SubMIT
Recent & Future Upgrades

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SubMIT Review
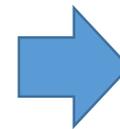May. 22nd 2024

Outline

- SubMIT in the past year

  - Accomplished major upgrades

  - Problems we encounters and its solution

- Recent&future upgrades

  - Control Groups implementation

  - System and software upgrades

  - LDAP server take over

  - Other plans

Accomplished Upgrades

- All the upgrade plans reported in the last review is accomplished
  - Operation system fully upgraded to AlmaLinux 9
    - All the crucial software: upgraded accordingly or replaced with other Alma9 packadges with the same functionality
  - Storage system migrated from Gluster to Ceph
    - Gluster disks decommissioned and used by Ceph
    - New disks put for Ceph: storage 500TB -> 1.5 PB

New Location

- ## SubMIT servers moved
  - happened on July 29, 2024, right after last review
  - 20 meters from the old location
  - big and better supported computing room

- ## The infrastructure is more compact
  - All submit machines contained within 4 racks
  - Three switches with 100Gib link

SubMIT Filer system

SubMIT servers

News, Project Team

Finally – subMIT moved

by **Christoph Paus** – July 31, 2024

Unexpected Outage

- On Saturday, March 22, **a scheduled MIT router upgrade**, during which the network was switched to a secondary router.

- The LNS network to the campus network is **not properly connected via the secondary router**, causing 6 hours down-time.

- The SubMIT had the check in person when outage happened and quickly identify the issue.

- Keep in contact the with the IS&T about the progress and informed users of the incident

News

Unexpected SubMIT Outage During MIT Network Maintenance

by **David Walter** – March 24, 2025

On Saturday, March 22, the SubMIT computing analysis facility experienced an unexpected six-hour outage, between 1pm and 7pm, due to [...]
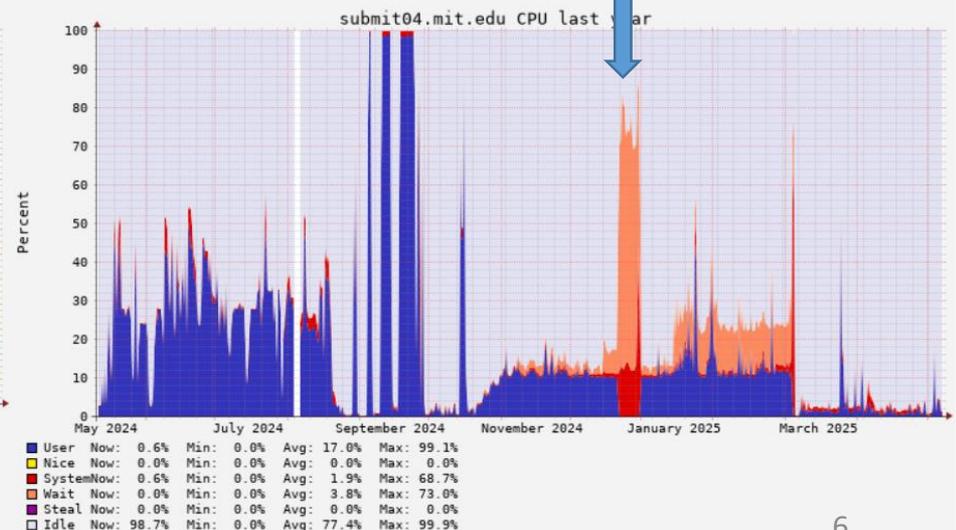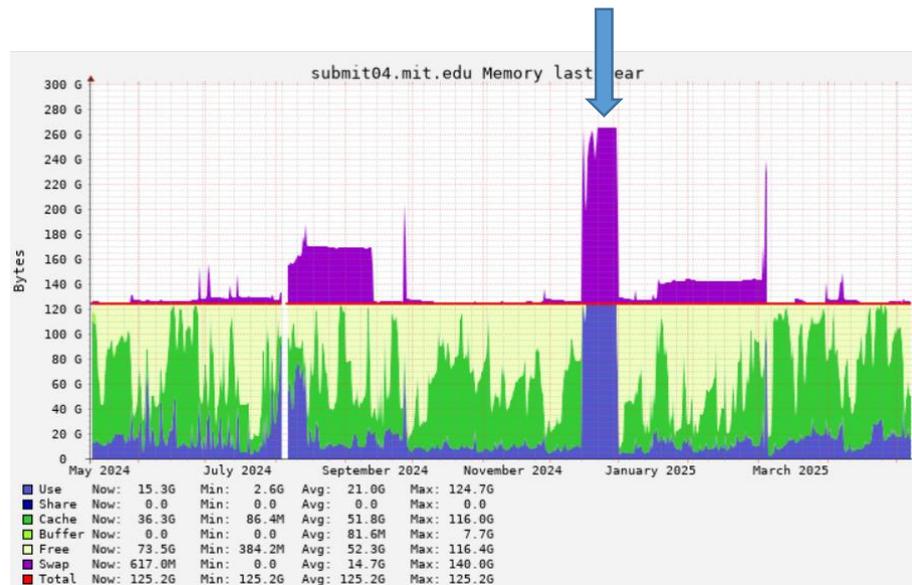
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- LNS router configuration adjusted to avoid such outage in the future

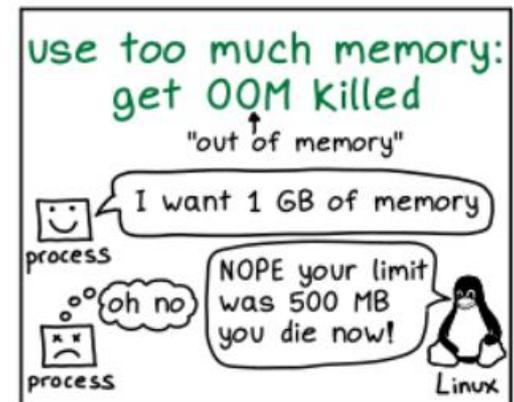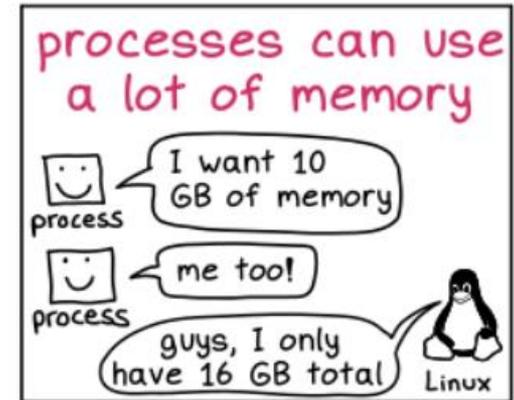- Subscribed to the IT System Status for the notice

5

Improper Operations

- Some user jobs unintentionally consume excessive CPU, memory, or I/O
  - Infinite loops or runaway processes
  - Excessive parallelization without limits
  - Poorly optimized code
- A single mistake brought down the entire server, along with the crucial service on it.
  - Sometimes we have to reboot the machine to bring it back

Control Groups

- Implement Control Groups (cgroup)
  - Accounts for, and isolates the resource usage
- The limits set up is far beyond an ordinary WFs
  - 70% memory of the machine
  - 90% of the CPU of the machine
  - Reserve certain resources for system service
  - Ensure that we don't constrain the productivity
- A safe guard to all the users for a stable system
- More resources freed under this protection
  - 10 Ceph servers put in slurm partition under cgroup protection

Control Groups in Slurm

- Cgroup partially implemented for basic protection
  - Limits applied on each machine to avoid overload and jammed the crucial service
- A more sophisticated cgroup set up on the way…..
  - **Cgroupv2** is implemented in the last upgrade,
  - Enable cgroupv2 in slurm
  - Improve cgroup setting on each server
- So that we have
  - Predictable performance for users
  - Reduced node crashes
  - Simplified cluster management
- Ensure a stable environment

cgroupv2

cgroupv2

System Upgrade

- Keep AlmaLinux version upgraded (current version 9.5)

- **Improvements**:
  - Security patches and kernel stability fixes
  - Enhanced **cgroup v2** support for better resource control
  - Faster systemd boot and updated core packages
    - **CephFS, NVIDIA Driver, Slurm, etc.**

News

System Maintenance Completed

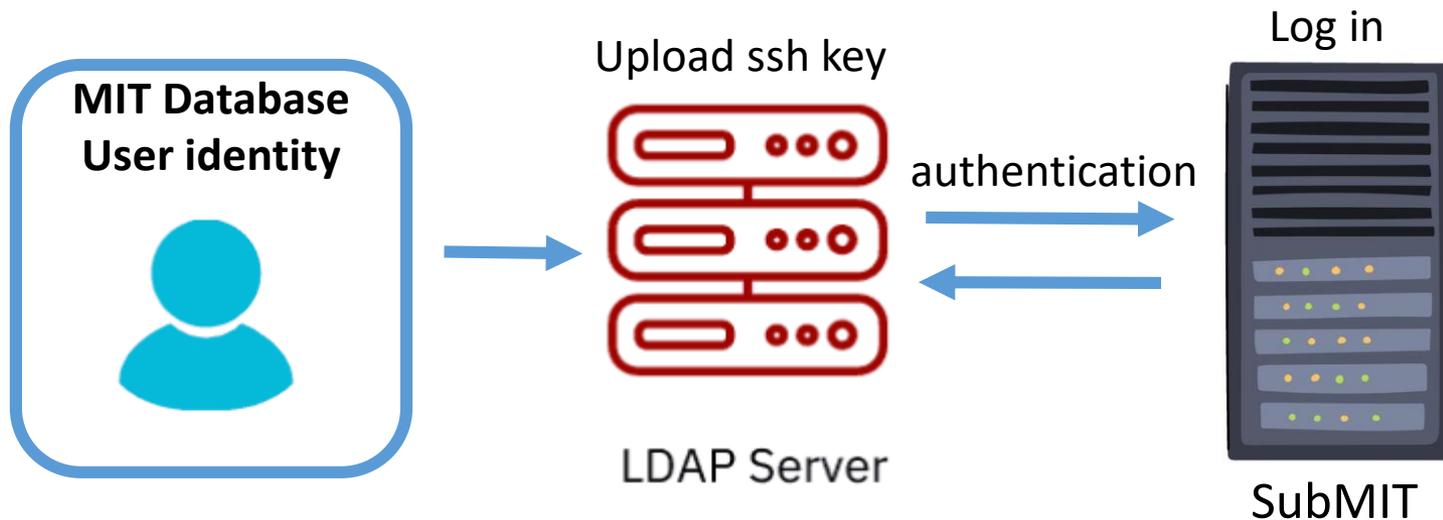by **Zhanqier Wang** – April 18, 2025

On Thursday afternoon, April 17, we performed scheduled system maintenance to apply a series of important upgrades. This required temporarily [...]

Upgrade Policy

- Security, compatibility, performance improvements
- 30 days after the new release of Alma9 version
- Includes crucial softwares
  - Batch: htcondor, slurmd
  - Storage and access: Ceph, xrootd
  - others: GPU drivers, wordpress, Julia, ...
- Software upon request

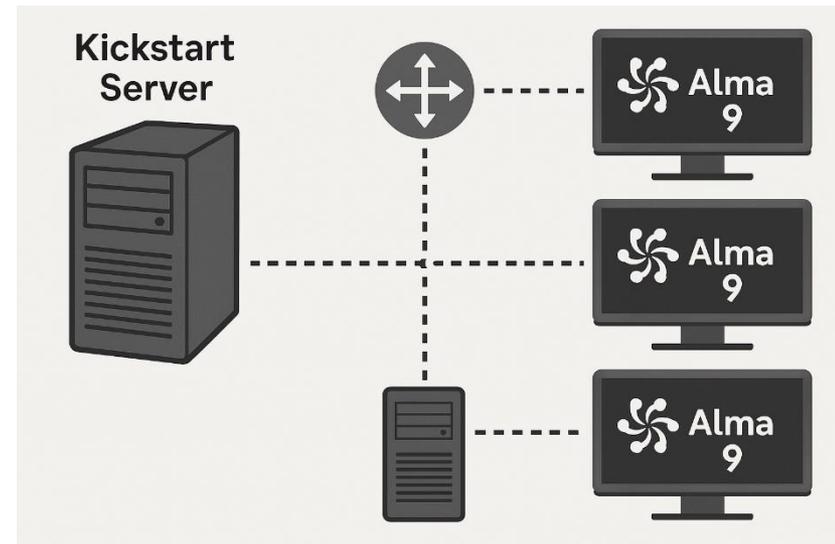PLAN

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LDAP Server

- The SubMIT user information is managed by LDAP, which is connected to the database of Athena to identify users.

Upload ssh key

Log in

MIT Database User identity

authentication

LDAP Server

SubMIT

- **Take over LDAP server**
  - reduce turn around time to manage research groups (GID) and manual operations
  - Add more detailed user metric – division, lab, etc.
- Streamlined account creation

PLAN

Other Plans

- Self cleaning mechanism
  - Orphan processes occur and left running for weeks without intervention
  - Consume extra resources
  - Automatically eliminate the orphan processes after long running

- Remote network management, Kickstart via pixel boot
  - Current status
    - Installation configuration ready
    - Kickstart server in preparation
  - Benefit
    - Largely automate the installation
    - Minimize human mistake
    - Consistency between servers
    - Fast recovery

Summary

- All the upgrade plan from the last SubMIT review is accomplished

- Some issue encountered, measures in place for precaution

- Presented the recent and future upgrade
  - Ensure that SubMIT stays as a high-performance analysis facility, and provides a stable, user-friendly environment.

The End