

# Jetstream Overview Gateways Edition

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Fischer, J. (2017). Jetstream Overview: Gateways Edition [Webinar]. Retrieved from <https://jetstream-cloud.org/archive/publications.php>



# What is Jetstream and why does it exist?

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- NSF's first production cloud facility
- Part of the NSF eXtreme Digital (XD) program
- Provides on-demand *interactive* computing and analysis or persistent services such as gateways
- Enables *configurable* environments and *programmable cyberinfrastructure*
- User-selectable library of preconfigured virtual machines
- Focus on ease-of-use, broad accessibility
- Will support persistent gateways (SEAGrid, Galaxy, GenApp, and others)
- Reproducibility: Share VMs and then store, publish via IU Scholarworks (DOI)



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# Who uses Jetstream?

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- The researcher needing a handful of cores (1 to 44/vCPU)
- Software creators and researchers needing to create their own customized virtual machines and workflows
- Science gateway creators using Jetstream as either the frontend or processor for scientific jobs
- STEM Educators teaching on a variety of subjects



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# What Jetstream isn't...

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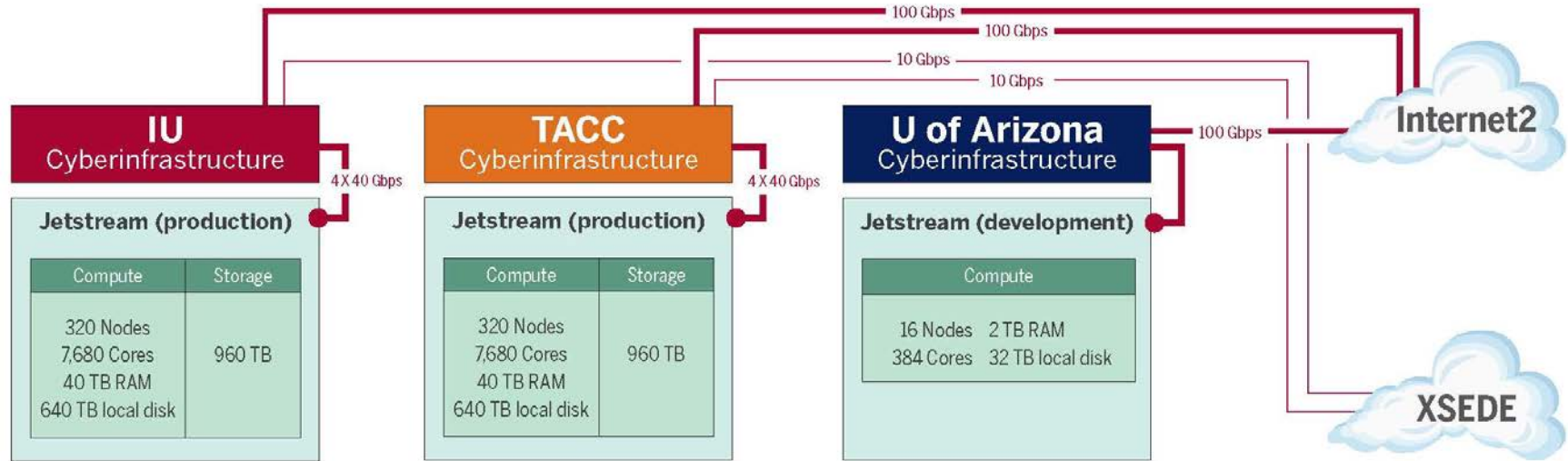
- It's not traditional HPC
- There's no shared filesystem (think cloudy!)
- There's no high-end interconnect fabric (keep thinking cloudy!)
- There aren't GPUs (yet...stay tuned)
- It isn't Amazon, Azure, or GCE (similar, but...)



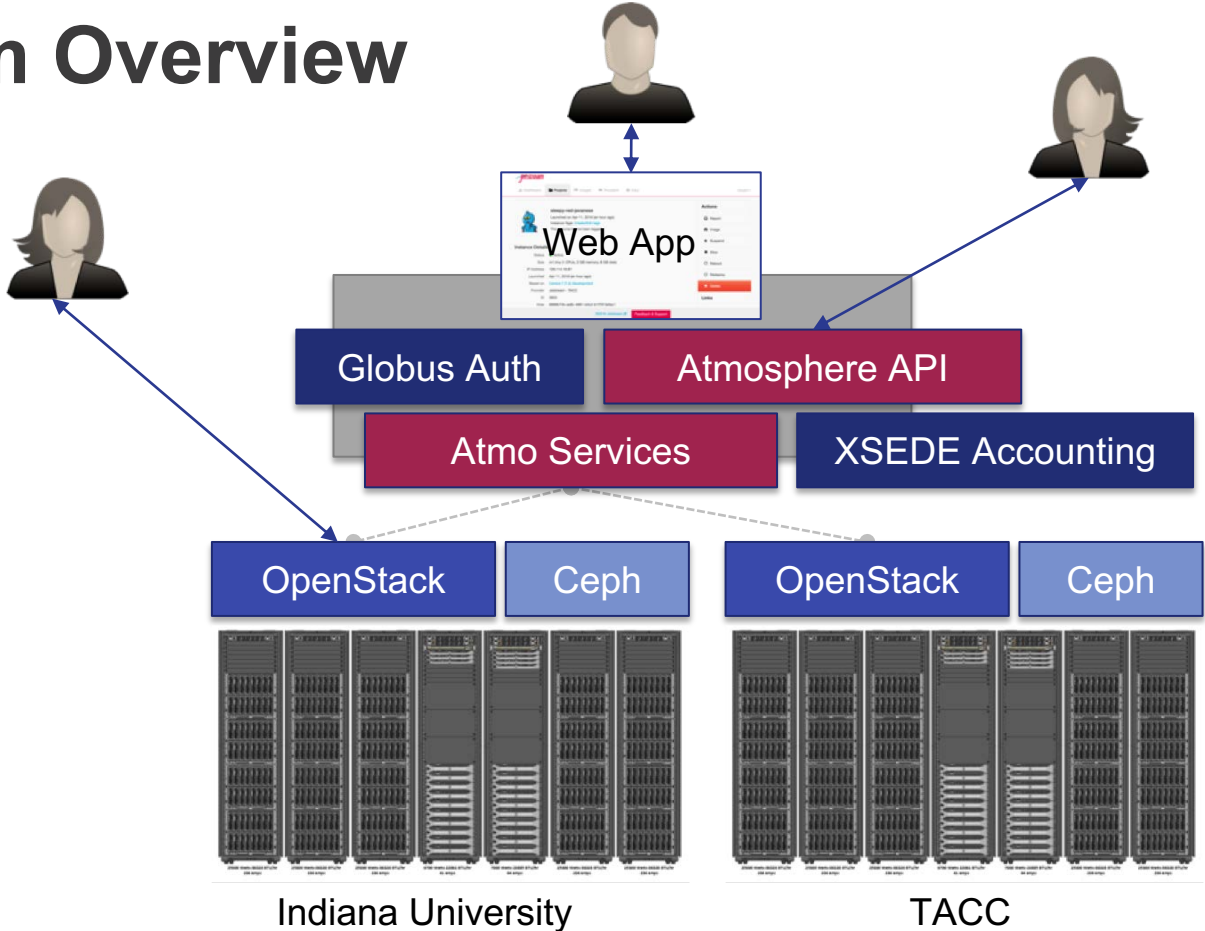
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# Jetstream System Overview



# Platform Overview



# Hardware and Instance "Flavors"

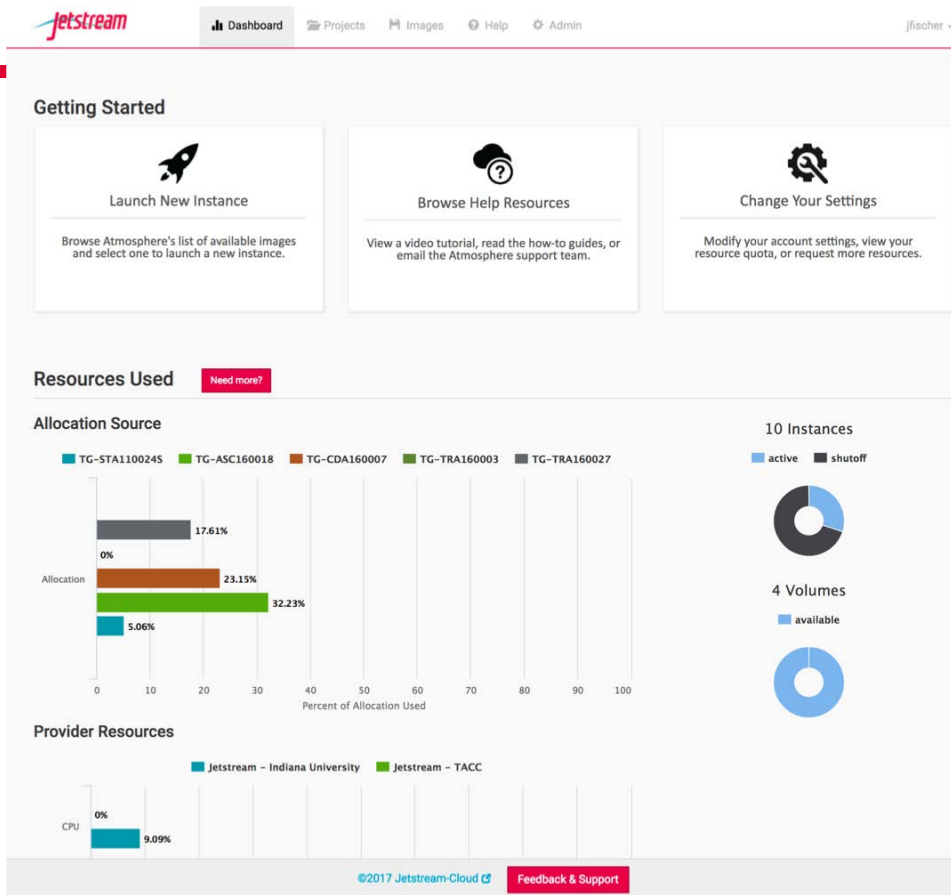
## VM Host Configuration

- Dual Intel E-2680v3 "Haswell"
- 24 physical cores/node @ 2.5 GHz (Hyperthreading on)
- 128 GB RAM
- Dual 1 TB local disks
- 10GB dual uplink NIC
- Running KVM Hypervisor
  
- Short-term *ephemeral* storage comes as part of launched instance
- Long-term storage is XSEDE-allocated
- Implemented as OpenStack Volumes
- Each user can get 10 volumes up to 500GB total storage\*

Flavor	vCPUs	RAM	Storage	Per Node
m1.tiny	1	2	8	46
m1.small	2	4	20	23
m1.medium	6	16	60	7
m1.large	10	30	60	4
m1.xlarge	24	60	60	2
m1.xxlarge	44	120	60	1
s1.large**	10	30	120	4
s1.xlarge**	24	60	240	2
s1.xxlarge**	44	120	480	1

\*\* s1.\* based instances are not eligible to be saved into a customized image

# The Jetstream Atmosphere web interface





# The Jetstream Atmosphere web interface

The screenshot displays the Jetstream Atmosphere web interface. At the top, there is a navigation bar with the Jetstream logo, a dashboard icon, and links for 'Dashboard', 'Projects', 'Images', and 'Help'. A user profile 'jffest' is visible in the top right. Below the navigation bar is a search bar and several filters: 'SEARCH', 'FAVORITES (0)', 'MY IMAGES (0)', 'MY IMAGE REQUESTS', and 'TAGS'. The main content area is titled 'Image Search' and contains a search input field with the placeholder text 'Search across image name, tag or description'. Below the search bar, it indicates 'Showing 57 of 57 Images'. A section titled 'Featured Images' lists six featured image entries, each with a thumbnail icon, title, author, date, description, and a set of tags. The tags are represented by red rounded rectangles with white text. The entries are: 1. 'Centos 7 (7.2) Development GUI' by jfischer, imported application, tags: CentOS, development, Featured, gui, iRODS. 2. 'BioLinux 8' by jfischer, based on Ubuntu 14.04.3, tags: bioinformatics, desktop, Featured, gui, m1\_small, Ubuntu, x2go. 3. 'Ubuntu 14.04.3 Development GUI' by jfischer, based on Ubuntu 14.04.3, tags: desktop, development, Featured, gui, iRODS, Ubuntu, vnc. 4. 'Intel Development (CentOS 7)' by jfischer, Intel compilers and development environment, tags: CentOS, desktop, development, Featured, gui, intel, m1\_small, vnc. 5. 'R with Intel compilers (CentOS ...)' by jfischer, R with Intel compilers built on CentOS 7, tags: CentOS, desktop, development, Featured, gui, intel, m1\_small, vnc. 6. 'Galaxy Standalone' by admin, Galaxy 16.01 Standalone, tags: community-contributed, Featured, m1\_large, Ubuntu. At the bottom of the interface, there is a footer with '©2017 Jetstream-Cloud' and a 'Feedback & Support' button.

Jetstream  
http://jetstream-cloud.org/

©2017 Jetstream-Cloud [Feedback & Support](#)



# Look! It's more Jetstream web interface!

The screenshot displays the Jetstream web interface with a modal dialog box titled "Launch an Instance / Basic Options". The background interface shows a sidebar with "RESOURCES" and "Instances" sections, and a main content area with "JLF Test" and "NEW" button. The dialog box is divided into two columns: "Basic Info" and "Resources".

**Basic Info**

- Instance Name: R with Intel compilers (CentOS 7)
- Base Image Version: 1.14
- Project: JLF Test

**Resources**

- Allocation Source: TG-CIE170025
- Provider: Jetstream - Indiana University
- Instance Size: m1.tiny (CPU: 1, Mem: 2 GB, Disk: 8 GB)

**Allocation Used**

0% of 140000 SUs from TG-CIE170025

**Resources Instance will Use**

A total 14 of 132 allotted CPUs


A total 38 of 360 allotted GBs of Memory

Buttons at the bottom of the dialog: Back, Advanced Options, CANCEL, LAUNCH INSTANCE.

**Jetstream**  
<http://jetstream-cloud.org/>

Jetstream Homepage - Jetstream Partners - Citing Jetstream - Jetstream is supported by NSF ACI-1445604

FEEDBACK & SUPPORT




# Even more Jetstream web interface...

**Jetstream** Dashboard Projects Images Help Admin jfischer

## JLF Test

[Resources](#) > KVM image to build Win10



KVM image to build Win10

**Allocation Source**

TG-CIE170025

**Allocation Used**

0% of 250000 SUs from TG-CDA160007

**Instance Details**

Status	● Active
Activity	N/A
Size	s1.large (10 CPUs, 30 GB memory, 120 GB disk)
IP Address	149.165.156.191 <a href="#">Copy</a>
Launched	Apr 6, 2017 (2 months ago)
Based on	<a href="#">Myers L533 Image</a>

**Actions**

- Report
- Image
- Suspend
- Shelve
- Stop
- Reboot
- Redeploy
- Delete**

**Links**

- Open Web Shell
- Open Web Desktop

[Jetstream Homepage](#) - [Jetstream Partners](#) - [Citing Jetstream](#) - Jetstream is supported by [NSF ACI-1445604](#)

**FEEDBACK & SUPPORT**

# Using Jetstream as a gateway developer

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## Manipulating Jetstream VMs:

- Direct API access via OpenStack CLI or Horizon access
- Log in via ssh (or gui if you install X and a VNC server– but that's up to you)

## Why:

- Programmatic access – Programmable cyberinfrastructure
- Reserved IP pools
- Ability for true cloud benefits like elastic computing are available via the API



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# The basics that Jetstream provides

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- Base images to start from
- A basic network space (some DIY required)
- An IP pool
- Isolated project space for your team (on two clouds)
- A blank canvas (to some degree) – you can truly install just about anything you want – and you can BYOLicense if needed

# Jetstream storage

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Storage built into the VM flavors = ephemeral (replicated, but...)

Volume storage = persistent (erasure coded, 4 data 2 recovery)

Valuable data should be on volumes (and backed up elsewhere)

# Thinking about VMs...



Cattle, not pets: pets take great amount of care, feeding, and you name them; cattle you intend to have high turnover and you give them numbers.

-- George Turner (Jetstream architect)

# Some of the possibilities on Jetstream...

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- True elastic computing
  - OpenStack Heat
  - OpenStack Magnum
  - Your own creation?
- Virtual clusters
  - Several gateways using virtual clusters
  - Working on a bigger and better long-term solution
  - Workshop at PEARC17 - Monday afternoon!
- Other possibilities
  - <https://www.openstack.org/software/project-navigator/>
  - Mistral (OSG) – cron as a service
  - Senlin (a coming attraction for making virtual clusters easier)
  - other additions like Manila (filesystems as a service), etc



# Left Twix, Right Twix

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- Having two clouds = some semblance of fault tolerance
- Making that work for your gateway
  - Fail over possibilities
  - Load distribution/performance
  - Maximizing simultaneous VMs (VM/IP limits per cloud)

# But what about big data sets and such?

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- At IU, Wrangler is nearby
- Jetstream wired to Wrangler's switch and vice versa
- Dedicated NFS node(s) on Wrangler for Jetstream
- Dedicated vlan built for projects that need access (still in beta, but working!)
- Hoping to replicate at TACC soon-ish

# Jetstream Fun: Happy cluster / Angry Cluster



# Where can I get help?

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Wiki / Documentation: <http://wiki.jetstream-cloud.org>

User guides: <https://portal.xsede.org/user-guides>

XSEDE KB: <https://portal.xsede.org/knowledge-base>

Email: [help@xsede.org](mailto:help@xsede.org)

Campus Champions: <https://www.xsede.org/campus-champions>

Training Videos / Virtual Workshops (TBD)



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# Jetstream Partners



INDIANA UNIVERSITY

PERVASIVE TECHNOLOGY INSTITUTE



JOHNS HOPKINS  
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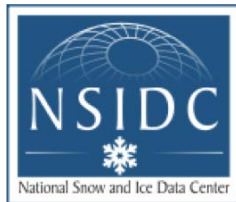
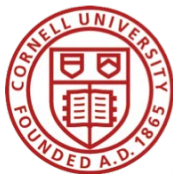


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# Discussion -

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- What images would gateway developers like to see?
  - Is there a distribution and standard set of packages that would benefit many gateway developers?
  - Is there any benefit to the availability of Intel compilers?
- What features would gateway developers like to see?
- Other things?

# Questions?

Project website: <http://jetstream-cloud.org/>

Project email: [help@jetstream-cloud.org](mailto:help@jetstream-cloud.org) Direct email: [jeremy@iu.edu](mailto:jeremy@iu.edu)

## License Terms

- Fischer, Jeremy. June 16, 2017. Jetstream Overview – Gateways Edition. Also available at: <http://jetstream-cloud.org/publications.php>
- Jetstream is supported by NSF award 1445604 (Craig Stewart, IU, PI)
- XSEDE is supported by NSF award 1053575 (John Towns, UIUC, PI)
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