# Getting Started with Parallel Computing using MATLAB on the Magnitude HPC Cluster

This document provides the steps to configure MATLAB to submit jobs to a cluster, retrieve results, and debug errors.

**CONFIGURATION**

After logging into the cluster, configure MATLAB to run parallel jobs on your cluster by calling the shell script `configCluster.sh`  This only needs to be called once per version of MATLAB.

```
$ module load matlab
$ configCluster.sh
```

Jobs will now default to the cluster rather than submit to the local machine.

**CONFIGURATION**

Contact your cluster administrator to get your site-specific MATLAB Parallel Server support package. Add the support package to your MATLAB Path by untarring/unzipping it into the location returned by

```
>> userpath
```

Start MATLAB.  Configure MATLAB to run parallel jobs on your cluster by calling `configCluster`. For each cluster, `configCluster` only needs to be called once per version of MATLAB.

```
>> configCluster
```

Submission to the remote cluster requires SSH credentials.  You will be prompted for your ssh username and password or identity file (private key).  The username and location of the private key will be stored in MATLAB for future sessions.

Jobs will now default to the cluster rather than submit to the local machine.

**NOTE**: If you would like to submit to the local machine then run the following command:

```
>> % Get a handle to the local resources
>> c = parcluster('local');
```

**CONFIGURING JOBS**

Prior to submitting the job, we can specify various parameters to pass to our jobs, such as queue, e-mail, walltime, etc.  *None of these are required*.

```
>> % Get a handle to the cluster
>> c = parcluster;

>> % Specify an account to use for MATLAB jobs
>> c.AdditionalProperties.AccountName = 'account-name';
```

```
>> % Request a FAT node
>> c.AdditionalProperties.Constraint = 'FAT';

>> % Specify e-mail address to receive notifications about your job
>> c.AdditionalProperties.EmailAddress = 'user-id@uni-due.de';

>> % Specify memory to use for MATLAB jobs, per core (MB)
>> c.AdditionalProperties.MemUsage = '4000';

>> % Specify a queue to use for MATLAB jobs
>> c.AdditionalProperties.QueueName = 'queue-name';

>> % Request reservation
>> c.AdditionalProperties.Reservation = 'name-of-reservation';

>> % Wait up to 30 minutes for a single switch; otherwise, proceed
>> c.AdditionalProperties.Switches = '1@00:30:00';

>> % Specify the walltime (e.g. 5 hours)
>> c.AdditionalProperties.WallTime = '05:00:00';
```

Save changes after modifying AdditionalProperties for the above changes to persist between MATLAB sessions.

```
>> c.saveProfile
```

To see the values of the current configuration options, display AdditionalProperties.

```
>> % To view current properties
>> c.AdditionalProperties
```

Unset a value when no longer needed.

```
>> % Turn off email notifications
>> c.AdditionalProperties.EmailAddress = '';

>> c.saveProfile
```

## INTERACTIVE JOBS

To run an interactive pool job on the cluster, continue to use `parpool` as you've done before.

```
>> % Get a handle to the cluster
>> c = parcluster;

>> % Open a pool of 64 workers on the cluster
>> p = c.parpool(64);
```

Rather than running local on the local machine, the pool can now run across multiple nodes on the cluster.

```
>> % Run a parfor over 1000 iterations
>> parfor idx = 1:1000
       a(idx) = …
   end
```

Once we're done with the pool, delete it.

```
>> % Delete the pool
>> p.delete
```

**TO LEARN MORE**

To learn more about the MATLAB Parallel Computing Toolbox, check out these resources:

- Parallel Computing Coding Examples
- Parallel Computing Documentation
- Parallel Computing Overview
- Parallel Computing Tutorials
- Parallel Computing Videos
- Parallel Computing Webinars