



INDIANA UNIVERSITY
**SCHOOL OF INFORMATICS,
COMPUTING, AND ENGINEERING**

Open Stack & Jetstream

February 15th 2019

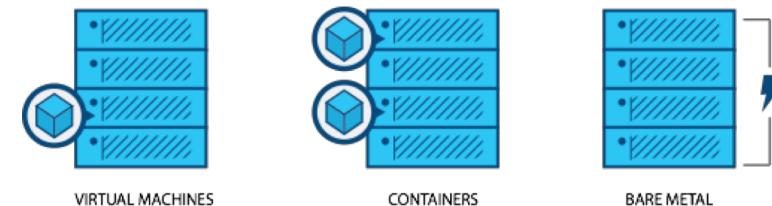
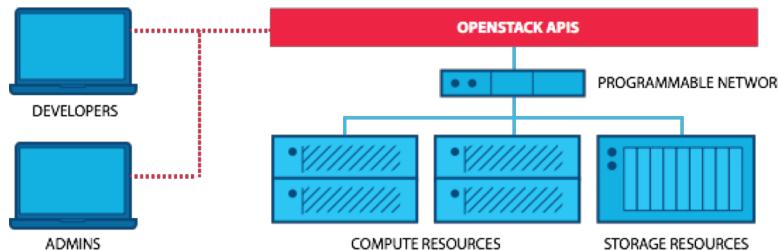
Suresh Marru, Marlon Pierce

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Outline for today

- Introduction to OpenStack and Jetstream
- Using OpenStack API on Jetstream
- Do's and Don'ts

What is OpenStack



Programmable infrastructure that lays a common set of APIs on top of compute, networking and storage

One platform for virtual machines, containers and bare metal

WHAT IT IS

WHY USE IT

THE COMMUNITY

USING OPENSTACK

FAQS

OpenStack Cloud Models

THERE'S A GLOBAL SHIFT TOWARD CLOUD. THE BENEFITS: AGILITY, SCALABILITY, DECREASED HARDWARE COSTS.

Public cloud: shared resource, “pay-as-you-go” models are common. OpenStack public cloud is available in 60+ datacenters globally.

Private Cloud: dedicated to a single user. Can be hosted private cloud in a vendor's data center or yours, or remotely managed private cloud.

Hybrid cloud: a mix of private cloud and public cloud orchestrated together to meet company needs

Source: <https://www.openstack.org/>

3 CLOUD MODELS



WHAT IT IS

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FAQS

Which industries choose OpenStack?

RETAIL/E-COMMERCE



ENERGY AND MANUFACTURING



FINANCIAL



INSURANCE

TELECOM



ENTERTAINMENT



ACADEMIC/RESEARCH



See more at
openstack.org/user-stories

WHAT IT IS

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FAQS

History of OpenStack

2010

NASA + Rackspace develop the basis of OpenStack

2014

OpenStack Marketplace opens to showcase maturing ecosystem; “Juno” release seen as enterprise grade

2016 - April

Half the Fortune 100 run OpenStack; Certified OpenStack Administrator program launched

2017

OpenStack emerges as one platform for containers, VMs and bare metal

2012

OpenStack Foundation established

2015

OpenStack Powered interop certification launched

2016

China booms; 86% of telecoms say OpenStack important to their business

WHAT IT IS

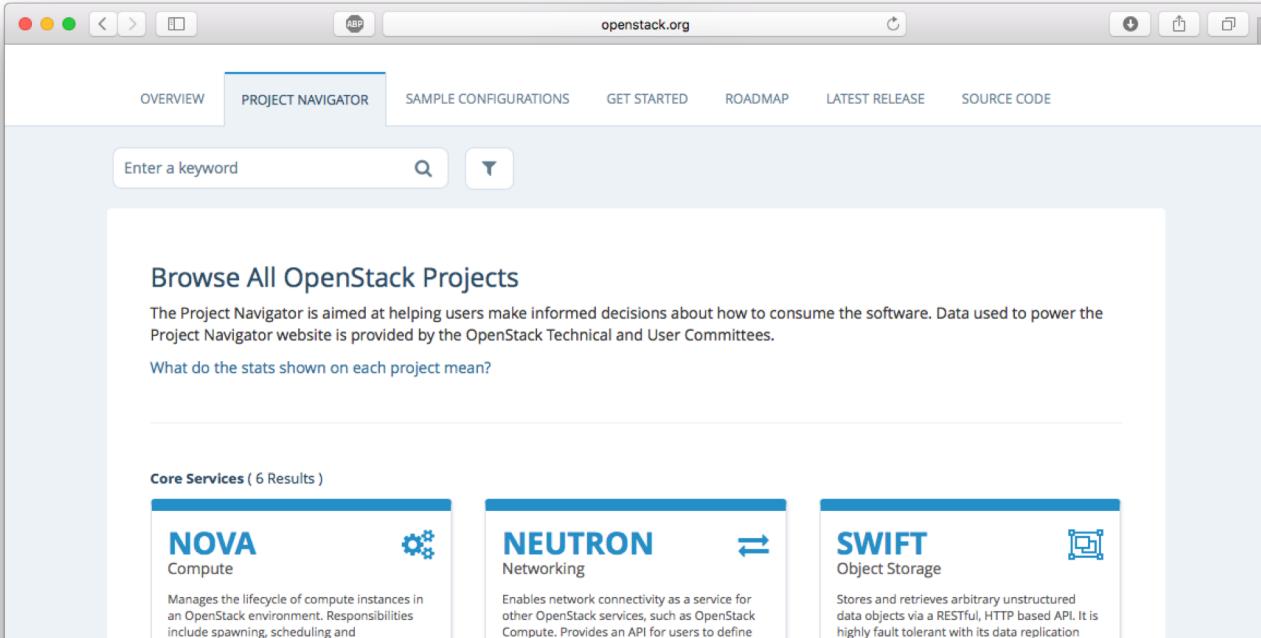
WHY USE IT

THE COMMUNITY

USING OPENSTACK

FAQS

The OpenStack Framework



The screenshot shows a web browser window for openstack.org/project-navigator. The navigation bar includes links for OVERVIEW, PROJECT NAVIGATOR (which is active), SAMPLE CONFIGURATIONS, GET STARTED, ROADMAP, LATEST RELEASE, and SOURCE CODE. A search bar with placeholder text "Enter a keyword" is present. Below the navigation bar, a section titled "Browse All OpenStack Projects" contains a brief description of the Project Navigator's purpose and a link to "What do the stats shown on each project mean?". A "Core Services (6 Results)" section lists three services: NOVA (Compute), NEUTRON (Networking), and SWIFT (Object Storage). Each service card includes a small icon, the service name, its category, and a brief description.

OVERVIEW PROJECT NAVIGATOR SAMPLE CONFIGURATIONS GET STARTED ROADMAP LATEST RELEASE SOURCE CODE

Enter a keyword

Browse All OpenStack Projects

The Project Navigator is aimed at helping users make informed decisions about how to consume the software. Data used to power the Project Navigator website is provided by the OpenStack Technical and User Committees.

What do the stats shown on each project mean?

Core Services (6 Results)

NOVA Compute
Manages the lifecycle of compute instances in an OpenStack environment. Responsibilities include spawning, scheduling and

NEUTRON Networking
Enables network connectivity as a service for other OpenStack services, such as OpenStack Compute. Provides an API for users to define

SWIFT Object Storage
Stores and retrieves arbitrary unstructured data objects via a RESTful, HTTP based API. It is highly fault tolerant with its data replication

WHAT GETS CALLED OPENSTACK?

USING THE SAMPLE CONFIGURATIONS

CORE SERVICES & OPTIONAL SERVICES

Should I install OpenStack Cloud?



Cloud Facility for Scientific Gateways

J. Mike Lowe, Lead Systems Programmer
Pervasive Technologies Institute, UITS/RT, Indiana University
George Turner, Chief Systems Architect
Pervasive Technologies Institute, UITS/RT, Indiana University

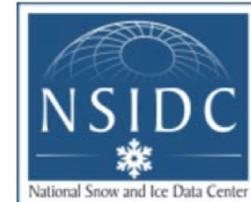
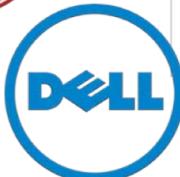
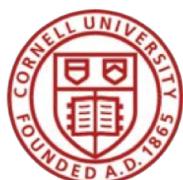
CSCI-B 649, Topics in Systems
Science Gateway Architectures,
School of Informatics and Computing, Indiana University

24-Oct-2017



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Award #ACI-1445604

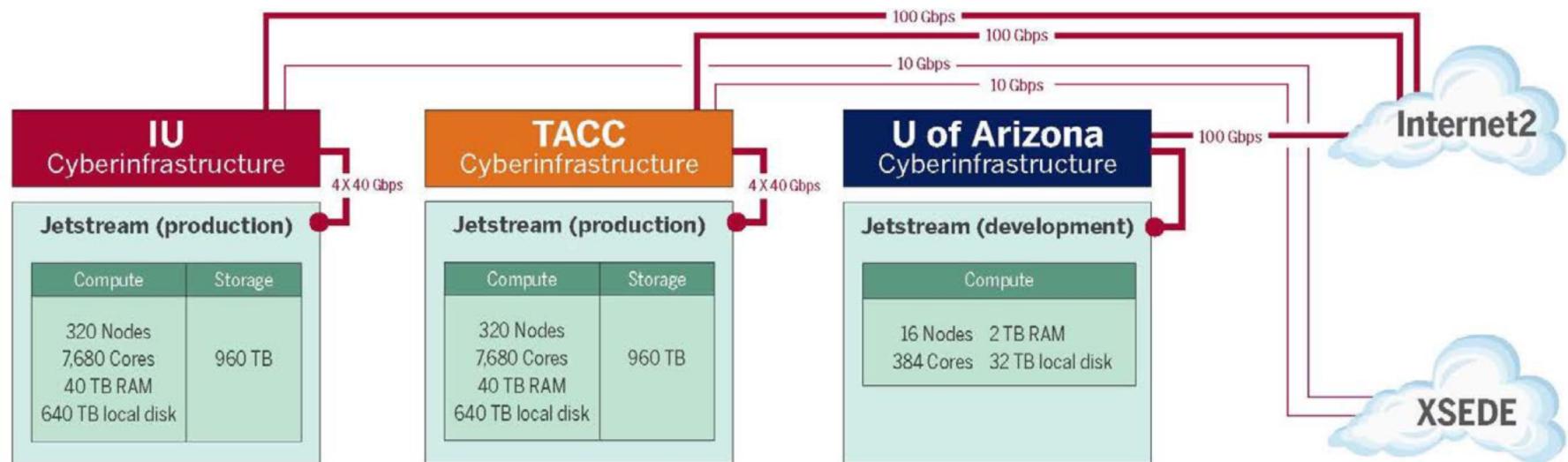
Jetstream partners



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Jetstream System Overview



Jetstream Fun: Happy cluster / Angry Cluster



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



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Ψ

Source: <https://jetstream-cloud.org/>, ACK: Mike Lowe, Jeremy Fischer

What is Jetstream?

- **Cloudy Technologies:** clouds are more than just virtual machines (VM)
 - **Old way:** robust (expensive) infrastructure, weak (cheap) software
 - You expect the hardware to not fail
 - State is maintained in volatile data structures
 - **Cloudy way:** commodity infrastructure, robust software
 - Expect & plan for infrastructure to fail
 - Put intelligence into the software to handle infrastructure failure
 - **Cows, not pets:**
 - pets have **state**, you name them, you get attached to them, you put forth great amount of care and effort
 - cows **do not** have **state**, you expect to have high turnover, you do not get attached to them, you give them numbers instead of names



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



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



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What is Jetstream?

- **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.



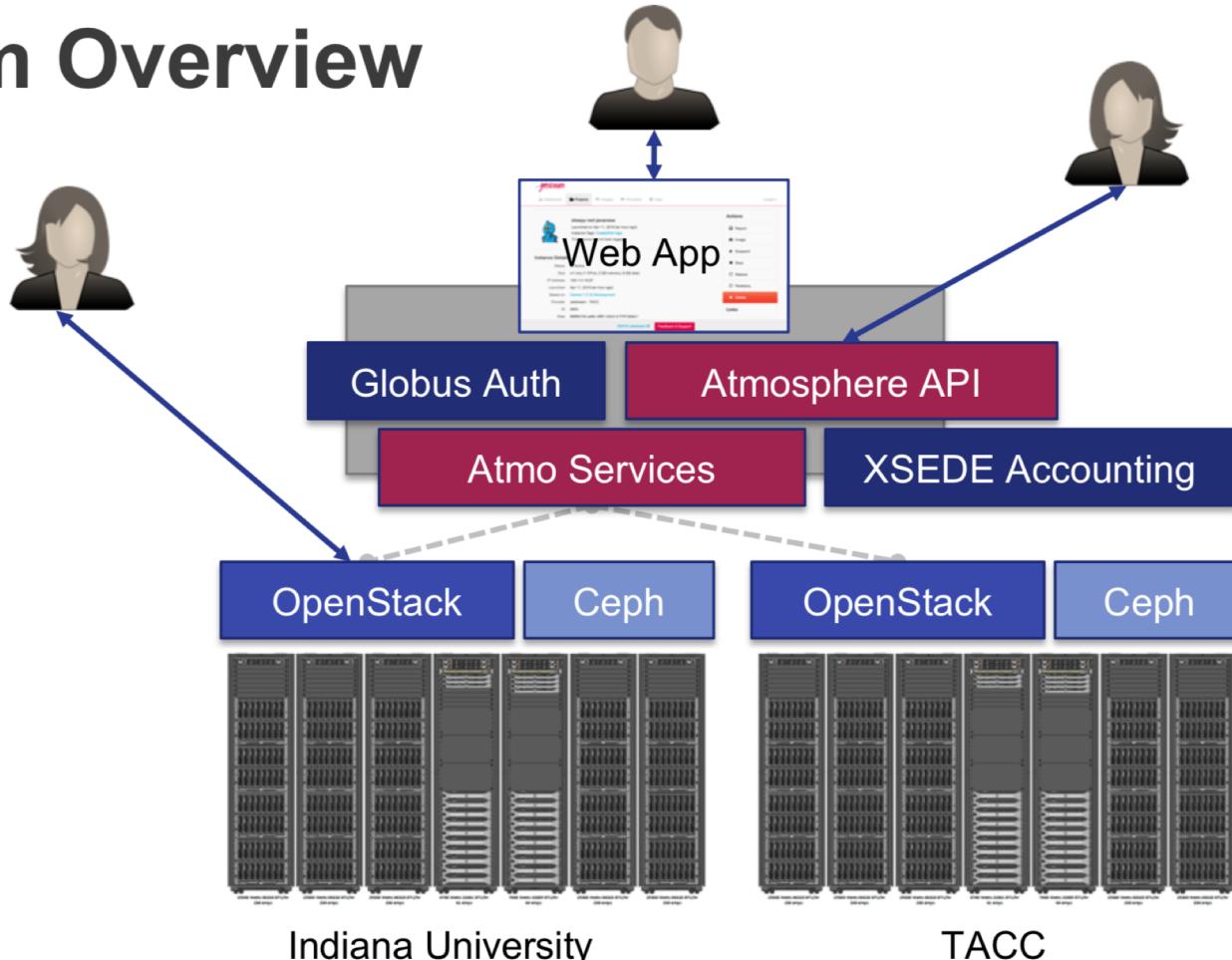
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API Access to Jetstream

- 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
- **Slack channel** for collaboration API users of Jetstream

Platform Overview

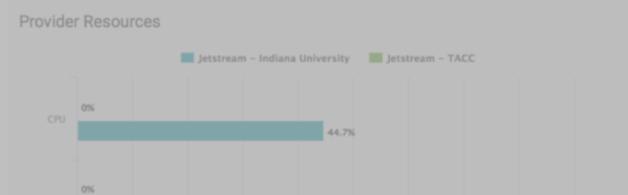
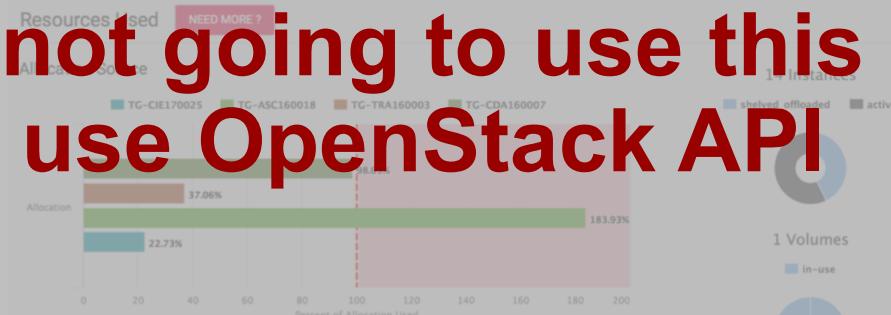


The Jetstream Atmosphere web interface

The screenshot shows the Jetstream Atmosphere web interface. At the top, there is a navigation bar with links for Dashboard, Projects, Images, Help, Admin, and a user account dropdown for ssudarsh. Below the navigation bar, the main content area has a title "Getting Started" and three cards:

- Launch New Instance**: An icon of a rocket ship. Description: "Browse Atmosphere's list of available images and select one to launch a new instance."
- Browse Help Resources**: An icon of a question mark inside a cloud. Description: "View a video tutorial, read the how-to guides, or email the Atmosphere support team."
- Change Your Settings**: An icon of a gear and wrench. Description: "Modify your account settings, view your resource quota, or request more resources."

We are not going to use this in class,
instead use OpenStack API



Accessing Jetstream

- You already have API access, **do not contact Jetstream admin for access again.**
- <https://iujetstream.atlassian.net/wiki/spaces/JWT/pages/31391748/After+API+access+has+been+granted>
 - This is where you should start.
- You can test your API/Horizon access at:
<https://tacc.jetstream-cloud.org/dashboard>
<https://iu.jetstream-cloud.org/dashboard>
using your TACC credentials and the domain "**tacc**".
- Reset TACC Password at
<https://portal.tacc.utexas.edu/password-reset-/password/request-reset>

Openstack API Clients

- Horizon Web Interface
 - <https://iu.jetstream-cloud.org/dashboard>
- Command Line Access (preferred)
 - <https://uijetstream.atlassian.net/wiki/spaces/JWT/pages/40796180/Installing+the+Openstack+clients+on+OS+X>
- Detailed step by step instructions
 - <https://uijetstream.atlassian.net/wiki/spaces/JWT/pages/44826638/Using+the+OpenStack+Horizon+GUI+Interface>