

National Aeronautics and Space Administration

Cloud Computing

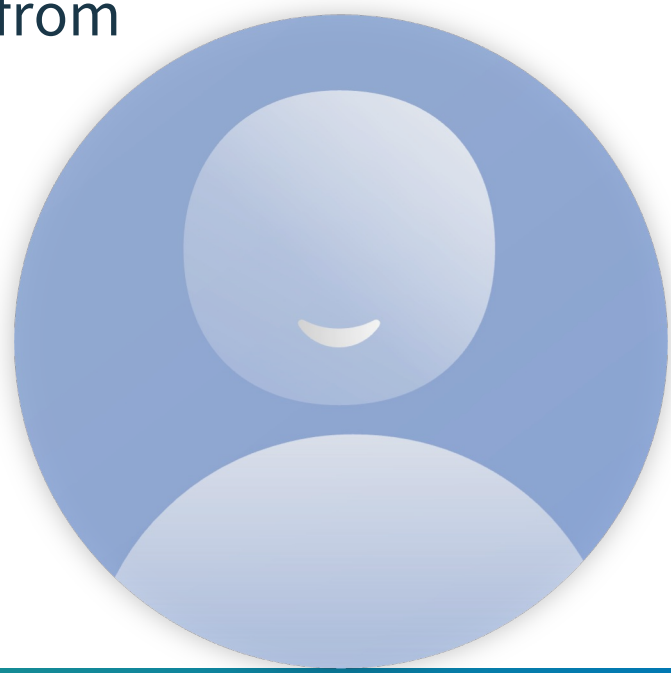
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A NAS-like computing environment in the cloud

- Moderate security plan in Amazon Web Services (AWS).
- The ability to run PBS batch and interactive jobs.
- Virtual GUI desktop (DCV client) for in-cloud GPU-accelerated visualization.
- Submit from cloud front ends, as well as the option to do a qsub from NAS to run in the cloud.
- Able to do high speed data transfer from NAS into the cloud.
- With user directives, PBS can do most of the heavy lifting of data transfer. To/from on-premises environment, as well as S3.
- Detailed cost tracking and spending guardrails.
- Bring your own funding or apply for NAS funding.
- Little to no waiting in the queue, but at a cost.



Cloud support and how to apply for access

- The NAS cloud team is available to help you transition your workflow!
- Software packages available in a project's cloud environment is configurable.
- OS in the cloud is not configurable. Agency rules limit our current offerings to Redhat version 8 only, but we strive to be binary compatible to on-prem environment.
- To apply for access:
  - The RMS application process is used, just like for NAS SBU allocations.
  - Ask for HECC commercial cloud in RMS.
  - The PI can specify a project supplied WBS or apply for NAS funding.
  - For NAS funding the approval process is done by NAS.



How to start a front-end and PBS job

```
dallas:heistand% ssh infrastructuresfeuse2-piv aws_fe --hour 4 --arch intel --jupyterlab
Enter PIN for 'PIV_II':
Starting front end instance. When started you will receive an email with login instructions

dallas:heistand% ssh infrastructuresfeuse2 aws_fe --list
There are 1 jobs, 0 queued and 1 running

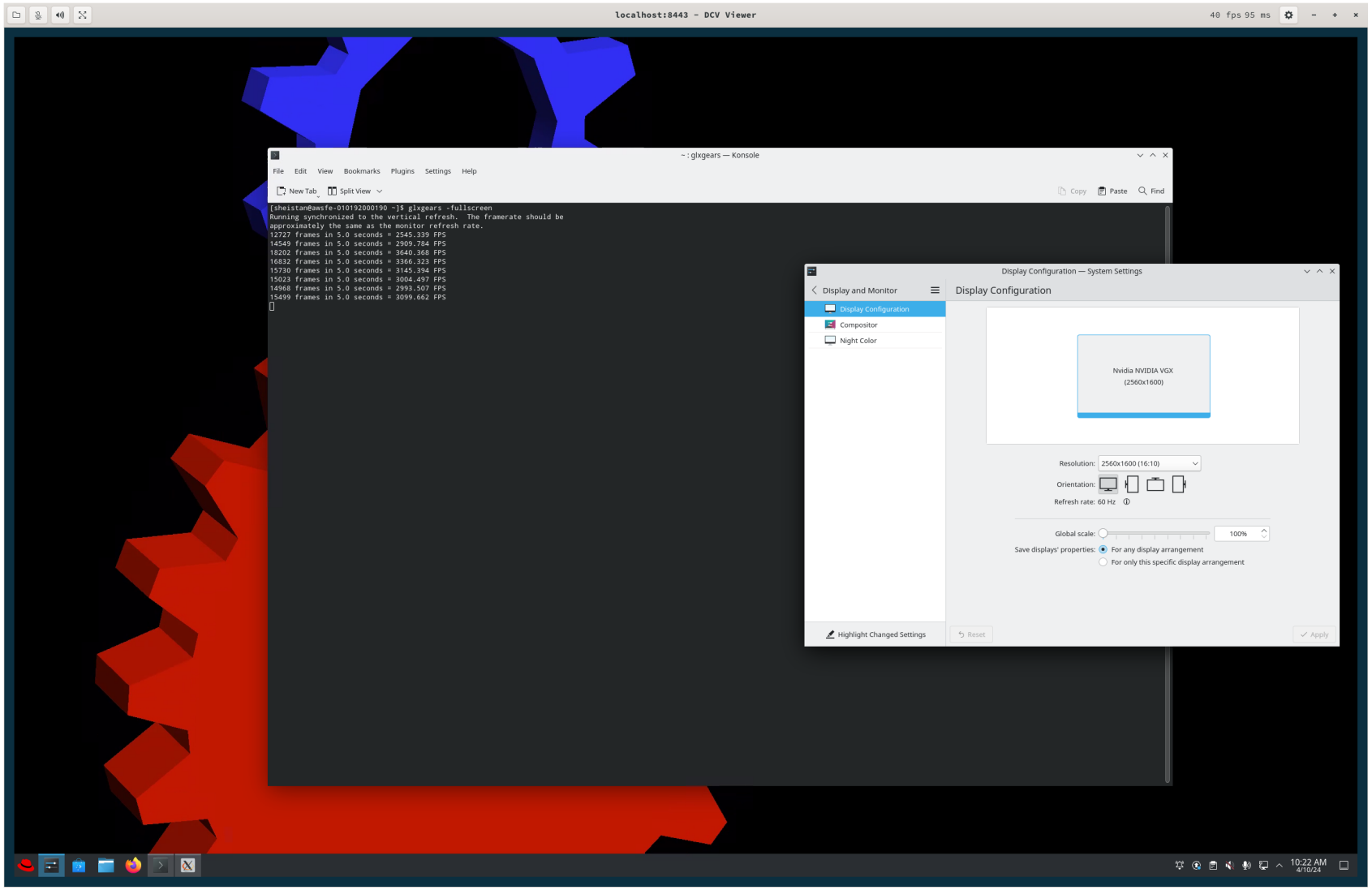
Job 571 is a front end running at internal IP 10.192.1.167
dallas:heistand% ssh -L 8888:localhost:8888 10.192.1.167
Last login: Fri Apr 12 07:01:19 2024
This system is not for the processing or storage of moderate/ITAR/EAR99 data.
[sheistan@awsfe-010192001167 ~]$ qsub -I -l select=2:mpiprocs=2:mem=64:container=podman:arch=intel,walltime=1:0:0
qsub: waiting for job 572.infrastructurepbsuse2.nas.nasa.gov to start
qsub: job 572.infrastructurepbsuse2.nas.nasa.gov ready

[sheistan@compute-010194119002 ~]$ df
Filesystem                                              1K-blocks     Used        Available Use% Mounted on
devtmpfs                                                 65426868        0         65426868   0% /dev
tmpfs                                                    65469292        0         65469292   0% /dev/shm
tmpfs                                                    65469292    17044         65452248   1% /run
/dev/nvme0n1p3                                           33337324  8050376         25286948  25% /
/dev/nvme1n1                                              8378368   569172          7809196   7% /var
/dev/nvme0n1p2                                             204580        8           204572   1% /boot/efi
/dev/nvme2n1                                             33544192   269096         33275096   1% /tmp
/dev/nvme3n1                                            115178108   836076        114342032   1% /data
127.0.0.1:/                                          9007199254739968   380928 9007199254359040   1% /u
127.0.0.1:/                                          9007199254739968        0 9007199254739968   0% /nobackup
127.0.0.1:/                                          9007199254739968 22374400 9007199232365568   1% /nasa
fs-0f22d1bf82daf7e84.fsx.us-east-2.amazonaws.com:/fsx        67108864    10240         67098624   1% /containers
tmpfs                                                    13093856        0         13093856   0% /run/user/1100
[sheistan@compute-010194119002 ~]$ exit
logout

qsub: job 572.infrastructurepbsuse2.nas.nasa.gov completed
[sheistan@awsfe-010192001167 ~]$ qdel $PBS_JOBID
[sheistan@awsfe-010192001167 ~]$ exit
logout
dallas:heistand%
```



DCV GUI login example



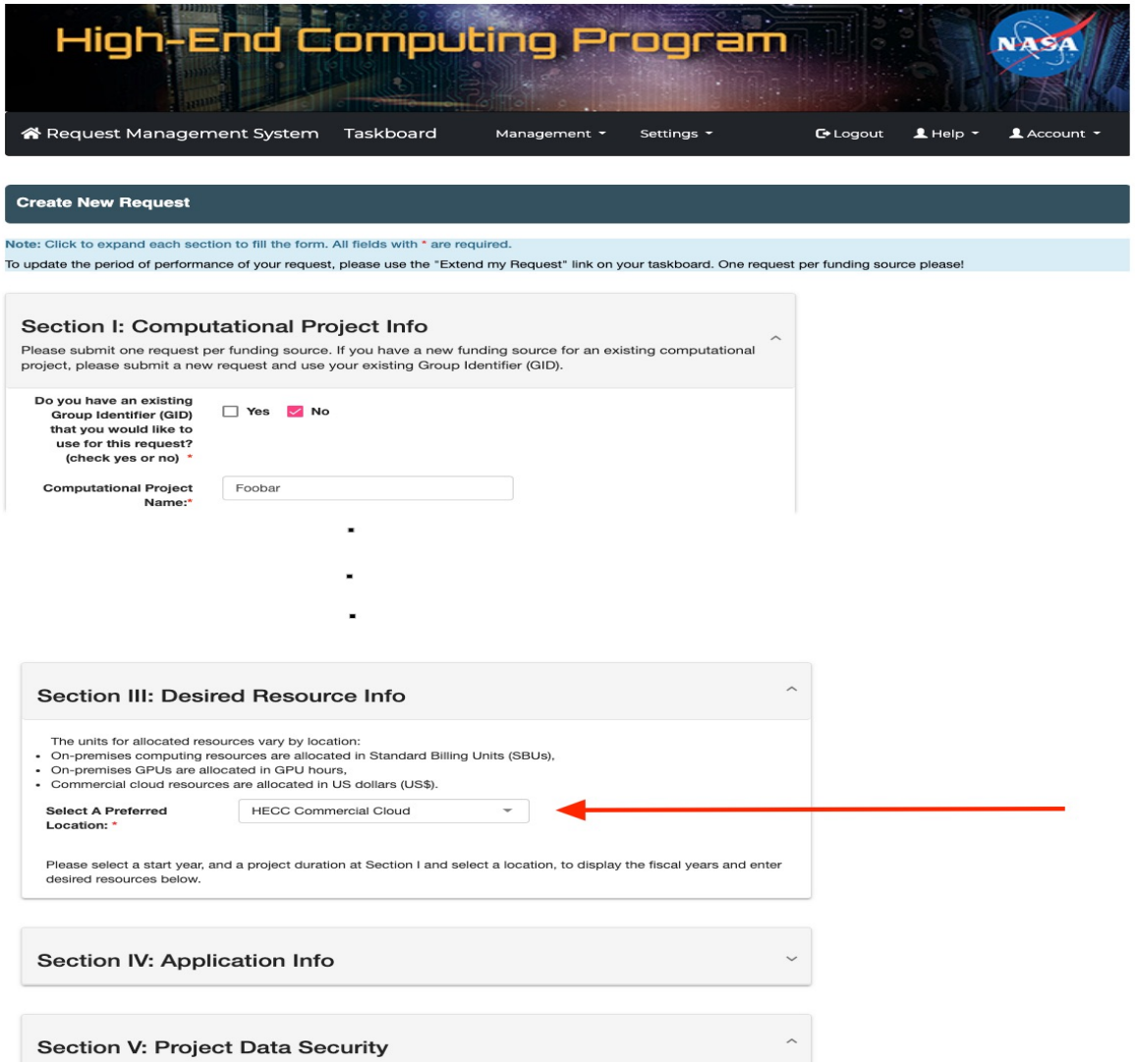


Bringing the cloud to our on-prem environment

- The cloud team is also trying to bring cloud-like features to the HECC environment.
  - Normal PBS jobs running on-prem can “automagically” cache S3 objects locally before the job starts. User specified PBS directives trigger this.
- Need access to AWS services for on-prem jobs?
  - We are starting to offer select AWS services available to users running on NAS machines.
  - SQS and RDS currently being offered. More applicable services will be added as requests come in.



How to select AWS cloud in RMS





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Ideas?
Questions?
Suggestions?

We want to hear from you!
support@nas.nasa.gov
1 (800)-331-8737

