

MATLAB at Research Computing: A Hands-On Tutorial to Running Your MATLAB code



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2/12/15

UF Research Computing
 Information Technology
 Home of High-Performance Computing and *HiPerGator*

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HiPerGator

The University of Florida Supercomputer for Research

- 16,384 cores—total of about 21,000 cores today
- Infiniband interconnect
- >3PB fast, high-availability, storage
- **GPGPUs**
- Large memory nodes (512GB to 1TB of RAM)



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Research Computing




MATLAB

Running MATLAB

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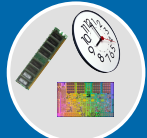
Cluster Basics

User interaction




Login server (Head node)

Scheduler



Tell the scheduler what you want to do

Compute resources



Your job runs on the cluster


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Cluster basics

Special Purpose Servers


- dev1
- dev2
- gui.rc.ufl.edu
- gui1.rc.ufl.edu

User interaction




Login server (Head node)

Scheduler



Tell the scheduler what you want to do

Compute resources



Your job runs on the cluster

Special Purpose Servers:

- Still connected to same storage
- Still have access to cluster if needed
- Designated for specific activities

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Cluster login

gator.rc.ufl.edu

ssh

gator1 gator3
gator2 gator4

/home/\$USER

ssh <user>@gator.rc.ufl.edu

Windows: PuTTY
Mac/Linux: Terminal

User interaction

Login server (Head node)

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Development servers

- Do not run applications on the login servers
 - Account will be suspended

Do not run interactive jobs on the login nodes.

UF Research Computing account policies are available at the following URL:
<http://www.rc.ufl.edu/about/policies/account>

- Use the development servers for testing and interactive use:
 - ssh dev1 or ssh dev2

User interaction

Login server

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Cluster login – GUI Nodes

For GUI nodes:

ssh -Y <user>@gui.rc.ufl.edu
or
ssh -Y <user>@gui1.rc.ufl.edu

Windows: PuTTY
Mac/Linux: Terminal

Windows: Xming or MobaXterm
Mac: Xquartz

User interaction

Login server (Head node)

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Trackpads and MATLAB

- Mevent.CASE! error
- Caused by a bug in MATLAB/JAVA/Trackpads
 - Two finger horizontal scrolling leads to this error
- Use a mouse for now

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MATLAB Policies

- Don't run or compile on login servers
 - Use dev1/dev2 or a GUI server (gui/gui1)
- Long jobs (>30 min) should be submitted to scheduler
- Licenses are from UF pool
- Compile your code with MATLAB compiler
 - Doesn't require a license to run

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MATLAB

- Functions can take variables from command line:


```
function myfunction(infile)
[ID,Dose,Response,Tmt,Age,Gender] = importfile(infile);
do stuff...
```

 - Compile once, run on any infile
- Saving graphics:


```
saveas(gcf, 'graph1.pdf', 'pdf');
```

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MATLAB Compiler

- ▶ Best to use from command line:

```
mcc -R -singleCompThread -m some_prog.m
```

- -singleCompThread
 - Gives single threaded executable
 - Otherwise MATLAB tries to use all CPUs on machine!
- Results in:
 - some_prog
 - run_some_prog.sh
 - readme.txt

readme.txt

-to run the shell script, type

```
./run_some_prog.sh <mcr_directory> <argument_list>
```

- ▶ You *could* use this, but `module load matlab` does what `run_script` handles in terms of getting environment set.
 - `module load matlab` sets `$MATLAB` to use for `mcr_directory`
- ▶ `argument_list`: any input variables your function needs: eg. `infile`
 - need to be in the correct order

mccExcludedFiles.log

```
[magitz@guil DoseResponse]$ more mccExcludedFiles.log
The List of Excluded Files
```

```
Excluded files  Exclusion Message ID  Reason For Exclusion  Exclusion Rule
```

- ▶ Not all MATLAB programs can be compiled
 - See http://www.mathworks.com/products/ineligible_programs/
 - Check this file to make sure nothing was excluded
- ▶ Some functions included in MCR don't need to be compiled again

Submit script

```
#!/bin/bash
#PBS -N My_Job_Name
#PBS -M Joe_Shmoie@ufl.edu
#PBS -m abe
#PBS -o My_Job.log
#PBS -e My_Job.err
#PBS -l nodes=1:ppn=1
#PBS -l pmem=900mb
#PBS -l walltime=00:05:00

cd $PBS_O_WORKDIR

module load matlab
./some_prog infile
```

MATLAB Demo

- ▶ Example files are located at:

```
/scratch/lfs/bio/training/2014-09-18/DoseResponse
```

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- ▶ Help and Support
 - <https://support.rc.ufl.edu>
 - For any kind of question or help requests
 - <http://wiki.rc.ufl.edu>
 - Documents on hardware and software resources
 - Various user guides
 - Many sample submission scripts
 - <http://rc.ufl.edu>
 - Frequently Asked Questions
 - Account set up and maintenance

