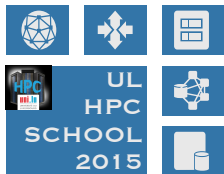


MATLAB on UL HPC

Interactive & passive jobs, sequential and XCS execution



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Latest versions available on **Github**:

UL HPC tutorials:

<https://github.com/ULHPC/tutorials>

UL HPC School:

<https://hpc.uni.lu/hpc-school>

This tutorial's sources: <https://github.com/ULHPC/tutorials/tree/devel/advanced/MATLAB1>

Summary

- 1 Pre-requisites
- 2 Objectives
- 3 Example 1
- 4 Example 2
- 5 Practical session
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Tutorial files

Sample MATLAB scripts used in the tutorial

- download only the scripts:

```
(frontend)$> mkdir $HOME/matlab-tutorial
(frontend)$> cd $HOME/matlab-tutorial
(frontend)$> wget
https://raw.githubusercontent.com/ULHPC/tutorials/devel/advanced/MATLAB1/code/example1.m
(frontend)$> wget
https://raw.githubusercontent.com/ULHPC/tutorials/devel/advanced/MATLAB1/code/example2.m
(frontend)$> wget
https://raw.githubusercontent.com/ULHPC/tutorials/devel/advanced/MATLAB1/code/yahoo_finance_data.m
```

- *or* download the full repository and link to the MATLAB tutorial:

```
(frontend)$> git clone https://github.com/ULHPC/tutorials.git
(frontend)$> ln -s tutorials/advanced/MATLAB1/
$HOME/matlab-tutorial
```

X Window System

In order to see locally the MATLAB graphical interface, a package providing the X Window System is required:

- on OS X: **XQuartz** <http://xquartz.macosforge.org/landing/>
- on Windows: **VcXsrv** <http://sourceforge.net/projects/vcxsrv/>

Now you will be able to connect with X11 forwarding enabled:

- on Linux & OS X:

```
$> ssh access-gaia.uni.lu -X
```
- on Windows, with Putty
 Connection → SSH → X11 → **Enable X11 forwarding**



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Objectives of this PS

Better understand the usage of MATLAB on the [UL HPC Platform](#)

- running in interactive mode
 - ↪ with either the full graphical or the text-mode interface
 - ↪ using the XCS portal (xcs.uni.lux)



Objectives of this PS

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- running in passive mode
 - ↪ several ways of submitting MATLAB jobs

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- checking available toolboxes & licenses status

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 - ↪ several ways of submitting MATLAB jobs
- checking available toolboxes & licenses status
- using script (.m) files
- plotting data, saving the plots to file



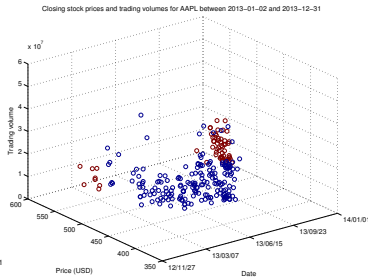
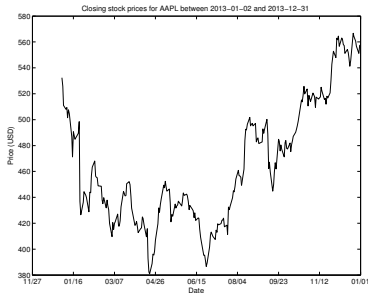
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Scripts and plots

example1.m: non-interactive script that shows:

- the use of a stopwatch timer
- how to use an external function (financial data retrieval)
- how to use different plotting methods
- how to export the plots in different graphic formats





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Parallelization

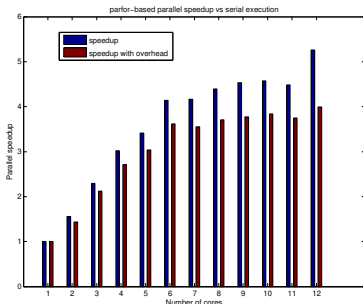
example2.m: non-interactive script that shows:

- the serial execution of time consuming operations

Parallelization

example2.m: non-interactive script that shows:

- the serial execution of time consuming operations
- Revisited in MATLAB2 tutorial:
 - the parallel execution and relative speedup vs serial execution
 - setting the # of parallel threads through environment variables
 - GPU-based parallel execution





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Exercises

- Read and understand the MATLAB tutorial

<https://github.com/ULHPC/tutorials/tree/devel/advanced/MATLAB1>

↪ all provided scripts are fully commented

- Run all the examples

↪ launching interactive/passive mode MATLAB

↪ plotting script

↪ parallel execution script

Useful links

- Parallel Computing Toolbox <http://www.mathworks.nl/help/distcomp/index.html>
- Parallel for-Loops (parfor) <http://www.mathworks.nl/help/distcomp/getting-started-with-parfor.html>
- GPU Computing <http://www.mathworks.nl/discovery/matlab-gpu.html>



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What we've seen so far

- MATLAB execution modes on the [UL HPC Platform](#)
- Checking for available toolboxes and licenses
- Plotting

Perspectives

- Personalize the UL HPC launchers with the MATLAB commands
- Check the second example M-file for insight into basic parallel execution
- Parallelize your own tasks using `parfor`/GPU-enabled instructions



Thank you for your attention...

Questions?

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