Decoupling OpenHPC Critical Services

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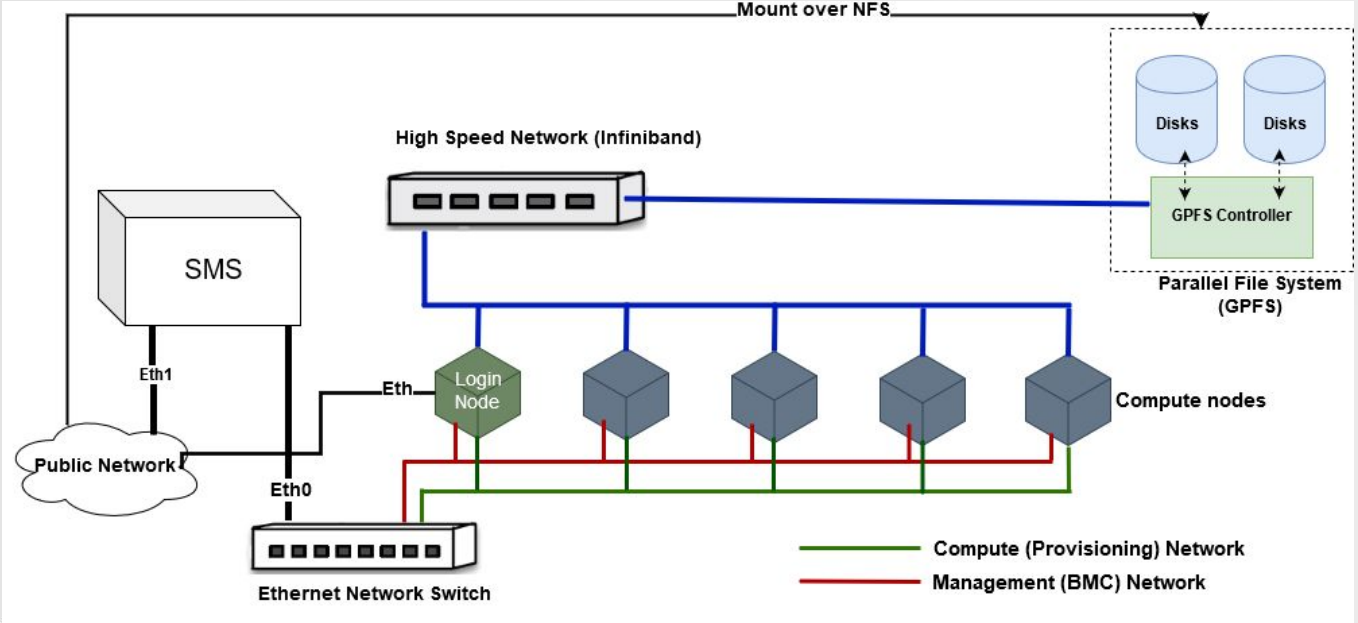
- HPC cluster toolkit that aggregates common HPC components (software development tools, scientific libraries, administrative utilities) into package repositories
  - Warewulf
  - Slurm
- Based on a centralized approach: a single **System Management Server (SMS)** is the “brains of the cluster”
- Cluster architect must “roll their own” **High Availability (HA)** if desired

Cluster Architecture

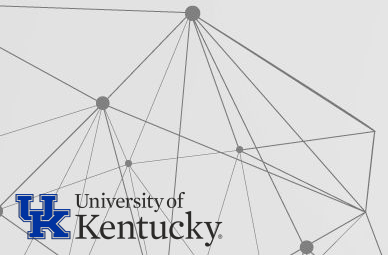


Upgrade Challenges

Risk "Don't fix it if it ain't broke"

Time "The cluster was down, so I missed my paper deadline"

ROI "Is this upgrade really worth it?"



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Minimizing Risk

Virtualization of the SMS

- Previous cluster administrative node was installed on bare-metal
- Root file system was on RAID1 with /etc backed up, but still anxiety when upgrading
- Installed the SMS in a traditional Virtual Machine (VirtualBox)
- Now able to fully clone the SMS VM before upgrading
- VM can be moved between underlying hardware

```
[root@cluster]# yum update
11,317 packages will be
updated taking 15 TB of
space. Are you sure? [y/n]
```

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Minimizing Time

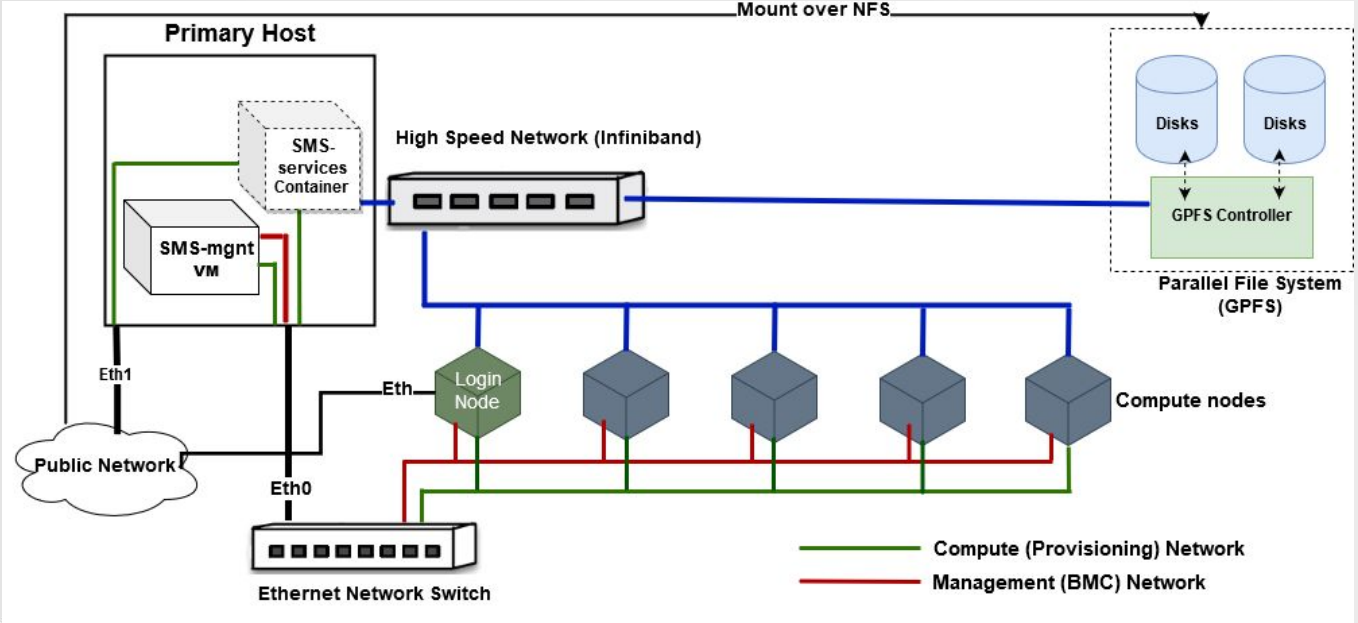
Decoupling SMS Services

- Sniffed network traffic on our provisioning network
- Identified services for each class of network traffic
- Partitioned services based on network connection initiator
  - TCP: Which node sent the SYN packet?
- Moved services to new infrastructure based on type
  - **SMS-Services**: Services which respond to requests from compute nodes (container)
  - **SMS-Mgmt**: Services which initiate connections to compute nodes (traditional VM)

Table of Services

SMS-Services	SMS-Mgmt
Rsyslog	Provisioning
NFS	File synchronization
Routing	
Ganglia/monitoring	
Slurm	
Mail	
NTP	

New Cluster Architecture



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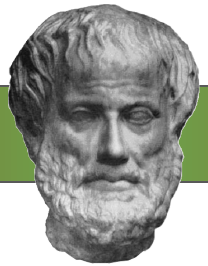
Determining ROI

Cluster Toolkit Release Frequency

3 months



2 years

openHPC

ROCKS
www.rocksclusters.org

THANKS

https://www.ccs.uky.edu/

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