



# ExCL Cheat Sheet

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

v1.3  
As of January 2024

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://www.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://docs.excl.ornl.gov/system-overview>.
- 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:

This research used resources of the Experimental Computing Laboratory (ExCL) at the Oak Ridge National Laboratory, which is supported by the Office of Science of the U.S. Department of Energy under Contract No. DE-AC05-00OR22725.