ilifu Online Training

Session 1: Introduction to `slurm`

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What is slurm?

https://docs.ilifu.ac.za/#/getting_started/submit_job_slurm

Job scheduling & cluster management tool

- Framework: Login node; Compute nodes; Scheduler; and Accounting

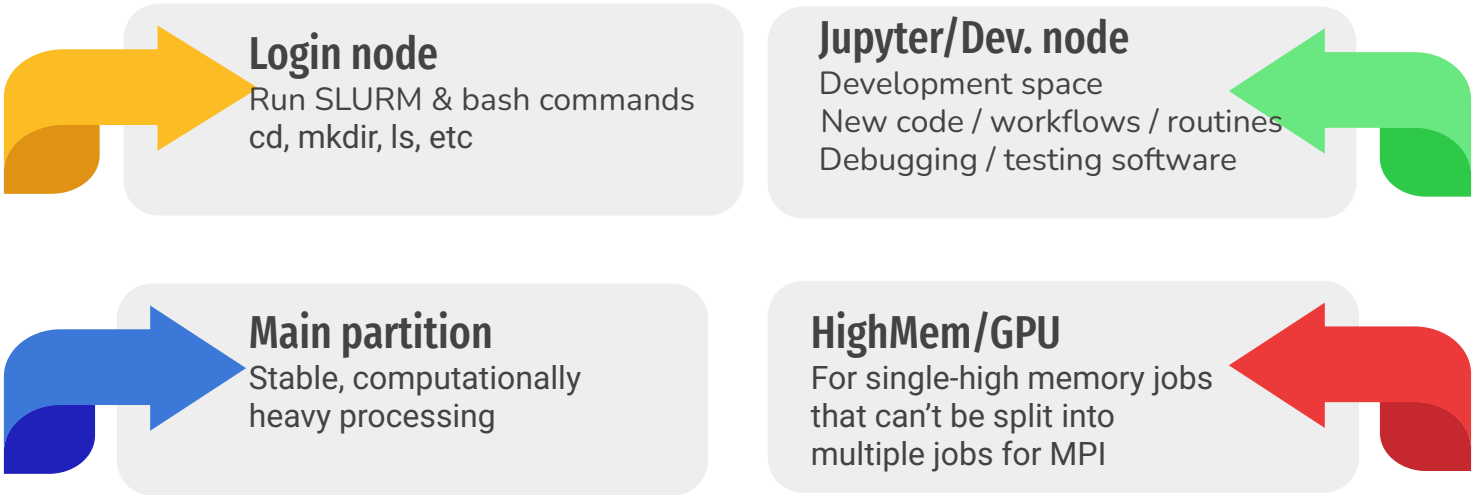
- **Login node**
  - Accessed via ssh (`$ ssh <username>@slurm.ilifu.ac.za`)
  - Submit jobs and manage work directories

- **Compute nodes**
  - Where your analysis / simulation runs (in a slurm job)
  - Software available via singularity containers or modules

- **Scheduler and Accounting Database**
  - Manage Jobs, Partitions and Queues
  - Accounting

Specific node / partition use cases

https://docs.ilifu.ac.za/#/tech_docs/running_jobs?id=available-resources

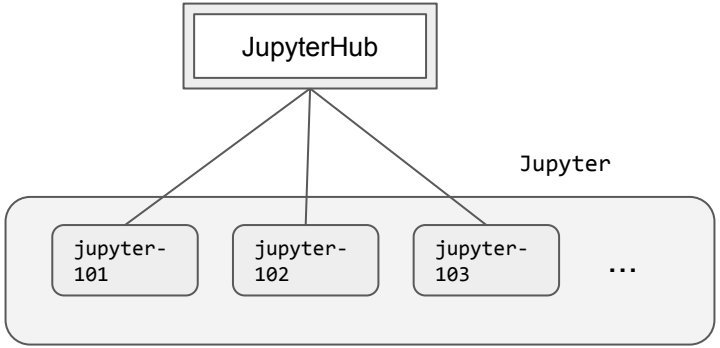


Main, Jupyter, Devel 32 core, ~232GiB RAM	**GPU** 32 core, ~232GiB RAM, Nvidia GPUs	**HighMem** 32 core, 503GiB RAM 96 core, 1.5TiB RAM
85 + 12 Nodes	8 nodes	8 nodes

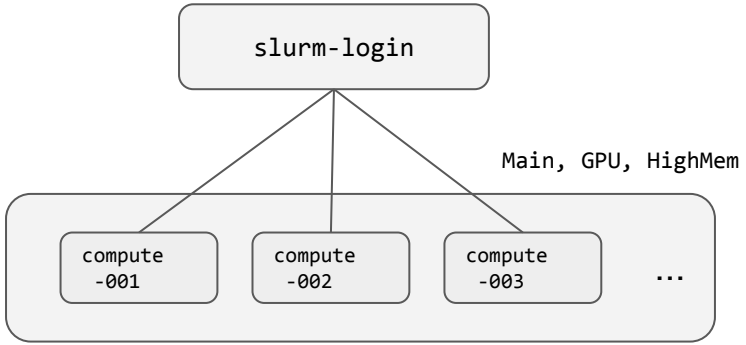
Interacting with slurm

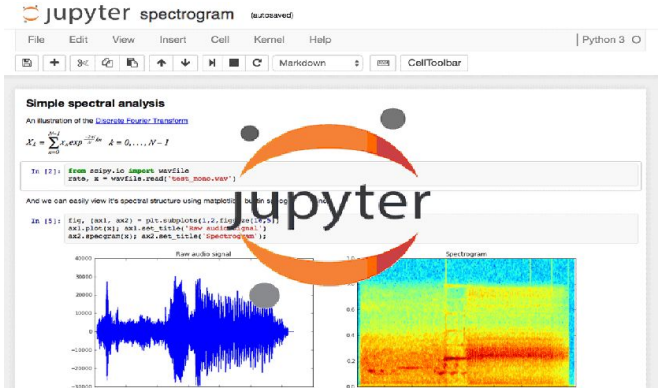
http://docs.ilifu.ac.za/#/getting_started/submit_job_slurm

https://jupyter.ilifu.ac.za



$ ssh *<username>*@slurm.ilifu.ac.za





CLI user commands

https://slurm.schedmd.com/quickstart.html

`$ ssh <un>@slurm.ilifu.ac.za` → connect to login node (from your machine))

`$ sinfo` → shows partitions and resources

`$ squeue` → shows all jobs in SLURM queue/partition

`$ squeue -u $USER` → shows your jobs

`$ sbatch slurm_job_script.sh` → submit job to SLURM

`$ sbatch --help` → information on job submission parameters

`$ scancel <jobid>` → cancel running / pending job

Example bash script

https://github.com/ilifu/ilifu_user_training/tree/main/introduction/tutorial2

```
#!/bin/bash

module add python/3.11.2

python hello_world.py
```

Default job parameters

https://docs.ilifu.ac.za/#/tech_docs/running_jobs?id=customising-your-job-using-sbatchsrun-parameters

```
-time=0-03:00:00   # 0 days + 3 hours
-mem=3G            # 3 GiB
-ntasks=1          # one task
-nodes=1           # one node
-partition=Main
-account=<your default>
```

Example slurm job script

https://github.com/ilifu/ilifu_user_training/tree/main/introduction/tutorial2

```
#!/bin/bash
#SBATCH --job-name=tutorial2_R_container
#SBATCH --time=00-00:01:00
#SBATCH --mem=4G
#SBATCH --partition=Main
#SBATCH --output=R_container-%j.stdout
#SBATCH --error=R_container-%j.stderr
#SBATCH --mail-user=YOUR_EMAIL_ADDRESS
#SBATCH --mail-type=BEGIN,END,FAIL,TIME_LIMIT_80
#SBATCH --account=ACCOUNTING_GROUP

singularity exec /software/common/containers/RStudio2023.06.1-524-R4.3.1.sif Rscript hello_world.R
```

Describe **job** parameters / resources

container

software

Defaults and maximums per partition

https://docs.ilifu.ac.za/#/tech_docs/resource_allocation?id=maximum-allocation

Partition	Node names	Default CPUs	Max CPUs	Default Memory (GiB)	Max Memory (GiB)	Default wall-time	Max wall-time
Main	compute-[002-021]	1	32	3	232	3 hours	14 days
Main	compute-[101-105]	1	48	3	232	3 hours	14 days
Main	compute-[201-260]	1	32	3	251	3 hours	14 days
HighMem	highmem-[001-002]	1	32	15	503	3 hours	14 days
HighMem	highmem-003	1	96	15	1508	3 hours	14 days
GPU	gpu-[001-004]	1	32	7	232	3 hours	14 days
GPU	gpu-005	1	24	7	232	3 hours	14 days
GPU	gpu-006	1	48	7	354	3 hours	14 days
GPU	gpu-007	1	48	7	354	3 hours	14 days
Devel	compute-001	1	32	-	-	3 hours	12 hours

slurm workload manager

ilifu

DEMO TIME!

https://github.com/ilifu/ilifu_user_training/tree/main/session1/tutorial2

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Best practices

https://docs.ilifu.ac.za/#/getting_started/best_practices

Do's :

- Run jobs using sbatch rather than interactive jobs
- Identify job resources requirements:
  - No. of nodes and CPUs, amount of RAM and wall-time.
- Remove files that aren't needed
  - `/scratch3` folder after data processing is complete
  - Old raw data, temporary products , etc.
- Use Singularity (cannot install software on nodes)
- Use `<username>@transfer.ilifu.ac.za` for data transfers

Don't:

- Don't run software/heavy processes on login node
- Don't place large files in your home directory (`/users`)
- Don't transfer using `scp`/`rsync` on the login node

Thank you

https://docs.ilifu.ac.za/

support@ilifu.ac.za