Handout

Local Machine

Juptyer Lab

Start Jupyter with the following command, ideally in the `$HOME` directory.

```
jupyter lab
```

- Evaluate a cell: `Ctrl+Enter`
- Evaluate a cell and move to next: `Shift+Enter`
- Create a new cell below: `Esc B`
- Delete a cell: `Esc X`

Visual Studio Code

- Open a regular Terminal: `Ctrl+~`
- Open integrated Julia REPL: `Alt-J Alt-O`
- Kill integrated Julia REPL: `Alt-J Alt-K`
- Restart integrated Julia REPL: `Alt-J Alt-R`
- Execute a line/block of code: `Shift+Enter` and `Ctrl+Enter` (similar to Jupyter)

Julia

- `]` to get into package manager (Pkg) mode
- `?` to get into help mode
- `;` to get into shell mode

Using MPI

It's recommended to run the MPI parts on the cluster. But if you want to use MPI on the local machine, you need to use `~/.julia/bin/mpiexecjl` instead of just `mpirun` or `mpiexec`. For example, to run a MPI program with 4 ranks use

```
~/.julia/bin/mpiexecjl --project -n 4 julia myprogram.jl
```

Hawk Cluster

Note: There is no Internet connection on Hawk.

Logging in

Note: You should not use your private laptop to acces Hawk!

```
ssh hlrskXY@hawk.hww.hlrs.de
```

Julia on Hawk

To make Julia available on Hawk simply type

`ml julia`

We've already instantiated the course environment for you such that all Julia packages are available if you run `julia --project` inside of the course folder (`~/JuliaHLRS`).

Interactive compute-node sessions

To get an interactive session on a Hawk compute node run

```
qsub -I -q julia -l select=1:node_type=rome -l walltime=01:00:00
```

or `sh get-cpu-node-interactive.sh` within your HOME directory. Here, `-I` indicates interactive mode and the walltime is set to one hour. If you plan to use **MPI**, use the following to get an interactive session or run `sh get-cpu-node-interactive-MPI.sh` in your HOME directory.

```
qsub -I -q julia -l select=1:node_type=rome:mpiprocs=128 -l walltime=01:00:00
```

Job submission

If you want to submit a non-interactive job, you first need to create a job file (see example below or `hawk_job.qbs` in your HOME directory).

```
#!/bin/bash
#PBS -N myjob # Change to whatever you like
#PBS -l select=1:node_type=rome
#PBS -q julia
#PBS -l walltime=00:30:00 # 30 minutes - change to whatever necessary.
#PBS -j oe
```

```
#PBS -o hawk_job.output

# change to the directory that the job was submitted from
cd $PBS_O_WORKDIR

# load necessary modules
ml r
ml julia

# run program
julia --project yourfile.jl # Change filename
```

To submit this job to the scheduler use `qsub`, e.g. `qsub hawk_job.qbs`. With `qstat -rnw` you can get a list of your scheduled/running jobs.