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Jetstream Overview: A national research and education cloud – Lightning Edition

ACNN Lightning Talks
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Fischer, J. (2020). Jetstream Overview: A national research and education cloud. Bloomington, IN. Retrieved from https://jetstream-cloud.org/research/publications.php

What is Jetstream and why does it exist?

- *NSF's first production cloud facility*
- *Focus on ease-of-use, broad accessibility*
- *User-selectable library of preconfigured virtual machines*
- *Provides on-demand interactive computing and analysis or persistent services such as gateways*
- *Enables configurable environments; programmable cyberinfrastructure*

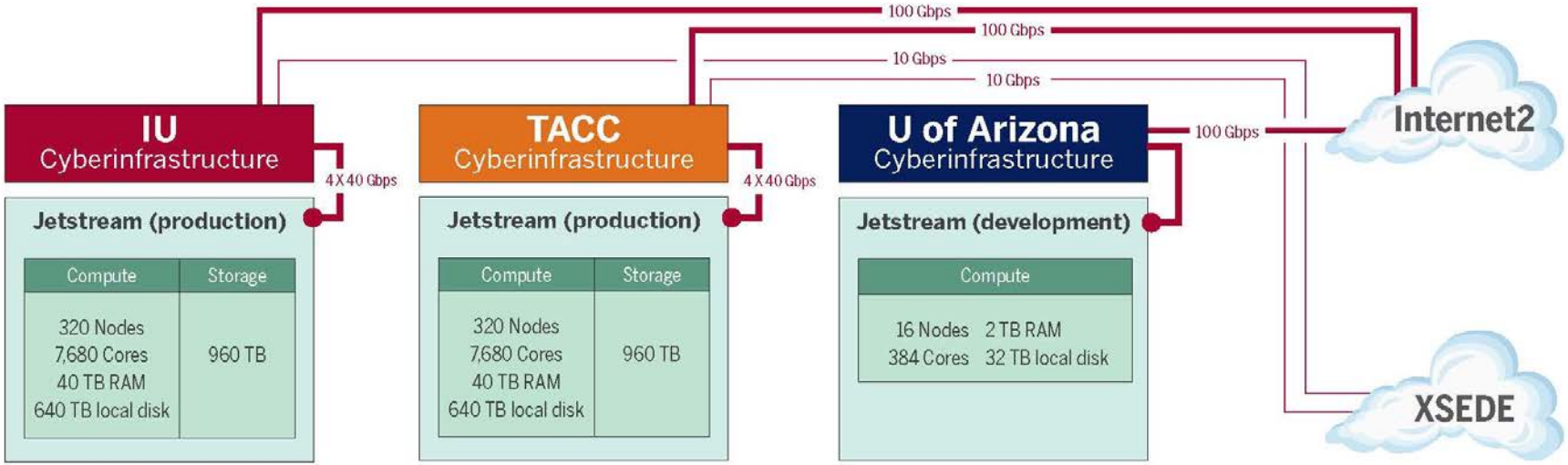
Who uses Jetstream?

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

What Jetstream isn't...

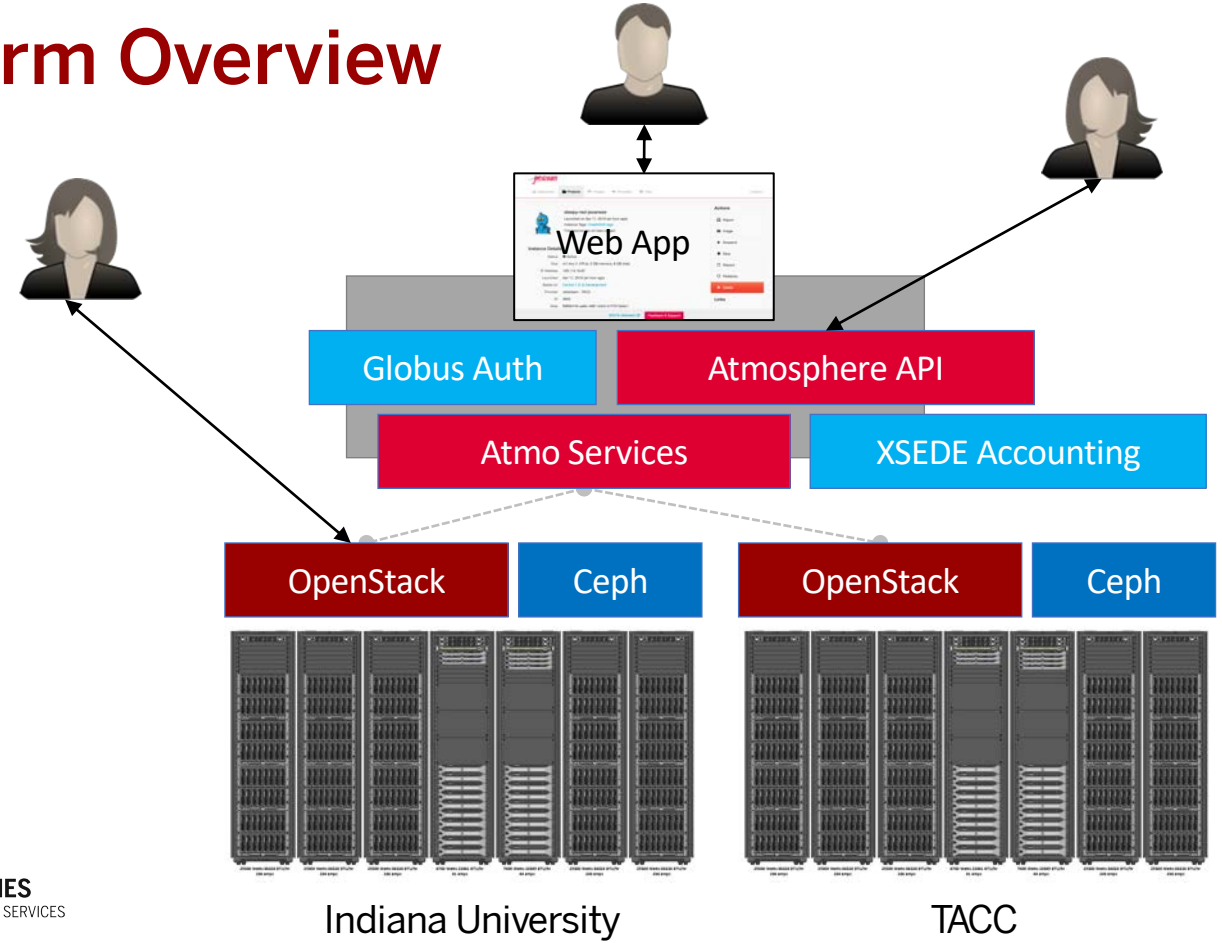
- *It's not traditional HPC*
- *There's no shared filesystem (think cloudy!)*
- *There's no high-end interconnect fabric (keep thinking cloudy!)*
- *There aren't GPUs widely available*
- *It isn't Amazon, Azure, or GCE (similar, but...)*

Jetstream System Overview



http://wiki.jetstream-cloud.org/Network+configuration+and+policies

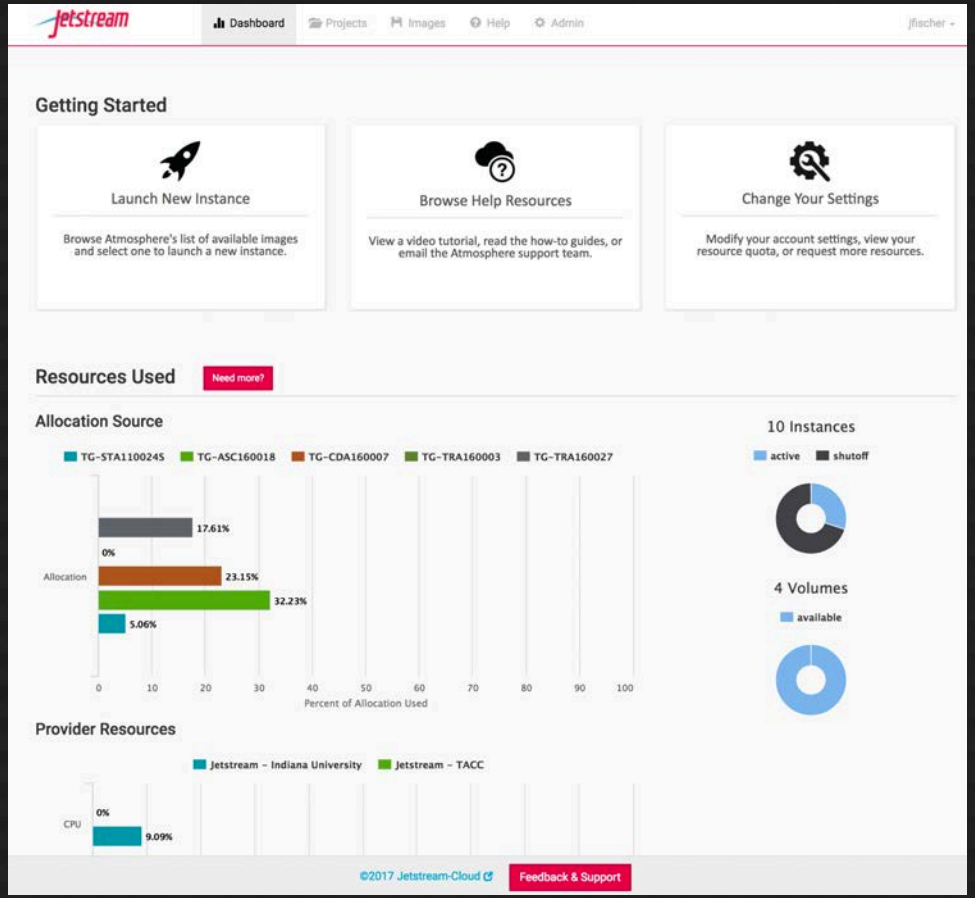
Platform Overview



What is Jetstream – a closer look

- **Software layers**
  - **Atmosphere** web interface
    - library of images, generic, domain specific
    - simplify VM administration
  - **OpenStack:** software tools for building and managing cloud computing platforms for public and private clouds.
  - **KVM** hypervisor: what the VMs run on
  - **Ceph**: storage platform that stores data on a single distributed computer cluster, and provides interfaces for **object**-, **block**- and *file-level* storage.
  - **Operating systems**: CentOS, Ubuntu, Windows(?)
  - **Applications**; e.g. software developed by the domain specialist, gateways, etc.

The Jetstream Atmosphere web interface



API Access to Jetstream

- *What was **unexpected***
  - **Demand** for **programmable cyberinfrastructure**
  - Great platform for learning **system administration skills**
  - Great platform for **teaching & learning cloudy technologies**

- *Command line clients*
- ***Horizon dashboard** very popular; but, incomplete*
- ***Programmatic control**; python is popular (https://docs.openstack.org/openstacksdk/latest/)*
- ***Slack channel** for collaboration API users of Jetstream*

Jetstream usage highlights – 1 July 2020

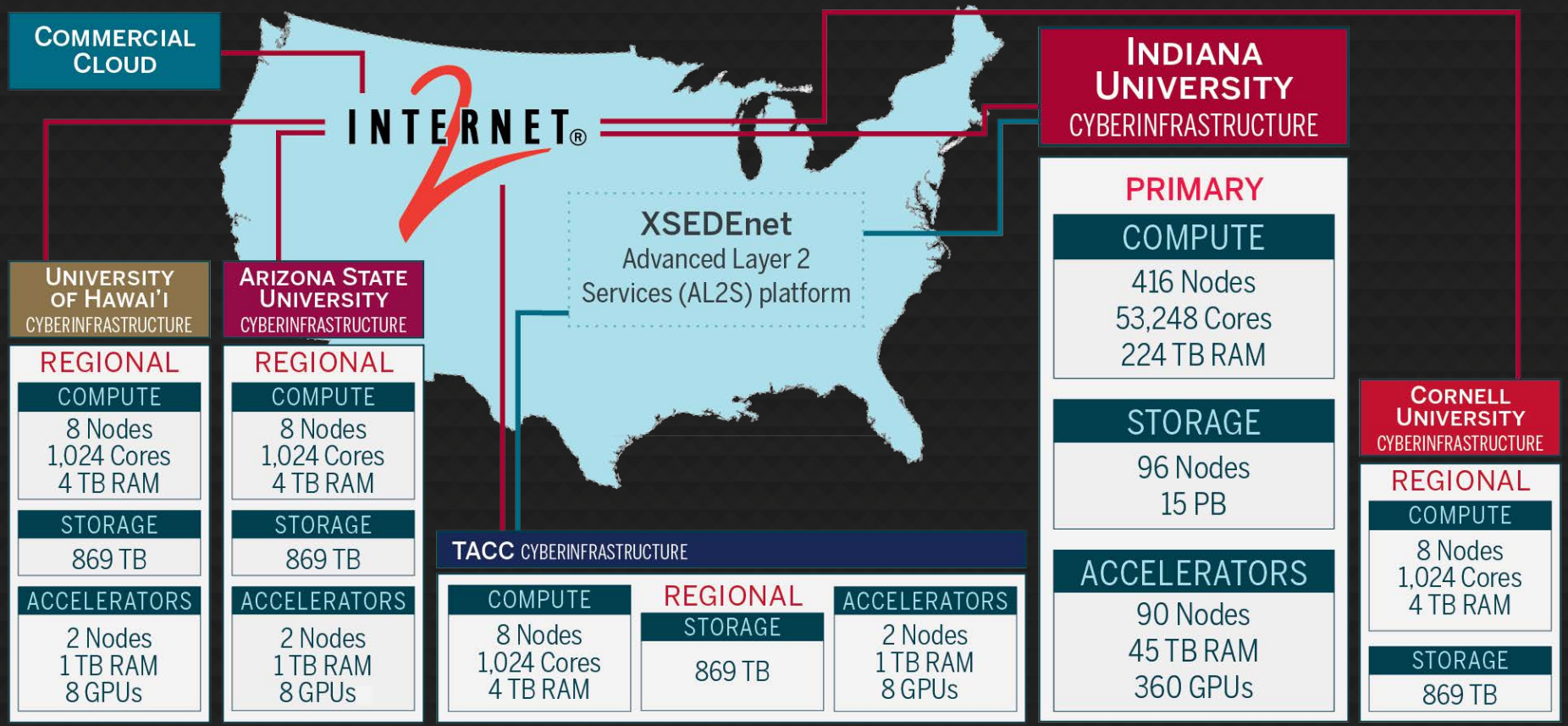
- *406 XSEDE projects covering 78 fields of science and over 2100* ***active users*** *representing* ***206 institutions***
- *80% of Jetstream users have not used any other XSEDE system*
- *>337M CPU hours allocated to XSEDE projects since June 2016*
- *38 active science gateways*
- *43 education/teaching allocations serving over 700 students presently and over 4900 through July 2020*
- *1189 mean active VMs in previous qtr, 1632 peak active VM count*
- *Highest user satisfaction in most recent XSEDE survey*

Jetstream2 Capabilities

- Enhancing IaaS model of Jetstream:
- Improved orchestration support
- Elastic virtual clusters
- Federated JupyterHubs
- Commitment to >99% uptime
- Critical for science gateway hosting
- Hybrid-cloud support
- Revamped User Interface
- Unified instance management
- Multi-instance launch

Feb 12, 2019 – Jet stream region called "Jet N6"
NASA/JPL-Caltech/SwRI/MSSS/Kevin M. Gill

- *>57K cores of next-gen AMD EPYC processors*
- *>360 NVIDIA A100 GPUs will provide vGPUs via NVIDIA's MIG feature*
- *>18PB of storage (NVMe and disk hybrid)*
- *100GbE Mellanox network*



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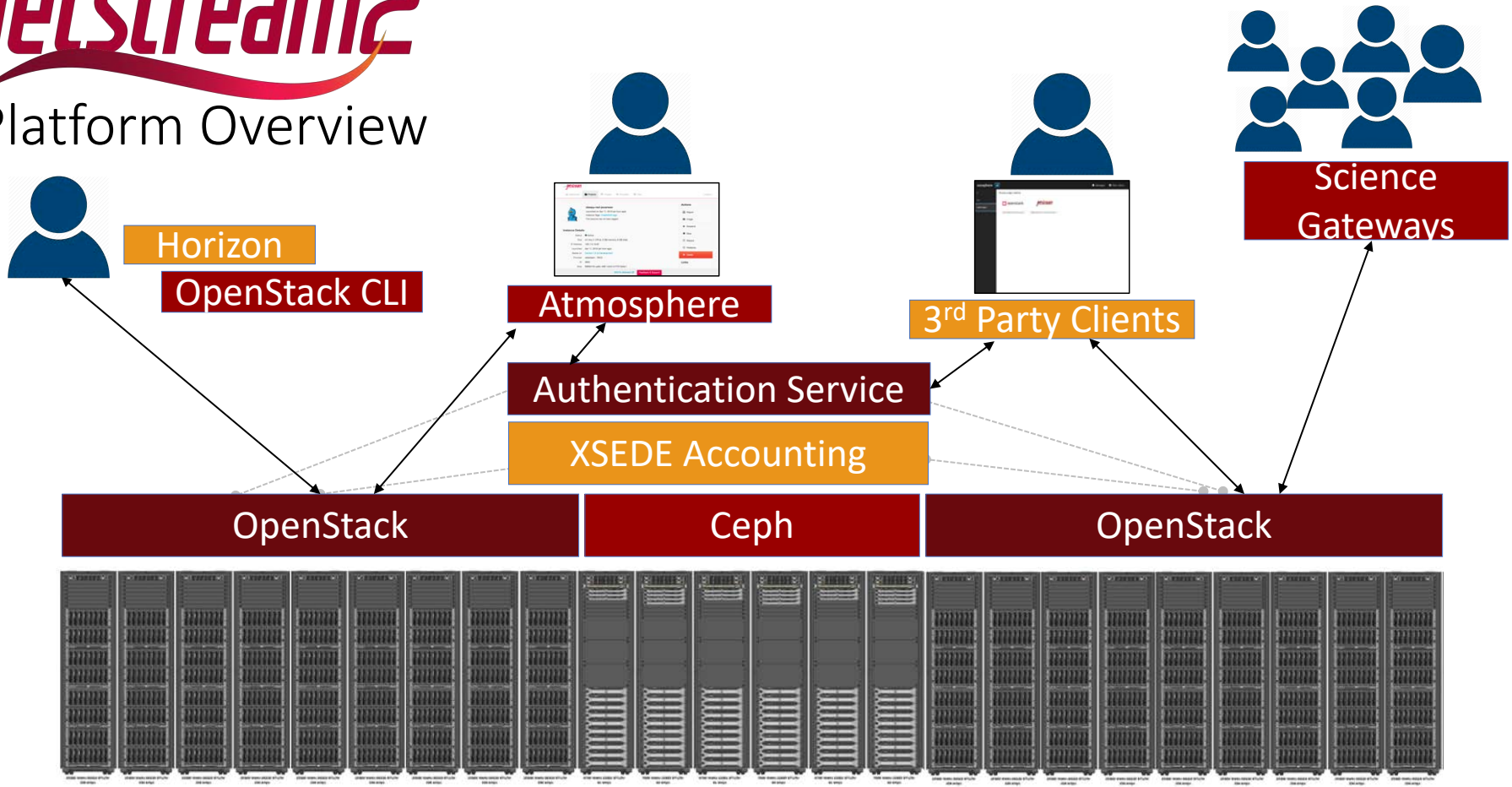
Jetstream2

Platform Overview



Jetstream2 Core System

Timeline

- *Jetstream now in 5th year of operations*
- *Jetstream extension requested through November 2021*
- *Jetstream2*
  - *Early operations planned for August 2021*
  - *Production operations by October 2021*

Flickr user Oiluj Samall Zeid - Lejos de Yulín

Where can I get help?

- *Wiki / Documentation: http://wiki.jetstream-cloud.org*
- *API CLI Tutorial: https://github.com/jlf599/JetstreamAPITutorial*
- *User guides: https://portal.xsede.org/user-guides*
- *XSEDE KB: https://portal.xsede.org/knowledge-base*
- *Email: help@xsede.org*

Jetstream Partners

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PERVASIVE TECHNOLOGY INSTITUTE

JOHNS HOPKINS UNIVERSITY

THE UNIVERSITY OF ARIZONA

TACC

THE UNIVERSITY OF CHICAGO

UNC THE ODUM INSTITUTE

Jetstream
http://jetstream-cloud.org/

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http://jetstream-cloud.org/
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