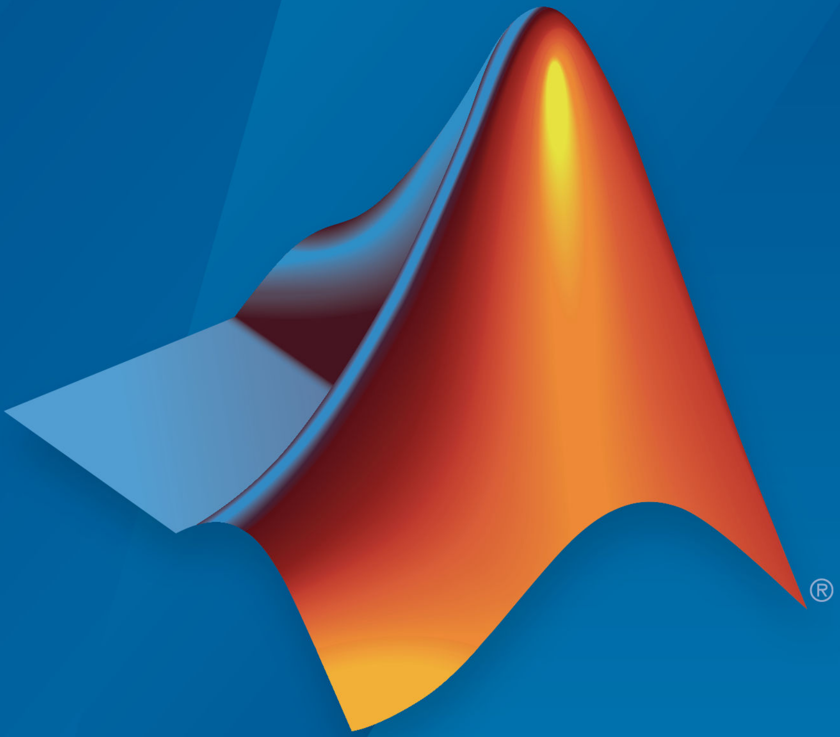
MATLAB® Compiler™

Hadoop® Integration Guide



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R2018a

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The MathWorks, Inc.
3 Apple Hill Drive
Natick, MA 01760-2098

MATLAB® Compiler™ Hadoop® Integration Guide

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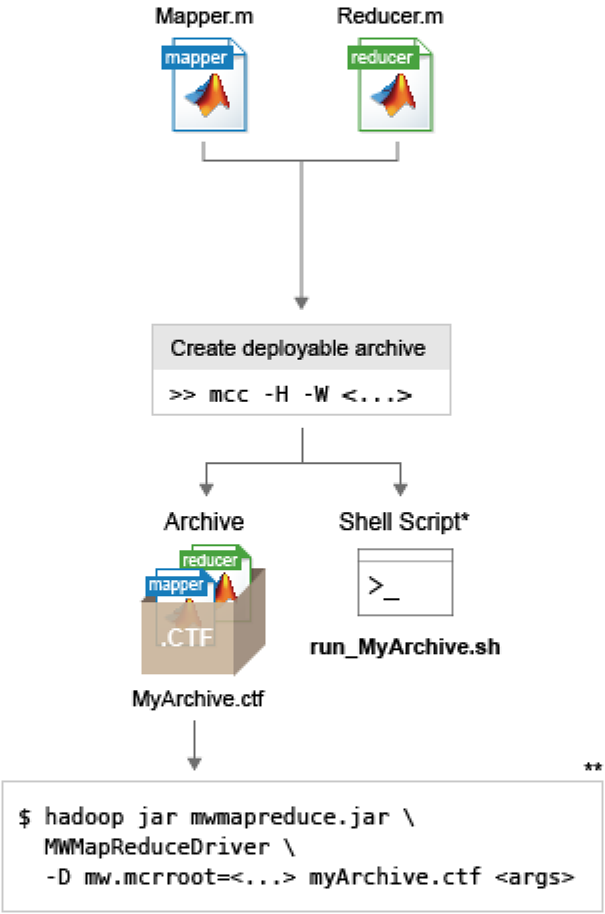
Deployable Archives

Workflow to Incorporate MATLAB Map and Reduce Functions into a Hadoop Job



```
>> mcc -H -W <...>
```

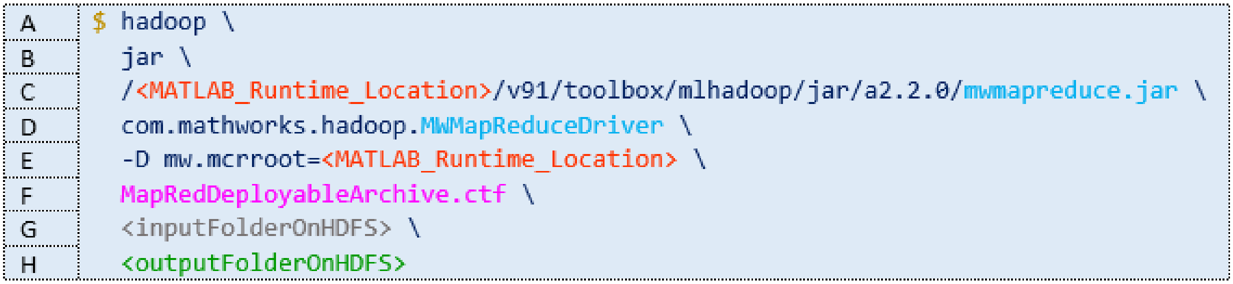
```
$ hadoop jar mwmapreduce.jar \
  MWMapReduceDriver \
  -D mw.mcrroot=<...> myArchive.ctf <args>
```

* You can use automatically generated shell scripts to execute applications from the terminal.

** Commands are not exact. For complete commands, see the auto-generated shell scripts.

1. Write mapper and reducer functions in MATLAB.
2. Create a MAT-file that contains a datastore that describes the structure of the data and the names of the variables to analyze. The datastore in the MAT-file can be created from a test data set that is representative of the actual data set.
3. Create a text file that contains Hadoop settings such as the name of the mapper, reducer, and the type of data being analyzed. This file is automatically created if you are using the **Hadoop Compiler** app.
4. Use the **Hadoop Compiler** app or the `mcc` command to package the components into a deployable archive. Both options generate a deployable archive (.ctf file) that can be incorporated into a Hadoop mapreduce job.
5. Incorporate the deployable archive into a Hadoop mapreduce job using the `hadoop` command and syntax.

Execution Signature



```
A  $ hadoop \
B    jar \
C    /<MATLAB_Runtime_Location>/v91/toolbox/mlhadoop/jar/a2.2.0/mwmapreduce.jar \
D    com.mathworks.hadoop.MWMapReduceDriver \
E    -D mw.mcrroot=<MATLAB_Runtime_Location> \
F    MapRedDeployableArchive.ctf \
G    <inputFolderOnHDFS> \
H    <outputFolderOnHDFS>
```

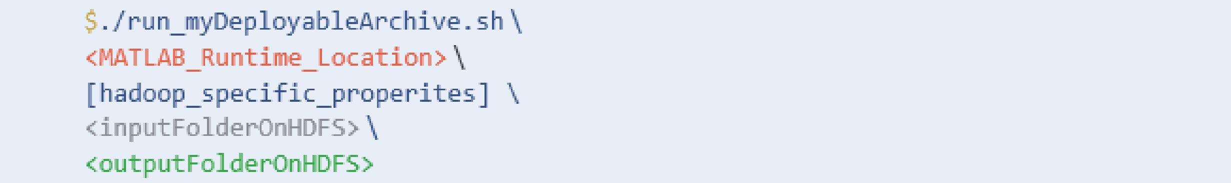
Key

Letter	Description
A	Hadoop command
B	JAR option
C	The standard name of the JAR file. All applications have the same JAR: `mwmapreduce.jar`.The path to the JAR is also fixed relative to the MATLAB Runtime location.
D	The standard name of the driver. All applications have the same driver name: `MWMapReduceDriver`

Letter	Description
E	A generic option specifying the MATLAB Runtime location as a key-value pair.
F	Deployable archive (`.ctf` file) generated by the **Hadoop Compiler** app or `mcc` is passed as a payload argument to the job.
G	Location of input files on HDFS™.
H	Location on HDFS where output can be written.

To simplify the inclusion of the deployable archive (`.ctf` file) into a Hadoop mapreduce job, both the **Hadoop Compiler** app and the `mcc` command generate a shell script alongside the deployable archive. The shell script has the following naming convention: `run_<deployableArchiveName>.sh`

To run the deployable archive using the shell script, use the following syntax:



```
$./run_myDeployableArchive.sh \
<MATLAB_Runtime_Location> \
[hadoop_specific_properites] \
<inputFolderOnHDFS> \
<outputFolderOnHDFS>
```

See Also

Related Examples

- “Example Using the Hadoop Compiler App Workflow” on page 1-5
- “Example Using the mcc Command Workflow” on page 1-11

Example Using the Hadoop Compiler App Workflow

Supported Platform: Linux® only.

This example shows you how to use the **Hadoop Compiler** app to create a deployable archive consiting of MATLAB map and reduce functions and then pass the deployable archive as a payload argument to a job submitted to a Hadoop cluster.

Goal: Calculate the maximum arrival delay of an airline from the given dataset.

Dataset:	`airlinesmall.csv`
Description:	Airline departure and arrival information from 1987-2008.
Location:	`/usr/local/MATLAB/R2018a/toolbox/matlab/demos`

Prerequisites

1 Start this example by creating a new work folder that is visible to the MATLAB search path.

2 Before starting MATLAB, at a terminal, set the environment variable `HADOOP_PREFIX` to point to the Hadoop installation folder. For example:

Shell	Command
csh / tcsh	`% setenv HADOOP_PREFIX /usr/lib/hadoop`
bash	`$ export HADOOP_PREFIX=/usr/lib/hadoop`

Note This example uses `/usr/lib/hadoop` as directory where Hadoop is installed. Your Hadoop installation directory maybe different.

If you forget setting the `HADOOP_PREFIX` environment variable prior to starting MATLAB, set it up using the MATLAB function `setenv` at the MATLAB command prompt as soon as you start MATLAB. For example:

```
setenv('HADOOP_PREFIX','/usr/lib/hadoop')
```

3 Install the MATLAB Runtime in a folder that is accessible by every worker node in the Hadoop cluster. This example uses `/usr/local/MATLAB/MATLAB_Runtime/v##` as the location of the MATLAB Runtime folder.

If you don’t have the MATLAB Runtime, you can download it from the website at: `https://www.mathworks.com/products/compiler/mcr`.

Note Replace all references to the MATLAB Runtime version `v##` in this example with the MATLAB Runtime version number corresponding to your MATLAB release. For example, MATLAB R2017b has MATLAB Runtime version number `v92`. For information about MATLAB Runtime version numbers corresponding MATLAB releases, see this list.

---

4. Copy the map function `maxArrivalDelayMapper.m` from `/usr/local/MATLAB/R2018a/toolbox/matlab/demos` folder to the work folder.

   `maxArrivalDelayMapper.m`

   ```
   function maxArrivalDelayMapper (data, info, intermKVStore)
   partMax = max(data.ArrDelay);
   add(intermKVStore,'PartialMaxArrivalDelay',partMax);
   ```

   For more information, see “Write a Map Function” (MATLAB).

5. Copy the reduce function `maxArrivalDelayReducer.m` from `*matlabroot*/toolbox/matlab/demos` folder to the work folder.

   `maxArrivalDelayReducer.m`

   ```
   function maxArrivalDelayReducer(intermKey, intermValIter, outKVStore)
   maxVal = -inf;
   while hasnext(intermValIter)
      maxVal = max(getnext(intermValIter), maxVal);
   end
   add(outKVStore,'MaxArrivalDelay',maxVal);
   ```

   For more information, see “Write a Reduce Function” (MATLAB).

6. Create the directory `/user/<username>/datasets` on HDFS and copy the file `airlinesmall.csv` to that directory. Here *<username>* refers to your user name in HDFS.

   ```
   $ ./hadoop fs -copyFromLocal airlinesmall.csv hdfs://host:54310/user/<username>
   ```

Procedure

1. Start MATLAB and verify that the `HADOOP_PREFIX` environment variable has been set. At the command prompt, type:

```
>> getenv('HADOOP_PREFIX')
```

If ans is empty, review the **Prerequisites** section above to see how you can set the HADOOP_PREFIX environment variable.

2 Create a datastore to the file airlinesmall.csv and save it to a .mat file. This datastore object is meant to capture the structure of your actual dataset on HDFS.

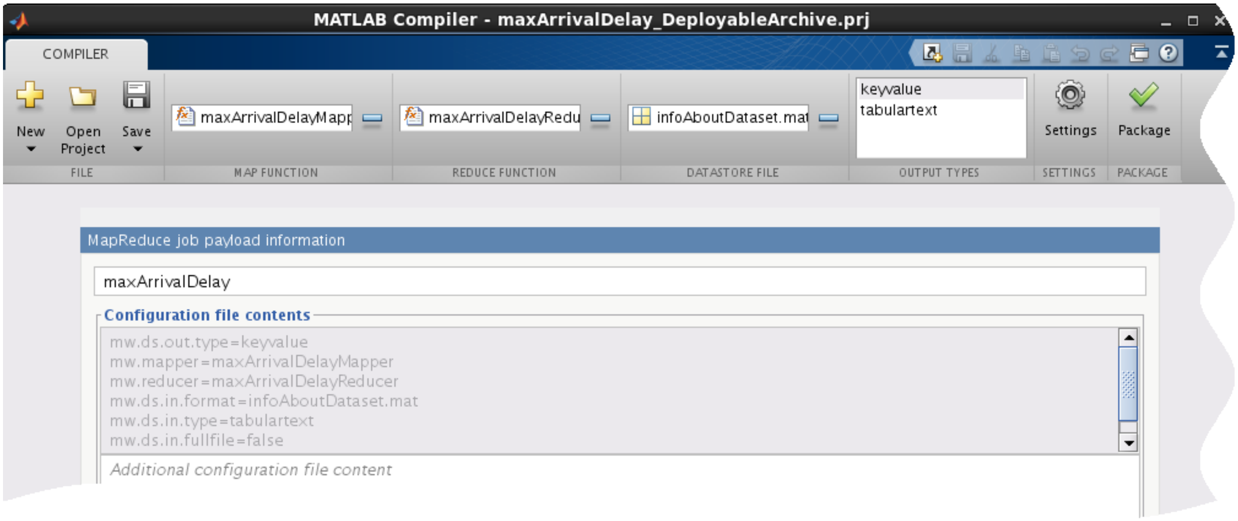
```
ds = datastore('airlinesmall.csv','TreatAsMissing','NA',...
     'SelectedVariableNames','ArrDelay','ReadSize',1000);

save('infoAboutDataset.mat','ds')
```

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.

Note In this example, the sample dataset (local) and the actual dataset on HDFS are the same.

3 Launch the **Hadoop Compiler** app through the MATLAB command line (>> hadoopCompiler) or through the apps gallery.



MapReduce job payload information

maxArrivalDelay

Configuration file contents

```
mw.ds.out.type=keyvalue
mw.mapper=maxArrivalDelayMapper
mw.reducer=maxArrivalDelayReducer
mw.ds.in.format=infoAboutDataset.mat
mw.ds.in.type=tabulartext
mw.ds.in.fullfile=false
```

Additional configuration file content

4 In the **Map Function** section of the toolstrip, click the plus button to add mapper file `maxArrivalDelayMapper.m`.

5 In the **Reduce Function** section of the toolstrip, click the plus button to add reducer file `maxArrivalDelayReducer.m`.

6 In the **Datastore File** section, click the plus button to add the `.mat` file `infoAboutDataset.mat` containing the `datastore` object.

7 In the **Output Types** section, select `keyvalue` as output type. Selecting `keyvalue` as your output type means your results can only be read within MATLAB. If you want your results to be accessible outside of MATLAB, select output type as `tabulartext`.

8 Rename the **MapReduce job payload information** to `maxArrivalDelay`.

9 Click **Package** to build a deployable archive.

The **Hadoop Compiler** app creates a log file `PackagingLog.txt` and two folders `for_redistribution` and `for_testing`.

`for_redistribution`	`for_testing`
`readme.txt`	`readme.txt`
`maxArrivalDelay.ctf`	`maxArrivalDelay.ctf`
`run_maxArrivalDelay.sh`	`run_maxArrivalDelay.sh`
	`mccExcludedFiles.log`
	`requiredMCRProducts.txt`

You can use the log file PackagingLog.txt to see the exact mcc syntax used to package the deployable archive.

10 From a Linux shell naviagate to the for_redistribution folder.

11 a Incorporate the deployable archive containing MATLAB map and reduce functions into a Hadoop mapreduce job from a Linux shell using the following command:

```
$ hadoop \
jar /usr/local/MATLAB/MATLAB_Runtime/v##/toolbox/mlhadoop/jar/a2.2.0/mw
com.mathworks.hadoop.MWMapReduceDriver \
-D mw.mcrroot=/usr/local/MATLAB/MATLAB_Runtime/v## \
maxArrivalDelay.ctf \
hdfs://host:54310/user/<username>/datasets/airlinesmall.csv \
hdfs://host:54310/user/<username>/results
```

b Alternately, you can incorporate the deployable archive containing MATLAB map and reduce functions into a Hadoop mapreduce job using the shell script generated by the **Hadoop Compiler** app. At the Linux shell type the following command:

```
$ ./run_maxArrivalDelay.sh \
/usr/local/MATLAB/MATLAB_Runtime/v## \
-D mw.mcrroot=/usr/local/MATLAB/MATLAB_Runtime/v## \
hdfs://host:54310/user/username/datasets/airlinesmall.csv \
hdfs://host:54310/user/<username>/results
```

12 To examine the results, switch to the MATLAB desktop and create a datastore to the results on HDFS. You can then view the results using the read method.

```
d = datastore('hdfs:///user/<username>/results/part*');
read(d)
```

```
ans = 

           Key              Value 
    _________________    _______

    'MaxArrivalDelay'    [1014]
```

Other examples of map and reduce functions are available at toolbox/matlab/demos folder. You can use other examples to prototype similar deployable archives to run on a Hadoop cluster. For more information, see “Build Effective Algorithms with MapReduce” (MATLAB).

See Also

`KeyValueDatastore` | `TabularTextDatastore` | `datastore` | `deploytool`

Related Examples

- “Example Using the mcc Command Workflow” on page 1-11

Example Using the mcc Command Workflow

Supported Platform: Linux only.

This example shows you how to use the `mcc` command to create a deployable archive consiting of MATLAB map and reduce functions and then pass the deployable archive as a payload argument to a job submitted to a Hadoop cluster.

Goal: Calculate the maximum arrival delay of an airline from the given dataset.

Dataset:	`airlinesmall.csv`
Description:	Airline departure and arrival information from 1987-2008.
Location:	`/usr/local/MATLAB/R2018a/toolbox/matlab/demos`

Note When compared to the **Hadoop Compiler** app workflow, this workflow requires the explicit creation of a Hadoop settings file. Follow the example for details.

Prerequisites

1. Start this example by creating a new work folder that is visible to the MATLAB search path.
2. Before starting MATLAB, at a terminal, set the environment variable `HADOOP_PREFIX` to point to the Hadoop installation folder. For example:

Shell	Command
csh / tcsh	`% setenv HADOOP_PREFIX /usr/lib/hadoop`
bash	`$ export HADOOP_PREFIX=/usr/lib/hadoop`

Note This example uses `/usr/lib/hadoop` as directory where Hadoop is installed. Your Hadoop installation directory maybe different.

If you forget setting the `HADOOP_PREFIX` environment variable prior to starting MATLAB, set it up using the MATLAB function `setenv` at the MATLAB command prompt as soon as you start MATLAB. For example:

```
setenv('HADOOP_PREFIX','/usr/lib/hadoop')
```

3. Install the MATLAB Runtime in a folder that is accessible by every worker node in the Hadoop cluster. This example uses `/usr/local/MATLAB/MATLAB_Runtime/v##` as the location of the MATLAB Runtime folder.

   If you don’t have the MATLAB Runtime, you can download it from the website at: `https://www.mathworks.com/products/compiler/mcr`.

   Note Replace all references to the MATLAB Runtime version `v##` in this example with the MATLAB Runtime version number corresponding to your MATLAB release. For example, MATLAB R2017b has MATLAB Runtime version number `v92`. For information about MATLAB Runtime version numbers corresponding MATLAB releases, see this list.

   ---

4. Copy the map function `maxArrivalDelayMapper.m` from `/usr/local/MATLAB/R2018a/toolbox/matlab/demos` folder to the work folder.

   `maxArrivalDelayMapper.m`

   ```
   function maxArrivalDelayMapper (data, info, intermKVStore)
   partMax = max(data.ArrDelay);
   add(intermKVStore,'PartialMaxArrivalDelay',partMax);
   ```

   For more information, see “Write a Map Function” (MATLAB).

5. Copy the reduce function `maxArrivalDelayReducer.m` from *`matlabroot`*`/toolbox/matlab/demos` folder to the work folder.

   `maxArrivalDelayReducer.m`

   ```
   function maxArrivalDelayReducer(intermKey, intermValIter, outKVStore)
   maxVal = -inf;
   while hasnext(intermValIter)
      maxVal = max(getnext(intermValIter), maxVal);
   end
   add(outKVStore,'MaxArrivalDelay',maxVal);
   ```

   For more information, see “Write a Reduce Function” (MATLAB).

6. Create the directory `/user/`*`<username>`*`/datasets` on HDFS and copy the file `airlinesmall.csv` to that directory. Here *`<username>`* refers to your user name in HDFS.

```
$ ./hadoop fs -copyFromLocal airlinesmall.csv hdfs://host:54310/user/<username>
```

Procedure

1 Start MATLAB and verify that the HADOOP_PREFIX environment variable has been set. At the command prompt, type:

```
>> getenv('HADOOP_PREFIX')
```

If ans is empty, review the **Prerequisites** section above to see how you can set the HADOOP_PREFIX environment variable.

2 Create a datastore to the file airlinesmall.csv and save it to a .mat file. This datastore object is meant to capture the structure of your actual dataset on HDFS.

```
ds = datastore('airlinesmall.csv','TreatAsMissing','NA',...
     'SelectedVariableNames','ArrDelay','ReadSize',1000);

save('infoAboutDataset.mat','ds')
```

In most cases, you will start off by working on a small sample dataset residing on a local machine that is reprensetative 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.

Note In this example, the sample dataset (local) and the actual dataset on HDFS are the same.

3 Create a configuration file (config.txt) that specifies the input type of the data, the format of the data specified by the datastore created in the previous step, the output type of the data, the name of map function, and the name of reduce function.

```
mw.ds.in.type = tabulartext
mw.ds.in.format = infoAboutDataset.mat
mw.ds.out.type = keyvalue
mw.mapper = maxArrivalDelayMapper
mw.reducer = maxArrivalDelayReducer
```

For more information, see “Configuration File for Creating Deployable Archive Using the mcc Command” on page 3-2.

4 Use the `mcc` command with the `-m` flag to create a deployable archive. The `-m` flag creates a standard executable that can be run from a command line. However, the `mcc` command cannot package the results in an installer. The command must be entered as a single line.

```
mcc -H -W 'hadoop:maxArrivalDelay,CONFIG:config.txt'
  maxArrivalDelayMapper.m maxArrivalDelayReducer.m
   -a infoAboutDataset.mat
```

For more information, see `mcc`.

MATLAB Compiler creates a shell script `run_maxarrivaldelay.sh`, a deployable archive `airlinesmall.ctf`, and a log file `mccExcludedfiles.log`.

5 **a** Incorporate the deployable archive containing MATLAB map and reduce functions into a Hadoop mapreduce job from a Linux shell using the following command:

```
$ hadoop \
jar /usr/local/MATLAB/MATLAB_Runtime/v##/toolbox/mlhadoop/jar/a2.2.0/mw
com.mathworks.hadoop.MWMapReduceDriver \
-D mw.mcrroot=/usr/local/MATLAB/MATLAB_Runtime/v## \
maxArrivalDelay.ctf \
hdfs://host:54310/user/<username>/datasets/airlinesmall.csv \
hdfs://host:54310/user/<username>/results
```

b Alternately, you can incorporate the deployable archive containing MATLAB map and reduce functions into a Hadoop mapreduce job using the shell script generated by the **Hadoop Compiler** app. At the Linux shell type the following command:

```
$ ./run_maxArrivalDelay.sh \
/usr/local/MATLAB/MATLAB_Runtime/v## \
-D mw.mcrroot=/usr/local/MATLAB/MATLAB_Runtime/v## \
hdfs://host:54310/user/username/datasets/airlinesmall.csv \
hdfs://host:54310/user/<username>/results
```

6 To examine the results, switch to the MATLAB desktop and create a `datastore` to the results on HDFS. You can then view the results using the `read` method.

```
d = datastore('hdfs:///user/<username>/results/part*');
read(d)
```

```
ans =

              Key            Value

    __________________       ______
```

```
        'MaxArrivalDelay'    [1014]
```

Other examples of `map` and `reduce` functions are available at `toolbox/matlab/demos` folder. You can use other examples to prototype similar deployable archives that run against Hadoop. For more information, see “Build Effective Algorithms with MapReduce” (MATLAB).

See Also

`KeyValueDatastore` | `TabularTextDatastore` | `datastore` | `deploytool` | `mcc`

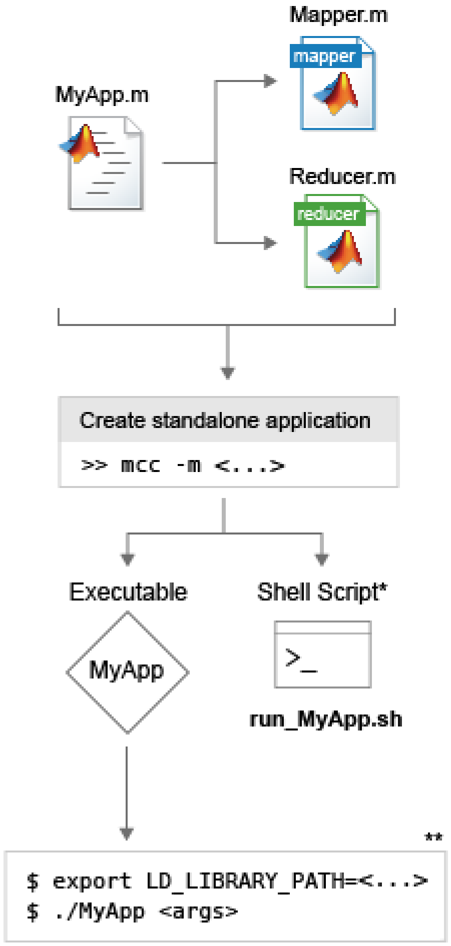
Related Examples

- “Example Using the Hadoop Compiler App Workflow” on page 1-5

2

Standalone Applications

Workflow to Run Compiled Standalone Applications Against a Hadoop Cluster



```
>> mcc -m <...>
```

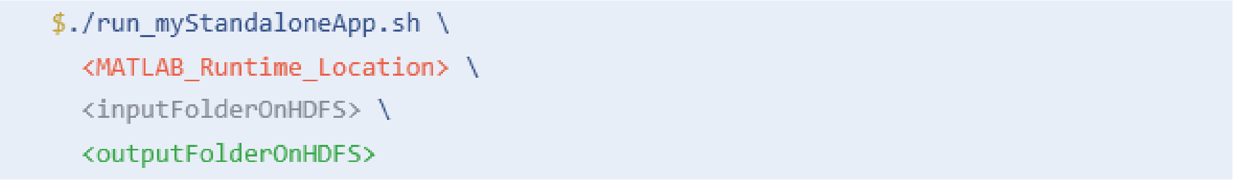
```
$ export LD_LIBRARY_PATH=<...>
$ ./MyApp <args>
```

* You can use automatically generated shell scripts to execute applications from the terminal.

** Commands are not exact. For complete commands, see the auto-generated shell scripts.

1. Write mapper and reducer functions in MATLAB.
2. Write a MATLAB application script or function that calls the mapper and reducer functions. While writing applications it is preferable to structure them as MATLAB functions over scripts since functions accept inputs. End users can make use of this and pass inputs such as the location of the data to the application.
3. Use the **Application Compiler** app or the `mcc` command to package your application as a standalone application. Both options generate an executable and a shell script to run the executable.
4. Run the shell scripts at the terminal. Specify the location of MATLAB Runtime and any inputs the application takes.

   Execution Signature



```
$./run_myStandaloneApp.sh \
  <MATLAB_Runtime_Location> \
  <inputFolderOnHDFS> \
  <outputFolderOnHDFS>
```

See Also

Related Examples

- “Example on Running a Standalone MATLAB MapReduce Application” on page 2-4

Example on Running a Standalone MATLAB MapReduce Application

Supported Platform: Linux only.

This example shows you how to create a standalone MATLAB MapReduce application using the `mcc` command and run it against a Hadoop cluster.

Goal: Calculate the maximum arrival delay of an airline from the given dataset.

Dataset:	`airlinesmall.csv`
Description:	Airline departure and arrival information from 1987-2008.
Location:	`/usr/local/MATLAB/R2018a/toolbox/matlab/demos`

Prerequisites

1. Start this example by creating a new work folder that is visible to the MATLAB search path.
2. Before starting MATLAB, at a terminal, set the environment variable `HADOOP_PREFIX` to point to the Hadoop installation folder. For example:

Shell	Command
csh / tcsh	`% setenv HADOOP_PREFIX /usr/lib/hadoop`
bash	`$ export HADOOP_PREFIX=/usr/lib/hadoop`

Note This example uses `/usr/lib/hadoop` as directory where Hadoop is installed. Your Hadoop installation directory maybe different.

If you forget setting the `HADOOP_PREFIX` environment variable prior to starting MATLAB, set it up using the MATLAB function `setenv` at the MATLAB command prompt as soon as you start MATLAB. For example:

```
setenv('HADOOP_PREFIX','/usr/lib/hadoop')
```

3. Install the MATLAB Runtime in a folder that is accessible by every worker node in the Hadoop cluster. This example uses `/usr/local/MATLAB/MATLAB_Runtime/v##` as the location of the MATLAB Runtime folder.

   If you don’t have the MATLAB Runtime, you can download it from the website at: `https://www.mathworks.com/products/compiler/mcr`.

   Note Replace all references to the MATLAB Runtime version `v##` in this example with the MATLAB Runtime version number corresponding to your MATLAB release. For example, MATLAB R2017b has MATLAB Runtime version number `v92`. For information about MATLAB Runtime version numbers corresponding MATLAB releases, see this list.

4. Copy the map function `maxArrivalDelayMapper.m` from `/usr/local/MATLAB/R2018a/toolbox/matlab/demos` folder to the work folder.

   `maxArrivalDelayMapper.m`

   ```
   function maxArrivalDelayMapper (data, info, intermKVStore)
   partMax = max(data.ArrDelay);
   add(intermKVStore,'PartialMaxArrivalDelay',partMax);
   ```

   For more information, see “Write a Map Function” (MATLAB).

5. Copy the reduce function `maxArrivalDelayReducer.m` from *`matlabroot`*`/toolbox/matlab/demos` folder to the work folder.

   `maxArrivalDelayReducer.m`

   ```
   function maxArrivalDelayReducer(intermKey, intermValIter, outKVStore)
   maxVal = -inf;
   while hasnext(intermValIter)
      maxVal = max(getnext(intermValIter), maxVal);
   end
   add(outKVStore,'MaxArrivalDelay',maxVal);
   ```

   For more information, see “Write a Reduce Function” (MATLAB).

6. Create the directory `/user/`*`<username>`*`/datasets` on HDFS and copy the file `airlinesmall.csv` to that directory. Here *`<username>`* refers to your user name in HDFS.

   ```
   $ ./hadoop fs -copyFromLocal airlinesmall.csv hdfs://host:54310/user/<username>
   ```

Procedure

1 Start MATLAB and verify that the HADOOP_PREFIX environment variable has been set. At the command prompt, type:

```
>> getenv('HADOOP_PREFIX')
```

If ans is empty, review the **Prerequisites** section above to see how you can set the HADOOP_PREFIX environment variable.

2 Create a new MATLAB script with the name depMapRedStandAlone.m. You will add the code listed in the steps listed below to this script file.

3 Create a datastore that points to the airline data in Hadoop Distributed File System (HDFS) .

```
ds = datastore('hdfs:///user/username/datasets/airlinesmall.csv',...
'TreatAsMissing','NA',...
'SelectedVariableNames',{'UniqueCarrier','ArrDelay'});
```

For more information, see “Read Remote Data” (MATLAB).

4 Configure the application for deployment against Hadoop with default settings.

```
config = matlab.mapreduce.DeployHadoopMapReducer;
```

The class matlab.mapreduce.DeployHadoopMapReducer can be used to configure a standalone application based on the Hadoop environment where it is going to be deployed.

For example, if you want to specify the location of the MATLAB Runtime on each of the worker nodes on the cluster, include a line of code similar to this:

```
config = matlab.mapreduce.DeployHadoopMapReducer('MCRRoot','/opt/MATLAB/MATLAB_Runt
```

In this scenario, we assume that the MATLAB Runtime is installed in a non-default location such as /opt/MATLAB/MATLAB_Runtime on the worker nodes.

For information on specifying additional cluster specific properties, see matlab.mapreduce.DeployHadoopMapReducer.

Note Specifying a MATLAB Runtime location as part of the class matlab.mapreduce.DeployHadoopMapReducer will override any MATLAB Runtime location specified during the execution of the standalone application.

5 Define the execution environment using the mapreducer.

```
mr = mapreducer(config);
```

6 Apply the `mapreduce` function.

```
result = mapreduce(...
    ds,...
    @maxArrivalDelayMapper,@maxArrivalDelayReducer,...
    mr,...
    'OutputType','Binary', ...
    'OutputFolder','hdfs:///user/<username>/results/myresults');
```

Note An HDFS directory such as `.../myresults` can be written to only once. If you plan on running your standalone application multiple times against the Hadoop cluster, make sure you delete the `.../myresults` directory on HDFS prior to each execution. Another option is to change the name of the `.../myresults` directory in the MATLAB code and recompile the application.

7 Read the result from the resulting datastore.

```
myAppResult = readall(result)
```

8 Use the `mcc` command with the `-m` flag to create a standalone application.

```
mcc -m depMapRedStandAlone.m
```

The `-m` flag creates a standard executable that can be run from a command line. However, the `mcc` command cannot package the results in an installer.

9 Run the standalone application from a Linux shell using the following command:

```
$ ./run_depMapRedStandAlone.sh /usr/local/MATLAB/MATLAB_Runtime/v##
```

`/usr/local/MATLAB/MATLAB_Runtime/v##` is an argument indicating the location of the MATLAB Runtime.

Prior to executing the above command, verify that the `HADOOP_PREFIX` environment variable is set in the Terminal by typing:

```
$ echo $HADOOP_PREFIX
```

If `echo` comes up empty, see the **Prerequisites** section above to see how you can set the `HADOOP_PREFIX` environment variable.

Your application will fail to execute if the `HADOOP_PREFIX` environment variable is not set.

10 You will see the following output:

```
myAppResult =

           Key             Value 
    _________________    ______

    'MaxArrivalDelay'    [1014]
```

Other examples of `map` and `reduce` functions are available at `toolbox/matlab/demos` folder. You can use other examples to prototype similar standalone applications that run against Hadoop. For more information, see “Build Effective Algorithms with MapReduce” (MATLAB).

Complete code for the standalone application `depMapRedStandAlone` can be found here:

`depMapRedStandAlone.m`

```
%% Create datastore
ds = datastore(...
    'hdfs:///user/username/datasets/airlinesmall.csv',...
    'TreatAsMissing','NA',...
    'SelectedVariableNames',{'UniqueCarrier','ArrDelay'});

%% Configure application for deployment against Hadoop with default settings
config = matlab.mapreduce.DeployHadoopMapReducer;

%% Define the execution environment
mr = mapreducer(config);

%% Apply the mapreduce function
result = mapreduce(...
    ds,...
    @maxArrivalDelayMapper,@maxArrivalDelayReducer,...
    mr,...
    'OutputType','Binary', ...
    'OutputFolder','hdfs:///user/username/results/myresults');

%% Read the result from the resulting datastore
myAppResult = readall(result)
```

See Also

`KeyValueDatastore` | `TabularTextDatastore` | `datastore` | `matlab.mapreduce.DeployHadoopMapReducer` | `mcc`

Related Examples

- “Create Standalone Application from MATLAB”
- “Pass Parallel Computing Toolbox Profile at Run Time”

3

Hadoop Configuration

Configuration File for Creating Deployable Archive Using the mcc Command

When creating a deployable archive using the `mcc` command, you must create a text file containing the following information:

Parameter Type	Description
`mw.ds.out.type`	Output type of data fromHadoop mapreduce job The options are: • `keyvalue` • `tabulartext`
`mw.mapper`	Name of MATLAB map function
`mw.reducer`	Name of MATLAB reduce function
`mw.ds.in.format`	Name of MAT-file containing a `datastore` object representing the format of the data to be processed. In most cases, you will start off by working on a small sample dataset residing on a local machine that is reprensetative 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.
`mw.ds.in.type`	Input type of data to Hadoop mapreduce job The options are: • `keyvalue` • `tabulartext`
`mw.ds.in.fullfile`	Default value is `false`

Note The **Hadoop Compiler** app automatically populates the above parameters after selecting the map function, the reduce function, the input type, and the output type. You can view the contents of your settings file in the **Configuration file contents** section of the Hadoop Compiler app.

Example:

config.txt

```
mw.ds.out.type = keyvalue
mw.mapper = maxArrivalDelayMapper
mw.reducer = maxArrivalDelayReducer
mw.ds.in.format = infoAboutDataset.mat
mw.ds.in.type = tabulartext
```

See Also

Related Examples

- “Example Using the mcc Command Workflow” on page 1-11
- “Example Using the Hadoop Compiler App Workflow” on page 1-5

Functions — Alphabetical List

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

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' -T link:lib options
mfilename1 mfilename2...mfilenameN

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

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

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

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

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

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

`mcc -W 'excel:`*`addin_name`*`,`*`className`*`,`*`version`*`' -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`* — Specifies the version of the add-in specified as *`major`*.*`minor`*.
    - *`major`* — Specifies the major version number. If you do not specify a version number, `mcc` uses the latest version.
    - *`minor`* — Specifies the minor version number. If you do not specify a version number, `mcc` uses the latest version.

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.

`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” on page 3-2.

Tip You can issue the `mcc` command either at the MATLAB command prompt or the DOS or UNIX® command line.

Examples

Compile a standalone application

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

Compile a standalone Windows application

Compile a standalone application that does not open a command prompt on Windows.

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

Compile an Excel add-in

```
mcc -W 'excel:myAddin,myClass,1.0' -T link:lib magic.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 | -d | -f | -g | -G | -I | -K | -m | -M | -n | -N | -o | -p | -R | -S | -T | -u | -U | -v | -w | -W | -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`**

  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 adds a folder to the beginning of the list of paths to search. For example,

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

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

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

  Direct `mcc` 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
`-logfile,`*`filename`*	Specify a log file name.	MATLAB Compiler
`-nodisplay`	Suppress the MATLAB `nodisplay` run-time warning.	MATLAB Compiler
`-nojvm`	Do not use the Java Virtual Machine (JVM).	MATLAB Compiler
`-startmsg`	Customizable user message displayed at initialization time.	MATLAB Compiler Standalone Applications

Option	Description	Target
`-completemsg`	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.

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

- **`-T`**

  Specify the output target phase and type.

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

Target	Description
`compile:exe`	Generate a C/C++ wrapper file, and compile C/C++ files to an object form suitable for linking into a standalone application.
`compile:lib`	Generate a C/C++ wrapper file, and compile C/C++ files to an object form suitable for linking into a shared library or DLL.
`link:exe`	Same as `compile:exe` and also 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**
`-w list`	List all of the possible warnings that `mcc` can generate.
`-w enable`	Enable all warnings.
`-w disable[:<`*`string`*`>]`	Disable specific warnings associated with <*string*>. See “Warning Messages” for a list of the <*string*> values. Omit the optional <*string*> to apply the `disable` action to all warnings.
`-w enable[:<`*`string`*`>]`	Enable specific warnings associated with <*string*>. See “Warning Messages” for a list of the <*string*> values. Omit the optional <*string*> to apply the `enable` action to all warnings.
`-w error[:<`*`string`*`>]`	Treat specific warnings associated with <*string*> as an error. Omit the optional <*string*> to apply the `error` action to all warnings.
`-w off[:<`*`string`*`>] [<`*`filename`*`>]`	Turn off warnings for specific error messages defined by <*string*>. You can also narrow the scope by specifying warnings be turned off when generated by specific <*filename*>s.

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

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

For example, to turn 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
```

- **-W**

  Control the generation of function wrappers. Use the syntax

  ```
  -W type
  ```

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

- **-Y** Use

  ```
   -Y license.lic
  ```

  to override the default license file with the specified argument.

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

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

See Also

Introduced before R2006a

matlab.mapreduce.DeployHadoopMapReducer class

Package: matlab.mapreduce

Configure a MapReduce application for deployment against Hadoop

Description

A `DeployHadoopMapReducer` object represents executing MapReduce on a Hadoop cluster with MATLAB Runtime.

Construction

`config = matlab.mapreduce.DeployHadoopMapReducer` creates a `matlab.mapreduce.DeployHadoopMapReducer` object that specifies the default properties for Hadoop execution.

Use the resulting object as input to the `mapreducer` function to specify the configuration properties for Hadoop execution. For deploying a standalone application, pass the `matlab.mapreduce.DeployHadoopMapReducer` object as input to `mapreduce`.

`config = matlab.mapreduce.DeployHadoopMapReducer(Name,Value)` creates a `matlab.mapreduce.DeployHadoopMapReducer` object with properties specified by one or more name-value pair arguments.

Input 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 single quotes (`' '`). You can specify several name and value pair arguments in any order as `Name1,Value1,...,NameN,ValueN`.

`HadoopInstallFolder` — Path to Hadoop installation
character vector

Path to Hadoop installation, specified as the comma-separated pair consisting of the `HadoopInstallFolder` and a character vector.

The default value of Hadoop install folder is specified by the environment variables in the order of precedence of `MATLAB_HADOOP_INSTALL`, `HADOOP_PREFIX`, and `HADOOP_HOME`.

`HadoopConfigurationFile` — Path to Hadoop application configuration files

character vector

Path to Hadoop application configuration files, specified as the comma-separated pair consisting of the `HadoopConfigurationFile` and a character vector.

`MCRRoot` — MATLAB Runtime installation folder for Hadoop cluster

character vector

MATLAB Runtime installation folder for Hadoop cluster, specified as the comma-separated pair consisting of the `MCRRoot` and a character vector.

MCRRoot specifies the MATLAB Runtime installation folder used by Hadoop when executing `mapreduce` tasks in Hadoop.

Example: `'MCRRoot','/hd-shared/hadoop-2.2.0/MCR/v84'`

`HadoopProperties` — Job or application-specific Hadoop configuration properties

containers.Map

A `containers.Map` object of name-value pairs that specify Hadoop configuration properties for a specific job or application. Name-value pairs must be specified as character vectors.

The properties specified in the `containers.Map` object are passed as a [GENERIC_OPTION] consisting of name-value pairs signaled by a `-D` flag to the `hadoop` shell command.

Example:

```
setenv('HADOOP_PREFIX', '/usr/lib/hadoop') % replace with your Hadoop install location
name = {'mapreduce.map.maxattempts','mapreduce.job.reduces'};
value = {'2','1'};
prop = containers.Map(name,value);
obj = matlab.mapreduce.DeployHadoopMapReducer('HadoopProperties', prop)
```

Examples

Create a Deploy Hadoop MapReducer object

Create and use a `matlab.mapreduce.DeployHadoopMapReducer` object to deploy into a standalone application, and deploy against Hadoop.

```
config = matlab.mapreduce.DeployHadoopMapReducer('MCRRoot',...
    '/hd-shared/hadoop-2.2.0/MCR/v84');
mr = mapreducer(config);
```

- “Example on Running a Standalone MATLAB MapReduce Application” on page 2-4

See Also

`mapreduce` | `mapreducer`

Topics

“Example on Running a Standalone MATLAB MapReduce Application” on page 2-4

hadoopCompiler

Package MATLAB Compiler programs for deployment against Hadoop clusters as MapReduce programs

Syntax

```
hadoopCompiler
hadoopCompiler project_name
```

Description

`hadoopCompiler` opens the **Hadoop Compiler** app.

`hadoopCompiler project_name` opens **Hadoop Compiler** app with the project preloaded.

Examples

Create a New Hadoop Compiler Project

Open the Hadoop compiler app to create a new project.

```
hadoopCompiler
```

Input Arguments

`project_name` — name of the project to be compiled

character array or string

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

See Also

`deploytool` | `mcc`

Introduced in R2014b

mapreducer

Define deployed execution for mapreduce

Use this function with MATLAB Compiler to specify information about the execution environment for standalone applications that execute against Hadoop.

Syntax

```
mapreducer(config)
mr = mapreducer(config)
```

Description

`mapreducer(config)` specifies execution environment. When deploying a standalone application against Hadoop, `config` is an object of `matlab.mapreduce.DeployHadoopMapReducer` class.

`mr = mapreducer(config)` returns a MapReducer object to specify the execution environment. You can define MapReducer objects, allowing you to swap execution environments by passing one as an input argument to `mapreduce`.

Examples

Create a mapreducer object in deployed mode

```
mr = mapreducer(...
    matlab.mapreduce.DeployHadoopMapReducer('MCRRoot',...
    '/hd-shared/hadoop-2.2.0/MCR/v84'))
```

Input Arguments

`config` — mapreducer object for running in deployed environment
`matlab.mapreduce.DeployHadoopMapReducer` object

`mapreducer` object for running in deployed environment, specified as a `matlab.mapreduce.DeployHadoopMapReducer` object.

Example: `config = mapreducer(matlab.mapreduce.DeployHadoopMapReducer('MCRRoot','/hd-shared/hadoop-2.2.0/MCR/v84'))`

Output Arguments

`mr` — Execution environment for `mapreduce`
`mapreducer` object

Execution environment for `mapreduce`, returned as a `mapreducer` object.

Tips

- `mapreducer` and `mapreducer(0)` enables different configurations based on the products you have. In MATLAB, the `mapreduce` function automatically runs using a `SerialMapReducer`. For more information, see `mapreducer`.

  If you have Parallel Computing Toolbox™, see the function reference page for `mapreducer` for additional information.

See Also

Functions
`gcmr` | `mapreduce`

Classes
`matlab.mapreduce.DeployHadoopMapReducer`

Topics

"Example on Running a Standalone MATLAB MapReduce Application" on page 2-4

Introduced in R2014b

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Apps

Hadoop Compiler

Package MATLAB programs for deployment to Hadoop clusters as MapReduce programs

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`.

Examples

- “Example Using the Hadoop Compiler App Workflow” on page 1-5

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 reprensetative 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" on page 3-2.

`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.

Programmatic Use

`hadoopCompiler`

See Also

Topics

"Example Using the Hadoop Compiler App Workflow" on page 1-5

Introduced in R2014b