HPC, Current State @ UW

UW/WSU/PNNL Exploratory Workshop, University of Washington

July 27, 2015

Overview - Part I

- High Level View of UW Cyberinfrastructure
  - What do we do?
  - When was/is it all happening (timeline)?
  - Why do we do this?
  - How are we doing?

Overview - Part II

- The Hyak Model

- Personal Supercomputers
- Traditional Supercomputers
- Having it all
- Does it work? Yes!

Overview - Part III

- The Hyak Mission & A Little Vision

- The Long Tail Escalator
- Partnership & Opportunity
- Advanced User Support
- Outreach & Curation

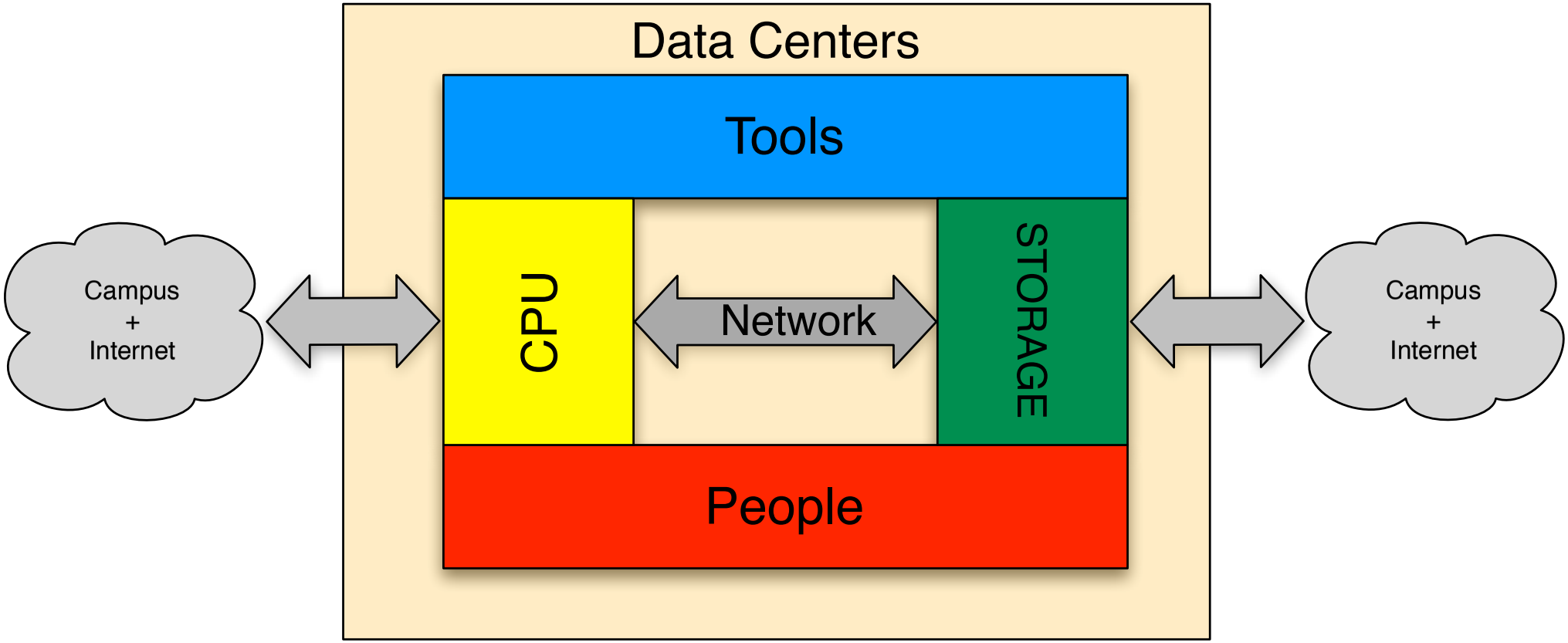
Q: What?
A: Cyberinfrastructure

Cyberinfrastructure is the coordinated aggregate of software, hardware and other technologies, as well as human expertise, required to support current and future discoveries in science and engineering.

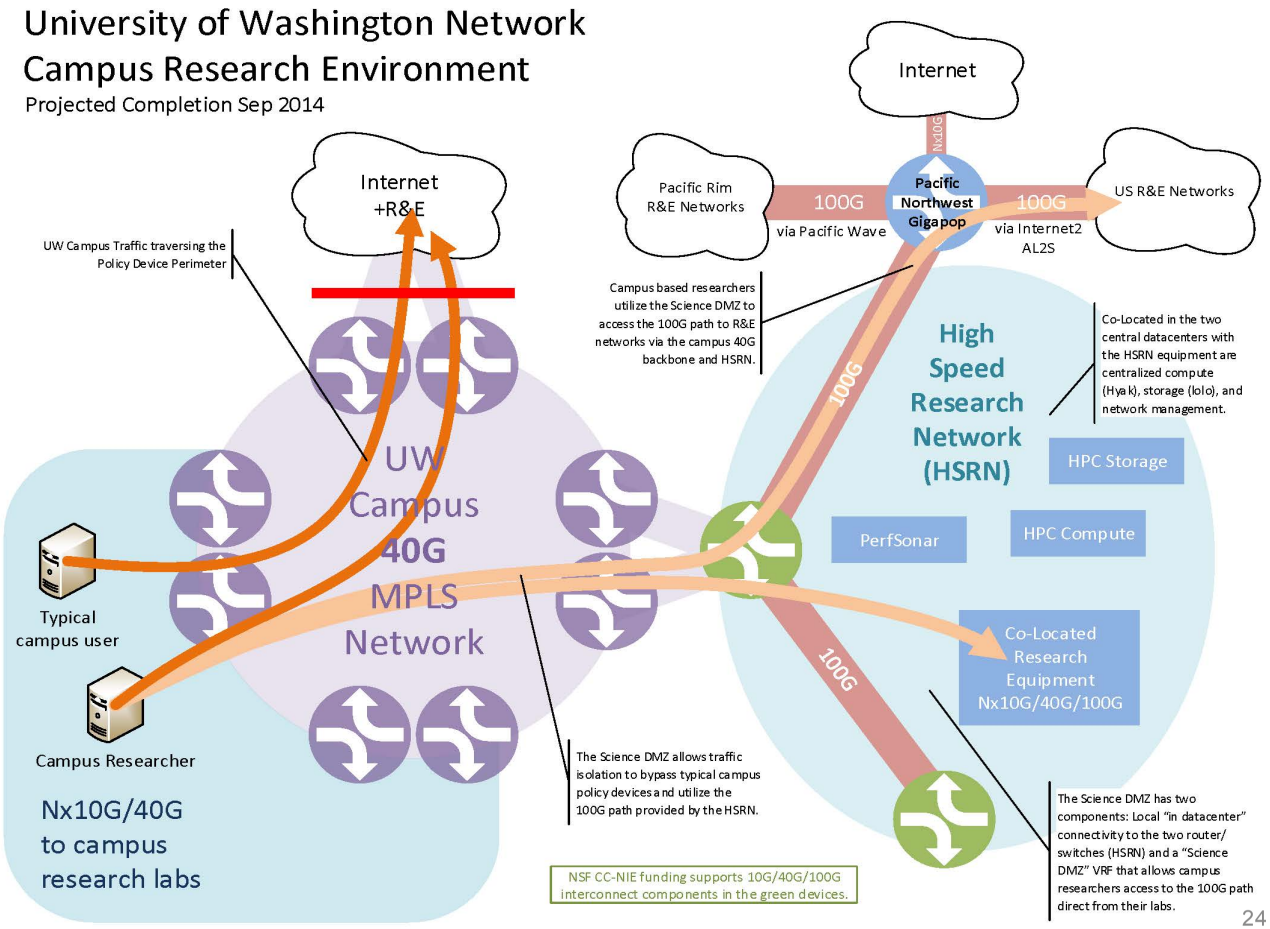
The challenge of Cyberinfrastructure is to integrate relevant and often disparate resources to provide a useful, usable, and enabling framework for research and discovery characterized by broad access and "end-to-end" coordination.

* Francine Berman (February 18, 2005). "SBE/CISE Workshop on Cyberinfrastructure for the Social Sciences". San Diego Supercomputer Center.

Q: What?
A: Cyberinfrastructure



HSRN & Science DMZ



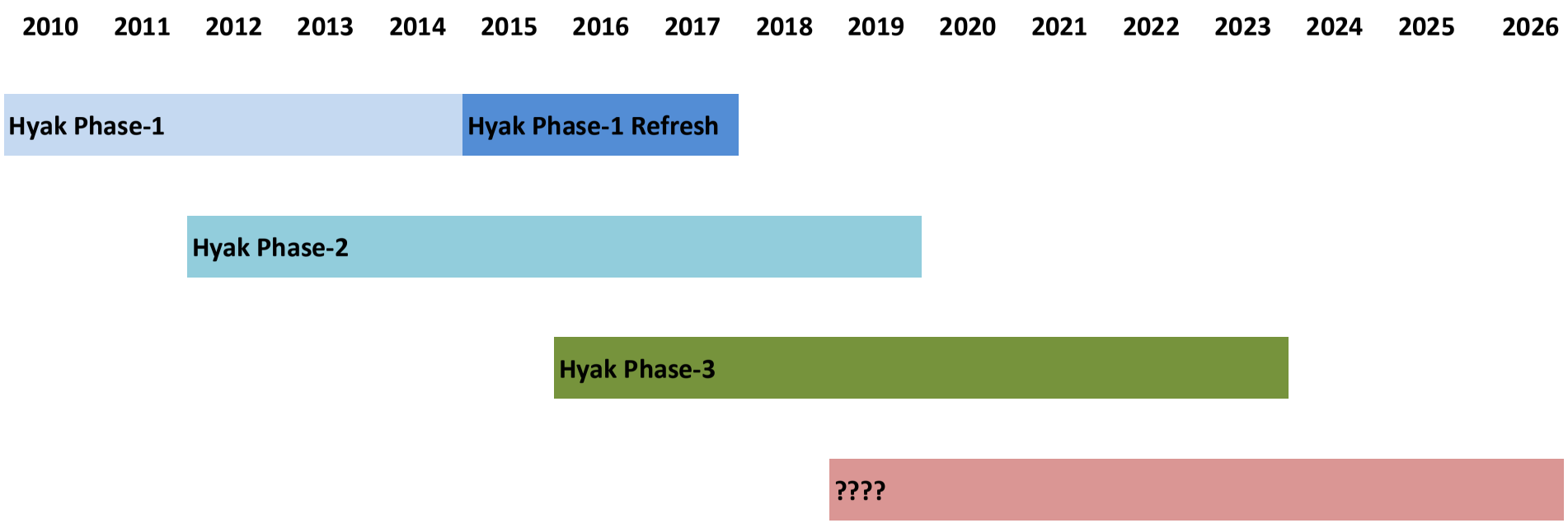
Q: What?
A: On-site HPC @UW

- UW-IT is Honest Broker
  - Help connect users with most appropriate resources
  - Whether those resources are local or remote
- **Recognize an Important Role for On-Site HPC**
  - **Speed of Science**
  - **Prep for PreExascale**
  - **Big Data Pipelines**
  - **Data Privacy for "Cloudy" Workloads**

Q: When?
A: Started in 2010

- 2000 steep uptick in computational research (Linux, cheap x86, Beowulf)
- 2005 data centers overwhelmed
- 2005 “data science” discussions begin
- 2007 VPR convenes forums to discuss solutions
- 2007 - 08 Conversations with UW Research Leaders
- 2008 VPR hires first eScientist (me)
- 2008 eScience Rollout event
- **2010 Hyak / Iolo / primitive Science DMZ (MRI + UW “club” — domain scientists/engineers solved for themselves)**
- 2014 High Speed Research Network / Science DMZ

Q: When?
A: Set Through 2024 and Beyond



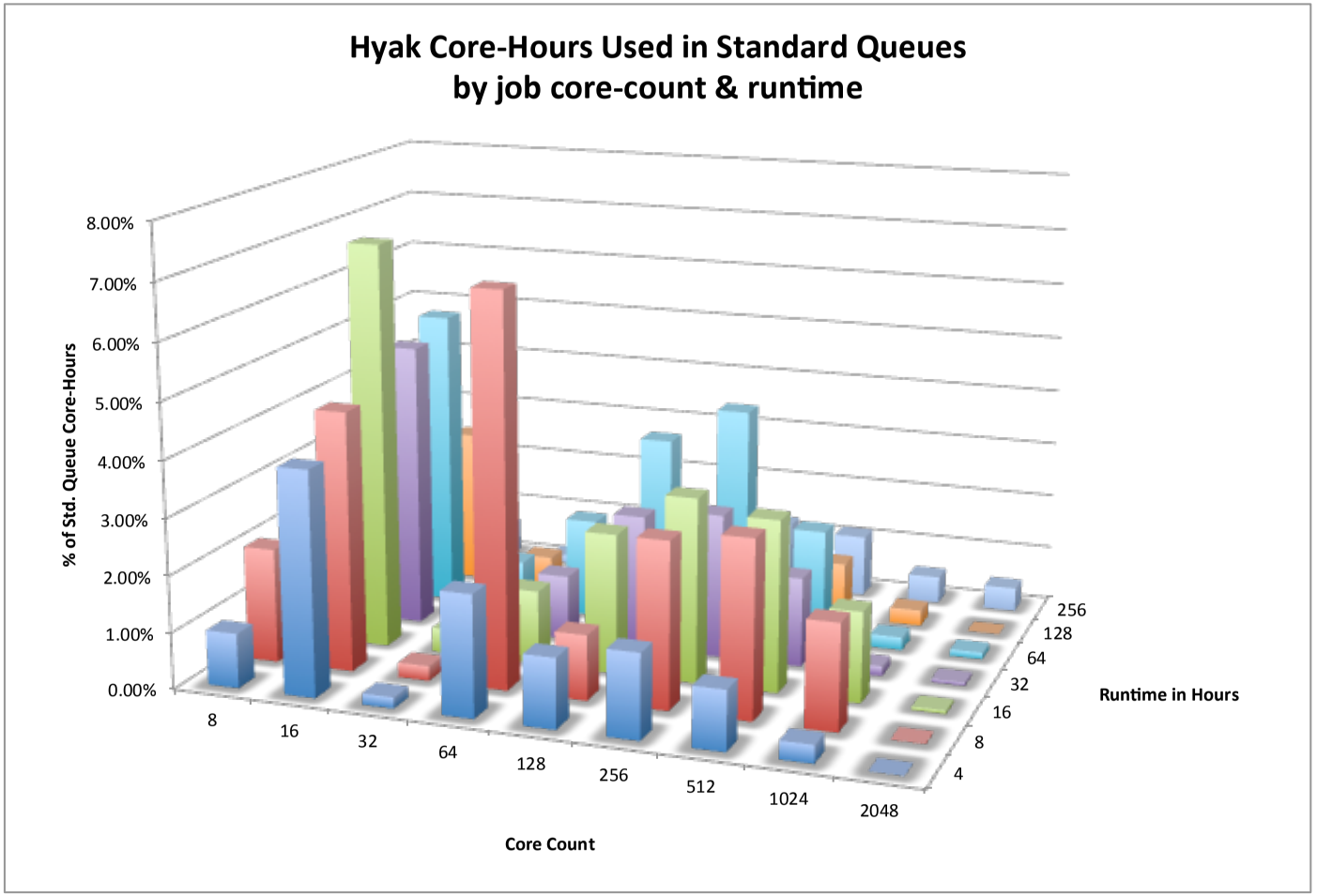
Q: Why (Leadership POV)?
A: Competitiveness & CO2

- Faculty recruitment & retention
- Data center space crisis
- Climate Action Plan
- The scaling problem

Q: Why (user POV)?
A: Fill the Gap

- Midscale Capacity/Capability Computing
  - Speed of Science / Thought
  - Prep for PreExascale
  - Big Data Pipelines
- Data Privacy for “Cloudy” Workloads

Q: How Happy?
A: Very!



Hyak - Campus Condo Cluster

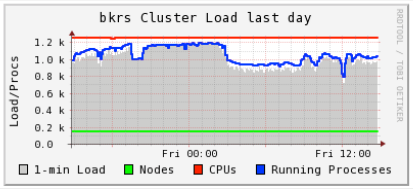
A Little Background

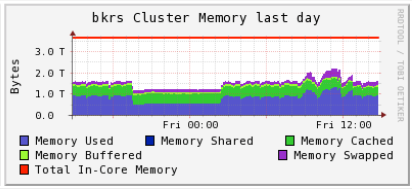
Hyak - Personal Supercomputers

bkrs (physical view)

CPUs Total:	1252
Hosts up:	147
Hosts down:	1

Avg Load (15, 5, 1m): 77%, 79%, 79%
Localtime: 2015-07-24 14:43

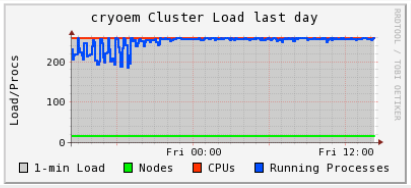


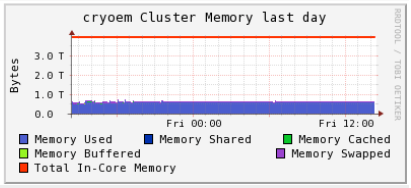


cryoem (physical view)

CPUs Total:	256
Hosts up:	16
Hosts down:	0

Avg Load (15, 5, 1m): 100%, 100%, 100%
Localtime: 2015-07-24 14:23





pfaendtner (physical view)

CPUs Total:	1512
Hosts up:	124
Hosts down:	1

Avg Load (15, 5, 1m): 79%, 79%, 80%
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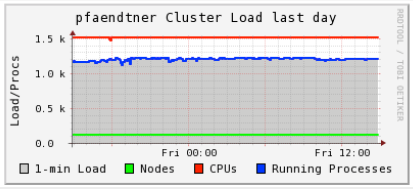

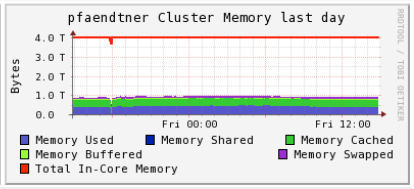

stf (physical view)

CPUs Total:	944
Hosts up:	66
Hosts down:	0

Avg Load (15, 5, 1m): 85%, 83%, 81%
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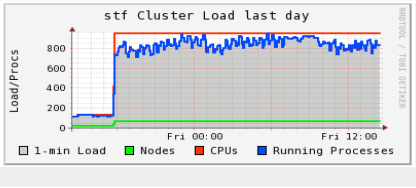
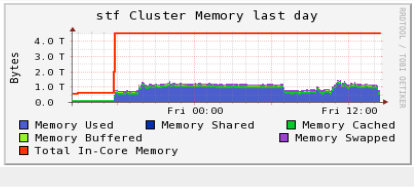
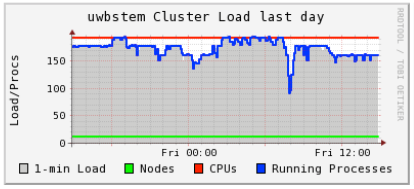


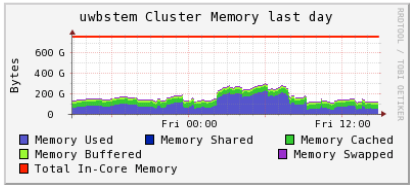


uwbstem (physical view)

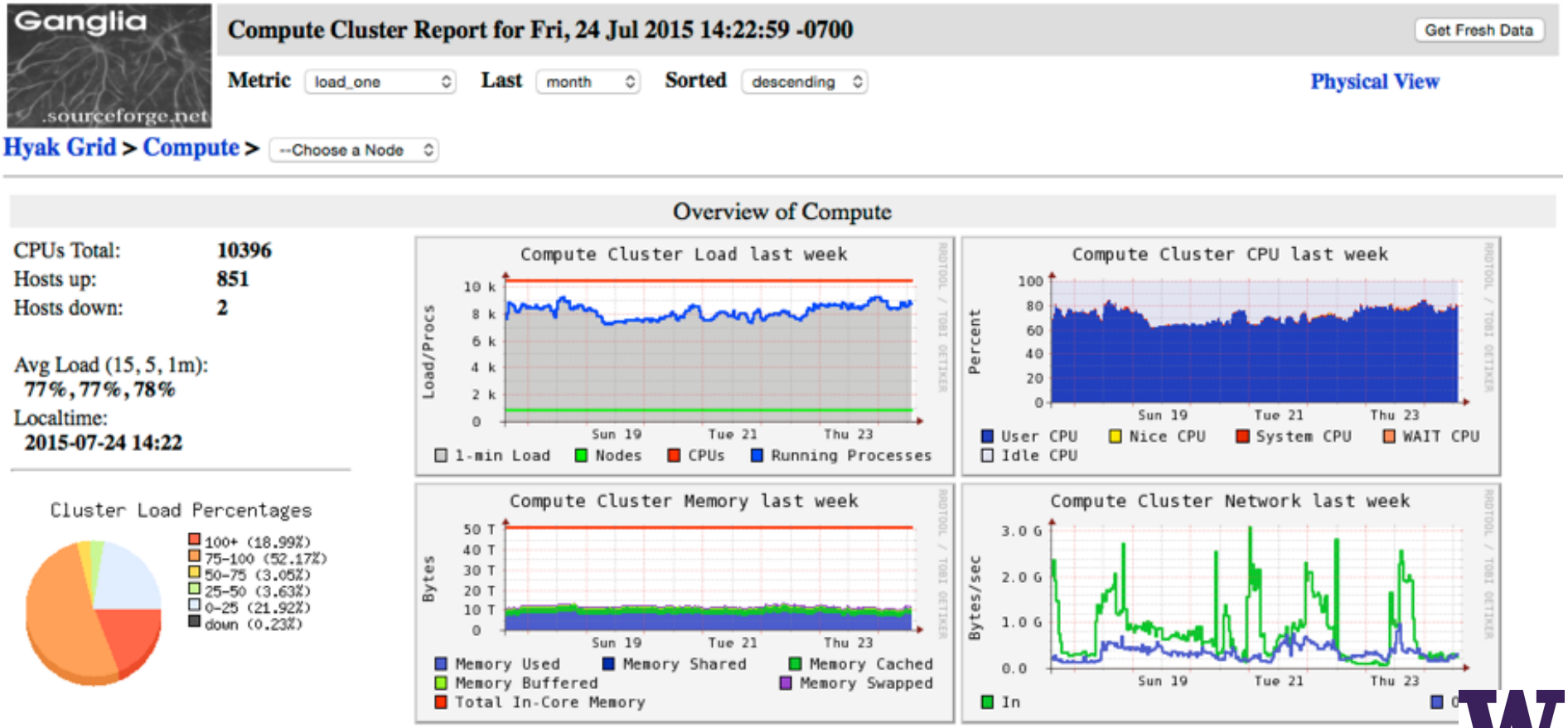
CPUs Total:	192
Hosts up:	12
Hosts down:	0

Avg Load (15, 5, 1m): 83%, 83%, 83%
Localtime: 2015-07-24 14:48

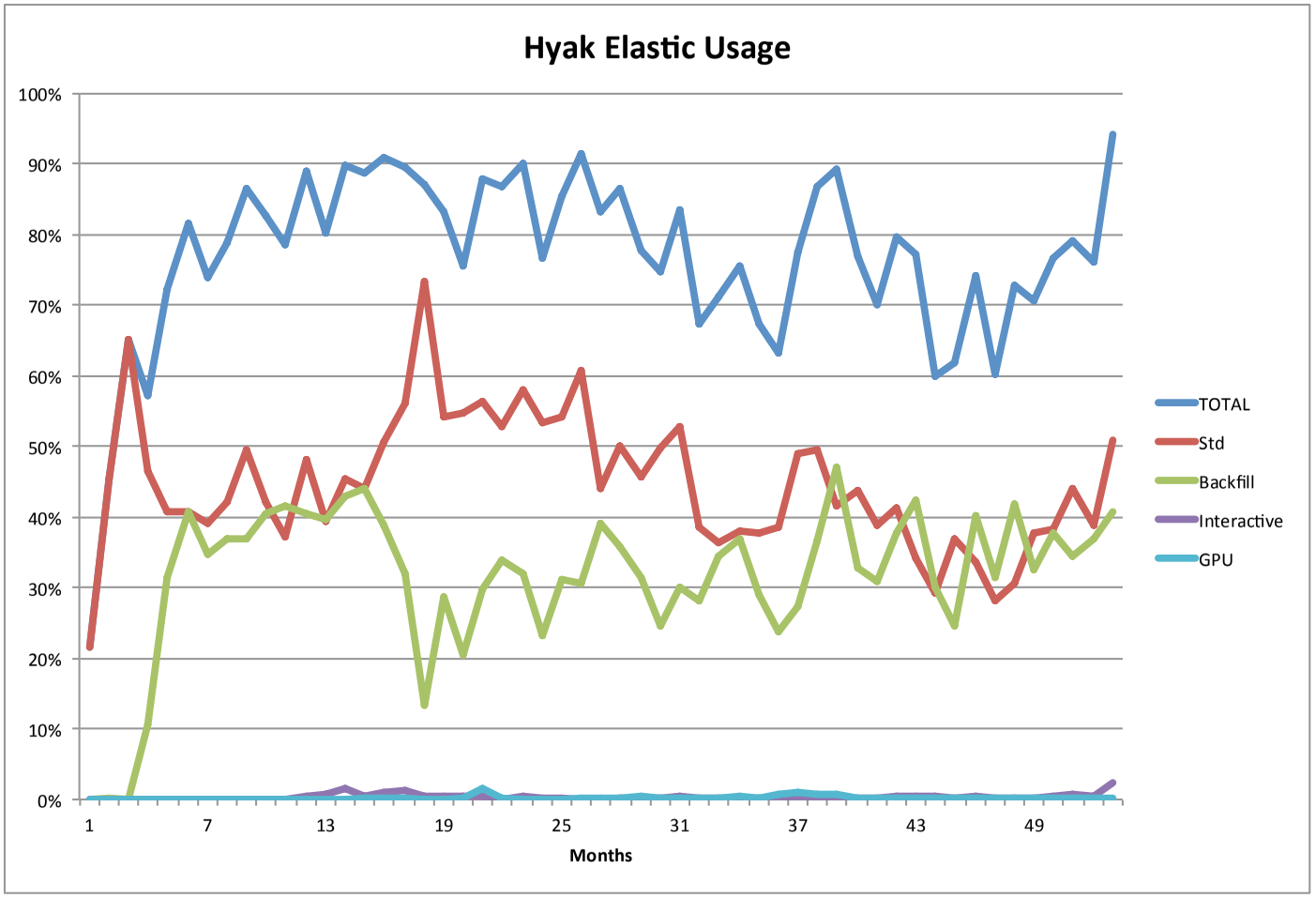




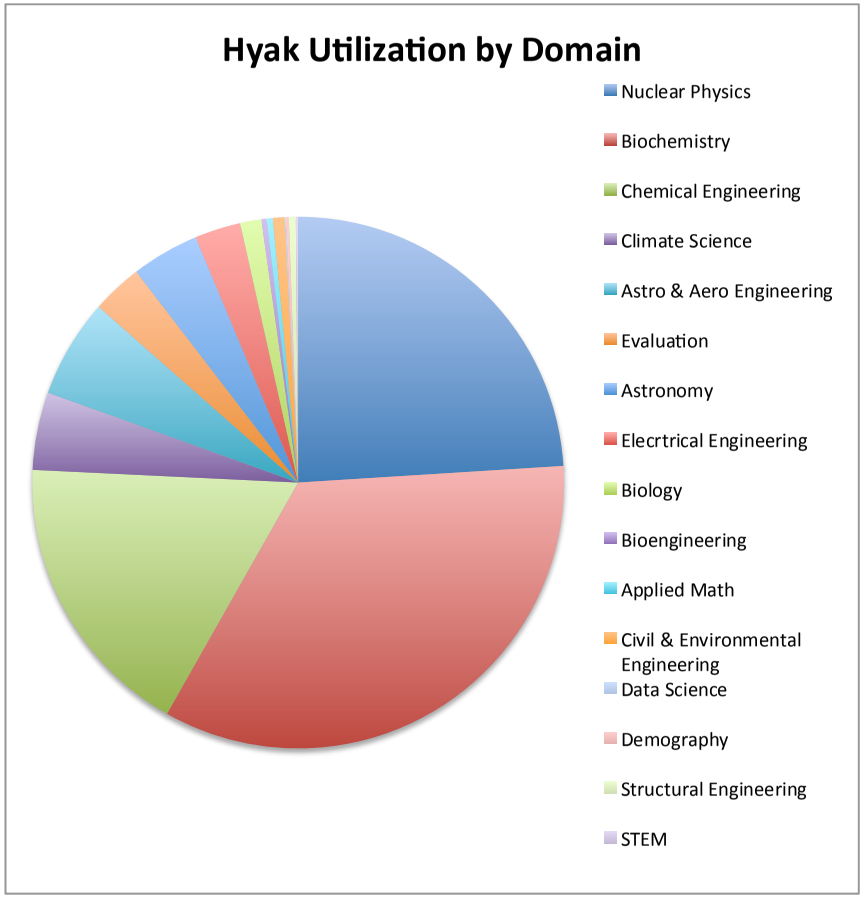
Hyak - A Traditional Supercomputer FREE!

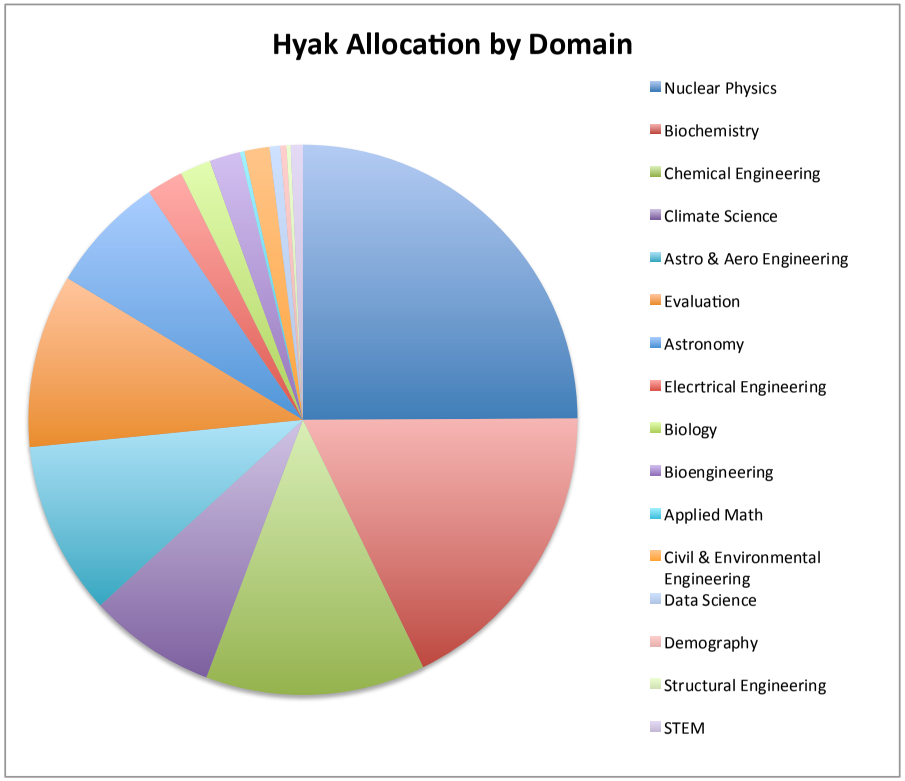


Elastic Supercomputing

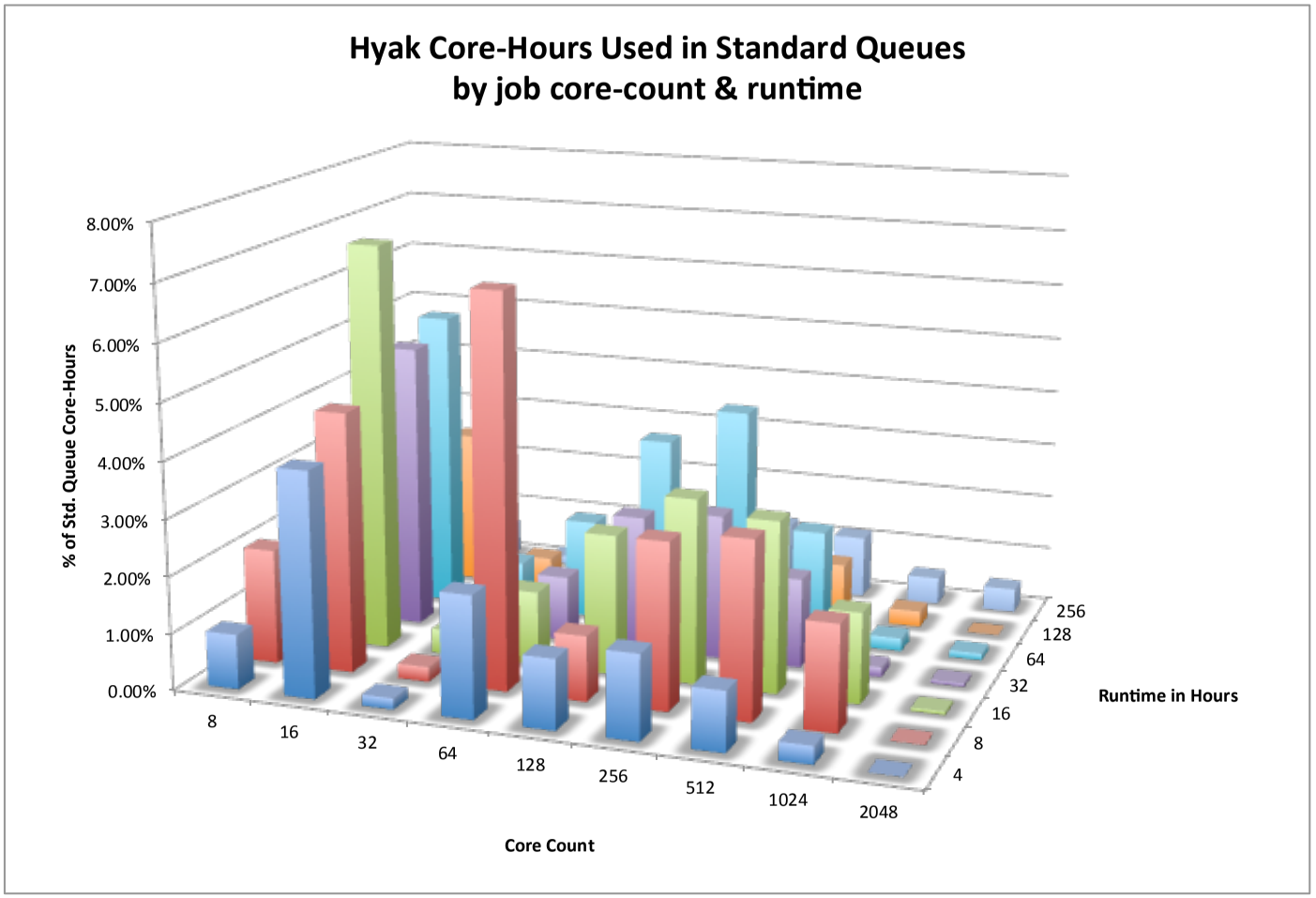


Hyak - Campus Condo Cluster





Q: How Well Does it Work?
A: Very!



Hyak - a ***SUPERCLOUD***

Your Personal Supercomputer

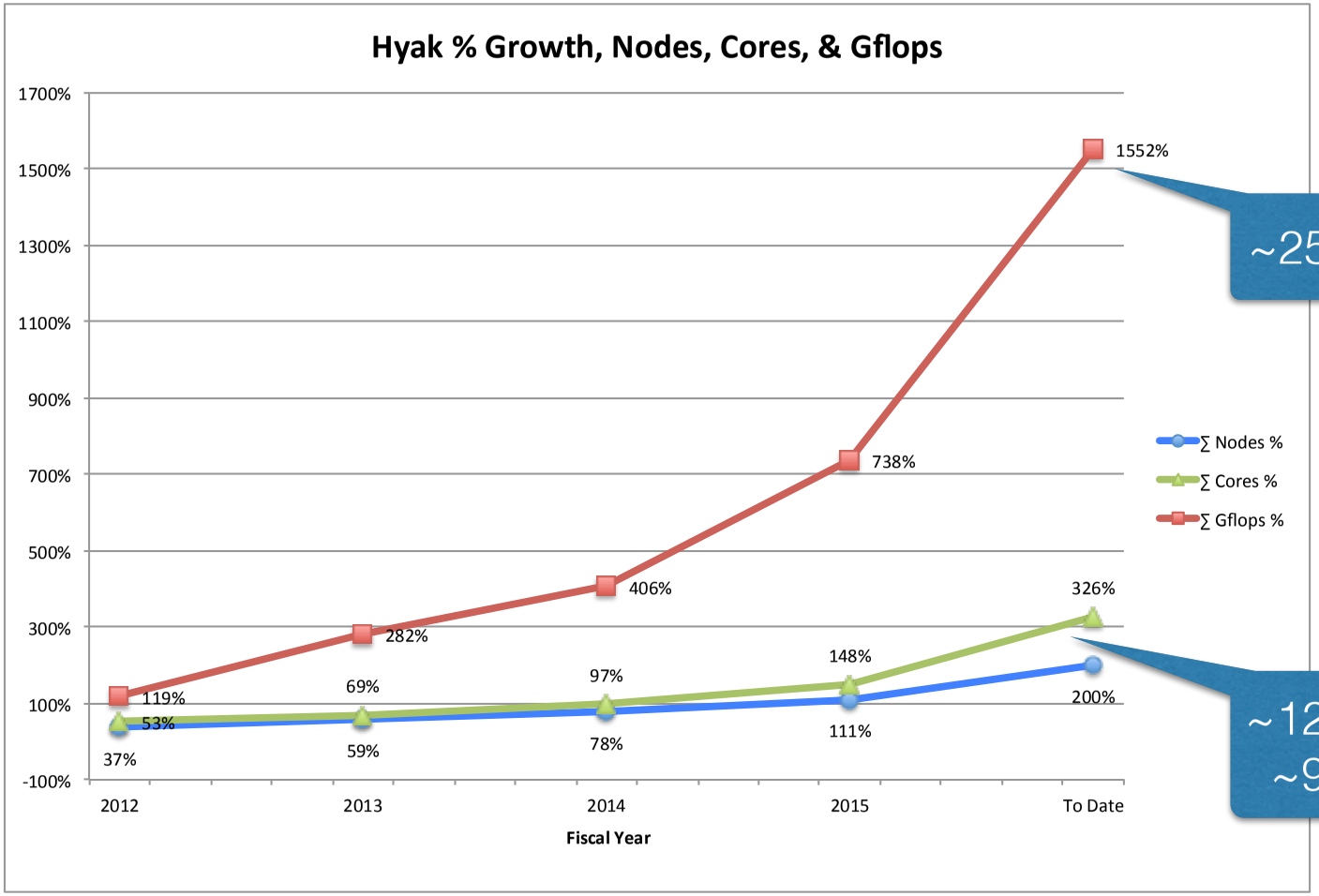
+

In a UW-IT managed “cloud”

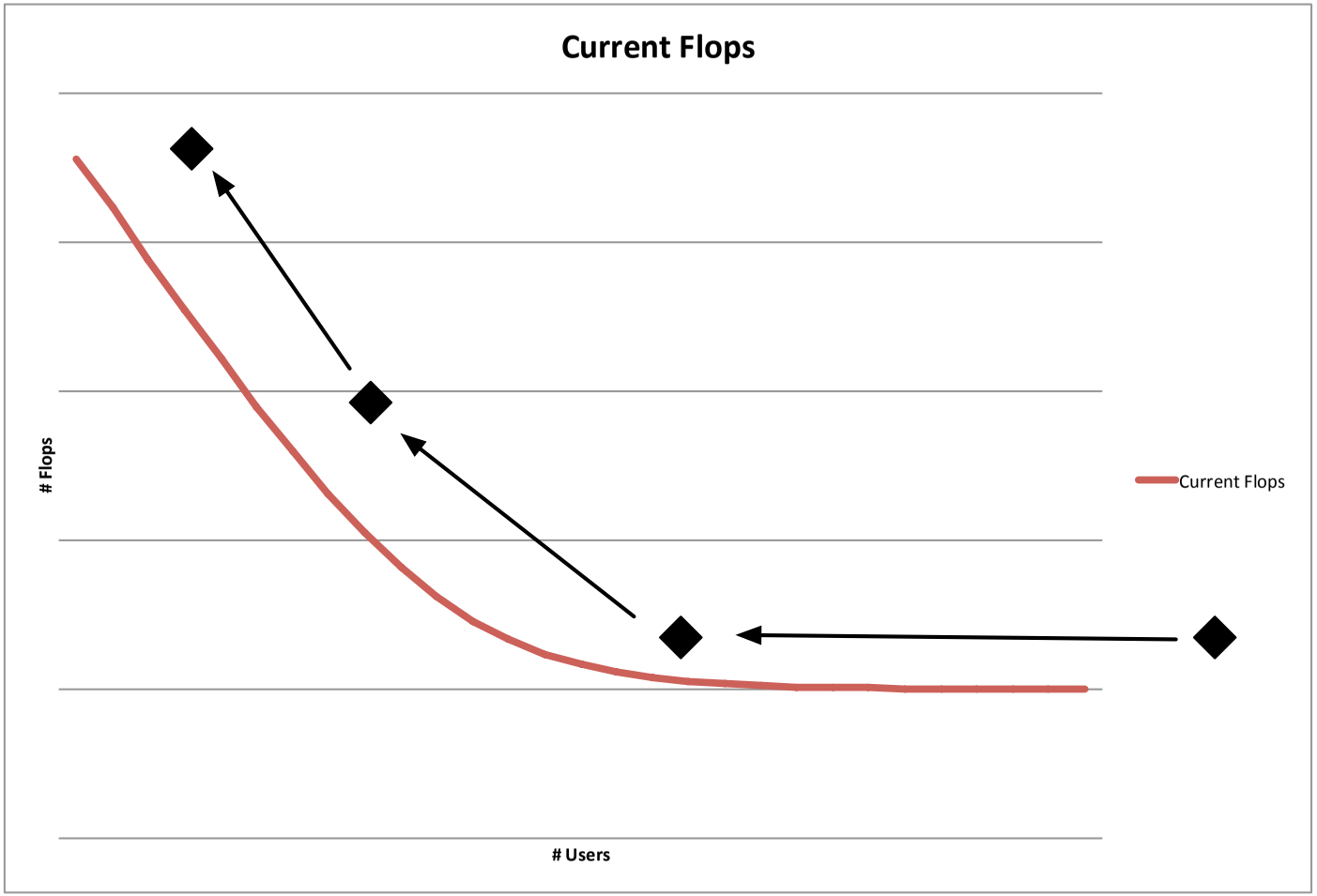
=

Elastic Supercomputing

Hyak - A Large & Growing Success



Q: What's Our Mission?
A: The Long Tail Escalator



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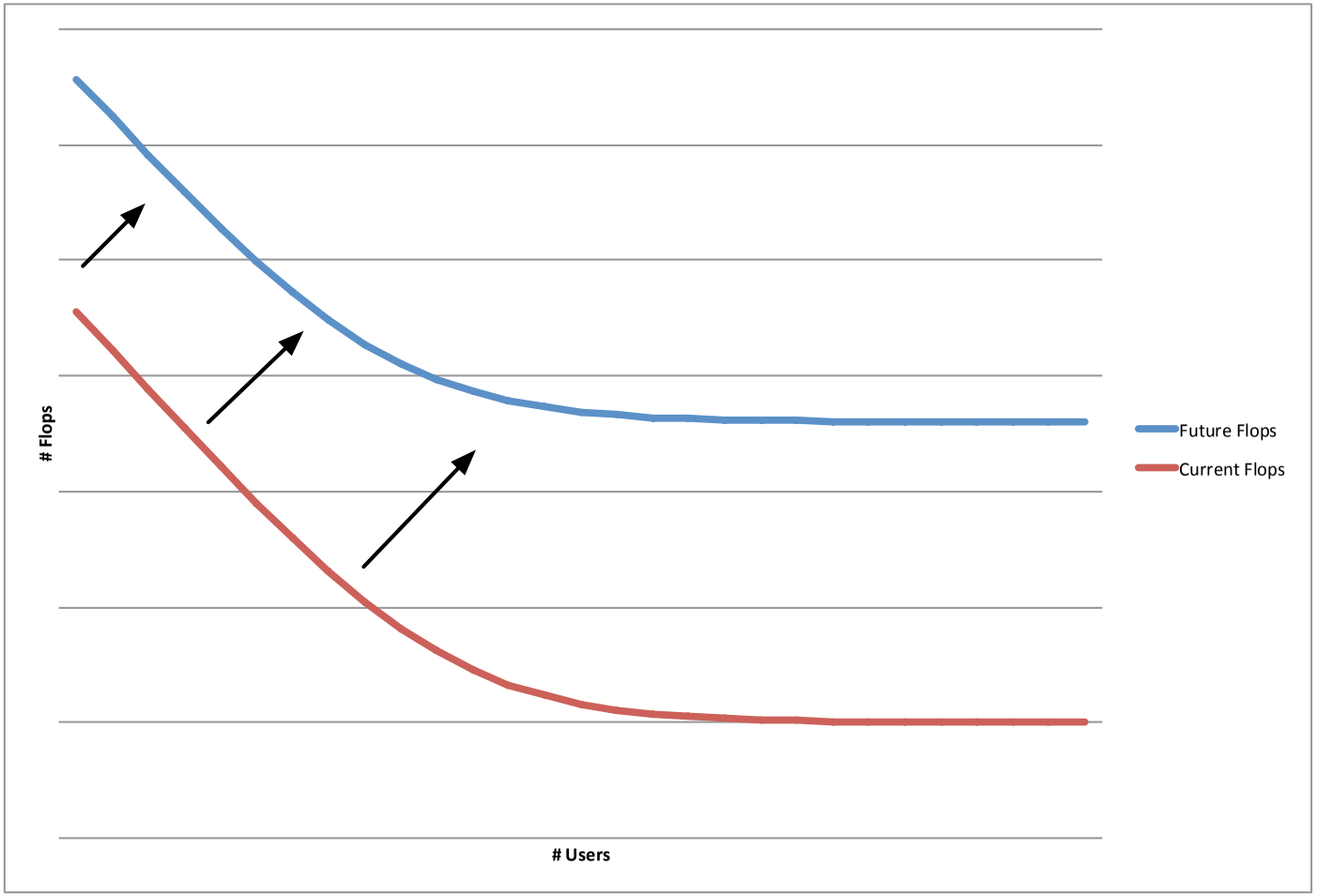
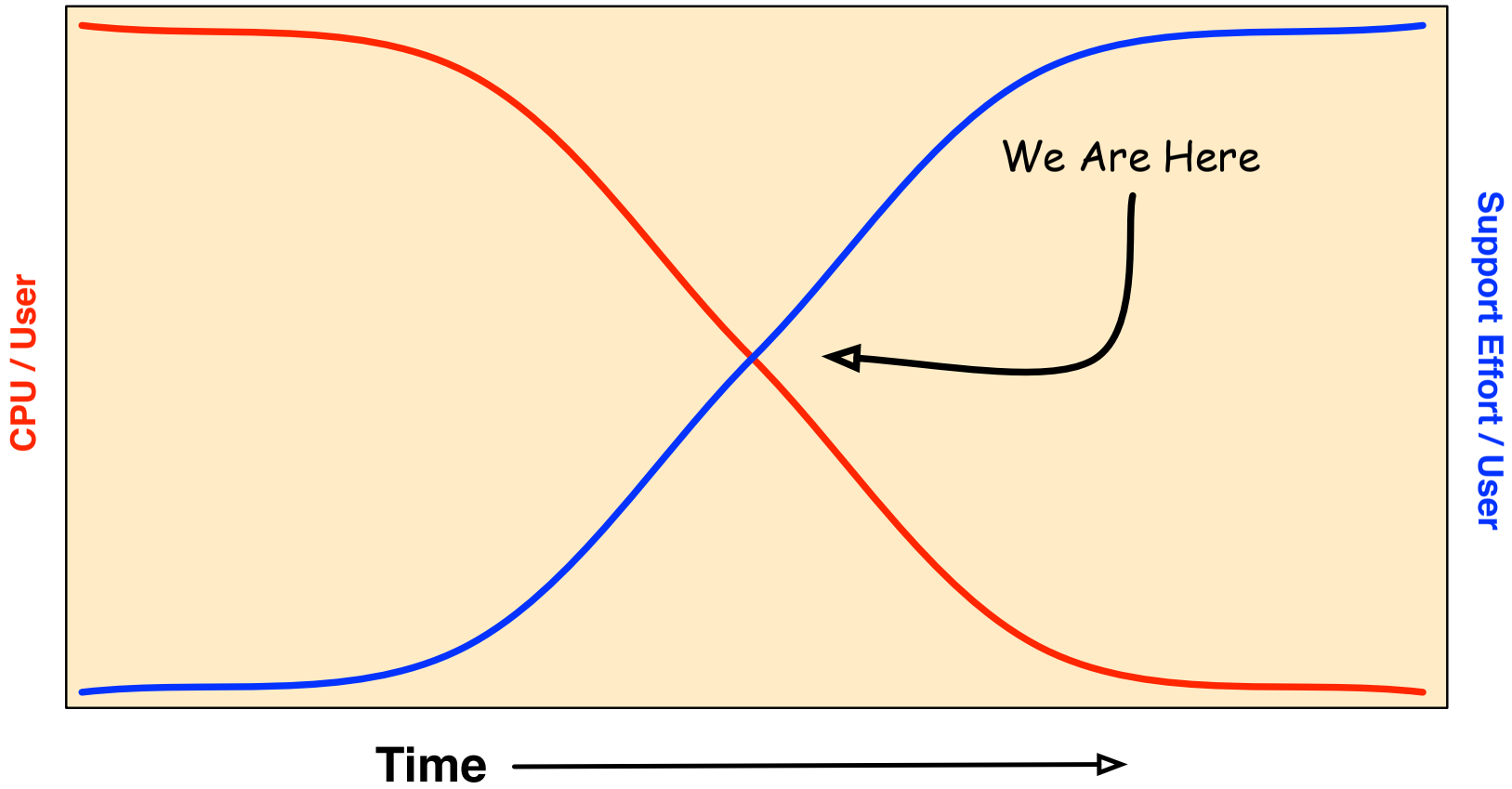
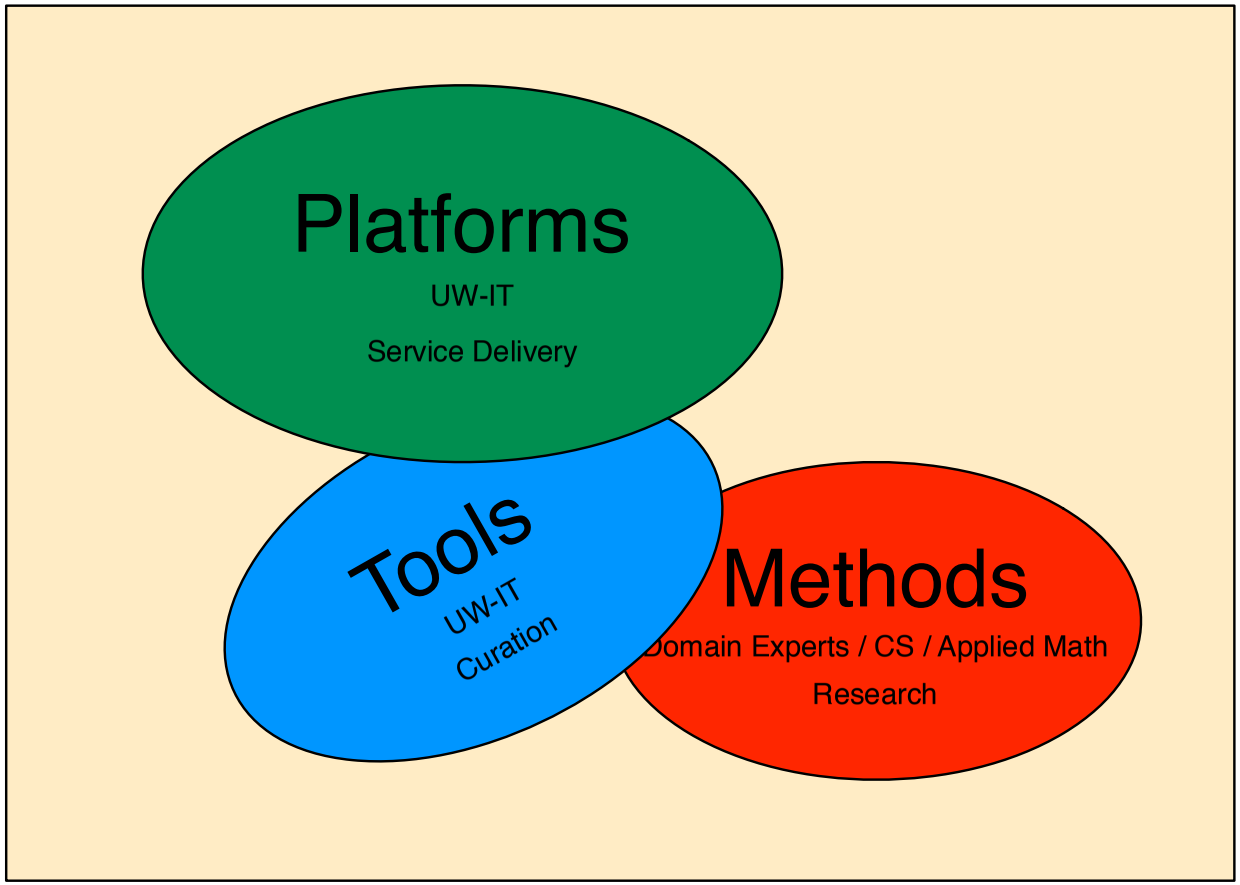


Q: Where (are we in the mission)?
A: The Long Tail



Q: How?
A: Partnership & Coordination



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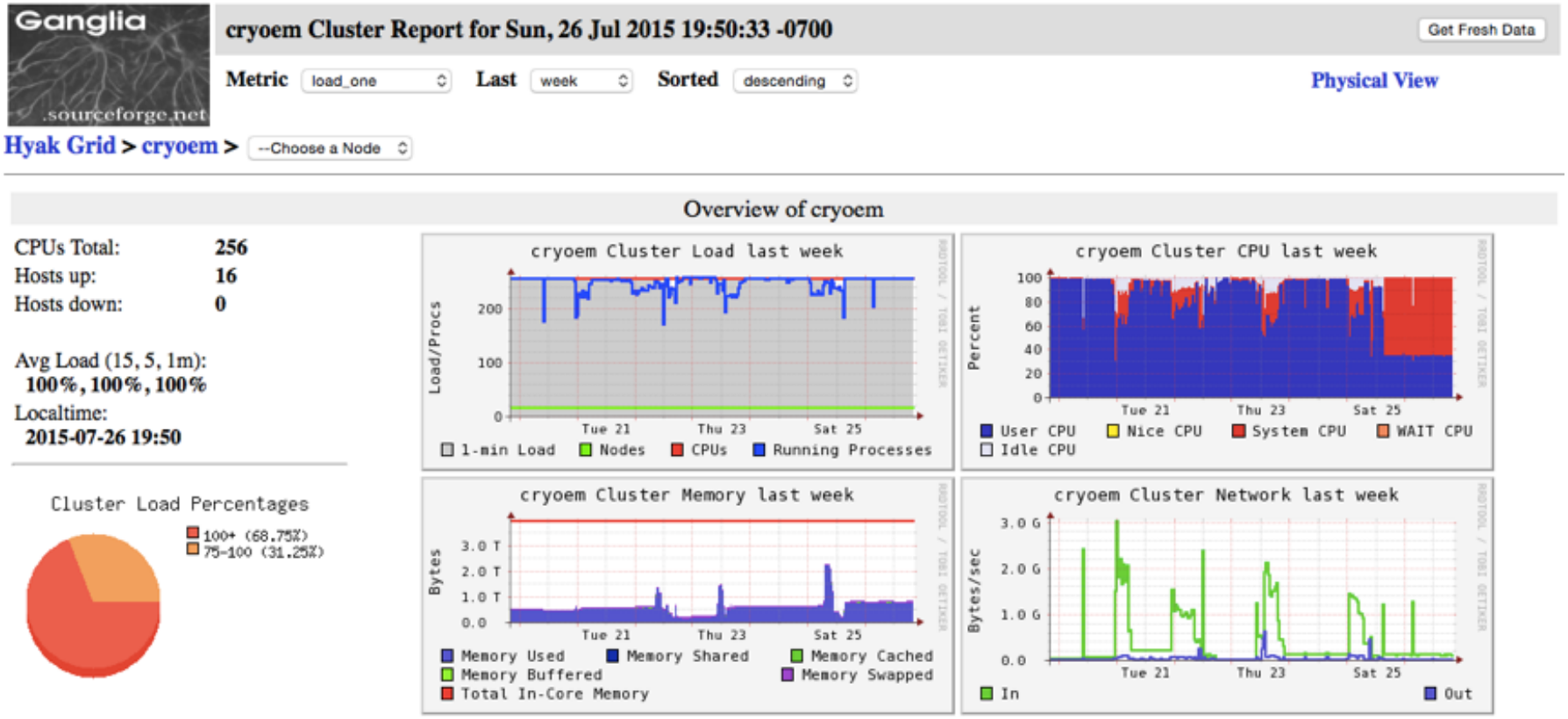

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Questions?

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