

**MATLAB® Compiler™**

User's Guide



**MATLAB®**

R2020a



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*MATLAB® Compiler™ User's Guide*

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## Revision History

September 1995	First printing	
March 1997	Second printing	
January 1998	Third printing	Revised for Version 1.2
January 1999	Fourth printing	Revised for Version 2.0 (Release 11)
September 2000	Fifth printing	Revised for Version 2.1 (Release 12)
October 2001	Online only	Revised for Version 2.3
July 2002	Sixth printing	Revised for Version 3.0 (Release 13)
June 2004	Online only	Revised for Version 4.0 (Release 14)
August 2004	Online only	Revised for Version 4.0.1 (Release 14+)
October 2004	Online only	Revised for Version 4.1 (Release 14SP1)
November 2004	Online only	Revised for Version 4.1.1 (Release 14SP1+)
March 2005	Online only	Revised for Version 4.2 (Release 14SP2)
September 2005	Online only	Revised for Version 4.3 (Release 14SP3)
March 2006	Online only	Revised for Version 4.4 (Release 2006a)
September 2006	Online only	Revised for Version 4.5 (Release 2006b)
March 2007	Online only	Revised for Version 4.6 (Release 2007a)
September 2007	Seventh printing	Revised for Version 4.7 (Release 2007b)
March 2008	Online only	Revised for Version 4.8 (Release 2008a)
October 2008	Online only	Revised for Version 4.9 (Release 2008b)
March 2009	Online only	Revised for Version 4.10 (Release 2009a)
September 2009	Online only	Revised for Version 4.11 (Release 2009b)
March 2010	Online only	Revised for Version 4.13 (Release 2010a)
September 2010	Online only	Revised for Version 4.14 (Release 2010b)
April 2011	Online only	Revised for Version 4.15 (Release 2011a)
September 2011	Online only	Revised for Version 4.16 (Release 2011b)
March 2012	Online only	Revised for Version 4.17 (Release 2012a)
September 2012	Online only	Revised for Version 4.18 (Release 2012b)
March 2013	Online only	Revised for Version 4.18.1 (Release 2013a)
September 2013	Online only	Revised for Version 5.0 (Release 2013b)
March 2014	Online only	Revised for Version 5.1 (Release 2014a)
October 2014	Online only	Revised for Version 5.2 (Release 2014b)
March 2015	Online only	Revised for Version 6.0 (Release 2015a)
September 2015	Online only	Revised for Version 6.1 (Release 2015b)
October 2015	Online only	Rereleased for Version 6.0.1 (Release 2015aSP1)
March 2016	Online only	Revised for Version 6.2 (Release 2016a)
September 2016	Online Only	Revised for Version 6.3 (Release 2016b)
March 2017	Online only	Revised for Version 6.4 (Release R2017a)
September 2017	Online only	Revised for Version 6.5 (Release R2017b)
March 2018	Online only	Revised for Version 6.6 (Release R2018a)
September 2018	Online only	Revised for Version 7.0 (Release R2018b)
March 2019	Online only	Revised for Version 7.0.1 (Release R2019a)
September 2019	Online only	Revised for Version 7.1 (Release R2019b)
March 2020	Online only	Revised for Version 8.0 (Release R2020a)



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# Getting Started

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- “Appropriate Tasks for MATLAB Compiler Products” on page 1-3
- “Create Standalone Application from MATLAB” on page 1-5

## **MATLAB Compiler Product Description**

### **Build standalone executables and web apps from MATLAB programs**

MATLAB Compiler enables you to share MATLAB programs as standalone applications and web apps. With MATLAB Compiler you can also package and deploy MATLAB programs as MapReduce and Spark™ big data applications and as Microsoft® Excel® add-ins. End users can run your applications royalty-free using MATLAB Runtime.

To provide browser-based access to your MATLAB web apps, you can host them using the development version of MATLAB Web App Server included with MATLAB Compiler. MATLAB programs can be packaged into software components for integration with other programming languages (with MATLAB Compiler SDK™). Large-scale deployment to enterprise systems is supported through MATLAB Production Server™.

## Appropriate Tasks for MATLAB Compiler Products

MATLAB Compiler generates standalone applications and Excel add-ins. MATLAB Compiler SDK generates C/C++ shared libraries, deployable archives for use with MATLAB Production Server, Java® packages, .NET assemblies, and COM components.

While MATLAB Compiler and MATLAB Compiler SDK let you run your MATLAB application outside the MATLAB environment, it is not appropriate for all external tasks you may want to perform. Some tasks require other products or MATLAB external interfaces. Use the following table to determine if MATLAB Compiler or MATLAB Compiler SDK is appropriate to your needs.

Task	MATLAB Compiler and MATLAB Compiler SDK	MATLAB Coder™	Simulink®	HDL Coder™	MATLAB External Interfaces
Package MATLAB applications for deployment to users who do not have MATLAB	■				
Package MATLAB applications for deployment to MATLAB Production Server	■				
Build non-MATLAB applications that include MATLAB functions	■				
Generate readable and portable C/C++ code from MATLAB code		■			
Generate MEX functions from MATLAB code for code verification and acceleration.		■			
Integrate MATLAB code into Simulink			■		

<b>Task</b>	<b>MATLAB Compiler and MATLAB Compiler SDK</b>	<b>MATLAB Coder™</b>	<b>Simulink®</b>	<b>HDL Coder™</b>	<b>MATLAB External Interfaces</b>
Generate hardware description language (HDL) from MATLAB code				■	
Integrate custom C code into MATLAB with MEX files					■
Call MATLAB from C and Fortran programs					■
Task	MATLAB Compiler and MATLAB Compiler SDK	MATLAB Coder	Simulink	HDL Coder	MATLAB External Interfaces

---

**Note** Components generated by MATLAB Compiler and MATLAB Compiler SDK cannot be used in the MATLAB environment.

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For information on MATLAB Coder, see “MATLAB Coder”.

For information on Simulink, see “Simulink”.

For information on HDL Coder, see “HDL Coder”.

For information on MATLAB external interfaces, see “Calling MATLAB from Other Languages” (MATLAB).

## Create Standalone Application from MATLAB

**Supported platform:** Windows®, Linux®, Mac

This example shows how to generate a standalone application from MATLAB. You package the prewritten function that prints a magic square to the command prompt of a computer. MATLAB Compiler produces an installer that installs both the standalone application and all the required dependencies on a target system. The target system does not require a licensed copy of MATLAB.

### Create Function in MATLAB

In MATLAB, examine the MATLAB code that you want deployed as a standalone application. For this example, open `magicsquare.m` located in `matlabroot\extern\examples\compiler`.

```
function m = magicsquare(n)

if ischar(n)
    n=str2double(n);
end
m = magic(n)
```

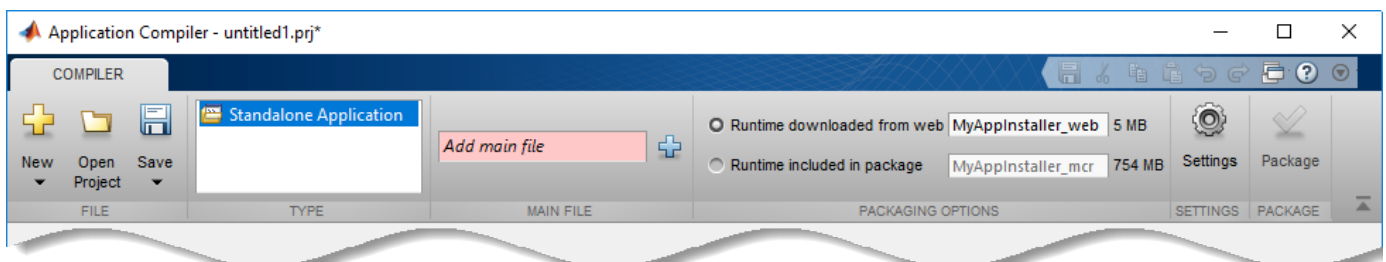
At the MATLAB command prompt, enter `magicsquare(5)`.

The output is:


```
17    24     1     8    15
23     5     7    14    16
 4     6    13    20    22
10    12    19    21     3
11    18    25     2     9
```

### Create Standalone Application Using Application Compiler App

- 1 On the **MATLAB Apps** tab, on the far right of the **Apps** section, click the arrow. In **Application Deployment**, click **Application Compiler**.



Alternately, you can open the **Application Compiler** app by entering `applicationCompiler` at the MATLAB prompt.

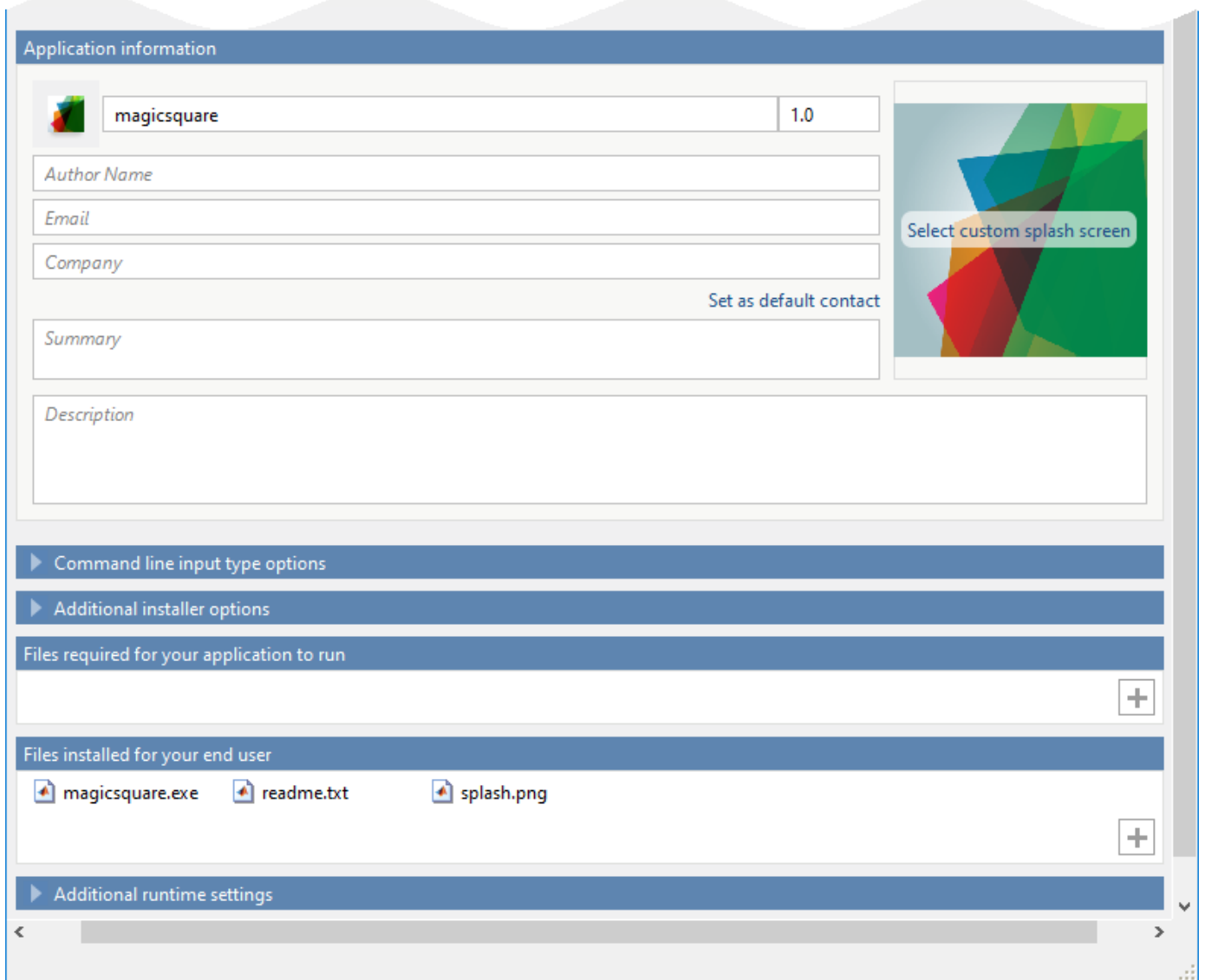
- 2 In the **MATLAB Compiler** project window, specify the main file of the MATLAB application that you want to deploy.
  - a In the **Main File** section of the toolstrip, click .
  - b In the **Add Files** window, browse to `matlabroot\extern\examples\compiler`, and select `magicsquare.m`. Click **Open**.

The function `magicsquare.m` is added to the list of main files.

- 3 Decide whether to include the MATLAB Runtime installer in the generated application by selecting one of the two options in the **Packaging Options** section:

- **Runtime downloaded from web** — Generates an installer that downloads the MATLAB Runtime and installs it along with the deployed MATLAB application.
- **Runtime included in package** — Generates an installer that includes the MATLAB Runtime installer.

- 4 Customize the packaged application and its appearance:



- **Application information** — Editable information about the deployed application. You can also customize the standalone applications appearance by changing the application icon and splash screen. The generated installer uses this information to populate the installed application metadata. See “Customize the Installer” on page 4-2.



- **Command line input type options** — Selection of input data types for the standalone application. For more information, see “Determine Data Type of Command-Line Input (For Packaging Standalone Applications Only)” on page 4-4.
- **Additional installer options** — Edit the default installation path for the generated installer and selecting custom logo. See “Change the Installation Path” on page 4-3 .
- **Files required for your application to run** — Additional files required by the generated application to run. These files are included in the generated application installer. See “Manage Required Files in Compiler Project” on page 4-4.
- **Files installed for your end user** — Files that are installed with your application. These files include:
  - Generated `readme.txt`
  - Generated executable for the target platform

See “Specify Files to Install with Application” on page 4-6.

- **Additional runtime settings** — Platform-specific options for controlling the generated executable. See “Additional Runtime Settings” on page 4-7.
- 5 To generate the packaged application, click **Package**.

In the Save Project dialog box, specify the location to save the project.

- 6 In the **Package** dialog box, verify that **Open output folder when process completes** is selected.

When the packaging process is complete, examine the generated output.

- Three folders are generated in the target folder location: `for_redistribution`, `for_redistribution_files_only`, and `for_testing`.

For further information about the files generated in these folders, see “Files Generated After Packaging MATLAB Functions” on page 3-14.

- `PackagingLog.txt` — Log file generated by MATLAB Compiler.

## Install and Run MATLAB Generated Standalone Application

- 1 To install the standalone application, in the `for_redistribution` folder, double-click the `MyAppInstaller_web` executable.

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**Note** The file extension varies depending on the platform on which the installer was generated.

- 2 If you want to connect to the Internet using a proxy server, click **Connection Settings**. Enter the proxy server settings in the provided window. Click **OK**.

To complete installation, follow the instructions on the user interface.

---

**Note** On Linux and Mac OS X, you do not have the option of adding a desktop shortcut.

- 3 To run your standalone application:

- a Open a terminal window.
- b Navigate to the folder into which you installed the application.

If you accepted the default settings, you can find the folder in one of the following locations:

Windows	C:\Program Files\magicsquare
Mac OS X	/Applications/magicsquare
Linux	/usr/magicsquare

- c** Run the application using one of the following commands:

Windows	application\magicsquare 5
Mac OS X	You must set the DYLD_LIBRARY_PATH environment variable in the command window for the standalone application to work as follows:  <pre>\$export DYLD_LIBRARY_PATH = MCR_ROOT/v92/runtime/ maci64:MCR_ROOT/v92/sys/os/ maci64:MCR_ROOT/v92/bin/maci64</pre> Now run the application: ./magicsquare.app/Contents/ MacOS/magicsquare 5
Linux	./magicsquare 5

A 5-by-5 magic square is displayed in the console:

```
17  24  1  8  15  
23  5  7  14 16  
4  6  13 20 22  
10 12 19 21 3  
11 18 25 2 9
```

## See Also

`applicationCompiler` | `deploytool` | `mcc`

## More About

- Application Compiler

# **MATLAB Runtime Additional Info**

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## Differences Between MATLAB and MATLAB Runtime

The MATLAB Runtime differs from MATLAB in several important ways:

- In the MATLAB Runtime, MATLAB files are encrypted and immutable.
- MATLAB has a desktop graphical interface. The MATLAB Runtime has all the MATLAB functionality without the graphical interface.
- The MATLAB Runtime is version-specific. You must run your applications with the version of the MATLAB Runtime associated with the version of MATLAB Compiler SDK with which it was created. For example, if you compiled an application using version 6.3 (R2016b) of MATLAB Compiler, users who do not have MATLAB installed must have version 9.1 of the MATLAB Runtime installed. Use `mcrversion` to return the version number of the MATLAB Runtime.
- The MATLAB paths in a MATLAB Runtime instance are fixed and cannot be changed. To change them, you must first customize them within MATLAB.

## Performance Considerations and the MATLAB Runtime

MATLAB Compiler SDK was designed to work with a large range of applications that use the MATLAB programming language. Because of this, run-time libraries are large.

Since the MATLAB Runtime technology provides full support for the MATLAB language, including the Java programming language, starting a compiled application takes approximately the same amount of time as starting MATLAB. The amount of resources consumed by the MATLAB Runtime is necessary in order to retain the power and functionality of a full version of MATLAB.

Calls into the MATLAB Runtime are serialized so calls into the MATLAB Runtime are threadsafe. This can impact performance.



# Deploying Standalone Applications

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## Create Standalone Application from Command Line

You can package standalone applications at the MATLAB prompt or your system prompt using either of these commands.

- `deploytool` invokes the Application Compiler app to execute a saved compiler project.
- `mcc` invokes the MATLAB Compiler to create a deployable application at the command prompt.

### Execute Compiler Projects with `deploytool`

The `deploytool` command has two flags that invoke one of the compiler apps to package an already existing project without opening a window.

- `-build project_name` — Invoke the correct compiler app to build the project but 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.

### Create Standalone Application with `mcc`

The `mcc` command invokes MATLAB Compiler to create a deployable application at the command prompt and provides fine-level control while packaging the application. It does not package the results in an installer.

To invoke the compiler to generate an application, use `mcc` with either the `-m` or the `-e` flag. Both flags package a MATLAB function and generate a standalone executable. The `-m` flag creates a standard executable that runs at a system command line. On Windows, the `-e` flag generates an executable that does not open a command prompt when double-clicked from Windows file explorer.

Use the following `mcc` options to package standalone applications.

Option	Description
<code>-W main -T link:exe</code>	Generate a standard executable equivalent to using <code>-m</code> .
<code>-W WinMain -T link:exe</code>	Generate an executable that does not open a command prompt when double-clicked from Windows file explorer. It is equivalent to using <code>-e</code> .
<code>-a filePath</code>	Add any files on the path to the generated binaries.
<code>-d outFolder</code>	Specify the folder for the packaged applications.
<code>-o fileName</code>	Specify the name of the generated executable file.



## Run MATLAB Generated Standalone Application

To run your standalone application:

- 1 Open a terminal window.
- 2 Navigate to the folder into which you packaged your standalone application.
- 3 Run the application using one of the following commands:

Windows	<code>magicsquare 5</code>
Mac OS X	<p>You must set the <code>DYLD_LIBRARY_PATH</code> environment variable in the command window for the standalone application to work as follows:</p> <pre>\$export DYLD_LIBRARY_PATH = MCR_ROOT/v92/runtime/ maci64:MCR_ROOT/v92/sys/os/ maci64:MCR_ROOT/v92/bin/maci64</pre> <p>Now run the application:</p> <pre>./magicsquare.app/Contents/MacOS/ magicsquare 5</pre>
Linux	<code>./magicsquare 5</code>

A 5-by-5 magic square is displayed in the console:

```
17  24   1   8  15
23   5   7  14  16
 4   6  13  20  22
10  12  19  21   3
11  18  25   2   9
```

## Differences Between Compiler Apps and Command Line

You perform the same functions using either the compiler apps or the `mcc` command-line interface. The interactive menus and dialog boxes used in the compiler apps build `mcc` commands that are customized to your specification. As such, your MATLAB code is processed the same way as if you were packaging it using `mcc`.

If you know the commands for the type of application you want to deploy and do not require an installer, it is faster to execute `mcc` than go through the compiler app workflow.

Compiler app advantages include:

- You can perform related deployment tasks with a single intuitive interface.
- You can maintain related information in a convenient project file.
- Your project state persists between sessions.
- You can load previously stored compiler projects from a prepopulated menu.
- You can package applications for distribution.

**See Also**

deploytool | mcc

**More About**

- “Create Standalone Application from MATLAB” on page 1-5

## Standalone Applications and Arguments

### In this section...

“Overview” on page 3-5

“Pass File Names, Numbers or Letters, Matrices, and MATLAB Variables” on page 3-5

“Run Standalone Applications that Use Arguments” on page 3-5

### Overview

You can create a standalone to run the application without passing or retrieving any arguments to or from it.

However, arguments can be passed to standalone applications created using MATLAB Compiler in the same way that input arguments are passed to any console-based application.

The following are example commands used to execute an application called `filename` from Windows or Linux command prompt with different types of input arguments.

### Pass File Names, Numbers or Letters, Matrices, and MATLAB Variables

To Pass....	Use This Syntax....	Notes
A file named <code>helpfile</code>	<code>filename helpfile</code>	
Numbers or letters	<code>filename 1 2 3 a b c</code>	Do <i>not</i> use commas or other separators between the numbers and letters you pass.
Matrices as input	<code>filename "[1 2 3]" "[4 5 6]"</code>	Place double quotes around input arguments to denote a blank space.
MATLAB variables	<pre>for k=1:10 cmd = ['filename ',num2str(k)]; system(cmd); end</pre>	To pass a MATLAB variable to a program as input, you must first convert it to a character vector.

### Run Standalone Applications that Use Arguments

You call a standalone application that uses arguments from MATLAB with any of the following commands:

- `SYSTEM`
- `DOS`
- `UNIX`
- `!`

To pass the contents of a MATLAB variable to the program as an input, the variable must first be converted to a character vector. For example:

### Using SYSTEM, DOS, or UNIX

Specify the entire command to run the application as a character vector (including input arguments). For example, passing the numbers and letters 1 2 3 a b c could be executed using the SYSTEM command, as follows:

```
system('filename 1 2 3 a b c')
```

### Using the ! (Bang) Operator

You can also use the ! (bang) operator, from within MATLAB, as follows:

```
!filename 1 2 3 a b c
```

When you use the ! (bang) operator, the remainder of the input line is interpreted as the SYSTEM command, so it is not possible to use MATLAB variables.

### Using a Windows System

To run a standalone application by double-clicking it, you create a batch file that calls the standalone application with the specified input arguments. For example:

```
rem This is main.bat file which calls  
rem filename.exe with input parameters  
  
filename "[1 2 3]" "[4 5 6]"  
@echo off  
pause
```

The last two lines of code in `main.bat` are added so that the window displaying your output stays open until you press a key.

Once you save this file, you run your code with the arguments specified above by double clicking the icon for `main.bat`.

### Using a MATLAB File You Plan to Deploy

When running MATLAB files that use arguments that you also plan to deploy with MATLAB Compiler, keep the following in mind:

- The input arguments you pass to your executable from a system prompt are received as character vector input. Thus, if you expect the data in a different format (for example, double), you must first convert the character vector input to the required format in your MATLAB code. For example, you can use `STR2NUM` to convert the character vector input to numerical data.
- You cannot return values from your standalone application to the user. The only way to return values from compiled code is to either display it on the screen or store it in a file.

In order to have data displayed back to the screen, do one of the following:

- Unsuppress the commands that yield your return data. Do not use semicolons to unsuppress.
- Use the `DISP` command to display the variable value, then redirect the outputs to other applications using redirects (the `>` operator) or pipes (`|`) on non-Windows systems.

### Taking Input Arguments and Displaying to a Screen Using a MATLAB File

Here are two ways to use a MATLAB file to take input arguments and display data to the screen:

**Method 1**

```
function [x,y]=foo(z);  
  
if ischar(z)  
z=str2num(z);  
else  
z=z;  
end  
x=2*z  
y=z^2;  
disp(y)
```

**Method 2**

```
function [x,y]=foo(z);  
  
if isdeployed  
z=str2num(z);  
end  
x=2*z  
y=z^2;  
disp(y)
```

## Use Parallel Computing Toolbox in Deployed Applications

### In this section...

“Pass Parallel Computing Toolbox Profile at Run Time” on page 3-8

“Embed Parallel Computing Toolbox Profile” on page 3-9

There are three ways to pass a cluster profile to a standalone application that uses the Parallel Computing Toolbox:

- 1 Save the cluster profile to your MATLAB preferences.

The cluster profile will be automatically bundled with the generated application and available to the Parallel Computing Toolbox code.

- 2 Pass the cluster profile location to the application at run time.

This option is useful if your application is run against different clusters.

- 3 Embed the cluster profile in the application.

### Pass Parallel Computing Toolbox Profile at Run Time

You can deploy standalone application in a cluster environment using the Parallel Computing Toolbox by passing the cluster profile to the compiled application at run time.

To deploy a standalone application written with Parallel Computing Toolbox:

- 1 In the Home tab, in the Environment section, select **Parallel > Manage Cluster Profiles**.
- 2 In the **Cluster Profile Manager** dialog, select a profile, and in the **Manage** section, click **Export**.
- 3 package the application.

---

**Note** If you are using the GPU feature of Parallel Computing Toolbox, you need to add the PTX and CU files.

---

- 4 Write a shell script that calls the application using the `-mcruserdata ParallelProfile:profile` flag.

```
myApp -mcruserdata ParallelProfile:C:\myprofile.settings
```

Use the full path name for the cluster profile file to specify *profile*.

- 5 Distribute the following files to application users:

- Generated installer
- Cluster profile
- Script that starts the application using the cluster profile

Users of the application must have access to the cluster specified in the profile.

---

**Note** As of R2012a, Parallel Configurations and MAT files have been replaced with Parallel Profiles. For more information, see the release notes for the Deployment products and Parallel Computing Toolbox.

To use existing MAT files and ensure backward compatibility with this change, issue a command such as the following, in the above example:

```
pct_Compiled.exe 200 -mcruserdata
    ParallelProfile:C:\work9b\pctdeploytool\pct_Compiled\distrib\myconfig.mat
```

If you continue to use MAT files, remember to specify the full path to the MAT file.

---

## Embed Parallel Computing Toolbox Profile

You can deploy standalone applications in a cluster environment using Parallel Computing Toolbox by including the cluster profile with the compiled application.

You can use the default configuration from settings. The steps are similar to using a standard compiled application with the following additional steps.

To deploy a standalone application written with Parallel Computing Toolbox:

- 1 Write a MATLAB function that uses `setmcruserdata` to load the cluster profile and pass it to the MATLAB Runtime.

```
function run_parallel_funct
setmcruserdata('ParallelProfile', 'profile')
a = parallel_funct
end
```

- 2 In the Home tab, in the **Environment** section, select **Parallel > Manage Cluster Profiles**.
- 3 In the **Cluster Profile Manager** dialog, select a profile, and in the **Manage** section, click **Export**.

The saved cluster profile should match the *profile* value in `setmcruserdata`.

- 4 Package the application.
  - a Use the `run_parallel_funct` as the main file for the application.
  - b In the **Files required for your application to run** field of the Application Compiler app, include the cluster profile and the MATLAB function for `parallel_funct`.

If you are using the GPU feature of Parallel Computing Toolbox, you need to manually add the PTX and CU files.

- 5 Distribute the generated installer to application users.

Users of the application must have access to the cluster specified in the profile.

## Integrate Application with Mac OS X Finder

In this section...
“Overview” on page 3-10
“Installing the Mac Application Launcher Preference Pane” on page 3-10
“Configuring the Installation Area” on page 3-10
“Running the Application” on page 3-12

### Overview

Mac graphical applications, opened through the Mac OS X finder utility, require additional configuration if MATLAB software or the MATLAB Runtime are not installed in default locations.

### Installing the Mac Application Launcher Preference Pane

Install the Mac Application Launcher preference pane, which gives you the ability to specify your installation area.

- 1 In the Mac OS X Finder, navigate to *install\_area/toolbox/compiler/maci64*.
- 2 Double-click **MW\_App\_Launch.prefPane**.

---

**Note** The Mac Application Launcher manages only *user* preference settings. If you copy the preferences defined in the launcher to the Mac System Preferences area, the preferences are still manipulated in the User Preferences area.

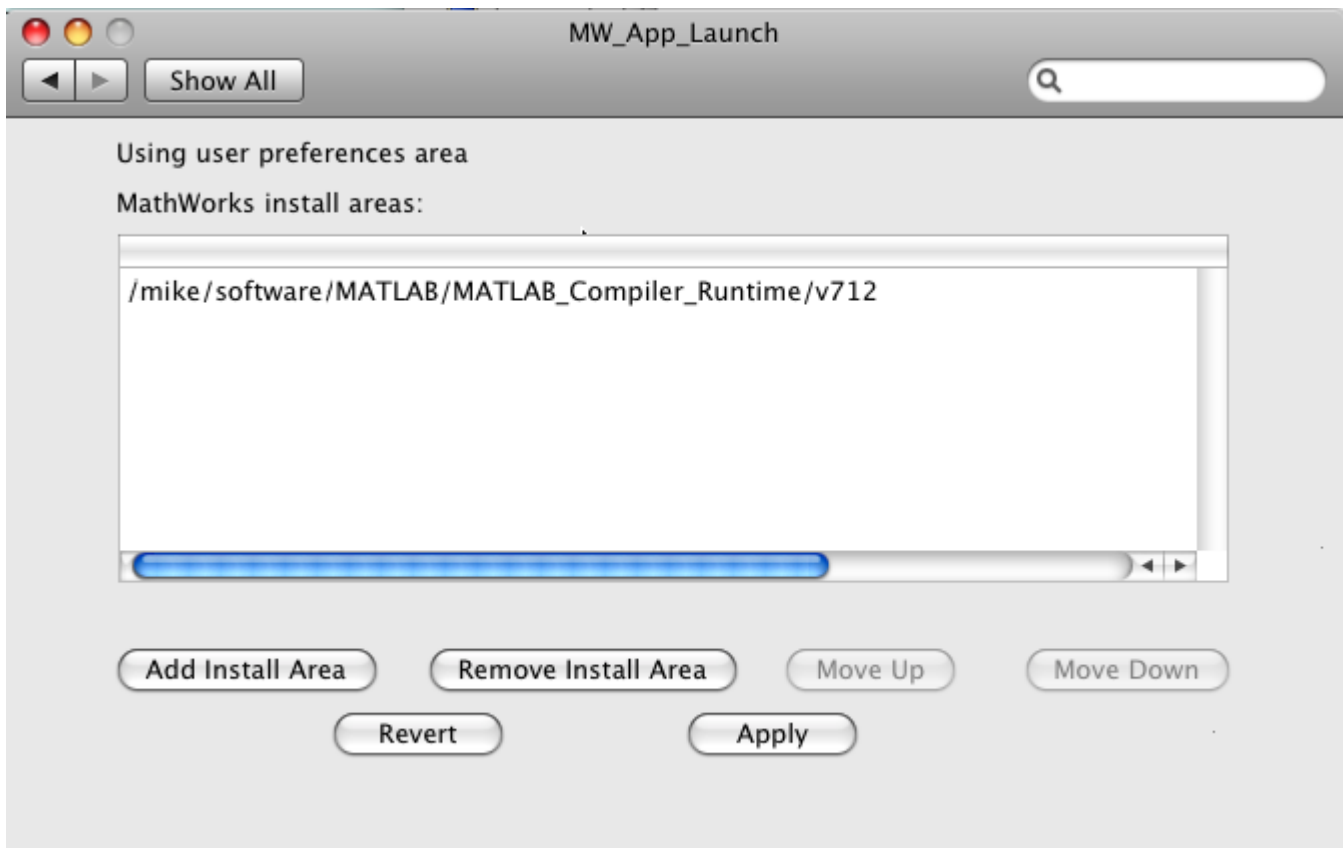
---

### Configuring the Installation Area

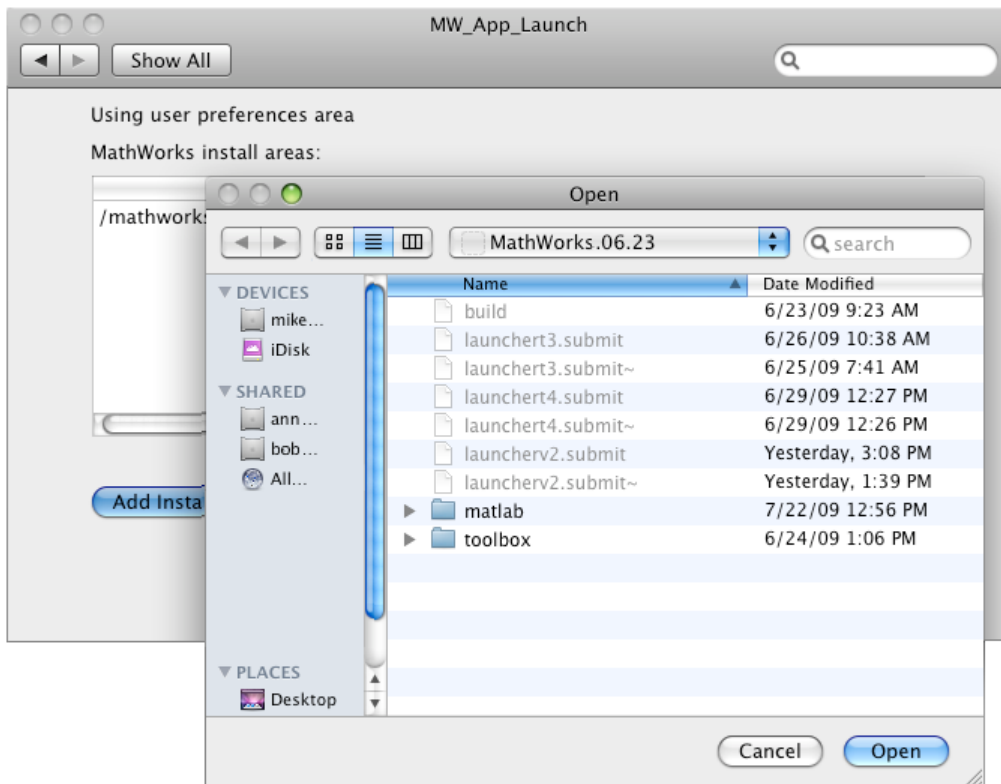
After you install the preference pane, you configure the installation area.

- 1 Open the preference pane by clicking the apple logo in the upper left corner of the desktop.
- 2 Click **System Preferences**. The **MW\_App\_Launch** preference pane appears in the **Other** area.





- 3 Define an installation area on your system by clicking **Add Install Area**.
- 4 Define the default installation path by browsing to it.
- 5 Click **Open**.



#### Modifying Your Installation Area

Occasionally, you remove an installation area, define additional areas, or change the order of installation area precedence.

You can use the following options in MathWorks® Application Launcher to modify your installation area:

- **Add Install Area** — Define the path on your system where your applications install by default.
- **Remove Install Area** — Remove a previously defined installation area.
- **Move Up** — After selecting an installation area, click to move the defined path up the list. Binaries defined in installation areas at the top of the list have precedence over all succeeding entries.
- **Move Down** — After selecting an installation area, click to move the defined path down the list. Binaries defined in installation areas at the top of the list have precedence over all succeeding entries.
- **Apply** — Save changes and exit MathWorks Application Launcher.
- **Revert** — Exit MathWorks Application Launcher without saving any changes.

#### Running the Application

When you create a Mac application, a Mac bundle is created. If the application does not require standard input and output, open the application by clicking the bundle in the Mac OS X Finder utility.

The location of the bundle is determined by whether you use `mcc` or `applicationCompiler` to build the application:

- If you use `applicationCompiler`, the application bundle is placed in the `for_redistribution` folder of the packaged application.
- If you use `mcc`, the application bundle is placed in the current working folder or in the output folder, as specified by the `mcc -d` switch.

### **See Also**

`applicationCompiler` | `mcc`

### **More About**

- “Create Standalone Application from MATLAB” on page 1-5

## Files Generated After Packaging MATLAB Functions

When the packaging process is complete, three folders are generated in the target folder location: `for_redistribution`, `for_redistribution_files_only`, and `for_testing`.

### for\_redistribution Folder

Distribute the `for_redistribution` folder to users who do not have MATLAB installed on their machines.

The folder contains the file `MyAppInstaller_web.exe` that installs the application and the MATLAB Runtime (if it is included in the application at the time of packaging). It installs all the files that enable use of the packaged application on the target platform with the target language in the target folder.

### for\_redistribution\_files\_only Folder

Distribute the `for_redistribution_files_only` folder to users who do not have MATLAB installed on their machines. This folder contains specific files that enable use of the packaged application on the target platform with the target language.

#### Standalone Applications

File	Description
<code>filename.exe</code>	Standalone executable file.
<code>readme.txt</code>	Text file containing packaging information.
<code>splash.png</code>	When the executable starts, the file is read from the same folder where the executable is located, and the splash screen is displayed.

#### Excel Add-Ins

File	Description
<code>_install.bat</code>	The file that registers the generated <code>dll</code> file.
<code>filename.bas</code>	VBA module file that can be imported into a VBA project.
<code>filename.xla</code>	Excel add-in that can be added directly to Excel. You do not need both <code>.bas</code> file and <code>.xla</code> file, one of them is sufficient.
<code>filename_2_0.dll</code>	The generated <code>dll</code> that needs to be registered using <code>mwregsvr.exe</code> or <code>regsvr32.exe</code> .
<code>readme.txt</code>	Text file containing packaging information.

### for\_testing Folder

Use the files in this folder to test you application. The folder contains all the intermediate and final artifacts such as binaries, JAR files, header files, and source files for a specific target. The final artifacts created during the packaging process are the same files as described in

“for\_redistribution\_files\_only Folder” on page 3-14. For further information on how to test your packaged applications, see the following topics:

Target	Link
Standalone Application	“Install and Run MATLAB Generated Standalone Application” on page 1-7
Excel Add-In	“Execute Functions and Create Macros”

The intermediate artifacts generated are a result of packaging of the MATLAB files. They are not significant to the user.

This folder also contains two text files. `mccExcludedFiles.txt` lists the files excluded from packaged application, and `requiredMCRProducts.txt`, contains product IDs of products required by MATLAB Runtime to run the application.

## See Also

`deploytool` | `mcc`

## More About

- “Create Standalone Application from MATLAB” on page 1-5
- “Create Excel Add-In from MATLAB”



# Customizing a Compiler Project

---

- “Customize an Application” on page 4-2
- “Manage Support Packages” on page 4-9

## Customize an Application

You can customize an application in several ways: customize the installer, manage files in the project, or add a custom installer path using the **Application Compiler** app or the **Library Compiler** app.

### Customize the Installer

#### Change Application Icon

To change the default icon, click the graphic to the left of the **Library name** or **Application name** field to preview the icon.



Click **Select icon**, and locate the graphic file to use as the application icon. Select the **Use mask** option to fill any blank spaces around the icon with white or the **Use border** option to add a border around the icon.

To return to the main window, click **Save and Use**.

#### Add Library or Application Information

You can provide further information about your application as follows:

- **Library/Application Name:** The name of the installed MATLAB artifacts. For example, if the name is `foo`, the installed executable is `foo.exe`, and the Windows start menu entry is **foo**. The folder created for the application is `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:** Name of the developer.
- **Support email address:** Email address to use for contact information.
- **Company name:** 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:** Brief summary describing the application.
- **Description:** Detailed explanation about the application.

All information is optional and, unless otherwise stated, is only displayed on the first page of the installer. On Windows systems, this information is also displayed in the Windows **Add/Remove Programs** control panel.



Library information





### Change the Splash Screen

The installer splash screen displays after the installer has 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**. When the file explorer opens, locate and select a new image.

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

### Change the Installation Path

This table lists the default path the installer uses when installing the packaged binaries onto a target system.

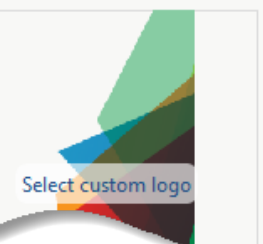
Windows	C:\Program Files\ <i>companyName</i> \ <i>appName</i>
Mac OS X	/Applications/ <i>companyName</i> / <i>appName</i>
Linux	/usr/ <i>companyName</i> / <i>appName</i>

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

Additional installer options

Default installation folder:

Installation notes



A text field specifying the path appended to the root folder is your installation folder. You can pick the root folder for the application installation folder. This table lists the optional custom root folders for each platform:

Windows	C:\Users\ <i>userName</i> \AppData
Linux	/usr/local

### Change the Logo

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

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

### Edit the Installation Notes

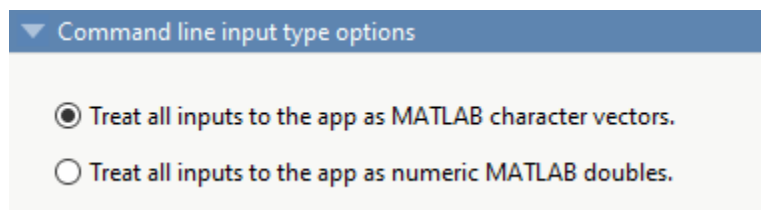
Installation notes are displayed once the installer has successfully installed the packaged files on the target system. You can provide useful information concerning any additional setup that is required to use the installed binaries and instructions for how to run the application.

## Determine Data Type of Command-Line Input (For Packaging Standalone Applications Only)

When an executable standalone application is run in the command prompt, the default input type is char. You can keep this default, or choose to interpret all inputs as numeric MATLAB doubles.

To pass inputs to the standalone application as MATLAB character vectors, select **Treat all inputs to the app as MATLAB character vectors**. In this case, you must include code to convert char to a numeric MATLAB type in the MATLAB function to be deployed as a standalone application.

To pass inputs to the standalone application as numeric MATLAB variables, select **Treat all inputs to the app as numeric MATLAB doubles**. option in the Application Compiler App. Thus, you do not need to include code to convert char to a numeric MATLAB type. Non numeric inputs to the application may result in an error.



## Manage Required Files in Compiler Project

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

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

To add files, click the plus button in the field, and select the file from the file explorer. To remove files, select the files, and press the **Delete** key.

---

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

---

### Using mcc

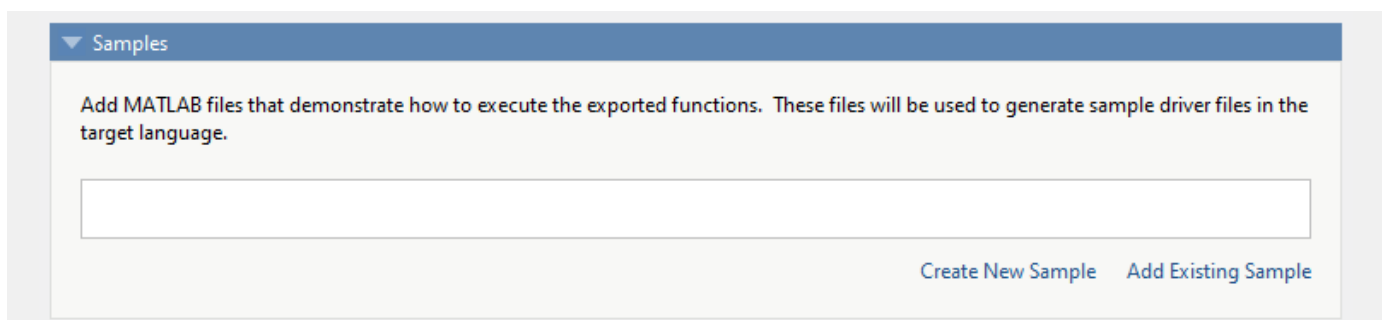
If you are using `mcc` to package your MATLAB code, the compiler does not display a list of required files before running. Instead, it packages all the required files that are discovered by the dependency analysis function and adds them to the generated binary file.

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 the files in `foo` and its subfolders to the list of required files.

## Sample Driver File Creation

The following target types support sample driver file creation in MATLAB Compiler SDK:

- C++ shared library
- Java package
- .NET assembly
- Python® package



The sample driver file creation feature in **Library Compiler** uses MATLAB code to generate sample driver files in the target language. The sample driver files are used to implement the generated shared libraries into an application in the target language. In the app, click **Create New Sample** to automatically generate a new MATLAB script, or click **Add Existing Sample** to upload a MATLAB script that you have already written. After you package your functions, a sample driver file in the target language is generated from your MATLAB script and is saved in `for_redistribution_files_only\samples`. Sample driver files are also included in the installer in `for_redistribution`.

To automatically generate a new MATLAB file, click **Create New Sample**. This opens up a MATLAB file for you to edit. The sample file serves as a starting point, and you can edit it as necessary based on the behavior of your exported functions. The sample MATLAB files must follow these guidelines:

- The sample file code must use only exported functions.
- Each exported function must be in a separate sample file.
- Each call to the same exported function must be a separate sample file.
- The output of the exported function must be an n-dimensional numeric, char, logical, struct, or cell array.
- Data must be saved as a local variable and then passed to the exported function in the sample file code.
- Sample file code should not require user interaction.

Additional considerations specific to the target language are as follows:

- C++ `mwArray` API — `varargin` and `varargout` are not supported.
- .NET — Type-safe API is not supported.
- Python — Cell arrays and char arrays must be of size 1xN and struct arrays must be scalar. There are no restrictions on numeric or logical arrays, other than that they must be rectangular, as in MATLAB.

To upload a MATLAB file that you have already written, click **Add Existing Sample**. The MATLAB code should demonstrate how to execute the exported functions. The required MATLAB code can be only a few lines:

```
input1 = [1 4 7; 2 5 8; 3 6 9];  
input2 = [1 4 7; 2 5 8; 3 6 9];  
addoutput = addmatrix(input1,input2);
```


This code must also follow all the same guidelines outlined for the **Create New Sample** option.

You can also choose not to include a sample driver file at all during the packaging step. If you create your own driver code in the target language, you can later copy and paste it into the appropriate directory once the MATLAB functions are packaged.

## Specify Files to Install with Application

The compiler packages files to install along with the ones it generates. By default, the installer includes a readme file with instructions on installing the MATLAB Runtime 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, click , and select the file from the file explorer.

JAR files are added to the application class path as if you had called `javaaddpath`.

---

**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 saved in the application folder.

## Additional Runtime Settings

Type of Packaged Application	Description	Additional Runtime Settings Options
Standalone Applications	<ul style="list-style-type: none"> <li>• <b>Do not display the Windows Command Shell (console) for execution</b> — If you select this option on a Windows platform, when you double-click the application from the file explorer, the application window opens without a command prompt.</li> <li>• <b>Create log file</b> — Generate a MATLAB log file for the application. The packaged application can't create a log file if installed in the C : folder on Windows because the application does not have write permission in that folder.</li> </ul>	<div data-bbox="867 499 1479 548" style="background-color: #4a7ebb; color: white; padding: 2px;">             ▼ Additional runtime settings         </div> <div data-bbox="922 598 1479 632" style="margin-left: 20px;"> <input checked="" type="checkbox"/> Do not display the Windows Command Shell (console) for execution         </div> <div data-bbox="922 661 1479 695" style="margin-left: 20px;"> <input type="checkbox"/> Create log file         </div>

Type of Packaged Application	Description	Additional Runtime Settings Options
Excel Add-Ins	<ul style="list-style-type: none"> <li>• <b>Register the component for the current user (Recommended for non-admin users)</b> — This option enables registering the component for the current user account. It is provided for users without admin rights.</li> <li>• <b>Create log file</b> — Generate a MATLAB log file for the application. The packaged application can't create a log file if installed in the C : folder on Windows because the application does not have write permission in that folder.</li> </ul>	<div style="background-color: #4a7ebb; color: white; padding: 2px;">             ▼ Additional runtime settings         </div> <ul style="list-style-type: none"> <li><input type="checkbox"/> Register the component for the current user (Recommended for non-admin users)</li> <li><input type="checkbox"/> Create log file</li> </ul>

**See Also**

applicationCompiler | libraryCompiler

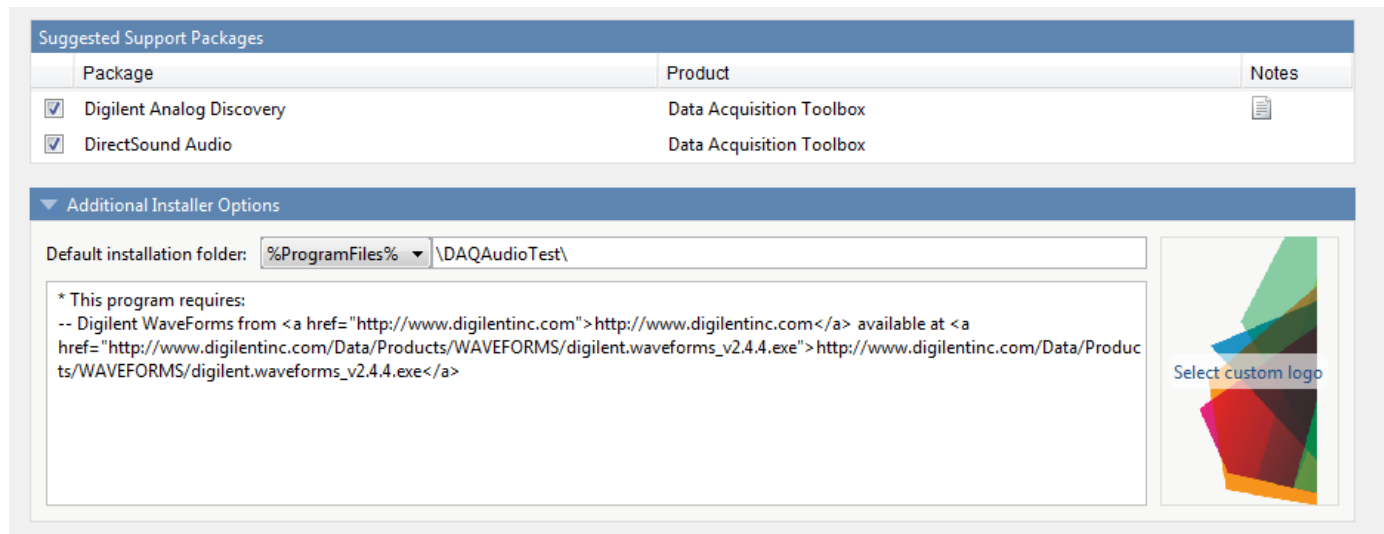
**More About**

- “Create Standalone Application from MATLAB” on page 1-5
- “Create Excel Add-In from MATLAB”
- “Generate a C++ mxArray API Shared Library and Build a C++ Application” (MATLAB Compiler SDK)
- “Generate a C++ MATLAB Data API Shared Library and Build a C++ Application” (MATLAB Compiler SDK)

## 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, use the `-a` flag with `mcc` command when packaging your MATLAB code to specify supporting files in the

support package folder. For example, if your function uses the OS Generic Video Interface support package, run the following command:

```
mcc -m -v test.m -a C:\MATLAB\SupportPackages\R2016b\toolbox\daq\supportpackages\daqaudio -a 'C:
```

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.



# MATLAB Code Deployment

---

- “How Does MATLAB Deploy Functions?” on page 5-2
- “Dependency Analysis” on page 5-3
- “MEX-Files, DLLs, or Shared Libraries” on page 5-4
- “Deployable Archive” on page 5-5
- “Write Deployable MATLAB Code” on page 5-8
- “Calling Shared Libraries in Deployed Applications” on page 5-11
- “MATLAB Data Files in Compiled Applications” on page 5-12

## How Does MATLAB Deploy Functions?

To deploy MATLAB functions, the compiler performs these tasks:

- 1** Analyzes files for dependencies using a dependency analysis function. Dependencies affect deployability and originate from functions called by the file. Deployability is affected by:
  - File type — MATLAB, Java, MEX, and so on.
  - File location — MATLAB, MATLAB toolbox, user code, and so on.

For more information about how the compiler does dependency analysis, see “Dependency Analysis” on page 5-3.

- 2** Validates MEX-files. In particular, `mexFunction` entry points are verified.

For more details about MEX-file processing, see “MEX-Files, DLLs, or Shared Libraries” on page 5-4.

- 3** Creates a deployable archive from the input files and their dependencies.

For more details about deployable archives see “Deployable Archive” on page 5-5.

- 4** Generates target-specific wrapper code.
- 5** Generates target-specific binary package.

For library targets such as C++ shared libraries, Java packages, or .NET assemblies, the compiler invokes the required third-party compiler.

# Dependency Analysis

## In this section...

“Function Dependency” on page 5-3

“Data File Dependency” on page 5-3

MATLAB Compiler uses a dependency analysis function to determine the list of necessary files to include in the generated package. Sometimes, this process generates a large list of files, particularly when MATLAB object classes exist in the compilation and the dependency analyzer cannot resolve overloaded methods at package time. Dependency analysis also processes `include/exclude` files on each pass.

**Tip** To improve package time performance and lessen application size, prune the path with the `mcc` command's `-N` and `-p` flags. You can also specify **Files required for your application** in the compiler app.

## Function Dependency

The dependency analyzer searches for executable content such as:

- MATLAB files
- P-files

**Note** If the MATLAB file corresponding to the p-file is not available, the dependency analysis cannot determine the p-file's dependencies.

- `.fig` files
- MEX-files

## Data File Dependency

In addition to executable content listed above, MATLAB Compiler can detect and automatically include files that your MATLAB functions access by calling any of these functions: `audioinfo`, `audioread`, `csvread`, `daqread`, `dlmread`, `fileread`, `fopen`, `imfinfo`, `importdata`, `imread`, `load`, `matfile`, `mmfileinfo`, `open`, `readtable`, `type`, `VideoReader`, `xlsfinfo`, `xlsread`, `xmlread`, and `xslt`.

If you are using the compiler app, these data files are automatically added to the **Files required for your application to run** area of the app.

## See Also

`applicationCompiler` | `mcc`

## More About

- Application Compiler

## MEX-Files, DLLs, or Shared Libraries

When you compile MATLAB functions containing MEX-files, ensure that the dependency analyzer can find them. Doing so allows you to avoid many common compilation problems. In particular, note that:

- Since the dependency analyzer cannot examine MEX-files, DLLs, or shared libraries to determine their dependencies, explicitly include all executable files these files require. To do so, use either the `mcc -a` option or the **Files required for your application to run** field in the compiler app.
- If you have any doubts that the dependency analyzer can find a MATLAB function called by a MEX-file, DLL, or shared library, then manually include that function. To do so, use either the `mcc -a` option or the **Files required for your application to run** field in the compiler app.
- Not all functions are compatible with the compiler. Check the file `mccExcludedFiles.log` after your build completes. This file lists all functions called from your application that you cannot deploy.

## Deployable Archive

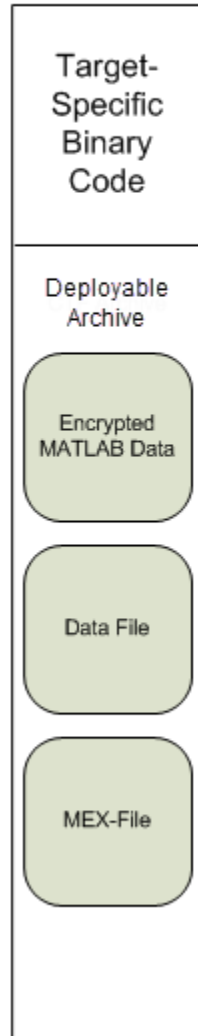
Each application or shared library you produce using the compiler has an embedded deployable archive. The archive contains all the MATLAB based content (MATLAB files, MEX-files, and so on). All MATLAB files in the deployable archive are encrypted using the Advanced Encryption Standard (AES) cryptosystem.

If you choose to extract the deployable archive as a separate file, the files remain encrypted. For more information on how to extract the deployable archive refer to the references in the following table.

### Information on Deployable Archive Embedding/Extraction and Component Cache

Product	Refer to
MATLAB Compiler SDK C/C++ integration	"MATLAB Runtime Component Cache and Deployable Archive Embedding" (MATLAB Compiler SDK)
MATLAB Compiler SDK .NET integration	"MATLAB Runtime Component Cache and Deployable Archive Embedding" (MATLAB Compiler SDK)
MATLAB Compiler SDK Java integration	"Deployable Archive Embedding and Extraction" (MATLAB Compiler SDK)
MATLAB Compiler Excel integration	"MATLAB Runtime Component Cache and Deployable Archive Embedding"

## Generated Component (EXE, DLL, SO, etc)



### Additional Details

Multiple deployable archives, such as those generated with COM components, .NET assemblies, or Excel add-ins, can coexist in the same user application. You cannot, however, mix and match the MATLAB files they contain. You cannot combine encrypted and compressed MATLAB files from multiple deployable archives into another deployable archive and distribute them.

All the MATLAB files from a given deployable archive associate with a unique cryptographic key. MATLAB files with different keys, placed in the same deployable archive, do not execute. If you want to generate another application with a different mix of MATLAB files, recompile these MATLAB files into a new deployable archive.

The compiler deletes the deployable archive and generated binary following a failed compilation, but only if these files did not exist before compilation initiates. Run `help mcc -K` for more information.

**Caution Release Engineers and Software Configuration Managers:** Do not use build procedures or processes that strip shared libraries on deployable archives. If you do, you can possibly strip the deployable archive from the binary, resulting in run-time errors for the driver application.

---

## Write Deployable MATLAB Code

### In this section...

“Packaged Applications Do Not Process MATLAB Files at Run Time” on page 5-8

“Do Not Rely on Changing Directory or Path to Control the Execution of MATLAB Files” on page 5-9

“Use isdeployed Functions To Execute Deployment-Specific Code Paths” on page 5-9

“Gradually Refactor Applications That Depend on Noncompilable Functions” on page 5-9

“Do Not Create or Use Nonconstant Static State Variables” on page 5-9

“Get Proper Licenses for Toolbox Functionality You Want to Deploy” on page 5-10

### Packaged Applications Do Not Process MATLAB Files at Run Time

The compiler secures your code against unauthorized changes. Deployable MATLAB files are suspended or frozen at the time of compilation. This does not mean that you cannot deploy a flexible application—it means that *you must design your application with flexibility in mind*. If you want the end user to be able to choose between two different methods, for example, both methods must be available in the deployable archive.

The MATLAB Runtime only works on MATLAB code that was encrypted when the deployable archive was built. Any function or process that dynamically generates new MATLAB code will not work against the MATLAB Runtime.

Some MATLAB toolboxes, such as the Deep Learning Toolbox™ product, generate MATLAB code dynamically. Because the MATLAB Runtime only executes encrypted MATLAB files, and the Deep Learning Toolbox generates unencrypted MATLAB files, some functions in the Deep Learning Toolbox cannot be deployed.

Similarly, functions that need to examine the contents of a MATLAB function file cannot be deployed. HELP, for example, is dynamic and not available in deployed mode. You can use LOADLIBRARY in deployed mode if you provide it with a MATLAB function prototype.

Instead of compiling the function that generates the MATLAB code and attempting to deploy it, perform the following tasks:

- 1 Run the code once in MATLAB to obtain your generated function.
- 2 Package the MATLAB code, including the generated function.

---

**Tip** Another alternative to using EVAL or FEVAL is using anonymous function handles.

---

If you require the ability to create MATLAB code for dynamic run-time processing, your end users must have an installed copy of MATLAB.



## Do Not Rely on Changing Directory or Path to Control the Execution of MATLAB Files

In general, good programming practices advise against redirecting a program search path dynamically within the code. Many developers are prone to this behavior since it mimics the actions they usually perform on the command line. However, this can lead to problems when deploying code.

For example, in a deployed application, the MATLAB and Java paths are fixed and cannot change. Therefore, any attempt to change these paths (using the `cd` command or the `addpath` command) fails.

If you find you cannot avoid placing `addpath` calls in your MATLAB code, use `ismcc` and `isdeployed`. See “Use `isdeployed` Functions To Execute Deployment-Specific Code Paths” on page 5-9 for details.

## Use `isdeployed` Functions To Execute Deployment-Specific Code Paths

The `isdeployed` function allows you to specify which portion of your MATLAB code is deployable, and which is not. Such specification minimizes your compilation errors and helps create more efficient, maintainable code.

For example, you find it unavoidable to use `addpath` when writing your `startup.m`. Using `ismcc` and `isdeployed`, you specify when and what is packaged and executed.

## Gradually Refactor Applications That Depend on Noncompilable Functions

Over time, refactor, streamline, and modularize MATLAB code containing non-compilable or non-deployable functions that use `isdeployed`. Your eventual goal is “graceful degradation” of non-deployable code. In other words, the code must present the end user with as few obstacles to deployment as possible until it is practically eliminated.

Partition your code into design-time and run-time code sections:

- Design-time code is code that is currently evolving. Almost all code goes through a phase of perpetual rewriting, debugging, and optimization. In some toolboxes, such as the Deep Learning Toolbox product, the code goes through a period of self-training as it reacts to various data permutations and patterns. Such code is almost never designed to be deployed.
- Run-time code, on the other hand, has solidified or become stable—it is in a finished state and is ready to be deployed by the end user.

Consider creating a separate directory for code that is not meant to be deployed or for code that calls undeployable code.

## Do Not Create or Use Nonconstant Static State Variables

Avoid using the following:

- Global variables in MATLAB code
- Static variables in MEX-files

- Static variables in Java code

The state of these variables is persistent and shared with everything in the process.

When deploying applications, using persistent variables can cause problems because the MATLAB Runtime process runs in a single thread. You cannot load more than one of these non-constant, static variables into the same process. In addition, these static variables do not work well in multithreaded applications.

When programming against packaged MATLAB code, you should be aware that an instance of the MATLAB Runtime is created for each instance of a new class. If the same class is instantiated again using a different variable name, it is attached to the MATLAB Runtime created by the previous instance of the same class. In short, if an assembly contains  $n$  unique classes, there will be maximum of  $n$  instances of MATLAB Runtime created, each corresponding to one or more instances of one of the classes.

If you must use static variables, bind them to instances. For example, defining instance variables in a Java class is preferable to defining the variable as `static`.

## **Get Proper Licenses for Toolbox Functionality You Want to Deploy**

You must have a valid MathWorks license for toolboxes you use to create deployable MATLAB code.

### **See Also**

`isdeployed` | `ismcc`

### **More About**

- MATLAB Compiler support for MATLAB and toolboxes

## Calling Shared Libraries in Deployed Applications

The `loadlibrary` function in MATLAB allows you to load shared library into MATLAB.

Loading libraries using header files is not supported in compiled applications. Therefore, to create an application that uses the `loadlibrary` function with a header file, follow these steps:

- 1 Create a prototype MATLAB file. Suppose that you call `loadlibrary` with the following syntax.

```
loadlibrary(library, header)
```

Run the following command in MATLAB only once to create the prototype file:

```
loadlibrary(library, header, 'mfilename', 'mylibrarymfile');
```

This creates `mylibrarymfile.m` in the current folder. If you are on Windows, another file named `library_thunk_pcwin64.dll` is also created in the current folder.

- 2 Change the call to `loadlibrary` in your MATLAB to the following:

```
loadlibrary(library, @mylibrarymfile)
```

- 3 Compile and deploy the application.

- If you are integrating the library into a deployed application, specify the library's `.dll` along with `library_thunk_pcwin64.dll`, if created, using the `-a` option of `mcc` command. If you are using Application Compiler or Library Compiler apps, add the `.dll` files to the **Files required for your application to run** section of the app.
- If you are providing the library as an external file that is not integrated with the deployed application, place the library `.dll` file in the same folder as the compiled application. If you are on Windows, you must integrate `library_thunk_pcwin64.dll` into your compiled application.

The benefit of this approach is that you can replace the library with an updated version without recompiling the deployed application. Replacing the library with a different version works only if the function signatures of the function in the library are not altered. This is because `mylibrarymfile.m` and `library_thunk_pcwin64.dll` are tied to the function signatures of the functions in the library.

---

**Note** You cannot use `loadlibrary` inside MATLAB to load a shared library built with MATLAB. For more information on `loadlibrary`, see “Limitations to Shared Library Support” (MATLAB).

---



---

**Note** Operating systems have a `loadlibrary` function, which loads specified Windows operating system module into the address space of the calling process.

---

### See Also

`loadlibrary`

### Related Examples

- “Call C Functions in Shared Libraries” (MATLAB)

## MATLAB Data Files in Compiled Applications

### In this section...

“Explicitly Including MATLAB Data files Using the `%#function` Pragma” on page 5-12

“Load and Save Functions” on page 5-12

### Explicitly Including MATLAB Data files Using the `%#function` Pragma

The compiler excludes MATLAB data files (MAT-files) from dependency analysis by default. See “Dependency Analysis” on page 5-3.

If you want the compiler to explicitly inspect data within a MAT file, you need to specify the `%#function` pragma when writing your MATLAB code.

For example, if you are creating a solution with Deep Learning Toolbox, you need to use the `%#function` pragma within your code to include a dependency on the `gmdistribution` class, for instance.

### Load and Save Functions

If your deployed application uses MATLAB data files (MAT-files), it is helpful to code `LOAD` and `SAVE` functions to manipulate the data and store it for later processing.

- Use `isdeployed` to determine if your code is running in or out of the MATLAB workspace.
- Specify the data file by either using `WHICH` (to locate its full path name) define it relative to the location of `ctfroot`.
- All MAT-files are unchanged after `mcc` runs. These files are not encrypted when written to the deployable archive.

For more information about deployable archives, see “Deployable Archive” on page 5-5.

See the `ctfroot` reference page for more information about `ctfroot`.

Use the following example as a template for manipulating your MATLAB data inside, and outside, of MATLAB.

### Using Load/Save Functions to Process MATLAB Data for Deployed Applications

The following example specifies three MATLAB data files:

- `user_data.mat`
- `userdata\extra_data.mat`
- `..\externdata\extern_data.mat`

- 1 Navigate to `matlab_root\extern\examples\compiler\Data_Handling`.
- 2 Compile `ex_loadsave.m` with the following `mcc` command:

```
mcc -mv ex_loadsave.m -a 'user_data.mat' -a
    '\userdata\extra_data.mat' -a
    '..\externdata\extern_data.mat'
```

**ex\_loadsave.m**

```

function ex_loadsave
% This example shows how to work with the
% "load/save" functions on data files in
% deployed mode. There are three source data files
% in this example.
%   userdata.mat
%   userdata\extra_data.mat
%   ..\externdata\extern_data.mat
%
% Compile this example with the mcc command:
%   mcc -m ex_loadsave.m -a 'userdata.mat' -a
%     '\userdata\extra_data.mat'
%     -a '..\externdata\extern_data.mat'
% All the folders under the current main MATLAB file directory will
% be included as
% relative path to ctroot; All other folders will have the
% folder
% structure included in the deployable archive file from root of the
% disk drive.
%
% If a data file is outside of the main MATLAB file path,
% the absolute path will be
% included in deployable archive and extracted under ctroot. For example:
% Data file
%   "c:\$matlabroot\examples\externdata\extern_data.mat"
% will be added into deployable archive and extracted to
% "$ctroot\$matlabroot\examples\externdata\extern_data.mat".
%
% All mat/data files are unchanged after mcc runs. There is
% no encryption on these user included data files. They are
% included in the deployable archive.
%
% The target data file is:
%   .\output\saved_data.mat
% When writing the file to local disk, do not save any files
% under ctroot since it may be refreshed and deleted
% when the application is next started.

%==== load data file =====
if isdeployed
% In deployed mode, all file under CTFroot in the path are loaded
% by full path name or relative to $ctroot.
% LOADFILENAME1=which(fullfile(ctroot,mfilename,'user_data.mat'));
% LOADFILENAME2=which(fullfile(ctroot,'userdata','extra_data.mat'));
LOADFILENAME1=which(fullfile('user_data.mat'));
LOADFILENAME2=which(fullfile('extra_data.mat'));
% For external data file, full path will be added into deployable archive;
% you don't need specify the full path to find the file.
LOADFILENAME3=which(fullfile('extern_data.mat'));
else
%running the code in MATLAB
LOADFILENAME1=fullfile(matlabroot,'extern','examples','compiler',
'Data_Handling','user_data.mat');
LOADFILENAME2=fullfile(matlabroot,'extern','examples','compiler',
'Data_Handling','userdata','extra_data.mat');
LOADFILENAME3=fullfile(matlabroot,'extern','examples','compiler',
'externdata','extern_data.mat');
end

% Load the data file from current working directory
disp(['Load A from : ',LOADFILENAME1]);
load(LOADFILENAME1,'data1');
disp('A= ');
disp(data1);

% Load the data file from sub directory
disp(['Load B from : ',LOADFILENAME2]);
load(LOADFILENAME2,'data2');
disp('B= ');
disp(data2);

```

```
% Load extern data outside of current working directory
disp(['Load extern data from : ',LOADFILENAME3]);
load(LOADFILENAME3);
disp('ext_data= ');
disp(ext_data);

%==== multiple the data matrix by 2 =====
result = data1*data2;
disp('A * B = ');
disp(result);

%==== save the new data to a new file =====
SAVEPATH=strcat(pwd,filesep,'output');
if ( ~isdir(SAVEPATH))
    mkdir(SAVEPATH);
end
SAVEFILENAME=strcat(SAVEPATH,filesep,'saved_data.mat');
disp(['Save the A * B result to : ',SAVEFILENAME]);
save(SAVEFILENAME, 'result');
```

# Standalone Application Creation

---

## Dependency Analysis Function and User Interaction with the Compilation Path

### addpath and rmpath in MATLAB

MATLAB Compiler uses the MATLAB search path to analyze dependencies. See `addpath`, `rmpath`, `savepath` for information on working with the search path.

---

**Note** `mcc` does not use the MATLAB startup folder and will not find any path information saved there.

---

### Passing `-I <directory>` on the Command Line

You can use the `-I` option to add a folder to the beginning of the list of paths to use for the current compilation. This feature is useful when you are compiling files that are in folders currently not on the MATLAB path.

### Passing `-N` and `-p <directory>` on the Command Line

There are two MATLAB Compiler options that provide more detailed manipulation of the path. This feature acts like a “filter” applied to the MATLAB path for a given compilation. The first option is `-N`. Passing `-N` on the `mcc` command line effectively 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\deploy`
- `matlabroot\toolbox\compiler`

It also retains all subfolders of the above list that appear on the MATLAB path at compile time. Including `-N` on the command line allows you to 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 the user has included on the path that are not under `matlabroot\toolbox`.

Use the `-p` option to add a folder to the compilation path in an order-sensitive context, i.e., the same order in which they are found on your MATLAB path. The syntax is

```
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. The rules for how these folders are included are

- 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 an order-sensitive context.
- If a folder is included with `-p` that is not on the original MATLAB path, that folder is not included in the compilation. (You can use `-I` to add it.)



- If a path is added with the `-I` option while this feature is active (`-N` has been passed) and it is already on the MATLAB path, it is added in the order-sensitive context as if it were included with `-p`. Otherwise, the folder is added to the head of the path, as it normally would be with `-I`.

---

**Note** The `-p` option requires the `-N` option on the `mcc` command line.

---



# Deployment Process

---

This chapter tells you how to deploy compiled MATLAB code to developers and to end users.

- “About the MATLAB Runtime” on page 7-2
- “Install and Configure the MATLAB Runtime” on page 7-3
- “Run Applications Using a Network Installation of MATLAB Runtime (Windows Only)” on page 7-9
- “MATLAB Runtime on Big Data Platforms” on page 7-10

## About the MATLAB Runtime

<b>In this section...</b>
---------------------------

“How is the MATLAB Runtime Different from MATLAB?” on page 7-2
--

“Performance Considerations and the MATLAB Runtime” on page 7-2
---

The MATLAB Runtime is a standalone set of shared libraries, MATLAB code, and other files that enables the execution of MATLAB files on computers without an installed version of MATLAB. Applications that use artifacts built with MATLAB Compiler SDK require access to an appropriate version of the MATLAB Runtime to run.

End-users of compiled artifacts without access to MATLAB must install the MATLAB Runtime on their computers or know the location of a network-installed MATLAB Runtime. The installers generated by the compiler apps may include the MATLAB Runtime installer. If you compiled your artifact using `mcc`, you should direct your end-users to download the MATLAB Runtime installer from the website <https://www.mathworks.com/products/compiler/mcr>.

See “Install and Configure the MATLAB Runtime” on page 7-3 for more information.

### How is the MATLAB Runtime Different from MATLAB?

The MATLAB Runtime differs from MATLAB in several important ways:

- In the MATLAB Runtime, MATLAB files are encrypted and immutable.
- MATLAB has a desktop graphical interface. The MATLAB Runtime has all the MATLAB functionality without the graphical interface.
- The MATLAB Runtime is version-specific. You must run your applications with the version of the MATLAB Runtime associated with the version of MATLAB Compiler SDK with which it was created. For example, if you compiled an application using version 6.3 (R2016b) of MATLAB Compiler, users who do not have MATLAB installed must have version 9.1 of the MATLAB Runtime installed. Use `mcrversion` to return the version number of the MATLAB Runtime.
- The MATLAB paths in a MATLAB Runtime instance are fixed and cannot be changed. To change them, you must first customize them within MATLAB.

### Performance Considerations and the MATLAB Runtime

MATLAB Compiler SDK was designed to work with a large range of applications that use the MATLAB programming language. Because of this, run-time libraries are large.

Since the MATLAB Runtime technology provides full support for the MATLAB language, including the Java programming language, starting a compiled application takes approximately the same amount of time as starting MATLAB. The amount of resources consumed by the MATLAB Runtime is necessary in order to retain the power and functionality of a full version of MATLAB.

Calls into the MATLAB Runtime are serialized so calls into the MATLAB Runtime are threadsafe. This can impact performance.

# Install and Configure the MATLAB Runtime

## In this section...

“Download the MATLAB Runtime Installer from the Web” on page 7-3  
 “Install the MATLAB Runtime Interactively” on page 7-3  
 “Install the MATLAB Runtime Non-Interactively” on page 7-4  
 “Install the MATLAB Runtime without Administrator Rights” on page 7-6  
 “Multiple MATLAB Runtime Versions on Single Machine” on page 7-6  
 “MATLAB and MATLAB Runtime on Same Machine” on page 7-6  
 “Uninstall MATLAB Runtime” on page 7-7

## Download the MATLAB Runtime Installer from the Web

Download the MATLAB® Runtime from the website at <https://www.mathworks.com/products/compiler/matlab-runtime.html>.

## Install the MATLAB Runtime Interactively

To install the MATLAB Runtime:

- 1 Unzip/Extract the archive containing the MATLAB Runtime installer.

Platform	Steps
Windows	Unzip the MATLAB Runtime installer. To unzip the installer: <ul style="list-style-type: none"> <li>• Right click the zip file MATLAB_Runtime_R2020a_win64.zip</li> <li>• Select <b>Extract All</b>, and then follow the instructions.</li> </ul>
Linux	Unzip the MATLAB Runtime installer at the terminal using the unzip command.  For example, if you are unzipping the R2020a MATLAB Runtime installer, at the Terminal, type:  <pre>unzip MATLAB_Runtime_R2020a_glnxa64.zip</pre>
macOS	Unzip the MATLAB Runtime installer at the terminal using the unzip command.  For example, if you are unzipping the R2020a MATLAB Runtime installer, at the Terminal, type:  <pre>unzip MATLAB_Runtime_R2020a_maci64.zip</pre>

**Note** The release part of the installer filename (`_R2020a_`) will change from one release to the next.

- 2 Start the MATLAB Runtime installer.

Platform	Steps
Windows	Double-click the file <code>setup.exe</code> from the extracted files to start the installer.
Linux	At the Terminal, type:  <code>sudo ./install</code>  <b>Note</b> On Debian® based Linux distributions, you will need to type:  <code>gksudo ./install</code>
macOS	At the Terminal, type:  <code>./install</code>  <b>Note</b> You may need to enter an administrator username and password after you run <code>./install</code> .

- 3 When the MATLAB Runtime installer starts, it displays a dialog box. Read the information and then click **Next** to proceed with the installation.
- 4 Specify the folder in which you want to install the MATLAB Runtime in the **Folder Selection** dialog box.

---

**Note** On Windows systems, you can have multiple versions of the MATLAB Runtime on your computer but only one installation for any particular version. If you already have an existing installation, the MATLAB Runtime installer does not display the **Folder Selection** dialog box because you can only overwrite the existing installation in the same folder.

- 5 Confirm your choices and click **Next**.

The MATLAB Runtime installer starts copying files into the installation folder.

- 6 On Linux and macOS platforms, after copying files to your disk, the MATLAB Runtime installer displays the **Product Configuration Notes** dialog box. This dialog box contains information necessary for setting your path environment variables. Copy the path information from this dialog box and then click **Next**.
- 7 Click **Finish** to exit the installer.

## Install the MATLAB Runtime Non-Interactively

To install the MATLAB Runtime without having to interact with the installer dialog boxes, use one of the MATLAB Runtime installer's non-interactive modes:

- `silent`—the installer runs as a background task and does not display any dialog boxes
- `automated`—the installer displays the dialog boxes but does not wait for user interaction

When run in silent or automated mode, the MATLAB Runtime installer uses default values for installation options. You can override these defaults by using MATLAB Runtime installer command-line options or an installer control file.

---

**Note** When running in silent or automated mode, the installer overwrites the default installation location.

---

## Running the Installer in Silent Mode

To install the MATLAB Runtime in silent mode:

- 1 Extract the contents of the MATLAB Runtime installer file to a temporary folder, called `$temp` in this documentation.

---

**Note** On Windows systems, **manually** extract the contents of the installer file.

- 2 Run the MATLAB Runtime installer, specifying the `-mode silent` option and `-agreeToLicense yes` on the command line.

---

**Note** On most platforms, the installer is located at the root of the folder into which the archive was extracted. On Windows 64, the installer is located in the archives `bin` folder.

---

Platform	Command
Windows	<code>setup -mode silent -agreeToLicense yes</code>
Linux	<code>./install -mode silent -agreeToLicense yes</code>
macOS	<code>./install -mode silent -agreeToLicense yes</code>

---

**Note** If you do not include the `-agreeToLicense yes` the installer will not install the MATLAB Runtime.

- 3 View a log of the installation.

On Windows systems, the MATLAB Runtime installer creates a log file, named `mathworks_username.log`, where `username` is your Windows log-in name, in the location defined by your `TEMP` environment variable.

- 4 On Linux and macOS systems, specify the path variable. The MATLAB Runtime installer displays the log information for Linux and macOS systems at the command prompt, unless you redirect it to a file.

## Customizing a Non-Interactive Installation

When run in one of the non-interactive modes, the installer will use the default values unless told to do otherwise. Like the MATLAB installer, the MATLAB Runtime installer accepts a number of command line options that modify the default installation properties.

Option	Description
<code>-destinationFolder</code>	Specifies where the MATLAB Runtime will be installed.
<code>-outputFile</code>	Specifies where the installation log file is written.
<code>-automatedModeTimeout</code>	Specifies how long, in milliseconds, that the dialog boxes are displayed when run in automatic mode.

Option	Description
-inputFile	Specifies an installer control file with the values for all of the above options.

---

**Note** The MATLAB Runtime installer archive includes an example installer control file called `installer_input.txt`. This file contains all of the options available for a full MATLAB installation. Only the options listed in this section are valid for the MATLAB Runtime installer.

---

## Install the MATLAB Runtime without Administrator Rights

To install the MATLAB Runtime as a user without administrator rights on Windows:

- 1 Use the MATLAB Runtime installer to install it on a Windows machine where you have administrator rights.
- 2 Copy the folder where the MATLAB Runtime was installed to the machine without administrator rights. You can compress the folder into zip file and distribute to multiple users.
- 3 On the machine without administrator rights, add the `mcr_root\runtime\arch` directory onto the user's path environment variable.

---

**Note** You don't need administrator rights for adding directories to a user's path environment variable.

---

## Multiple MATLAB Runtime Versions on Single Machine

MCRInstaller supports the installation of multiple versions of the MATLAB Runtime on a target machine. This allows applications compiled with different versions of the MATLAB Runtime to execute side by side on the same machine.

If you do not want multiple MATLAB Runtime versions on the target machine, you can remove the unwanted ones. On Windows, run **Add or Remove Programs** from the Control Panel to remove any of the previous versions. On Linux, you manually delete the unwanted MATLAB Runtime. You can remove unwanted versions before or after installation of a more recent version of the MATLAB Runtime, as versions can be installed or removed in any order.

## MATLAB and MATLAB Runtime on Same Machine

You do not need to install MATLAB Runtime on your machine if your machine has MATLAB installed. The version of MATLAB should be the same as the version of MATLAB that was used to create the compiled MATLAB code. Also, to act as the MATLAB Runtime replacement, the MATLAB installation must include MATLAB Compiler.

You can, however, install the MATLAB Runtime for debugging purposes.

### Modifying the Path

If you install MATLAB Runtime on a machine that already has MATLAB on it, you must adjust the library path according to your needs.

- **Windows**



To run deployed MATLAB code against MATLAB Runtime install, *mcr\_root\ver\runtime\win64* must appear on your system path before *matlabroot\runtime\win64*.

If *mcr\_root\ver\runtime\arch* appears first on the compiled application path, the application uses the files in the MATLAB Runtime install area.

If *matlabroot\runtime\arch* appears first on the compiled application path, the application uses the files in the MATLAB installation area.

- **Linux**

To run deployed MATLAB code against MATLAB Runtime on Linux, the folder *<mcr\_root>/runtime/<arch>* must appear on your LD\_LIBRARY\_PATH before *matlabroot/runtime/<arch>*.

- **macOS**

To run deployed MATLAB code on macOS, the *<mcr\_root>/runtime* folder must appear on your DYLD\_LIBRARY\_PATH before *matlabroot/runtime/<arch>*.

To run MATLAB on macOS or Intel® Mac, *matlabroot/runtime/<arch>* must appear on your DYLD\_LIBRARY\_PATH before the *<mcr\_root>/bin* folder.

## Uninstall MATLAB Runtime

The method you use to uninstall MATLAB Runtime from your computer varies depending on the type of computer.

### Windows

- 1 Start the uninstaller.

From the Windows Start menu, search for the **Add or Remove Programs** control panel, and double-click MATLAB Runtime in the list.

You can also start the MATLAB Runtime uninstaller from the *mcr\_root\uninstall\bin\arch* folder, where *mcr\_root* is your MATLAB Runtime installation folder and *arch* is an architecture-specific folder, such as win64.

- 2 Select the MATLAB Runtime from the list of products in the Uninstall Products dialog box.
- 3 Click **Next**.
- 4 Click **Finish**.

### Linux

- 1 Exit the application.
- 2 Enter this command at the Linux prompt:

```
rm -rf mcr_root
```

where *mcr\_root* represents the name of your top-level MATLAB installation folder.

### macOS

- 1 Exit the application.
- 2 Navigate to your MATLAB Runtime installation folder. For example, the installation folder might be named *MATLAB\_Compiler\_Runtime.app* in your Applications folder.

- 3** Drag your MATLAB Runtime installation folder to the trash, and then select **Empty Trash** from the Finder menu.

## Run Applications Using a Network Installation of MATLAB Runtime (Windows Only)

Local clients on a network can access MATLAB Runtime on a network drive. To run applications using a network install of MATLAB Runtime:

- 1 Run the `mcrinstaller` function to obtain name and location of the MATLAB Runtime installer.
- 2 Copy the entire MATLAB Runtime folder onto a network drive.
- 3 Copy the compiled application into a separate folder on the network drive, and add the path `<mcr_root>\<ver>\runtime\<arch>` to all client machines. All network clients can then execute the application.
- 4 The following table specifies what DLLs to register to deploy specific applications.

Application Deployed	DLL's to Register on Each Client Machine
Excel Add-Ins	<code>mwcomutil.dll</code> <code>mwcommgr.dll</code>
.NET assemblies to create COM objects	<code>mwcomutil.dll</code>

To register the DLLs, at the DOS prompt enter:

```
mwregsvr <fully_qualified_pathname\dllname.dll>
```

These DLLs are located in `<matlab_runtime_root>\<ver>\bin\win64`.

---

**Note** These libraries are automatically registered on the machine on which the installer was run.

---

**Note** There is no need to perform these steps on a Linux system.

Distributing to a Linux network file system is the same as distributing to a local file system. You set up the `LD_LIBRARY_PATH` or use scripts on page B-2 which point to the MATLAB Runtime installation.

---

## MATLAB Runtime on Big Data Platforms

MATLAB Runtime can be downloaded and installed on big data platforms such as Cloudera®, Apache Ambari™, and Azure® HDInsight.

### Cloudera

MATLAB Runtime can be downloaded as a parcel by Cloudera Manager.

#### Download URL

[https://www.mathworks.com/supportfiles/downloads/R2020a/deployment\\_files/R2020a/cdhparcels](https://www.mathworks.com/supportfiles/downloads/R2020a/deployment_files/R2020a/cdhparcels)

After downloading the parcel, you can distribute and activate it across the cluster. For more information on how to work with Cloudera Manager and parcels, see the Cloudera documentation.

### Apache Ambari

MATLAB Runtime is available for distribution as an Apache Ambari stack.

You can distribute MATLAB Runtime across a Hadoop® cluster using Apache Ambari.

#### Download URL

[https://www.mathworks.com/supportfiles/downloads/R2020a/deployment\\_files/R2020a/ambari/matlab-runtime-2020a-service.tgz](https://www.mathworks.com/supportfiles/downloads/R2020a/deployment_files/R2020a/ambari/matlab-runtime-2020a-service.tgz)

[https://www.mathworks.com/supportfiles/downloads/R2020a/deployment\\_files/R2020a/ambari/matlab-runtime-2020a-service.shal](https://www.mathworks.com/supportfiles/downloads/R2020a/deployment_files/R2020a/ambari/matlab-runtime-2020a-service.shal)

For more information, see the Apache Ambari documentation.

### Azure HDInsight

MATLAB Runtime is available for distribution as an Azure HDInsight script action. You can distribute MATLAB Runtime across an Azure HDInsight cluster using script action.

#### Download URL

[https://www.mathworks.com/supportfiles/downloads/R2020a/deployment\\_files/R2020a/hdinsight](https://www.mathworks.com/supportfiles/downloads/R2020a/deployment_files/R2020a/hdinsight)

# Work with the MATLAB Runtime

---

- “MATLAB Runtime Startup Options” on page 8-2
- “Using the MATLAB Runtime User Data Interface” on page 8-4
- “Display the MATLAB Runtime Initialization Messages” on page 8-6

## MATLAB Runtime Startup Options

### Set MATLAB Runtime Options

For a standalone executable, set MATLAB Runtime options by specifying the `-R` switch and arguments. You can set options from either of the following:

- The **Additional Runtime Settings** area of the compiler apps.
- The `mcc` command.

---

**Note** Not all options are available for all compilation targets.

---

### Use a Compiler App

In the **Additional Runtime Settings** area of the compiler apps, you can set the following options.

MATLAB Runtime Startup Option	Description	Setting
<code>-nojvm</code>	Disable the Java Virtual Machine (JVM™), which is enabled by default. This can help improve the MATLAB Runtime performance.	Select the <b>No JVM</b> check box.
<code>-nodisplay</code>	On Linux, open the MATLAB Runtime without display functionality.	In the <b>Settings</b> box, enter <code>-R -nodisplay</code> .
<code>-logfile</code>	Write information about the MATLAB Runtime startup to a logfile.	Select the <b>Create log file</b> check box. Enter the path to the log file, including the log file name, in the <b>Log File</b> box.
<code>-startmsg</code>	Specify message to be displayed when the MATLAB Runtime begins initialization.	In the <b>Settings</b> box, enter <code>-R 'startmsg, message text'</code> .
<code>-completemsg</code>	Specify message to be displayed when the MATLAB Runtime completes initialization.	In the <b>Settings</b> box, enter <code>-R 'completemsg, message text'</code> .

### Set MATLAB Runtime Startup Options Using the `mcc` Command Line

When you use the command line, specify the `-R` switch to invoke the MATLAB Runtime startup options you want to use.

Following are examples of using `mcc -R` to invoke `-nojvm`, `-nodisplay`, and `-logfile` when building a standalone executable (designated by the `-m` switch).

#### Set `-nojvm`

```
mcc -m -R -nojvm -v foo.m
```

**Set -nodisplay (Linux Only)**

```
mcc -m -R -nodisplay -v foo.m
```

**Set -logfile**

```
mcc -e -R '-logfile,bar.txt' -v foo.m
```

**Set -nojvm, -nodisplay, and -logfile with One Command**

```
mcc -m -R '-logfile,bar.txt,-nojvm,-nodisplay' -v foo.m
```

## Using the MATLAB Runtime User Data Interface

The MATLAB Runtime User Data Interface lets you easily access MATLAB Runtime data. It allows keys and values to be passed among a MATLAB Runtime instance, the MATLAB code running on the MATLAB Runtime, and the host application that created the instance. Through calls to the MATLAB Runtime User Data Interface API, you access MATLAB Runtime data by creating a per-instance associative array of `mxAArrays`, consisting of a mapping from string keys to `mxAArray` values. Reasons for doing this include, but are not limited to the following:

- You need to supply run-time profile information to a client running an application created with the Parallel Computing Toolbox. You supply and change profile information on a per-execution basis. For example, two instances of the same application may run simultaneously with different profiles. For more information, see “Use Parallel Computing Toolbox in Deployed Applications” (MATLAB Compiler SDK).
- You want to set up a global workspace, a global variable, or variables that MATLAB and your client can access.
- You want to store the state of any variable or group of variables.

The API consists of:

- Two MATLAB functions callable from within deployed application MATLAB code
- Four external C functions callable from within deployed application wrapper code

### MATLAB Functions

Use the MATLAB functions `getmcruserdata` and `setmcruserdata` from deployed MATLAB applications. They are loaded by default only in applications created with the MATLAB Compiler or MATLAB Compiler SDK products.

You can include `setmcruserdata` and `getmcruserdata` in your packaged application using `mcc` as follows:

```
mcc -g -W cpplib:<lib> -T link:lib ... setmcruserdata.m getmcruserdata.m
```

You can also use the `%#` function in your MATLAB file to include `setmcruserdata` and `getmcruserdata`. Doing so ensures inclusion of these functions in the packaged application when you use `deploytool`.

---

**Tip** `getmcruserdata` and `setmcruserdata` produce an Unknown function error when called in MATLAB if the MCLMCR module cannot be located. You can avoid this situation by calling `isdeployed` before calling `getmcruserdata` and `setmcruserdata`. For more information about the `isdeployed` function, see the `isdeployed` reference page.

---

### Set and Retrieve MATLAB Runtime Data for Shared Libraries

There are many possible scenarios for working with MATLAB Runtime data. The most general scenario involves setting the MATLAB Runtime with specific data for later retrieval, as follows:

- 1 In your code, include the MATLAB Runtime header file and the library header generated by MATLAB Compiler SDK.



- 2 Properly initialize your application using `mclInitializeApplication`.
- 3 After creating your input data, write or *set* it to the MATLAB Runtime with `setmcruserdata`.
- 4 After calling functions or performing other processing, retrieve the new MATLAB Runtime data with `getmcruserdata`.
- 5 Free up storage memory in work areas by disposing of unneeded arrays with `mxDestroyArray`.
- 6 Shut down your application properly with `mclTerminateApplication`.

**See Also**

`getmcruserdata` | `setmcruserdata`

## Display the MATLAB Runtime Initialization Messages

You can display a console message for end users that informs them when MATLAB Runtime initialization starts and completes.

To create these messages, use the `-R` option of the `mcc` command.

You have the following options:

- Use the default start-up message only (Initializing MATLAB runtime version `x.xx`)
- Customize the start-up or completion message with text of your choice. The default start-up message will also display prior to displaying your customized start-up message.

Some examples of different ways to invoke this option follow:

This command:	Displays:
<code>mcc -R -startmsg</code>	Default start-up message Initializing MATLAB Runtime version <code>x.xx</code>
<code>mcc -R -startmsg,'user customized message'</code>	Default start-up message Initializing MATLAB Runtime version <code>x.xx</code> and <i>user customized message</i> for start-up
<code>mcc -R -completemsg,'user customized message'</code>	Default start-up message Initializing MATLAB Runtime version <code>x.xx</code> and <i>user customized message</i> for completion
<code>mcc -R -startmsg,'user customized message' -R -completemsg,'user customized message'</code>	Default start-up message Initializing MATLAB Runtime version <code>x.xx</code> and <i>user customized message</i> for both start-up and completion by specifying <code>-R</code> before each option
<code>mcc -R -startmsg,'user customized message',-completemsg,'user customized message'</code>	Default start-up message Initializing MATLAB Runtime version <code>x.xx</code> and <i>user customized message</i> for both start-up and completion by specifying <code>-R</code> only once

### Best Practices

Keep the following in mind when using `mcc -R`:

- When calling `mcc` in the MATLAB command window, place the comma inside the single quote.

```
mcc -m hello.m -R '-startmsg,"Message_Without_Space"'
```

- If your initialization message has a space in it, call `mcc` from the system command window or use `!mcc` from MATLAB.

# Distributing Code to an End User

---

## Distribute MATLAB Code Using the MATLAB Runtime

On target computers without MATLAB, install the MATLAB Runtime, if it is not already present on the deployment machine.

### MATLAB Runtime

The MATLAB Runtime is an execution engine made up of the same shared libraries MATLAB uses to enable execution of MATLAB files on systems without an installed version of MATLAB.

The MATLAB Runtime is available for downloading from the web to simplify the distribution of your applications created using the MATLAB Compiler or the MATLAB Compiler SDK. Download the MATLAB Runtime from the MATLAB Runtime product page.

The MATLAB Runtime installer does the following:

- 1 Install the MATLAB Runtime.
- 2 Install the component assembly in the folder from which the installer is run.
- 3 Copy the `MWArray` assembly to the Global Assembly Cache (GAC), as part of installing the MATLAB Runtime.

### MATLAB Runtime Prerequisites

- 1 The MATLAB Runtime installer requires administrator privileges to run.
- 2 The version of the MATLAB Runtime that runs your application on the target computer must be compatible with the version of MATLAB Compiler or MATLAB Compiler SDK that built the deployed code.
- 3 Do not install the MATLAB Runtime in MATLAB installation directories.
- 4 The MATLAB Runtime installer requires approximately 2 GB of disk space.

### Add the MATLAB Runtime Installer to the Installer

This example shows how to include the MATLAB Runtime in the generated installer, using one of the compiler apps. The generated installer contains all files needed to run the standalone application or shared library built with MATLAB Compiler or MATLAB Compiler SDK and properly lays them out on a target system.

- 1 On the **Packaging Options** section of the compiler interface, select one or both of the following options:
  - **Runtime downloaded from web** — This option builds an installer that invokes the MATLAB Runtime installer from the MathWorks website.
  - **Runtime included in package** — The option includes the MATLAB Runtime installer into the generated installer.
- 2 Click **Package**.
- 3 Distribute the installer as needed.

### Install the MATLAB Runtime

This example shows how to install the MATLAB Runtime on a system.

If you are given an installer containing the compiled artifacts, then the MATLAB Runtime is installed along with the application or shared library. If you are given just the raw binary files, download the MATLAB Runtime installer from the web and run the installer.

---

**Note** If you are running on a platform other than Windows, modify the path on the target machine. Setting the paths enables your application to find the MATLAB Runtime. For more information on setting the path, see “MATLAB Runtime Path Settings for Run-Time Deployment” (MATLAB Compiler SDK).

Windows paths are set automatically. On Linux and Mac, you can use the run script to set paths. See “Problems Setting MATLAB Runtime Paths” on page B-2 for detailed information on performing all deployment tasks specifically with UNIX® variants such as Linux and Mac.

---



# Compiler Commands

---

This chapter describes `mcc`, which is the command that invokes the compiler.

## Compiler Tips

<b>In this section...</b>
---------------------------

“Deploying Applications That Call the Java Native Libraries” on page 10-2
---

“Using the VER Function in a Compiled MATLAB Application” on page 10-2
--

### Deploying Applications That Call the Java Native Libraries

If your application interacts with Java, you need to specify the search path for native method libraries by editing `librarypath.txt` and deploying it.

- 1 Copy `librarypath.txt` from `matlabroot/toolbox/local/librarypath.txt`.
- 2 Place `librarypath.txt` in `<mcr_root>/<ver>/toolbox/local`.

`<mcr_root>` refers to the complete path where the MATLAB Runtime library archive files are installed on your machine.

- 3 Edit `librarypath.txt` by adding the folder that contains the native library that your application's Java code needs to load.

### Using the VER Function in a Compiled MATLAB Application

When you use the `VER` function in a compiled MATLAB application, it will perform with the same functionality as if you had called it from MATLAB. However, be aware that when using `VER` in a compiled MATLAB application, only version information for toolboxes which the compiled application uses will be displayed.



# Standalone Applications

---

This chapter describes how to use MATLAB Compiler to code and build standalone applications. You can distribute standalone applications to users who do not have MATLAB software on their systems.

## Deploying Standalone Applications

In this section...
“Compiling the Application” on page 11-2
“Testing the Application” on page 11-2
“Deploying the Application” on page 11-3
“Running the Application” on page 11-4

### Compiling the Application

This example takes a MATLAB file, `magicsquare.m`, and creates a standalone application, `magicsquare`.

- 1 Copy the file `magicsquare.m` from

```
matlabroot\extern\examples\compiler
```

to your work folder.

- 2 To compile the MATLAB code, use

```
mcc -mv magicsquare.m
```

The `-m` option tells MATLAB Compiler (`mcc`) to generate a standalone application. The `-v` option (verbose) displays the compilation steps throughout the process and helps identify other useful information such as which third-party compiler is used and what environment variables are referenced.

This command creates the standalone application called `magicsquare` and additional files. The Windows platform appends the `.exe` extension to the name.

### Testing the Application

These steps test your standalone application on your development machine.

---

**Note** Testing your application on your development machine is an important step to help ensure that your application is compilable. To verify that your application compiled properly, you must test all functionality that is available with the application. If you receive an error message similar to `Undefined function or Attempt to execute script script_name as a function`, it is likely that the application will not run properly on deployment machines. Most likely, your deployable archive is missing some necessary functions. Use `-a` to add the missing functions to the archive and recompile your code.

---

- 1 Update your path as described in “MATLAB Runtime Path Settings for Run-Time Deployment” on page 14-2
- 2 Run the standalone application from the system prompt (shell prompt on UNIX or DOS prompt on Windows) by typing the application name.

```

magicsquare.exe 4 (On Windows)
magicsquare 4 (On UNIX)
magicsquare.app/Contents/MacOS/magicsquare (On Maci64)

```

The results are:

```

ans =
    16     2     3    13
     5    11    10     8
     9     7     6    12
     4    14    15     1

```

## Deploying the Application

You can distribute a MATLAB Compiler generated standalone application to any target machine that has the same operating system as the machine on which the application was compiled.

For example, if you want to deploy an application to a Windows machine, you must use MATLAB Compiler to build the application on a Windows machine. If you want to deploy the same application to a UNIX machine, you must use MATLAB Compiler on the same UNIX platform and completely rebuild the application. To deploy an application to multiple platforms requires MATLAB and MATLAB Compiler licenses on all the desired platforms.

### Windows

Gather and package the following files and distribute them to the deployment machine.

Component	Description
MATLAB Runtime installer	Self-extracting MATLAB Runtime library utility; platform-dependent file that must correspond to the end user's platform. Run the <code>mcrinstaller</code> command to obtain name of executable.
magicsquare	Application; <code>magicsquare.exe</code> for Windows

### UNIX

Distribute and package your standalone application on UNIX by packaging the following files and distributing them to the deployment machine.

Component	Description
MATLAB Runtime installer	MATLAB Runtime library archive; platform-dependent file that must correspond to the end user's platform. Run the <code>mcrinstaller</code> command to obtain name of the binary.
magicsquare	Application

### Maci64

Distribute and package your standalone application on 64-bit Macintosh by copying, tarring, or zipping as described in the following table.

Component	Description
MATLAB Runtime installer	MATLAB Runtime library archive; platform-dependent file that must correspond to the end user's platform. Run the <code>mcrinstaller</code> command to obtain name of the binary.
<code>magicsquare</code>	Application
<code>magicsquare.app</code>	<p>Application bundle</p> <p>Assuming <code>foo</code> is a folder within your current folder:</p> <ul style="list-style-type: none"> <li>Distribute by copying: <pre>cp -R myapp.app foo</pre> </li> <li>Distribute by tarring: <pre>tar -cvf myapp.tar myapp.app cd foo tar -xvf ../ myapp.tar</pre> </li> <li>Distribute by zipping: <pre>zip -ry myapp myapp.app cd foo unzip ../myapp.zip</pre> </li> </ul>

## Running the Application

These steps describe the process that end users must follow to install and run the application on their machines.

### Preparing Your Machines

Install the MATLAB Runtime by running the `mcrinstaller` command to obtain name of the executable or binary. For more information on running the MATLAB Runtime installer utility and modifying your system paths, see “MATLAB Runtime” on page 9-2.

### Executing the Application

Run the `magicsquare` standalone application from the system prompt and provide a number representing the size of the desired magic square, for example, 4.

```
magicsquare 4
```

The results are displayed as:

```
ans =
    16     2     3    13
     5    11    10     8
     9     7     6    12
     4    14    15     1
```

---

**Note** Input arguments you pass to and from a system prompt are treated as string input and you need to consider that in your application.

---

**Note** Before executing your MATLAB Compiler generated executable, set the LD\_PRELOAD environment variable to `\lib\libgcc_s.so.1`.

---

**Executing the Application on 64-Bit Macintosh (Maci64)**

For 64-bit Macintosh, you run the application through the bundle:

`magicsquare.app/Contents/MacOS/magicsquare`



# Troubleshooting

---

- “Testing Failures” on page 12-2
- “Investigate Deployed Application Failures” on page 12-4

## Testing Failures

After you have successfully compiled your application, the next step is to test it on a development machine and deploy it on a target machine. Typically the target machine does not have a MATLAB installation and requires that the MATLAB Runtime be installed. A distribution includes all of the files that are required by your application to run, which include the executable, deployable archive and the MATLAB Runtime.

Test the application on the development machine by running the application against the MATLAB Runtime shipped with MATLAB Compiler. This will verify that library dependencies are correct, that the deployable archive can be extracted and that all MATLAB code, MEX-files and support files required by the application have been included in the archive. If you encounter errors testing your application, the questions in the column to the right may help you isolate the problem.

### **Are you able to execute the application from MATLAB?**

On the development machine, you can test your application's execution by issuing `!application-name` at the MATLAB prompt. If your application executes within MATLAB but not from outside, this can indicate an issue with the system PATH variable.

### **Does the application begin execution and result in MATLAB or other errors?**

Ensure that you included all necessary files when compiling your application (see the `readme.txt` file generated with your compilation for more details).

Functions that are called from your main MATLAB file are automatically included by MATLAB Compiler; however, functions that are not explicitly called, for example through EVAL, need to be included at compilation using the `-a` switch of the `mcc` command. Also, any support files like `.mat`, `.txt`, or `.html` files need to be added to the archive with the `-a` switch. There is a limitation on the functionality of MATLAB and associated toolboxes that can be compiled. Check the documentation to see that the functions used in your application's MATLAB files are valid. Check the file `mccExcludedFiles.log` on the development machine. This file lists all functions called from your application that cannot be compiled.

### **Do you have multiple MATLAB versions installed?**

Executables generated by MATLAB Compiler are designed to run in an environment where multiple versions of MATLAB are installed. Some older versions of MATLAB may not be fully compatible with this architecture.

On Windows, ensure that the `matlabroot\runtime\win64` of the version of MATLAB in which you are compiling appears ahead of `matlabroot\runtime\win64` of other versions of MATLAB installed on the PATH environment variable on your machine.

Similarly, on UNIX, ensure that the dynamic library paths (`LD_LIBRARY_PATH` on Linux) match. Do this by comparing the outputs of `!printenv` at the MATLAB prompt and `printenv` at the shell prompt. Using this path allows you to use `mcc` from the operating system command line.

### **If you are testing a standalone executable or shared library and driver application, did you install the MATLAB Runtime?**

All shared libraries required for your standalone executable or shared library are contained in the MATLAB Runtime. Installing the MATLAB Runtime is required for any of the deployment targets.



### Do you receive an error message about a missing DLL?

Error messages indicating missing DLLs such as `mclmcrprt7x.dll` or `mclmcrprt7x.so` are generally caused by incorrect installation of the MATLAB Runtime. It is also possible that the MATLAB Runtime is installed correctly, but that the `PATH`, `LD_LIBRARY_PATH`, or `DYLD_LIBRARY_PATH` variables is set incorrectly. For information on installing the MATLAB Runtime on a deployment machine, see “Install and Configure the MATLAB Runtime” on page 7-3.

---

**Caution** Do not solve these problems by moving libraries or other files within the MATLAB Runtime folder structure. The system is designed to accommodate different MATLAB Runtime versions operating on the same machine. The folder structure is an important part of this feature.

---

### Does your system’s graphics card support the graphics application?

In situations where the existing hardware graphics card does not support the graphics application, you should use software OpenGL. OpenGL libraries are visible for an application by appending `matlab/sys/opengl/lib/arch` to the `LD_LIBRARY_PATH`. For example:

```
setenv LD_LIBRARY_PATH $LD_LIBRARY_PATH:matlab/sys/opengl/lib/arch
```

For issues with MATLAB graphics in Linux, set the environment variable `LD_LIBRARY_PATH` to:

```
setenv LD_LIBRARY_PATH $MATLAB/sys/opengl/lib/glnxa64:$LD_LIBRARY_PATH
```

### Is OpenGL properly installed on your system?

When searching for OpenGL libraries, the MATLAB Runtime first looks on the system library path. If OpenGL is not found there, it will use the `LD_LIBRARY_PATH` environment variable to locate the libraries. If you are getting failures due to the OpenGL libraries not being found, you can append the location of the OpenGL libraries to the `LD_LIBRARY_PATH` environment variable. For example:

```
setenv LD_LIBRARY_PATH $LD_LIBRARY_PATH:matlab/sys/opengl/lib/arch
```

## Investigate Deployed Application Failures

After the application is working on the test machine, failures can be isolated in end-user deployment. The end users of your application need to install the MATLAB Runtime on their machines. The MATLAB Runtime includes a set of shared libraries that provides support for all features of MATLAB. If your application fails during end-user deployment, the following questions in the column to the right may help you isolate the problem.

---

**Note** There are a number of reasons why your application might not deploy to end users, after running successfully in a test environment. For a detailed list of guidelines for writing MATLAB code that can be consumed by end users, see “Write Deployable MATLAB Code” on page 5-8

---

### Is the MATLAB Runtime installed?

All shared libraries required for your standalone executable or shared library are contained in the MATLAB Runtime. Installing the MATLAB Runtime is required for any of the deployment targets. See “Install and Configure the MATLAB Runtime” on page 7-3 for complete information.

### If running on UNIX or Mac, did you update the dynamic library path after installing the MATLAB Runtime?

For information on installing the MATLAB Runtime on a deployment machine, see “Install and Configure the MATLAB Runtime” on page 7-3.

### Do you receive an error message about a missing DLL?

Error messages indicating missing DLLs such as `mclmcr7x.dll` or `mclmcr7x.so` are generally caused by incorrect installation of the MATLAB Runtime. It is also possible that the MATLAB Runtime is installed correctly, but that the `PATH`, `LD_LIBRARY_PATH`, or `DYLD_LIBRARY_PATH` variables are set incorrectly. For information on installing the MATLAB Runtime on a deployment machine, see “Install and Configure the MATLAB Runtime” on page 7-3.

---

**Caution** Do not solve these problems by moving libraries or other files within the MATLAB Runtime folder structure. The system is designed to accommodate different MATLAB Runtime versions operating on the same machine. The folder structure is an important part of this feature.

---

### Do you have write access to the directory the application is installed in?

The first operation attempted by a compiled application is extraction of the deployable archive. If the archive is not extracted, the application cannot access the compiled MATLAB code and the application fails. If the application has write access to the installation folder, a subfolder named *application-name\_mcr* is created the first time the application is run. After this subfolder is created, the application no longer needs write access for subsequent executions.

### Are you executing a newer version of your application?

When deploying a newer version of an executable, both the executable needs to be redeployed, since it also contains the embedded deployable archive. The deployable archive is keyed to a specific compilation session. Every time an application is recompiled, a new, matched deployable archive is created. As above, write access is required to expand the new deployable archive. Deleting the

existing *application-name\_mcr* folder and running the new executable will verify that the application can expand the new deployable archive.



# Limitations and Restrictions

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- “Limitations” on page 13-2
- “Functions Not Supported for Compilation by MATLAB Compiler and MATLAB Compiler SDK ” on page 13-7

## Limitations

### Packaging MATLAB and Toolboxes

MATLAB Compiler supports the full MATLAB language and almost all toolboxes based on MATLAB except:

- Most of the prebuilt graphical user interfaces included in MATLAB and its companion toolboxes.
- Functionality that cannot be called directly from the command line.
- Symbolic Math Toolbox™
- Cross-platform compatibility of applications. For example, you cannot run an application compiled in Windows on Linux.

Compiled applications can run only on operating systems that run MATLAB. However, components generated by the MATLAB Compiler cannot be used in MATLAB. Also, since the MATLAB Runtime is approximately the same size as MATLAB, applications built with MATLAB Compiler need specific storage memory and RAM to operate. For the most up-to-date information about system requirements, go to the MathWorks website.

To see the full list of MATLAB Compiler limitations, visit: [https://www.mathworks.com/products/compiler/compiler\\_support.html](https://www.mathworks.com/products/compiler/compiler_support.html).

---

**Note** For a list of functions not supported by the MATLAB Compiler See “Functions Not Supported for Compilation by MATLAB Compiler and MATLAB Compiler SDK” on page 13-7.

---

### Fixing Callback Problems: Missing Functions

When MATLAB Compiler creates a standalone application, it packages the MATLAB files that you specify on the command line. In addition, it includes any other MATLAB files that your packaged MATLAB files call. MATLAB Compiler uses a dependency analysis, which determines all the functions on which the supplied MATLAB files, MEX-files, and P-files depend.

---

**Note** If the MATLAB file associated with a p-file is unavailable, the dependency analysis cannot discover the p-file dependencies.

---

The dependency analysis cannot locate a function if the only place the function is called in your MATLAB file is a call to the function in either of the following:

- Callback string
- Character array passed as an argument to the `feval` function or an ODE solver

---

**Tip** Dependent functions can also be hidden from the dependency analyzer in `.mat` files that are loaded by compiled applications. Use the `mcc -a` argument or the `%#function` pragma to identify `.mat` file classes or functions that are supported by the `load` command.

---

MATLAB Compiler does not look in these text character arrays for the names of functions to package.

## Symptom

Your application runs, but an interactive user interface element, such as a push button, does not work. The compiled application issues this error message:

```
An error occurred in the callback: change_colormap
The error message caught was      : Reference to unknown function
                                change_colormap from FEVAL in stand-alone mode.
```

## Workaround

There are several ways to eliminate this error:

- Using the `##function` pragma and specifying callbacks as character arrays
- Specifying callbacks with function handles
- Using the `-a` option

### Specifying Callbacks as Character Arrays

Create a list of all the functions that are specified only in callback character arrays and pass these functions using separate `##function` pragma statements. This overrides the product dependency analysis and instructs it to explicitly include the functions listed in the `##function` pragmas.

For example, the call to the `change_colormap` function in the sample application `my_test` illustrates this problem. To make sure MATLAB Compiler processes the `change_colormap` MATLAB file, list the function name in the `##function` pragma.

```
function my_test()
% Graphics library callback test application

##function change_colormap

peaks;

p_btn = uicontrol(gcf,...
                 'Style', 'pushbutton',...
                 'Position',[10 10 133 25 ],...
                 'String', 'Make Black & White',...
                 'Callback','change_colormap');
```

### Specifying Callbacks with Function Handles

To specify the callbacks with function handles, use the same code as in the example above, and replace the last line with:

```
'Callback',@change_colormap);
```

For more information on specifying the value of a callback, see the MATLAB Programming Fundamentals documentation.

### Using the `-a` Option

Instead of using the `##function` pragma, you can specify the name of the missing MATLAB file on the MATLAB Compiler command line using the `-a` option.

## Finding Missing Functions in a MATLAB File

To find functions in your application that need to be listed in a `%#function` pragma, search your MATLAB file source code for text specified as callback character arrays or as arguments to the `feval`, `fminbnd`, `fminsearch`, `funm`, and `fzero` functions or any ODE solvers.

To find text used as callback character array, search for the characters “Callback” or “fcn” in your MATLAB file. This search finds all the `Callback` properties defined by graphics objects, such as `uicontrol` and `uimenu`. In addition, it finds the properties of figures and axes that end in `Fcn`, such as `CloseRequestFcn`, that also support callbacks.

## Suppressing Warnings on the UNIX System

Several warnings might appear when you run a standalone application on the UNIX system.

To suppress the `libjvm.so` warning, set the dynamic library path properly for your platform. See “MATLAB Runtime Path Settings for Run-Time Deployment” on page 14-2.

You can also use the compiler option `-R -nojvm` to set your application's `nojvm` run-time option, if the application is capable of running without Java.

## Cannot Use Graphics with the -nojvm Option

If your program uses graphics and you compile with the `-nojvm` option, you get a run-time error.

## Cannot Create the Output File

If you receive this error, there are several possible causes to consider.

Can't create the output file *filename*

Possible causes include:

- Lack of write permission for the folder where MATLAB Compiler is attempting to write the file (most likely the current working folder).
- Lack of free disk space in the folder where MATLAB Compiler is attempting to write the file (most likely the current working folder).
- If you are creating a standalone application and have been testing it, it is possible that a process is running and is blocking MATLAB Compiler from overwriting it with a new version.

## No MATLAB File Help for Packaged Functions

If you create a MATLAB file with self-documenting online help and package it, the results of following command are unintelligible:

```
help filename
```

---

**Note** For performance reasons, MATLAB file comments are stripped out before MATLAB Runtime encryption.

---



## No MATLAB Runtime Versioning on Mac OS X

The feature that allows you to install multiple versions of the MATLAB Runtime on the same machine is not supported on Mac OS X. When you receive a new version of MATLAB, you must recompile and redeploy all your applications and components. Also, when you install a new MATLAB Runtime on a target machine, you must delete the old version of the MATLAB Runtime and install the new one. You can have only one version of the MATLAB Runtime on the target machine.

## Older Neural Networks Not Deployable with MATLAB Compiler

Loading networks saved from older Deep Learning Toolbox versions requires some initialization routines that are not deployable. Therefore, these networks cannot be deployed without first being updated.

For example, deploying with Deep Learning Toolbox Version 5.0.1 (2006b) and MATLAB Compiler Version 4.5 (R2006b) yields the following errors at run time:

```
??? Error using ==> network.subsasgn
"layers{1}.initFcn" cannot be set to non-existing
function "initwb".
Error in ==> updatenet at 40
Error in ==> network.loadobj at 10
```

```
??? Undefined function or method 'sim' for input
arguments of type 'struct'.
Error in ==> mynetworkapp at 30
```

## Restrictions on Calling PRINTDLG with Multiple Arguments in Packaged Mode

In compiled mode, only one argument can be present in a call to the MATLAB `printdlg` function (for example, `printdlg(gcf)`).

You cannot receive an error when making a call to `printdlg` with multiple arguments. However, when an application containing the multiple-argument call is packaged, the action fails with the following error message:

```
Error using = => printdlg at 11
PRINTDLG requires exactly one argument
```

## Packaging a Function with which Does Not Search Current Working Folder

Using `which`, as in this example, does not cause the current working folder to be searched in deployed applications. In addition, it may cause unpredictable behavior of the `open` function.

```
function pathtest
which myFile.mat
open('myFile.mat')
```

Use one of the following solutions as an alternative:

- Use the `pwd` function to explicitly point to the file in the current folder, as follows:

```
open([pwd 'myFile.mat'])
```

- Rather than using the general `open` function, use `load` or other specialized functions for your particular file type, as `load` explicitly checks for the file in the current folder. For example:

```
load myFile.mat
```

- Include your file in the **Files required for your application to run** area of the **Compiler** app or the `-a` flag using `mcc`.

## Restrictions on Using C++ SetData to Dynamically Resize an mxArray

You cannot use the C++ `SetData` method to dynamically resize `mxArrays`.

For instance, if you are working with the following array:

```
[1 2 3 4]
```

you cannot use `SetData` to increase the size of the array to a length of five elements.

## Accepted File Types for Packaging

The valid and invalid file types for packaging using deployment apps are as follows:

Target Application	Valid File Types	Invalid File Types
Standalone Application	MATLAB MEX files, MATLAB scripts, and MATLAB functions. These files must have a single entry point.	MATLAB class files, protected function files (.p files), Java functions, COM or .NET components, and data files. MATLAB class files can be dependent files.
Library Compiler	MATLAB MEX files and MATLAB functions. These files must have a single entry point.	MATLAB scripts, MATLAB class files, protected function files (.p files), Java functions, COM or .NET components, and data files. MATLAB class files can be dependent files.
MATLAB Production Server	MATLAB MEX files and MATLAB functions. These files must have a single entry point.	MATLAB scripts, MATLAB class files, protected function files (.p files), Java functions, COM or .NET components, and data files. MATLAB class files can be dependent files.

## See Also

### More About

- “Functions Not Supported for Compilation by MATLAB Compiler and MATLAB Compiler SDK” on page 13-7

## Functions Not Supported for Compilation by MATLAB Compiler and MATLAB Compiler SDK

---

**Note** Due to the number of active and ever-changing list of MathWorks products and functions, this is not a complete list of functions that cannot be compiled. If you have a question as to whether a specific MathWorks product's function is able to be compiled or not, the definitive source is that product's documentation. For an updated list of such functions, see Support for MATLAB and Toolboxes.

---

Functions that cannot be compiled fall into the following categories:

- Functions that print or report MATLAB code from a function, such as the MATLAB `help` function or debug functions.
- Simulink functions, in general.
- Functions that require a command line, such as the MATLAB `lookfor` function.
- `clc`, `home`, and `savepath`, which do not do anything in deployed mode.

In addition, there are functions and programs that have been identified as non-deployable due to licensing restrictions.

Only certain tools that allow run-time manipulation of figures are supported for compilation, for example, adding legends, selecting data points, zooming in and out, etc.

`mccExcludedFiles.log` lists all the functions and files excluded by `mcc`. It is created after each attempted build.

**List of Unsupported Functions and Programs**

add\_block  
add\_line  
checkcode  
close\_system  
colormapeditor  
commandwindow  
Control System Toolbox™ prescale GUI  
createClassFromWsdL  
dbclear  
dbcont  
dbdown  
dbquit  
dbstack  
dbstatus  
dbstep  
dbstop  
dbtype  
dbup  
delete\_block  
delete\_line  
depfun  
doc  
echo  
edit  
fields  
figure\_palette  
get\_param  
help  
home  
inmem  
keyboard  
linkdata  
linmod  
matlab.unittest.TestSuite.fromProject  
mislocked  
mlock  
more  
munlock

new\_system  
open  
open\_system  
pack  
pcode  
plotbrowser  
plottedit  
plottools  
profile  
profsave  
propedit  
propertyeditor  
publish  
rehash  
restoredefaultpath  
run  
segment  
set\_param  
sldebug  
type



# Reference Information

---

- “MATLAB Runtime Path Settings for Run-Time Deployment” on page 14-2
- “MATLAB Compiler Licensing” on page 14-4
- “Deployment Product Terms” on page 14-5

## MATLAB Runtime Path Settings for Run-Time Deployment

In this section...
“General Path Guidelines” on page 14-2
“Path for Java Applications on All Platforms” on page 14-2
“Windows Path for Run-Time Deployment” on page 14-2
“Linux Paths for Run-Time Deployment” on page 14-3
“OS X Paths for Run-Time Deployment” on page 14-3

### General Path Guidelines

Regardless of platform, be aware of the following guidelines with regards to placing specific folders on the path:

- Always avoid including `arch` on the path. Failure to do so may inhibit ability to run multiple MATLAB Runtime instances.
- Ideally, set the environment in a separate shell script to avoid run-time errors caused by path-related issues.

### Path for Java Applications on All Platforms

When your users run applications that contain compiled MATLAB code, you must instruct them to set the path so that the system can find the MATLAB Runtime.

---

**Note** When you deploy a Java application to end users, they must set the class path on the target machine.

The system needs to find `.jar` files containing the MATLAB libraries. To tell the system how to locate the `.jar` files it needs, specify a `classpath` either in the `javac` command or in your system environment variables.

---

### Windows Path for Run-Time Deployment

The following folder should be added to the system path:

```
mcr_root\version\runtime\win64
```

*mcr\_root* refers to the complete path where the MATLAB Runtime library archive files are installed on the machine where the application is to be run.

*mcr\_root* is version specific; you must determine the path after you install the MATLAB Runtime.

---

**Note** If you are running the MATLAB Runtime installer on a shared folder, be aware that other users of the share may need to alter their system configuration.

---



## Linux Paths for Run-Time Deployment

Use these `setenv` commands to set your MATLAB Runtime paths.

```
setenv LD_LIBRARY_PATH  
  mcr_root/version/runtime/glnxa64:  
  mcr_root/version/bin/glnxa64:  
  mcr_root/version/sys/os/glnxa64:  
  mcr_root/version/sys/opengl/lib/glnxa64
```

## OS X Paths for Run-Time Deployment

Use these `setenv` commands to set your MATLAB Runtime paths.

```
setenv DYLD_LIBRARY_PATH  
  mcr_root/version/runtime/maci64:  
  mcr_root/version/bin/maci64:  
  mcr_root/version/sys/os/maci64
```

## MATLAB Compiler Licensing

### Using MATLAB Compiler Licenses for Development

You can run MATLAB Compiler from the MATLAB command prompt (MATLAB mode) or the DOS/UNIX prompt (standalone mode).

MATLAB Compiler uses a lingering license. This has different behavior in MATLAB mode and standalone mode.

#### Running MATLAB Compiler in MATLAB Mode

When you run MATLAB Compiler from “inside” of the MATLAB environment, that is, you run `mcc` from the MATLAB command prompt, you hold the MATLAB Compiler license as long as MATLAB remains open. To give up the MATLAB Compiler license, exit MATLAB.

#### Running MATLAB Compiler in Standalone Mode

If you run MATLAB Compiler from a DOS or UNIX prompt, you are running from “outside” of MATLAB. In this case, MATLAB Compiler

- Does not require MATLAB to be running on the system where MATLAB Compiler is running
- Gives the user a dedicated 30-minute time allotment during which the user has complete ownership over a license to MATLAB Compiler

Each time a user requests MATLAB Compiler, the user begins a 30-minute time period as the sole owner of the MATLAB Compiler license. Anytime during the 30-minute segment, if the same user requests MATLAB Compiler, the user gets a new 30-minute allotment. When the 30-minute interval has elapsed, if a different user requests MATLAB Compiler, the new user gets the next 30-minute interval.

When a user requests MATLAB Compiler and a license is not available, the user receives the message

```
Error: Could not check out a Compiler License.
```

This message is given when no licenses are available. As long as licenses are available, the user gets the license and no message is displayed. The best way to guarantee that all MATLAB Compiler users have constant access to MATLAB Compiler is to have an adequate supply of licenses for your users.

## Deployment Product Terms

### A

*Add-in* — A Microsoft Excel add-in is an executable piece of code that can be actively integrated into a Microsoft Excel application. Add-ins are front-ends for COM components, usually written in some form of Microsoft Visual Basic®.

*Application program interface (API)* — A set of classes, methods, and interfaces that is used to develop software applications. Typically an API is used to provide access to specific functionality. See *MWArray*.

*Application* — An end user-system into which a deployed functions or solution is ultimately integrated. Typically, the end goal for the deployment customer is integration of a deployed MATLAB function into a larger enterprise environment application. The deployment products prepare the MATLAB function for integration by wrapping MATLAB code with enterprise-compatible source code, such as C, C++, C# (.NET), F#, and Java code.

*Assembly* — An executable bundle of code, especially in .NET.

### B

*Binary* — See *Executable*.

*Boxed Types* — Data types used to wrap opaque C structures.

*Build* — See *Compile*.

### C

*Class* — A user-defined type used in C++, C#, and Java, among other object-oriented languages, that is a prototype for an object in an object-oriented language. It is analogous to a derived type in a procedural language. A class is a set of objects which share a common structure and behavior. Classes relate in a class hierarchy. One class is a specialization (a subclass) of another (one of its *superclasses*) or comprises other classes. Some classes use other classes in a client-server relationship. Abstract classes have no members, and concrete classes have one or more members. Differs from a MATLAB class

*Compile* — In MATLAB Compiler and MATLAB Compiler SDK, to compile MATLAB code involves generating a binary that wraps around MATLAB code, enabling it to execute in various computing environments. For example, when MATLAB code is compiled into a Java package, a Java wrapper provides Java code that enables the MATLAB code to execute in a Java environment.

*COM component* — In MATLAB Compiler, the executable back-end code behind a Microsoft Excel add-in. In MATLAB Compiler SDK, an executable component, to be integrated with Microsoft COM applications.

*Console application* — Any application that is executed from a system command prompt window.

### D

*Data Marshaling* — Data conversion, usually from one type to another. Unless a MATLAB deployment customer is using type-safe interfaces, data marshaling—as from mathematical data types to MathWorks data types such as represented by the *MWArray* API—must be performed manually, often at great cost.

*Deploy* — The act of integrating MATLAB code into a larger-scale computing environment, usually to an enterprise application, and often to end users.

*Deployable archive* — The deployable archive is embedded by default in each binary generated by MATLAB Compiler or MATLAB Compiler SDK. It houses the deployable package. All MATLAB-based content in the deployable archive uses the Advanced Encryption Standard (AES) cryptosystem. See “Additional Details” on page 5-6.

*DLL* — Dynamic link library. Microsoft's implementation of the shared library concept for Windows. Using DLLs is much preferred over the previous technology of static (or non-dynamic) libraries, which had to be manually linked and updated.

## E

*Empties* — Arrays of zero (0) dimensions.

*Executable* — An executable bundle of code, made up of binary bits (zeros and ones) and sometimes called a *binary*.

## F

*Fields* — For this definition in the context of MATLAB Data Structures, see *Structs*.

*Fields and Properties* — In the context of .NET, *Fields* are specialized classes used to hold data. *Properties* allow users to access class variables as if they were accessing member fields directly, while actually implementing that access through a class method.

## I

*Integration* — Combining deployed MATLAB code's functionality with functionality that currently exists in an enterprise application. For example, a customer creates a mathematical model to forecast trends in certain commodities markets. In order to use this model in a larger-scale financial application (one written with the Microsoft .NET Framework, for instance) the deployed financial model must be integrated with existing C# applications, run in the .NET enterprise environment.

*Instance* — For the definition of this term in context of MATLAB Production Server software, see *MATLAB Production Server Server Instance*.

## J

*JAR* — Java archive. In computing software, a JAR file (or Java Archive) aggregates many files into one. Software developers use JARs to distribute Java applications or libraries, in the form of classes and associated metadata and resources (text, images, etc.). Computer users can create or extract JAR files using the `jar` command that comes with a Java Development Kit (JDK).

*Java-MATLAB Interface* — Known as the *JMI Interface*, this is the Java interface built into MATLAB software.

*JDK* — The Java Development Kit is a product which provides the environment required for programming in Java.

*JMI Interface* — see *Java-MATLAB Interface*.

*JRE* — Java Run-Time Environment is the part of the Java Development Kit (JDK) required to run Java programs. It comprises the Java Virtual Machine, the Java platform core classes, and supporting files.

It does not include the compiler, debugger, or other tools present in the JDK™. The JRE™ is the smallest set of executables and files that constitute the standard Java platform.

## M

*Magic Square* — A square array of integers arranged so that their sum is the same when added vertically, horizontally, or diagonally.

*MATLAB Runtime* — An execution engine made up of the same shared libraries. MATLAB uses these libraries to enable the execution of MATLAB files on systems without an installed version of MATLAB.

*MATLAB Runtime singleton* — See *Shared MATLAB Runtime instance*.

*MATLAB Runtime workers* — A MATLAB Runtime session. Using MATLAB Production Server software, you have the option of specifying more than one MATLAB Runtime session, using the `--num-workers` options in the server configurations file.

*MATLAB Production Server Client* — In the MATLAB Production Server software, clients are applications written in a language supported by MATLAB Production Server that call deployed functions hosted on a server.

*MATLAB Production Server Configuration* — An instance of the MATLAB Production Server containing at least one server and one client. Each configuration of the software usually contains a unique set of values in the server configuration file, `main_config` (MATLAB Production Server).

*MATLAB Production Server Server Instance* — A logical server configuration created using the `mps-new` command in MATLAB Production Server software.

*MATLAB Production Server Software* — Product for server/client deployment of MATLAB programs within your production systems, enabling you to incorporate numerical analytics in enterprise applications. When you use this software, web, database, and enterprise applications connect to MATLAB programs running on MATLAB Production Server via a lightweight client library, isolating the MATLAB programs from your production system. MATLAB Production Server software consists of one or more servers and clients.

*Marshaling* — See *Data Marshaling*.

*mbuild* — MATLAB Compiler SDK command that compiles and links C and C++ source files into standalone applications or shared libraries. For more information, see the `mbuild` function reference page.

*mcc* — The MATLAB command that invokes the compiler. It is the command-line equivalent of using the compiler apps.

*Method Attribute* — In the context of .NET, a mechanism used to specify declarative information to a .NET class. For example, in the context of client programming with MATLAB Production Server software, you specify method attributes to define MATLAB structures for input and output processing.

*mxArray interface* — The MATLAB data type containing all MATLAB representations of standard mathematical data types.

*MWArray interface* — A proxy to `mxArray`. An application program interface (API) for exchanging data between your application and MATLAB. Using `MWArray`, you marshal data from traditional mathematical types to a form that can be processed and understood by MATLAB data type `mxArray`.

There are different implementations of the `MWArray` proxy for each application programming language.

## P

*Package* — The act of bundling the deployed MATLAB code, along with the MATLAB Runtime and other files, into an installer that can be distributed to others. The compiler apps place the installer in the `for_redistribution` subfolder. In addition to the installer, the compiler apps generate a number of loose artifacts that can be used for testing or building a custom installer.

*PID File* — See *Process Identification File (PID File)*.

*Pool* — A pool of threads, in the context of server management using MATLAB Production Server software. Servers created with the software do not allocate a unique thread to each client connection. Rather, when data is available on a connection, the required processing is scheduled on a pool, or group, of available threads. The server configuration file option `--num-threads` sets the size of that pool (the number of available request-processing threads) in the master server process.

*Process Identification File (PID File)* — A file that documents informational and error messages relating to a running server instance of MATLAB Production Server software.

*Program* — A bundle of code that is executed to achieve a purpose. Programs usually are written to automate repetitive operations through computer processing. Enterprise system applications usually consist of hundreds or even thousands of smaller programs.

*Properties* — For this definition in the context of .NET, see *Fields and Properties*.

*Proxy* — A software design pattern typically using a class, which functions as an interface to something else. For example, `MWArray` is a proxy for programmers who need to access the underlying type `mxArray`.

## S

*Server Instance* — See MATLAB Production Server Server Instance.

*Shared Library* — Groups of files that reside in one space on disk or memory for fast loading into Windows applications. Dynamic-link libraries (DLLs) are Microsoft's implementation of the shared library concept for Microsoft Windows.

*Shared MATLAB Runtime instance* — When using MATLAB Compiler SDK, you can create a shared MATLAB Runtime instance, also known as a singleton. When you invoke MATLAB Compiler with the `-S` option through the compiler (using either `mcc` or a compiler app), a single MATLAB Runtime instance is created for each COM component or Java package in an application. You reuse this instance by sharing it among all subsequent class instances. Such sharing results in more efficient memory usage and eliminates the MATLAB Runtime startup cost in each subsequent class instantiation. All class instances share a single MATLAB workspace and share global variables in the deployed MATLAB files. MATLAB Compiler SDK creates singletons by default for .NET assemblies. MATLAB Compiler creates singletons by default for the COM components used by the Excel add-ins.

*State* — The present condition of MATLAB, or the MATLAB Runtime. MATLAB functions often carry state in the form of variable values. The MATLAB workspace itself also maintains information about global variables and path settings. When deploying functions that carry state, you must often take additional steps to ensure state retention when deploying applications that use such functions.

*Structs* — MATLAB Structures. Structs are MATLAB arrays with elements that you access using textual field designators. Fields are data containers that store data of a specific MATLAB type.

*System Compiler* — A key part of Interactive Development Environments (IDEs) such as Microsoft Visual Studio®.

## T

*Thread* — A portion of a program that can run independently of and concurrently with other portions of the program. See *pool* for additional information on managing the number of processing threads available to a server instance.

*Type-safe interface* — An API that minimizes explicit type conversions by hiding the `MWArray` type from the calling application.

## W

*Web Application Archive (WAR)* — In computing, a Web Application Archive is a JAR file used to distribute a collection of JavaServer pages, servlets, Java classes, XML files, tag libraries, and static web pages that together constitute a web application.

*Webfigure* — A MathWorks representation of a MATLAB figure, rendered on the web. Using the WebFigures feature, you display MATLAB figures on a website for graphical manipulation by end users. This enables them to use their graphical applications from anywhere on the web, without the need to download MATLAB or other tools that can consume costly resources.

*Windows Communication Foundation (WCF)* — The Windows Communication Foundation™ is an application programming interface in the .NET Framework for building connected, service-oriented, web-centric applications. WCF is designed in accordance with service oriented architecture principles to support distributed computing where services are consumed by client applications.





# Functions

---

## **%#exclude**

Ignore a file or function dependency during dependency analysis while executing the `mcc` command

### **Syntax**

```
%#exclude fileOrFunction1 [fileOrFunction2 ... fileOrFunctionN]
```

### **Description**

`%#exclude fileOrFunction1 [fileOrFunction2 ... fileOrFunctionN]` pragma informs the `mcc` command that the specified file(s) or function(s) need to be excluded from dependency analysis during compilation.

### **Examples**

#### **Using %#exclude Within a MATLAB Function**

Create a MATLAB function named `testExclusion` that includes a `%#exclude` pragma to determine which files are included and which ones are excluded while executing the `mcc` command with various options.

```
function testExclusion()  
  
%#exclude foo.mat  
load foo.mat  
load bar.mat  
  
%#function foo.txt  
fid = fopen('foo.txt');  
fclose(fid)
```

- Executing `mcc -m testExclusion.m` results in:
  - `bar.mat` and `foo.txt` being included during dependency analysis
  - `foo.mat` being excluded
- Executing `mcc -m testExclusion.m -X` results in:
  - `foo.txt` being included during dependency analysis
  - `bar.mat` and `foo.mat` being excluded
- Executing `mcc -m testExclusion.m -X -a foo.mat` results in:
  - `foo.mat` and `foo.txt` being included during dependency analysis
  - `bar.mat` being excluded

The `-a` option in the `mcc` command is used to add files. The `%#function` pragma is used to inform the `mcc` command that the specified function(s) should be included in the compilation.

In the last case, `-a` option takes precedence over the `##exclude` pragma.

## **See Also**

`mcc`

**Introduced in R2020a**

## **%#function**

Pragma to help MATLAB Compiler locate functions called through `feval`, `eval`, Handle Graphics callback, or objects loaded from MAT-files

### **Syntax**

```
%#function function1 [function2 ... functionN]
```

```
%#function object_constructor
```

### **Description**

The `%#function` pragma informs MATLAB Compiler that the specified function(s) will be called through an `feval`, `eval`, Handle Graphics<sup>®</sup> callback, or objects loaded from MAT-files.

Use the `%#function` pragma in standalone applications to inform MATLAB Compiler that the specified function(s) should be included in the compilation, whether or not MATLAB Compiler's dependency analysis detects the function(s). It is also possible to include objects by specifying the object constructor.

Without this pragma, the product's dependency analysis will not be able to locate and compile all MATLAB files used in your application. This pragma adds the top-level function as well as all the local functions in the file to the compilation.

### **Examples**

#### **Example 1**

```
function foo
    %#function bar

    feval('bar');

end %#function foo
```

By implementing this example, MATLAB Compiler is notified that function `bar` will be included in the compilation and is called through `feval`.

#### **Example 2**

```
function foo
    %#function bar foobar

    feval('bar');
    feval('foobar');

end %#function foo
```

In this example, multiple functions (`bar` and `foobar`) are included in the compilation and are called through `feval`.

### Example 3

```
function foo
    ##function ClassificationSVM

        load('svm-classifier.mat');
        num_dimensions = size(svm_model.PredictorNames, 2);

    end ##function foo
```

In this example, an object from the class `ClassificationSVM` is loaded from a MAT-file. For more information, see “MATLAB Data Files in Compiled Applications”.

**Introduced before R2006a**

# applicationCompiler

Build and package functions into standalone applications

## Syntax

```
applicationCompiler  
applicationCompiler project_name
```

## Description

`applicationCompiler` opens the MATLAB standalone compiler for the creation of a new compiler project. For more information on the Application Compiler app, see Application Compiler.

`applicationCompiler project_name` opens the MATLAB standalone compiler app with the project preloaded.

## Examples

### Create a New Standalone Application Project

Open the application compiler to create a new project.

```
applicationCompiler
```

## Input Arguments

### **project\_name** — name of the project to be compiled

character array or string

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

## Compatibility Considerations

### **-build and -package options will be removed**

*Not recommended starting in R2020a*

The `-build` and `-package` options will be removed. To build applications, use the `mcc` command, and to package and create an installer, use the `compiler.package.installer` function.

## See Also

`compiler.package.installer` | `deploytool` | `mcc`

**Introduced in R2013b**

# ctfroot

Location of files related to deployed application

## Syntax

```
root = ctfroot
```

## Description

`root = ctfroot` returns the name of the folder where the deployable archive for the application is expanded.

Use this function to access any file that the user would have included in their project (excluding the ones in the packaging folder).

## Examples

### Determine location of deployable archive

```
appRoot = ctfroot;
```

## Output Arguments

### **root** — Path to expanded deployable archive

character vector

Path to expanded deployable archive returned as a character vector in the form:

*application\_name\_mcr.*

**Introduced in R2006a**

# 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 array or string

Name of the project to be compiled, specified as a character array or string. The project must be on the current path.

**Introduced in R2006b**



# getmcruserdata

Retrieve MATLAB array value associated with a given key

## Syntax

```
value = getmcruserdata(key)
```

## Description

`value = getmcruserdata(key)` returns MATLAB data associated with the string `key` in the current MATLAB Runtime instance. If there is no data associated with the key, it returns an empty matrix.

This function is part of the MATLAB Runtime User Data interface API. It is available both in MATLAB and in deployed applications created with MATLAB Compiler and MATLAB Compiler SDK.

## Examples

Get the magic square data associated with the string 'magic' in the current instance of the MATLAB Runtime.

```
value = magic(3);  
setmcruserdata('magic', value);  
getmcruserdata('magic')
```

```
ans =  
     8     1     6  
     3     5     7  
     4     9     2
```

## Input Arguments

### key — Key associated with MATLAB data

string

`key` is the MATLAB string with which MATLAB data `value` is associated within the current instance of the MATLAB Runtime.

## Output Arguments

### value — Value of MATLAB data

any MATLAB data type including matrices, cell arrays, and Java objects

`value` is the MATLAB data associated with input string `key` for the current instance of the MATLAB Runtime.

## See Also

setmcruserdata

**Introduced in R2008b**

# isdeployed

Determine whether code is running in deployed or MATLAB mode

## Syntax

```
x = isdeployed
```

## Description

`x = isdeployed` returns true (1) when the function is running in deployed mode and false (0) if it is running in a MATLAB session.

If you include this function in an application and compile the application with MATLAB Compiler, the function will return true when the application is run in deployed mode. If you run the application containing this function in a MATLAB session, the function will return false.

## Extended Capabilities

### C/C++ Code Generation

Generate C and C++ code using MATLAB® Coder™.

Usage notes and limitations:

- Returns true and false as appropriate for MEX and SIM targets
- Returns false for other targets

**Introduced before R2006a**

## ismcc

Test if code is running during compilation process (using `mcc`)

### Syntax

```
x = ismcc
```

### Description

`x = ismcc` returns true when the function is being executed by `mcc` dependency checker and false otherwise.

When this function is executed by the compilation process started by `mcc`, it will return true. This function will return false when executed within MATLAB as well as in deployed mode. To test for deployed mode execution, use `isdeployed`. This function should be used to guard code in `matlabrc`, or `hgrc` (or any function called within them, for example `startup.m` in the example on this page), from being executed by MATLAB Compiler (`mcc`) or any of the MATLAB Compiler SDK targets.

In a typical example, a user has `ADDPATH` calls in their MATLAB code. These can be guarded from executing using `ismcc` during the compilation process and `isdeployed` for the deployed application as shown in the example on this page.

### Examples

```
`% startup.m
    if ~(ismcc || isdeployed)
        addpath(fullfile(matlabroot, 'work'));
    end
```

### Extended Capabilities

#### C/C++ Code Generation

Generate C and C++ code using MATLAB® Coder™.

Usage notes and limitations:

- Returns true and false as appropriate for MEX and SIM targets.
- Returns false for other targets.

### See Also

`isdeployed` | `mcc`

**Introduced in R2008b**

# libraryCompiler

Build and package functions for use in external applications

## Syntax

```
libraryCompiler  
libraryCompiler project_name
```

## Description

`libraryCompiler` opens the Library Compiler app for the creation of a new compiler project

`libraryCompiler project_name` opens the Library Compiler app with the project preloaded.

## Examples

### Create a New Project

Open the Library Compiler app to create a new project.

```
libraryCompiler
```

## Input Arguments

**project\_name** — name of the project to be compiled

character array or string

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

## Compatibility Considerations

**-build and -package options will be removed**

*Not recommended starting in R2020a*

The `-build` and `-package` options will be removed. To build applications, use the `mcc` command, and to package and create an installer, use the `compiler.package.installer` function.

**Introduced in R2013b**

## mcc

Compile MATLAB functions for deployment

### Syntax

```
mcc options mfilename1 mfilename2...mfilenameN
```

```
mcc -m options mfilename
```

```
mcc -e options mfilename
```

```
mcc -W 'excel:addin_name,className,version=version_number' -T link:lib  
options mfilename1 mfilename2...mfilenameN
```

```
mcc -H -W hadoop:archiveName,CONFIG:configFile
```

```
mcc -m options mfilename
```

### Description

`mcc options mfilename1 mfilename2...mfilenameN` compiles the functions as specified by the options.

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

- C/C++ shared libraries, .NET assemblies, Java packages, or Python packages see `mcc` for MATLAB Compiler SDK
- MATLAB Production Server deployable archives or Excel add-ins for MATLAB Production Server see `mcc` for MATLAB Compiler SDK

### Standalone Application

`mcc -m options mfilename` compiles the function into a standalone application.

This is equivalent to `mcc -W main -T link:exe`.

`mcc -e options mfilename` compiles the function into a standalone application that does not open an MS-DOS<sup>®</sup> command window.

This syntax is equivalent to `-W WinMain -T link:exe`.

### Excel Add-In

`mcc -W 'excel:addin_name,className,version=version_number' -T link:lib options mfilename1 mfilename2...mfilenameN` creates a Microsoft Excel add-in from the specified files.

- *addin\_name* — Specifies the name of the addin 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. If specified, *className*, needs to be different from *mfilename*.

- *version\_number* — Specifies the version number of the add-in file as *major.minor.bug.build* in the file system. You are not required to specify a version number. If you do not specify a version number, `mcc` sets the version number, by default, to `1.0.0.0`.
- *major* — Specifies the major version number. If you do not specify a number, `mcc` sets *major* to `0`.
- *minor* — Specifies the minor version number. If you do not specify a number, `mcc` sets *minor* to `0`.
- *bug*— Specifies the bug fix maintenance release number. If you do not specify a number, `mcc` sets *bug* to `0`.
- *build*— Specifies the build number. If you do not specify a number, `mcc` sets *build* to `0`.

---

**Note** Excel add-ins can be created only in MATLAB running on Windows.

---



---

**Note** Remove the single quotes around `'excel:addin_name,className,version'` when executing the `mcc` command from a DOS prompt.

---

### MapReduce Applications on Hadoop

`mcc -H -W hadoop:archiveName,CONFIG:configFile` generates a deployable archive that can be run as a job by Hadoop.

- *archiveName* — Specifies the name of the generated archive.
- *configFile* — Specifies the path to the configuration file for creating a deployable archive. For more information, see “Configuration File for Creating Deployable Archive Using the `mcc` Command”.

---

**Tip** You can issue the `mcc` command either at the MATLAB command prompt or the Windows or Linux system command-line.

---

### Simulink Simulations (Requires Simulink Compiler)

`mcc -m options mfilename` compiles a MATLAB application containing a Simulink simulation into a standalone application. For more information, see “Create and Deploy a Script with Simulink Compiler” (Simulink Compiler).

## Examples

### Create a standalone application

```
mcc -m magic.m
```

### Create a standalone application that does not open the Command shell (Windows only)

```
mcc -e magic.m
```

### Create a standalone application with a system-level file version number (Windows only)

Create a standalone application in Windows with version number `3.4.1.5`.

```
mcc -W 'main:,version=3.4.1.5' -T link:exe mymagic.m
```

### Create an Excel add-in

```
mcc -W 'excel:myAddin,myClass,1.0' -T link:lib magic.m
```

### Create an Excel add-in with a system-level file version number (Windows only)

Create an Excel add-in in Windows with version number 5.2.1.7.

```
mcc -W 'excel:myAddin,myClass,version=5.2.1.7' -T link:lib -b class{myClass:mymagic.m}
```

### Create a COM component

Create a COM component in Windows with version number 7.10.1.3.

```
mcc -W 'com:myCOMComponent,myClass,version=7.10.1.3' -T link:lib class{myClass:mymagic.m}
```

### Create an Excel add-in for MATLAB Production Server

```
mcc -W 'mpxml:myDeployableArchvie,myExcelClass,version=1.0' -T link:lib mymagic.m
```

### Create a Standalone Application for a Simulink Simulation (Requires Simulink Compiler)

To create a standalone application for a Simulink simulation:

Create a Simulink model using Simulink. This example uses the model `sldemo_suspn_3dof` that ships with Simulink.

Create a MATLAB application that uses APIs from Simulink Compiler to simulate the model. For more information, see “Deploy Simulations with Tunable Parameters” (Simulink Compiler).

```
function deployParameterTuning(outputFile, mbVariable)
    if ischar(mbVariable) || isstring(mbVariable)
        mbVariable = str2double(mbVariable);
    end

    if isnan(mbVariable) || ~isa(mbVariable, 'double') || ~isscalar(mbVariable)
        disp('mb must be a double scalar or a string or char that can be converted to a double scalar');
    end

    in = Simulink.SimulationInput('sldemo_suspn_3dof');
    in = in.setVariable('Mb', mbVariable);
    in = simulink.compiler.configureForDeployment(in);
    out = sim(in);

    save(outputFile, 'out');
end
```

Use `mcc` to create a standalone application from the MATLAB application.

```
mcc -m deployParameterTuning.m
```

## Input Arguments

### **mfilename** — File to be compiled

filename

File to be compiled, specified as a character vector or string scalar.



**mfilename1 mfilename2...mfilenameN — Files to be compiled**

list of filenames

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

**options — Options for customizing the output**

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

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

- **-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 use the `-a` option to specify a full path to a resource, the basic path is preserved, with some modifications, but relative to a subdirectory of the runtime cache directory, not to the user's local folder. The cache directory is created from the deployable archive the first time the application is executed. You can use the `isdeployed` function to determine whether the application is being run in deployed mode, and adjust the path accordingly. The `-a` option also creates a `.auth` file for authorization purposes.

---

**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” (MATLAB Compiler SDK).

- **-c**

When used in conjunction with the `-l` option, suppresses compiling and linking of the generated C wrapper code. The `-c` option cannot be used independently of the `-l` option.

- **-C**

Do not embed the deployable archive in binaries.

---

**Note** The `-C` flag is ignored for Java libraries.

---

- **-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. It specifically applies to the C/C++ shared libraries, COM, and Excel targets. 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 appends the folder to the end 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` to not 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 option provides a useful mechanism for defining compile-time options, for example, `-M "-Dmacro=value"`.

---

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

---

- **-n**

The `-n` option automatically identifies numeric command line inputs and treats them as MATLAB doubles.

- **-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`

- `matlabroot\toolbox\shared\bigdata`

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 (for example, `.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**

Provide MATLAB Runtime options. This option is relevant only when building standalone applications using MATLAB Compiler. The syntax is as follows:

`-R option`

Option	Description	Target
<code>-logfile, filename</code>	Specify a log file name.	MATLAB Compiler
<code>-nodisplay</code>	Suppress the MATLAB <code>nodisplay</code> run-time warning.	MATLAB Compiler
<code>-nojvm</code>	Do not use the Java Virtual Machine (JVM).	MATLAB Compiler

Option	Description	Target
- startmsg	Customizable user message displayed at initialization time.	MATLAB Compiler Standalone Applications
- complete msg	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`.

**Note** If you specify the `-R` option for libraries created from MATLAB Compiler SDK, `mcc` still compiles without errors and generates the results. But the `-R` option doesn't apply to these libraries and does not do anything.

- **-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 which 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	<ul style="list-style-type: none"> <li>• Using the Library Compiler app, click <b>Settings</b> and add <code>-S</code> to the <b>Additional parameters passed to MCC</b> field.</li> <li>• Using <code>mcc</code>, pass the <code>-S</code> flag.</li> </ul>
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 link object files into a standalone application.
link:lib	Same as compile:lib and also link 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.

- **-U**

Build deployable archive (.ctf file) for MATLAB Production Server.

- **-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
<code>-w list</code>	List the compile-time warnings that have abbreviated identifiers, together with their status.
<code>-w enable</code>	Enable all compile-time warnings.
<code>-w disable[:&lt;string&gt;]</code>	Disable specific compile-time warnings associated with <string>. Omit the optional <string> to apply the disable action to all compile-time warnings.
<code>-w enable[:&lt;string&gt;]</code>	Enable specific compile-time warnings associated with <string>. Omit the optional <string> to apply the enable action to all compile-time warnings.

Syntax	Description
<code>-w error[:&lt;string&gt;]</code>	Treat specific compile-time warnings associated with <i>&lt;string&gt;</i> as an error. Omit the optional <i>&lt;string&gt;</i> to apply the <code>error</code> action to all compile-time warnings.
<code>-w off[:&lt;string&gt;]</code>	Turn off warnings for specific error messages defined by <i>&lt;string&gt;</i> . Omit the optional <i>&lt;string&gt;</i> to apply the <code>off</code> action to all runtime warnings.
<code>-w on[:&lt;string&gt;]</code>	Turn on runtime warnings associated with <i>&lt;string&gt;</i> . Omit the optional <i>&lt;string&gt;</i> to apply the <code>on</code> action to all runtime warnings.

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

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

```
if isdeployed
    warning off
end
```

To turn on warnings for deployed applications, you write:

```
if isdeployed
    warning on
end
```

You can also specify multiple `-w` options.

For example, if you want to disable all warnings except `repeated_file`, you write:

```
-w disable -w enable:repeated_file
```

When you specify multiple `-w` options, they are processed from left to right.

- **-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.

- **-X**

Use `-X` to ignore data files read by common MATLAB file I/O functions during dependency analysis. For a list of MATLAB file I/O functions whose data files are ignored when you use the `-X` option, see “App Packaging Dependency Analysis” (MATLAB). For details on how to use `-X` option, see `%#exclude`.

- **-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
```

---

## Tips

- On Windows, you can generate a system-level file version number for your target file by appending `version=version_number` to the target generating `mcc` syntax. For an example, see “Create a standalone application with a system-level file version number (Windows only)” on page 15-15.

*version\_number* — Specifies the version of the target file as *major.minor.bug.build* in the file system. You are not required to specify a version number. If you do not specify a version number, `mcc` sets the version number, by default, to `1.0.0.0`.

- *major* — Specifies the major version number. If you do not specify a version number, `mcc` sets *major* to 1.
- *minor* — Specifies the minor version number. If you do not specify a version number, `mcc` sets *minor* to 0.
- *bug* — Specifies the bug fix maintenance release number. If you do not specify a version number, `mcc` sets *bug* to 0.
- *build* — Specifies build number. If you do not specify a version number, `mcc` sets *build* to 0.

This functionality is supported for standalone applications and Excel add-ins in MATLAB Compiler. For supported targets in MATLAB Compiler SDK, see the **Tips** section in `mcc`.

## See Also

**Introduced before R2006a**



# mcrinstaller

Display version and location information for MATLAB Runtime installer corresponding to current platform

## Syntax

```
[INSTALLER_PATH, MAJOR, MINOR, PLATFORM] = mcrinstaller;
```

## Description

Displays information about available MATLAB Runtime installers using the format: `[INSTALLER_PATH, MAJOR, MINOR, PLATFORM] = mcrinstaller;` where:

- *INSTALLER\_PATH* is the full path to the installer for the current platform.
- *MAJOR* is the major version number of the installer.
- *MINOR* is the minor version number of the installer.
- *PLATFORM* is the name of the current platform (returned by `COMPUTER(arch)`).

If no MATLAB Runtime installer is found, you are prompted to download an installer using the command `compiler.runtime.download`.

---

**Note** You must distribute the MATLAB Runtime library to your end users to enable them to run applications developed with MATLAB Compiler or MATLAB Compiler SDK.

---

See “Install and Configure the MATLAB Runtime” (MATLAB Compiler SDK) for more information about the MATLAB Runtime installer.

## Examples

### Find MATLAB Runtime Installer Location

Display the location of MATLAB Runtime installers for a particular platform. This example shows output for a `win64` system. The release number is called `R20xxx` indicating the release for which the MATLAB Runtime installer has been downloaded.

```
mcrinstaller
```

```
C:\Program Files\MATLAB\R20xxx\toolbox\compiler\deploy\win64\MCR_R20xxx_win64_installer.exe
```

For example, for R2018b, the path would be:

```
C:\Program Files\MATLAB\R2018b\toolbox\compiler\deploy\win64\MCR_R2018b_win64_installer.exe
```

**Introduced in R2009a**

## mcrversion

Determine version of installed MATLAB Runtime

### Syntax

```
[major, minor] = mcrversion;
```

### Description

The MATLAB Runtime version number consists of two digits, separated by a decimal point. This function returns each digit as a separate output variable: `[major, minor] = mcrversion;` Major and minor are returned as integers.

If the version number ever increases to three or more digits, call `mcrversion` with more outputs, as follows:

```
[major, minor, point] = mcrversion;
```

At this time, all outputs past “minor” are returned as zeros.

Typing only `mcrversion` will return the major version number only.

### Examples

```
mcrversion
ans =
     7
```

**Introduced in R2008a**

# setmcruserdata

Associate MATLAB data value with a key

## Syntax

```
void setmcruserdata(key, value)
```

## Description

`void setmcruserdata(key, value)` associates the MATLAB data value with the string key in the current MATLAB Runtime instance. If there is already a value associated with the key, it is overwritten.

This function is part of the MATLAB Runtime User Data interface API. It is available both in MATLAB and in deployed applications created with MATLAB Compiler and MATLAB Compiler SDK.

## Examples

Store a cell array and associate it with the string 'PI\_Data' in the current instance of the MATLAB Runtime.

```
value = {3.14159, 'March 14th is PI day'};  
setmcruserdata('PI_Data', value);
```

## Input Arguments

### value — Value of MATLAB data

any MATLAB data type including matrices, cell arrays, and Java objects

Value is the MATLAB data associated with input string key for the current instance of the MATLAB Runtime.

### key — Key associated with MATLAB data

string

key is a MATLAB string with which MATLAB data value is associated within the current instance of the MATLAB Runtime.

## See Also

getmcruserdata

Introduced in R2008a

## compiler.runtime.download

Download MATLAB Runtime installer

### Syntax

```
compiler.runtime.download
```

### Description

`compiler.runtime.download` downloads the MATLAB Runtime installer matching the version and update level of MATLAB from where the command is executed. If the installer has already been downloaded to the machine, it returns a message stating that the MATLAB Runtime installer exists and specifies its location.

### Examples

#### Download the MATLAB Runtime Installer

```
compiler.runtime.download
```

```
Downloading MATLAB Runtime installer. It may take several minutes...
```

```
MATLAB Runtime installer has been downloaded to:
```

```
"C:\Users\username\AppData\Local\Temp\username\MCRInstaller9.4\MCR_R2018a_win64_installer.exe"
```

#### Location of MATLAB Runtime Installer

If you already have downloaded the latest version of the MATLAB Runtime installer, this command gives following result on Windows:

```
compiler.runtime.download
```

```
An existing MATLAB Runtime installer was found at:
```

```
"C:\Users\username\AppData\Local\Temp\username\MCRInstaller9.4\MCR_R2018a_win64_installer.exe"
```

### See Also

`mcrinstaller` | `mcrversion`

#### Introduced in R2018a

# compiler.package.installer

Create an installer for files generated by the `mcc` command

## Syntax

```
compiler.package.installer(files,filePath,'ApplicationName',appName)
compiler.package.installer(files,filePath,'ApplicationName',appName,
Name,Value)
compiler.package.installer(files,filePath,'Options',opts)
```

## Description

`compiler.package.installer(files,filePath,'ApplicationName',appName)` creates an installer for files generated by the `mcc` command. The installed application's name is specified by `appName`. The installer's extension is determined by the operating system you are running the function from.

`compiler.package.installer(files,filePath,'ApplicationName',appName,Name,Value)` creates an installer for files generated by the `mcc` command. The installed application's name is specified by `appName`. The installer can be customized using optional name-value pairs.

`compiler.package.installer(files,filePath,'Options',opts)` creates an installer for files generated by the `mcc` command with installer options specified by an `InstallerOptions` object `opts`. If you use an `InstallerOptions` object, you cannot specify any other options using name-value pairs.

## Examples

### Create an Installer

Create an installer for a standalone application on a Windows system.

Write a MATLAB function that generates a magic square. Save the function in a file named `mymagic.m`.

```
function out = mymagic(in)
out = magic(in)
```

Build a standalone application using the `mcc` command.

```
mcc -m mymagic.m
```

```
mymagic.exe
mccExcludedFiles.log
readme.txt
requiredMCRProducts.txt
```

Create an installer for the standalone application using the `compiler.package.installer` function.

```
compiler.package.installer(...
    'mymagic.exe', 'D:\Documents\MATLAB\work\MagicSquare\requiredMCRProducts.txt',...
    'ApplicationName', 'MagicSquare_Generator')
```

This generates an installer named `MyAppInstaller.exe` within a folder named `MagicSquare_Generator`.

### Customize an Installer Using Name-Value Pairs

Customize an installer for a standalone application on a Windows system using name-value pairs.

```
compiler.package.installer('mymagic.exe', 'requiredMCRProducts.txt',...
    'ApplicationName', 'MagicSquare_Generator',...
    'AuthorCompany', 'Boston Common',...
    'AuthorName', 'Frog',...
    'InstallerName', 'MagicSquare_Installer',...
    'Summary', 'Generates a magic square.')
```

### Customize an Installer Using an Installer Options Object

Customize an installer for a standalone application on a Windows system using an `InstallerOptions` object.

Create an `InstallerOptions` object.

```
opts = compiler.package.InstallerOptions('ApplicationName', 'MagicSquare_Generator',...
    'AuthorCompany', 'Boston Common',...
    'AuthorName', 'Frog',...
    'InstallerName', 'MagicSquare_Installer',...
    'Summary', 'Generates a magic square.')
```

```
opts =
```

InstallerOptions with properties:

```
    RuntimeDelivery: 'web'
    InstallerSplash: 'C:\Program Files\MATLAB\R2020a\toolbox\toolbox\compiler\resources\default_i
    InstallerIcon: 'C:\Program Files\MATLAB\R2020a\toolbox\compiler\resources\default_i
    InstallerLogo: 'C:\Program Files\MATLAB\R2020a\toolbox\compiler\resources\default_l
    AuthorName: 'Frog'
    AuthorEmail: ''
    AuthorCompany: 'Boston Common'
    Summary: 'Generates a magic square.'
    Description: ''
    InstallationNotes: ''
    Shortcut: ''
    Version: '1.0'
    InstallerName: 'MagicSquare_Installer'
    ApplicationName: 'MagicSquare_Generator'
    OutputDir: '.\MagicSquare_Generator'
    DefaultInstallationDir: 'C:\Program Files\MagicSquare_Generator'
```

Pass the `InstallerOptions` object as an input to the function.

```
compiler.package.installer('mymagic.exe', 'requiredMCRProducts.txt', 'Options', opts)
```

## Input Arguments

### files — List of files and folders for installation

character vector | string scalar | cell array of character vectors | string array

List of files and folders for installation, specified as a character vector, a string scalar, a cell array of character vectors, or a string array. These files are typically generated by the `mcc` command and can also include any additional files and folders required by the installed application to run.

- Files generated by the `mcc` command in a particular release can be packaged using the `compiler.package.installer` function of the same release.
- Files of type `.ctf` generated by the `mcc` command on one operating system, can be packaged using the `compiler.package.installer` function on a different operating system, as long as the `mcc` command and the `compiler.package.installer` function are from the same release.

Example: 'mymagic.exe'

Data Types: char | string

### filePath — Path to requiredMCRProducts.txt file

character vector | string scalar

Path to the `requiredMCRProducts.txt` file generated by the `mcc` command.

Example: 'D:\Documents\MATLAB\work\MagicSquare\requiredMCRProducts.txt'

Data Types: char | string

### appName — Name of the installed application

character vector | string scalar

Name of the installed application, specified as a character vector or a string scalar.

Example: 'MagicSquare\_Generator'

Data Types: char | string

### opts — Installer options object

InstallerOptions object

Installer options, specified as an `InstallerOptions` object.

## Name-Value Pair Arguments

Specify optional comma-separated pairs of `Name`, `Value` arguments. `Name` is the argument name and `Value` is the corresponding value. `Name` must appear inside quotes. You can specify several name and value pair arguments in any order as `Name1, Value1, ..., NameN, ValueN`.

### AuthorCompany — Company name

' ' (default) | character vector | string scalar

Name of company that created the application, specified as a character vector or a string scalar.

Example: 'Boston Common'

Data Types: char | string

**AuthorEmail — Email address**

'' (default) | character vector | string scalar

Email address of the application author, specified as a character vector or a string scalar.

Example: 'frog@bostoncommon.com'

Data Types: char | string

**AuthorName — Name**

'' (default) | character vector | string scalar

Name of application author, specified as a character vector or a string scalar.

Example: 'Frog'

Data Types: char | string

**DefaultInstallationDir — Default installation path**

character vector | string scalar

Default directory where you want the installer to install the application, specified as a character vector or a string scalar.

If no path is specified, the default path for each operating system is:

Operating System	Default Installation Directory
Windows	C:\Program Files\appName
Linux	/usr/appName
macOS	/Applications/appName

Example: On Windows: C:\Program Files\MagicSquare\_Generator

Data Types: char | string

**Description — Detailed application description**

'' (default) | character vector | string scalar

Detailed description of the application, specified as a character vector or a string scalar.

Example: 'The MagicSquare\_Generator application generates an n-by-n matrix constructed from the integers 1 through n2 with equal row and column sums.'

Data Types: char | string

**InstallationNotes — Notes**

'' (default) | character vector | string scalar

Notes about additional requirements for using application, specified as a character vector or a string scalar.

Example: 'This is a Linux installer.'

Data Types: char | string

**InstallerIcon — Path to icon image**

character vector | string scalar



Path to an image file used as the icon for the installed application, specified as a character vector or a string scalar.

The default path is:

'C:\Program Files\MATLAB\R2020a\toolbox\compiler\Resources\default\_icon\_48.png'

Example: 'D:\Documents\MATLAB\work\images\myIcon.png'

**InstallerLogo — Path to installer image**

character vector | string scalar

Path to an image file used as the installer's logo, specified as a character vector or a string scalar. The logo will be resized to 150 pixels by 340 pixels.

The default path is:

'C:\Program Files\MATLAB\R2020a\toolbox\compiler\Resources\default\_logo.png'

Example: 'D:\Documents\MATLAB\work\images\myLogo.png'

**InstallerName — Name of installer file**

MyAppInstaller (default) | character vector | string scalar

Name of the installer file, specified as a character vector or a string scalar. The extension is determined by the operating system in which the function is executed.

Example: 'MagicSquare\_Installer'

**InstallerSplash — Path to splash screen image**

character vector | string scalar

Path to an image file used as the installer's splash screen, specified as a character vector or a string scalar. The splash screen icon will be resized to 400 pixels by 400 pixels.

The default path is:

'C:\Program Files\MATLAB\R2020a\toolbox\toolbox\compiler\Resources\default\_splash.png'

Example: 'D:\Documents\MATLAB\work\images\mySplash.png'

**OutputDir — Path to folder where the installer will be saved**

character vector | string scalar

Path to folder where the installer is saved, specified as a character vector or a string scalar.

If no path is specified, the default path for each operating system is:

Operating System	Default Installation Directory
Windows	.\appName
Linux	./appName
macOS	./appName

The . in the directories listed above represents the present working directory.

Example: 'D:\Documents\MATLAB\work\MagicSquare'

**RuntimeDelivery — MATLAB Runtime delivery option**`'web'` (default) | `'installer'`

Choice on how the MATLAB Runtime is made available to the installed application.

- `'web'`—Option for installer to download MATLAB Runtime from MathWorks website during application installation. This is the default option.
- `'installer'`—Option to include MATLAB Runtime within the installer so that it can be installed during application installation without connecting to the MathWorks website. Use this option if you think your end-user may not have access to the Internet.

Example: `'installer'`

Data Types: `char` | `string`

**Shortcut — Path to shortcut**`''` (default) | character vector | string scalar

Path to a file or folder that the installer will create a shortcut to at install time, specified as a character vector or a string scalar.

Example: `'.\mymagic.exe'`

Data Types: `char` | `string`

**Summary — Brief description of application**`''` (default) | character vector | string scalar

Summary description of the application, specified as a character vector or a string scalar.

Example: `'Generates a magic square.'`

Data Types: `char` | `string`

**Version — Version of installed application**`'1.0'` (default) | character vector | string scalar

Version number of the generated application, specified as a character vector or a string scalar.

Example: `'2.0'`

Data Types: `char` | `string`

**See Also**`compiler.package.InstallerOptions` | `mcc`**Introduced in R2020a**

# compiler.package.InstallerOptions

Create an installer options object

## Syntax

```
opts = compiler.package.InstallerOptions('ApplicationName', appName)
opts = compiler.package.InstallerOptions('ApplicationName', appName,
Name, Value)
```

## Description

`opts = compiler.package.InstallerOptions('ApplicationName', appName)` creates a default `InstallerOptions` object `opts` with application name specified by `appName`. The `InstallerOptions` object is passed as an input to the `compiler.package.installer` function.

`opts = compiler.package.InstallerOptions('ApplicationName', appName, Name, Value)` creates an `InstallerOptions` object `opts` with application name specified by `appName` and additional customizations specified by name-value pairs. The `InstallerOptions` object is passed as an input to the `compiler.package.installer` function.

## Examples

### Create an Installer Options Object

Create an `InstallerOptions` object with an application name and additional options specified as name-value pairs.

```
opts = compiler.package.InstallerOptions('ApplicationName', 'MagicSquare_Generator', ...
    'AuthorCompany', 'Boston Common', ...
    'AuthorName', 'Frog', ...
    'InstallerName', 'MagicSquare_Installer', ...
    'Summary', 'Generates a magic square.')
```

```
opts =
```

InstallerOptions with properties:

```
    RuntimeDelivery: 'web'
    InstallerSplash: 'C:\Program Files\MATLAB\R2020a\toolbox\toolbox\compiler\resources\default_i
    InstallerIcon: 'C:\Program Files\MATLAB\R2020a\toolbox\compiler\resources\default_i
    InstallerLogo: 'C:\Program Files\MATLAB\R2020a\toolbox\compiler\resources\default_l
    AuthorName: 'Frog'
    AuthorEmail: ''
    AuthorCompany: 'Boston Common'
    Summary: 'Generates a magic square.'
    Description: ''
    InstallationNotes: ''
    Shortcut: ''
    Version: '1.0'
    InstallerName: 'MagicSquare_Installer'
    ApplicationName: 'MagicSquare_Generator'
```

```
        OutputDir: '.\MagicSquare_Generator'  
DefaultInstallationDir: 'C:\Program Files\MagicSquare_Generator'
```

You can modify options using dot notation. For example, set the installation notes to Windows installer.

```
opts.InstallationNotes = 'Windows installer'
```

## Input Arguments

### **appName** — Name of the installed application

character vector | string scalar

Name of the installed application, specified as a character vector or a string scalar.

Example: 'MagicSquare\_Generator'

Data Types: char | string

### **Name-Value Pair Arguments**

Specify optional comma-separated pairs of `Name`, `Value` arguments. `Name` is the argument name and `Value` is the corresponding value. `Name` must appear inside quotes. You can specify several name and value pair arguments in any order as `Name1, Value1, ..., NameN, ValueN`.

### **AuthorCompany** — Company name

' ' (default) | character vector | string scalar

Name of company that created the application, specified as a character vector or a string scalar.

Example: 'Boston Common'

Data Types: char | string

### **AuthorEmail** — Email address

' ' (default) | character vector | string scalar

Email address of the application author, specified as a character vector or a string scalar.

Example: 'frog@bostoncommon.com'

Data Types: char | string

### **AuthorName** — Name

' ' (default) | character vector | string scalar

Name of application author, specified as a character vector or a string scalar.

Example: 'Frog'

Data Types: char | string

### **DefaultInstallationDir** — Default installation path

character vector | string scalar

Default directory where you want the installer to install the application, specified as a character vector or a string scalar.

If no path is specified, the default path for each operating system is:

Operating System	Default Installation Directory
Windows	C:\Program Files\appName
Linux	/usr/appName
macOS	/Applications/appName

Example: On Windows: C:\Program Files\MagicSquare\_Generator

Data Types: char | string

**Description — Detailed application description**

'' (default) | character vector | string scalar

Detailed description of the application, specified as a character vector or a string scalar.

Example: 'The MagicSquare\_Generator application generates an n-by-n matrix constructed from the integers 1 through n2 with equal row and column sums.'

Data Types: char | string

**InstallationNotes — Notes**

'' (default) | character vector | string scalar

Notes about additional requirements for using application, specified as a character vector or a string scalar.

Example: 'This is a Linux installer.'

Data Types: char | string

**InstallerIcon — Path to icon image**

character vector | string scalar

Path to an image file used as the icon for the installed application, specified as a character vector or a string scalar.

The default path is:

'C:\Program Files\MATLAB\R2020a\toolbox\compiler\Resources\default\_icon\_48.png'

Example: 'D:\Documents\MATLAB\work\images\myIcon.png'

**InstallerLogo — Path to installer image**

character vector | string scalar

Path to an image file used as the installer's logo, specified as a character vector or a string scalar. The logo will be resized to 150 pixels by 340 pixels.

The default path is:

'C:\Program Files\MATLAB\R2020a\toolbox\compiler\Resources\default\_logo.png'

Example: 'D:\Documents\MATLAB\work\images\myLogo.png'

**InstallerName — Name of installer file**

MyAppInstaller (default) | character vector | string scalar

Name of the installer file, specified as a character vector or a string scalar. The extension is determined by the operating system in which the function is executed.

Example: 'MagicSquare\_Installer'

### InstallerSplash — Path to splash screen image

character vector | string scalar

Path to an image file used as the installer's splash screen, specified as a character vector or a string scalar. The splash screen icon will be resized to 400 pixels by 400 pixels.

The default path is:

'C:\Program Files\MATLAB\R2020a\toolbox\toolbox\compiler\resources\default\_splash.png'

Example: 'D:\Documents\MATLAB\work\images\mySplash.png'

### OutputDir — Path to folder where the installer will be saved

character vector | string scalar

Path to folder where the installer is saved, specified as a character vector or a string scalar.

If no path is specified, the default path for each operating system is:

Operating System	Default Installation Directory
Windows	.\appName
Linux	./appName
macOS	./appName

The . in the directories listed above represents the present working directory.

Example: 'D:\Documents\MATLAB\work\MagicSquare'

### RuntimeDelivery — MATLAB Runtime delivery option

'web' (default) | 'installer'

Choice on how the MATLAB Runtime is made available to the installed application.

- 'web'—Option for installer to download MATLAB Runtime from MathWorks website during application installation. This is the default option.
- 'installer'—Option to include MATLAB Runtime within the installer so that it can be installed during application installation without connecting to the MathWorks website. Use this option if you think your end-user may not have access to the Internet.

Example: 'installer'

Data Types: char | string

### Shortcut — Path to shortcut

' ' (default) | character vector | string scalar

Path to a file or folder that the installer will create a shortcut to at install time, specified as a character vector or a string scalar.

Example: '.\mymagic.exe'

Data Types: `char` | `string`

**Summary — Brief description of application**

`' '` (default) | `character vector` | `string scalar`

Summary description of the application, specified as a character vector or a string scalar.

Example: `'Generates a magic square.'`

Data Types: `char` | `string`

**Version — Version of installed application**

`'1.0'` (default) | `character vector` | `string scalar`

Version number of the generated application, specified as a character vector or a string scalar.

Example: `'2.0'`

Data Types: `char` | `string`

## Output Arguments

**opts — Installer options object**

`InstallerOptions` object

Installer options, returned as an `InstallerOptions` object.

## See Also

`compiler.package.installer` | `mcc`

**Introduced in R2020a**





# **MATLAB Compiler Quick Reference**

## mcc Command Arguments Listed Alphabetically

Option	Description	Comment
-a <i>path</i>	Add path to the deployable archive.	If a folder name is specified, all files in the folder are added. If a wildcard is used all files matching the wildcard are added.
-b	Generate Excel compatible formula function.	Requires MATLAB Compiler for Excel add-ins
-B filename[:arg[,arg]]	Replace -B filename on the mcc command line with the contents of filename.	The file should contain only mcc command-line options. These are MathWorks included options files: <ul style="list-style-type: none"> <li>• -B csharedlib:foo (C shared library)</li> <li>• -B cpplib:foo (C++ library)</li> </ul>
-c	Generate C wrapper code.	Equivalent to -T codegen
-C	Direct mcc to not embed the deployable archive in generated binaries.	
-d directory	Place output in specified folder.	
-e	Suppresses appearance of the MS-DOS Command Window when generating a standalone application.	Use -e in place of the -m option. Available for Windows only. Use with -R option to generate error logging. Equivalent to -W WinMain -T link:exe  The standalone app compiler suppresses the MS-DOS command window by default. To unsuppress it, unselect <b>Do not require Windows Command Shell (console) for execution</b> in the app's <b>Additional Runtime Settings</b> area.
-f filename	Use the specified options file, filename, when calling mbuild.	mbuild -setup is recommended.
-g	Generate debugging information.	None
-G	Same as -g	None
-I directory	Add folder to search path for MATLAB files.	
-K	Directs mcc to not delete output files if the compilation ends prematurely, due to error.	mcc's default behavior is to dispose of any partial output if the command fails to execute successfully.
-l	Macro to create a function library.	Equivalent to -W lib -T link:lib
-m	Macro to generate a standalone application.	Equivalent to -W main -T link:exe
-M string	Pass string to mbuild.	Use to define compile-time options.
-N	Clear the path of all but a minimal, required set of folders.	None

Option	Description	Comment
-o outputfile	Specify name of final output file.	Adds appropriate extension
-p directory	Add directory to compilation path in an order-sensitive context.	Requires -N option
-R <i>option</i>	Specify run-time options for MATLAB Runtime.	<i>option</i> = -nojvm, -nodisplay, -logfile <i>filename</i> , -startmsg, and -completemsg <i>filename</i>
-S	Create Singleton MATLAB Runtime.	Default for generic COM components. Valid for Microsoft Excel and Java packages.
-T	Specify the output target phase and type.	Default is codegen.
-u	Registers COM component for current user only on development machine	Valid only for generic COM components and Microsoft Excel add-ins
-v	Verbose; display compilation steps.	
-w <i>option</i>	Display warning messages.	<i>option</i> = list, level, or level:string where level = disable, enable, error, off:string, or on:string
-W <i>type</i>	Control the generation of function wrappers.	<i>type</i> = main cpplib:<string> lib:<string> none com:compname, clname, version
-Y licensefile	Use licensefile when checking out a MATLAB Compiler license.	The -Y flag works only with the command-line mode.  >>!mcc -m foo.m -Y license.lic
-?	Display help message.	

## mcc Command Line Arguments Grouped by Task

### COM Components

Option	Description	Comment
-u	Registers COM component for current user only on development machine	Valid only for generic COM components and Microsoft Excel add-ins (requiring MATLAB Compiler)

### Deployable Archive

Option	Description	Comment
-a <i>filename</i>	Add <i>filename</i> to the deployable archive.	None
-C	Directs mcc to not embed the deployable archive in C/C++ and main/Winmain shared libraries and standalone binaries by default.	None

### Debugging

Option	Description	Comment
-g	Generate debugging information.	None
-G	Same as -g	None
-K	Directs mcc to not delete output files if the compilation ends prematurely, due to error.	mcc's default behavior is to dispose of any partial output if the command fails to execute successfully.
-v	Verbose; display compilation steps.	None
-W <i>type</i>	Control the generation of function wrappers.	<i>type</i> = main cpplib:<string> lib:<string> none com:compname, clname, version
-?	Display help message.	None

### Dependency Function Processing

Option	Description	Comment
-a <i>filename</i>	Add <i>filename</i> to the deployable archive.	None

### Licenses

Option	Description	Comment
-Y licensefile	Use licensefile when checking out a MATLAB Compiler license.	The -Y flag works only with the command-line mode.  >>!mcc -m foo.m -Y license.lic

### MATLAB Compiler for Excel Add-Ins

Option	Description	Comment
-b	Generate Excel compatible formula function.	Requires MATLAB Compiler
-u	Registers COM component for current user only on development machine	Valid only for generic COM components and Microsoft Excel add-ins (requiring MATLAB Compiler)

### MATLAB Path

Option	Description	Comment
-I directory	Add folder to search path for MATLAB files.	MATLAB path is automatically included when running from MATLAB, but not when running from a DOS/UNIX shell.
-N	Clear the path of all but a minimal, required set of folders.	None
-p directory	Add directory to compilation path in an order-sensitive context.	Requires -N option

### mbuild

Option	Description	Comment
-f filename	Use the specified options file, filename, when calling mbuild.	mbuild -setup is recommended.
-M string	Pass string to mbuild.	Use to define compile-time options.

### MATLAB Runtime

Option	Description	Comment
-R option	Specify run-time options for MATLAB Runtime.	option = -nojvm -nodisplay -logfile filename -startmsg -completemsg filename
-S	Create Singleton MATLAB Runtime.	Default for generic COM components. Valid for Microsoft Excel and Java packages.

### Override Default Inputs

Option	Description	Comment
-B filename[:arg[,arg]]	Replace -B filename on the mcc command line with the contents of filename (bundle).	The file should contain only mcc command-line options. These are MathWorks included options files: <ul style="list-style-type: none"> <li>• -B csharedlib:foo — C shared library</li> <li>• -B cpplib:foo — C++ library</li> </ul>

### Override Default Outputs

Option	Description	Comment
-d directory	Place output in specified folder.	None
-o outputfile	Specify name of final output file.	Adds appropriate extension
-e	Suppresses appearance of the MS-DOS Command Window when generating a standalone application.	Use -e in place of the -m option. Available for Windows only. Use with -R option to generate error logging. Equivalent to -W WinMain -T link:exe  The standalone app compiler suppresses the MS-DOS command window by default. To unsuppress it, unselect <b>Do not require Windows Command Shell (console) for execution</b> in the app's <b>Additional Runtime Settings</b> area.

### Wrappers and Libraries

Option	Description	Comment
-c	Generate C wrapper code.	Equivalent to -T codegen
-l	Macro to create a function library.	Equivalent to -W lib -T link:lib
-m	Macro to generate a standalone application.	Equivalent to -W main -T link:exe
-W type	Control the generation of function wrappers.	type = main cpplib:<string> lib:<string> none com:compname, clname, version

# **Using MATLAB Compiler on Mac or Linux**

## Problems Setting MATLAB Runtime Paths

<b>In this section...</b>
“Running SETENV on Mac Failed” on page B-2
“Mac Application Fails with “Library not loaded” or “Image not found”” on page B-2

When you build applications, associated shell scripts (`run_application.sh`) are automatically generated in the same folder as your binary. By running these scripts, you can conveniently set the path to your MATLAB Runtime location.

### Running SETENV on Mac Failed

If the `setenv` command fails with a message similar to `setenv: command not found` or `setenv: not found`, you are not using a C Shell command interpreter (such as `cs` or `tcsh`).

Set the environment variables using the `export` command using the format `export my_variable=my_value`.

For example, to set `DYLD_LIBRARY_PATH`, run the following command:

```
export DYLD_LIBRARY_PATH=mcr_root/v98/runtime/maci64:mcr_root/ ...
```

### Mac Application Fails with “Library not loaded” or “Image not found”

If you set your environment variables, you may still receive the following message when you run your application:

```
dyld: Library not loaded: @rpath/libmwlaunchermain.dylib
Referenced from: /Applications/magicsquare/application/
magicsquare.app/Contents/MacOS/magicsquare
Reason: image not found
Trace/BPT trap: 5
```

You may have set your environment variables initially, but they were not set up as persistent variables. Do the following:

- 1 In your home directory, open a file such as `.bashrc` or `.profile` file in your log-in shell.
- 2 In either of these types of log-in shell files, add commands to set your environment variables so that they persist. For example, to set `DYLD_LIBRARY_PATH` in this manner, you enter the following in your file:

```
# Setting PATH for MCR

DYLD_LIBRARY_PATH=MCR_ROOT/v98/runtime/maci64:
MCR_ROOT/v98/sys/os/maci64:
MCR_ROOT/v98/bin/maci64
export DYLD_LIBRARY_PATH

?
```



---

**Note** The DYLD\_LIBRARY\_PATH= statement is one statement that must be entered as a single line. The statement is shown on different lines, in this example, for readability only.

---



# Apps

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# Application Compiler

Package MATLAB programs for deployment as standalone applications

## Description

The **Application Compiler** app packages MATLAB programs into applications that can run outside of MATLAB.

## Open the Application Compiler App

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

## Examples

- “Create Standalone Application from MATLAB” on page 1-5

## Parameters

### **main file — name of the function to package**

character vector

Name of the function to package as a character vector. The selected function is the entry point for the packaged application.

### **packaging options — method for installing the MATLAB Runtime with the packaged application**

MATLAB Runtime downloaded from web (default) | MATLAB Runtime included in package

You can decide whether to include the MATLAB Runtime fallback for MATLAB Runtime installer in the generated application by selecting one of the two options in the **Packaging Options** section. Including the MATLAB Runtime installer in the package significantly increases the size of the package.

Runtime downloaded from web — Generates an installer that downloads the MATLAB Runtime and installs it along with the deployed MATLAB application.

Runtime included in package — Generates an installer that includes the MATLAB Runtime installer.

The first time you select this option, you are prompted to download the MATLAB Runtime installer or obtain a CD if you do not have internet access.

### **Files required for your application to run — files that must be included with application**

list of files

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

**Files installed for your end user – files installed on the end user's machine when the application is installed**

list of files

Optional files installed with application as a list of files.

**Additional runtime settings – execution options for the application**

check options

Check the appropriate boxes if you don't want a command window to show up during execution or if you want a log file to be created.

**Settings****Additional parameters passed to MCC – flags controlling the behavior of the compiler**

character vector

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

**Testing Files – Folder where files for testing are stored**

character vector

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

**End User Files – Folder where files for building a custom installer are stored**

character vector

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

**Packaged Installers – Folder where generated installers are stored**

character vector

Folder where generated installers are stored as a character vector.

**Application information****Application Name – name of the installed application**

character vector

Name of the installed application as a character vector.

For example, if the name is `foo`, the installed executable would be `foo.exe`, the 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 – version of the generated application**

character vector

Version of the generated application as a character vector.

**splash screen – image displayed on installer**

image

Image displayed on installer as an image.

**Author Name — name of the application author**

character vector

Name of the application author as a character vector.

**Email — Email address used to contact application support**

character vector

Email address used to contact application support as a character vector.

**Summary — brief description of application**

character vector

Brief description of application as a character vector.

**Description — detailed description of application**

character vector

Detailed description of application as a character vector.

**Additional installer options****Default installation folder — Folder where application is installed**

character vector

Folder where the application is installed as a character vector.

**Installation notes — notes about additional requirements for using application**

character vector

Notes about additional requirements for using application as a character vector.

**Programmatic Use**

applicationCompiler

**See Also****Topics**

“Create Standalone Application from MATLAB” on page 1-5

**Introduced in R2013b**

# Hadoop Compiler

Package MATLAB programs for deployment to Hadoop clusters as MapReduce programs

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**Note** The **Hadoop Compiler** app will be removed in a future release. To create standalone MATLAB® MapReduce applications, or deployable archives from MATLAB map and reduce functions, use the `mcc` command. For details, see “Compatibility Considerations”.

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## Description

The **Hadoop Compiler** app packages MATLAB map and reduce functions into a deployable archive. You can incorporate the archive into a Hadoop mapreduce job by passing it as a payload argument to job submitted to a Hadoop cluster.

## Open the Hadoop Compiler App

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

## Parameters

### **map function — mapper file**

character vector

Function for the mapper, specified as a character vector.

### **reduce function — reducer file**

character vector

Function for the reducer, specified as a character vector.

### **datastore file — file containing a datastore representing the data to be processed**

character vector

A file containing a datastore representing the data to be processed, specified as a character vector.

In most cases, you will start off by working on a small sample dataset residing on a local machine that is representative of the actual dataset on the cluster. This sample dataset has the same structure and variables as the actual dataset on the cluster. By creating a datastore object to the dataset residing on your local machine you are taking a snapshot of that structure. By having access to this datastore object, a Hadoop job executing on the cluster will know how to access and process the actual dataset residing on HDFS™.

### **output types — format of output**

keyvalue (default) | tabulartext

Format of output from Hadoop mapreduce job, specified as a keyvalue or tabular text.

**additional configuration file content — additional parameters configuring how Hadoop executes the job**

character vector

Additional parameters to configure how Hadoop executes the job, specified as a character vector. For more information, see “Configuration File for Creating Deployable Archive Using the mcc Command”.

**files required for your MapReduce job payload to run — files that must be included with generated artifacts**

list of files

Files that must be included with generated artifacts, specified as a list of files.

**Settings****Additional parameters passed to MCC — flags controlling the behavior of the compiler**

character vector

Flags controlling the behavior of the compiler, specified as a character vector.

**testing files — folder where files for testing are stored**

character vector

Folder where files for testing are stored, specified as a character vector.

**packaged files — folder where generated artifacts are stored**

character vector

Folder where generated artifacts are stored, specified as a character vector.

**Compatibility Considerations****Hadoop Compiler will be removed***Not recommended starting in R2020a*

**Hadoop Compiler** app will be removed in a future release. To create standalone MATLAB MapReduce applications, or deployable archives from MATLAB map and reduce functions, use the `mcc` command.

**Introduced in R2014b**