Introduction to Talon

UND Computational Research Center

Overview

- About Talon
- Login to Talon (Open OnDemand)
- Modulefiles
- How to Run Programs/slurm

How to get a Talon account

- Visit https://crc.und.edu
- Click Support in the menu
- Click Account Request

- Request type: Account request
- Account type: Check Globus, Talon, and Talon GPU

- You should receive a request confirmation and an email when the account has been created

Talon HPC/Supercomputer

System overview

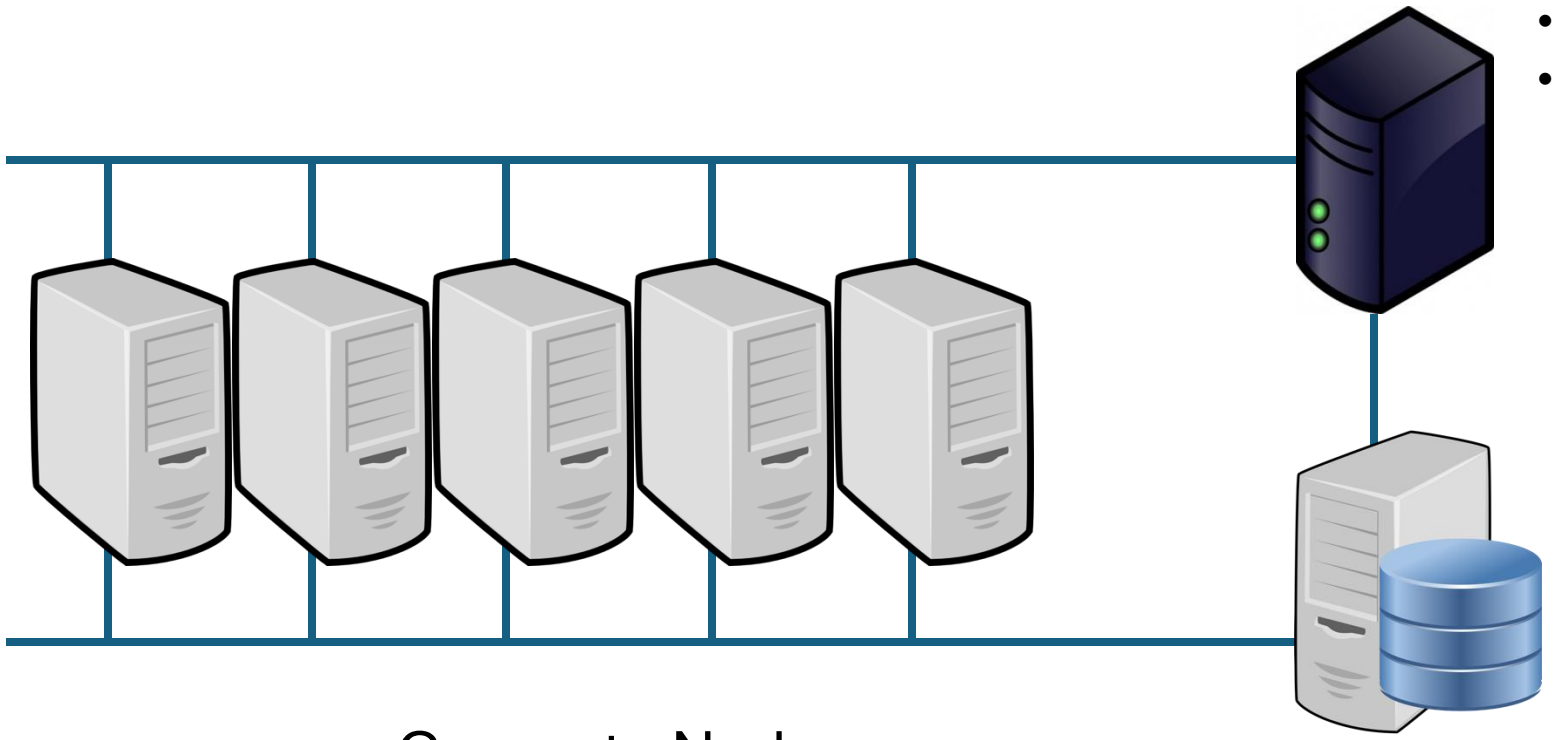
What is Talon?

- A High-Performance Computing (HPC) cluster
  - A small supercomputer
- Compute nodes
  - Grouped into Partitions (aka Queues)
- Resource management
  - Slurm software ensures fair and efficient usage of cores, memory, and GPUs

Computer Cluster

Login Node

- Login to login node
- Submit jobs from here
- Interface
  - Command line or Browser



Compute Nodes

- Research programs run here

Network Storage

- Data files
- Program files

Talon Compute Resources

Partition/Queue	Number Nodes	Total Cores	GPUs	Total Memory (GB)
talon	18	648	-	192
talon-large	3	216	-	3000 (3 TB)
talon-short	2	72	-	192
talon-gpu32	2	144	8	1500 (1.5 TB)
gpu-code-test	1	36	8	1500
6 Private Partitions				

Open OnDemand

Using Talon with your Browser

Open OnDemand

- A “one-stop shop” for accessing Talon
  - Web browser provides a graphical interface
- File manager
  - Upload, download, create, edit, copy, move, delete
- Shell access to login node
- Certain applications with graphical user interfaces

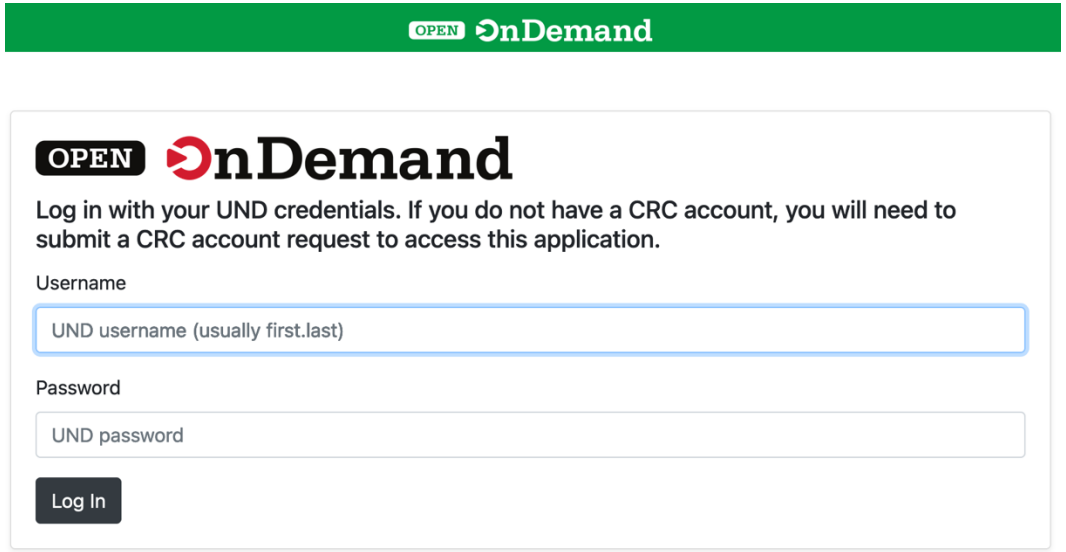
UND VPN

- If you are off-campus, you must connect to the UND VPN before connecting to Talon.

https://und.teamdynamix.com/TDClient/2048/IT/KB/ArticleDet?ID=145487

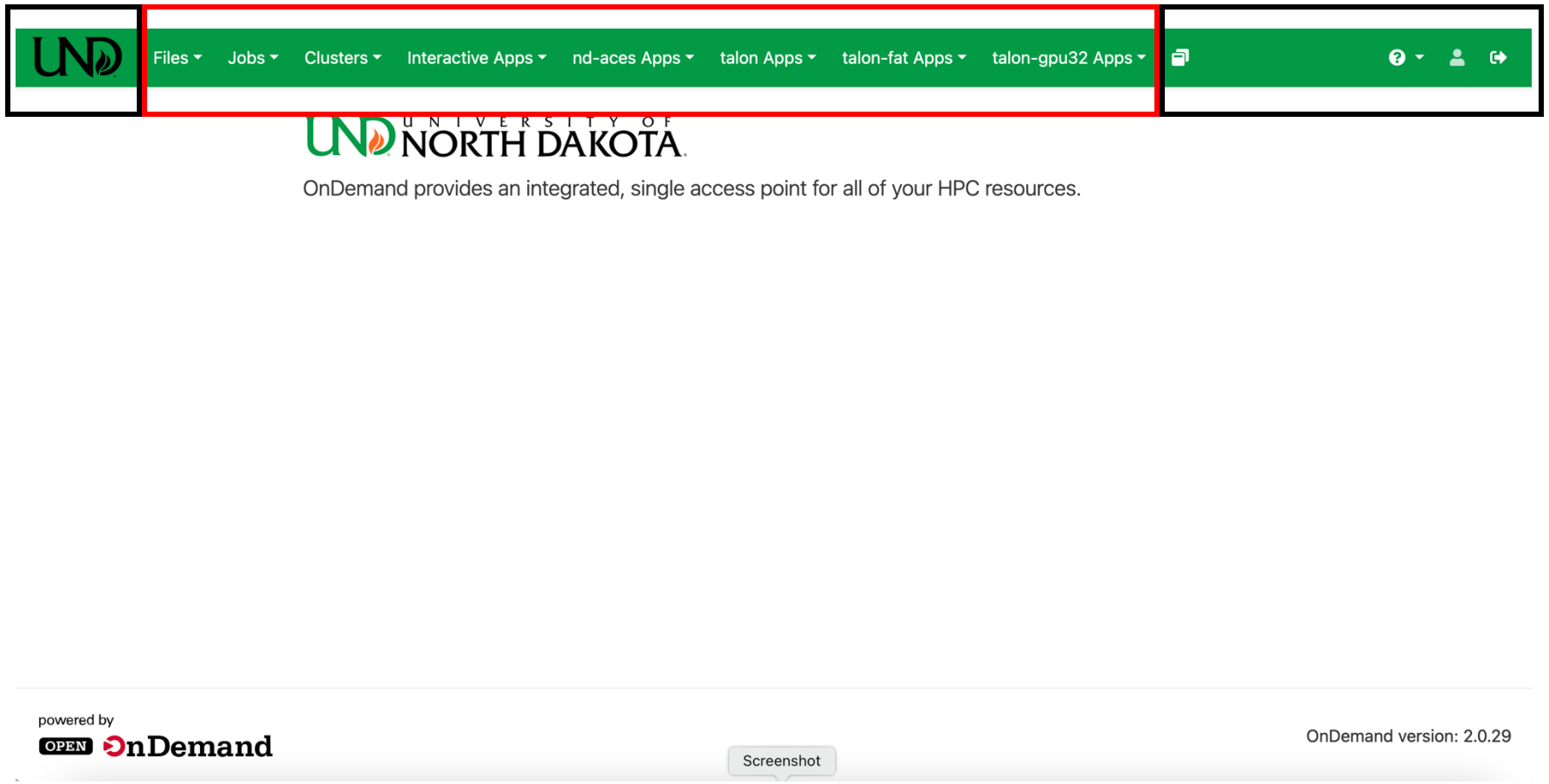
Log in to Open OnDemand (OOD)

- Browse to https://apps.talon.und.edu

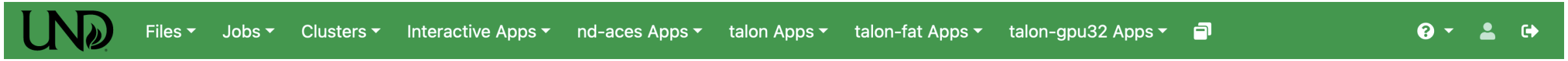


- Enter your Talon/UND username and password
- Click “Log In” button

OOD Dashboard

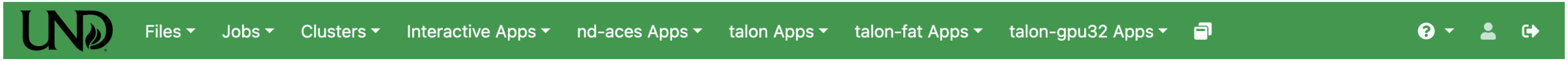


Navigating the Dashboard, Buttons



Button	Icon
Log Out	
Logged In As	
Help	
My Interactive Sessions	
Return to Dashboard	

Navigating the Dashboard, Menus



- Drop-down Menus
  - Files
  - Jobs
  - Clusters
  - Partition-specific Applications

Module Files

Configure your environment on Talon

Environment Variables

- Some programs may need specific compilers, libraries, and include files.
- Module files let you configure your environment.

`$ module avail`	Show available modules
`$ module list`	Show modules currently loaded
`$ module load [module name]`	Load a specific module
`$ module unload [module name]`	Unload a module
`$ module help [module name]`	Short description of a module

Module Exercise

- Login to Talon
- List the currently loaded modules
- `$ echo $PATH`
- `$ echo $LD_LIBRARY_PATH`
- Load the Gnu Compiler module
  - `$ module load gcc`
- `$ echo $PATH`
- `$ echo $LD_LIBRARY_PATH`
- Unload the Gnu Compiler module
- Confirm that the $PATH and $LD_LIBRARY_PATH are reset

Slurm

Resource Manager / Job Scheduler

What is a resource manager?

- A computer cluster is a finite resource
- Users compete for nodes, cores, network, memory…
- Resource manager: special software to provide for fair and efficient cluster usage

Key Functions

- Manage and allocate cluster resources
- Provide accounting for cluster resources and user jobs
- Let users
  - submit jobs to compute nodes
  - monitor jobs running on compute nodes
  - cancel jobs in queue or running on compute nodes

Helpful Commands

• sinfo	Cluster status
• squeue	Cluster/job status
• squeue --me	My jobs
• squeue -j [job id]	
• squeue -u [user id] --start	Estimated start time of queued jobs
• sbatch [script filename]	Job submission
• scancel [job id]	Job deletion

Batch Scripts (Slurm Job Submission Script)

```
1  #!/bin/bash
2  #SBATCH --job-name=hello
3  #SBATCH --partition=talon
4  #SBATCH --ntasks=1
5  #SBATCH --time=1-00:01:00
6  #SBATCH --output=%x.%j.txt
7
8  module load gcc
9  echo "Job started at $(date)”
10 ./a.out [arguments]
11 echo "Job ended at $(date)"
12 echo “Tasks: $SLURM_NTASKS”
```

Time to Solution

- All Slurm jobs spend time in queue and running
- Goal is to minimize turnaround time
  - Asking for more resources can increase time in queue (waiting)
  - Asking for more resources can decrease execution time

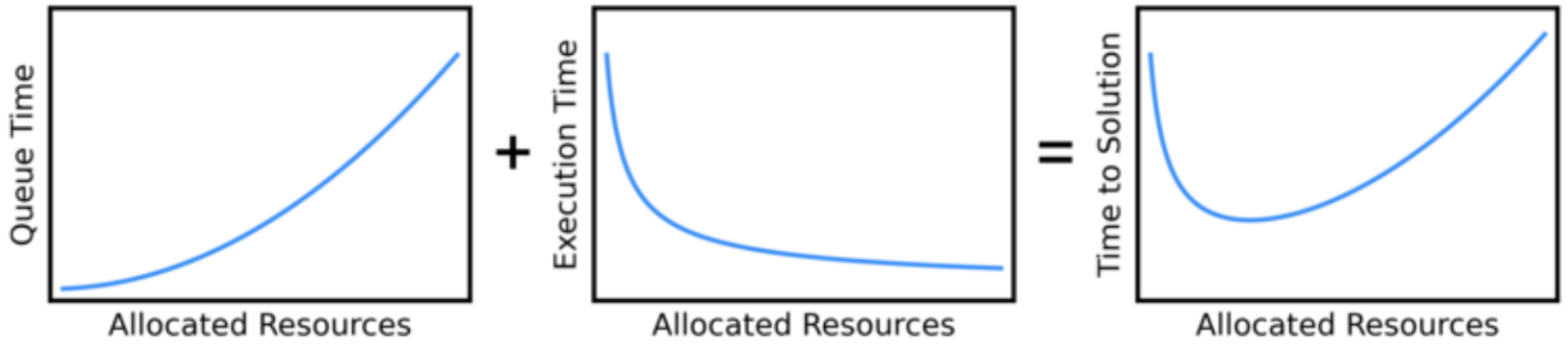


Image:researchcomputing.princeton.edu/support/knowledge_base/slurm

Job Length

- Asking for too little time -- Slurm kills the job
- Asking for too much time -- can increase wait time
- The *sacct* command displays accounting data
  - sacct --format="JobId,JobName,Elapsed,ExitCode" --job=[job id]
- Can help set timelimit on future jobs: Elapsed + 20%

Helpful Links

- sbatch
  - https://slurm.schedmd.com/sbatch.html
- squeue
  - https://slurm.schedmd.com/squeue.html
- sinfo
  - https://slurm.schedmd.com/sinfo.html
- Linux commands
  - https://ryanstutorials.net/linuxtutorial/