



PERVASIVE TECHNOLOGY INSTITUTE



UNIVERSITY INFORMATION TECHNOLOGY SERVICES
RESEARCH TECHNOLOGIES

Jetstream2

Jetstream2:

Accelerating cloud computing via Jetstream

Jeremy Fischer – Indiana University

Research Cloud Infrastructure Manager

CARCC Emerging Centers Call

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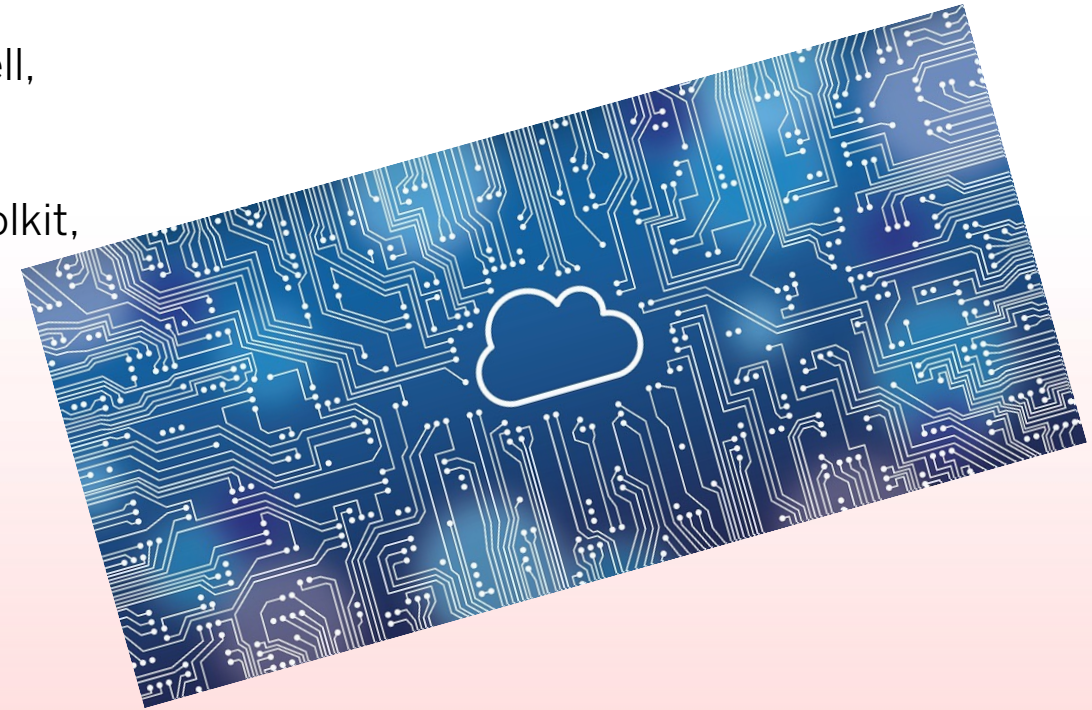
About Jetstream2

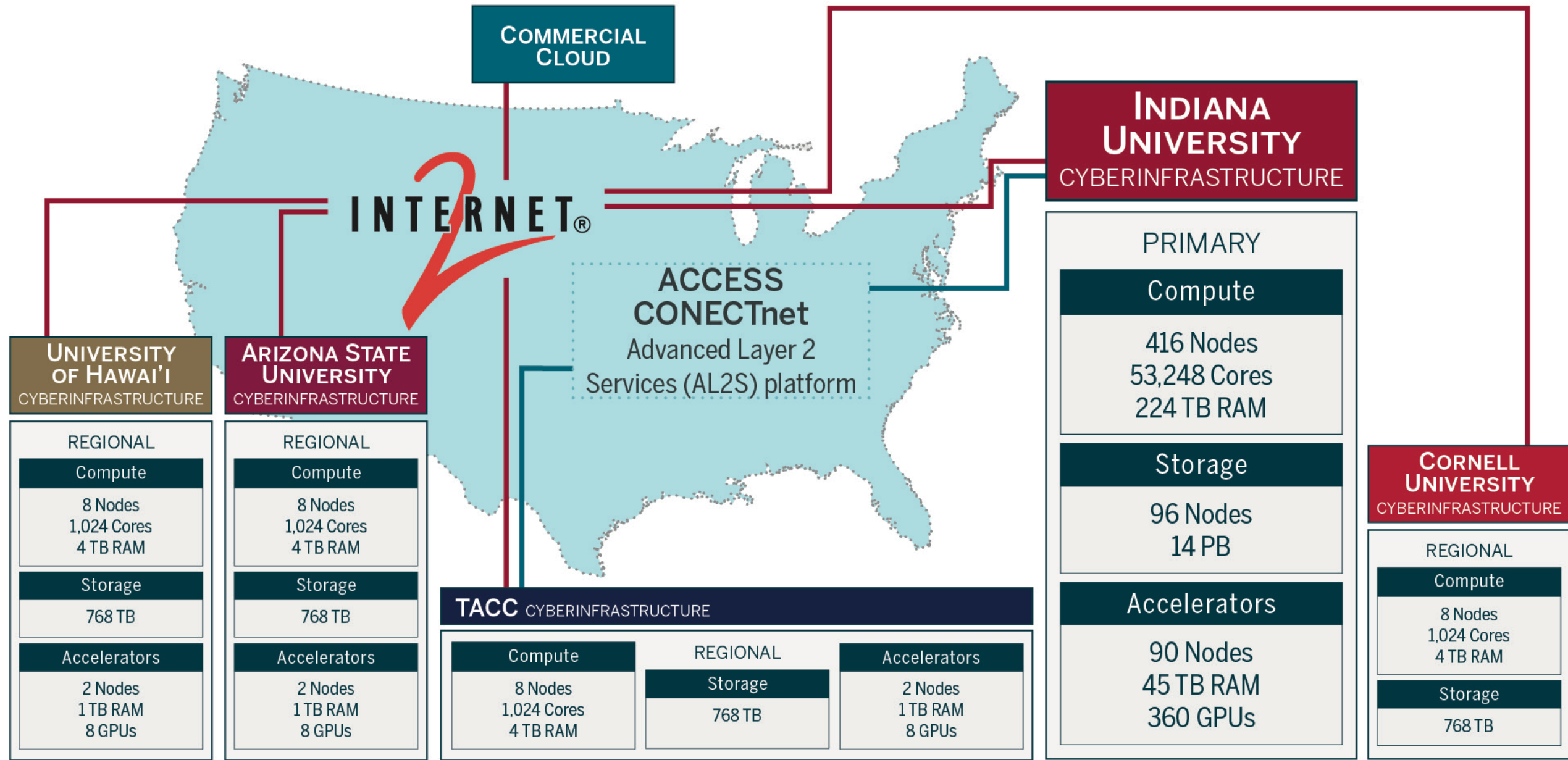
- NSF-funded production cloud environment
- Ease-of-use focus, rapid on-ramp to ACCESS (allocated ONLY via ACCESS)
- **On-demand** interactive computing and persistent services for science gateways
- Enables configurable environments; *programmable cyberinfrastructure*
- Building on the success of Jetstream1
 - The 63 science gateways that utilized Jetstream indirectly supported over 183,197 people.
 - Six year of operations an overall availability of 98.54%, incl. planned and unplanned outages
 - An uptime of 99.9967% where the system was operating but at a reduced capacity



Jetstream2 Features

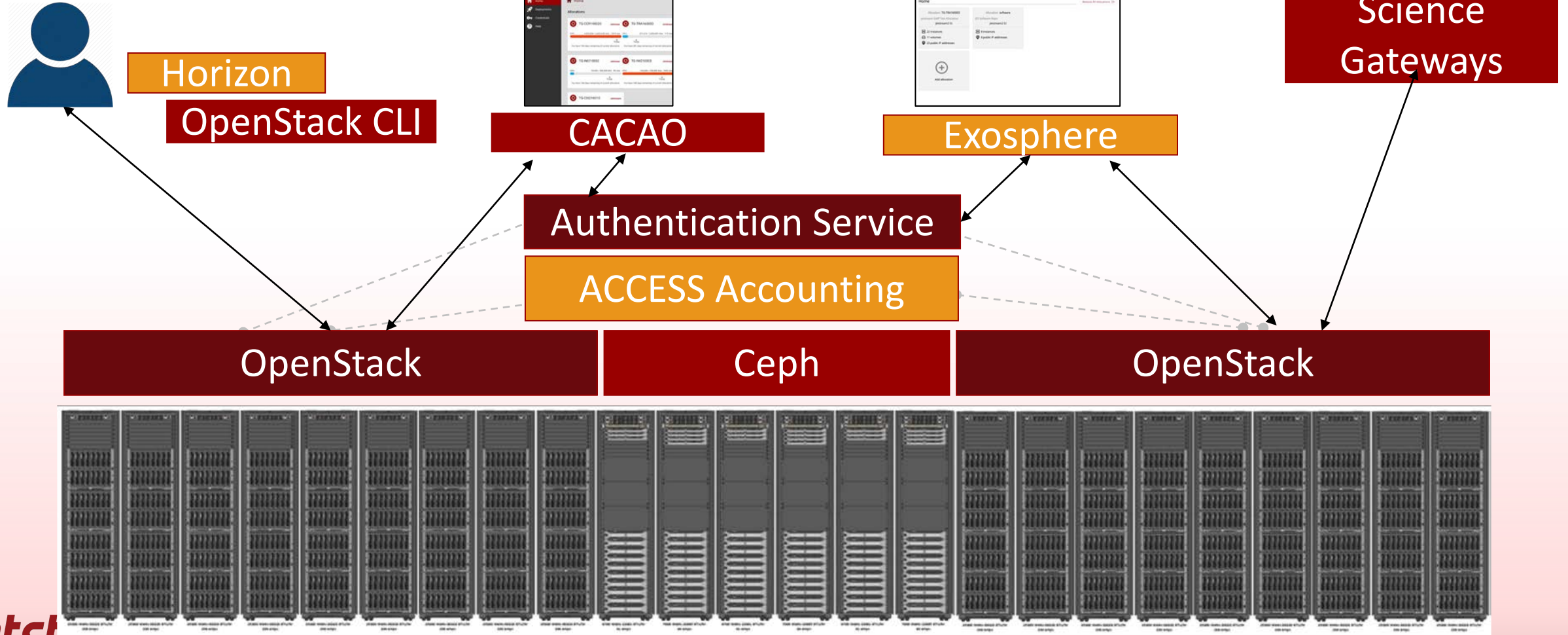
- Primary Cloud (IU)
 - 400 compute nodes -- AMD EPYC 3rd Generation Milan CPUs – 128 cores per node + 512gb RAM
 - 90 GPU nodes – 4 x NVIDIA A100 40gb per node
 - 32 Large Memory nodes with 1TB of RAM
- Regional Clouds available by invitation/request (Arizona State, Cornell, Hawaii, TACC)
- Shared application store with common applications (NVIDIA HPC Toolkit, multiple compilers, R/Rstudio, Matlab, Anaconda, etc)
- Federated JupyterHubs, Virtual Clusters, and orchestration are all available with features being added and refined
- Commitment to **>99%** uptime
 - **99.87% availability for 9-7-22 to 3-31-23** (last NSF reporting period)





Jetstream2

Platform Overview



Some sample use cases

- Science gateways
- Research-supporting infrastructure / Infrastructure as a service
- Education support – compute and desktops for courses, workshops, tutorials
- Domain science interactive compute
- Domain science long running compute
 - Small core counts, "pleasingly parallel", etc
- Jupyter notebooks and Hubs
- Research software development
- Machine learning – training and workflow development and data analysis
- [Your use case here]

A few key stats...

1,900

Users using Jetstream2
directly

170,000

Users using Jetstream2
via Science Gateway

74

Fields of science
represented on
Jetstream2

How do I access Jetstream2?



Home > Project TG-TRA160003

Jetstream2 IU - TG-TRA160003 (logged in as jfischer@xsede.org)

Remove Allocation [→] Create [v]

Allocation usage 0 of 1,000,000 SUs

Jetstream Staff Test Allocation

Instances

Instances used 10 of 100 total

No instances to preview and 10 more instances

Volumes

Volumes used 9 of 50 total

cmaaaaaaaaaart 10 GB
(Untitled volume) 20 GB
(Untitled volume) 20 GB

Public IP Addresses

Public IP Addresses used 11 of 50 total

149.165.159.21

```
Openstack Admin - IU -- -bash -- 94x26
(openstack5) [JS2 IU Admin] [Entropy] jeremy ~-->openstack flavor list
+-----+-----+-----+-----+-----+-----+-----+
| ID | Name      | RAM   | Disk | Ephemeral | VCPUs | Is Public |
+-----+-----+-----+-----+-----+-----+-----+
| 1  | m3.tiny   | 3072  | 20   | 0          | 1     | True      |
| 13 | g3.xl     | 128000| 60   | 0          | 32    | False     |
| 2  | m3.small  | 6144  | 20   | 0          | 2     | True      |
| 3  | m3.quad   | 15360 | 20   | 0          | 4     | True      |
| 4  | m3.medium | 30720 | 60   | 0          | 8     | True      |
| 5  | m3.large  | 61440 | 60   | 0          | 16    | True      |
| 7  | m3.xl     | 128000| 60   | 0          | 32    | True      |
| 8  | m3.2xl    | 256000| 60   | 0          | 64    | True      |
+-----+-----+-----+-----+-----+-----+-----+
(openstack5) [JS2 IU Admin] [Entropy] jeremy ~-->
```

Overview

Limit Summary

Category	Resource	Used	Limit
Compute	Instances	Used 10 of 100	
	VCPUs	Used 25 of 12,800	
	RAM	Used 84GB of 48.8TB	
Volume	Volumes	Used 9 of 50	
	Volume Snapshots	Used 0 of 10	
	Volume Storage	Used 180GB of 1000GB	
Network	Floating IPs	Allocated 11 of 50	
	Security Groups	Used 10 of 100	
	Security Group Rules	Used 62 of 100	
	Networks	Used 1 of 100	
	Ports	Used 23 of 500	
	Routers	Used 1 of 10	

Usage Summary

cacao Jetstream2 Alpha Release

Thank you for participating in the Jetstream2 Alpha release. Please use the following links to view known issues and submit any additional feedback as you use the application.

Allocations

Allocation ID	Project	CPU	Memory	Storage
TRA220028	Jetstream2 Affiliated Development Projects	48,279 / 1,000,000 SUs	0 / 1,000,000 SUs	0 / 1,000,000 SUs
TRA160003	Jetstream Staff Test Allocation	149,943 / 2,000,000 SUs	93,202 / 2,000,000 SUs	0 / 2,000,000 SUs
OS220045	Deep Learning Tutorial for Translational AI Center at Iowa State University	424,222 / 480,000 SUs	0 / 480,000 SUs	0 / 480,000 SUs

Featured Learning

- Continuous Analysis 101
- Jetstream2 Basics
- Manage Resources



<https://docs.jetstream-cloud.org/overview/overview-doc/>

Exosphere

The screenshot shows the Jetstream dashboard for Project TG-CCR190024. At the top, there's a navigation bar with the Jetstream logo, Messages, Settings, Get Support, About, and Logout. Below the navigation bar, the page title is "iu.jetstream-cloud.org - TG-CCR190024". There are two main sections: "Instances" and "Volumes".

Instances: Shows usage metrics: 11 of 25 total instances used, 26 of 132 total cores used, and 100 of 388 GB RAM used. A list of instances is shown below, including "formally_trusty_urchin" (Ready), "optionally_certain_longhorn with GUI" (Shelved), and "wildly_united_mite" (Ready). A "Show" button indicates 8 other instances are hidden.

Volumes: Shows usage metrics: 2 of 10 total volumes used and 279 of 1,100 GB storage used.

The screenshot shows the details for the instance "formally_trusty_urchin". The page title is "iu.jetstream-cloud.org - TG-CCR190024".

Instance Details: Created 19 minutes ago by user tg836338 from image JS-API-Featured-CentOS8-Latest. Status is Ready. UUID is 2bc77f59-73bf-470f-95b6-51dc31d7577f. Flavor is m1.small. SSH Public Key Name is cmart. Public IP Address is 149.165.157.3.

Actions: Lock, Suspend, Shelve, Image, Reboot, Delete.

Action History: create 19 minutes ago (2021-10-26 20:10:54 UTC).

System Resource Usage: CPU Usage and Memory Usage graphs showing percent usage over time.

Interactions: Web Shell, Web Desktop, Native SSH: exouser@149.165.157.3, Console.

Password: Try logging in with username "exouser" and the following password: Show password.



<https://exosphere.Jetstream-cloud.org> or try.exosphere.app

Using and preserving VMs

- You can install just about anything*
 - But generally limited to Linux**
- Snapshots are fairly simple and easily shared with your allocation
- One general practice is often to pull from Git(hub/lab) or pull a container

* Standard warnings about licensed software here.

** Here there be dragons.

Gateways use JS2 in several ways



Gateway web hosting



Datasets and
Database hosting



Gateway Security
Services

Integrated JupyterHub



Interactive
Computing



Elastic Virtual Clusters



Elastic Virtual Clusters

One Click OnDemand Cluster Augmenting the cloud capabilities

- Bundled lightweight HPC Stack, including SLURM.
- Users deploy scientific software with complete OS control.
- Dedicated and Responsive scheduler for rapid testing and development like workloads.
- Mounted persistent storage.

Jetstream2 Allocation/Usage Considerations

- No scheduled downtime for upgrades
 - Upgrades are generally done while the system stays live overall
 - 99.87% availability for 9-7-22 to 3-31-23 (last NSF reporting period)
- Persistent IP addresses (for the life of an allocation if desired)
- No runtime limits – VMs can exist as long as there is an active allocation with SUs available
- No allocation limits for SUs – if you can justify it and we can provide it, we do
- Instance, core, and ram limits are flexible and extendable – if you can justify it and we can provide it, we do
- Storage allocations are reasonably generous – 1TB default up to 50TB in volume, shared, or object storage





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