

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



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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**)



Research Computing




MATLAB

Running MATLAB

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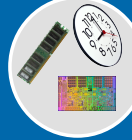
Cluster Basics

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




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Tell the scheduler what you want to do

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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






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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

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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` 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_Shmoee@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/2015-09-24/DoseResponse`

UF Research Computing

- ▶ 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

