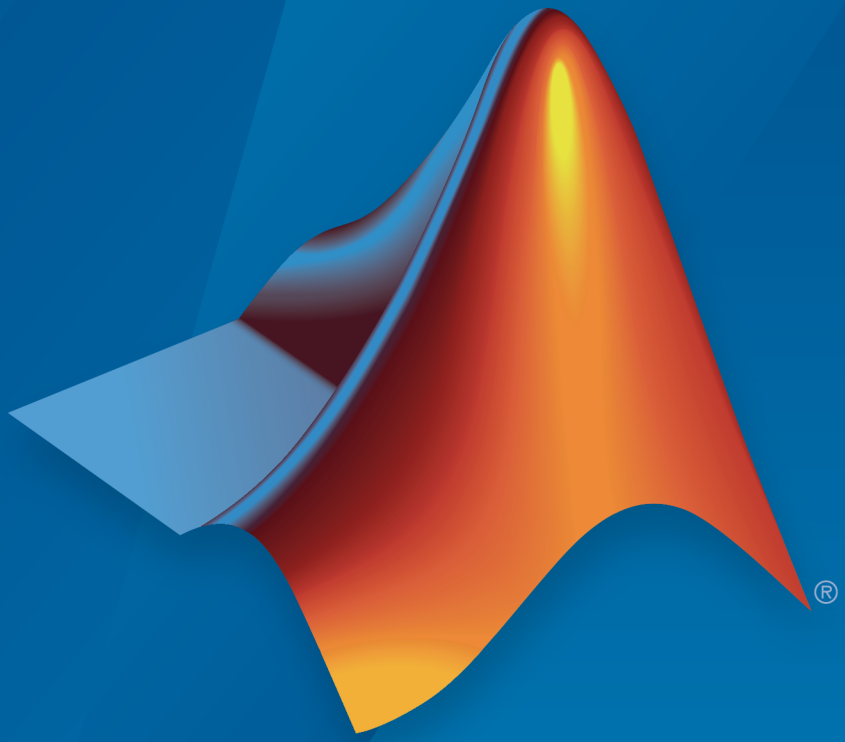
MATLAB® Production Server™

Code Deployment



MATLAB®

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MATLAB® Production Server™ Code Deployment

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Write Deployable MATLAB Code

MATLAB Coding Guidelines

When writing MATLAB code for deployment to MATLAB Production Server you must adhere to the same to the same guidelines as when writing code for deployment with MATLAB Compiler™ or MATLAB Compiler SDK™. In addition, code deployed to MATLAB Production Server must adhere to additional guidelines:

- functions cannot depend on nor change MATLAB state.

  Functions deployed with MATLAB Production Server may not always execute on the same instance of the MATLAB Runtime. Each worker access a different MATLAB Runtime instance.
- explicitly use `varargin` and `varargout` for functions with variable inputs and outputs.
- avoid MATLAB figure or GUI code.

  Deployed MATLAB code runs on the server, any figures or GUIs created during runtime will show up on the server machine, not the client machine. If figures or GUIs are required to run to create the function results, make sure to close these figures at the end of your code to avoid left over windows and leaking resources on the server.

More About

- “State-Dependent Functions” on page 1-3
- “Write Deployable MATLAB Code”

State-Dependent Functions

MATLAB code that you want to deploy often carries *state*—a specific data value in a program or program variable.

Does My MATLAB Function Carry State?

Example of carrying state in a MATLAB program include, but are not limited to:

- Modifying or relying on the MATLAB path and the Java® class path
- Accessing MATLAB state that is inherently persistent or global. Some example of this include:
  - Random number seeds
  - Handle Graphics® root objects that retain data
  - MATLAB or MATLAB toolbox settings and preferences
- Creating global and persistent variables.
- Loading MATLAB objects (MATLAB classes) into MATLAB. If you access a MATLAB object in any way, it loads into MATLAB.
- Calling MEX files, Java methods, or C# methods containing static variables.

Defensive Coding Practices

If your MATLAB function not only carries state, but *relies on it* for your function to properly execute, you must take additional steps (listed in this section) to ensure state retention.

When you deploy your application, consider cases where you carry state, and safeguard against that state's corruption if needed. *Assume* that your state may be changed and code defensively against that condition.

The following are examples of "defensive coding" practices:

Reset System-Generated Values in the Deployed Application

If you are using a random number seed, for example, reset it in your deployed application program to ensure the integrity of your original MATLAB function.

Validate Global or Persistent Variable Values

If you must use global or persistent variables, always validate their value in your deployed application and reset if needed.

Ensure Access to Data Caches

If your function relies on cached replies to previous requests, for instance, ensure your deployed system and application has access to that cache outside of the MATLAB environment.

Use Simple Data Types When Possible

Simple data types are usually not tied to a specific application and means of storing state. Your options for choosing an appropriate state-preserving tool increase as your data types become less complicated and specific.

Avoid Using MATLAB Callback Functions

Avoid using MATLAB callbacks, such as `timer`. Callback functions have the ability to interrupt and override the current state of the MATLAB Production Server worker and may yield unpredictable results in multiuser environments.

Techniques for Preserving State

The most appropriate method for preserving state depends largely on the type of data you need to save.

- Databases provide the most versatile and scalable means for retaining stateful data. The database acts as a generic repository and can generally work with any application in an enterprise development environment. It does not impose requirements or restrictions on the data structure or layout. Another related technique is to use comma-delimited files, in applications such as Microsoft® Excel®.
- Data that is specific to a third-party programming language, such as Java and C#, can be retained using a number of techniques. Consult the online documentation for the appropriate third-party vendor for best practices on preserving state.

Caution Using MATLAB `LOAD` and `SAVE` functions is often used to preserve state in MATLAB applications and workspaces. While this may be successful in some

circumstances, it is highly recommended that the data be validated and reset if needed, if not stored in a generic repository such as a database.

Deploying MATLAB Functions Containing MEX Files

If the MATLAB function you are deploying uses MEX files, ensure that the system running MATLAB Production Server is running the version of MATLAB Compiler used to create the MEX files.

Coordinate with your server administrator and application developer as needed.

Unsupported MATLAB Data Types for Client and Server Marshaling

These data types are not supported for marshaling between MATLAB Production Server server instances and clients:

- MATLAB function handles
- Complex (imaginary) data
- Sparse arrays

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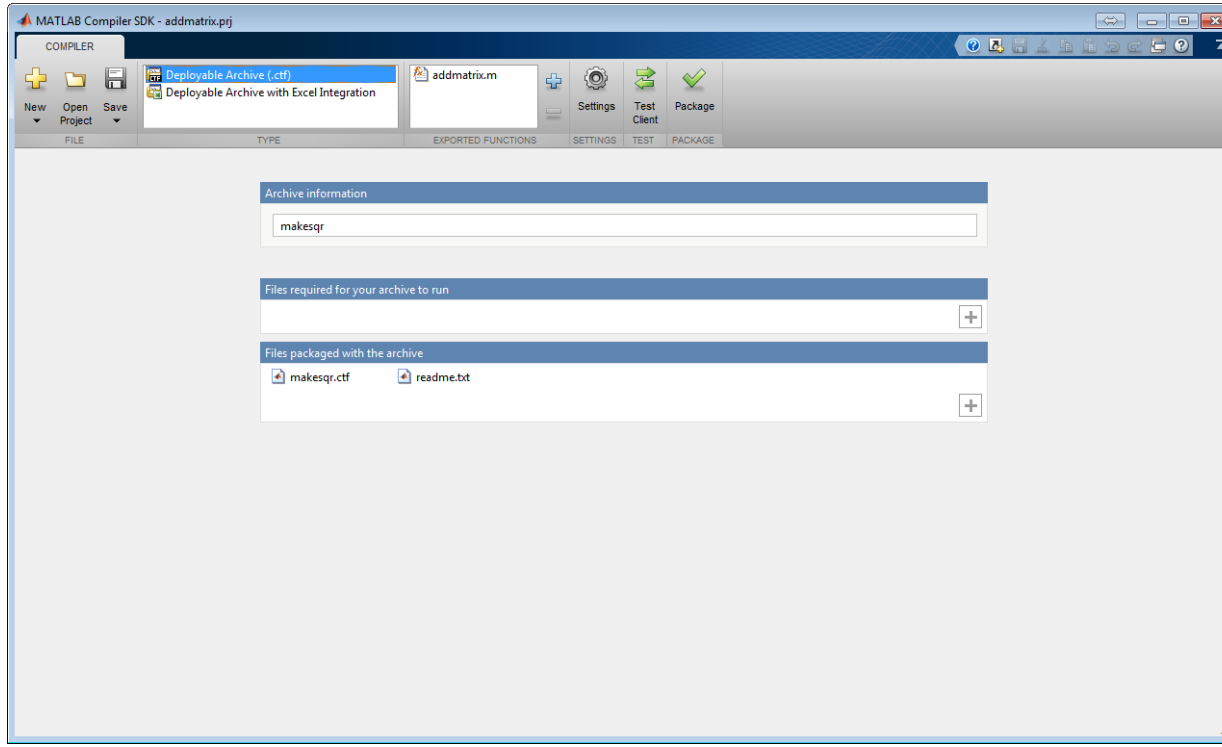
Create a Deployable Archive from MATLAB Code

Compile Deployable Archives with Production Server Compiler App

To compile MATLAB code into a deployable archive:

1. Open the Production Server Compiler app.
   a. On the toolstrip select the **Apps** tab on the toolstrip.
   b. Click the arrow at the far right of the tab to open the apps gallery.
   c. Click **Production Server Compiler**.



Note: To open an existing project, select it from the MATLAB **Current Folder** panel.

Note: You can also launch the Production Server Compiler app using the `productionServerCompiler` function.

2 In the **Application Type** section of the toolstrip, select **Deployable Archive**.

Note: If the **Application Type** section of the toolstrip is collapsed, you can expand it by clicking the down arrow.

3 Specify the MATLAB files you want deployed in the package.

   a In the **Exported Functions** section of the toolstrip, click the plus button.

   Note: If the **Exported Functions** section of the toolstrip is collapsed, you can expand it by clicking the down arrow.

   b In the file explorer that opens, locate and select one or more the MATLAB files.

   c Click **Open** to select the file and close the file explorer.

   The names of the selected files are added to the list and a minus button appears below the plus button. The name of the first file listed is used as the default application name.

4 In the **Archive Information** section of the app, specify the name of the archive.

5 In the **Files required for your application to run** section of the app, verify that all of the files required by the deployed MATLAB functions are listed.

Note: These files are compiled into the generated binaries along with the exported files.

The built-in dependency checker will automatically populate this section with the appropriate files. However, if needed you can manually add any files it missed.

For more information see “Manage Required Files in Compiler Project” on page 3-6.

6 In the **Files packaged with your archive** section of the app, verify that any additional non-MATLAB files you want packaged with the archive are listed.

Note: These files are placed in the `applications` folder of the installation.

This section automatically lists:

- Generated deployable archive
- Readme file

You can manually add files to the list. Additional files can include documentation, sample data files, and examples to accompany the application.

For more information see “Specify Files to Install with Application” on page 3-8.

7 Click the **Settings** button to customize the flags passed to the compiler and the folders to which the generated files are written.

8 Click the **Package** button to compile the MATLAB code and generate any installers.

9 Verify that the generated output contains:

- `for_redistribution` — A folder containing the installer to distribute the archive
- `for_testing` — A folder containing the raw generated files to create the installer
- `PackagingLog.txt` — A log file generated by the compiler

Compile Deployable Archives from Command Line

In this section...

You can compile deployable archives from both the MATLAB command line and the system terminal command line:

- `deploytool` invokes one of the compiler apps to execute a presaved compiler project
- `mcc` invokes the command line compiler

Execute Compiler Projects with deploytool

The `deploytool` command has two flags to invoke one of the compiler apps without opening a window.

- `-build` *`project_name`* — Invoke the correct compiler app to build the project and not generate an installer.
- `-package` *`project_name`* — Invoke the correct compiler app to build the project and generate an installer.

For example, `deploytool -package magicsquare` generates the binary files defined by the `magicsquare` project and packages them into an installer that you can distribute to others.

Compile a Deployable Archive with mcc

The `mcc` command invokes the raw compiler and provides fine-level control over the compilation of the deployable archive. It, however, cannot package the results in an installer.

To invoke the compiler to generate a deployable archive use the `-W CTF:`*`component_name`* flag with `mcc`. The `-W CTF:`*`component_name`* flag creates a deployable archive called *`component_name`*`.ctf`.

For compiling deployable archives, you can also use the following options.

Compiler Options

Option	Description
`-a filePath`	Add any files on the path to the generated binary.
`-d outFolder`	Specify the folder into which the results of compilation are written.
`class{className:mfilename...}`	Specify that an additional class is generated that includes methods for the listed MATLAB files.

Modifying Deployed Functions

Once you have built a deployable archive, you can modify your MATLAB code, recompile, and see the change instantly reflected in the archive hosted on your server. This is known as “hot deploying” or “redeploying” a function.

To Hot Deploy, you must have a server created and running, with the built deployable archive located in the server’s `auto_deploy` folder.

The server deploys the updated version of your archive when on the following occurs:

- Compiled archive has an updated time stamp
- Change has occurred to the archive contents (new file or deleted file)

It takes a maximum of five seconds to redeploy a function using Hot Deployment. It takes a maximum of ten seconds to undeploy a function (remove the function from being hosted).

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Customizing a Compiler Project

Customize the Installer

In this section...

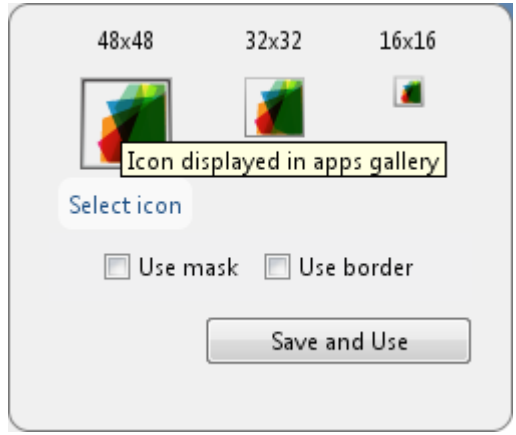
Change the Application Icon

The application icon is used for the generated installer. For standalone applications, it is also the application's icon.

You can change the default icon in **Application Information**. To set a custom icon:

1. Click the graphic to the left of the **Application name** field.

   A window previewing the icon opens.



2. Click **Select icon**.
3. Using the file explorer, locate the graphic file to use as the application icon.
4. Select the graphic file.

5 Click **OK** to return to the icon preview.
6 Select **Use mask** to fill any blank spaces around the icon with white.
7 Select **Use border** to add a border around the icon.
8 Click **Save and Use** to return to the main window.

Add Application Information

The **Application Information** section of the app allows you to provide these values:

- Name

  Determines the name of the installed MATLAB artifacts. For example, if the name is `foo`, the installed executable would be `foo.exe`, the Windows® start menu entry would be **foo**. The folder created for the application would be *`InstallRoot`*`/foo`.

  The default value is the name of the first function listed in the **Main File(s)** field of the app.
- Version

  The default value is 1.0.
- Author name
- Support e-mail address
- Company name

  Determines the full installation path for the installed MATLAB artifacts. For example, if the company name is `bar`, the full installation path would be *`InstallRoot`*`/bar/`*`ApplicationName`*.
- Summary
- Description

This information is all optional and, unless otherwise stated, is only used for display purposes. It appears on the first page of the installer. On Windows systems, this information is also displayed in the Windows **Add/Remove Programs** control panel.

Change the Splash Screen

The installer's splash screen displays after the installer is started. It is displayed, along with a status bar, while the installer initializes.

You can change the default image by clicking the **Select custom splash screen** link in **Application Information**. When the file explorer opens, locate and select a new image.

Note: You can drag and drop a custom image onto the default splash screen.

Change the Installation Path

Default Installation Paths lists the default path the installer will use when installing the compiled binaries onto a target system.

Default Installation Paths

Windows	`C:\Program Files\`*`companyName`*`\`*`appName`*
Mac OS X	`/Applications/`*`companyName`*`/`*`appName`*
Linux®	`/usr/`*`companyName`*`/`*`appName`*

You can change the default installation path by editing the **Default installation folder** field under **Additional Installer Options**.

The **Default installation folder** field has two parts:

- root folder — A drop down list that offers options for where the install folder is installed. Custom Installation Roots lists the optional root folders for each platform.

  Custom Installation Roots

Windows	`C:\Users\`*`userName`*`\AppData`
Linux	`/usr/local`

- install folder — A text field specifying the path appended to the root folder.

Change the Logo

The logo displays after the installer is started. It is displayed on the right side of the installer.

You change the default image by clicking the **Select custom logo** link in **Additional Installer Options**. When the file explorer opens, locate and select a new image.

Note: You can drag and drop a custom image onto the default logo.

Edit the Installation Notes

Installation notes are displayed once the installer has successfully installed the packaged files on the target system. They can provide useful information concerning any additional set up that is required to use the installed binaries or simply provide instructions for how to run the application.

The field for editing the installation notes is in **Additional Installer Options**.

Manage Required Files in Compiler Project

In this section...

Dependency Analysis

The compiler uses a dependency analysis function to automatically determine what additional MATLAB files are required for the application to compile and run. These files are automatically compiled into the generated binary. The compiler does not generate any wrapper code allowing direct access to the functions defined by the required files.

Using the Compiler Apps

If you are using one of the compiler apps, the required files discovered by the dependency analysis function are listed in the **Files required by your application to run** field.

To add files:

1. Click the plus button in the field.
2. Select the desired file from the file explorer.
3. Click **OK**.

To remove files:

1. Select the desired file.
2. Press the **Delete** key.

Caution Removing files from the list of required files may cause your application to not compile or to not run properly when deployed.

Using mcc

If you are using `mcc` to compile your MATLAB code, the compiler does not display a list of required files before running. Instead, it compiles all of the required files that are

discovered by the dependency analysis function and adds them to the generated binary file.

You can add files to the list by passing one, or more, `-a` arguments to `mcc`. The `-a` arguments add the specified files to the list of files to be added into the generated binary. For example, `-a hello.m` adds the file `hello.m` to the list of required files and `-a ./foo` adds all of the files in `foo`, and its subfolders, to the list of required files.

Specify Files to Install with Application

The compiler apps package files to install along with the ones it generates. By default the installer includes a readme file with instructions on installing the MATLAB Runtine and configuring it.

These files are listed in the **Files installed for your end user** section of the app.

To add files to the list:

1. Click the plus button in the field.
2. Select the desired file from the file explorer.
3. Click **OK** to close the file explorer.

Jar files are added to the application classpath in the same ways as if the user called `javaaddpath`.

To remove files from the list:

1. Select the desired file.
2. Press the **Delete** key.

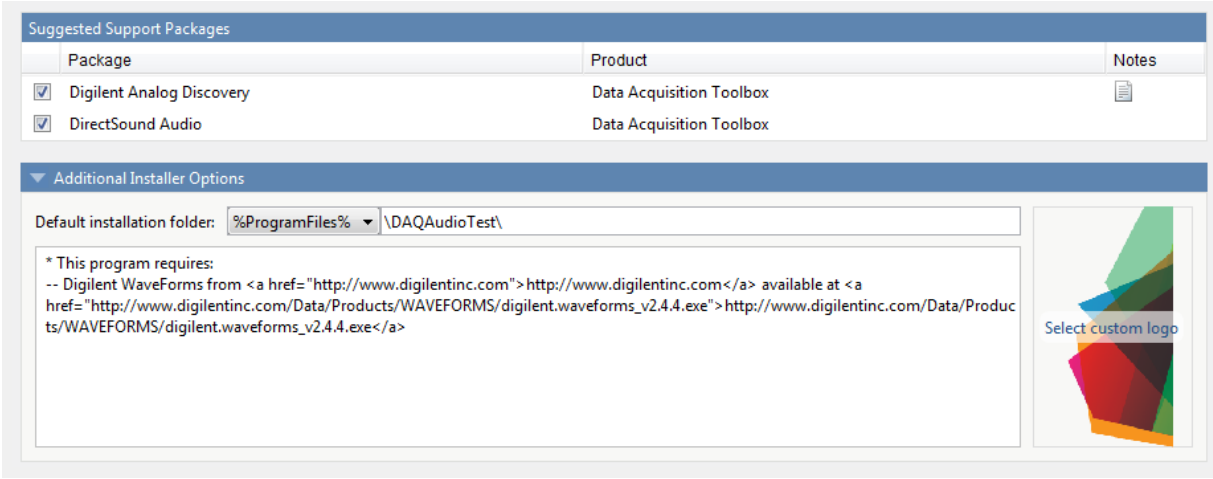
Caution Removing the binary targets from the list results in an installer that does not install the intended functionality.

When installed on a target computer, the files listed in the **Files installed for your end user** are placed in the `application` folder.

Manage Support Packages

Using a Compiler App

Many MATLAB toolboxes use support packages to interact with hardware or to provide additional processing capabilities. If your MATLAB code uses a toolbox with an installed support package, the app displays a **Suggested Support Packages** section.



The list displays all installed support packages that your MATLAB code requires. The list is determined using these criteria:

- the support package is installed
- your code has a direct dependency on the support package
- your code is dependent on the base product of the support package
- your code is dependent on at least one of the files listed as a dependency in the `mcc.xml` file of the support package, and the base product of the support package is MATLAB

Deselect support packages that are not required by your application.

Some support packages require third-party drivers that the compiler cannot package. In this case, the compiler adds the information to the installation notes. You can edit

installation notes in the **Additional Installer Options** section of the app. To remove the installation note text, deselect the support package with the third-party dependency.

Caution Any text you enter beneath the generated text will be lost if you deselect the support package.

Using the Command Line

Many MATLAB toolboxes use support packages to interact with hardware or to provide additional processing capabilities. If your MATLAB code uses a toolbox with an installed support package, you pass a `-a` flag to `mcc` when compiling your MATLAB code.

For example, if your function uses the `OS Generic Video Interface` support package.

```
mcc -m -v test.m -a C:\MATLAB\SupportPackages\R2014a\genericvideo
```

Some support packages require third-party drivers that the compiler cannot package. In this case, you are responsible for downloading and installing the required drivers.

4

Advanced Uses of the Command Line Compiler

Simplify Compilation Using Macros

In this section...

Macros

The compiler, through its exhaustive set of options, gives you access to the tools you need to do your job. If you want a simplified approach to compilation, you can use one simple *macro* that allows you to quickly accomplish basic compilation tasks. Macros let you group several options together to perform a particular type of compilation.

This table shows the relationship between the macro approach to accomplish a standard compilation and the multioption alternative.

Macro	Bundle	Creates	Option Equivalence `Function Wrapper |Output Stage ||`
`-l`	`macro_option_l`	Library	`-W lib -T link:lib`
`-m`	`macro_option_m`	Standalone application	`-Wmain-Tlink:exe`

Working With Macros

The `-m` option tells the compiler to produce a standalone application. The `-m` macro is equivalent to the series of options

```
-W main -T link:exe
```

This table shows the options that compose the `-m` macro and the information that they provide to the compiler.

-m Macro

Option	Function
`-W main`	Produce a wrapper file suitable for a standalone application.
`-T link:exe`	Create an executable link as the output.

Changing Macros

You can change the meaning of a macro by editing the corresponding `macro_option` file in *`matlabroot`*`\toolbox\compiler\bundles`. For example, to change the `-m` macro, edit the file `macro_option_m` in the `bundles` folder.

Note This changes the meaning of `-m` for all users of this MATLAB installation.

Specifying Default Macros

As the `MCCSTARTUP` functionality has been replaced by bundle technology, the `macro_default` file that resides in `toolbox\compiler\bundles` can be used to specify default options to the compiler.

For example, adding `-mv` to the `macro_default` file causes the command:

```
mcc foo.m
```

to execute as though it were:

```
mcc -mv foo.m
```

Similarly, adding `-v` to the `macro_default` file causes the command:

```
mcc -W 'lib:libfoo' -T link:lib foo.m
```

to behave as though the command were:

```
mcc -v -W 'lib:libfoo' -T link:lib foo.m
```

Invoke MATLAB Build Options

In this section...

Specify Full Path Names to Build MATLAB Code

If you specify a full path name to a MATLAB file on the `mcc` command line, the compiler

1. Breaks the full name into the corresponding path name and file names (`<path>` and `<file>`).
2. Replaces the full path name in the argument list with "`-I <path> <file>`".

Specifying Full Path Names

For example:

```
mcc -m /home/user/myfile.m
```

would be treated as

```
mcc -m -I /home/user myfile.m
```

In rare situations, this behavior can lead to a potential source of confusion. For example, suppose you have two different MATLAB files that are both named `myfile.m` and they reside in `/home/user/dir1` and `/home/user/dir2`. The command

```
mcc -m -I /home/user/dir1 /home/user/dir2/myfile.m
```

would be equivalent to

```
mcc -m -I /home/user/dir1 -I /home/user/dir2 myfile.m
```

The compiler finds the `myfile.m` in `dir1` and compiles it instead of the one in `dir2` because of the behavior of the `-I` option. If you are concerned that this might be happening, you can specify the `-v` option and then see which MATLAB file the compiler parses. The `-v` option prints the full path name to the MATLAB file during the dependency analysis phase.

Note The compiler produces a warning (`specified_file_mismatch`) if a file with a full path name is included on the command line and the compiler finds it somewhere else.

Using Bundles to Build MATLAB Code

Bundles provide a convenient way to group sets of compiler options and recall them as needed. The syntax of the bundle option is:

```
-B <bundle>[:<a1>,<a2>,...,<an>]
```

where bundle is either a predefined string such as `cpplib` or `csharedlib` or the name of a file that contains a set of `mcc` command-line options, arguments, filenames, and/or other `-B` options.

A bundle can include replacement parameters for compiler options that accept names and version numbers. For example, the bundle for C shared libraries, `csharedlib`, consists of:

```
-W lib:%1% -T link:lib
```

To invoke the compiler to produce the C shared library `mysharedlib` use:

```
mcc -B csharedlib:mysharedlib myfile.m myfile2.m
```

In general, each `%n%` in the bundle will be replaced with the corresponding option specified to the bundle. Use `%%` to include a `%` character. It is an error to pass too many or too few options to the bundle.

Note You can use the `-B` option with a replacement expression as is at the DOS or UNIX® prompt. If more than one parameter is passed, you must enclose the expression that follows the `-B` in single quotes. For example,

```
>>mcc -B csharedlib:libtimefun weekday data tic calendar toc
```

can be used as is at the MATLAB prompt because `libtimefun` is the only parameter being passed. If the example had two or more parameters, then the quotes would be necessary as in

```
>>mcc -B 'cexcel:component,class,1.0' ...
weekday data tic calendar toc
```

Available Bundle Files

Bundle File	Creates	Contents
`cpplib`	C++ library	`-W cpplib:`*`library_name`*`-T link:lib`
`csharedlib`	C library	`-W lib:`*`library_name`*`-T link:lib`
`ccom`	COM component	`-W com:`*`component_name`*`,`*`className`*`,`*`version`*` -T link:lib`
`cexcel`	Excel Add-in	`-W excel:`*`addin_name`*`,`*`className`*`,`*`version`*` -T link:lib`
`cjava`	Java package	`-W java:`*`packageName`*`,`*`className`*
`dotnet`	.NET assembly	`-W dotnet:`*`assembly_name`*`,`*`className`*`,`*`framework_version`*`,`*`securit`*`T link:lib`

MATLAB Runtime Component Cache and Deployable Archive Embedding

In this section...

Deployable archive data is automatically embedded directly in compiled components and extracted to a temporary folder.

Automatic embedding enables usage of MATLAB Runtime Component Cache features through environment variables.

These variables allow you to specify the following:

- Define the default location where you want the deployable archive to be automatically extracted
- Add diagnostic error printing options that can be used when automatically extracting the deployable archive, for troubleshooting purposes
- Tuning the MATLAB Runtime component cache size for performance reasons.

Use the following environment variables to change these settings.

Environment Variable	Purpose	Notes
MCR_CACHE_ROOT	When set to the location of where you want the deployable archive to be extracted, this variable overrides the default per-user component cache location.	Does not apply
MCR_CACHE_VERBOSE	When set to any value, this variable prints logging details about the component cache for diagnostic reasons. This can be very helpful if problems are encountered during deployable archive extraction.	Logging details are turned off by default (for example, when this variable has no value).

Environment Variable	Purpose	Notes
MCR_CACHE_SIZE	When set, this variable overrides the default component cache size.	The initial limit for this variable is 32M (megabytes). This may, however, be changed after you have set the variable the first time. Edit the file `.max_size`, which resides in the file designated by running the `mcrcachedir` command, with the desired cache size limit.

You can override this automatic embedding and extraction behavior by compiling with the "Overriding Default Behavior" on page 4-8 option.

Caution If you run `mcc` specifying conflicting wrapper and target types, the deployable archive will not be embedded into the generated component. For example, if you run:

```
mcc -W lib:myLib -T link:exe test.m test.c
```

the generated `test.exe` will not have the deployable archive embedded in it, as if you had specified a `-C` option to the command line.

Overriding Default Behavior

To extract the deployable archive in a manner prior to R2008b, alongside the compiled .NET assembly, compile using the `mcc`'s `-C` option.

You might want to use this option to troubleshoot problems with the deployable archive, for example, as the log and diagnostic messages are much more visible.

For More Information

For more information about the deployable archive, see "Deployable Archive".

5

Functions

productionServerCompiler

Test, build and package functions for use with MATLAB Production Server

Syntax

```
productionServerCompiler
productionServerCompiler project_name
productionServerCompiler -build project_name
productionServerCompiler -package project_name
```

Description

`productionServerCompiler` opens the Production Server Compiler app for the creation of a new compiler project.

`productionServerCompiler project_name` opens the appropriate compiler app with the project preloaded.

`productionServerCompiler -build project_name` runs the appropriate compiler app to build the specified project. The installer is not generated.

`productionServerCompiler -package project_name` runs the appropriate compiler app to build and package the specified project. The installer is generated.

Examples

Create a New Production Server Project

Open the Production Server Compiler app to create a new project.

```
productionServerCompiler
```

Package a Deployable Archive using an Existing Project

Open the appropriate compiler app to package an existing project file.

```
productionServerCompiler -package my_magic
```

Input Arguments

`project_name` — name of the project to be compiled

character array

Specify the name of a previously saved project. The project must be on the current path.

Introduced in R2014a

deploytool

Compile and package functions for external deployment

Syntax

```
deploytool
deploytool project_name
deploytool -build project_name
deploytool -package project_name
```

Description

`deploytool` opens a list of the compiler apps.

`deploytool project_name` opens the appropriate compiler app with the project preloaded.

`deploytool -build project_name` runs the appropriate compiler app to build the specified project. The installer is not generated.

`deploytool -package project_name` runs the appropriate compiler app to build and package the specified project. The installer is generated.

Examples

Create a New Compiler Project

Open the compiler to create a new project.

```
deploytool
```

Package an Application using an Existing Project

Open the compiler to build a new application using an existing project.

```
deploytool -package my_magic
```

Input Arguments

`project_name` — name of the project to be compiled

character vector

Specify the name of a previously saved project. The project must be on the current path.

Introduced in R2013b

mcc

Compile MATLAB functions for deployment

Syntax

```
mcc options mfilename1,...,mfilenameN
```

```
mcc -W CTF:archive_name options mfilename1,...,mfilenameN
```

```
mcc -W mpsxl:addin_name,className,version input_marshaling_flags
output_marshaling_flags -T link:lib options
mfilename1,...,mfilenameN
```

Description

`mcc options mfilename1,...,mfilenameN` compiles the functions as specified by the options.

The options used depend on the intended results of the compilation. For information on compiling:

- standalone applications, Excel add-ins, or Hadoop® jobs see `mcc` for MATLAB Compiler
- C/C++ shared libraries, .NET assemblies, Java packages, or Python® packages see `mcc` for MATLAB Compiler SDK

`mcc -W CTF:archive_name options mfilename1,...,mfilenameN` instructs the compiler to create a deployable archive for use with a MATLAB Production Server instance.

`mcc -W mpsxl:addin_name,className,version input_marshaling_flags output_marshaling_flags -T link:lib options mfilename1,...,mfilenameN` creates a Microsoft Excel add-in that is integrated with MATLAB Production Server from the specified files.

- *`addin_name`* — Specifies the name of the add-in and its namespace, which is a period-separated list, such as `companyname.groupname.component`.

- *`className`* — Specifies the name of the class to be created. If you do not specify the class name, `mcc` uses the *`addin_name`* as the default.
- *`version`* — Specifies the version of the add-in specified as *`major`*.*`minor`*.
  - *`major`* — Specifies the major version number. If you do not specify a version number, `mcc` uses the latest version.
  - *`minor`* — Specifies the minor version number. If you do not specify a version number, `mcc` uses the latest version.
- *`input_marshaling_flags`* — Specifies options for how data is marshaled between Microsoft Excel and MATLAB.
  - `-replaceBlankWithNaN` — Specifies that a blank in Microsoft Excel is mashaled into NaN in MATLAB. If you do not specify this flag, blanks are marshaled into 0.
  - `-convertDateToString` — Specifies that dates in Microsoft Excel are marshaled into MATLAB character vectors. If you do not specify this flag, dates are marshaled into MATLAB doubles.
- *`output_marshaling_flags`* — Specifies options for how data is marshaled between MATLAB and Microsoft Excel.
  - `-replaceNaNWithZero` — Specifies that NaN in MATLAB is marshaled into a 0 in Microsoft Excel. If you do not specify this flag, NaN is marshaled into `#QNAN` in Visual Basic®.
  - `-convertNumericToDate` — Specifies that MATLAB numeric values are marshaled into Microsoft Excel dates. If you do not specify this flag, Microsoft Excel does not receive dates as output.

Examples

Input Arguments

`mfilename1,...,mfilenameN` — Files to be compiled

list of filenames

One, or more, files to be compiled, specified as a comma-separated list of filenames.

`options` — Options for customizing the output

-a | -b | -B | -C | -d | -f | -g | -G | -I | -K | -m | -M | -N | -o | -p | -R | -S | -T | -u | -v | -w | -W | -Y

Options for customizing the output, specified as a list of character vectors.

- `-a`

  Add files to the deployable archive using `-a path` to specify the files to be added. Multiple `-a` options are permitted.

  If a file name is specified with `-a`, the compiler looks for these files on the MATLAB path, so specifying the full path name is optional. These files are not passed to `mbuild`, so you can include files such as data files.

  If a folder name is specified with the `-a` option, the entire contents of that folder are added recursively to the deployable archive. For example

  ```
  mcc -m hello.m -a ./testdir
  ```

  specifies that all files in `testdir`, as well as all files in its subfolders, are added to the deployable archive. The folder subtree in `testdir` is preserved in the deployable archive.

  If the filename includes a wildcard pattern, only the files in the folder that match the pattern are added to the deployable archive and subfolders of the given path are not processed recursively. For example

  ```
  mcc -m hello.m -a ./testdir/*
  ```

  specifies that all files in `./testdir` are added to the deployable archive and subfolders under `./testdir` are not processed recursively.

  ```
  mcc -m hello.m -a ./testdir/*.m
  ```

  specifies that all files with the extension `.m` under `./testdir` are added to the deployable archive and subfolders of `./testdir` are not processed recursively.

  Note: `*` is the only supported wildcard.

When you add files to the archive using `-a` that do not appear on the MATLAB path at the time of compilation, a path entry is added to the application's run-time path so that they appear on the path when the deployed code executes.

When you include files, the absolute path for the DLL and header files changes. The files are placed in the `.\exe_mcr\` folder when the archive is expanded. The file is not placed in the local folder. This folder is created from the deployable archive the first time the application is executed. The `isdeployed` function is provided to help you accommodate this difference in deployed mode.

The `-a` switch also creates a `.auth` file for authorization purposes. It ensures that the executable looks for the DLL- and H-files in the `exe_mcr\exe` folder.

Caution If you use the `-a` flag to include a file that is not on the MATLAB path, the folder containing the file is added to the MATLAB dependency analysis path. As a result, other files from that folder might be included in the compiled application.

Note: If you use the `-a` flag to include custom Java classes, standalone applications work without any need to change the `classpath` as long as the Java class is not a member of a package. The same applies for JAR files. However, if the class being added is a member of a package, the MATLAB code needs to make an appropriate call to `javaaddpath` to update the `classpath` with the parent folder of the package.

- `-b`

  Generate a Visual Basic file (`.bas`) containing the Microsoft Excel Formula Function interface to the COM object generated by MATLAB Compiler. When imported into the workbook Visual Basic code, this code allows the MATLAB function to be seen as a cell formula function.

- `-B`

  Replace the file on the `mcc` command line with the contents of the specified file. Use

  ```
  -B filename[:<a1>,<a2>,...,<an>]
  ```

  The bundle `filename` should contain only `mcc` command-line options and corresponding arguments and/or other file names. The file might contain other `-`

`B` options. A bundle can include replacement parameters for compiler options that accept names and version numbers. See “Using Bundles to Build MATLAB Code”.

- `-C`

  Do not embed the deployable archive in binaries.

- `-d`

  Place output in a specified folder. Use

  ```
  -d outFolder
  ```

  to direct the generated files to *`outFolder`*.

- `-f`

  Override the default options file with the specified options file. Use

  ```
  -f filename
  ```

  to specify `filename` as the options file when calling `mbuild`. This option lets you use different ANSI compilers for different invocations of the compiler. This option is a direct pass-through to `mbuild`.

- `-g`, `-G`

  Include debugging symbol information for the C/C++ code generated by MATLAB Compiler SDK. It also causes `mbuild` to pass appropriate debugging flags to the system C/C++ compiler. The debug option lets you backtrace up to the point where you can identify if the failure occurred in the initialization of MATLAB Runtime, the function call, or the termination routine. This option does not let you debug your MATLAB files with a C/C++ debugger.

- `-I`

  Add a new folder path to the list of included folders. Each `-I` option adds a folder to the beginning of the list of paths to search. For example,

  ```
  -I <directory1> -I <directory2>
  ```

  sets up the search path so that `directory1` is searched first for MATLAB files, followed by `directory2`. This option is important for standalone compilation where the MATLAB path is not available.

If used in conjunction with the `-N` option, the `-I` option adds the folder to the compilation path in the same position where it appeared in the MATLAB path rather than at the head of the path.

- `-K`

  Direct `mcc` not to delete output files if the compilation ends prematurely, due to error.

  The default behavior of `mcc` is to dispose of any partial output if the command fails to execute successfully.

- `-m`

  Direct `mcc` to generate a standalone application.

- `-M`

  Define compile-time options. Use

  ```
  -M string
  ```

  to pass `string` directly to `mbuild`. This provides a useful mechanism for defining compile-time options, e.g., `-M "-Dmacro=value"`.

  Note: Multiple `-M` options do not accumulate; only the rightmost `-M` option is used.

- `-N`

  Passing `-N` clears the path of all folders except the following core folders (this list is subject to change over time):

  - *`matlabroot`*`\toolbox\matlab`
  - *`matlabroot`*`\toolbox\local`
  - *`matlabroot`*`\toolbox\compiler`

  Passing `-N` also retains all subfolders in this list that appear on the MATLAB path at compile time. Including `-N` on the command line lets you replace folders from the original path, while retaining the relative ordering of the included folders. All subfolders of the included folders that appear on the original path are also included. In addition, the `-N` option retains all folders that you included on the path that are not under *`matlabroot`*`\toolbox`.

When using the –N option, use the –I option to force inclusion of a folder, which is placed at the head of the compilation path. Use the –p option to conditionally include folders and their subfolders; if they are present in the MATLAB path, they appear in the compilation path in the same order.

- `-o`

  Specify the name of the final executable (standalone applications only). Use

  ```
  -o outputfile
  ```

  to name the final executable output of MATLAB Compiler. A suitable platform-dependent extension is added to the specified name (e.g., `.exe` for Windows standalone applications).

- `-p`

  Use in conjunction with the option `-N` to add specific folders and subfolders under *`matlabroot`*`\toolbox` to the compilation MATLAB path. The files are added in the same order in which they appear in the MATLAB path. Use the syntax

  ```
  -N -p directory
  ```

  where `directory` is the folder to be included. If `directory` is not an absolute path, it is assumed to be under the current working folder.

  - If a folder is included with `-p` that is on the original MATLAB path, the folder and all its subfolders that appear on the original path are added to the compilation path in the same order.
  - If a folder is included with `-p` that is not on the original MATLAB path, that folder is ignored. (You can use `-I` to force its inclusion.)

- `-R`

  Provides MATLAB Runtime options. The syntax is as follows:

  ```
  -R option
  ```

Option	Description	Target
`-logfile,`	Specify a log file name.	MATLAB Compiler MATLAB Compiler SDK

Option	Description	Target
`-nodispla`	Suppress the MATLAB `nodisplay` run-time warning.	MATLAB Compiler MATLAB Compiler SDK
`-nojvm`	Do not use the Java Virtual Machine (JVM).	MATLAB Compiler MATLAB Compiler SDK
`-startmsg`	Customizable user message displayed at initialization time.	MATLAB Compiler Standalone Applications
`-complete`	Customizable user message displayed when initialization is complete.	MATLAB Compiler Standalone Applications

Caution When running on Mac OS X, if you use `-nodisplay` as one of the options included in `mclInitializeApplication`, then the call to `mclInitializeApplication` must occur before calling `mclRunMain`.

- `-S`

The standard behavior for the MATLAB Runtime is that every instance of a class gets its own MATLAB Runtime context. The context includes a global MATLAB workspace for variables, such as the path and a base workspace for each function in the class. If multiple instances of a class are created, each instance gets an independent context. This ensures that changes made to the global, or base, workspace in one instance of the class does not affect other instances of the same class.

In a singleton MATLAB Runtime, all instances of a class share the context. If multiple instances of a class are created, they use the context created by the first instance. This saves startup time and some resources. However, any changes made to the global workspace or the base workspace by one instance impacts all class instances. For example, if `instance1` creates a global variable `A` in a singleton MATLAB Runtime, then `instance2` can use variable `A`.

Singleton MATLAB Runtime is only supported by the following products on these specific targets:

Target supported by Singleton MATLAB Runtime	Create a Singleton MATLAB Runtime by....
Excel add-in	Default behavior for target is singleton MATLAB Runtime. You do not need to perform other steps.
.NET assembly	Default behavior for target is singleton MATLAB Runtime. You do not need to perform other steps.
COM component	• Using the Library Compiler app, click **Settings** and add `-S` to the **Additional parameters passed to MCC** field. • Using `mcc`, pass the `-S` flag.
Java package	

- `-T`

  Specify the output target phase and type.

  Use the syntax `-T target` to define the output type.

Target	Description
`compile:exe`	Generate a C/C++ wrapper file and compile C/C++ files to an object form suitable for linking into a standalone application.
`compile:lib`	Generate a C/C++ wrapper file and compile C/C++ files to an object form suitable for linking into a shared library or DLL.
`link:exe`	Same as `compile:exe`, and also links object files into a standalone application.
`link:lib`	Same as `compile:lib`, and also links object files into a shared library or DLL.

- `-u`

  Register COM component for the current user only on the development machine. The argument applies only to the generic COM component and Microsoft Excel add-in targets.

- `-v`

  Display the compilation steps, including:

  - MATLAB Compiler version number
  - The source file names as they are processed
  - The names of the generated output files as they are created
  - The invocation of `mbuild`

  The `-v` option passes the `-v` option to `mbuild` and displays information about `mbuild`.

- `-w`

  Display warning messages. Use the syntax

  ```
  -w option [:<msg>]
  ```

  to control the display of warnings.

Syntax	Description
`-w list`	List all of the possible warning that `mcc` can generate.
`-w enable`	Enable complete warnings.
`-w disable[:<string>]`	Disable specific warnings associated with `<string>`. See "Warning Messages" for a list of the `<string>` values. Omit the optional `<string>` to apply the `disable` action to all warnings.
`-w enable[:<string>]`	Enable specific warnings associated with `<string>`. See "Warning Messages" for a list of the `<string>` values. Omit the optional `<string>` to apply the `enable` action to all warnings.
`-w error[:<string>]`	Treat specific warnings associated with `<string>` as an error. Omit the optional `<string>` to apply the `error` action to all warnings.
`-w off[:<string>] [<filename>]`	Turn warnings off for specific error messages defined by `<string>`. You can also narrow scope by

Syntax	Description
	specifying warnings be turned off when generated by specific <*filename*>s.
`-w on[:<string>] [<filename>]`	Turn warnings on for specific error messages defined by <*string*>. You can also narrow scope by specifying warnings be turned on when generated by specific <*filename*>s.

You can also turn warnings on or off in your MATLAB code.

For example, to turn warnings off for deployed applications (specified using `isdeployed`) in your `startup.m`, you write:

```
if isdeployed
    warning off
end
```

To turn warnings on for deployed applications, you write:

```
if isdeployed
    warning on
end
```

- `-W`

  Control the generation of function wrappers. Use the syntax

  `-W type`

  to control the generation of function wrappers for a collection of MATLAB files generated by the compiler. You provide a list of functions and the compiler generates the wrapper functions and any appropriate global variable definitions.

- `-Y` Use

  ```
  -Y license.lic
  ```

  to override the default license file with the specified argument.

Note: The `-Y` flag works only with the command-line mode.

```
>>!mcc -m foo.m -Y license.lic
```

Introduced before R2006a

Apps — Alphabetical List

Production Server Compiler

Test and Package MATLAB functions for deployment to MATLAB Production Server

Description

The **Production Server Compiler** app tests the integration of client code with MATLAB functions. It also packages MATLAB functions into archives for deployment to MATLAB Production Server.

Open the Production Server Compiler App

- MATLAB Toolstrip: On the **Apps** tab, under **Application Deployment**, click the app icon.
- MATLAB command prompt: Enter `productionServerCompiler`.

Examples

- "Create a Deployable Archive for MATLAB Production Server"
- "Build Excel Add-In and Deployable Archive"

Parameters

`type` — type of archive generated

Deployable Archive | Deployable Archive with Excel Integration

Type of archive to generate as a character array.

`exported functions` — functions to package

list of character arrays

Functions to package as a list of character arrays.

`archive information` — name of the archive

character array

Name of the archive as a character array.

`files required for your archive to run` — files that must be included with archive
list of files

Files that must be included with archive as a list of files.

`files packaged with the archive` — optional files installed with archive
list of files

Optional files installed with archive as a list of files.

Settings

`Additional parameters passed to MCC` — flags controlling the behavior of the compiler
character array

Flags controlling the behavior of the compiler as a character array.

`testing files` — folder where files for testing are stored
character array

Folder where files for testing are stored as a character array.

`end user files` — folder where files for building a custom installer are stored
character array

Folder where files for building a custom installer are stored are stored as a character array.

`packaged installers` — folder where generated installers are stored
character array

Folder where generated installers are stored as a character array.

Programmatic Use

```
productionServerCompiler
```

Introduced in R2013b