MATLAB on UL HPC

Interactive & passive jobs, sequential and XCS execution

UL High Performance Computing (HPC) Team

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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

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2. Objectives
3. Example 1
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6. Conclusion

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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.github.com/ULHPC/tutorials/devel/advanced/MATLAB1/code/example1.m
(frontend)$> wget
https://raw.github.com/ULHPC/tutorials/devel/advanced/MATLAB1/code/example2.m
(frontend)$> wget
https://raw.github.com/ULHPC/tutorials/devel/advanced/MATLAB1/code/google_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)

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- checking available toolboxes & licenses status

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- using script (.m) files

- plotting data, saving the plots to file

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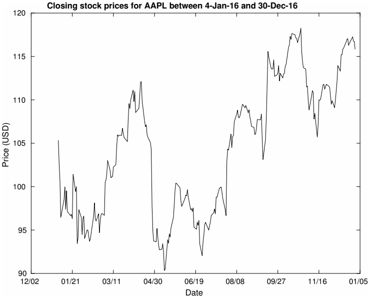
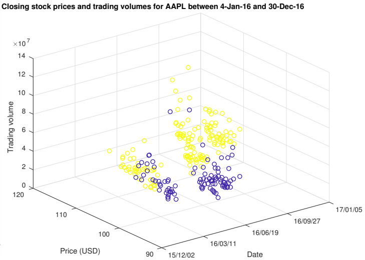
Scripts and plots

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:

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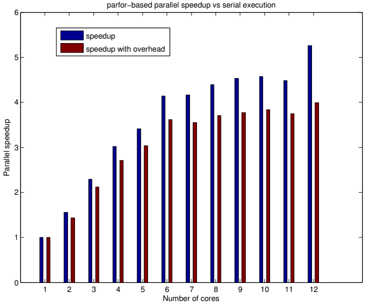
Parallelization

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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