleted.

```
delete(s2)
```

`isvalid` verifies that `s1` is valid and `s2` is invalid.

```
sarray = [s1 s2];
isvalid(sarray)
ans =
     1     0
```

See Also

Functions

`clear`, `delete`

length (serial)

Purpose Length of serial port object array

Syntax `length(obj)`

Arguments

`obj`	A serial port object or an array of serial port objects.

Description `length(obj)` returns the length of `obj`. It is equivalent to the command `max(size(obj))`.

See Also

Functions

`size`

Purpose Load serial port objects and variables into the MATLAB workspace

Syntax

```
load filename
load filename obj1 obj2...
out = load('filename','obj1','obj2',...)
```

Arguments

`filename`	The MAT-file name.
`obj1 obj2...`	Serial port objects or arrays of serial port objects.
`out`	A structure containing the specified serial port objects.

Description `load filename` returns all variables from the MAT-file specified by `filename` into the MATLAB workspace.

`load filename obj1 obj2...` returns the serial port objects specified by `obj1 obj2` ... from the MAT-file `filename` into the MATLAB workspace.

`out = load('filename','obj1','obj2',...)` returns the specified serial port objects from the MAT-file `filename` as a structure to `out` instead of directly loading them into the workspace. The field names in `out` match the names of the loaded serial port objects.

Remarks Values for read-only properties are restored to their default values upon loading. For example, the `Status` property is restored to `closed`. To determine if a property is read-only, examine its reference pages.

Example Suppose you create the serial port objects `s1` and `s2`, configure a few properties for `s1`, and connect both objects to their instruments:

```
s1 = serial('COM1');
s2 = serial('COM2');
set(s1,'Parity','mark','DataBits',7);
fopen(s1);
fopen(s2);
```

Save `s1` and `s2` to the file `MyObject.mat`, and then load the objects back into the workspace:

```
save MyObject s1 s2;
load MyObject s1;
load MyObject s2;

get(s1, {'Parity', 'DataBits'})
ans =
    'mark'    [7]
get(s2, {'Parity', 'DataBits'})
ans =
    'none'    [8]
```

See Also

Functions

save

Properties

Status

Purpose Read data asynchronously from the device

Syntax

```
readasync(obj)
readasync(obj,size)
```

Arguments

`obj`	A serial port object.
`size`	The number of bytes to read from the device.

Description `readasync(obj)` initiates an asynchronous read operation.

`readasync(obj,size)` asynchronously reads, at most, the number of bytes given by `size`. If `size` is greater than the difference between the `InputBufferSize` property value and the `BytesAvailable` property value, an error is returned.

Remarks Before you can read data, you must connect `obj` to the device with the `fopen` function. A connected serial port object has a `Status` property value of `open`. An error is returned if you attempt to perform a read operation while `obj` is not connected to the device.

You should use `readasync` only when you configure the `ReadAsyncMode` property to `manual`. `readasync` is ignored if used when `ReadAsyncMode` is `continuous`.

The `TransferStatus` property indicates if an asynchronous read or write operation is in progress. You can write data while an asynchronous read is in progress because serial ports have separate read and write pins. You can stop asynchronous read and write operations with the `stopasync` function.

You can monitor the amount of data stored in the input buffer with the `BytesAvailable` property. Additionally, you can use the `BytesAvailableFcn` property to execute an M-file callback function when the terminator or the specified amount of data is read.

Rules for Completing an Asynchronous Read Operation

An asynchronous read operation with readasync completes when one of these conditions is met:

- The terminator specified by the Terminator property is read.
- The time specified by the Timeout property passes.
- The specified number of bytes is read.
- The input buffer is filled (if size is not specified).

Because readasync checks for the terminator, this function can be slow. To increase speed, you might want to configure ReadAsyncMode to continuous and continuously return data to the input buffer as soon as it is available from the device.

Example

This example creates the serial port object s, connects s to a Tektronix TDS 210 oscilloscope, configures s to read data asynchronously only if readasync is issued, and configures the instrument to return the peak-to-peak value of the signal on channel 1.

```
s = serial('COM1');
fopen(s)
s.ReadAsyncMode = 'manual';
fprintf(s,'Measurement:Meas1:Source CH1')
fprintf(s,'Measurement:Meas1:Type Pk2Pk')
fprintf(s,'Measurement:Meas1:Value?')
```

Begin reading data asynchronously from the instrument using readasync. When the read operation is complete, return the data to the MATLAB workspace using fscanf.

```
readasync(s)
s.BytesAvailable
ans =
     15
out = fscanf(s)
out =
2.0399999619E0
fclose(s)
```

See Also

Functions

`fopen`, `stopasync`

Properties

`BytesAvailable`, `BytesAvailableFcn`, `ReadAsyncMode`, `Status`, `TransferStatus`

record

Purpose

Record data and event information to a file

Syntax

```
record(obj)
record(obj,'switch')
```

Arguments

`obj`	A serial port object.
`'switch'`	Switch recording capabilities on or off.

Description

`record(obj)` toggles the recording state for `obj`.

`record(obj,'switch')` initiates or terminates recording for `obj`. *`switch`* can be `on` or `off`. If *`switch`* is `on`, recording is initiated. If *`switch`* is `off`, recording is terminated.

Remarks

Before you can record information to disk, `obj` must be connected to the device with the `fopen` function. A connected serial port object has a `Status` property value of `open`. An error is returned if you attempt to record information while `obj` is not connected to the device. Each serial port object must record information to a separate file. Recording is automatically terminated when `obj` is disconnected from the device with `fclose`.

The `RecordName` and `RecordMode` properties are read-only while `obj` is recording, and must be configured before using `record`.

For a detailed description of the record file format and the properties associated with recording data and event information to a file, refer to "Debugging: Recording Information to Disk."

Example

This example creates the serial port object `s`, connects `s` to the device, configures `s` to record information to a file, writes and reads text data, and then disconnects `s` from the device.

```
s = serial('COM1');
fopen(s)
s.RecordDetail = 'verbose';
s.RecordName = 'MySerialFile.txt';
```

```
record(s,'on')
fprintf(s,'*IDN?')
out = fscanf(s);
record(s,'off')
fclose(s)
```

See Also

Functions

`fclose`, `fopen`

Properties

`RecordDetail`, `RecordMode`, `RecordName`, `RecordStatus`, `Status`

save (serial)

Purpose

Save serial port objects and variables to a MAT-file

Syntax

```
save filename
save filename obj1 obj2...
```

Arguments

`filename`	The MAT-file name.
`obj1 obj2...`	Serial port objects or arrays of serial port objects.

Description

`save filename` saves all MATLAB variables to the MAT-file `filename`. If an extension is not specified for `filename`, then the `.mat` extension is used.

`save filename obj1 obj2...` saves the serial port objects `obj1 obj2` ... to the MAT-file `filename`.

Remarks

You can use `save` in the functional form as well as the command form shown above. When using the functional form, you must specify the filename and serial port objects as strings. For example. to save the serial port object `s` to the file `MySerial.mat`

```
s = serial('COM1');
save('MySerial','s')
```

Any data that is associated with the serial port object is not automatically stored in the MAT-file. For example, suppose there is data in the input buffer for `obj`. To save that data to a MAT-file, you must bring it into the MATLAB workspace using one of the synchronous read functions, and then save to the MAT-file using a separate variable name. You can also save data to a text file with the `record` function.

You return objects and variables to the MATLAB workspace with the `load` command. Values for read-only properties are restored to their default values upon loading. For example, the `Status` property is restored to `closed`. To determine if a property is read-only, examine its reference pages.

Example

This example illustrates how to use the command and functional form of `save`.

```
s = serial('COM1');
```

```
set(s,'BaudRate',2400,'StopBits',1)
save MySerial1 s
set(s,'BytesAvailableFcn',@mycallback)
save('MySerial2','s')
```

See Also

Functions

`load`, `record`

Properties

`Status`

serial

Purpose

Create a serial port object

Syntax

```
obj = serial('port')
obj = serial('port','PropertyName',PropertyValue,...)
```

Arguments

`'port'`	The serial port name.
`'PropertyName'`	A serial port property name.
`PropertyValue`	A property value supported by *`PropertyName`*.
`obj`	The serial port object.

Description

`obj = serial('port')` creates a serial port object associated with the serial port specified by `port`. If `port` does not exist, or if it is in use, you will not be able to connect the serial port object to the device.

`obj = serial('port','PropertyName',PropertyValue,...)` creates a serial port object with the specified property names and property values. If an invalid property name or property value is specified, an error is returned and the serial port object is not created.

Remarks

When you create a serial port object, these property values are automatically configured:

- The `Type` property is given by `serial`.
- The `Name` property is given by concatenating `Serial` with the port specified in the `serial` function.
- The `Port` property is given by the port specified in the `serial` function.

You can specify the property names and property values using any format supported by the `set` function. For example, you can use property name/property value cell array pairs. Additionally, you can specify property names without regard to case, and you can make use of property name completion. For example, the following commands are all valid.

```
s = serial('COM1','BaudRate',4800);
```

```
s = serial('COM1','baudrate',4800);
s = serial('COM1','BAUD',4800);
```

Refer to “Configuring Property Values” for a list of serial port object properties that you can use with `serial`.

Before you can communicate with the device, it must be connected to `obj` with the `fopen` function. A connected serial port object has a `Status` property value of `open`. An error is returned if you attempt a read or write operation while the object is not connected to the device. You can connect only one serial port object to a given serial port.

Example

This example creates the serial port object `s1` associated with the serial port COM1.

```
s1 = serial('COM1');
```

The `Type`, `Name`, and `Port` properties are automatically configured.

```
get(s1,{'Type','Name','Port'})
ans =
    'serial'    'Serial-COM1'    'COM1'
```

To specify properties during object creation

```
s2 = serial('COM2','BaudRate',1200,'DataBits',7);
```

See Also

Functions

`fclose`, `fopen`

Properties

`Name`, `Port`, `Status`, `Type`

serialbreak

Purpose

Send a break to the device connected to the serial port

Syntax

```
serialbreak(obj)
serialbreak(obj,time)
```

Arguments

`obj`	A serial port object.
`time`	The duration of the break, in milliseconds.

Description

`serialbreak(obj)` sends a break of 10 milliseconds to the device connected to `obj`.

`serialbreak(obj,time)` sends a break to the device with a duration, in milliseconds, specified by `time`. Note that the duration of the break might be inaccurate under some operating systems.

Remarks

For some devices, the break signal provides a way to clear the hardware buffer.

Before you can send a break to the device, it must be connected to `obj` with the `fopen` function. A connected serial port object has a `Status` property value of `open`. An error is returned if you attempt to send a break while `obj` is not connected to the device.

`serialbreak` is a synchronous function, and blocks the command line until execution is complete.

If you issue `serialbreak` while data is being asynchronously written, an error is returned. In this case, you must call the `stopasync` function or wait for the write operation to complete.

See Also

Functions

`fopen`, `stopasync`

Properties

`Status`

Purpose

Configure or display serial port object properties

Syntax

```
set(obj)
props = set(obj)
set(obj,'PropertyName')
props = set(obj,'PropertyName')
set(obj,'PropertyName',PropertyValue,...)
set(obj,PN,PV)
set(obj,S)
```

Arguments

`obj`	A serial port object or an array of serial port objects.
`'PropertyName'`	A property name for `obj`.
`PropertyValue`	A property value supported by *`PropertyName`*.
`PN`	A cell array of property names.
`PV`	A cell array of property values.
`S`	A structure with property names and property values.
`props`	A structure array whose field names are the property names for `obj`, or cell array of possible values.

Description

`set(obj)` displays all configurable properties values for `obj`. If a property has a finite list of possible string values, then these values are also displayed.

`props = set(obj)` returns all configurable properties and their possible values for `obj` to `props`. `props` is a structure whose field names are the property names of `obj`, and whose values are cell arrays of possible property values. If the property does not have a finite set of possible values, then the cell array is empty.

`set(obj,'PropertyName')` displays the valid values for *`PropertyName`* if it possesses a finite list of string values.

`props = set(obj,'PropertyName')` returns the valid values for *PropertyName* to `props`. `props` is a cell array of possible string values or an empty cell array if *PropertyName* does not have a finite list of possible values.

`set(obj,'PropertyName',PropertyValue,...)` configures multiple property values with a single command.

`set(obj,PN,PV)` configures the properties specified in the cell array of strings `PN` to the corresponding values in the cell array `PV`. `PN` must be a vector. `PV` can be m-by-n where m is equal to the number of serial port objects in `obj` and n is equal to the length of `PN`.

`set(obj,S)` configures the named properties to the specified values for `obj`. `S` is a structure whose field names are serial port object properties, and whose field values are the values of the corresponding properties.

Remarks

Refer to "Configuring Property Values" for a list of serial port object properties that you can configure with `set`.

You can use any combination of property name/property value pairs, structures, and cell arrays in one call to `set`. Additionally, you can specify a property name without regard to case, and you can make use of property name completion. For example, if `s` is a serial port object, then the following commands are all valid.

```
set(s,'BaudRate')
set(s,'baudrate')
set(s,'BAUD')
```

If you use the `help` command to display help for `set`, then you need to supply the pathname shown below.

```
help serial/set
```

Examples

This example illustrates some of the ways you can use `set` to configure or return property values for the serial port object `s`.

```
s = serial('COM1');
set(s,'BaudRate',9600,'Parity','even')
set(s,{'StopBits','RecordName'},{2,'sydney.txt'})
set(s,'Parity')
```

```
[ {none} | odd | even | mark | space ]
```

See Also

Functions

`get`

size (serial)

Purpose Size of serial port object array

Syntax

```
d = size(obj)
[m,n] = size(obj)
[m1,m2,...,mn] = size(obj)
m = size(obj,dim)
```

Arguments

`obj`	A serial port object or an array of serial port objects.
`dim`	The dimension of `obj`.
`d`	The number of rows and columns in `obj`.
`m`	The number of rows in `obj`, or the length of the dimension specified by `dim`.
`n`	The number of columns in `obj`.
`m1,m2,..., mn`	The length of the first N dimensions of `obj`.

Description

`d = size(obj)` returns the two-element row vector `d` containing the number of rows and columns in `obj`.

`[m,n] = size(obj)` returns the number of rows and columns in separate output variables.

`[m1,m2,m3,...,mn] = size(obj)` returns the length of the first `n` dimensions of `obj`.

`m = size(obj,dim)` returns the length of the dimension specified by the scalar `dim`. For example, `size(obj,1)` returns the number of rows.

See Also

Functions

`length`

Purpose Stop asynchronous read and write operations

Syntax

```
stopasync(obj)
```

Arguments

`obj`	A serial port object or an array of serial port objects.

Description

`stopasync(obj)` stops any asynchronous read or write operation that is in progress for `obj`.

Remarks

You can write data asynchronously using the `fprintf` or `fwrite` functions. You can read data asynchronously using the `readasync` function, or by configuring the `ReadAsyncMode` property to `continuous`. In-progress asynchronous operations are indicated by the `TransferStatus` property.

If `obj` is an array of serial port objects and one of the objects cannot be stopped, the remaining objects in the array are stopped and a warning is returned. After an object stops:

- Its `TransferStatus` property is configured to `idle`.
- Its `ReadAsyncMode` property is configured to `manual`.
- The data in its output buffer is flushed.

Data in the input buffer is not flushed. You can return this data to the MATLAB workspace using any of the synchronous read functions. If you execute the `readasync` function, or configure the `ReadAsyncMode` property to `continuous`, then the new data is appended to the existing data in the input buffer.

See Also

Functions

`fprintf`, `fwrite`, `readasync`

Properties

`ReadAsyncMode`, `TransferStatus`

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