McMaster University | Research & High Performance Computing

Digital Research Alliance of Canada

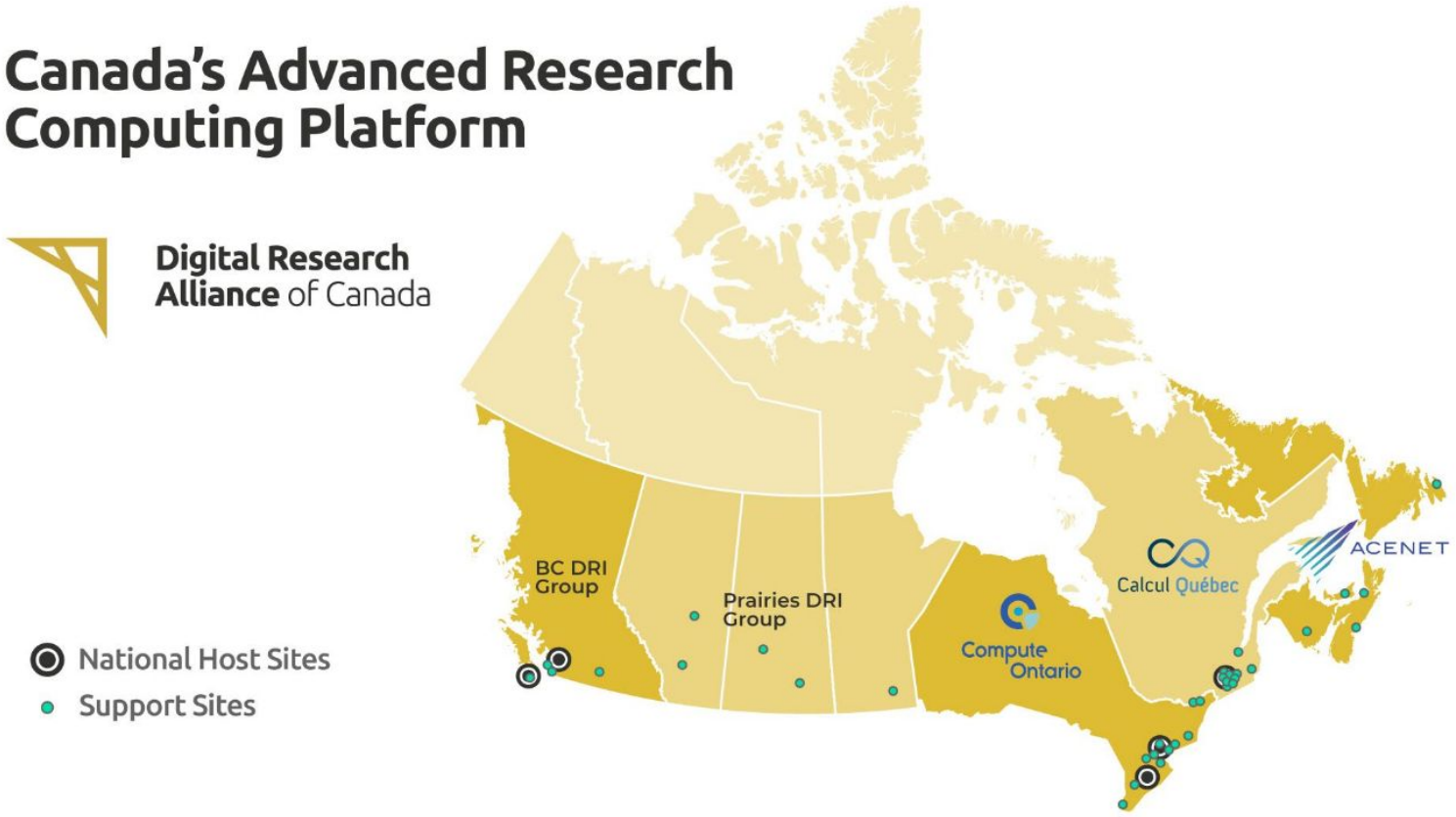
Free compute and storage resources for Mac researchers

SHARCNET update
by Sergey Mashchenko

September 29, 2026, 1pm-2pm

SHARCNET™
Shared Hierarchical Academic Research Computing Network

Single account...



One can access all national supercomputers across the country, for free.

Academic/research computing across Canada

What you can access

A user with an account from the Digital Research Alliance of Canada has access to all supercomputers, clouds and storage services operated by the Alliance and its members across the country free of charge. See the services (https://www.alliancecan.ca/en/services) for details.



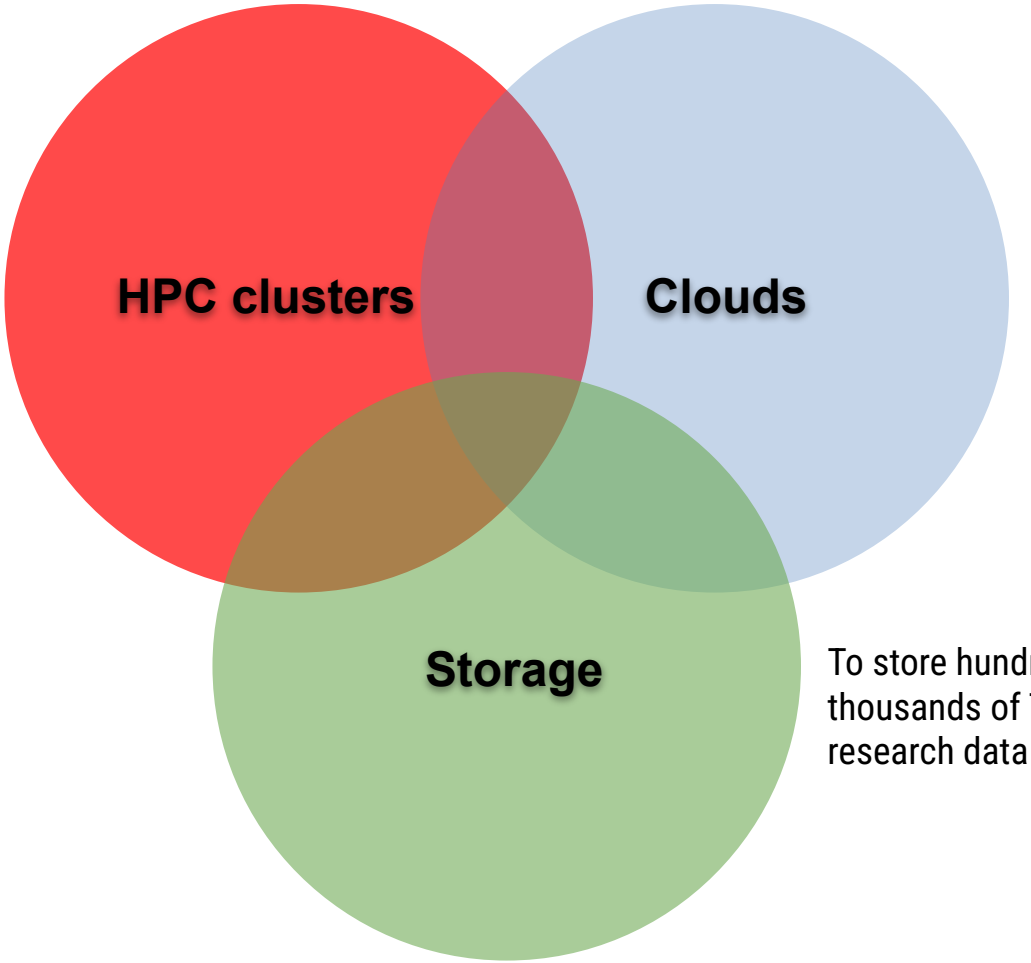
SHARCNET



Shared
Hierarchical
Academic
Research
Computing
NETwork

Alliance resources: *HPC clusters, clouds and storage*

To run large and exascale simulations that need dedicated access to hundreds of thousands CPU and GPU cores and low latency, fast interconnect fabric; or to run hundreds of thousands of simulations simultaneously



To run web services, databases or use virtual machines (VMs) with full control. The CPU and GPU resources are typically over committed, that is, a CPU core or GPU device might be shared by the running VMs.

To store hundreds of thousands of TB of research data

Who are the Alliance resources for?

If you are an academic researcher in Canada, and:

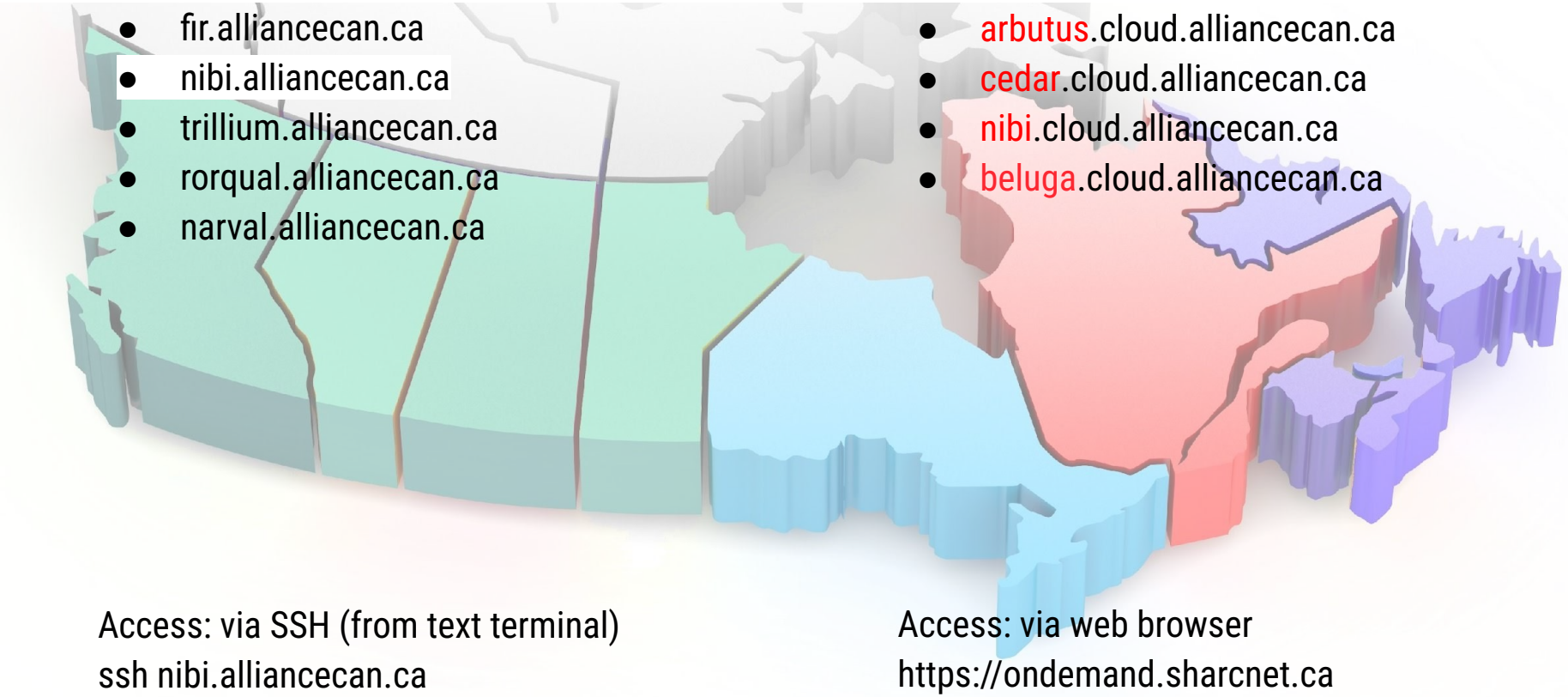
- You do not have enough CPU cores or memory
- You do not have the GPUs of the type needed
- You need a large amount of disk space, e.g. hundreds of TB
- You need to run a large scale computation that need many CPU cores
- You need to run a large number of smaller computations
- You need to host a research portal
- You need to run SQL databases
- You need to run programs in a VM

All these services are provided by SHARCNET/Alliance **for free**

Resources: *How to access clusters, clouds and storage*

Clusters across the country

- fir.alliancecan.ca
- nibi.alliancecan.ca
- trillium.alliancecan.ca
- rorqual.alliancecan.ca
- narval.alliancecan.ca



Access: via SSH (from text terminal)
ssh nibi.alliancecan.ca

Cloud services

- arbutus.cloud.alliancecan.ca
- cedar.cloud.alliancecan.ca
- nibi.cloud.alliancecan.ca
- beluga.cloud.alliancecan.ca

Access: via web browser
https://ondemand.sharcnet.ca

Resources: *AI specific systems*

Pan-Canadian AI Compute Environment (PAICE)

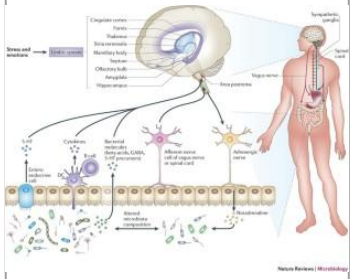
- **TamIA** at Mila -Québec Artificial Intelligence Institute.
- **Killarney** at Vector Institute.
- **Vulcan** at Alberta Machine Intelligence Institute (Amii).

Our researchers: *Diverse research fields*



Michael Surette

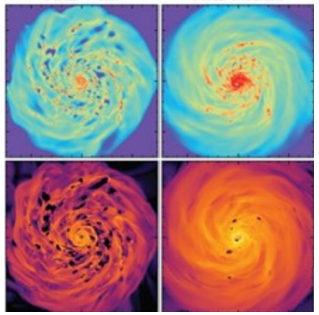
Medicine

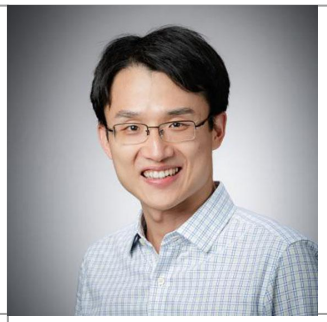




James Wadsley

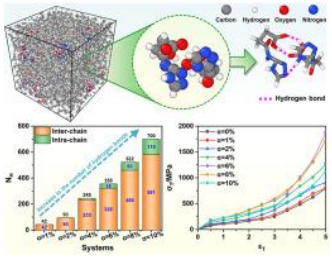
Astrophysics





Li Xi

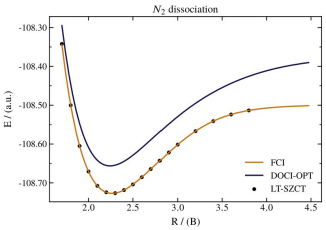
Chemical engineering





Paul W. Ayers

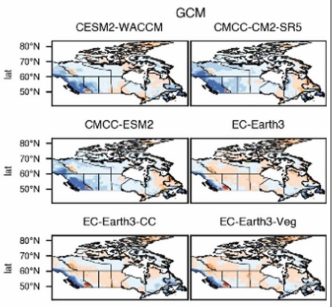
Theoretical Chemistry





Zoe Li

Civil Engineering



Resources: *HPC clusters and storage*

Large national systems at a glance

Resource	Fir	Narval	Nibi	Trillium	Rorqual	Total
CPU cores	165,120	83,216	134,400	235,008	131,712	**749,456**
GPUs	640	632[1]	312[2]	244[3]	324	**2,152[3]**
Storage	49PB	19PB	25PB	29PB	68PB	**190PB**
Source: https://docs.alliancecan.ca/wiki/National_systems						

1. Narval is the only cluster with the older A100 GPUs
2. Nibi has 36 nodes of 8 x NVIDIA H100s and 6 nodes of 4 x AMD Mi300As.
3. The numbers will increase once the Trillium upgrade is finished

Resources: *Getting an account*

Sign up for an account for FREE at https://ccdb.alliancecan.ca/

STEP 1	STEP 2	STEP 3	STEP 4
Learn and assess if you need lots of compute and/or storage resources for your research. See also here	If you are not a faculty, talk to your supervisor to get his/her CCDB id (a code like abc-123-02). If your supervisor does not have an account, convince him/her to sign up for an account first.	Go to the website to sign up for an account. Choose an appropriate role that fits you.	Access and explore the resources - clusters, cloud and storage - across Canada, all can be through just a few clicks.

Requests for compute, storage and cloud resources

Default access	Rapid Access Service (RAS)	Resource Allocation Competition (RAC)
Compute: No limit in CPU and GPU cores, but low priority, hence longer wait time. **Storage:** Limited storage space • 50GB home • 1TB project - work space • 20TB scratch (60 days when over 1TB) - temp space • 10TB nearline (tape) **Cloud:** Limited cloud resources • 80 VCPU years • persistent 25 VCPU years • 10TB volume and snapshot storage **Request:** No	**Compute:** May ask for increase in priority *temporarily*, to improve the throughput of jobs. **Storage:** Storage • project - up to 40TB across the country • nearline - up to 100TB • Not available at some sites. **Cloud:** Moderate increase. **Request:** Any time Email: support@tech.alliancecan.ca	**Compute:** Best assurance of priority access to allocated number of CPU cores (200+) and GPUs (25 RGUs) throughout a year. Shorter wait time. **Storage:** Guaranteed access to allocated storage spaces: • project (40+ TB) • nearline (100+ TB) **Cloud:** Guaranteed access to allocated cloud resources beyond the default access limits. **Request:** Annual application

Requests for compute, storage and cloud resources

2027 Resource Allocation Competition (RAC) - A peer reviewed process

- The 2027 RAC competition is now open.
- Application information sessions (recordings and slides):
  - https://docs.alliancecan.ca/wiki/Resource_Allocation_Competition
- Deadline
  - **November 3, 2026**
- Show your project needs, the rationale and the execution plan in details.
- Request a consultation with the local staff before you proceed if it is a new application.
- Announcement of RAC 2027 results: late March 2027
- Start of the RAC 2027 allocations: early April 2027

What is new for RAC 2027?

- Significant improvements to the RRG and RPP form GUIs.
- Expanded RAC guide to improve clarity and transparency.
- Up to 10% increase of CPU and GPU resources allowed via Fast Track and RPP progress reports.
  - no guarantee that the increase will be awarded
- Instructions to provide GPU scalability tests have been included in the RRG and RPP application templates.
- We introduced the “application size” category, can be Small, Medium, Large, and Very Large.

Requests for compute, storage and cloud resources

Type	Resource	Unit	Small	Medium	Large	Very large
HPC	CPU	core-years	≤ 500	> 500 ≤ 2500	> 2500 ≤ 10000	> 10000
HPC	GPU	RGU-years	≤ 50	> 50 ≤ 250	> 250 ≤ 500	> 500
Cloud	vGPU	RGU-years	≤ 5	> 5 ≤ 10	> 10 ≤ 25	> 25
Cloud	Compute Cloud	vCPU-years	≤ 50	> 50 ≤ 250	> 250 ≤ 1000	> 1000
Cloud	Persistent Cloud	vCPU-years	≤ 25	> 25 ≤ 100	> 100 ≤ 250	> 250
HPC	Project storage	TB	≤ 50	> 50 ≤ 250	> 250 ≤ 1000	> 1000
HPC	Nearline storage	TB	≤ 250	> 250 ≤ 1000	> 1000 ≤ 2500	> 2500
Cloud	Volume and snapshot storage	TB	≤ 10	> 10 ≤ 50	> 50 ≤ 250	> 250
Cloud	Object storage	TB	≤ 10	> 10 ≤ 50	> 50 ≤ 250	> 250
Cloud	Shared filesystem storage	TB	≤ 10	> 10 ≤ 50	> 50 ≤ 250	> 250

Consult with staff for very large request!

Resources: *Running your applications*

```
bge@zenaida:~$ ssh nibi
Last login: Wed Sep 17 16:39:34 2025 from 10.37.127.254
Welcome to the Nibi cluster.

More details about the new system are available:
        https://docs.alliancecan.ca/wiki/Nibi

Accidentally deleted a file? Try the "oops" command to recover from snapshot.
Need an old file version? Try "versions <filename>".



NOTE upcoming partial outage:
https://status.alliancecan.ca/view_incident?incident=1420


[bge@l1.nibi ~]$ cd demo/parallel
[bge@l1.nibi parallel]$
[bge@l1.nibi parallel]$ sbatch run_julia_pi_forslides.sh
sbatch: NOTE: Your memory request of 1024.0M was likely submitted as 1.0G. Pleas
e note that Slurm interprets memory requests denominated in G as multiples of 10
24M, not 1000M.
Submitted batch job 2032056
[bge@l1.nibi parallel]$
[bge@l1.nibi parallel]$ squeue -u bge
             JOBID     USER              ACCOUNT                NAME  ST  TIME_LEFT NO
DES CPUS TRES_PER_N MIN_MEM NODELIST (REASON)
           2032056      bge          def-bge_cpu run_julia_pi_f  PD       30:00
  1   64        N/A      1G  (Priority)
[bge@l1.nibi parallel]$
[bge@l1.nibi parallel]$
```

Submit

Check

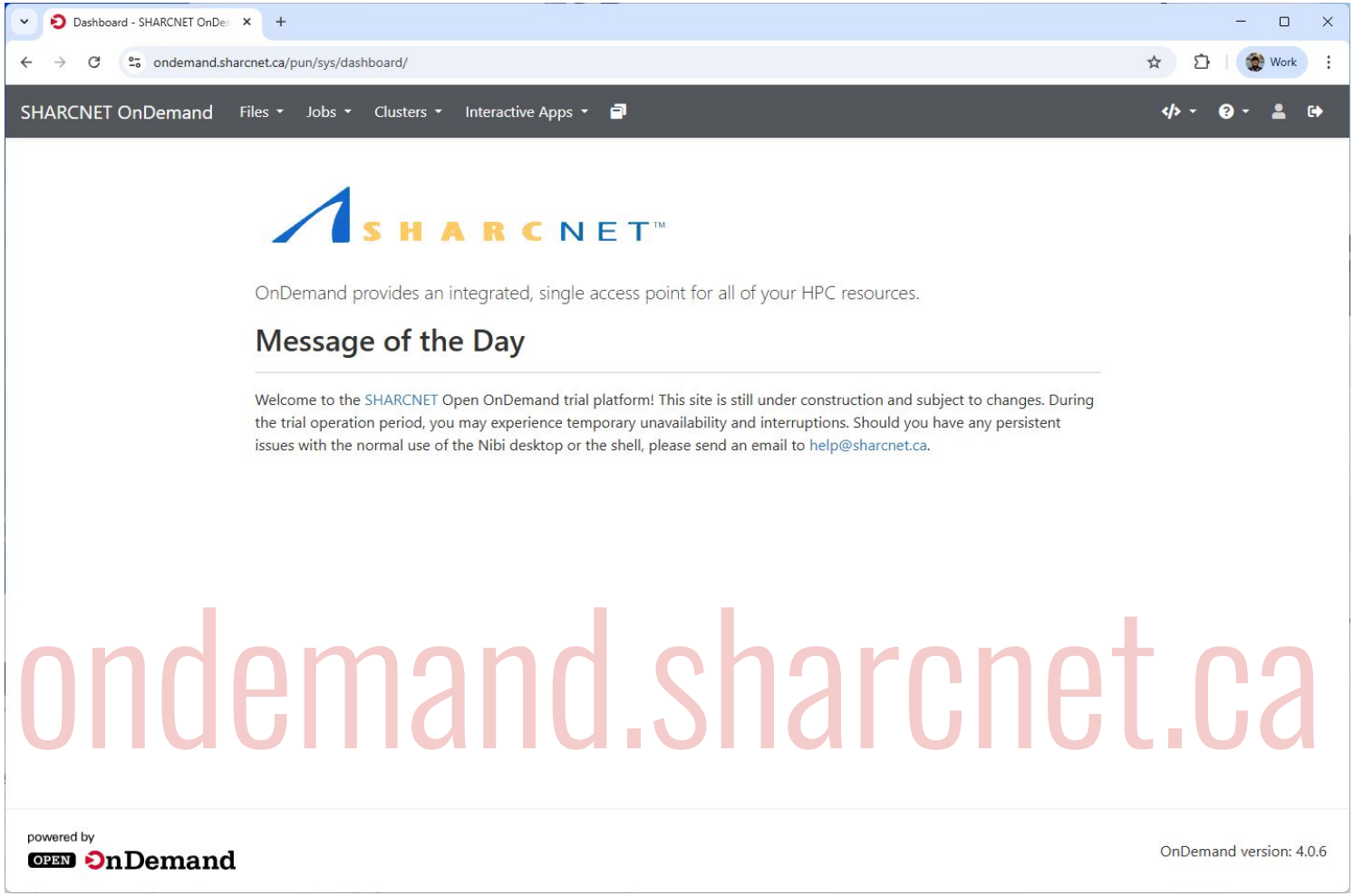
Then you submit your jobs using a script

```
#!/bin/bash
# Slurm section
#SBATCH --ntasks=64             # Nmber of parallel (MPI) processes
#SBATCH --cpus-per-task=1       # One process/thread per core
#SBATCH --mem-per-cpu=1G        # memory; default unit is megabytes
#SBATCH --time=0-00:30:00       # 30 min
#SBATCH --account=def-bge       # Or RAC group account, e.g. rrg-mypi

# User section
# Following are user specific commands for running programs
srun hostname -s > hostfile

julia --machine-file ./hostfile ./pi_p.jl 1000000000
~
~
~
```

Resources: *Login to a cluster, upload and download files*



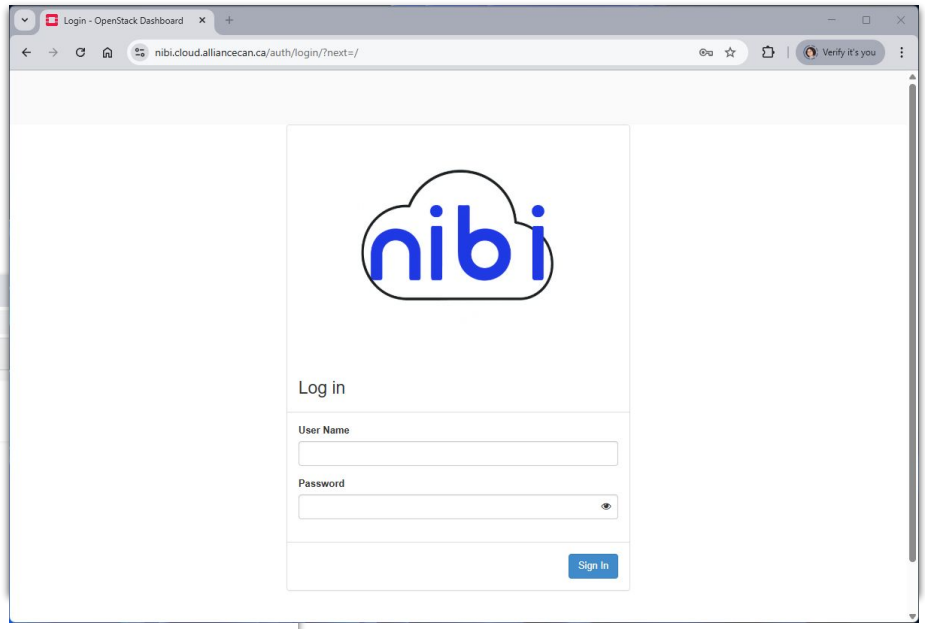
Resources: *Accessing a cloud*

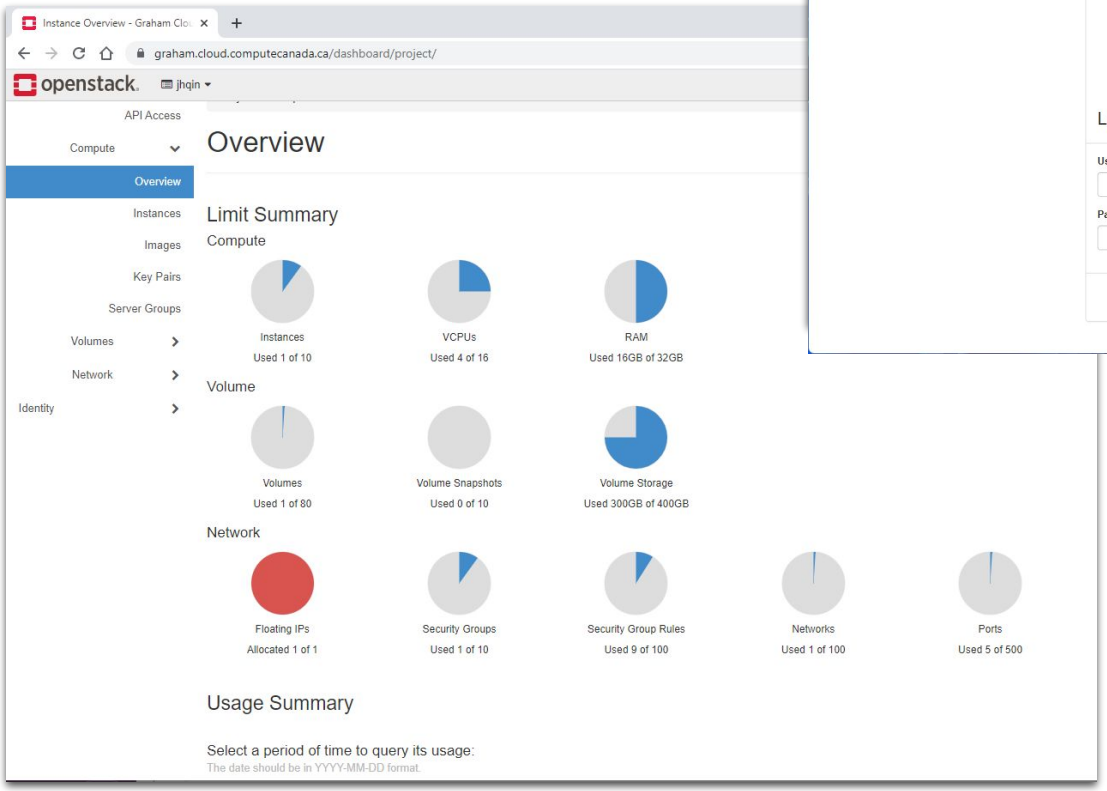
A few notes

- The Alliance provides clouds as an infrastructure as a service (IaaS). Not necessarily seen as a turn-key solution as one might have seen. Users are responsible for running VMs and tasks inside VMs themselves.
- Typical uses of cloud at Alliance: web services, databases, compute intensive applications (small scale), etc.
- Before you proceed, visit the Alliance wiki page on cloud.
- One needs to have a project to use cloud.
- Only a PI can create a cloud project per cloud.
- Once a cloud project is created, user can access individual clouds to *manage their VMs and services*.

Resources: *Accessing a cloud*

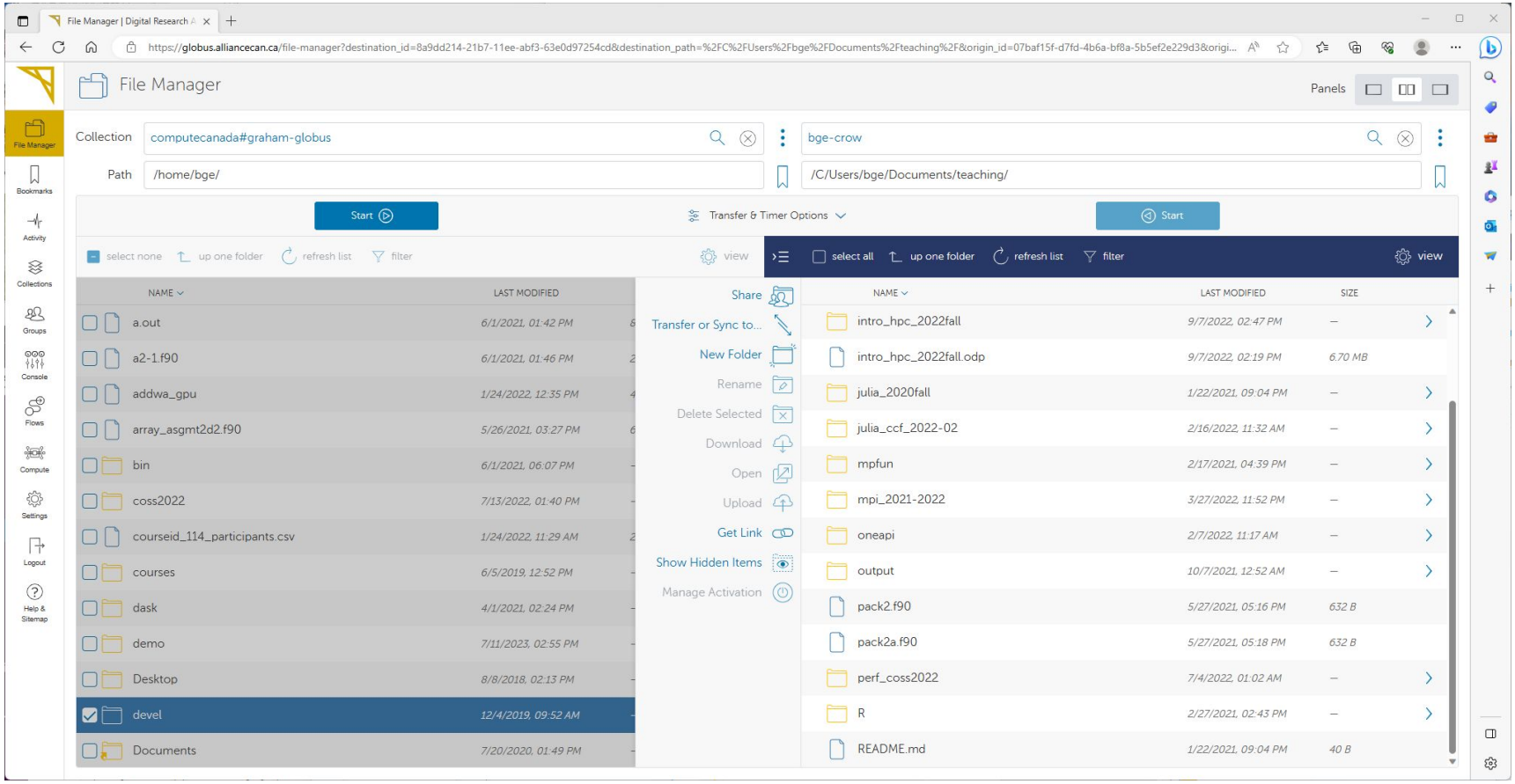
- arbutus.cloud.alliancecan.ca
- cedar.cloud.alliancecan.ca
- nibi.cloud.alliancecan.ca
- beluga.cloud.alliancecan.ca





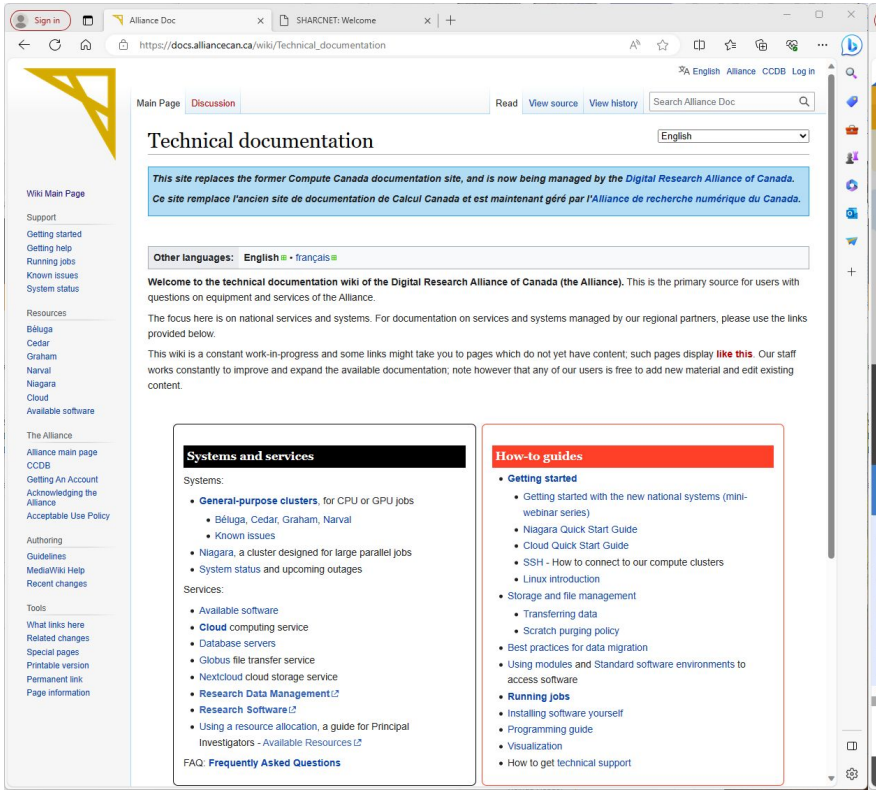
- One needs a project
- No Windows images, all VMs are Linux.
- Up to 80 virtual CPU cores.
- May have virtual GPUs.
- Up to 10 TB storage.
- Up to 25 persistent CPU cores.

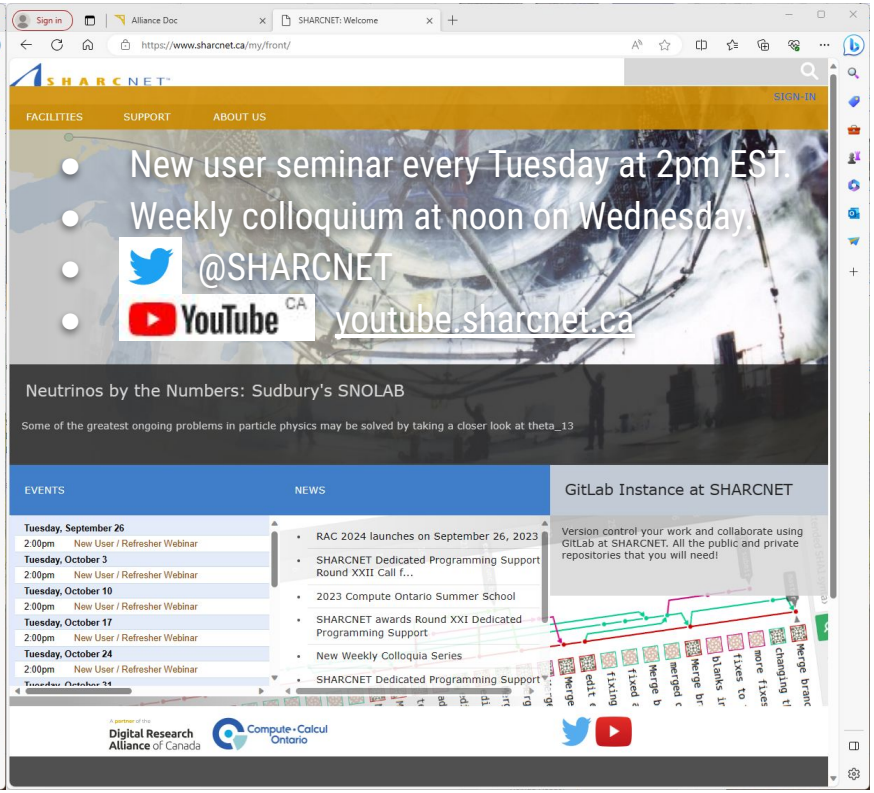
Resources: *Transferring files via Globus*[1]



1. Check https://docs.alliancecan.ca/wiki/Globus. Go to https://globus.alliancecan.ca/ and follow the instructions

Resources: *Getting help online*





https://docs.alliancecan.ca/

https://www.sharcnet.ca/

Resources: *Getting help*

- Ticketing system (most recommended): support@tech.alliancecan.ca
- Weekly New User Q&A session, Tue, 2pm: https://www.sharcnet.ca/my/news/calendar
- McMaster users meetings every 2 weeks: online, advertised via email.
- Staff contact info to email or phone: https://www.sharcnet.ca/

Local staff (we are in ABB)



Servilio Afre Puentes, Software developer



Sergey Mashchenko, HPC Analyst



Weiguang Guan, Software developer

What is new in Alliance

Brine: SHARCNET's "AI as a service"

An AI system, always-on, no queue, OpenAI-compatible API for hosted models that support chat, tool calling, and audio transcription, etc. Models include DeepSeek-V4-Flash-0731, Qwen3.8-27B, gpt-oss-120b, North-Mini-Code-1.0, etc.
Typical work cases:

- retrieval-augmented generation systems
- agents or workflow automation
- document-processing pipelines
- code assistance
- audio transcription
- workloads that currently use a commercial API or a locally hosted model

What is new in Alliance

Continued:

- This is a pilot project at the moment
- Any DRAC researcher can apply (not just PI, not just SHARCNET sites)
- To apply, submit a ticket with the request (help@sharcnet.ca)
- Once the account is set up, can be used right away (no queue wait time like on clusters)

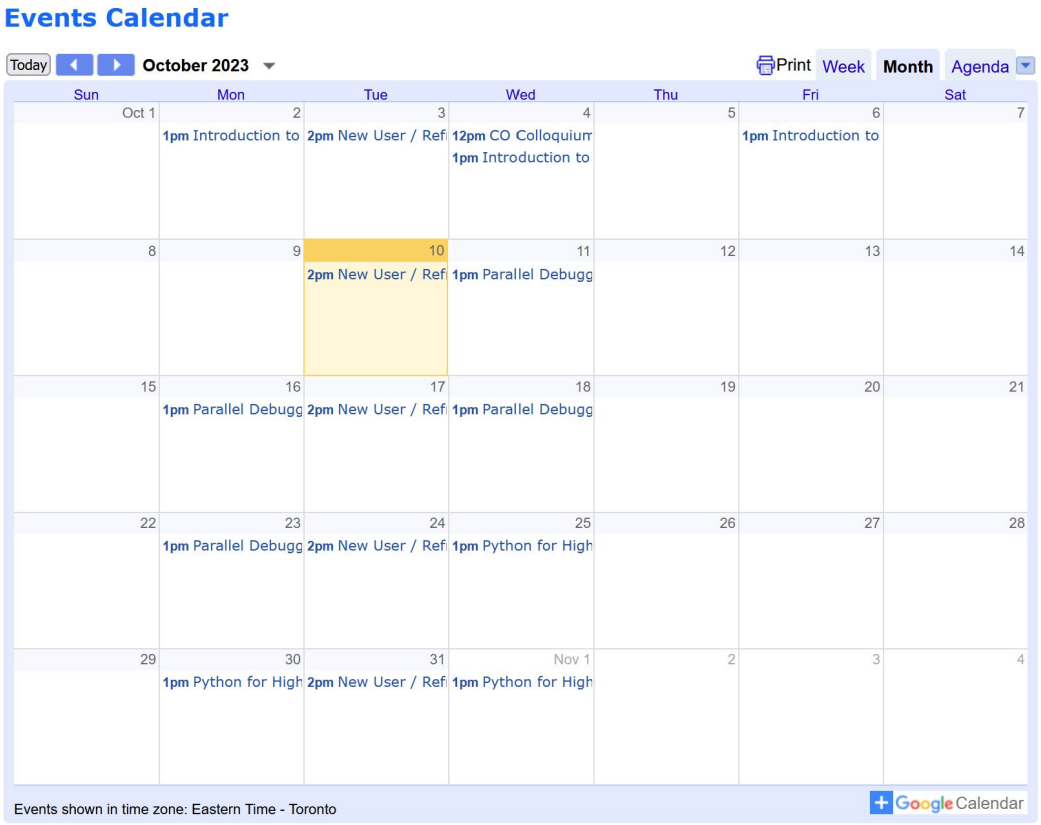
What is new in Alliance

Trillium upgrade: added 416 B200 Nvidia GPUs, 180GB each

Login Node	nodes	cores	available memory	CPU	GPU
trillium.alliancecan.ca	1224	192	749G or 767000M	2 x AMD EPYC 9655 (Zen 5) @ 2.6 GHz, 384MB cache L3	
trillium-**gpu**.alliancecan.ca (important: the B200s are not yet available)	63	96	749G or 767000M	1 x AMD EPYC 9654 (Zen 4) @ 2.4 GHz, 384MB cache L3	4 x NVidia H100 SXM (80 GB memory), connected via NVLink
	1	96	1498G or 1534M	2 x AMD EPYC 9455 (Zen 5) @ 3.15 GHz, 256MB cache L3	4 x NVidia H200 SXM (141GB memory), connected via NVLink
	52	96	2000G or 2048000M	2 x Intel 8558P @ 2.7 GHz, 260MB cache L3	8 x NVidia B200 SXM (180 GB memory), connected via NVLink

Resources: *Online training*

- Events calendar: https://www.sharcnet.ca/my/news/calendar
- Q&A for new users every Tuesday at 2pm Eastern time
- Biweekly General Interest Seminars at noon on Wednesdays
- Fall / Winter semesters courses ("Introduction to ARC")
- Compute Ontario Summer School (June)
- youtube.sharcnet.ca
- SHARCNET self-paced courses



Training sites

SHARCNET uses Moodle as its LMS. Our courses (live and self-paced) are hosted here:

- https://training.sharcnet.ca/

Alliance account is required. The courses are free.

Compute Ontario Summer Schools are hosted on a separate Moodle server:

- https://training.computeontario.ca/

Anyone from academia can attend (Alliance account is not required). The courses are free.

Live courses: fall 2026



In Fall 2026 / Winter 2027 semesters, the bulk of training provided by SHARCNET to our users is comprised of a series of independent, self-contained workshops on a wide range of topics pertaining to Advanced Research Computing. The courses are delivered online live. (Some of these courses are also available as self-paced courses.) An Alliance account is required to register for and attend these courses. All our courses are **free**.

Upcoming live courses:

- **Introduction to CMake: Sept. 29, Oct. 1**
- Introduction to GPU Programming: Oct. 6, 9, 13, 16
- Mastering GPU Efficiency: Oct. 20, 23
- Python for High Performance Computing: Oct. 27, 30, Nov. 3, 6
- Introduction to AI agents in research: Nov. 10, 13
- Engineering Software: Nov. 17, 20
- Working with Jupyter on the Clusters: Nov. 24, 27
- Tidyverse: Data Science with R: Dec. 1, 4, 8
- Mastering the Alliance Job Scheduler: Dec. 11, 15, 18

Live courses: winter 2027

- A Practical Guide to Windows Subsystem for Linux (WSL): Jan. 12, 15
- High Performance Computing C++: Jan. 19, 22, 26, 29
- Efficient Deep Learning with PyTorch: Feb. 2, 5, 9, 12
- Fundamentals of Retrieval-Augmented Generation: Feb. 16, 19, 23
- Visualization: Feb. 26, Mar. 2
- Using Apptainer Containers: Mar. 5, 9
- Fundamentals and practice of advanced research computing: Mar. 16 - Apr. 15

Self-paced courses

- New User Course
- Introduction to GPU Programming
- Introduction to Machine Learning
- Introduction to SQL
- Introduction to the Shell
- Mastering GPU Efficiency
- Mastering the Alliance job scheduler
- Bioinformatics



Questions?