

|| HPE/HPC Strategy Meeting - All Regions ||

KISTI and the Nurion HPC Integration

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|| HEP/HPC Strategy Meeting - All Region ||
(30-31 Jan 2025)

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1. Nurion Introduction

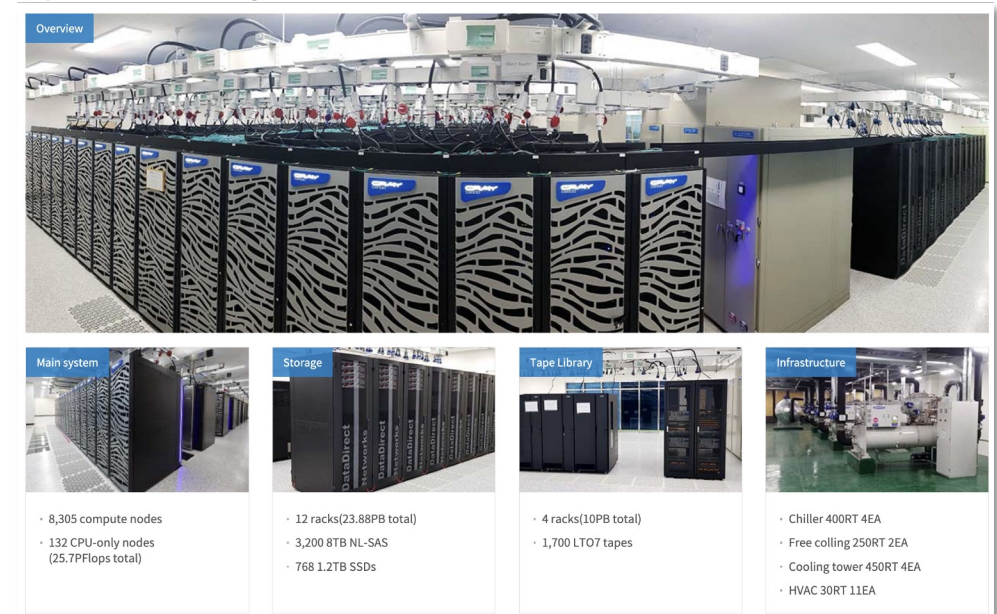
❖ Nurion?

- South Korea's 5th supercomputer introduced in 2018
- 11th on the Top500 list (at the time of its introduction)
- **Spec summary :**
 - Model : Cray CS5000
 - Architecture : Xeon Phi cluster
 - Nodes : 8,305
 - Cores : 564,740 (64cores * 8,305 nodes)
 - Memory : 797,3TB (96GB * 8,305 nodes)
 - Storage : 21PB (Diskless)

(Notice) Nearing its operational retirement
⇒ ***New GPU-based 6th supercomputer!***



<https://www.ksc.re.kr/eng/resources/nurion>

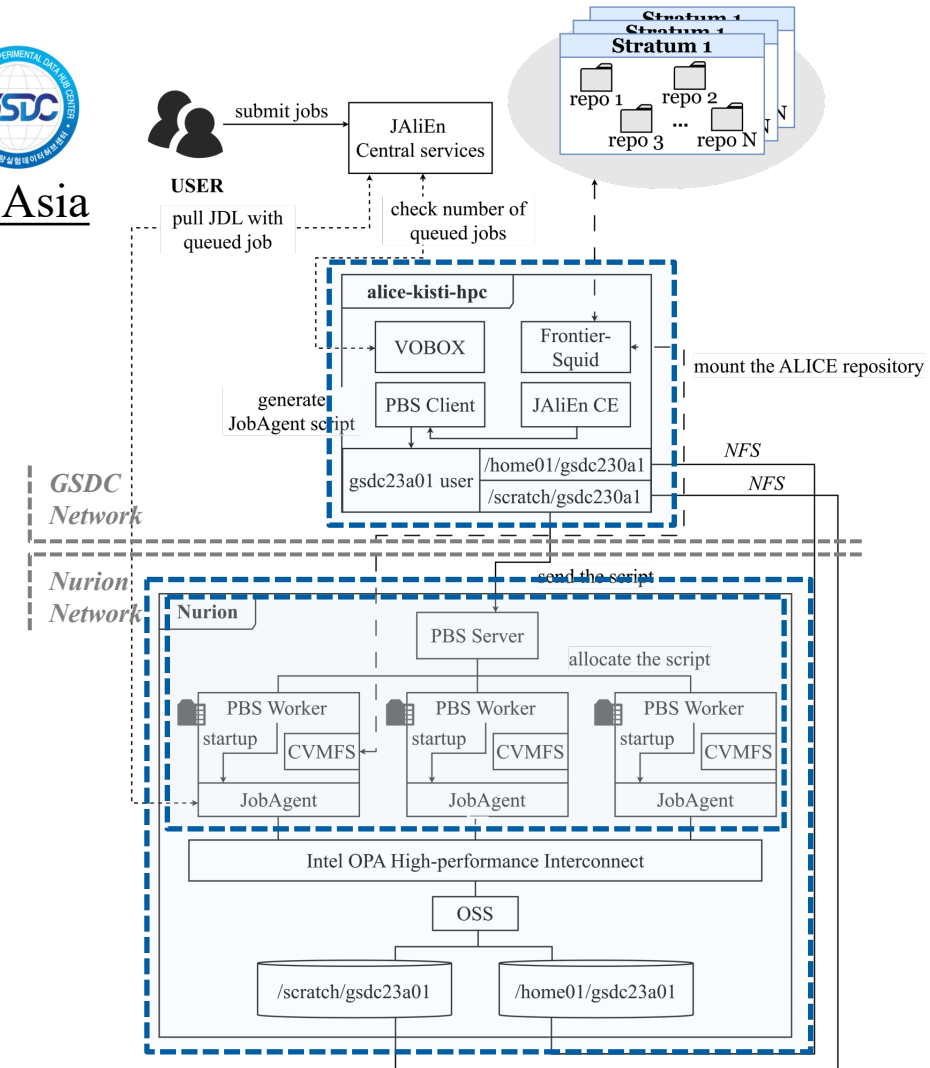
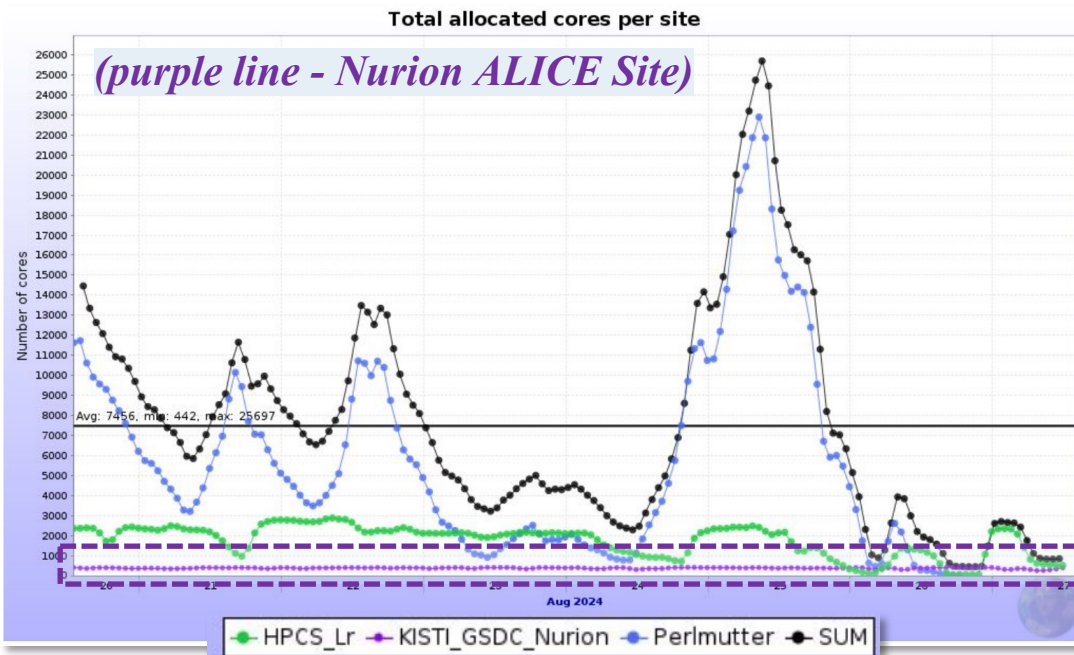


2. Nurion ALICE Site Introduction



❖ Nurion ALICE Site?

- The site based on Nurion introduced in 2024
 - GSDC at KISTI - the only institute operating Tier-1 center in Asia
- The 3rd SC Grid Site supporting ALICE (As of September 2024)
- Applying additional technologies for HPC-based environment

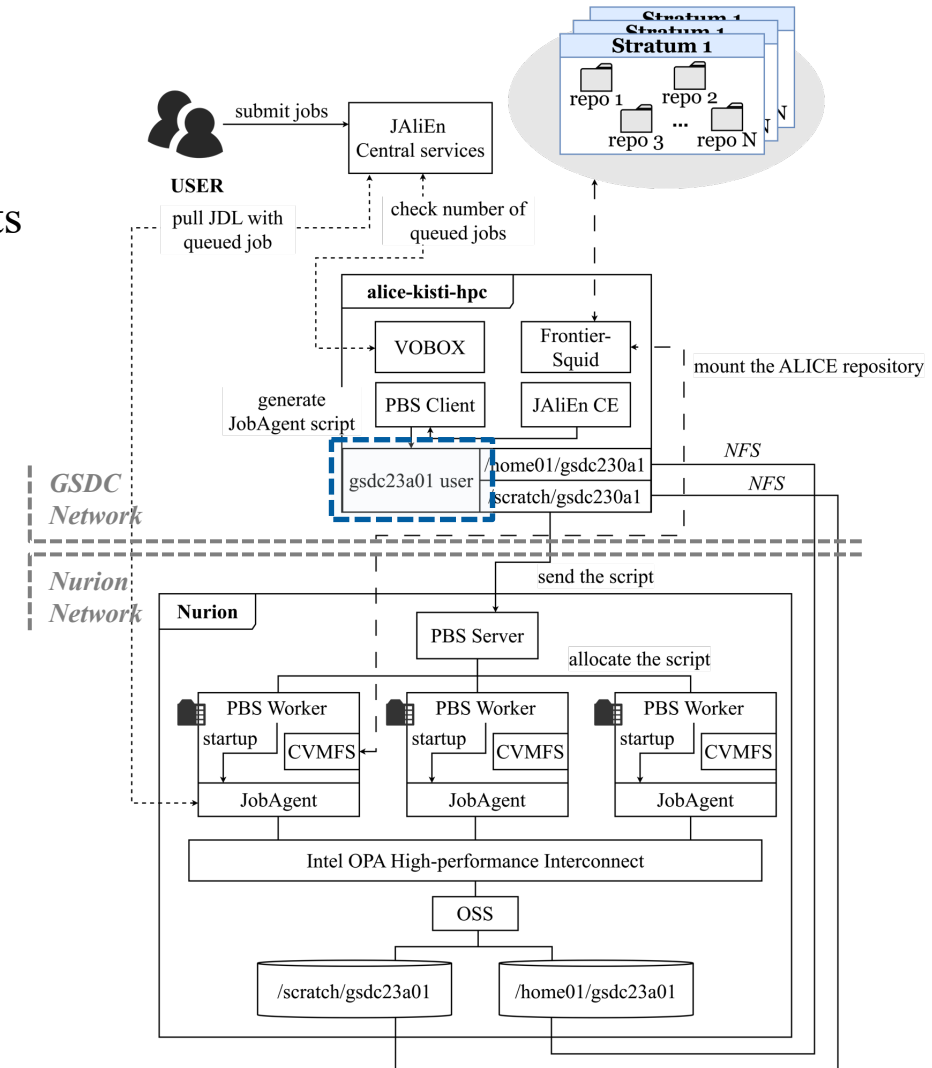


3. Specific Requirements

1. The application of LDAP and SSSD

- LDAP - to retrieve specific accounts from the LDAP server
- SSSD - enables access to directories restricted to certain accounts

⇒ accessing the designated job submitter account (gsdcXXa01)



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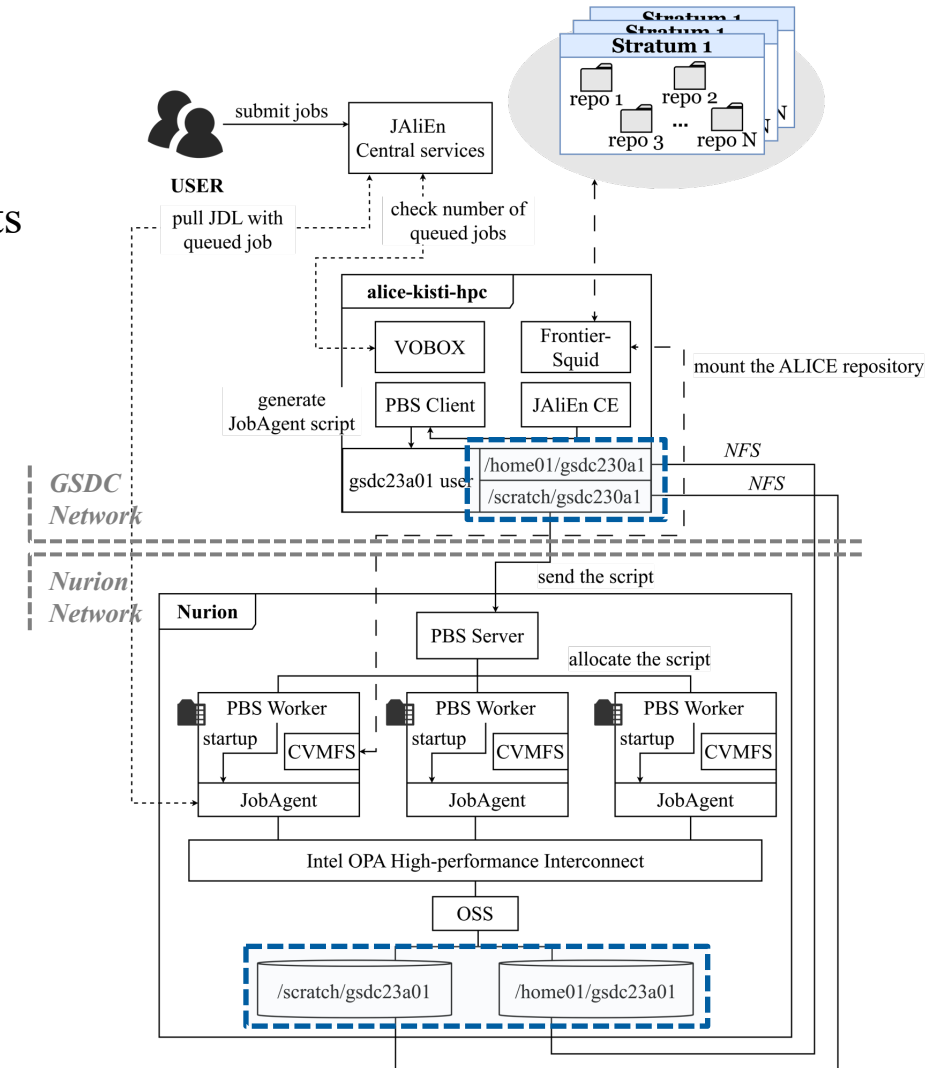
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⇒ job submissions are restricted to the /scratch



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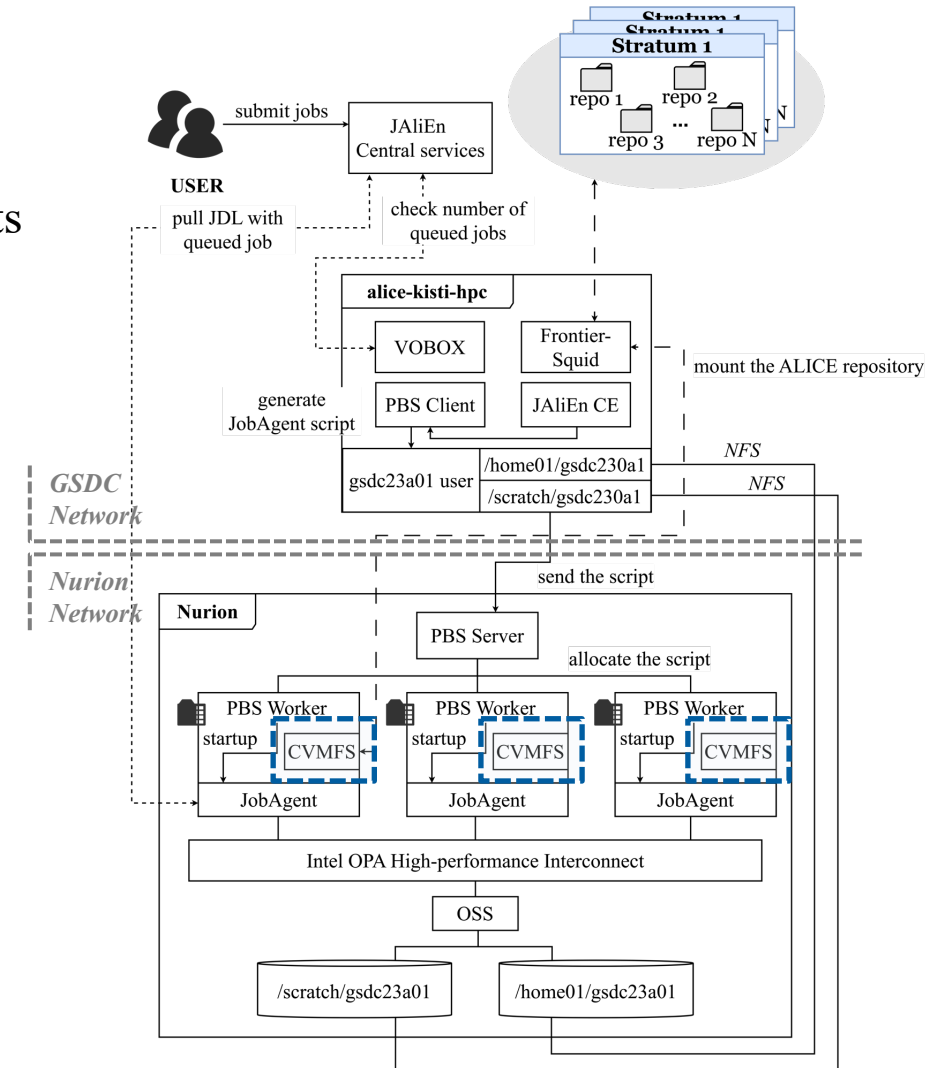
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3. The installation of CVMFS on Nurion

⇒ requiring the deployment of CVMFS-installed images to Nurion



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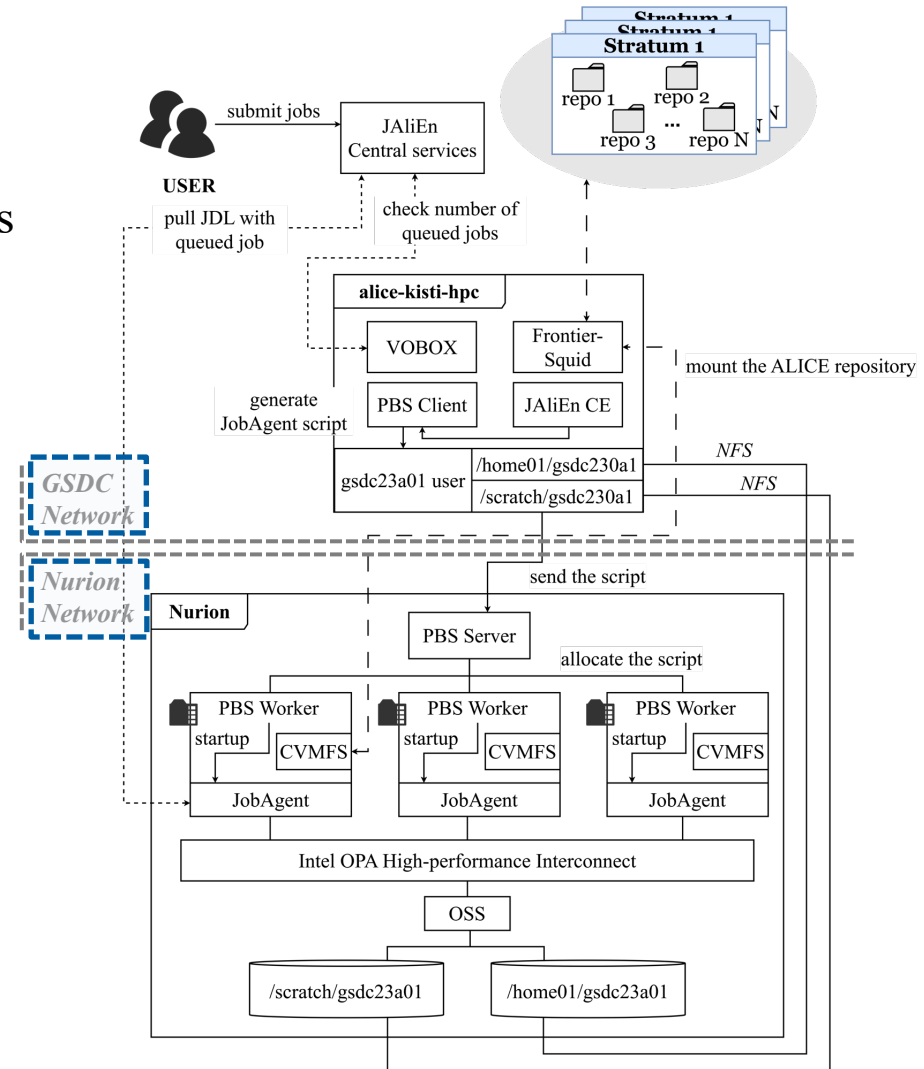
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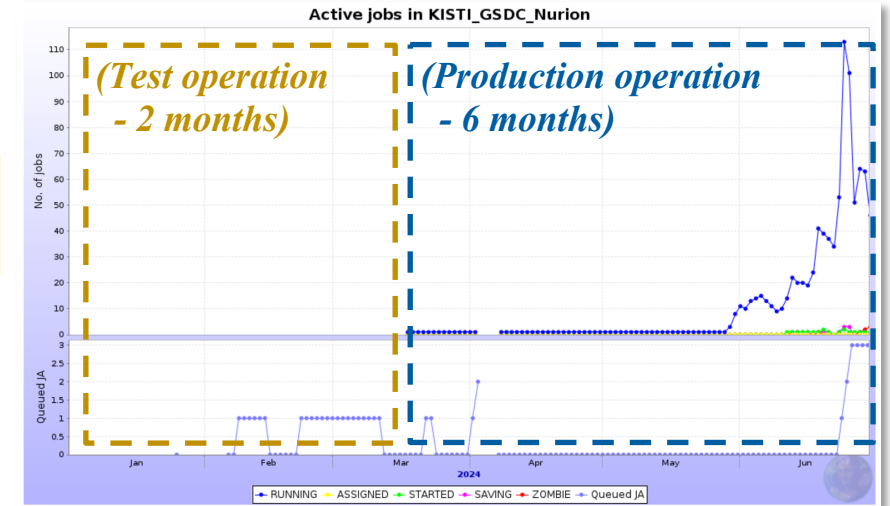
4. The bypass connection between VOBox node and Nurion

⇒ operating on different networks (firewall-based bypass settings)

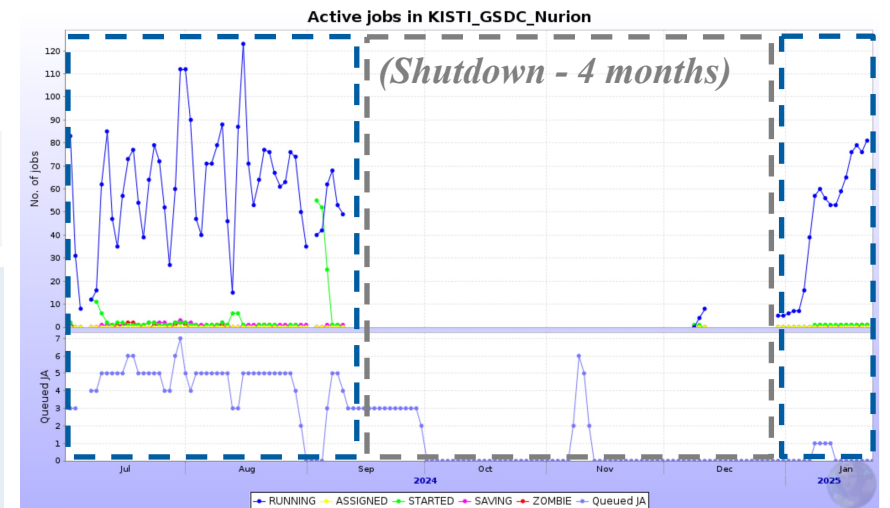


4. Timeline of Nurion ALICE Site

[2024.01.01 - 2024.06.30]



[2024.07.01 - 2025.01.23]



Nov 2023

- Activating for the first time
- Beginning the works for production operations

Jan 2024

- Starting as the production operation

Mar 2024

- Operation with limitations on # of tasks and cores *(lifted in the middle of Mar)*

Jun 2024

- Expanding the number of nodes from 2 to 10 *(enable it to better fulfill its role)*

Sep 2024

- Shutdown due to changes in the JAliEn and Nurion environment

Dec 2024

- Re-activating with the shutdown troubleshooting *(on last day of Dec)*

Jan 2025

- Running stably after re-activation

5. Ongoing Works for Future Integration

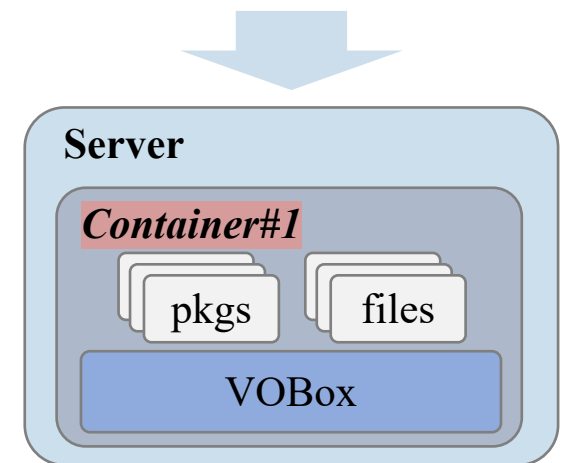
❖ 1) VOBox Containerization

- Need to add specific features for Nurion to the standard VOBox container provided by ALICE
- Implementing a 'CentOS 7 + PBS-Pro' based VOBox container

⇒ *Including the following features:*

- Installation and configuration of LDAP + SSSD
- Mounting of /scratch and /home01 directories
- Addition of iptables rules to enable communication with Nurion
- Installation and configuration of the PBS scheduler

1. The application of LDAP and SSSD
⇒ *accessing the designated job submitter account (gsdcXXa01)*
2. The mount of /scratch and /home01
⇒ *job submissions are restricted to the /scratch*
3. The installation of CVMFS on Nurion
⇒ *requiring the deployment of CVMFS-installed images to Nurion*
4. The bypass connection between VOBox node and Nurion
⇒ *operating on different networks (firewall-based bypass settings)*



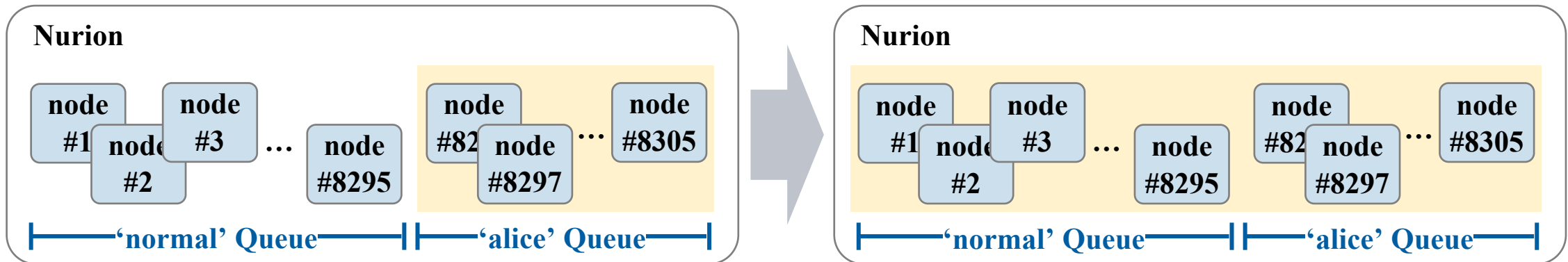
5. Ongoing Works for Future Integration

❖ 2) Queue Extension

- Only 10 dedicated nodes allocated to ‘alice’ queue on Nurion ALICE site
- Starting efforts to use whole scale of Nurion as potential available resources
 - impossible to install CVMFS directly on Nurion because of the diskless supercomputer
(significant overhead about installing CVMFS images on over 8,305 nodes)

⇒ *The approaches supporting CVMFS via NFS :*

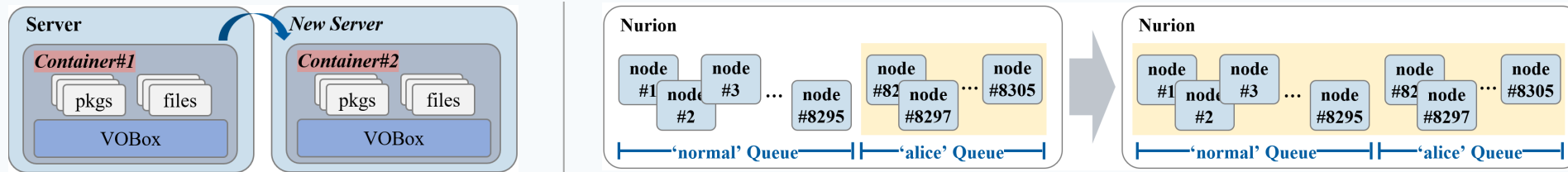
VOBox node : acting as the NFS server & Nurion : mounting /cvmfs as the NFS client



6. Outlook

1 Deploying the technologies for high availability of Nurion site

- **VOBox Containerization** (CentOS 7 + PBS-Pro environment)
- **Queue extension** with utilizing whole scale of Nurion (10 nodes(alice) → 8,305 nodes(normal + alice))



2 Improving the operational efficiency of the Nurion site (just planned)

- **Main objectives:**
 1. Complete isolation of JAliEn
 2. A site-specific issue ticketing service
 3. An internal monitoring system for the site

** (Goal) develop them as independent services on server environments*

[Expected Impact]

To establish and maintain the 6th SC Grid site quickly regardless system constraints