Flux: The State of the Cluster

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7 November 2012

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Questions

Thank you all for coming.

Questions?

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Flux Since Last November

Hardware

- added 4,000 cores of "standard" Flux nodes
  - 2,016 cores (12 cores/node), 4GB RAM per core
  - 1,984 cores (16 cores/node), 4GB RAM per core
- added 200 cores of "larger-memory" Flux nodes
  - 40 cores/node, 25GB RAM per core
- added 342TB parallel filesystem: `/scratch`
  - connected to compute nodes over InfiniBand
  - peak performance of 44Gb/s (5.5GB/s)



`/scratch` hardware

Questions Flux Since Last November Flux Today Flux Until Next November Questions

Flux Since Last November

Environment

- upgraded to the latest version of RedHat Linux
  - RedHat Enterprise Linux 6.3
- started requiring MTokens to log in
  - two-factor authentication on IIA's advice

Business Administration

- the rate was increased from ~$11/core/month to $18/core/month
- historical Flux usage data is available in MReports
  - `https://mreports.umich.edu/MReports/pages/Flux.aspx`



M-Token

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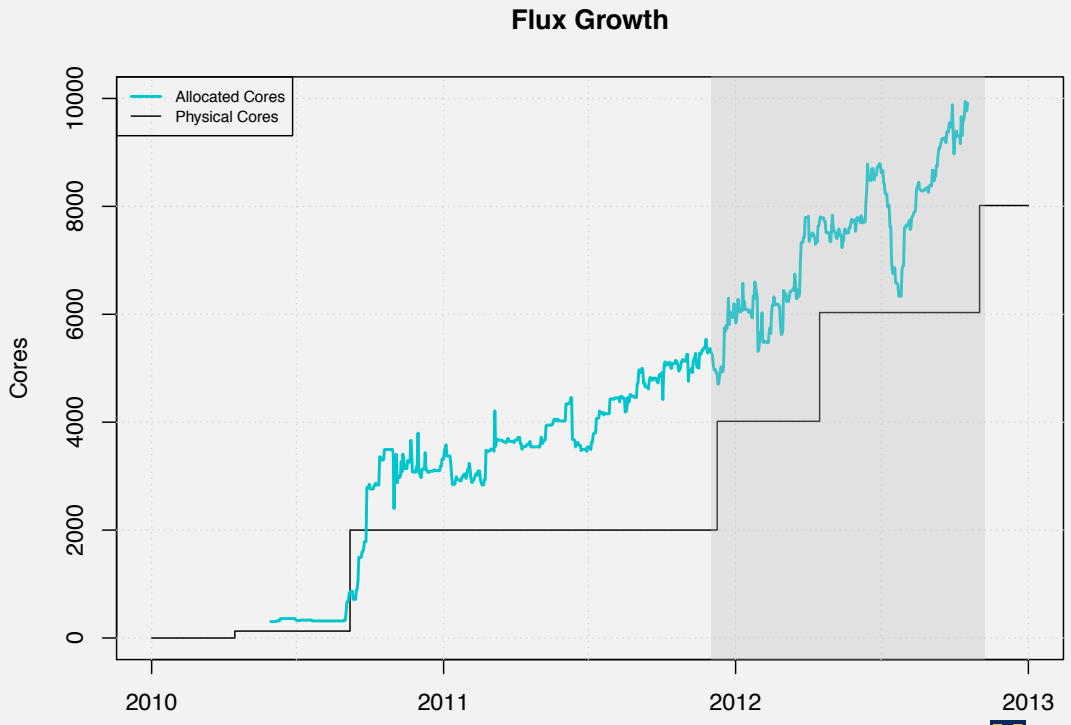
Flux Today: The Hardware

- 632 nodes providing 8,016 cores and 30TB RAM (4GB RAM/core)
- 5 nodes providing 200 cores and 5TB RAM (25GB RAM/core)
- 80GB home directories
- 324TB of scratch disk space
- 25Tb of network bandwidth (639 40Gb network connections)

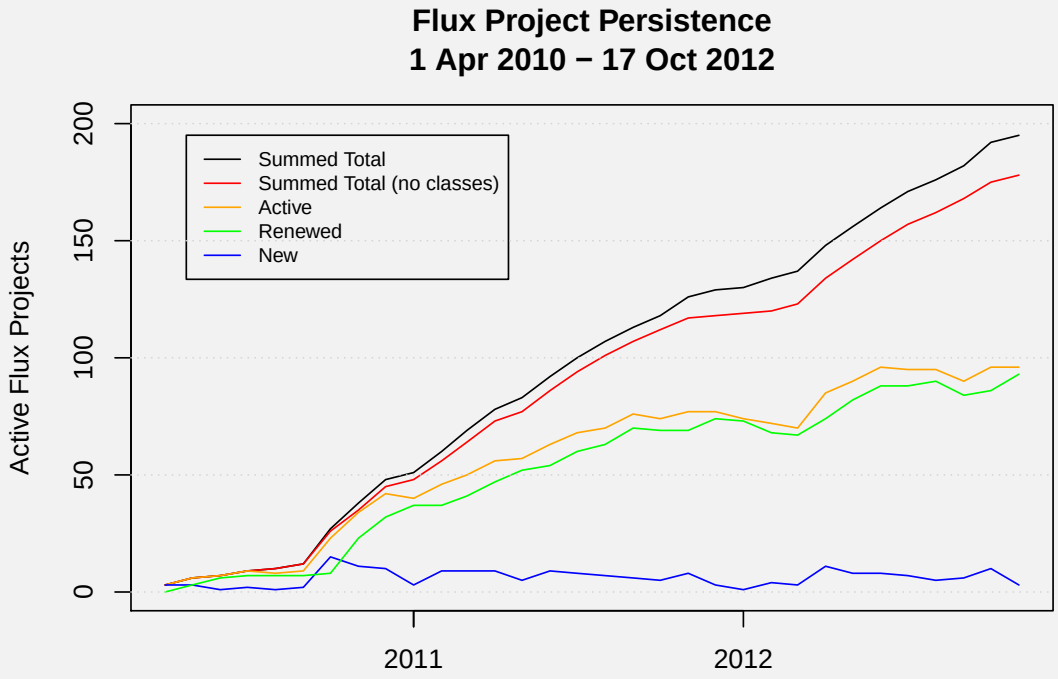


24 Flux nodes: 288 cores, $1\frac{1}{8}$TB RAM, 960Tbps bandwidth

Flux Today: Growth



Flux Today: Utilization



Flux Until Next November

Hardware

- adding $\sim 2,000$ more cores to get to $\sim 10,000$ cores
- expanding `/scratch`
  - adding 140 3TB disks for an additional $\sim$ 300 TB
  - `/scratch` will be 300 disks and $\sim$ 640TB usable space
  - performance will increase, as well as capacity

Networking

- 20Gb Ethernet connection to U-M backbone
  - if you have 10GbE storage, let us know
  - we can add more 10GbE links
  - upcoming network backbone upgrades will provide 100GbE

Flux Until Next November

Environment

- no major OS updates
  - minor OS updates, but no huge software library upgrades
- decreased resilience against loss of power
  - moving Flux to Modular Data Center
  - we expect this to be less expensive than the MACC, and will reflect that in the rate
    - data center is $\sim$ 20% of the rate
  - most of Flux will move at the end of December during the outage



Modular Data Center

Questions Flux Since Last November Flux Today Flux Until Next November Questions

Flux Until Next November

Business Administration

- research software library
  - for use by U-M faculty and students for publishable research
  - there will likely be a user agreement reflecting this
- rate increase to $\sim$ \$22/core/month
  - this is the last big rate increase
  - for planning purposes, expect 2–5% increase annually
  - you should talk to your Research Dean about subsidy planning
- Paul Killey has two sessions tomorrow on *Flux, for Research and other Academic Administrators*
  - at 9:15am and 2:30pm

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Flux Operating Environment

Federated Flux is an extension of Flux comprising hardware purchased by researchers and a subscription to the Flux Operating Environment (FOE).

- A subscription to the FOE provides all of the infrastructure and services that comprise Flux except the compute nodes
- The configuration of compute nodes added to the FOE is based on the most current configuration of nodes in Flux
- Hardware orders are aggregated and placed three times per year
- The rate for the FOE is $267 per node per month
- Web content is coming soon

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