



# ExCL Cheat Sheet

<https://docs.excl.ornl.gov>

v1.2

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Send email to [excl-help@ornl.gov](mailto:excl-help@ornl.gov) to create a ticket for help and support.

## Overview

- The Experimental Computing Lab (ExCL) is a laboratory designed for computer science research by offering heterogeneous resources and full configurability of the software stack.
- The computational resources provided by ExCL comprise diverse technologies in terms of chips, memories, and storage. ExCL will also adapt to the ever-changing computing ecosystem and will incorporate the latest technology and make it available to its users.
- The Experimental Computing Lab will offer a mix of exclusive access nodes and shared nodes where users will be able to carry out their research. It follows a novel design that allows a high degree of flexibility for users and administrators to accommodate a wide range of experiments.
- ExCL has been designed and is managed by researchers at the [Architectures and Performance Group](#) of [Oak Ridge National Laboratory](#).
- This cheat sheet gives a quick overview, each topic is covered in detail in [ExCL documentation](#).

## Software and Job Management

- Several software packages are available on ExCL.
- Can request new software installation via slack or a support ticket.
- Module system for software:

```
module avail          #look for available modules
module whatis         #help on a module
module list           #list loaded modules
module load           #load a module
module unload         #unload a module
module purge          #purge all loaded modules
```
- Additional packages can also be installed by the user with [Spack](#).
- Job management commands for [SLURM](#) scheduler:

```
sbatch               #submit a job
squeue <jobid>        #check job status by job id
squeue -u <userid>    #check job status by user
sinfo                #queue status summary
scontrol show job <jobid> #running job info
```
- Use `sinfo` to see available nodes.
- Start an interactive SLURM job:

```
srun -N 1 -c 32 --mem=0g -t 1:00:00 \
    -A <account> -p <queue> --pty /bin/bash
```
- ExCL also supports [GitLab-CI](#), [Docker](#), and Virtual Machines via [KVM](#).

## Storage and Data

- Most systems automatically mount NFS (not all).
- Each user has a home directory on the NFS server: `/home/<uid>/`
  - File restore snapshots available in `/home/<uid>/zfs/snapshot`
- Each system has a local scratch space: `/scratch/`
  - Good for caching files on a local hard drive.
  - Not shared between nodes.
  - Create working space via `mkdir /scratch/<uid>`
  - Please clean up after you no longer need scratch space.
- Use `df -h` to see all storage mounted on a node.
- Use `du -h <path>` to see disk usage.

## Access and Connect

- To get access: <https://excl.ornl.gov/accessing-excl/>
- `ssh <id>@login.excl.ornl.gov`
  - ID is UCAMS or XCAMS ID
  - ssh keys are supported and recommended for accessing `login.excl.ornl.gov`.
- ThinLinc: <https://login.excl.ornl.gov:300/>
- To access an internal node, ssh from the login node to the internal node.
  - `ssh <internal node>`
  - internal ssh keys are automatically generated.
- Use ThinLinc or X11 forwarding to access GUIs. Using ThinLinc to the login node plus X11 forwarding to internal nodes is the most performant.
  - Login with ThinLinc: <https://login.excl.ornl.gov:300/>
  - `ssh -X <internal node>`

## Systems

- System list available at <https://excl.ornl.gov/excl-systems/>.
- Use `ssh` to connect to the system from the login node.

## Spack

- Installation instructions: <https://docs.excl.ornl.gov/quick-start-guides/conda-and-spack-installation>
- Detailed Spack documentation: <https://spack.readthedocs.io/en/latest/>
- Common commands:

```
spack env activate <project> OR spack activate
spack env create <project> [spack.yml or spack.lock]
spack env status          # Print environment status
spack env list            # List environments
spack install <spec>
spack concretize          # Lock generic spec by concretize.

# Add specific compiler installed by spack to spack
spack compiler add $(spack location -i gcc@8.3.0)

spack list                # What can be installed
spack find                # What is installed

spack versions <package>  # Print all package versions
spack info <package>      # Get package info

spack help -spec          # Print Spack spec help
spack config edit
spack config add
spack config get

spack cd -e <myproject>   # Change to project build directory
spack config blame config # See which config file set config
spack blame <package>     # See commits to a package
```
- Spack environment in a directory:

```
spack env create -d . spack.yaml
spack env activate .
spack install
```
- Load someone else's Spack modules:

```
spack env loads -r          # Create a loads file
module use /nback/<uid>/spack/share/modules/<system-type>
source <generated loads file>
```

## Other Cheat Sheets

- [Conda](#)
- [Matplotlib](#)
- [Slurm](#)
- [Vim](#)
- [Pandas](#)
- [Seaborn](#)
- [Git Usage](#)
- [Git Commands](#)

## To cite/ack ExCL:

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