# EIDF Kubernetes

Kubernetes in EIDF

- OpenStack Kubernetes
  - Project Private Clusters
  - OpenStack VM Hosts
  - User Managed Cluster

- EIDF Container Service
  - Private Project Namespace
  - "Public" Services
  - KVM VM Hosts
  - RKE Kubernetes
  - EIDF Managed Cluster

Openstack: self managed project private clusters

- Various options:
  - Microk8s for a single node cluster
    - Very convenient; includes ingress, MinIO, storage, DNS, …
  - Manual installation with kubeadm
    - Straightforward too but not convenient or scalable

- StackHPC Azimuth
  - Uses Cluster API to create Kubernetes clusters on demand
  - Didn't work until very recently without DNS: private Openstack API server domain could not be resolved on instances; with Openstack Designate (DNSaaS) it works as of last week!
  - Very easy to use; provides monitoring and auto-scaling
  - Integration with EIDF/EPCC infrastructure required; users don't have access to Horizon

- Use Octavia or MetalLB as load balancer

- Issues with CNI canal (known problem?), calico or weave net were fine

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EIDF Container Service Overview
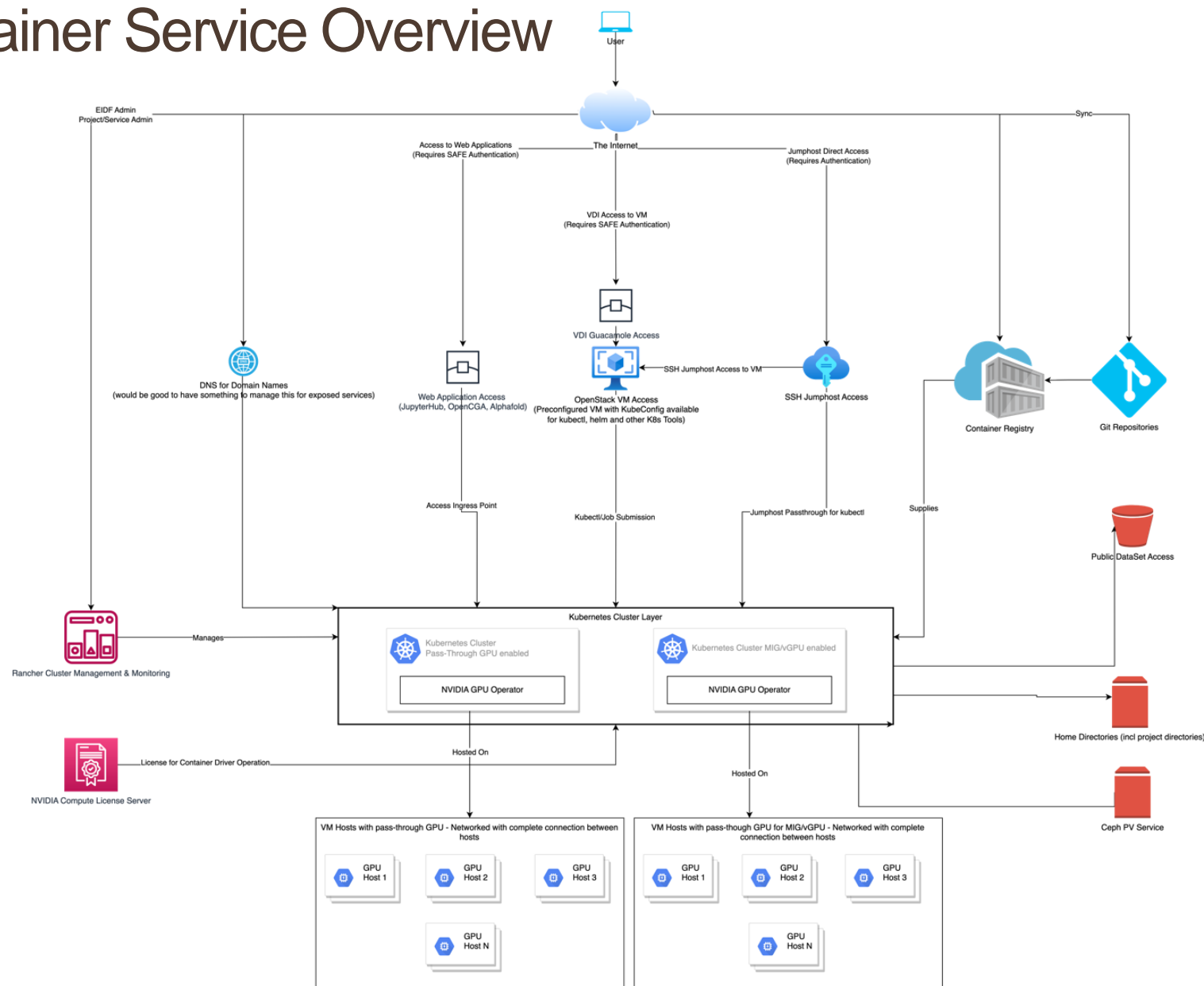
Current Status

- 11 Physical 8 GPU Nodes - 36 Virtual Nodes

Allocatable CPU (millicores)	1536000
CPU Capacity (millicores)	1536000
Current CPU Requests (millicores)	22533
Allocatable GPU	222
GPU Capacity	222
Current GPU Requests	4
GPU Type Capacity	
NVIDIA-A100-SXM4-40GB	54
NVIDIA-A100-SXM4-40GB-MIG-1g.5gb	140
NVIDIA-A100-SXM4-40GB-MIG-3g.20gb	28
GPU Type Requests	
NVIDIA-A100-SXM4-40GB	4
NVIDIA-A100-SXM4-40GB-MIG-1g.5gb	0
NVIDIA-A100-SXM4-40GB-MIG-3g.20gb	0
Allocatable Memory (MiB)	6732536
Memory Capacity (MiB)	6732536
Memory Requests (MiB)	19507

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Cluster Management: Rancher

- Managed Kubernetes and Clusters

- Multi-Cluster Management Tool
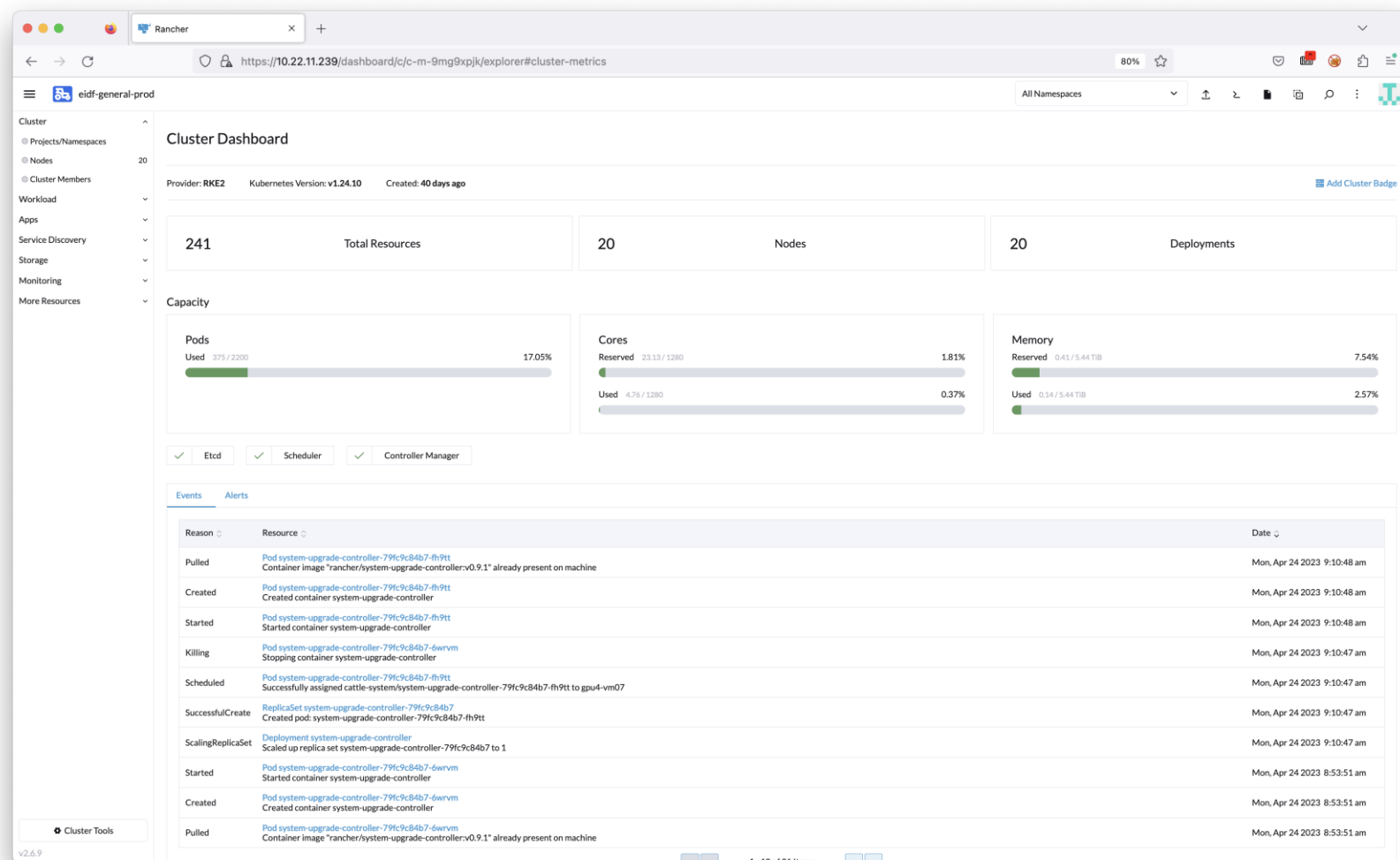
Setup

- Ansible
  - Hypervisor Prep
  - Network and VM Deployment
  - VM Node Prep – NVIDIA and upgrades
  - Cluster Registration

- Manual Steps
  - Host Inventories
  - Variable Files
  - Token Creation

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Projects

- Users
- Namespaces - including default tolerations
- Quotas
- Limits

- Access:
  - Ceph
  - GPU (MIG/Passthrough)
  - Specific Node Restrictions - Taints

Future

- A100 80GB GPU Nodes

- Internal Registry

- Improved Queue and Scheduling Management

- Policy Agent Additions