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## Overview

- CADES offers computational infrastructure to ORNL users, namely, an HPC cluster called SHPC and a cloud solution
- SHPC cluster employs a "condo" model, runs SLURM scheduler
- Cloud lets users create and use VMs with full admin access
- This cheat sheet gives a quick overview, each topic is covered in detail in CADES documentation
- This cheat sheet is in **poster format**, to print select appropriate page-size first.

## Software and Job Management

- Several software packages are available on SHPC
- Can install or request new software installation via support ticket
- Module system for software:
 

```
module avail      #look for available modules
module whatis <modulename> #help on a module
module list       #list loaded modules
module load <modulename>   #load a module
module unload <modulename> #unload a module
module purge      #purge all loaded modules
```
- Job management commands for SLURM scheduler:
 

```
sbatch <jobscriptname> #submit a job
squeue <ijobid> #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
```
- Start an interactive SLURM job:
 

```
srun -N 1 -c 32 --mem=0g -t 1:00:00 \
    -A <account> -p <queue> --pty /bin/bash
```

## Storage and Data

- Each user has a home directory that is limited to 25G of storage location: `/home/<ucams/xcams>`
- An NFS based storage is available to project-based data, space varies based on needs, contact us for details location: `/nfs/data/<project-name>`
- A fast Lustre scratch available to do IO over jobs running on SHPC:
 

```
/lustre/or-hydra/<group>/<xcamsorucams>
/lustre/hydra/<group>/<xcamsorucams> #mod
```

## Access and Connect

- `ssh <id>@or-slurm-login.ornl.gov #open pz`
- `ssh <id>@mod-slurm-login.ornl.gov #mod pz`
- id is UCAMS OR XCAMS id
- `ssh <xcams>@collab.cades.ornl.gov`  
jump node for external network followed by the above ssh command
- To access cloud, navigate to **cloud.cades.ornl.gov** in a **web browser**, authenticate with your **ucams/xcams** credentials, use **ornl** in Domain
- On this page, to create and access a VM, go to: project (top left) -> instances -> launch instance and follow the dialogues; `ssh cades@<instanceip>` from a terminal

## Example SLURM Job Scripts

```
#!/bin/bash

#SBATCH --nodes=1
#SBATCH --ntasks=1
#SBATCH --cpus-per-task=1
#SBATCH --time=00:10:00
#SBATCH --mem-per-cpu=1G
#SBATCH --job-name=test
#SBATCH --output=test.out
#SBATCH -p burst
#SBATCH -A birthright

/bin/hostname

=== Request GPU Resources ===
#!/bin/bash

#SBATCH --nodes=1
#SBATCH --partition=gpu
#SBATCH --gres=gpu:1
#SBATCH --ntasks=1
#SBATCH --cpus-per-task=1
#SBATCH --time=00:10:00
#SBATCH --mem-per-cpu=1G
#SBATCH --job-name=testgpu
#SBATCH --output=gputest.out
#SBATCH -p burst
#SBATCH -A birthright

nvidia-smi
```

## Hardware

- 450 nodes with 15000+ CPU cores (Haswell, Broadwell and Skylake) in open
- 204 nodes with 5000+ CPU cores (Haswell and Broadwell) in mod
- 25 GPUs (K80s, P100s and V100s) in open
- Storage Capacity: 1.5 PB Lustre in open, 0.5 PB in mod, 2 PB NFS in open, 3 PB in mod

### To cite/ack CADES:

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