

# What exactly is a Resource Allocation Competition (RAC) Compute Award?

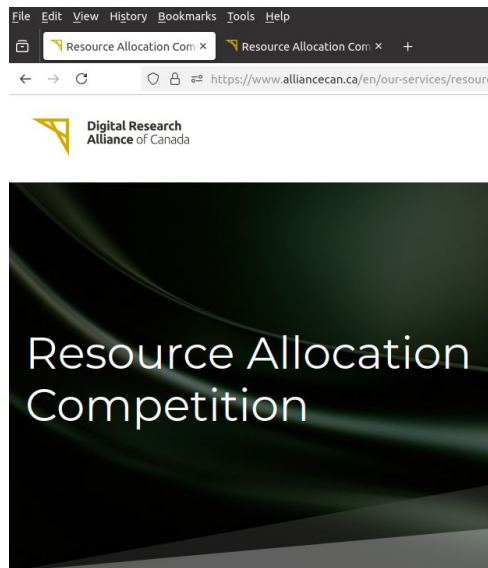
James Desjardins  
SHARCNet, October 22nd, 2025

# Overview

- What is the Resource Allocation Competition (RAC)?
- The relationship between capacity, allocations and utilization
- The queue state and compute capacity saturation
- Difference between allocating storage vs compute
- The difference between RAS and RAC allocated resources?
- Calculating the usage of compute resources
- Comparing compute usage to the target share of an account
- The dynamic state of compute target shares and usage
- Visualizing job resource utilization time series at [portal.alliancecan.ca](https://portal.alliancecan.ca)
- Past presentation

# What is the Resource Allocation Competition (RAC)

“... access to compute, storage and cloud resources beyond what can be obtained via the Rapid Access Service (RAS).”

A screenshot of the Resource Allocation Competition wiki page. The page title is "Resource Allocation Competition" and it is in Canadian English. The page content includes a description of the RAC, a list of other languages (English and français), and a table of key dates. The table lists events such as "Resources for Research Groups (RRG)", "Research Platforms and Portals (RPP)", "RAC general overview information session", "Information session about GPU requests", "Information session about Cloud requests", "Announcement of RAC results", and "Start of allocations". The page also includes a section for "Useful RAC documentation" with links to the RAC Application Guide, Fast Track application guide, Annual RPP progress report guide, Available resources, RAC FAQ, CCV submission guide, and Rapid Access Service. Finally, there is a section for "Past competitions".

Event	Date
<b>Resources for Research Groups (RRG)</b> <ul style="list-style-type: none"><li>Including Fast Track applications</li></ul>	September 23 to November 4, 2025, until 11:59 PM (EST) <i>(extension of this deadline is not possible)</i>
<b>Research Platforms and Portals (RPP)</b> <ul style="list-style-type: none"><li>Including RPP Annual Progress Reports</li></ul>	
RAC general overview information session	September 24 (English) - <a href="#">Presentation</a> , <a href="#">Recording</a> September 29 (French) - <a href="#">Presentation</a> , <a href="#">Recording</a>
Information session about GPU requests	October 1 (English) - <a href="#">Presentation</a> , <a href="#">Recording</a> October 2 (French) - <a href="#">Presentation</a> , <a href="#">Recording</a>
Information session about Cloud requests	October 3 (English) - <a href="#">Presentation</a> , <a href="#">Recording</a>
Announcement of RAC results	Late March 2026
Start of allocations	Early April 2026

Services > Resource Allocation Competition

The [Resource Allocation Competition \(RAC\)](#) enables faculty members and their research groups to access compute, storage and cloud resources beyond what can be obtained via the Rapid Access Service (RAS).

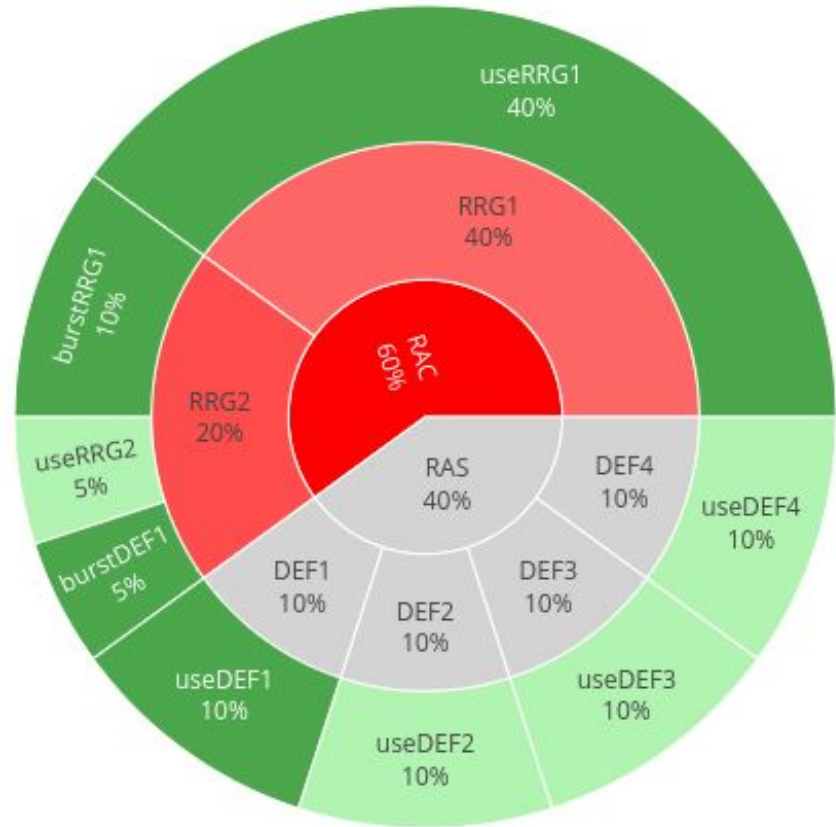
If you are not sure about which application process is best for your project, please email [allocations@tech.alliancecan.ca](mailto:allocations@tech.alliancecan.ca).

# The relationship between Capacity, Allocations and utilization

The Capacity is the total installed hardware for the resources offer by the Alliance.

Allocations are the quotas and target shares controlling the consumption of resources from groups.

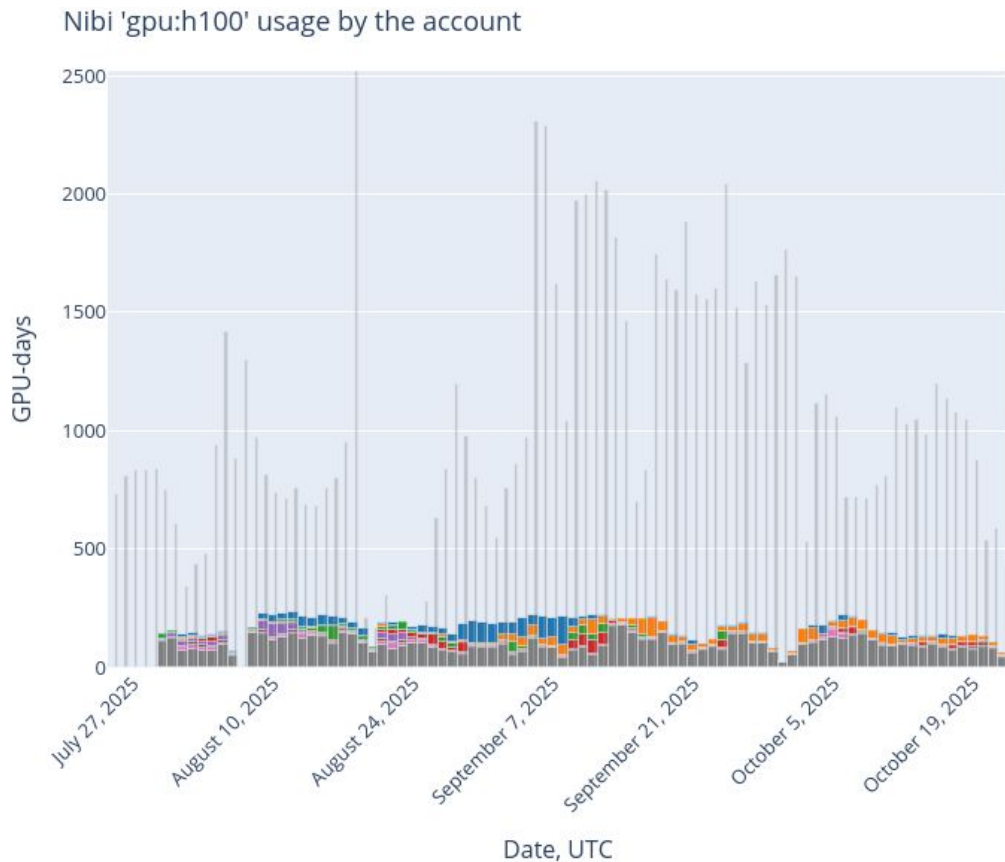
Utilization is the consumption of the resources by groups.



# The queue state and compute capacity saturation

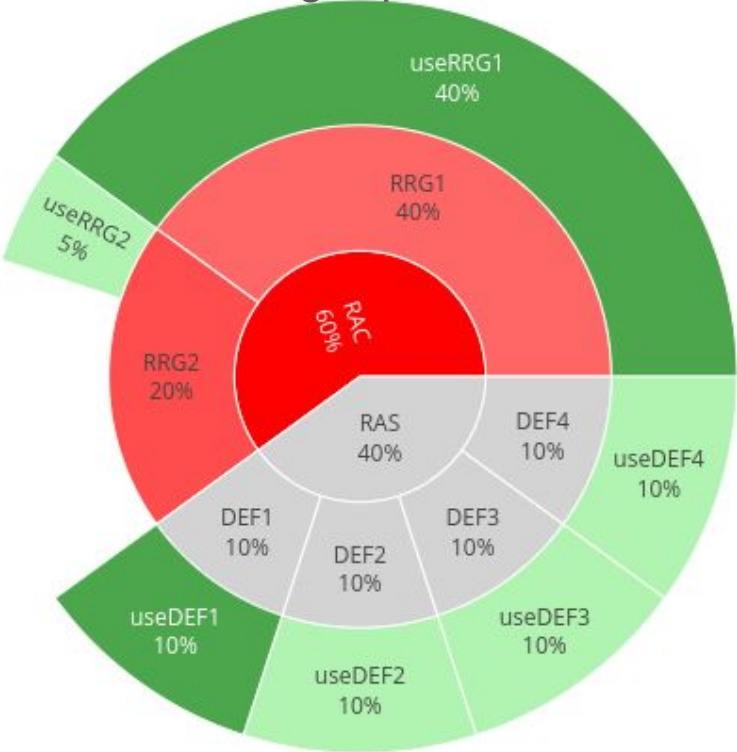
The cluster compute capacities are in constant high demand.

The quantity of resources requested in queued jobs at any given time is typically multiple times the size of the installed capacity.

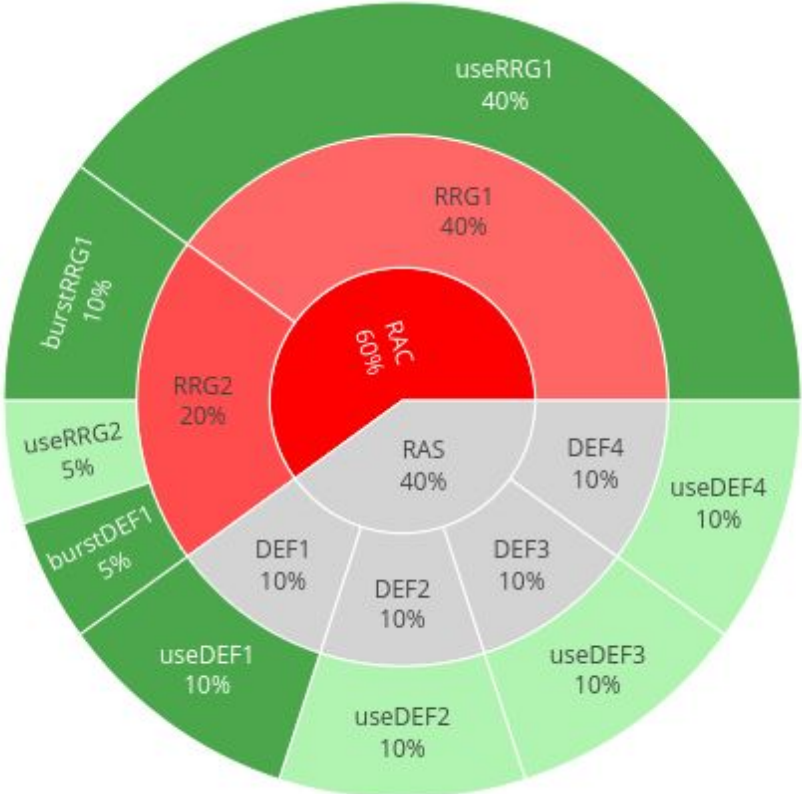


# Difference between allocating storage vs compute

Storage quotas



Compute target share



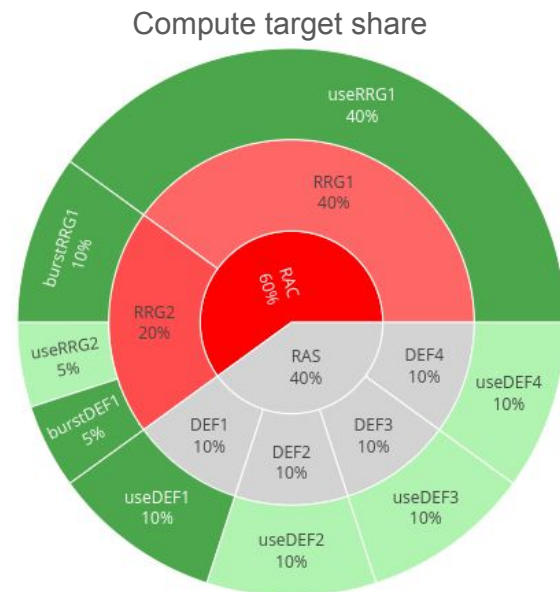
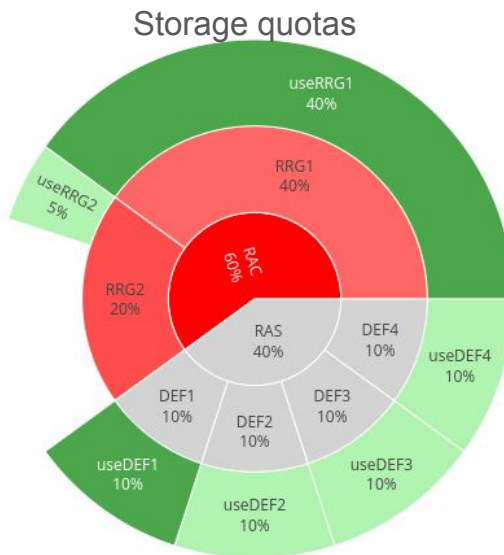
# The difference between RAS and RAC allocated resources?

Both RAS and RAC take the form of quotas and target shares.

RAS are limited in size.

RAC allocations have an application process.

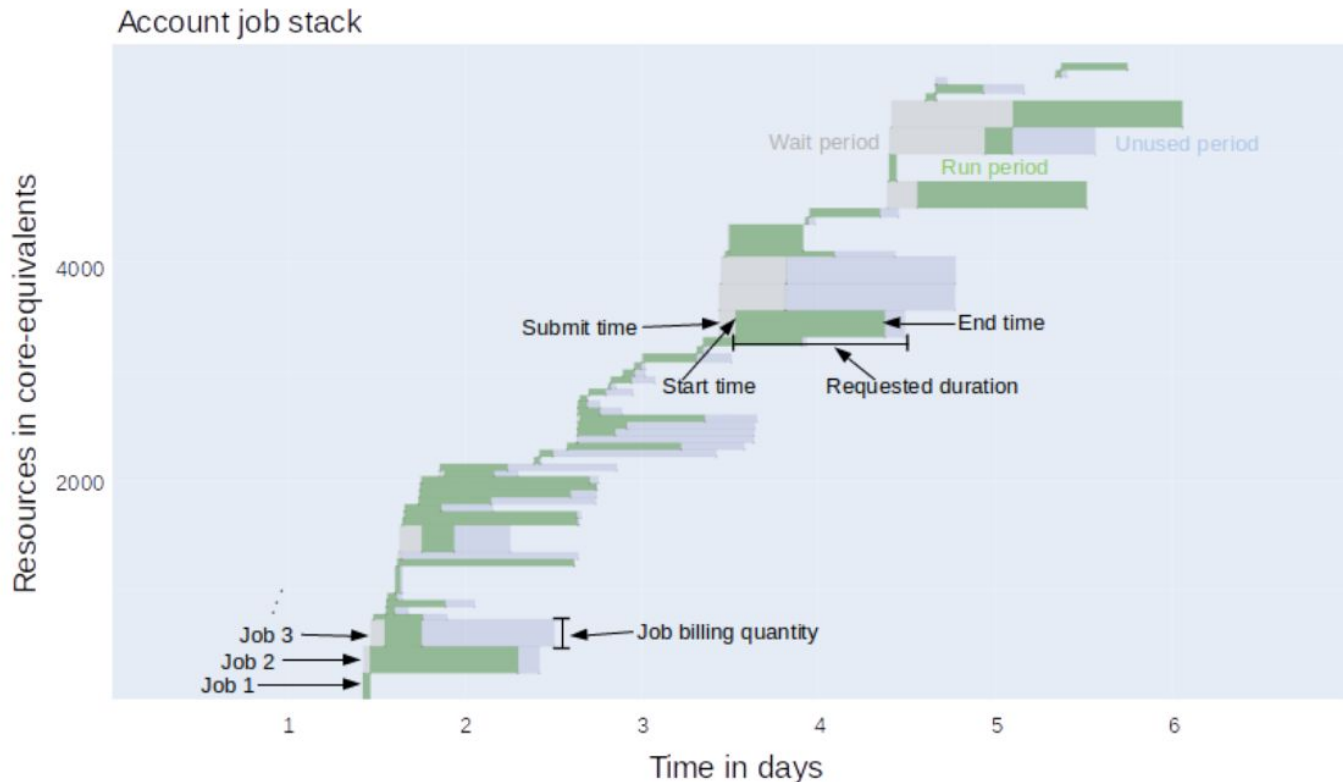
RAC compute allocations are of a fixed size for the allocation period.



# Calculating the usage of compute resources

Job shape and the measurement of resource consumption.

Jobs can be visualized as multi-dimensional rectangles. In this case time and billing units.

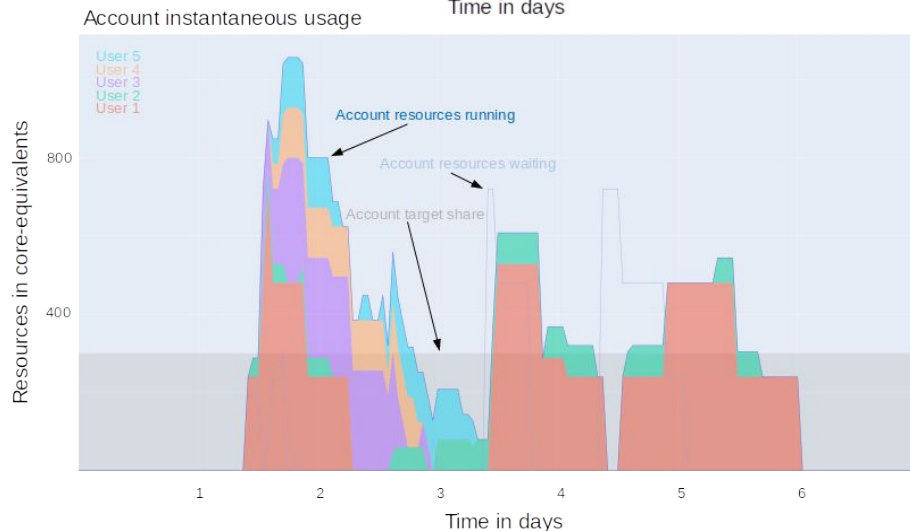
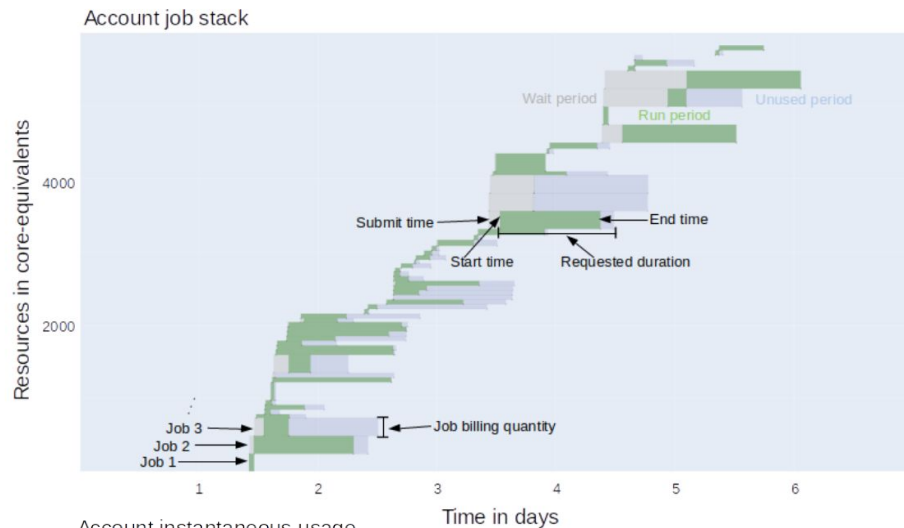




Summing the billing units at each time point across all jobs provides a time series of resource consumption.

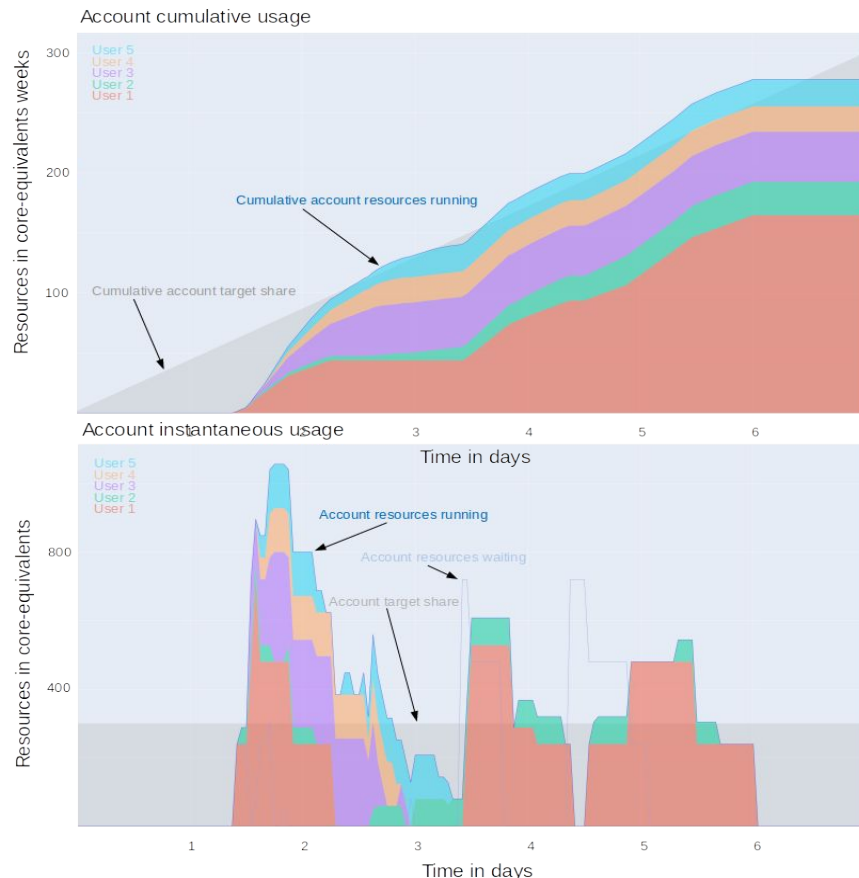
A similar time series can be generated for pending resources at each time point.

These metrics can then be compared to the account's target share to determined states like expect wait times.



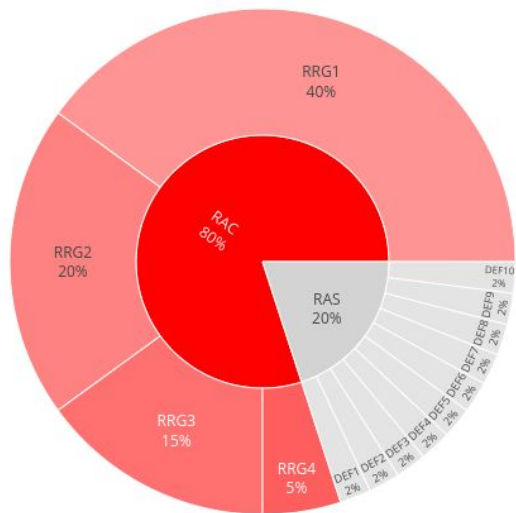
# Comparing compute usage to the target share of an account

Converting the resource consumption time series to a cumulative sum provides a view of how the usage is relating to the target share over time.

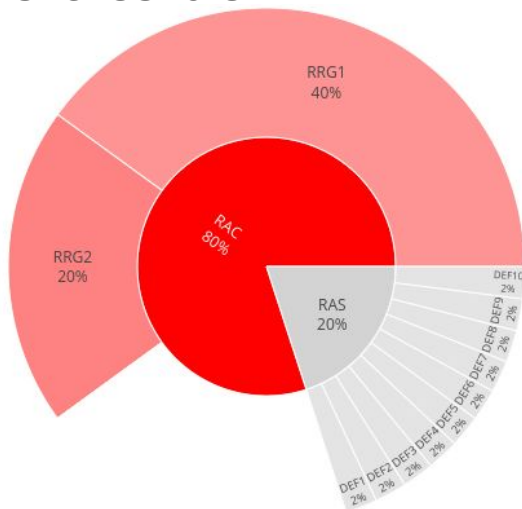


# The dynamic state of compute target shares and usage

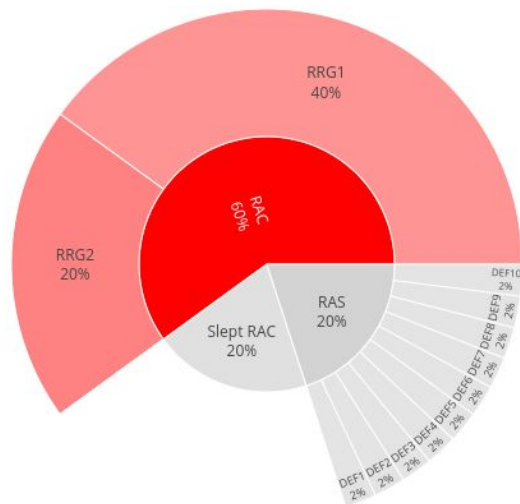
The sum of target shares is equal to the compute resource capacity.



Some accounts do not have jobs queued or running at times making their target shares idle.

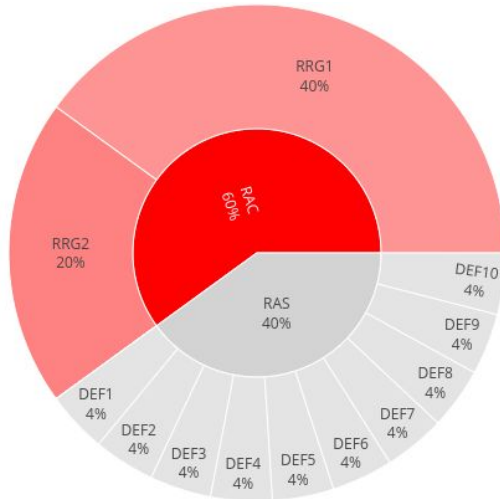


Idle RAC allocations enter a state referred to as “Slept RAC”.

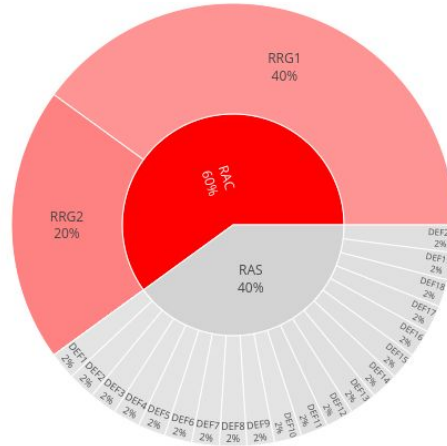


# The dynamic state of compute target shares and usage

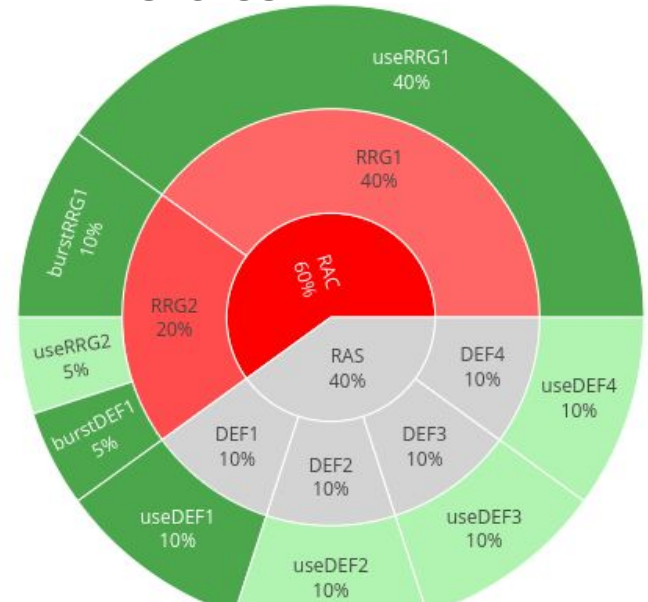
Slept RAC shares are passed to the RAS pool to be equally divided among active default RAS accounts.



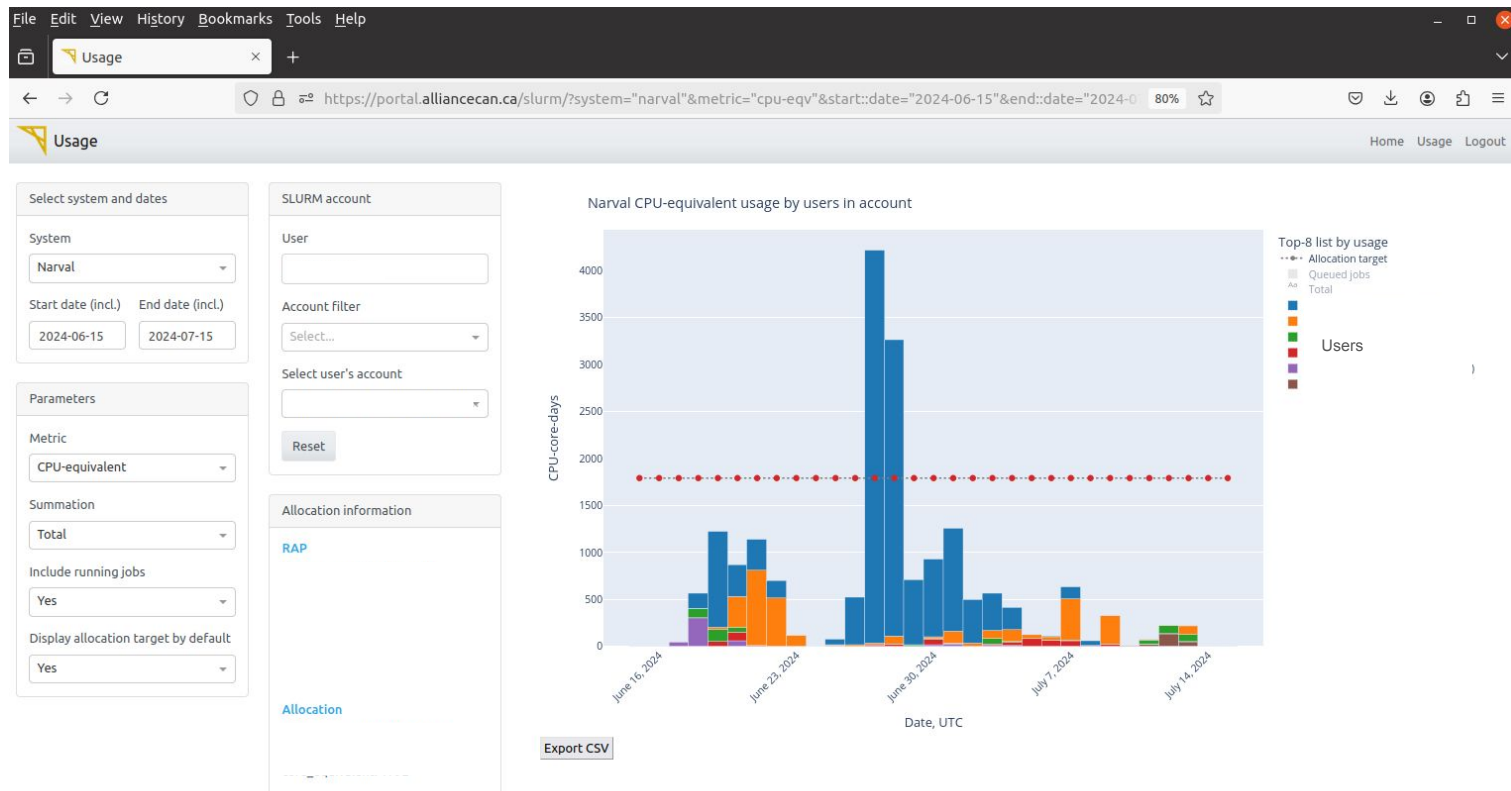
RAS compute target shares vary in size based on the size of Slept RAC shares and the number of active RAS accounts.



Both RAC and RAS usage is able to burst beyond their target shares.



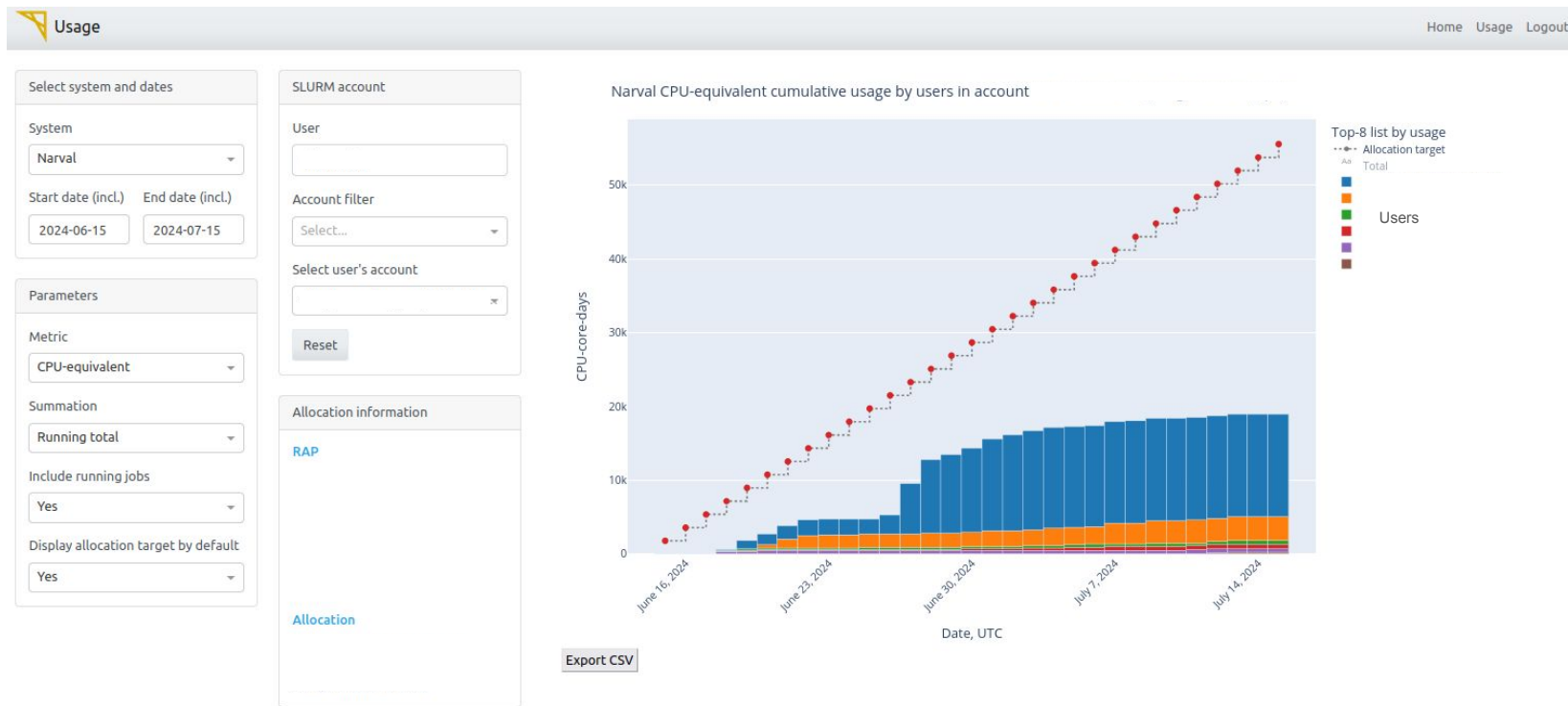
# Visualizing job resource utilization time series at portal.alliancecan.ca



# Visualizing job resource utilization time series at portal.alliancecan.ca



# Visualizing job resource utilization time series at portal.alliancecan.ca



# Visualizing job resource utilization time series at portal.alliancecan.ca

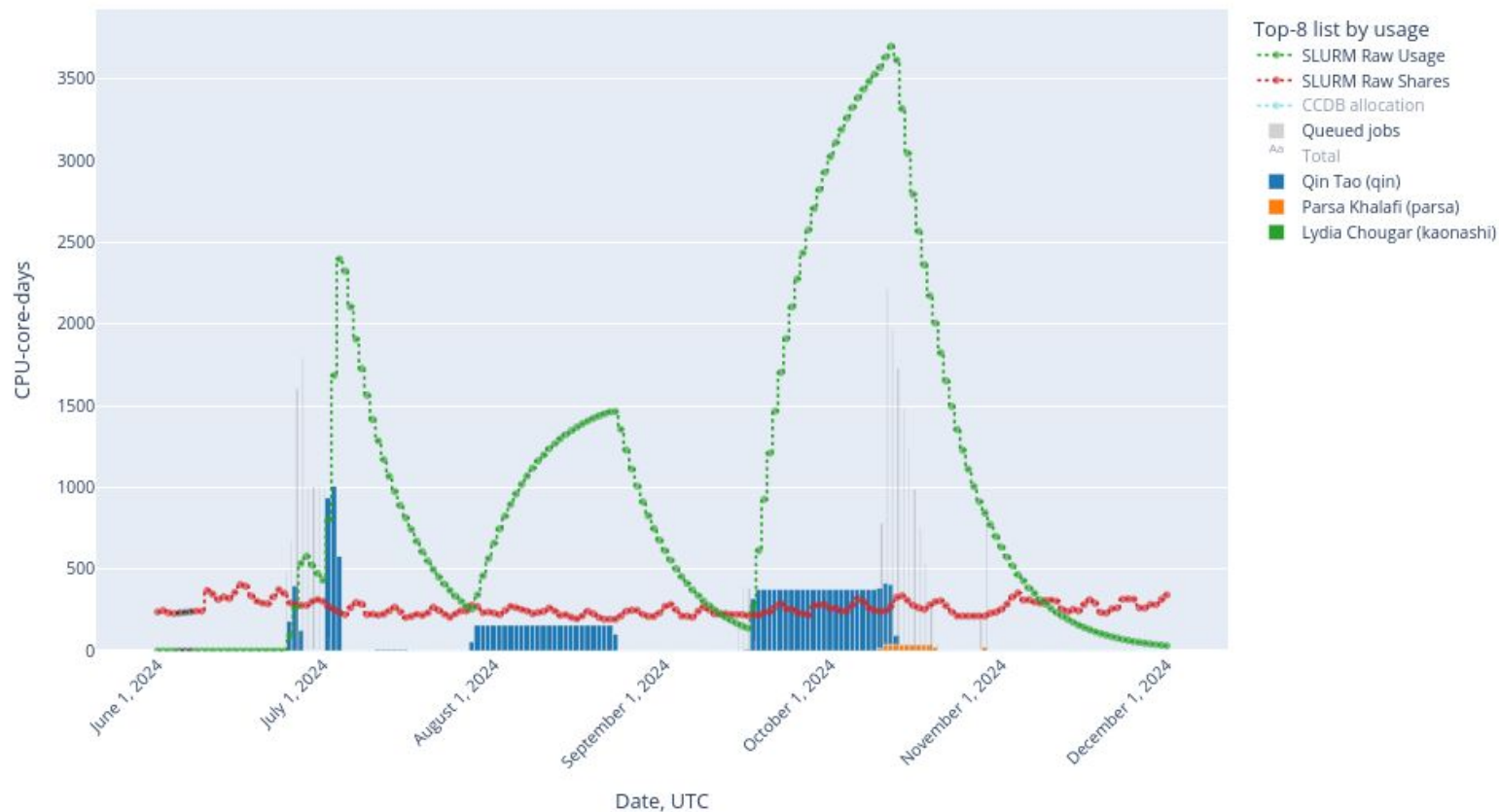




# Visualizing job resource utilization time series at portal.alliancecan.ca



# Visualizing job resource utilization time series at portal.alliancecan.ca



# Previous presentations on this topic

Exploring Compute Usage  
from User Facing Portals on  
the National Clusters

File Edit View History Bookmarks Tools Help

Exploring Compute U... x

https://www.youtube.com/watch?v=MXff0iaoWhs&t=1764s

sharcnet wait time

### Exploring job resource usage at portail.narval.calculquebec.ca

https://portail.narval.calculquebec.ca/secure/accountstats/

Detailed utilization by user  
CPUs

Allocated CPU cores

Used CPU cores

Wasted CPU cores

Exploring Compute Usage from User Facing Portals on the National Clusters

Sharcnet HPC  
5.37K subscribers

Subscribe

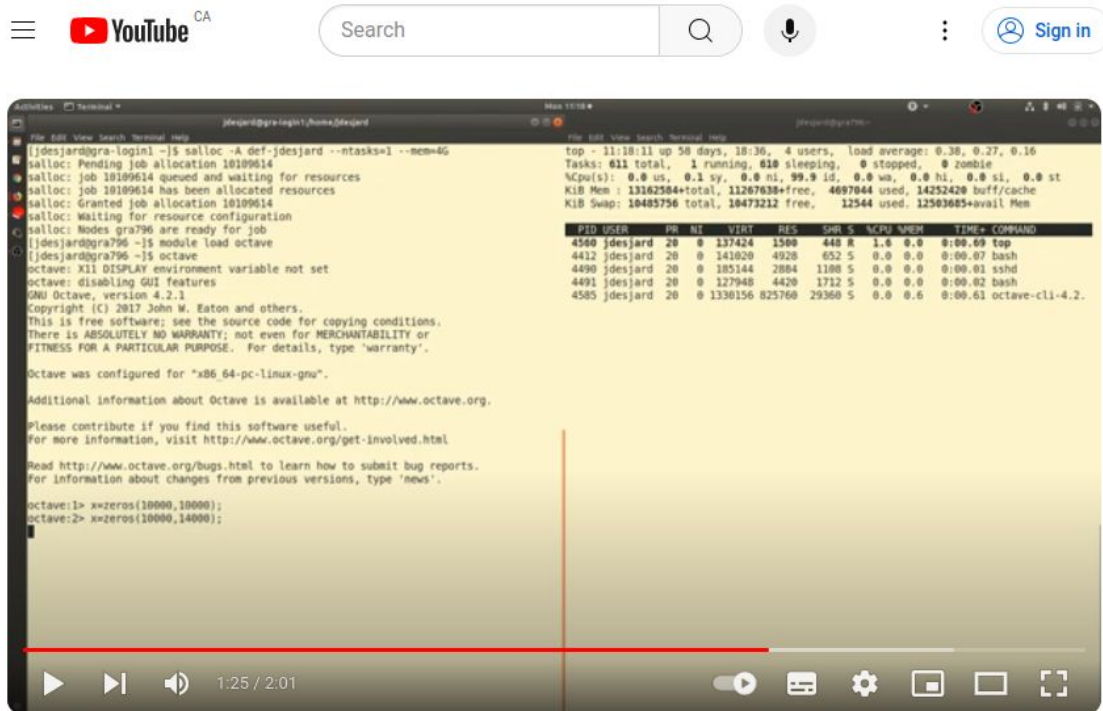
4

Share

Ask

# Previous presentations on this topic

Estimating the memory usage of a process within an interactive job allocation using top.



The screenshot shows a YouTube video player interface. The video content is a terminal window with the following text:

```
jdesjard@gra-login1:~$ salloc -A def-jdesjard --ntasks=1 --mem=6G
salloc: Pending job allocation 10109614
salloc: job 10109614 queued and waiting for resources
salloc: job 10109614 has been allocated resources
salloc: Granted job allocation 10109614
salloc: Waiting for resource configuration
salloc: Nodes gra796 are ready for job
jdesjard@gra796:~$ module load octave
jdesjard@gra796:~$ octave
octave: X11 DISPLAY environment variable not set
octave: disabling GUI features
GNU Octave, version 4.2.1
Copyright (C) 2017 John W. Eaton and others.
This is free software; see the source code for copying conditions.
There is ABSOLUTELY NO WARRANTY; not even for MERCHANTABILITY or
FITNESS FOR A PARTICULAR PURPOSE. For details, type 'warranty'.

Octave was configured for "x86_64-pc-linux-gnu".

Additional information about Octave is available at http://www.octave.org.

Please contribute if you find this software useful.
For more information, visit http://www.octave.org/get-involved.html

Read http://www.octave.org/bugs.html to learn how to submit bug reports.
For information about changes from previous versions, type 'news'.

octave:1> xxzeros(10000,10000);
octave:2> xxzeros(10000,14000);
```

On the right side of the terminal window, the output of the 'top' command is visible:

```
top - 11:10:11 up 50 days, 10:30, 4 users, load average: 0.30, 0.27, 0.16
Tasks: 611 total, 1 running, 610 sleeping, 0 stopped, 0 zombie
%Cpu(s): 0.0 us, 0.1 sy, 0.0 ni, 99.9 id, 0.0 wa, 0.0 hi, 0.0 si, 0.0 st
KiB Mem : 13102504+total, 11267630+free, 4697044 used, 14252420 buff/cache
KiB Swap: 10485756 total, 10473212 free, 12544 used, 12503685+avail Mem
```

PID	USER	PR	NI	VSZ	RES	SHR	S	%CPU	%MEM	TIME+	CMD
4560	jdesjard	20	0	137424	1500	448	R	1.0	0.0	0:00.09	top
4412	jdesjard	20	0	141020	4928	652	S	0.0	0.0	0:00.07	bash
4490	jdesjard	20	0	185144	2884	1180	S	0.0	0.0	0:00.01	sshd
4491	jdesjard	20	0	127948	4420	1712	S	0.0	0.0	0:00.02	bash
4585	jdesjard	20	0	1330156	825760	29368	S	0.0	0.0	0:00.61	octave-cli-4.2.

Estimating the memory footprint of your code



Sharcnnet HPC  
4.85K subscribers

Subscribe

Like

Comment

Share

Save

More

# Previous presentations on this topic

## Exploring job properties with the ViewClust Python package

← → ↺ github.com/Andesha/ViewClust

README MIT license

### ViewClust

`pypi v0.8.0` `docs failing`

Python package for computing cluster measure

- Free software: MIT license
- Documentation: <https://viewclust.readthedocs.io>

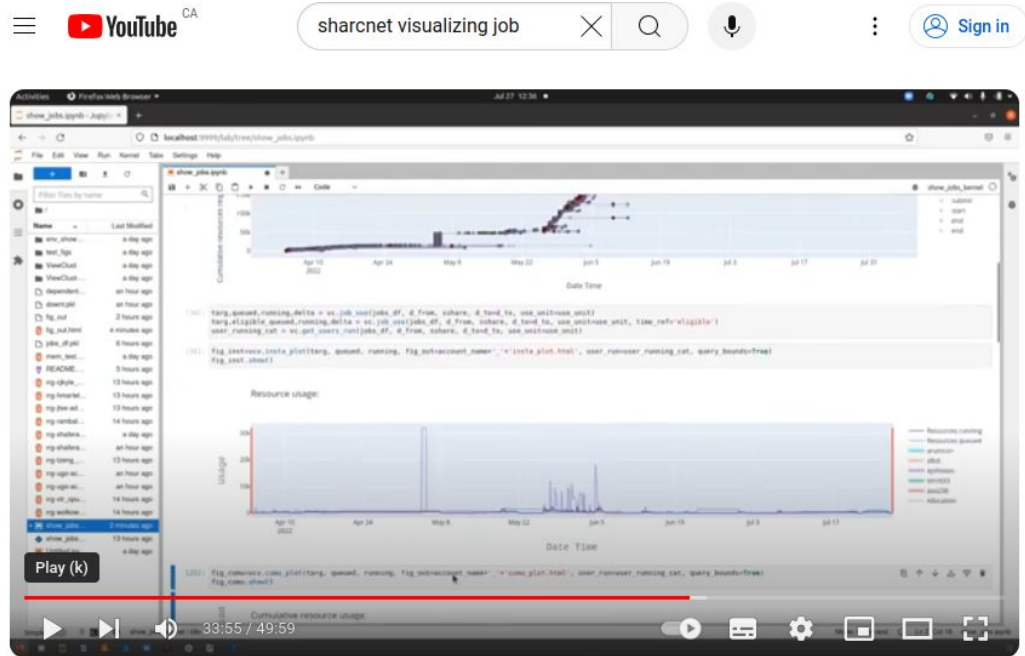
### Features

- Calculates job usage based on inputs from frames
- Plots cumulative and instantaneous usage
- Accepts dynamic targets for account and s
- Provides a basic interface for generating jo

For more plotting options and dashboard suites package.

### Credits

- [Tyler Collins](#)
- [James Desjardins](#)
- [Sergiy Khan](#)
- [Pier-Luc St-Onge](#)
- [Jose Sergio Hleap](#)
- [Chris Want](#)



### Visualizing job properties for wait time assessment



SharCNet HPC  
4.85K subscribers

Subscribe

👍 0

💬

➦ Share

🔖 Save

⋮

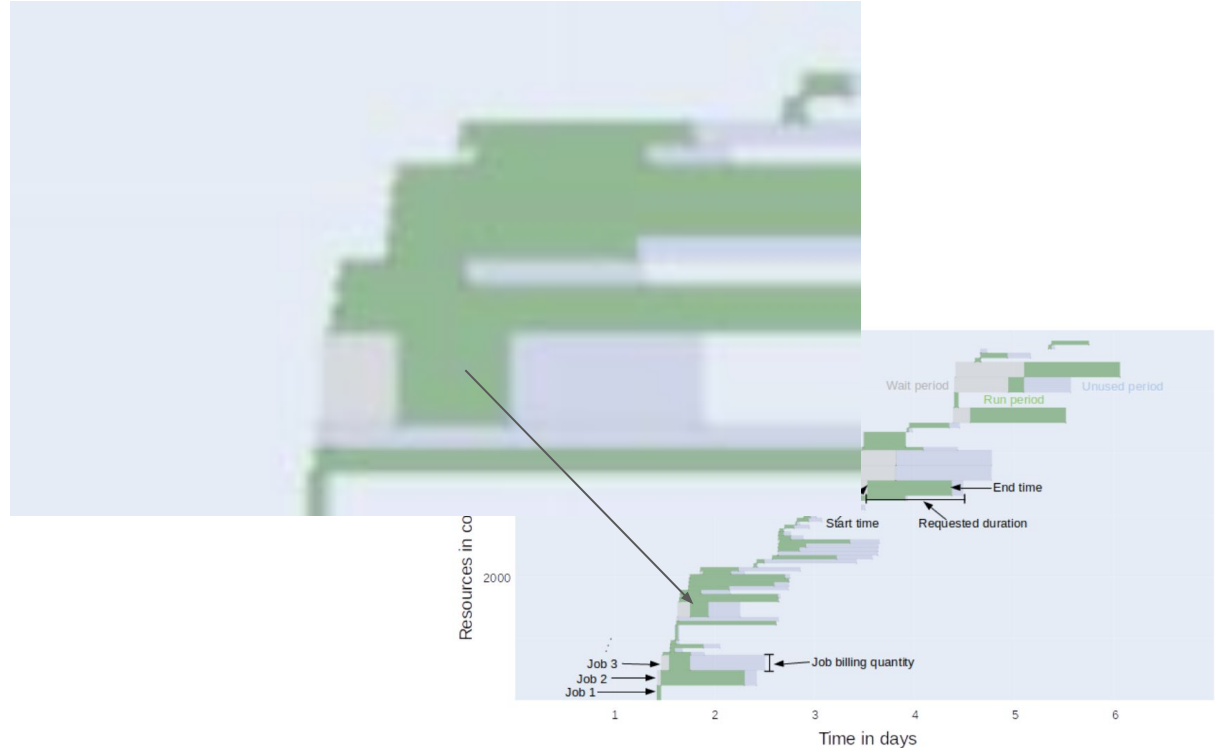
# Thank you!

Any questions?



# Allocated vs Used job shape

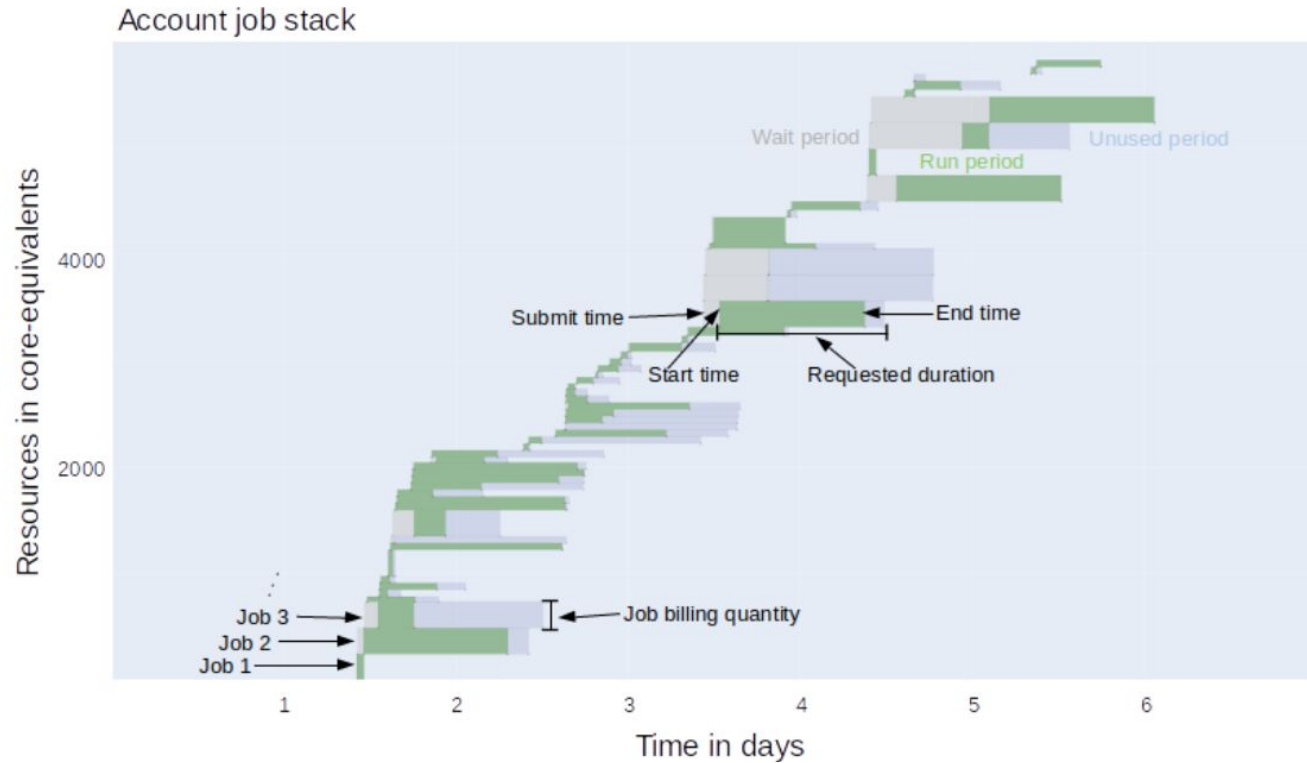
The scheduler “bills” toward fairshare based on the resources reserved for a job. The resources reserved may be substantially different than the resources used for the procedures executed in the job.





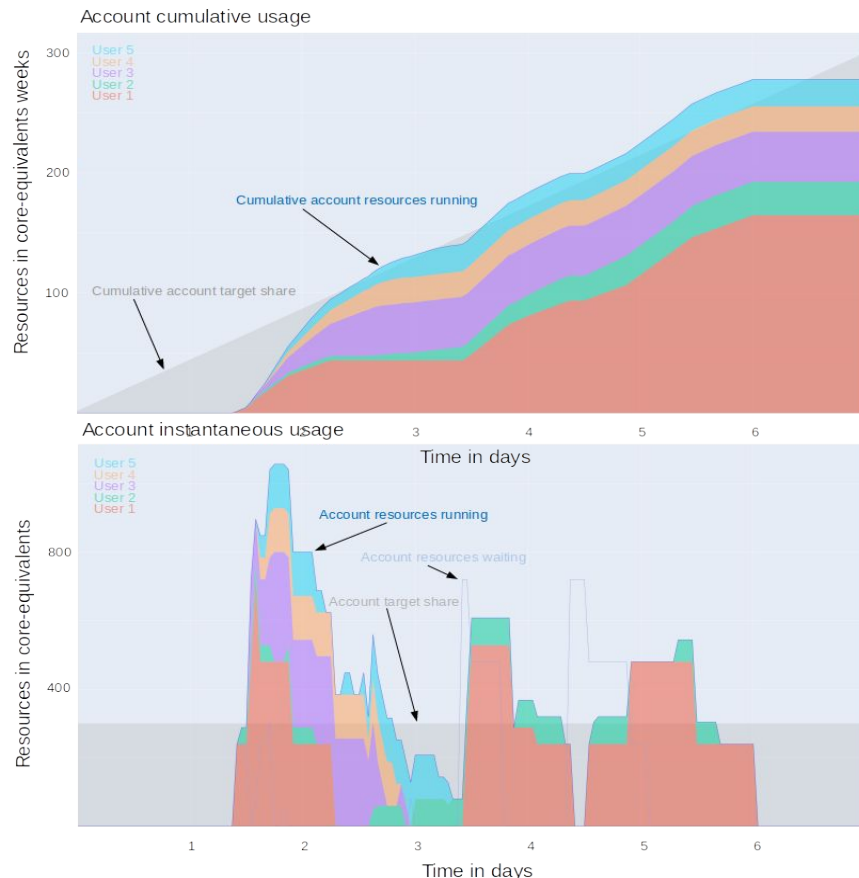
# Job shape and the measurement of resource consumption

Jobs can be visualized as multi-dimensional rectangles. In this case time and billing units.

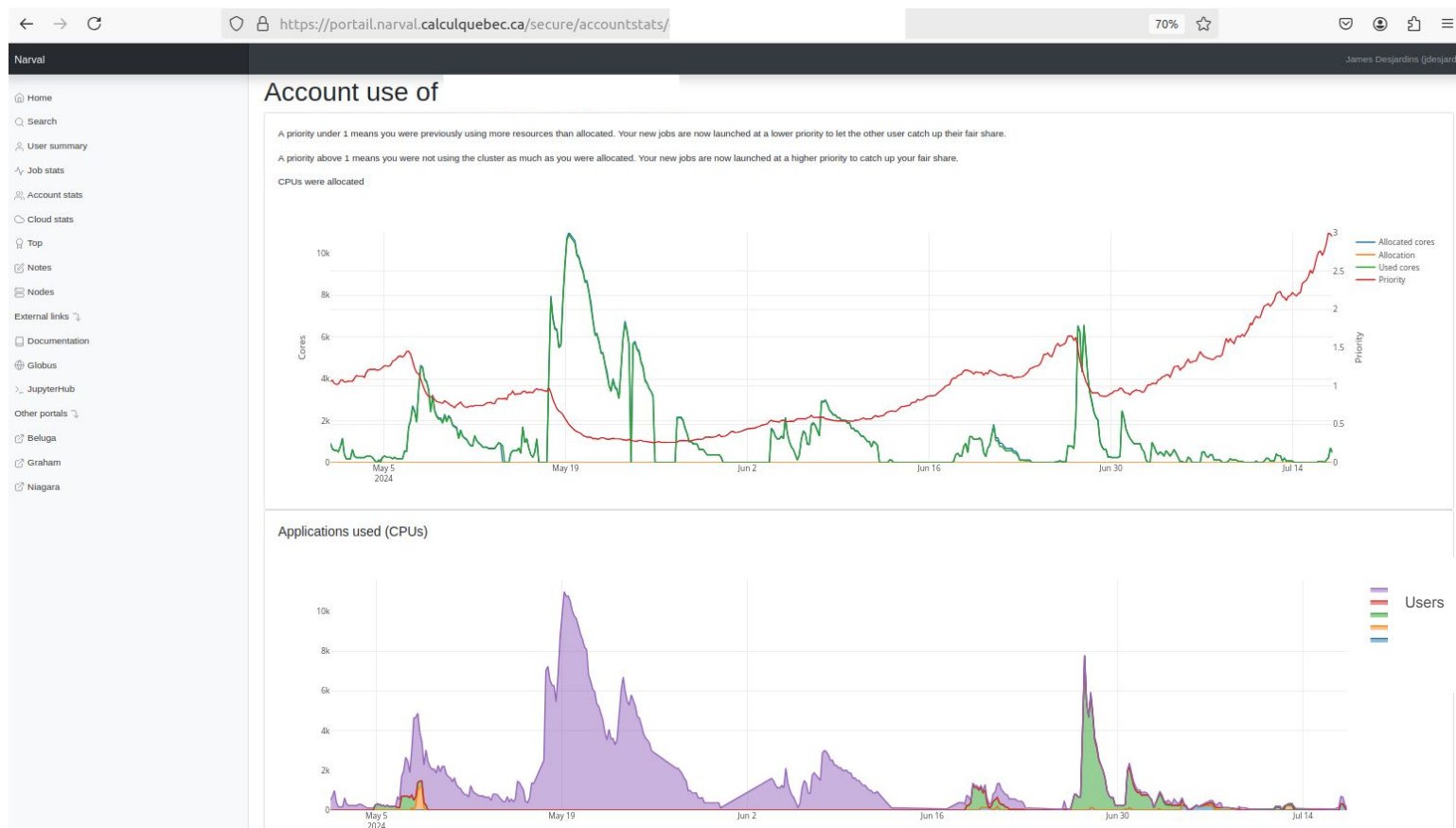


# Job shape and the measurement of resource consumption

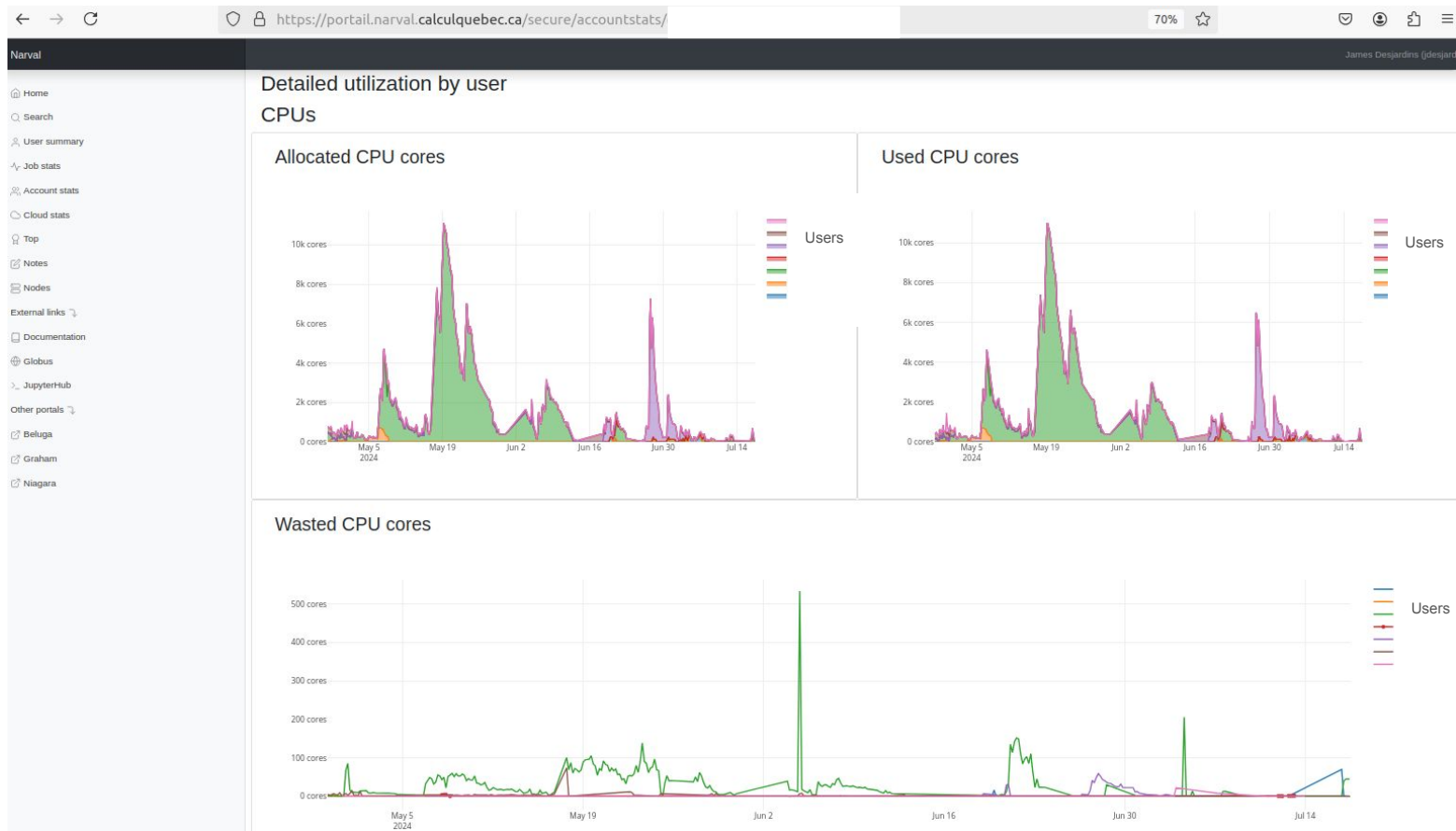
Converting the resource consumption time series provides a view of how the usage is relating to the target share over time.



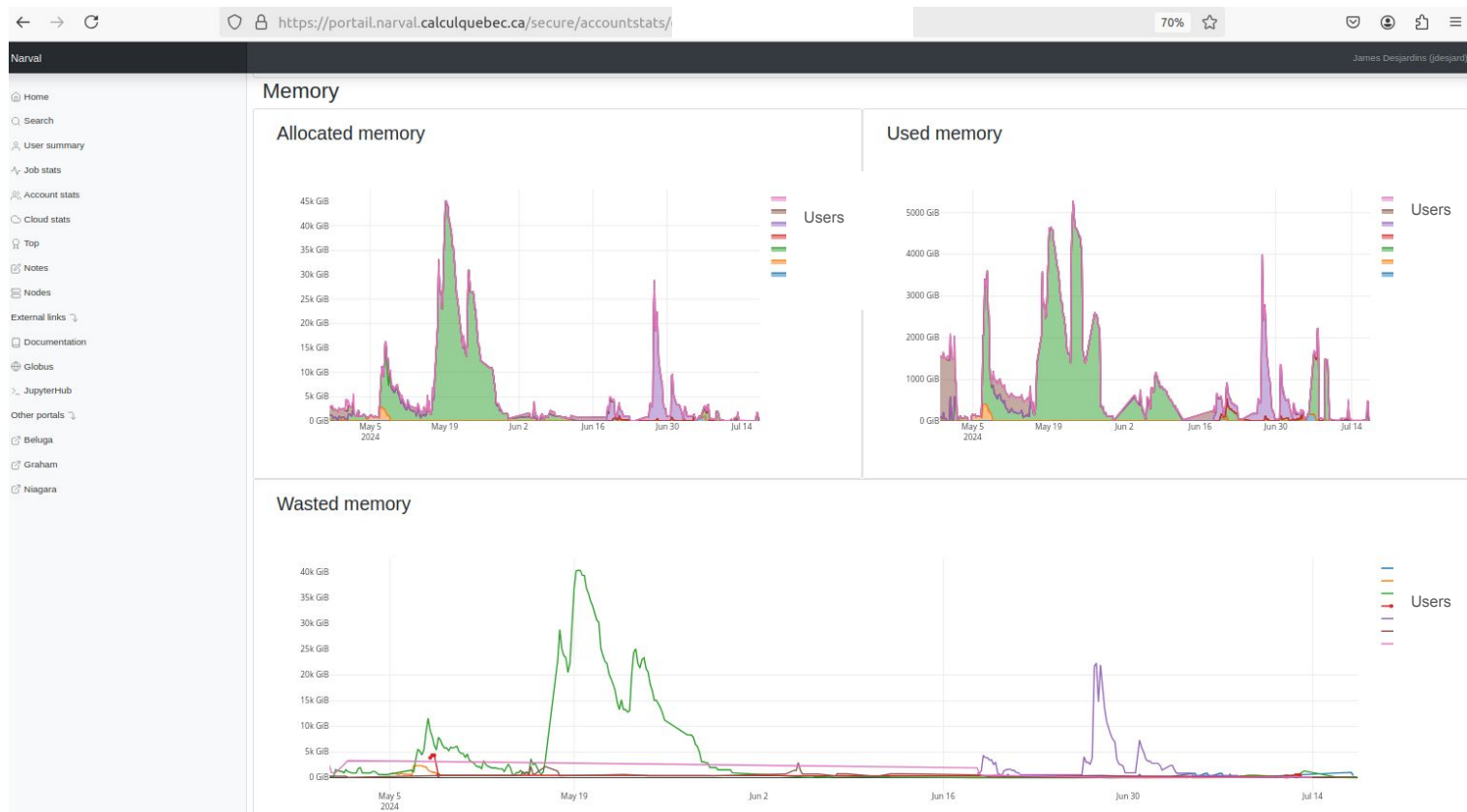
# Exploring job resource usage at portail.narval.calculquebec.ca



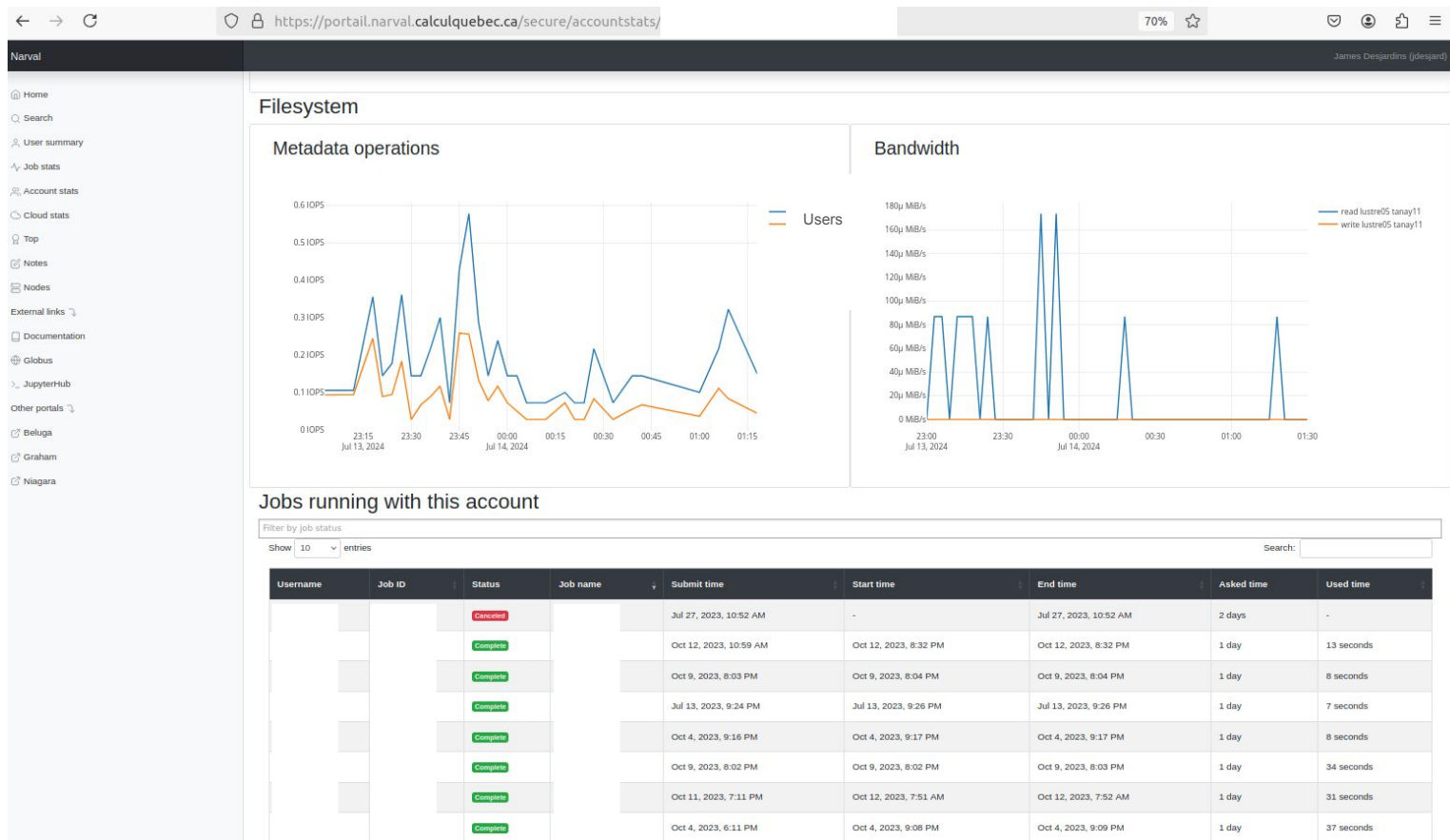
# Exploring job resource usage at [portail.narval.calculquebec.ca](https://portail.narval.calculquebec.ca)



# Exploring job resource usage at portail.narval.calculquebec.ca



# Exploring job resource usage at portail.narval.calculquebec.ca



# Demonstration and discussion