New User Seminar

- This webinar only covers topics pertaining to our newest and largest system, **Graham**.
- For the introduction to our legacy systems (Orca etc.), please check the following recorded webinar:

  "SHARCNet New User Seminar for Legacy Systems"
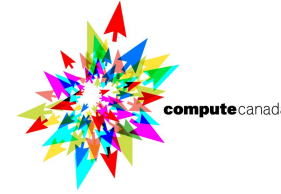
  available on our youtube channel,

  http://youtube.sharcnet.ca

(or read it online:
https://www.sharcnet.ca/help/index.php/Getting_Started_with_SHARCNET)

SHARCNET
INTRODUCTION
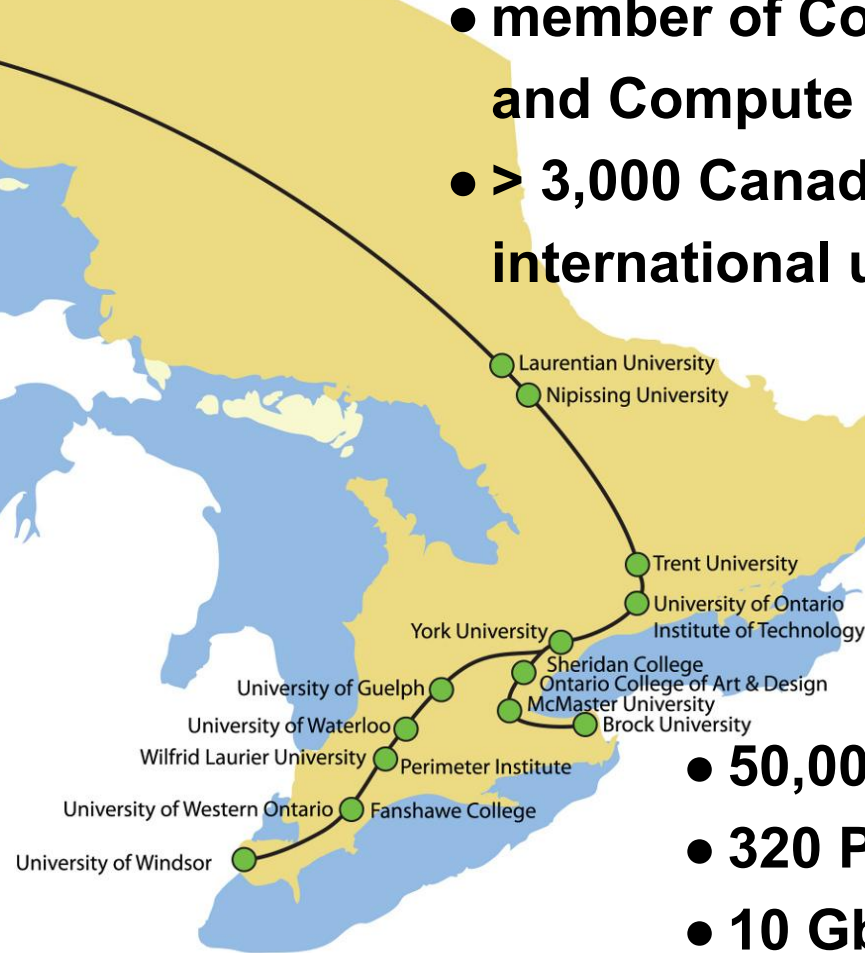
Consortium of 18 Ontario institutions providing advanced computing resources and support...

compute canada

compute calcul ONTARIO

Shared
Hierarchical
Academic
Research
Computing
NETwork

- **member of Compute Canada and Compute Ontario**
- **> 3,000 Canadian and international users**
- **50,000 CPU cores**
- **320 P100 GPUs**
- **10 Gb/s network**

Getting Help: SHARCNET web portal

The SHARCNET web site (www.sharcnet.ca) provides extensive information about our systems and software.

- **User-editable help wiki**
  - Help pages, tutorials, FAQ: Support > Wiki
  - Software documentation: Facilities > Software
- **System status**
  - System notices, present status: Facilities > Systems
  - System notices are also sent via email and posted on RSS
- **Ticketing system**
  - Online access (requires login): Support > Tickets
  - Or send an email to help@sharcnet.ca

Getting Help: Compute Canada site

Compute Canada web site (docs.computecanada.ca) contains a large collection of help pages for the national systems (Graham and Cedar).

- **How-to guides**
  - [Getting Started with the new National Systems (mini-webinar series)](#)
  - Detailed help pages on submitting jobs, software etc.
- **Compute Canada's problem tracking system**
  - Email to support@computecanada.ca

Getting Help: SHARCNET or CC?

- **Graham related issues**
  - Check both SHARCNET's and Compute Canada's help pages
  - To submit a ticket, use either SHARCNET's or Compute Canada's ticketing system

- **Help for legacy systems (orca etc)**
  - Use SHARCNET's help pages and ticketing system.

- **Systems**
  - Clusters, Cloud facilities, Visualization systems
- **Operating Systems**
  - Linux
- **Languages**
  - Fortran, C/C++, Java, MATLAB, Python, etc.
- **Key Parallel Development Support**
  - MPI, pthreads, OpenMP, CUDA, OpenACC, OpenCL
- **Software Modules**
  - select pre-built and configured software, as well as versions, with the *module* command
- **Batch Scheduling**
  - SLURM scheduler

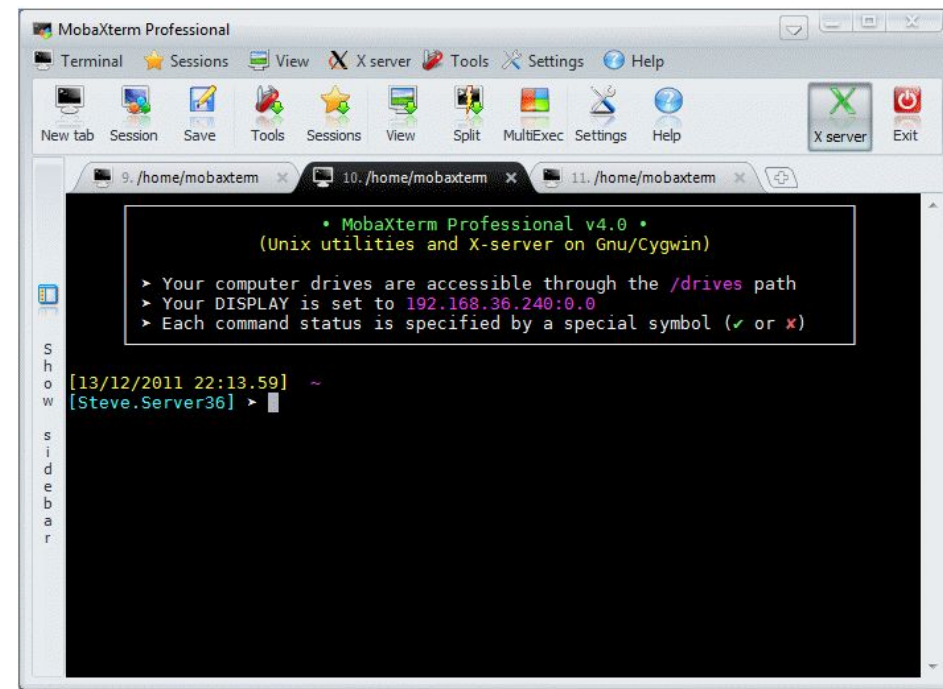- All SHARCNET systems are only accessible via *secure shell* (ssh):

   $ ssh user@graham.sharcnet.ca

   (Use Compute Canada credentials to login to Graham.)

- We recommend authenticating using an *ssh key agent*
   - See the *SSH page* in our help wiki for details

File transfer programs:

- Unix / Mac
   - scp or sftp, rsync
- Windows
   - MobaXterm
- Any OS (from a browser)
   - Globus

Essentials: File systems

File system	Quotas	Backed up?	Purged?	Available by Default?	Mounted on Compute Nodes?
Home Space /home	50 GB, 500 K files	Yes	No	Yes	Yes
Scratch Space /scratch	20 TB and 1000k files per user, 100 TB and 10M files per group	No	Yes, all files older than a certain number of days	Yes	Yes
Project Space /project	1TB for each cluster per user, can request increase to 10TB 500k files per user	Yes	No	Yes	Yes
Nearline Space	5 TB per group	No	No	No	No

Essentials: Graham cluster

- Number of CPU cores: 33,448

- Number of nodes: 1043

- 32 cpu cores per node

- Between 128 and 3072 GB of RAM per node

- Number of NVIDIA P100 GPUs: 320

- Networking: EDR (cpu nodes) and FDR (GPU nodes) InfiniBand

- All significant work is submitted to the system as a *job*
- Jobs are run in *batch mode* via a job scheduling system
  - enforces policies to promote fair and efficient use
- Jobs are submitted using the **sbatch** command
- The only required job script options are **-t** (run time) and **-A** (account)

  - RAM can be requested via **--mem** (serial / multithreaded jobs) or **--mem-per-cpu** (MPI jobs; per rank) options
  - For parallel jobs one has to specify the number of cpu cores (**-c** for multithreaded, **-n** for MPI)

- *squeue* **:** lists the status of submitted jobs
- *sacct* **:** shows details for recent jobs
- *scancel*: kills jobs

- do not run significant programs on login nodes or directly on compute nodes
    - submit them as a job to the scheduler

- do not specify a maximum job run time (say, 7 days), or more memory than required for your program
    - pick an appropriate value, eg. 150% of the measured/expected run time or memory per processor

- do not create millions of tiny files, or large amounts (> GB) of uncompressed (eg. ASCII) output
    - aggregate files with tar, use binary or compressed file formats