



# Matlab on Ibex

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# Running on Ibex

- Getting Access
- Interactive Mode
- Batch Mode
  - Serial Jobs
  - Parallel Jobs



# Getting Access

- In order to use Matlab; you need to be added to the ksl-matlab group .
- *“As Matlab is a licensed software we had to restrict access to authorized users only.*
- *Access to the software is controlled via Shaheen, so in order to grant you access we need to create an account for you on Shaheen (although you will not use it).*
- *Submit the application form along with a scan of your passport and KAUST ID.*
- *The form will need to be signed by your PI in the section at the top of page 3, you can leave the project and IP address sections blank as you will not be logging into the system.*
- *The form can be found on our website at:*  
[https://www.hpc.kaust.edu.sa/sites/default/files/files/public/documents/KSL\\_Shaheen\\_Individual\\_Access\\_Application\\_IAA.docx](https://www.hpc.kaust.edu.sa/sites/default/files/files/public/documents/KSL_Shaheen_Individual_Access_Application_IAA.docx)  
“  
-
- Fill in the mentioned form and send it to [help@hpc.kaust.edu.sa](mailto:help@hpc.kaust.edu.sa) requesting access to the Matlab group “ksl-matlab” to use Matlab on Ibex.
- After confirming your addition to the group; You are now ready to use Matlab on Ibex.

# Interactive Mode

- `ssh -X username@ilogin.ibex.kaust.edu.sa`
- `ssh -X username@glogin.ibex.kaust.edu.sa`
- *Allocate an interactive node, also choose the time. For example:*  
**`srun -N 1 --ntasks=4 -t 01:00:00 --pty /bin/bash -l`**
- `module avail matlab` #to check the available versions on the system
- `module load matlab/R2023b`
- `matlab`
- ***Note:** To be able to open the GUI, make sure you have installed xquartz for MAC users / Xming or MobaXterm for windows users.*

# Example on Ibex

```
khatabah@login509-02-r:~$srun -N 1 --ntasks=4 -t 01:00:00 --pty /bin/bash -l
srun: job 31890735 queued and waiting for resources
srun: job 31890735 has been allocated resources
khatabah@cn605-26-l:~$module avail matlab
----- /sw/rl9c/modulefiles/applications -----
matlab/R2022a  matlab/R2022b  matlab/R2023a  matlab/R2023b

Key:
modulepath
khatabah@cn605-26-l:~$module load matlab/R2023b
Loading module for Matlab-R2023b
Matlab-R2023b modules now loaded
khatabah@cn605-26-l:~$matlab
```

GUI will pop up!!



## Batch Mode

- *For the batch mode, you can run a serial code or a parallelized code across multi-cores up to 128 cores which translates to 128 workers.*
- Here is an example of batch script to run a serial matlab code running 1 worker on 1 core :
- Steps
  - cd to your working directory
  - Create your batch script as mentioned in the next slide. For example name it: mybatchscript
  - Paste the example
  - Save and exit
  - sbatch mybatchscript #to submit your script to SLURM

# Batch Mode

## 1- Running a serial code

```
#!/bin/bash -l
#SBATCH -N 1
#SBATCH --ntasks-per-node=1
#SBATCH --partition=batch
#SBATCH -J test-matlab
#SBATCH -o test-matlab.%J.out
#SBATCH -e test-matlab.%J.err
#SBATCH --time=00:20:00
#SBATCH --mem=40G
#SBATCH --constraint=[intel]
```

```
#OpenMP settings:
export OMP_NUM_THREADS=1
```

```
module load matlab/R2023b
```

```
cd /ibex/scratch/your_user_name/working_dir
```

```
#run the application:
matlab -nodisplay < your_file.m
```

# Batch Mode

## 2- Running a parallel code

- Add the below lines at the beginning of .m file so the parallelism is done over the allocated cores.

```
pc = parcluster('local');  
parpool(pc, str2num(getenv('SLURM_CPUS_ON_NODE')));
```

Here is an example of a batch script to run a parallel matlab code running 40 workers on 40 cores :





# Batch Mode

## 2- Single Node: Running a parallel code

```
#!/bin/bash -l
#SBATCH -N 1
#SBATCH --ntasks-per-node=40
#SBATCH --partition=batch
#SBATCH -J test-matlab
#SBATCH -o test-matlab.%J.out
#SBATCH -e test-matlab.%J.err
#SBATCH --time=00:20:00
#SBATCH --mem=40G
#SBATCH --constraint=[intel]
```

```
#OpenMP settings:
export OMP_NUM_THREADS=1
```

```
module load matlab/R2023b
```

```
cd /ibex/scratch/your_user_name/working_dir
```

```
#run the application:
matlab -nodisplay < your_file.m
```

# Tips and Tricks

## Workaround when running multiple parpool jobs

- Sometimes when running multiple parpool jobs simultaneously, conflict between the jobs may happen.
- Parpool needs a temporary location to store files for workers synchronization under
  - /home/username/.matlab
- Solution:
  - In your batch file add this line before running the matlab line:
    - **mkdir -p \$SCRATCH/\$SLURM\_JOB\_ID**
  - In the .m file add also the line in red:
    - pc = parcluster('local')
    - **pc.JobStorageLocation = strcat(getenv('SCRATCH'),'/',**  
**getenv('SLURM\_JOB\_ID'))**
    - parpool(pc, str2num(getenv('SLURM\_CPUS\_ON\_NODE')))

# Tips and Tricks

## Workaround when running multiple parpool jobs

### Batch script

```
#!/bin/bash -l
#SBATCH -N 1
#SBATCH --ntasks-per-node=12
#SBATCH --partition=batch
#SBATCH -J test-matlab
#SBATCH -o test-matlab.%J.out
#SBATCH -e test-matlab.%J.err
#SBATCH --time=00:20:00
#SBATCH --mem=40G
#SBATCH --constraint=[intel]

#OpenMP settings:
export OMP_NUM_THREADS=1

module load matlab/R2023b

cd /ibex/scratch/your_user_name/working_dir
mkdir -p $SCRATCH/$SLURM_JOB_ID

#run the application:
matlab -nodisplay < your_file.m
```

### Matlab example file

```
pc = parcluster('local')
pc.JobStorageLocation = strcat(getenv('SCRATCH'),'/', getenv('SLURM_JOB_ID'))
parpool(pc, str2num(getenv('SLURM_CPUS_ON_NODE')))

tic
ticBytes(gcp);
n = 200;
A = 500;
a = zeros(1,n);
parfor l = 1:n
a(l) = max(abs(eig(round(A)))));
end
tocBytes(gcp)
toc
```

# Batch Mode

## 2- Multi Nodes: HPC Add-on

The KAUST HPC Addon for MATLAB is a tool that allows users to submit their scripts from their local computers (directly from the MATLAB GUI) to KAUST HPC Clusters, and also to retrieve the output files from these clusters.

### Steps to be done on the workstation:

- 1- Setup passwordless authentication from local machines to IBEX. Otherwise, you will be prompted for your password every time you submit a job.
- 2- Load the MATLAB module **module load matlab/R2023b**
- 3- export the correct timezone **export TZ="Asia/Riyadh"**
- 4- Clone **IMAT** and export MATLABPATH
  - **git clone <https://github.com/kaust-rccl/IMAT.git>**
  - **export MATLABPATH=\$HOME/IMAT**
  - **cd \$HOME/IMAT**
- 5- Run the MATLAB GUI **matlab &**

# Batch Mode

## 2- Multi Nodes: HPC Add-on

### Steps to be done on the MATLAB GUI:

On the matlab window, modify and execute the following commands to submit your job.

```
clear all;  
configCluster  
ibex = parcluster('ibex');  
ibex.AdditionalProperties.WallTime = ('1000');  
% modify the line to point to the path of the private key file  
% to use for passwordless authentication for IBEX  
ibex.AdditionalProperties.IdentityFile = '<path/to/identity/file>';  
% In the following line, replace <script-name> with the name of  
% your m file without the ".m"  
% <number-of-workers> is the number of cpus your job will use.  
Job = ibex.batch('<script-name>','pool',<number-of-workers>);
```

Thank you !

