Jetstream Overview
Gateways Edition

Jeremy Fischer – jeremy@iu.edu
Senior Technical Advisor,
UI TS Research Technologies

What is Jetstream and why does it exist?

• 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)
Who uses Jetstream?

• 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
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 (yet…stay tuned)
- It isn’t Amazon, Azure, or GCE (similar, but…)
Platform Overview

Web App

Globus Auth  Atmosphere API

Atmo Services  XSEDE Accounting

OpenStack  Ceph  OpenStack  Ceph

Indiana University  TACC
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*

<table>
<thead>
<tr>
<th>Flavor</th>
<th>vCPUs</th>
<th>RAM</th>
<th>Storage</th>
<th>Per Node</th>
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<td>1</td>
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<tr>
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<td>44</td>
<td>120</td>
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</tr>
</tbody>
</table>

** s1.* based instances are not eligible to be saved into a customized image
The Jetstream Atmosphere web interface
The Jetstream Atmosphere web interface
Look! It’s more Jetstream web interface!
Even more Jetstream web interface…

JLF Test

KVM image to build Win10

Allocation Source
TG-CIE170025

Allocation Used
0% of 255000 SUs from TG-CDA160007

Instance Details
Status
Active
Activity
N/A
Size
a1.large (10 CPUs, 30 GB memory, 120 GB disk)
IP Address
149.165.156.191
Launched
Apr 6, 2017 (2 months ago)
Based on
Myers LS33 Image

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
Using Jetstream as a gateway developer

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
The basics that Jetstream provides

- 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

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…

• 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

- 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?

- 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?


User guides: [https://portal.xsede.org/user-guides](https://portal.xsede.org/user-guides)

XSEDE KB: [https://portal.xsede.org/knowledge-base](https://portal.xsede.org/knowledge-base)

Email: help@xsede.org

Campus Champions: [https://www.xsede.org/campus-champions](https://www.xsede.org/campus-champions)

Training Videos / Virtual Workshops (TBD)
Discussion -

• 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 Direct email: jeremy@iu.edu

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