Compute and Storage Infrastructure

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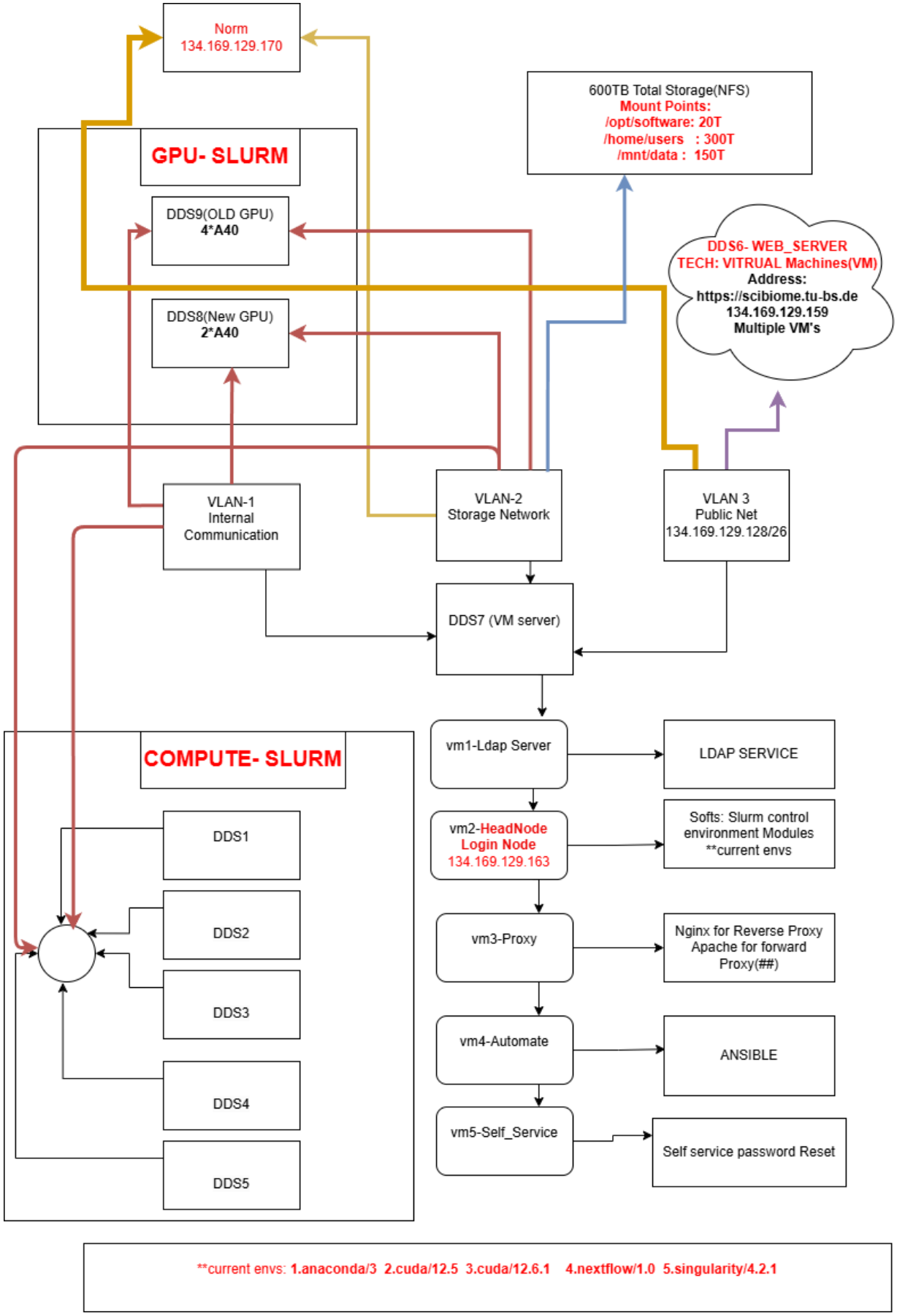
Cluster Diagram

This is how our server is functioning currently.



Infrastructure Overview

Scibiome Infrastructure Overview

This article provides an overview of the Scibiome infrastructure, overview of its network con-

figuration, compute nodes, virtual machines, storage setup, and authentication mechanisms.

Summary:

- **Login ip for cluster: 134.169.129.163(Headnode)**
- **Login ip for Norm: 134.169.129.170(or from headnode: `**ssh norm**`)**
- `**Login Credentials are the same across the infrustucture**`

Network Architecture

The infrastructure is divided into three primary VLANs:

VLAN-1(aka. 2000): Internal Communication

- Manages internal communication between compute nodes and virtual machines.

VLAN-2 (aka. 2001): Storage Network

- Dedicated to storage communication, ensuring efficient data transfers.

VLAN-3(aka. 518): Public Network

- Provides external access for specific services such as web servers and login nodes.

Compute and Virtual Machines

The infrastructure consists of various compute nodes and virtual machines:

Compute Nodes

DDS8 (New GPU)

- GPUs: `2 x A40`
- CPUs: `2 x Intel Xeon Gold 6334, 3.6 GHz(8C/16T)`
- RAM `16 x 16 GB RDIMM, 3.200 MT/s, Dual Rank`

DDS9 (Old GPU)

- GPUs: `4 x A40`
- CPUs: `2 x Intel® Xeon® Gold 6326 Processor(16C/32T)`
- RAM `16 x 32 GB RDIMM, 3.200 MT/s, Dual Rank`

General Compute Nodes

- DDS1 to DDS5

Server Specifications- (Each DDS1 to DDS5)

Processor Specification	Details	RAM Specification	Details
Model	Intel Xeon Silver 4316	Type	RDIMM (Registered DIMM)
Clock Speed	2.3 GHz	Speed	3,200 MT/s
Cores/Threads	20C/40T	Capacity per module	32 GB
Cache	30 MB	Total RAM	512 GB (16 x 32 GB)
Turbo Boost & Hyper-Threading	Enabled	Configuration	Dual Rank, x8 BASE
TDP	150 W		
Memory Speed Support	DDR4-2666		
Quantity	2 (dual processor configuration)		

VM Server: DDS7

- Hosts multiple virtual machines for various purposes with **Login Node(aka HeadNode) with ldap servers.**

Virtual Machines running in DDS7(aka VM Server)

vm1 - LDAP Server

- `**Provide single login interface for all the servers.**`

vm2 - HeadNode (Login Node)

- Manages user logins and resource scheduling via Slurm
- **Login ip for ssh: 134.169.129.163**

vm3 - Proxy

- Tech: `Nginx for reverse proxy` , `Apache for forward proxy`
- **Forward Proxy Access:** Allows internet access for compute and GPU nodes.

vm4 - Automate

- Tech: `Ansible automation`

vm5 - Self_Service

- Provides a **self-service password reset** mechanism

Storage Infrastructure(GITZ Managed ZFS pool)

The infrastructure includes **600TB** of **NFS-based storage(shared across the infrustucture)**:

- **Mount Points**:
  - `/opt/software` : `5TB`
  - `/home/users` : `300TB`
  - `/mnt/data` : `150TB`
  - `/data-pool/norm-40TB (Previous Norm home folder backup only.)`

Web Server

- **DDS6 - Web Server**
  - Tech: `Virtual machines`

Norm server

- **Norm- Gerneral computation Server**
  - OS: Ubuntu 24
  - `ssh login ip: 134.169.129.170`

Software Stack

The infrastructure supports various software environments across the cluster:

Read this document to understand how to use the softwares in our infrastucture.

`[https://docs.scibiome.nat.tu-bs.de/en/Softwares/guidelines](https://docs.scibiome.nat.tu-bs.de/en/Softwares/guidelines)`

1. **Anaconda/3**
2. **CUDA/12.5**
3. **CUDA/12.6.1**
4. **Nextflow/1.0**
5. **Singularity/4.2.1**

Additionally, **SLURM** is being used for job scheduling and resource management. Docker is only available to **headnode by local installation. It is highly recommended to use Singularity instead of docker.**

Security & Access

- **LDAP Authentication** ensures centralized user management.
- **Reverse Proxy (Nginx)** secures and optimizes web services.
- **Forward Proxy (Apache)** manages external internet access for all compute and GPU nodes.