

<http://research-it.berkeley.edu>

<http://research-it.berkeley.edu/services/high-performance-computing/using-matlab-savio>

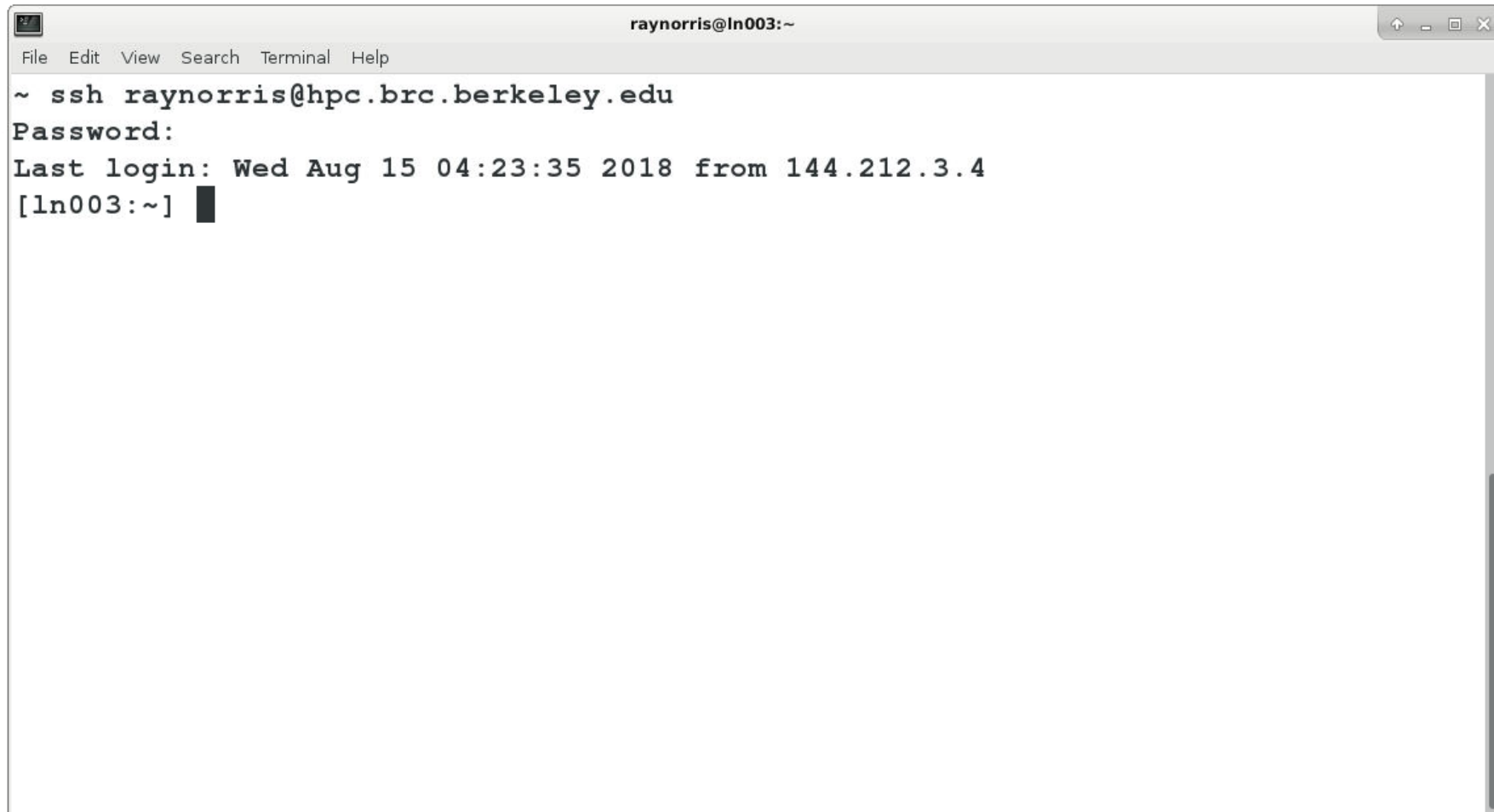
# What Do You Want to Run?

- **MATLAB**
  - Single node, multi-threaded (across all cores)
  - Interactively? Batch?
- **Local Pool**
  - Single node, single thread, multi-processing
  - Interactively? Batch?
- **Multi-node**
  - M cores, N nodes
  - `--licenses=mdcs:M*N`

# Connecting to Savio

- <http://research-it.berkeley.edu/services/high-performance-computing/logging-brc-clusters>
  - Requires Google Authenticator

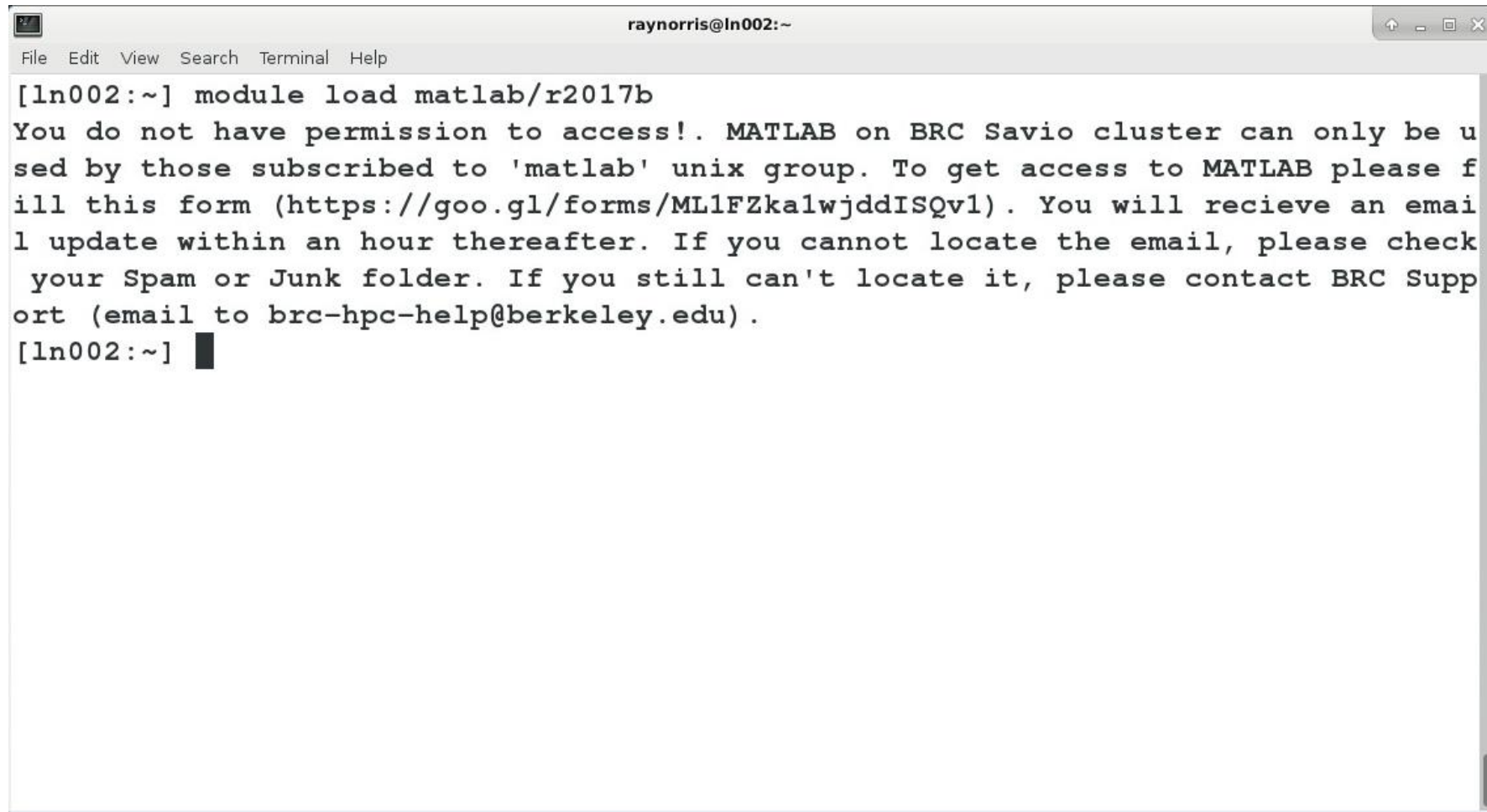
# ssh to Savio



A terminal window titled "raynorris@ln003:~" with a menu bar (File, Edit, View, Search, Terminal, Help) and standard window controls. The terminal output shows an SSH session to "hpc.brc.berkeley.edu". The prompt is "~ ssh raynorris@hpc.brc.berkeley.edu". The user is prompted for a password ("Password:"). The login message is "Last login: Wed Aug 15 04:23:35 2018 from 144.212.3.4". The prompt changes to "[ln003:~]" followed by a black cursor block.

```
raynorris@ln003:~  
File Edit View Search Terminal Help  
~ ssh raynorris@hpc.brc.berkeley.edu  
Password:  
Last login: Wed Aug 15 04:23:35 2018 from 144.212.3.4  
[ln003:~] █
```

# Load MATLAB on System Path



```
raynorris@ln002:~  
File Edit View Search Terminal Help  
[ln002:~] module load matlab/r2017b  
You do not have permission to access!. MATLAB on BRC Savio cluster can only be used by those subscribed to 'matlab' unix group. To get access to MATLAB please fill this form (https://goo.gl/forms/ML1FZka1wjddISQv1). You will receive an email update within an hour thereafter. If you cannot locate the email, please check your Spam or Junk folder. If you still can't locate it, please contact BRC Support (email to brc-hpc-help@berkeley.edu).  
[ln002:~] █
```

# Submit MATLAB Form

If you are a non-Berkeley cluster user who needs MATLAB access, you can fill out the form using the same license key your project PI has obtained from Software Central, but all Berkeley users should submit their own key.

<https://goo.gl/forms/ML1FZka1wjddISQv1>

## Berkeley Research Computing HPC Cluster, MATLAB Access Request Form

MATLAB access on BRC HPC clusters is limited to those who have obtained MATLAB license from UC Berkeley Software Central (<https://software.berkeley.edu>). After getting your own MATLAB license from UCB Software Central please fill this form to obtain MATLAB access on BRC HPC Clusters.

More information about BRC HPC Clusters can be found here : <http://research-it.berkeley.edu/services/high-performance-computing>

For additional assistance refer to BRC getting help page here : <http://research-it.berkeley.edu/services/high-performance-computing/getting-help>

\* Required

Email address \*

Your email

Full Name \*

Your answer

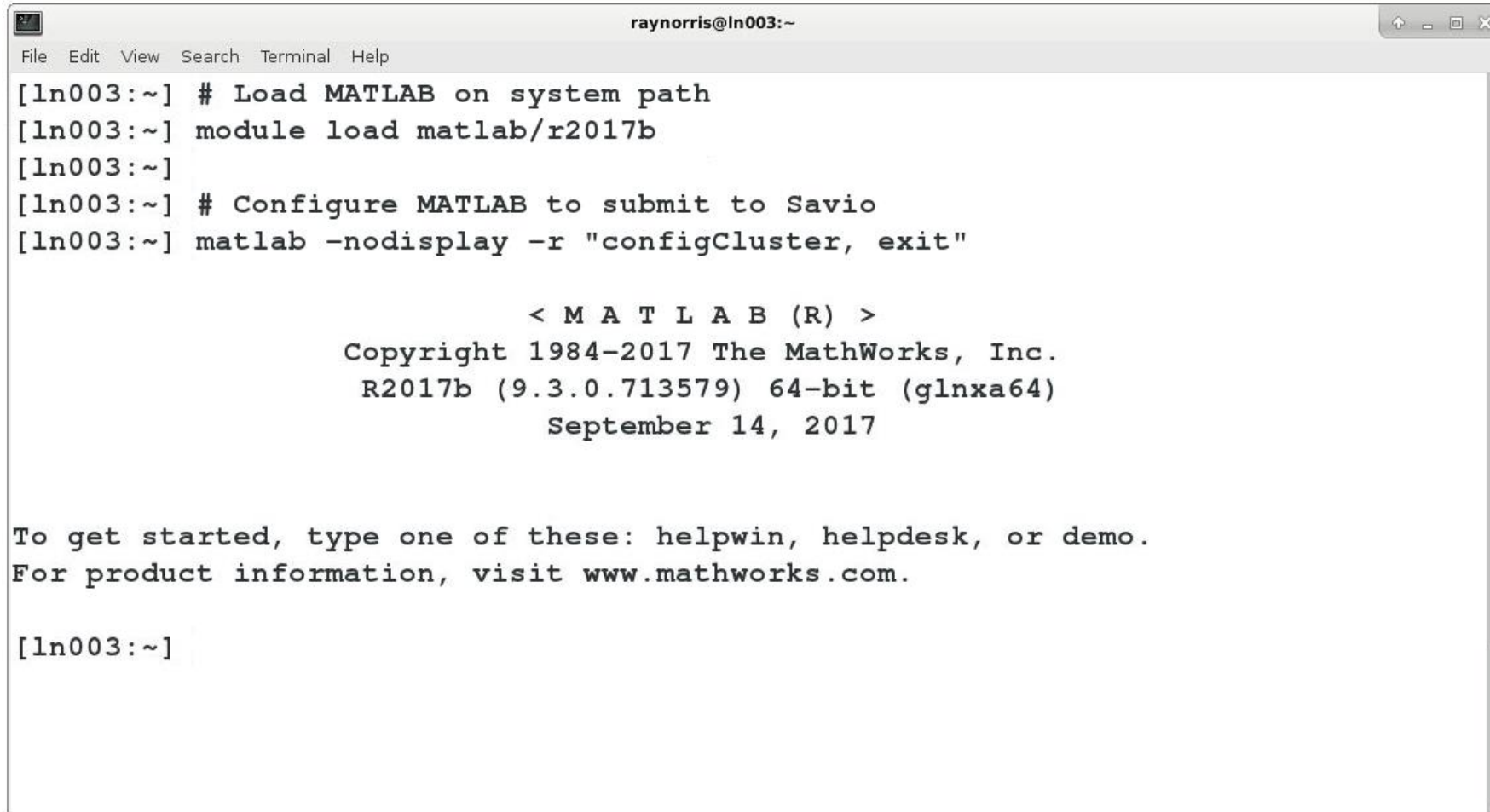
BRC HPC Cluster Username \*

Your answer

Personal MATLAB License Key (Obtained from UCB Software Central) \*

Your answer

# Configure MATLAB to submit Jobs to Savio

A terminal window titled 'raynorris@ln003:~' with a menu bar (File, Edit, View, Search, Terminal, Help). The terminal shows the execution of 'module load matlab/r2017b' and 'matlab -nodisplay -r "configCluster, exit"'. The MATLAB startup banner is displayed, including the version 'R2017b (9.3.0.713579) 64-bit (glnxa64)' and the date 'September 14, 2017'. The prompt '[ln003:~]' is shown at the bottom.

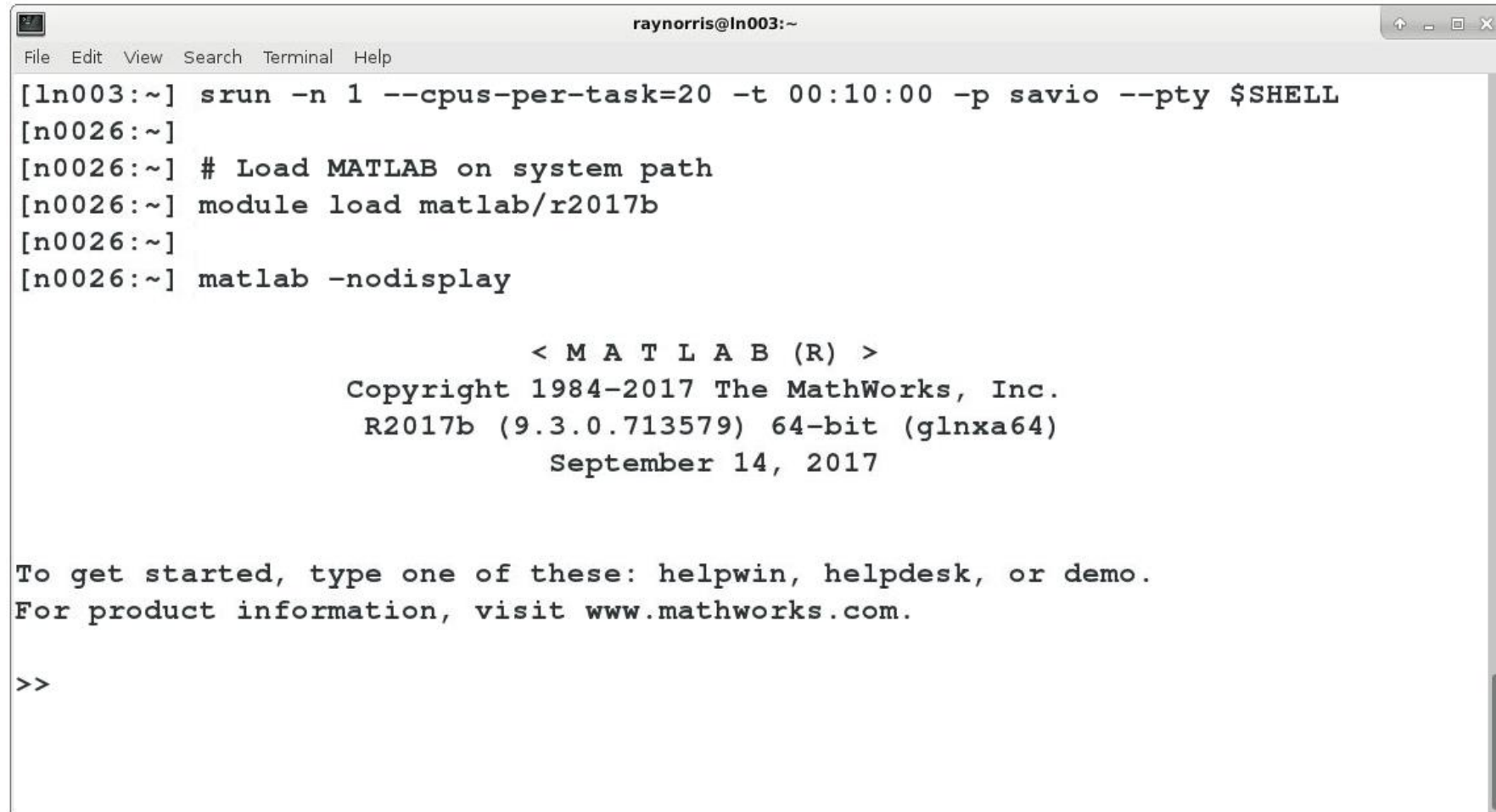
```
raynorris@ln003:~  
File Edit View Search Terminal Help  
[ln003:~] # Load MATLAB on system path  
[ln003:~] module load matlab/r2017b  
[ln003:~]  
[ln003:~] # Configure MATLAB to submit to Savio  
[ln003:~] matlab -nodisplay -r "configCluster, exit"  
  
      < M A T L A B (R) >  
Copyright 1984-2017 The MathWorks, Inc.  
R2017b (9.3.0.713579) 64-bit (glnxa64)  
September 14, 2017  
  
To get started, type one of these: helpwin, helpdesk, or demo.  
For product information, visit www.mathworks.com.  
  
[ln003:~]
```

# Ways to Run MATLAB

- Interactively
- Batch Mode



# Run MATLAB – Interactively

A terminal window titled 'raynorris@ln003:~' with a menu bar (File, Edit, View, Search, Terminal, Help). The terminal shows a sequence of commands and output for starting MATLAB interactively. The commands are: 'srun -n 1 --cpus-per-task=20 -t 00:10:00 -p savio --pty \$SHELL', 'module load matlab/r2017b', and 'matlab -nodisplay'. The output shows the MATLAB startup banner, including the version 'R2017b (9.3.0.713579) 64-bit (glnxa64)' and the date 'September 14, 2017'. It also includes instructions on how to get started and where to find product information. The prompt '>>' is visible at the bottom.

```
raynorris@ln003:~  
File Edit View Search Terminal Help  
[ln003:~] srun -n 1 --cpus-per-task=20 -t 00:10:00 -p savio --pty $SHELL  
[n0026:~]  
[n0026:~] # Load MATLAB on system path  
[n0026:~] module load matlab/r2017b  
[n0026:~]  
[n0026:~] matlab -nodisplay  
  
          < M A T L A B (R) >  
Copyright 1984-2017 The MathWorks, Inc.  
R2017b (9.3.0.713579) 64-bit (glnxa64)  
September 14, 2017  
  
To get started, type one of these: helpwin, helpdesk, or demo.  
For product information, visit www.mathworks.com.  
  
>>
```

# Sample MATLAB Parallel Code

```
function my_parallel_app

% Get a handle to the cluster
c = parcluster('savio');

% What the ideal pool size
mps = maxPoolSize();

% Open a pool of workers
t0 = tic;
p = c.parpool(mps);
t = toc(t0);
fprintf('Time to start parpool: %.2f\n',t);

% PARFOR
t0 = tic;
parfor idx = 1:mps*3
    pause(2)
end
t = toc(t0) %#ok<*NASGU,*NOPRT>

% SPMD
spmd
    o = gop(@plus,labindex);
end
o{end}
% Compare our results to a cumulative summation
o = cumsum(1:mps);
o(end)

% Close the pool
p.delete
```

# Run MATLAB – Batch Mode

```
#!/bin/bash

#SBATCH --job-name=matlab
#SBATCH --account=
#SBATCH --partition=savio2          # REQUIRED
#SBATCH -N 2
#SBATCH --ntasks=8
#SBATCH --cpus-per-task=1
#SBATCH --time=00:10:00            # REQUIRED
#SBATCH --licenses=mdcs:8
#SBATCH --reservation=matlabclass  # JUST FOR TODAY
# =====

# Load MATLAB on system path
module load matlab

# Required for MDCS jobs
export MDCE_OVERRIDE_EXTERNAL_HOSTNAME=`/bin/hostname -f`

# Run MATLAB
matlab -nodisplay -r my_parallel_app
```

## Submit the Jobscript

- `sbatch matlab.parallel.jobscript`  
Submitted batch job 3269288
- `squeue -j <job-id>`
- `cat slurm-<job-id>.out`

```
To get started, type one of these: helpwin, helpdesk, or demo.  
For product information, visit www.mathworks.com.
```

```
Starting parallel pool (parpool) using the 'savio' profile ...  
connected to 8 workers.
```

```
Time to start parpool: 105.88
```

```
t =
```

```
    8.5951
```

```
ans =
```

```
    36
```

```
ans =
```

```
    36
```

```
Parallel pool using the 'savio' profile is shutting down.
```