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Jetstream2 in the lightning
Accelerating Science and Engineering on Demand

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Jetstream2

What is Jetstream2 and why does it exist?

- Significant evolution of the Jetstream

- Under 10% NSF investment –> support for 24% of institutions, 23% of active PIs, and 32% of users*

- Jetstream has provided 6x more SUs than any other XSEDE resource for Education
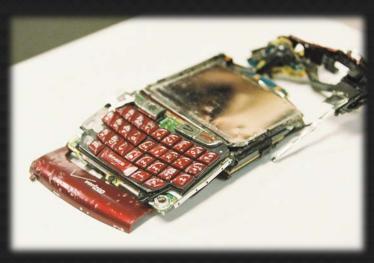
- Emphasis on ease-of-use, broad accessibility, *AI for Everyone*

- Will provide on-demand *interactive* computing and persistent services for science gateways

- Enables *configurable* environments; *programmable cyberinfrastructure*

*Based on XDMoD data at Workload Analysis Report: http://arxiv.org/abs/1801.04306

Jetstream2

What worked?

- Allowing API access and full control (root privileges)

- "Indefinite workflows" – allowing instances to run continuously – providing PIs renew their allocations

- Development of trial allocations

Flickr user MattHurst – Broken Blackberry

What didn't work?

- Forcing small allocations into the research allocation process

- Lack of multi-year allocations

- Lack of shared data set storage
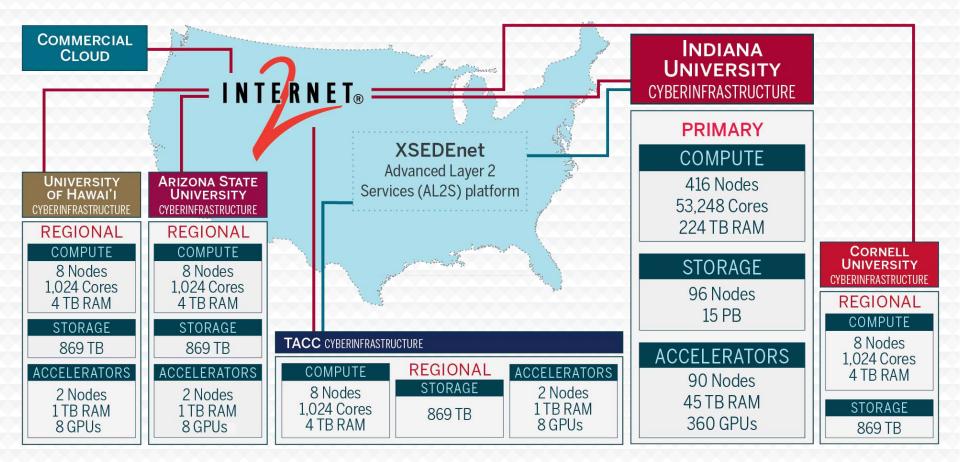
Jetstream

Jetstream2 Capabilities

Enhancing IaaS model of Jetstream:

- Improved orchestration support

- Elastic "push button" virtual clusters

- Federated JupyterHubs

Commitment to >99% uptime

- Critical for science gateway hosting

- Hybrid-cloud support

Revamped User Interface

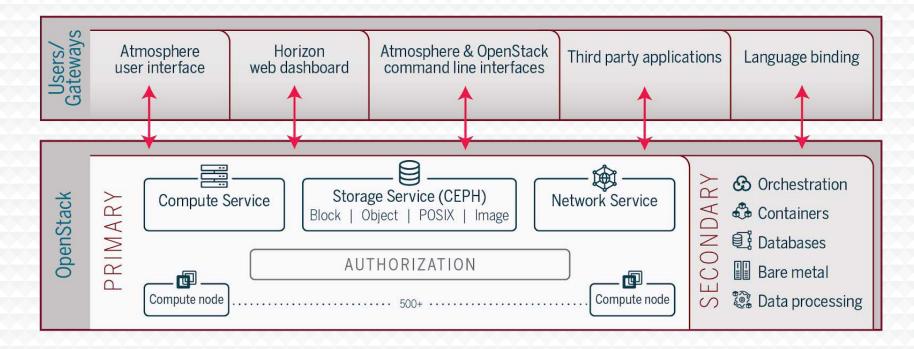- Unified instance management

- 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

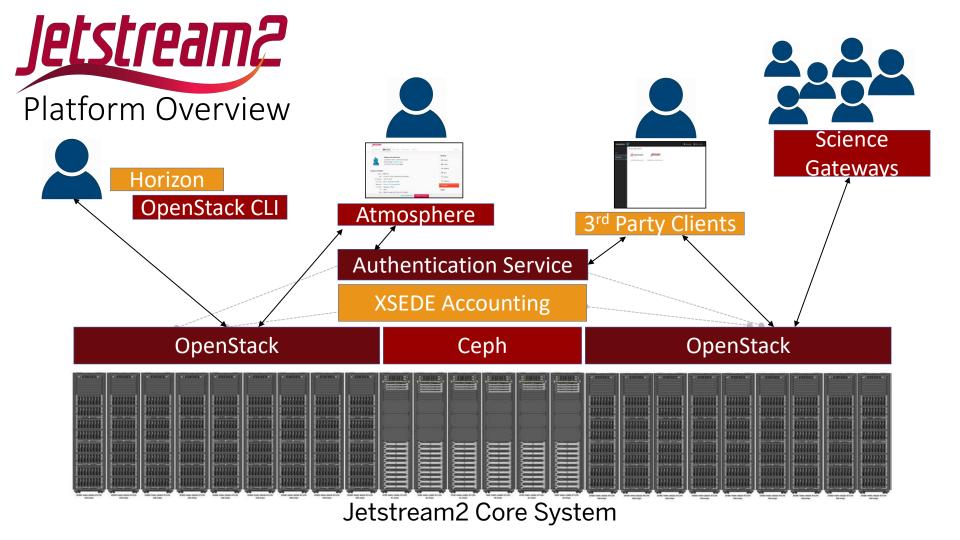- >18PB of storage (NVMe and disk hybrid)

- 100GbE Mellanox network

Jetstream2

COMMERCIAL CLOUD

INTERNET 2®

INDIANA UNIVERSITY
CYBERINFRASTRUCTURE

PRIMARY

COMPUTE
416 Nodes
53,248 Cores
224 TB RAM

STORAGE
96 Nodes
15 PB

ACCELERATORS
90 Nodes
45 TB RAM
360 GPUs

XSEDEnet
Advanced Layer 2
Services (AL2S) platform

UNIVERSITY OF HAWAI'I
CYBERINFRASTRUCTURE

REGIONAL

COMPUTE
8 Nodes
1,024 Cores
4 TB RAM

STORAGE
869 TB

ACCELERATORS
2 Nodes
1 TB RAM
8 GPUs

ARIZONA STATE UNIVERSITY
CYBERINFRASTRUCTURE

REGIONAL

COMPUTE
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TACC CYBERINFRASTRUCTURE

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CORNELL UNIVERSITY
CYBERINFRASTRUCTURE

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Jetstream2

Conceptual Jetstream2 Architecture

Jetstream2
Platform Overview

Horizon
OpenStack CLI

Atmosphere

Science Gateways

3rd Party Clients

Authentication Service

XSEDE Accounting

OpenStack   Ceph   OpenStack

Jetstream2 Core System

Timeline

- Jetstream now in 5th year of operations

- Jetstream extension granted by the NSF through November 2021

- Jetstream2
  - Early operations planned for August 2021
  - Production operations by October 2021

Flickr user Oiluj Samall Zeid - Lejos de Yulín

Jetstream2

Acknowledgements