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

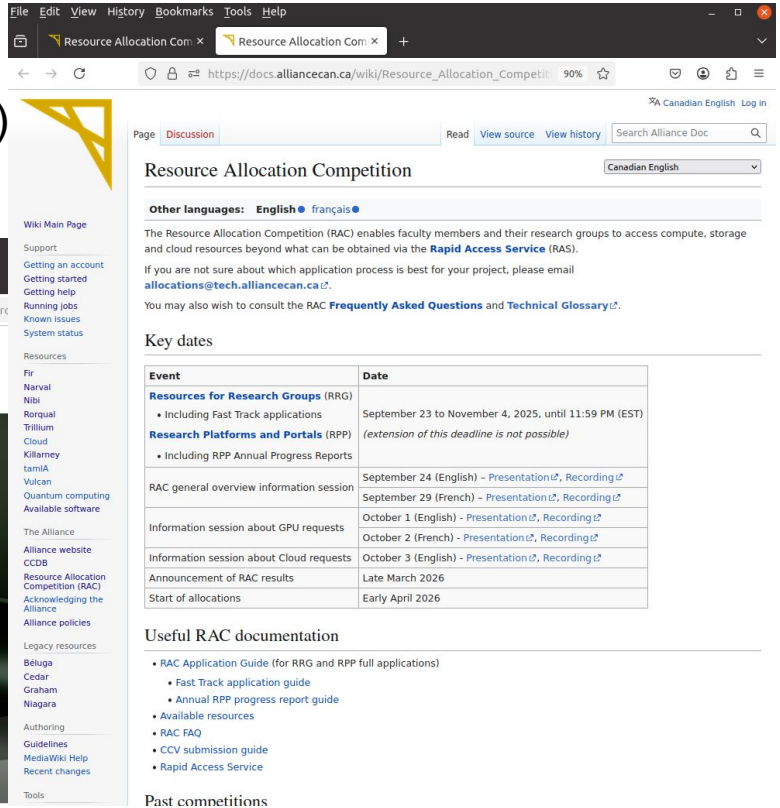
James Desjardins
SHARCNet, October 22nd, 2025

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
- 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)."

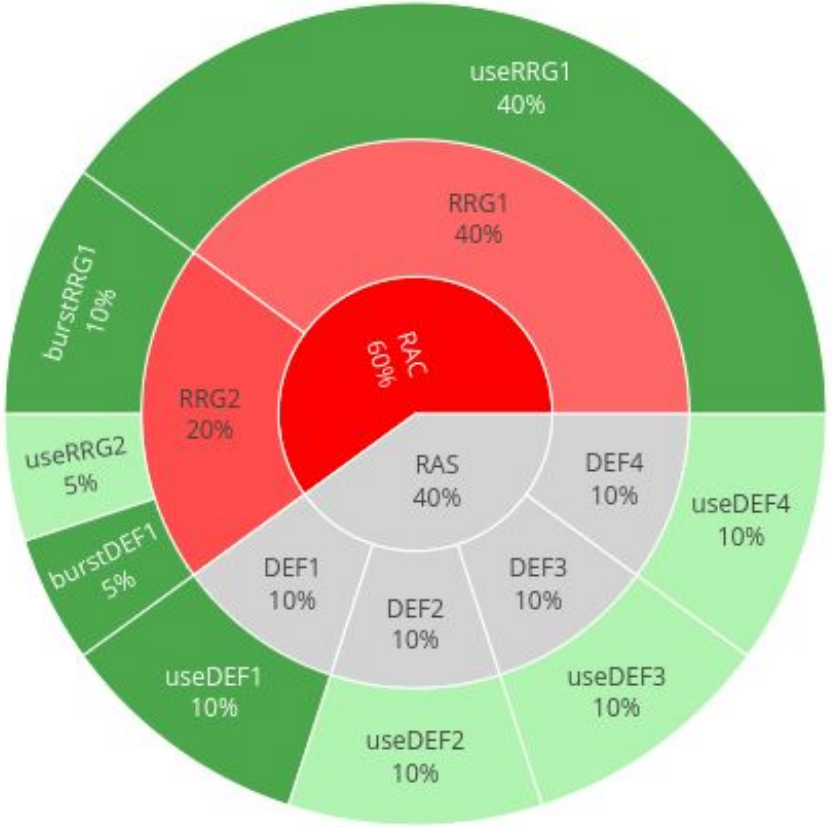


The relationship between Capacity, Allocations and utilization

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.

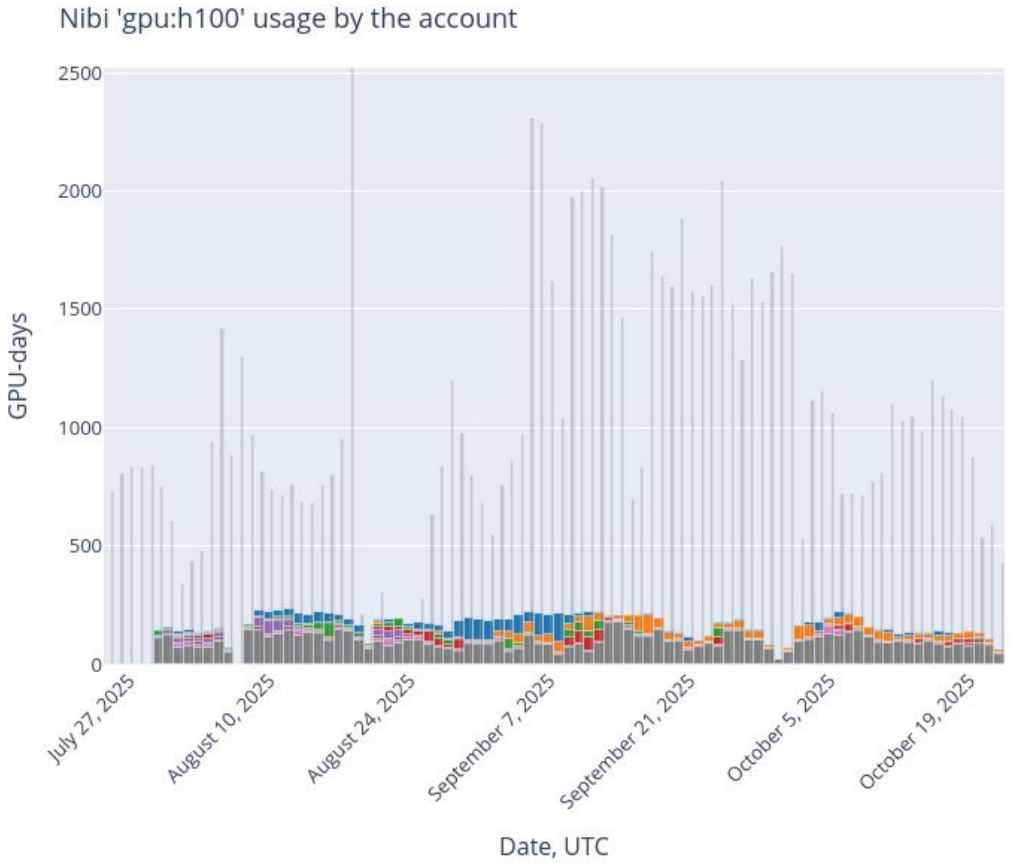
Utilization is the consumption of the resources by groups.



The queue state and compute capacity saturation

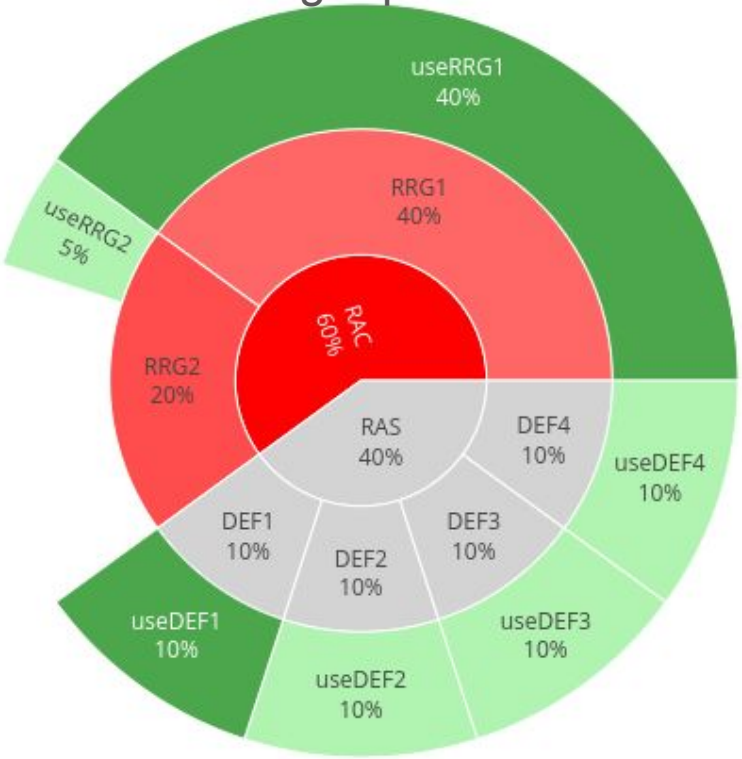
The cluster compute capacities are in constant high demand.

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

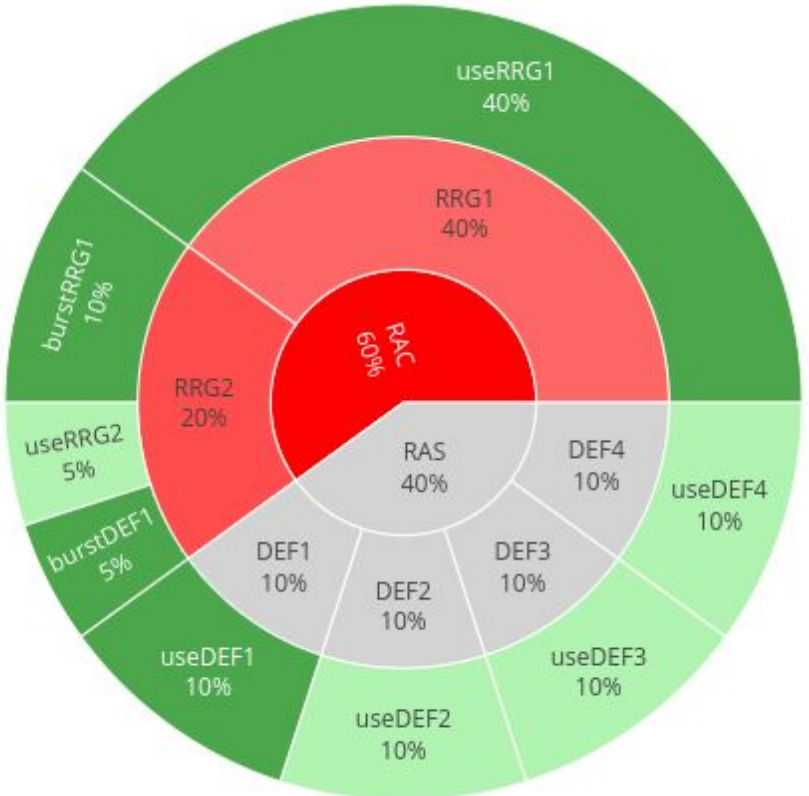


Difference between allocating storage vs compute

Storage quotas



Compute target share



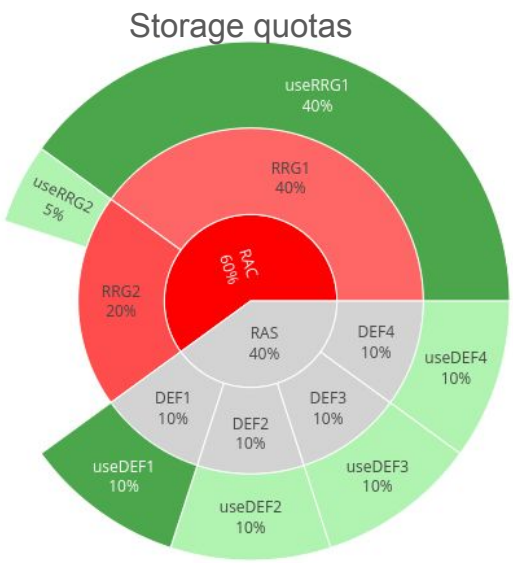
The difference between RAS and RAC allocated resources?

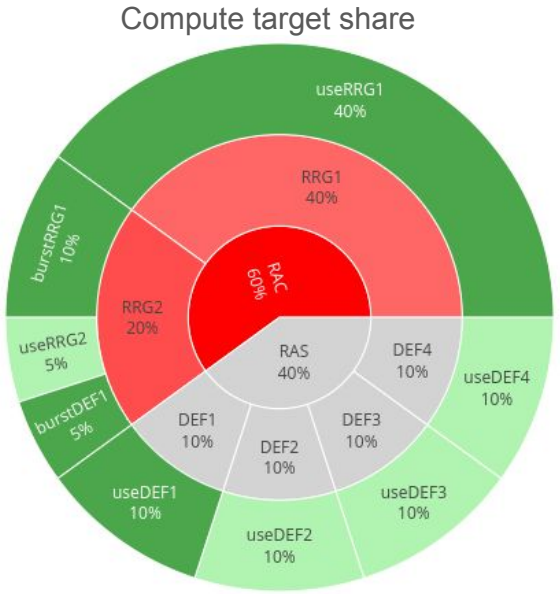
Both RAS and RAC take the form of quotas and target shares.

RAS are limited in size.

RAC allocations have an application process.

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

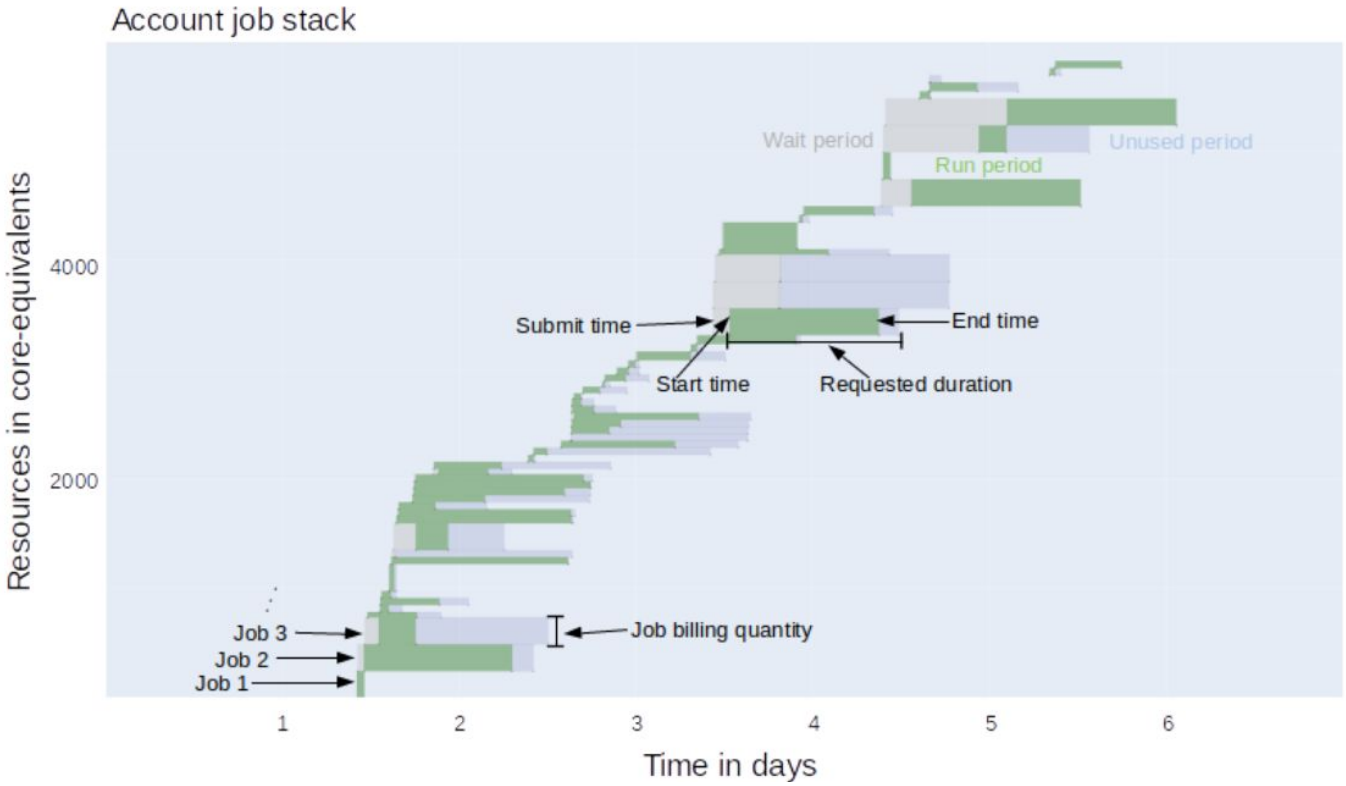




Calculating the usage of compute resources

Job shape and the measurement of resource consumption.

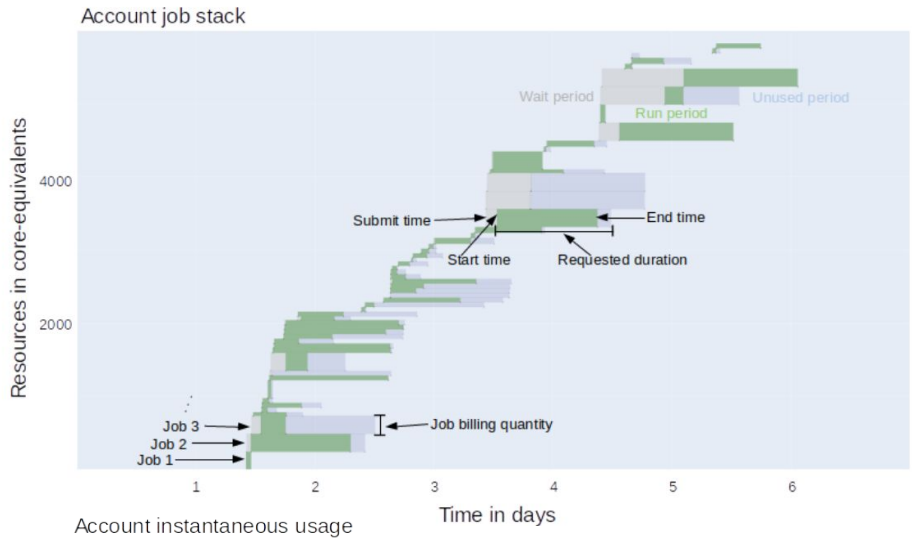
Jobs can be visualized as multi-dimensional rectangles.
In this case time and billing units.

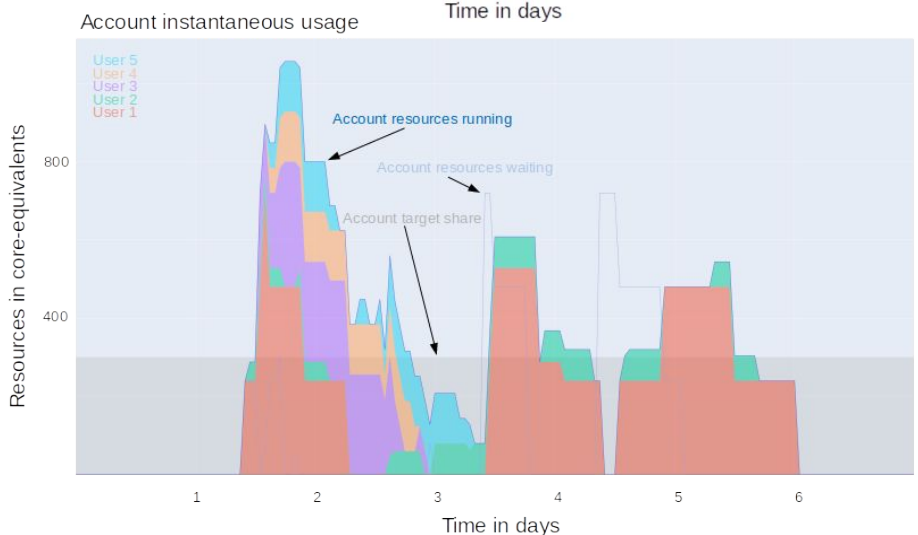


Summing the billing units at each time point across all jobs provides a time series of resource consumption.

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

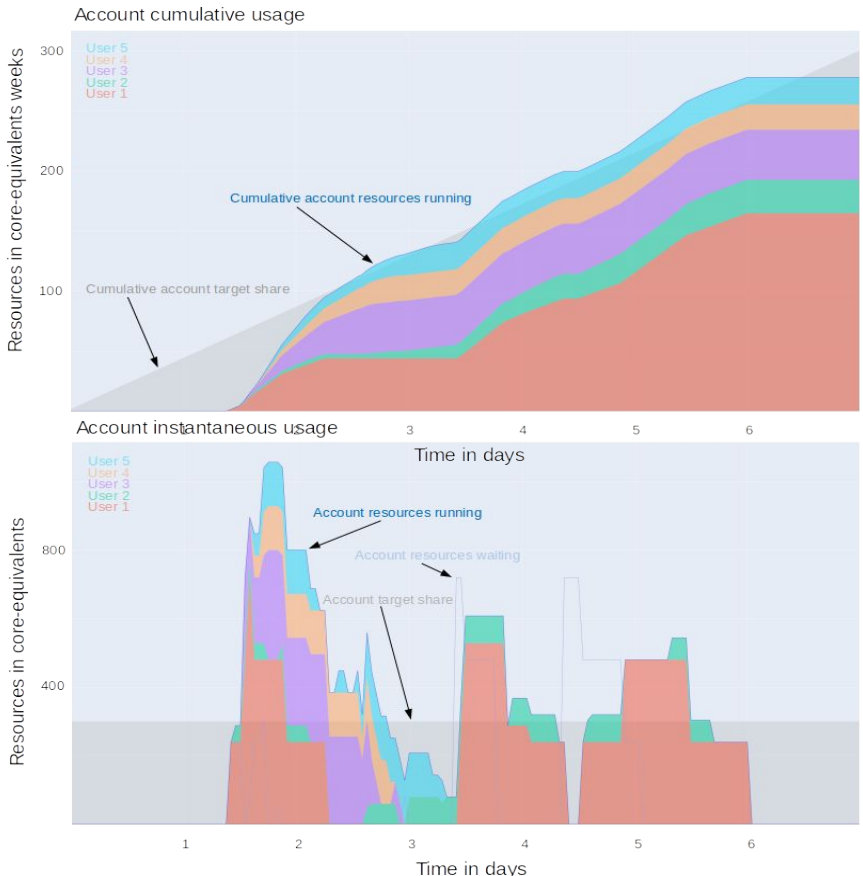
These metrics can then be compared to the account's target share to determined states like expect wait times.





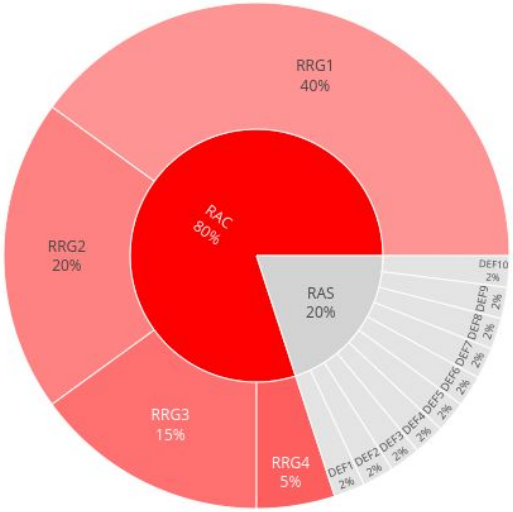
Comparing compute usage to the target share of an account

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.

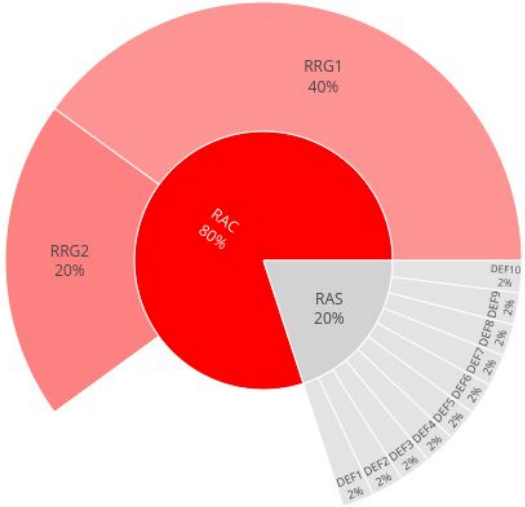


The dynamic state of compute target shares and usage

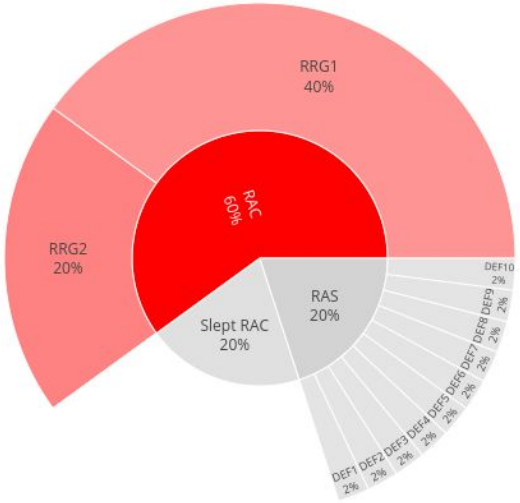
The sum of target shares is equal to the compute resource capacity.



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

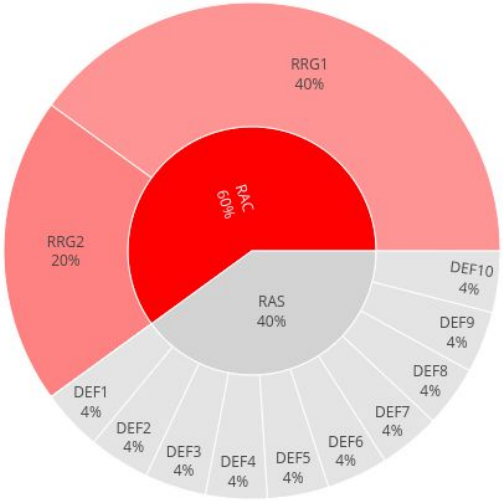


Idle RAC allocations enter a state referred to as “Slept RAC”.

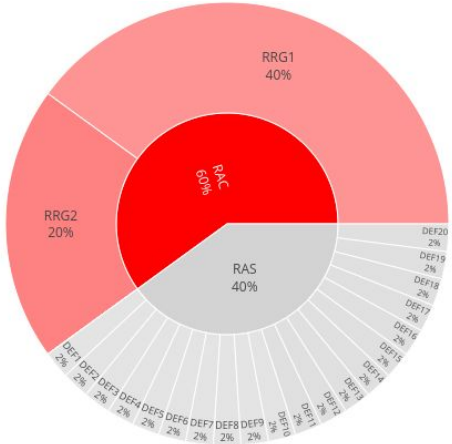


The dynamic state of compute target shares and usage

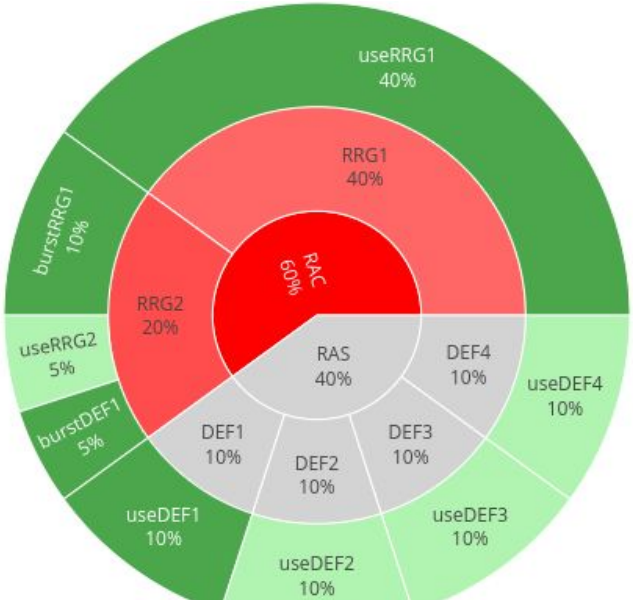
Slept RAC shares are passed to the RAS pool to be equally divided among active default RAS accounts.



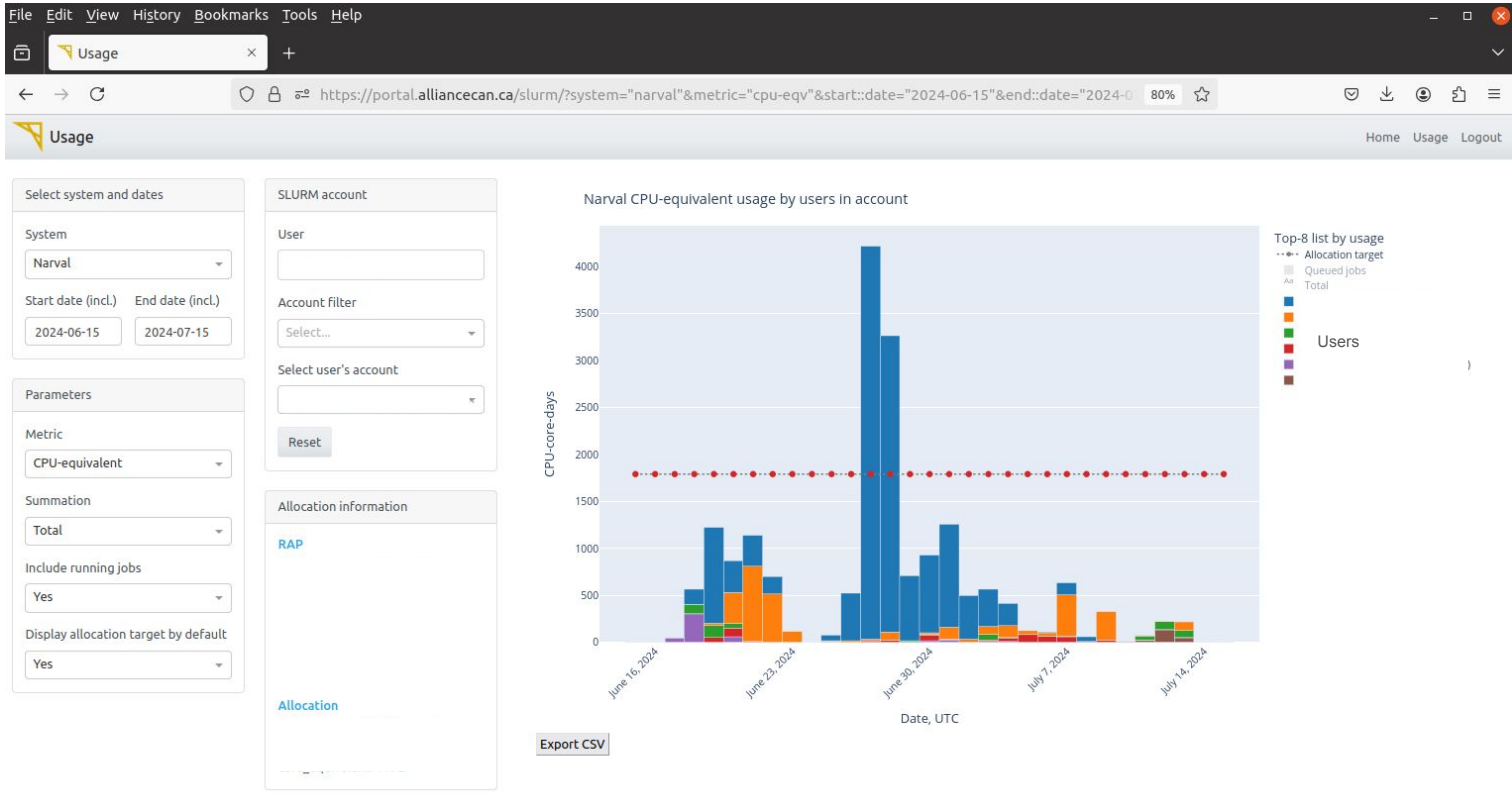
RAS compute target shares vary in size based on the size of Slept RAC shares and the number of active RAS accounts.



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



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



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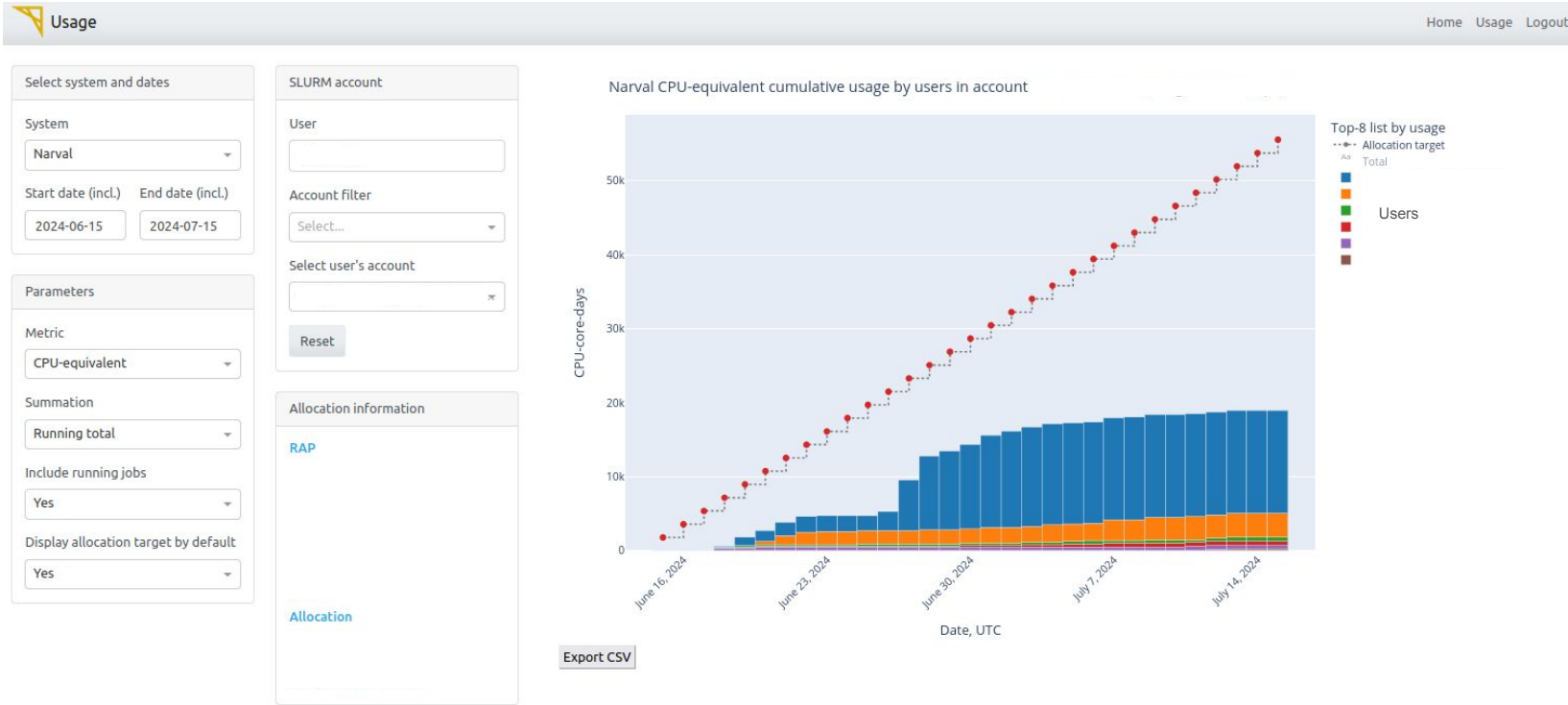

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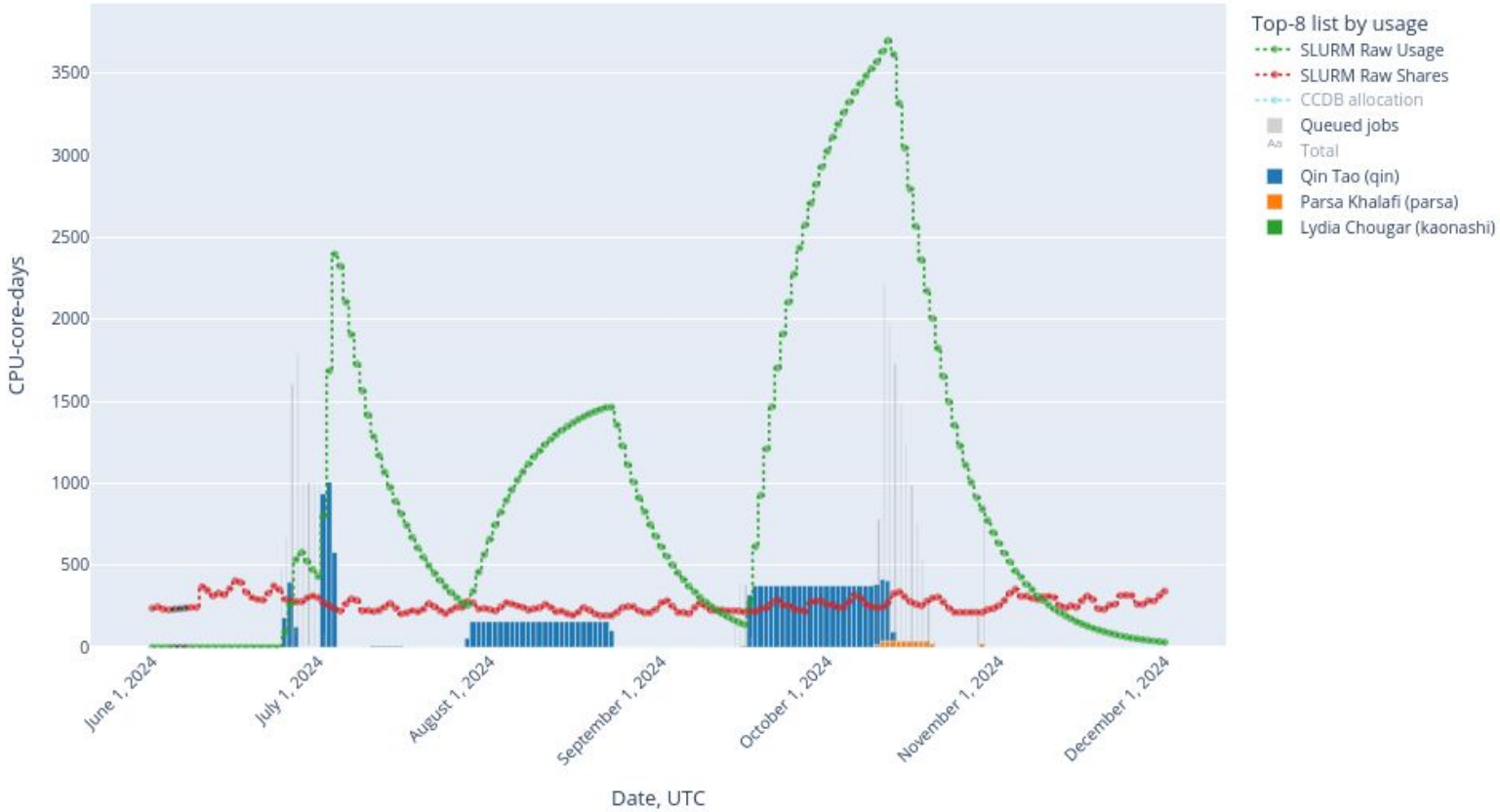
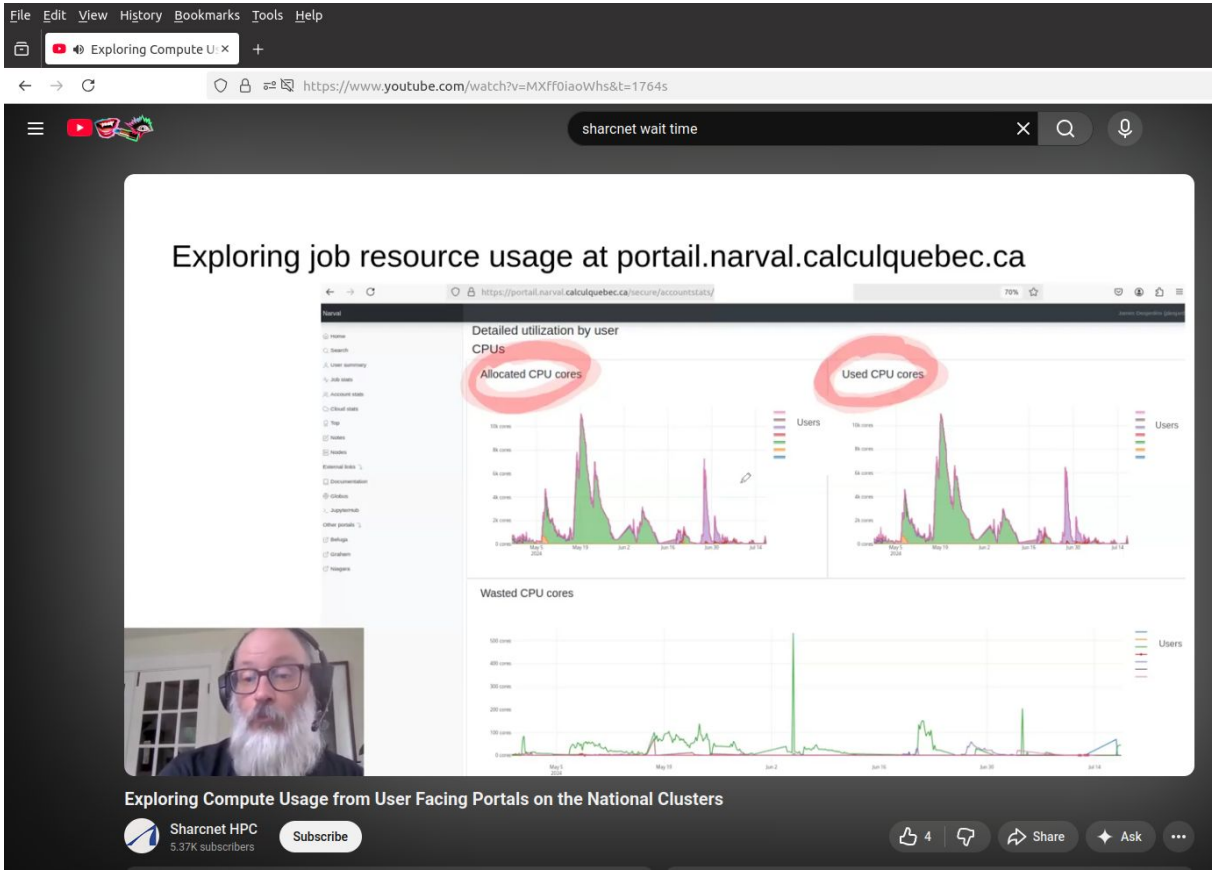


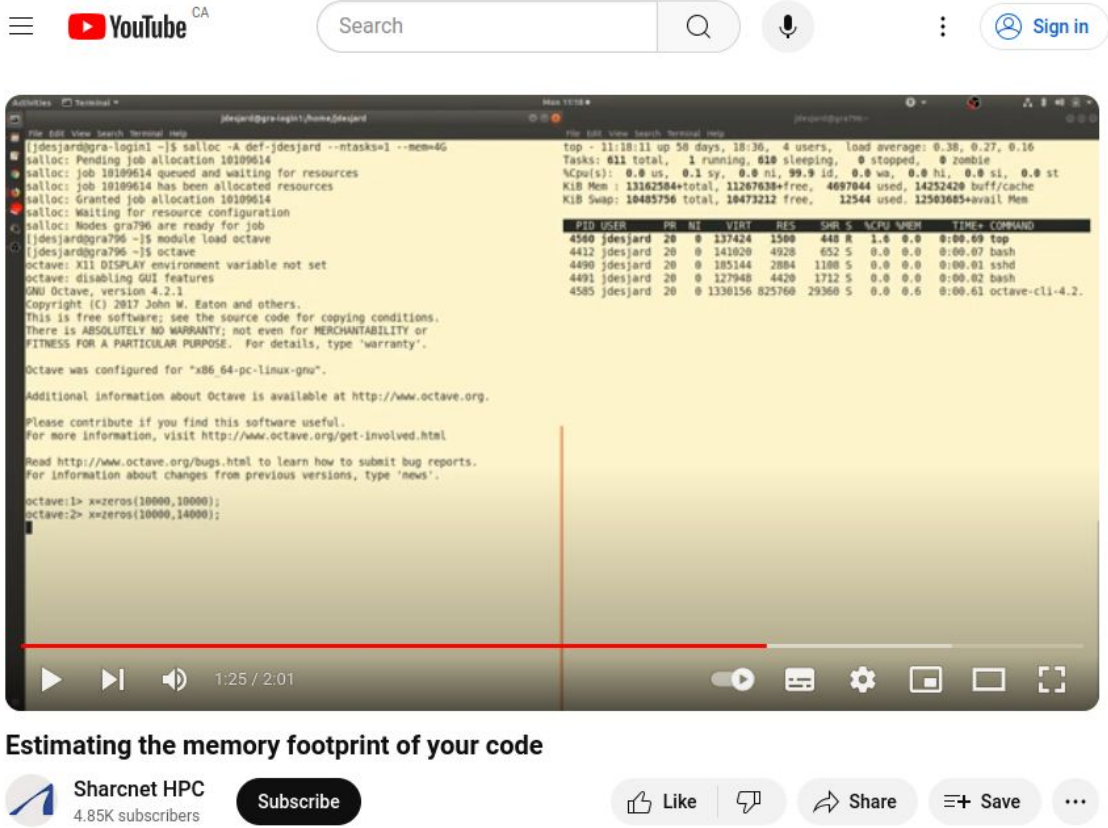
Previous presentations on this topic

Exploring Compute Usage from User Facing Portals on the National Clusters



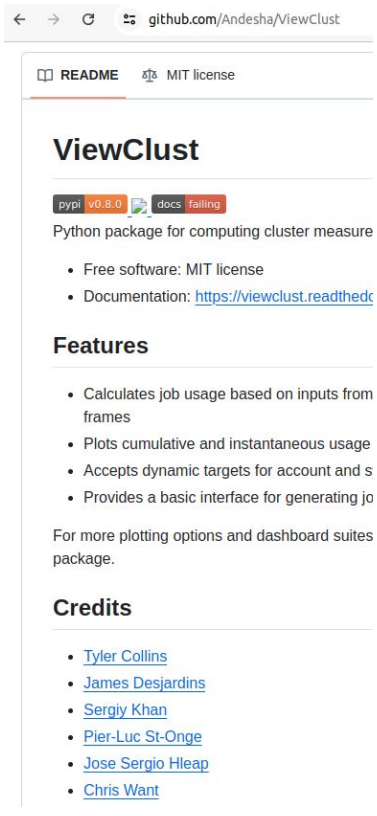
Previous presentations on this topic

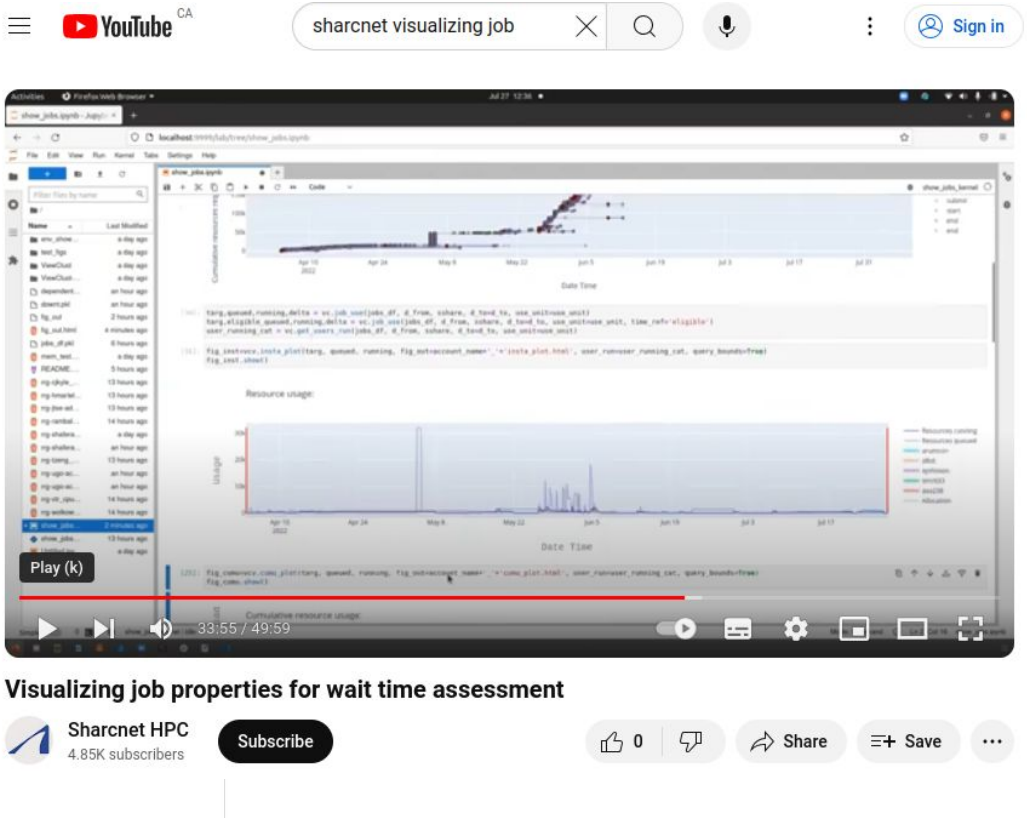
Estimating the memory usage of a process within an interactive job allocation using top.



Previous presentations on this topic

Exploring job properties with the ViewClust Python package



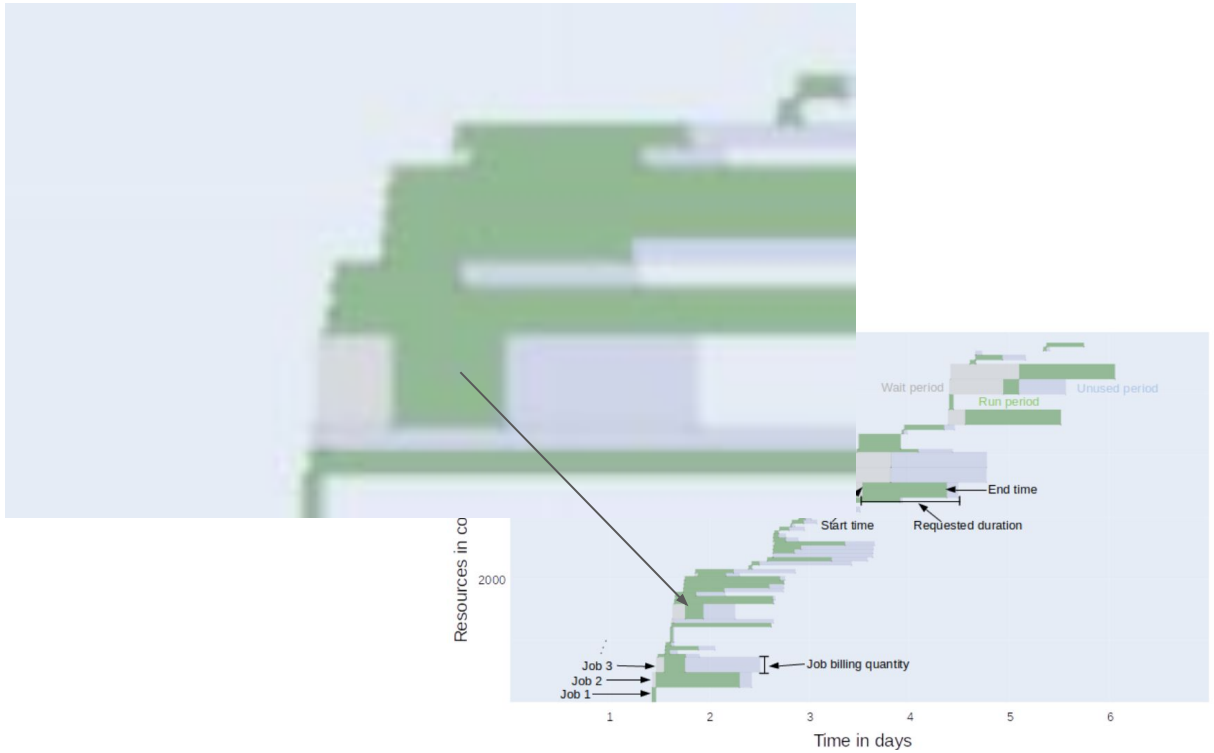


Thank you!

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.



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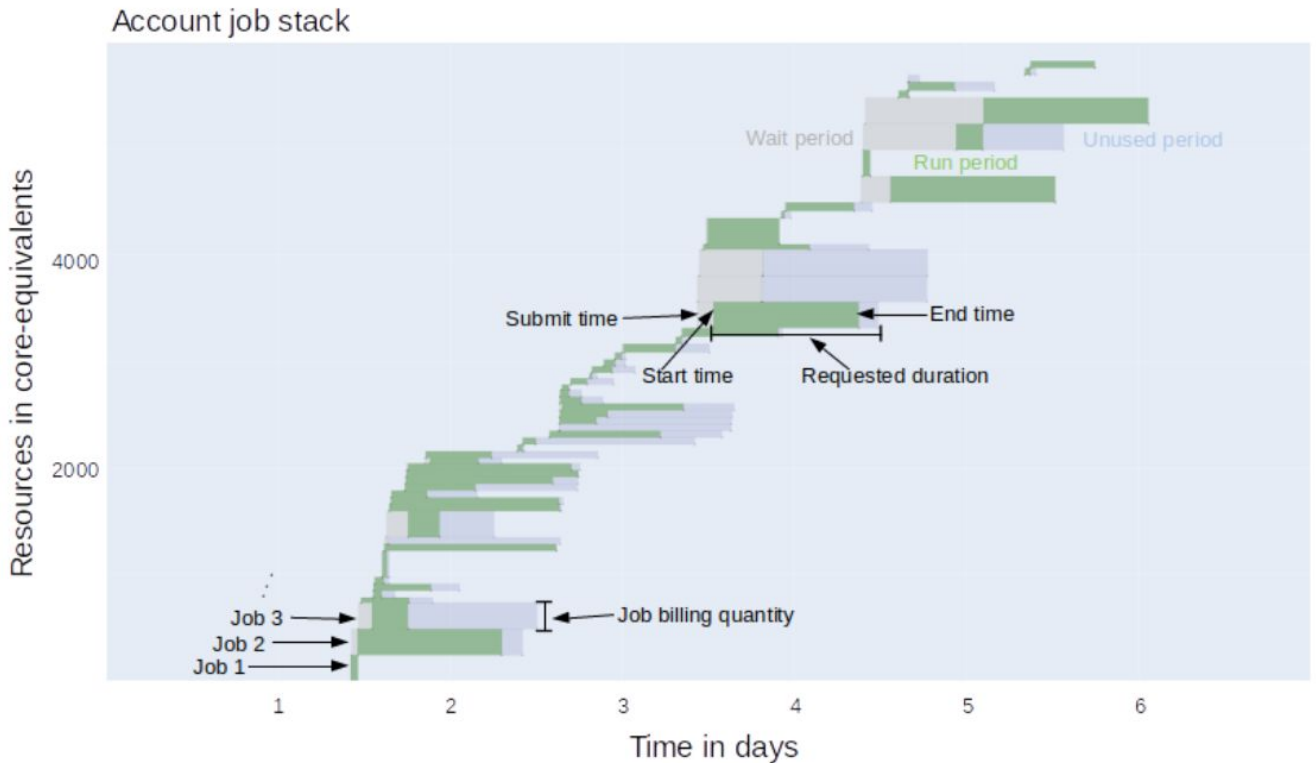

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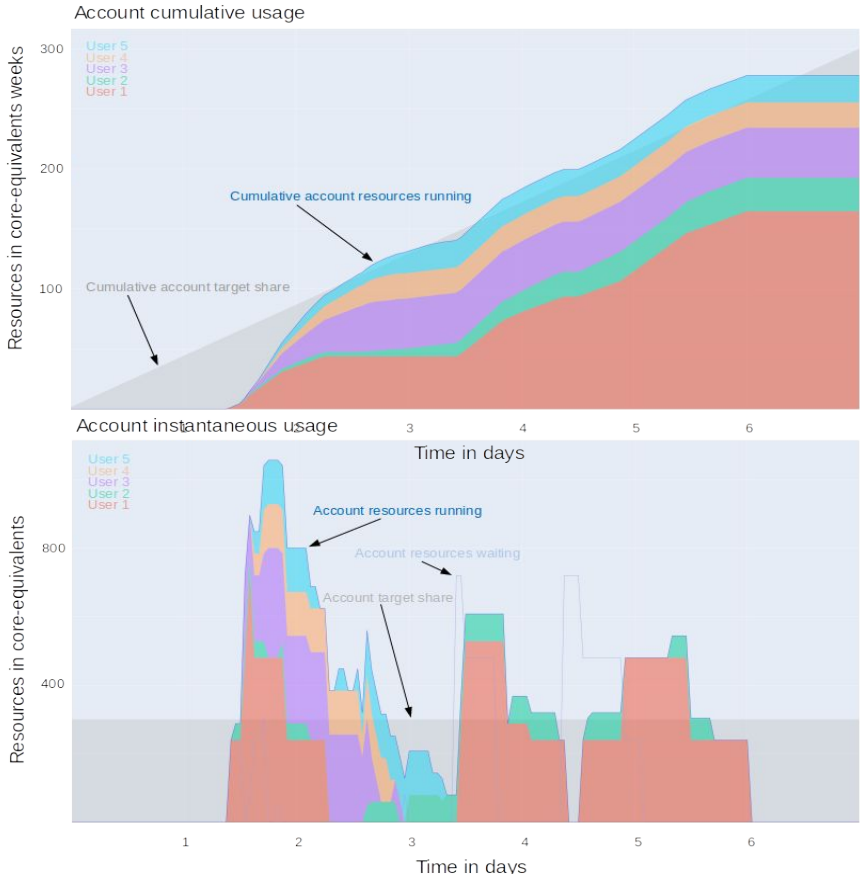
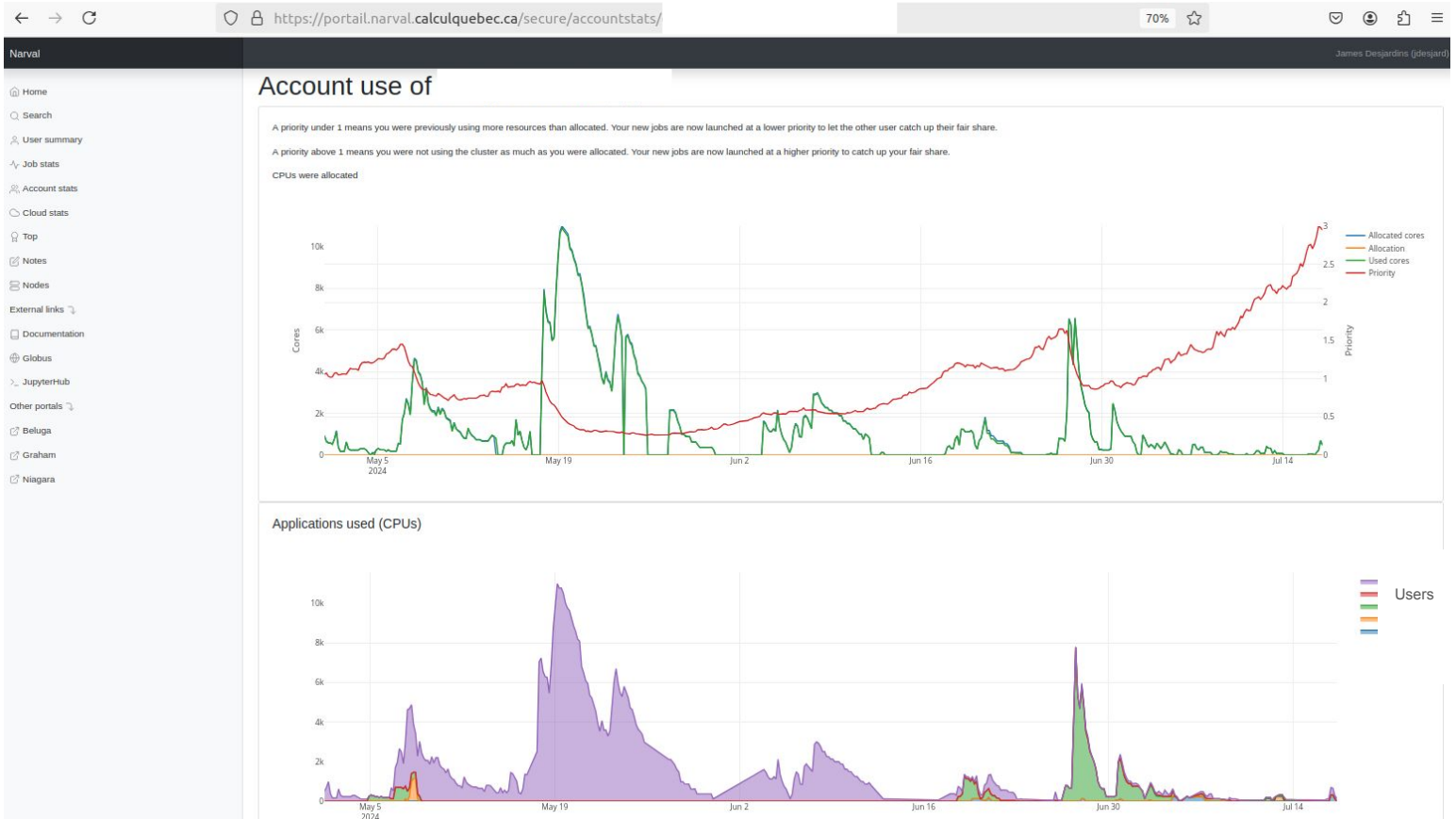


Exploring job resource usage at portail.narval.calculquebec.ca



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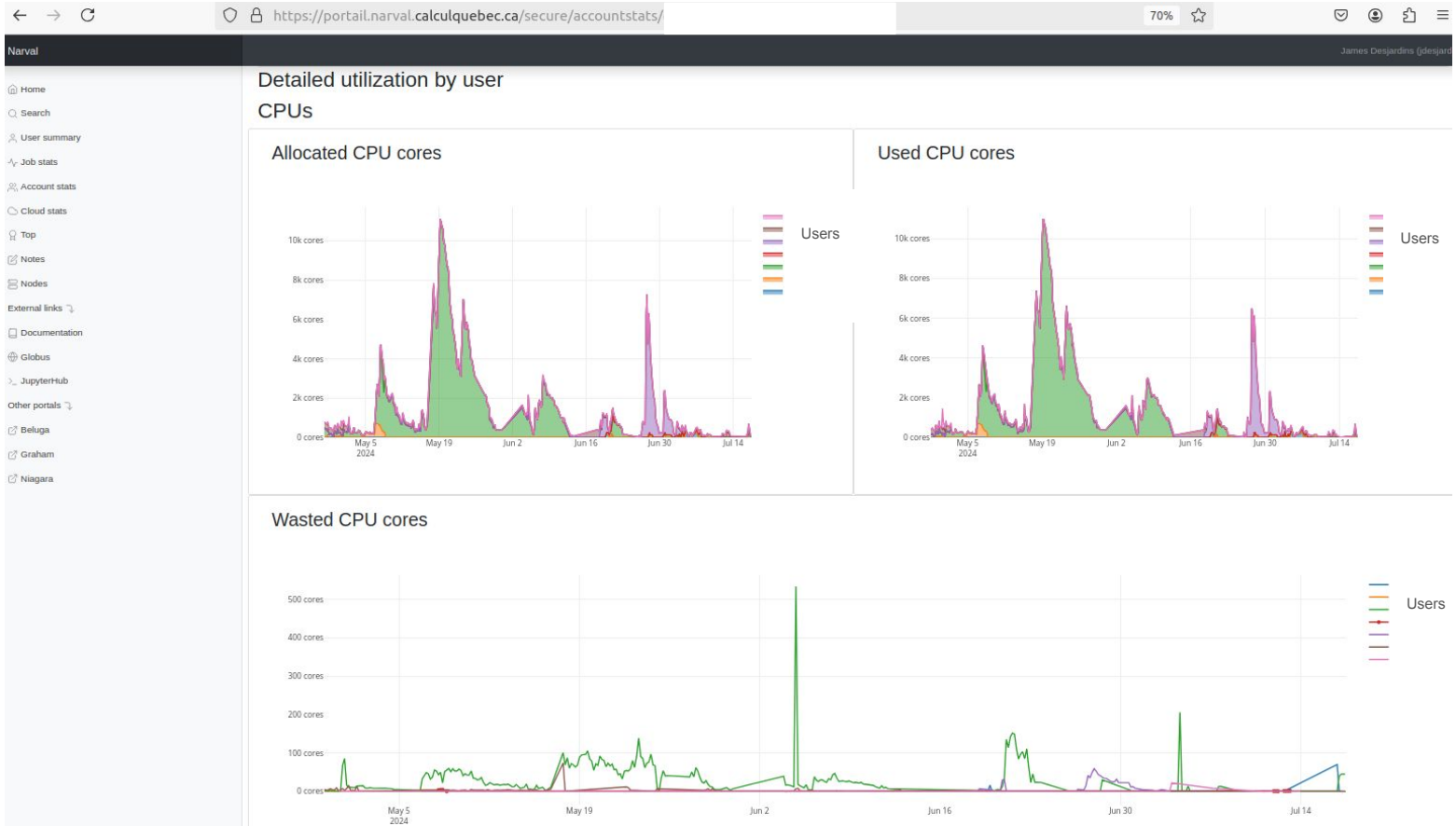

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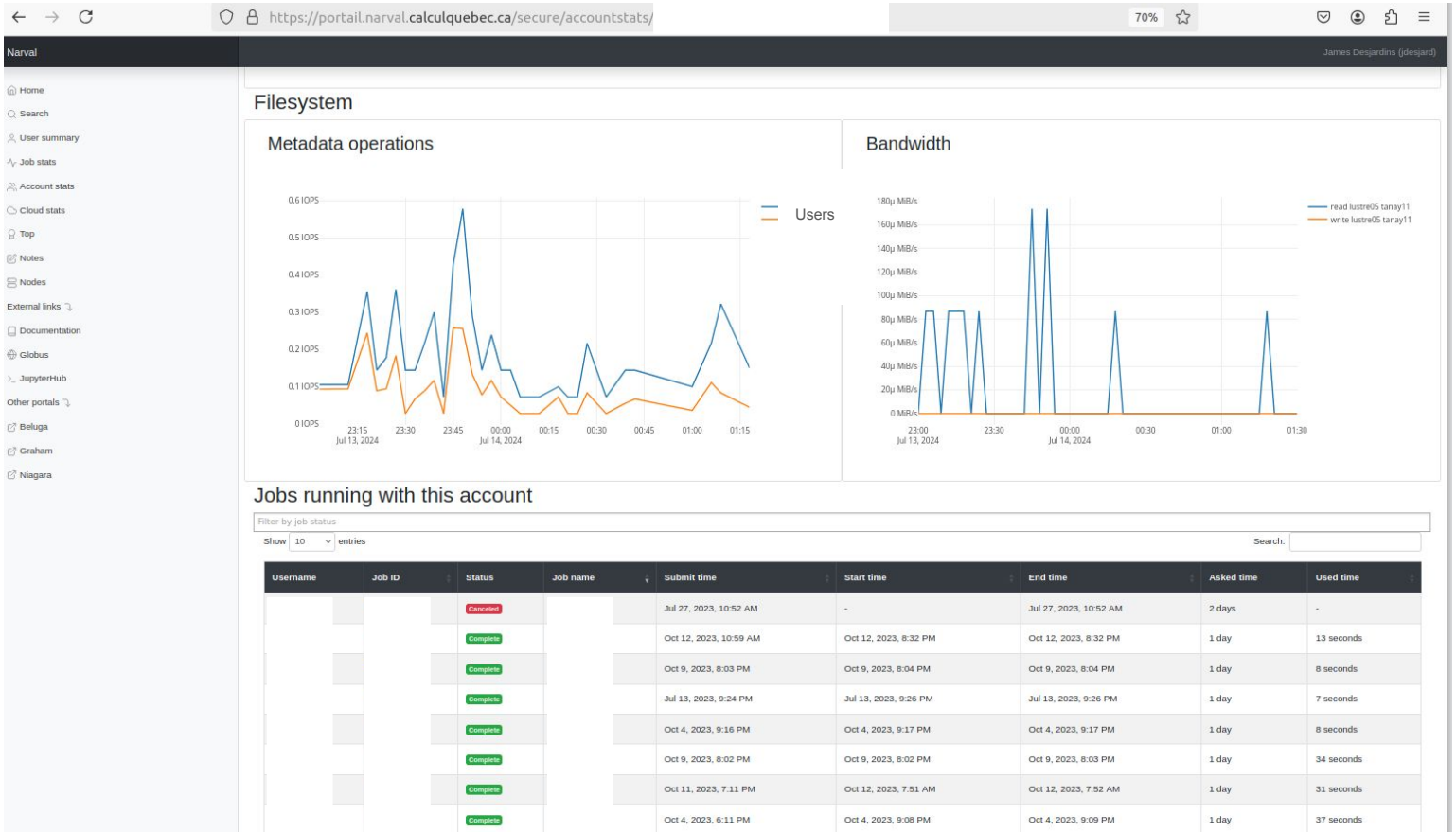

Demonstration and discussion