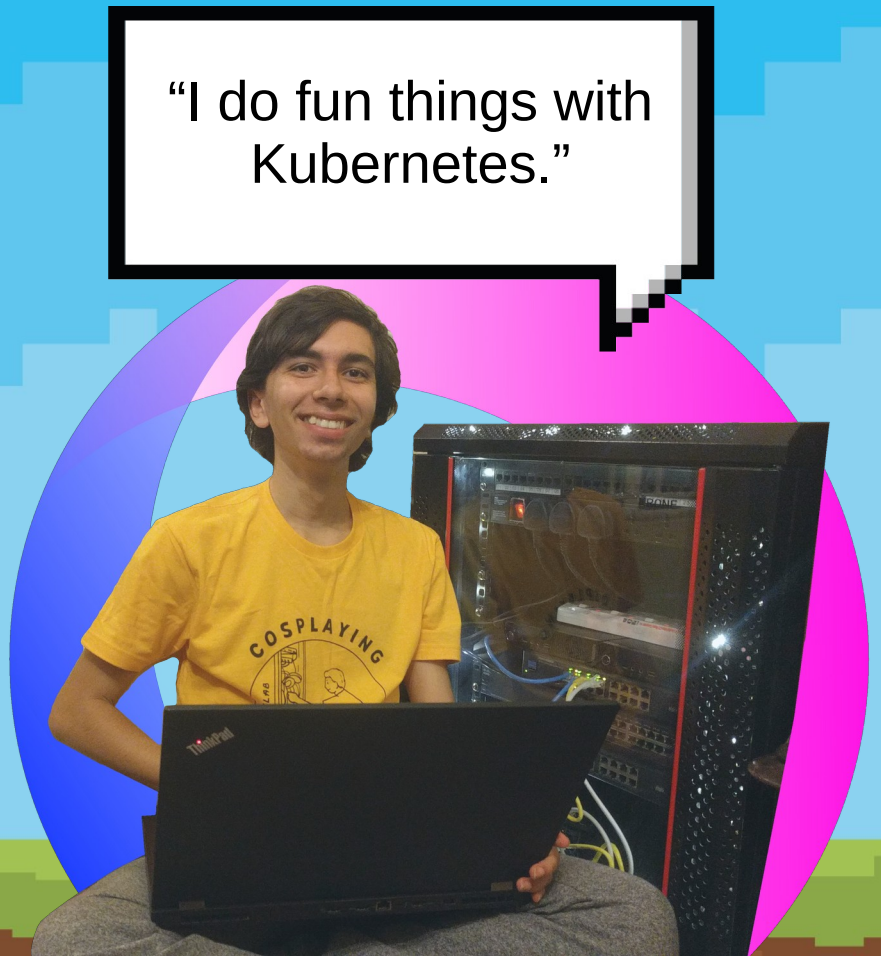
# Virtualisation with Harvester & Longhorn

By Alex Bissessur

alex.yaml

```yaml
---
apiVersion: v1
kind: Person
metadata:
 name: Alex Bissessur
spec:
  work:
    company: La Sentinelle
    role: Kubernetes Person
    location: Mauritius
  contact:
    website: alexbissessur.dev
    mastodon: moris.social/@AlexB
    github: github.com/xelab04
  interests:
    - Kubernetes
    - Linux
    - Free & Open Source Software
  hobbies:
    - Playing kubectl with Homelab
```



# Containerisation is the future

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But what about my legacy VMs?

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But what about my legacy VMs?

Run VMs the Cloud Native way

Containerisation is the future

But what about my legacy VMs?

Run VMs the Cloud Native way

How? Why? Are you insane?

# “I Like My Virtualisation Stack”

# “I Like My Virtualisation Stack”

- No, no you don’t.
  (you just don’t want to change)

# “I Like My Virtualisation Stack”

- No, no you don’t.
- Does Management like the cost?
  *someone* added an extra zero to the price, overnight
- How easy is your exit plan?
- Is it Open Source? (digital sovereignty)

# What is Harvester?

# What is Harvester?

- It is a platform for hyperconverged infrastructure.
- It is a collection of open source software.
- It is your “cloud on-prem solution”
- Harvester is the free version of SUSE Virtualisation

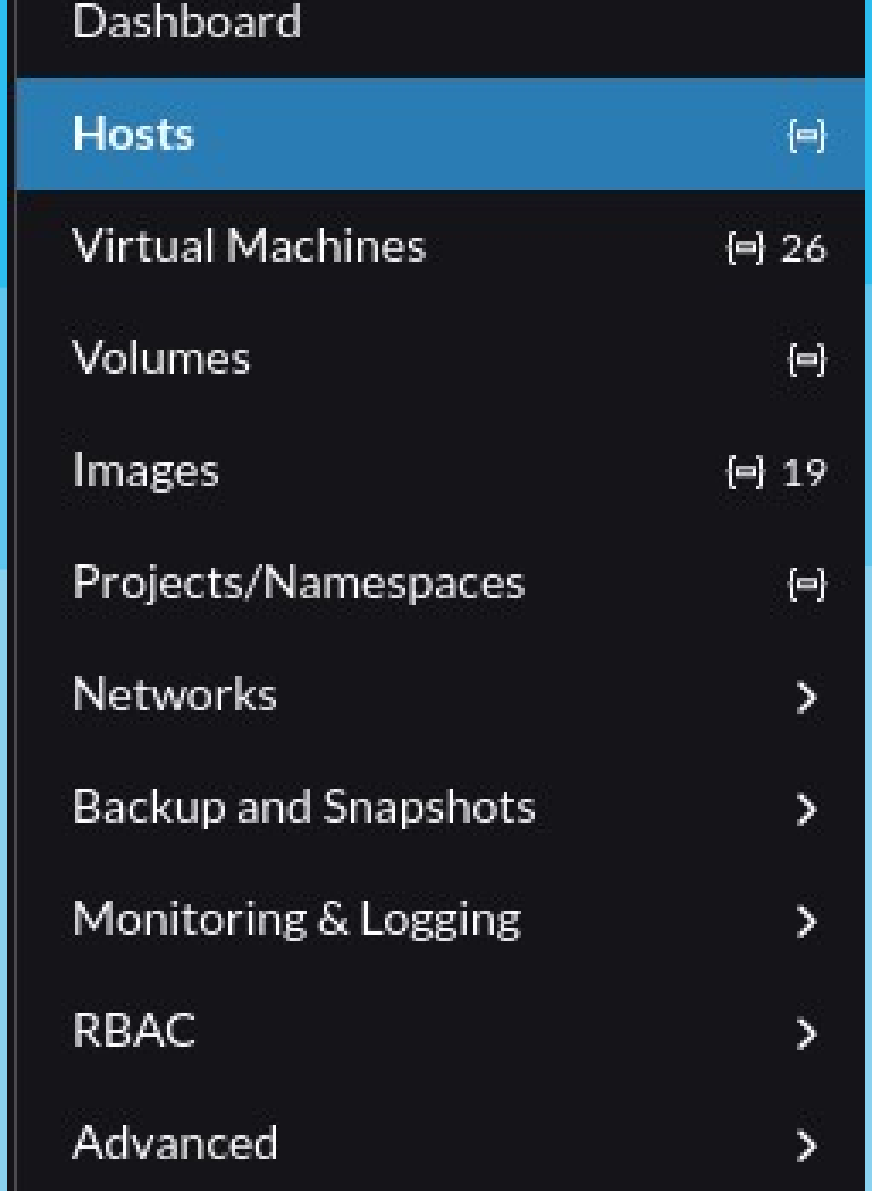
# Hyperconverged What?

- **H**yper**C**onverged **I**nfrastructure (HCI) means everything infra is under one roof.

- Infrastructure is:
  - compute
  - storage
  - network

# Why is That Good?

- From one interface, manage everything compute, networking, and storage.
- Specialise in one technology rather than 3 different tech stacks (from different vendors)
- Tighter integration of the 3 components
- You can have everything in one nice UI rather than 3 ugly ones :)


Dashboard
Hosts
Virtual Machines 26
Volumes
Images 19
Projects/Namespaces
Networks
Backup and Snapshots
Monitoring & Logging
RBAC
Advanced

# So What **is** Harvester?

- rke2

Rancher Kubernetes Engine 2

Kubernetes distribution, fully compliant with K8s with extra security-oriented features

- Compliant with many CIS benchmarks out of the box

# So What **is** Harvester?

- rke2
- Kubevirt

Incubating CNCF project

Open Source (duh)

Allows running VMs directly on top of Kubernetes clusters with KVM

# So What **is** Harvester?

- rke2
- Kubevirt
- Longhorn

Incubating CNCF project (open source)

Provides persistent storage in an otherwise stateless cluster

Ability to create replicas of volumes across different nodes of the cluster for redundancy

# So What **is** Harvester?

- rke2
- Kubevirt
- Longhorn
- Prometheus
  Grafana

Prometheus & Grafana are built-in to Harvester for monitoring purposes

Integrated Grafana dashboard to monitor the state of host nodes and VMs

# So What **is** Harvester?

- rke2
- Kubevirt
- Longhorn
- Prometheus
  Grafana
- Rancher

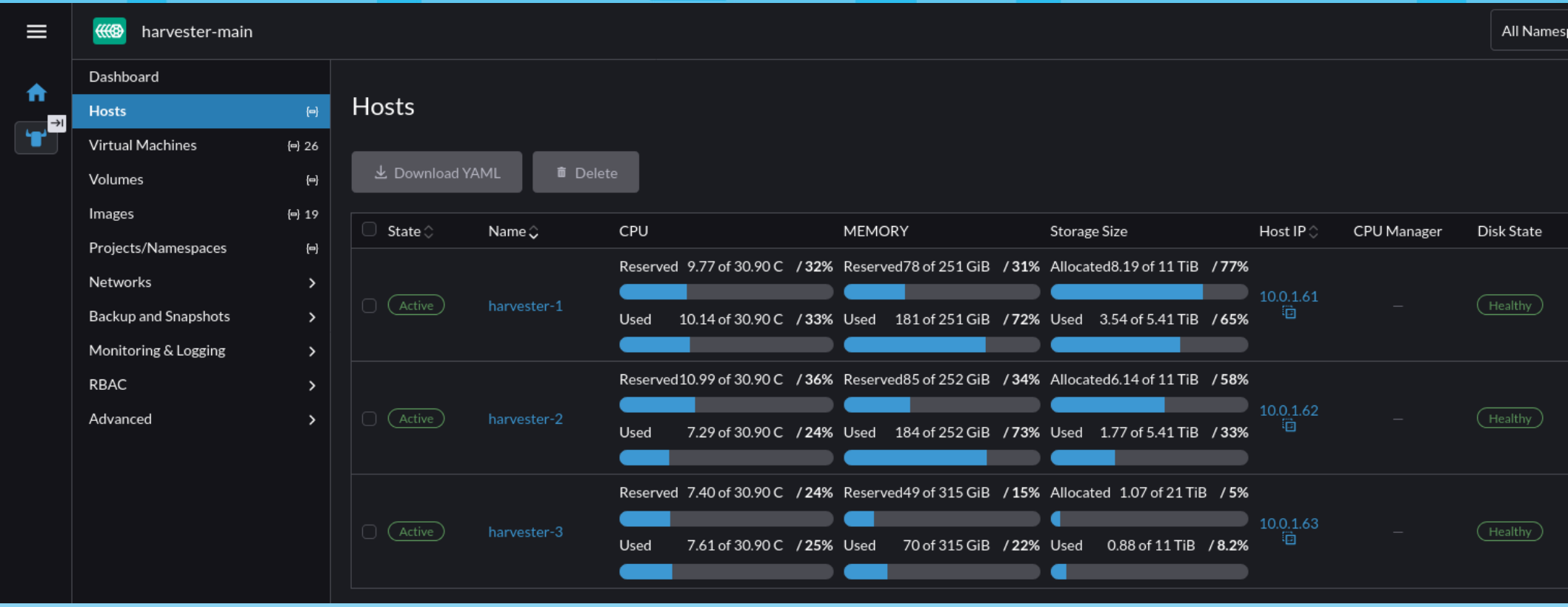
Rancher provides the UI to manage the entire cluster

Unifies all components and makes them easy to manage
(especially for ClickOps people)

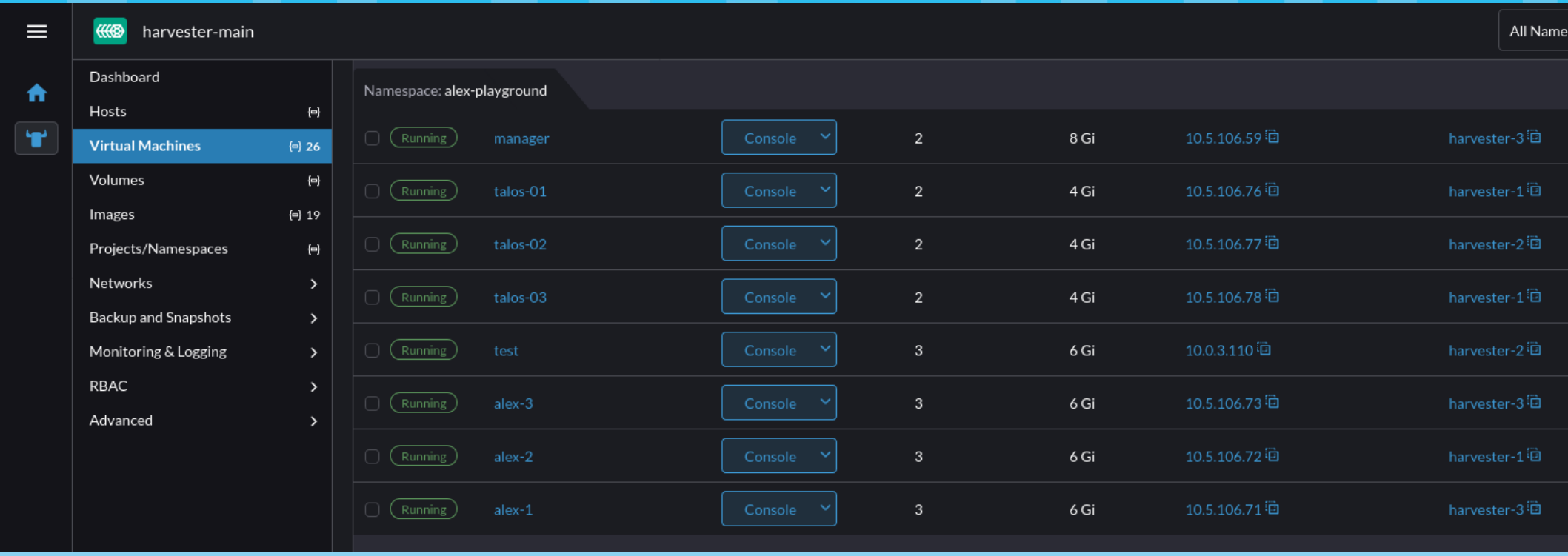
# Compute

- Harvester is built on top of Kubernetes (rke2)
- Harvester is meant to be clustered (ex 3 servers)
  - allows seamless failover in case of server failure
- VMs run through Kubevirt, storage done through Longhorn
- Possibility to run containers in parallel
  - past and future of infra in one platform

# Harvester Nodes



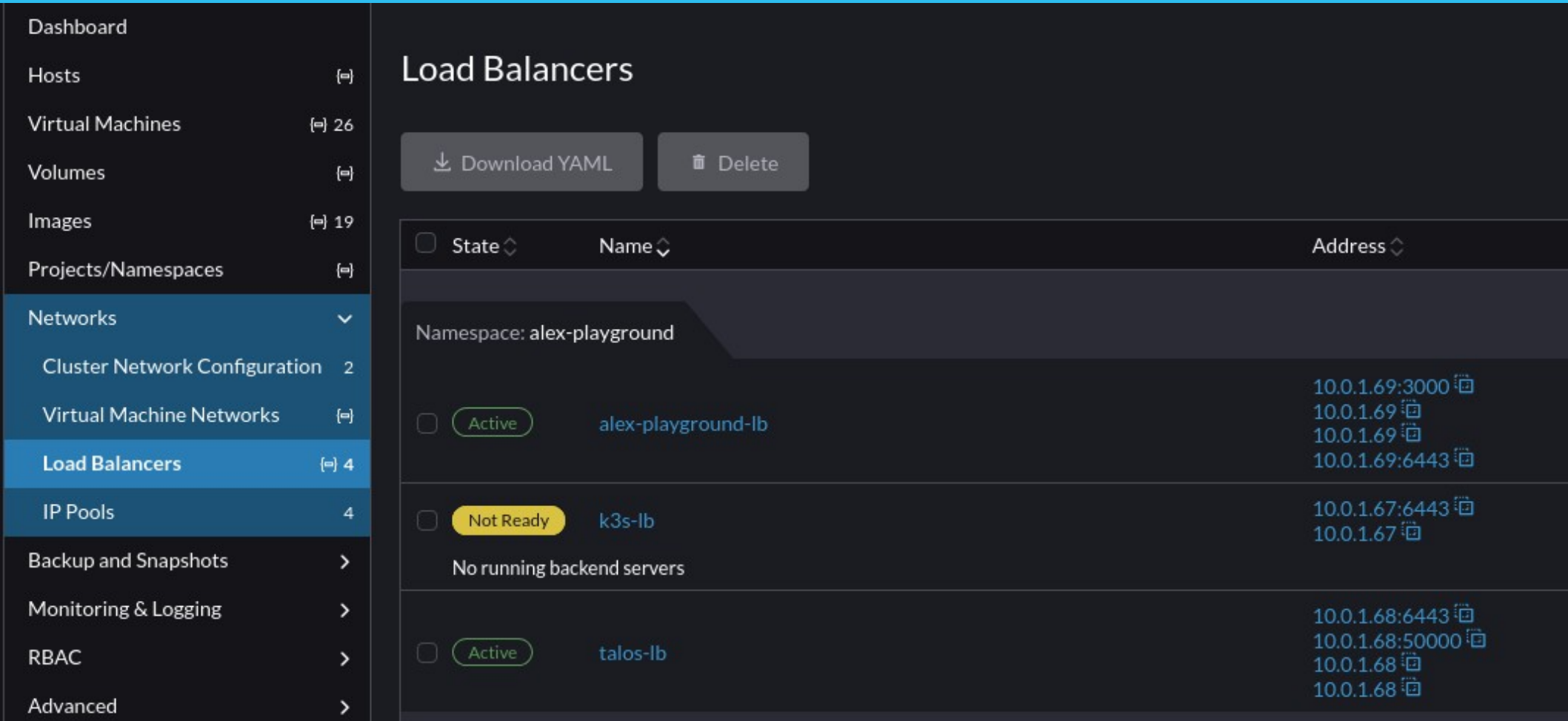
# VMs


harvester-main
All Name
Dashboard
Hosts
Virtual Machines 26
Volumes
Images 19
Projects/Namespaces
Networks
Backup and Snapshots
Monitoring & Logging
RBAC
Advanced
Namespace: alex-playground
Running manager Console 2 8 Gi 10.5.106.59 harvester-3
Running talos-01 Console 2 4 Gi 10.5.106.76 harvester-1
Running talos-02 Console 2 4 Gi 10.5.106.77 harvester-2
Running talos-03 Console 2 4 Gi 10.5.106.78 harvester-1
Running test Console 3 6 Gi 10.0.3.110 harvester-2
Running alex-3 Console 3 6 Gi 10.5.106.73 harvester-3
Running alex-2 Console 3 6 Gi 10.5.106.72 harvester-1
Running alex-1 Console 3 6 Gi 10.5.106.71 harvester-3

# Networking

- Create networks within Harvester for different VMs to use
- Integrate VLANs with Harvester
- Use physical network for different VMs
  ex: reserve one ethernet port for a certain set of VMs
  also use different networks for storage traffic

# Networking


Dashboard
Hosts
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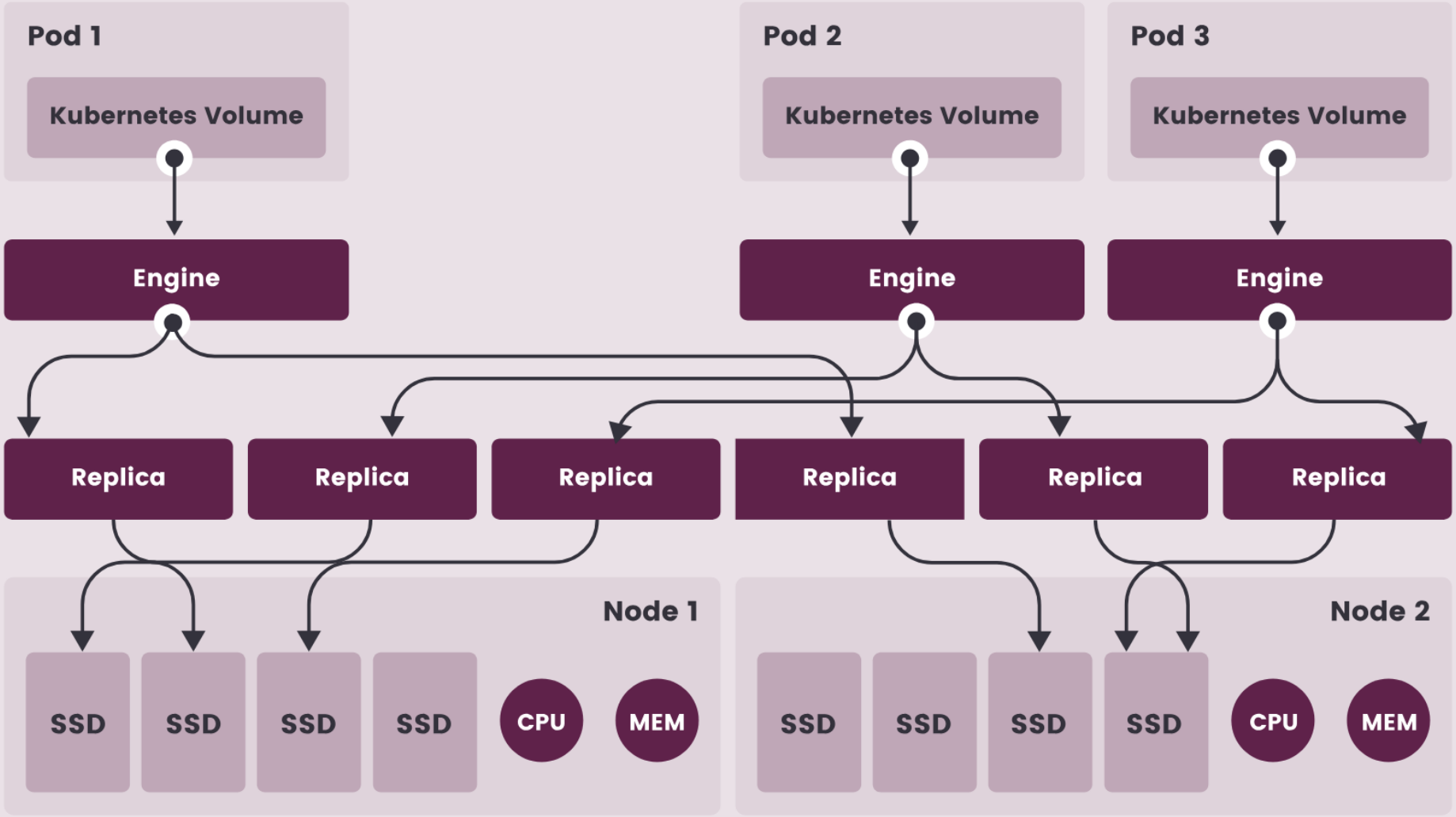
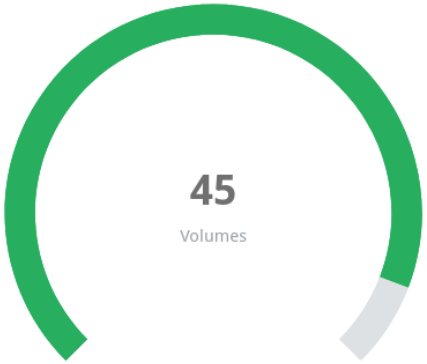
Projects/Namespaces
Networks
Cluster Network Configuration 2
Virtual Machine Networks
Load Balancers 4
IP Pools 4
Backup and Snapshots
Monitoring & Logging
RBAC
Advanced
Load Balancers
Download YAML
Delete
State
Name
Address
Namespace: alex-playground
Active
alex-playground-lb
10.0.1.69:3000
10.0.1.69
10.0.1.69
10.0.1.69:6443
Not Ready
k3s-lb
10.0.1.67:6443
10.0.1.67
No running backend servers
Active
talos-lb
10.0.1.68:6443
10.0.1.68:50000
10.0.1.68
10.0.1.68

# Storage/Longhorn

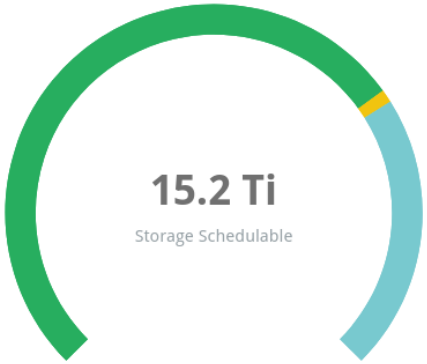
- Harvester uses Longhorn, a CNCF *incubating* project for storage
- Longhorn is an open source, cloud-native, persistent block storage solution
- Data is replicated across nodes' disks for redundancy and high availability


Pod 1
Kubernetes Volume
Pod 2
Kubernetes Volume
Pod 3
Kubernetes Volume
Engine
Engine
Engine
Replica
Replica
Replica
Replica
Replica
Replica
Node 1
SSD
SSD
SSD
SSD
CPU
MEM
Node 2
SSD
SSD
SSD
SSD
CPU
MEM

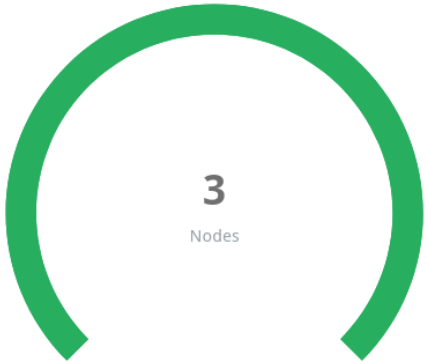
# Dashboard




| | |
|---|---|
| Healthy | 41 |
| Degraded | 0 |
| In Progress | 0 |
| Fault | 0 |
| Detached | 4 |
| Total | 45 |




| | |
|---|---|
| Schedulable | 15.2 Ti |
| Reserved | 300 Gi |
| Used | 6.2 Ti |
| Disabled | 0 Bi |
| Total | 21.7 Ti |




| | |
|---|---|
| Schedulable | 3 |
| Unschedulable | 0 |
| Down | 0 |
| Disabled | 0 |
| Total | 3 |

## Event Log

| Last Seen | First Seen | Count | Name | Kind | Type | Reason | Source | Message |
|---|---|---|---|---|---|---|---|---|
| | | | backing-image- | | | | longhorn-backing-image-manager- | Deleted backing image |

## Volume Details

State: Attached
Health: Healthy
Ready for workload: Ready
Conditions: Restore Scheduled TooManySnapshots
Frontend: Block Device
Data Engine: v1
Attached Node & Endpoint:
harvester-2
/dev/longhorn/pvc-19ccf922-d878-4efd-8831-2089a5464fde
Size: 25 Gi
Actual Size: 413 Mi

## Replicas

2089a5464fde-r-19d887a0
Healthy

harvester-2
Node
instance-manager-90a34bf76cd5cac3fd28a9d2f3aa3cd9
/var/lib/harvester/defaultdisk
Running

2089a5464fde-r-f6be10ae
Healthy

harvester-1
Node
instance-manager-b6cd77f73ef001339edbfea87ef1a3a8
/var/lib/harvester/defaultdisk
Running

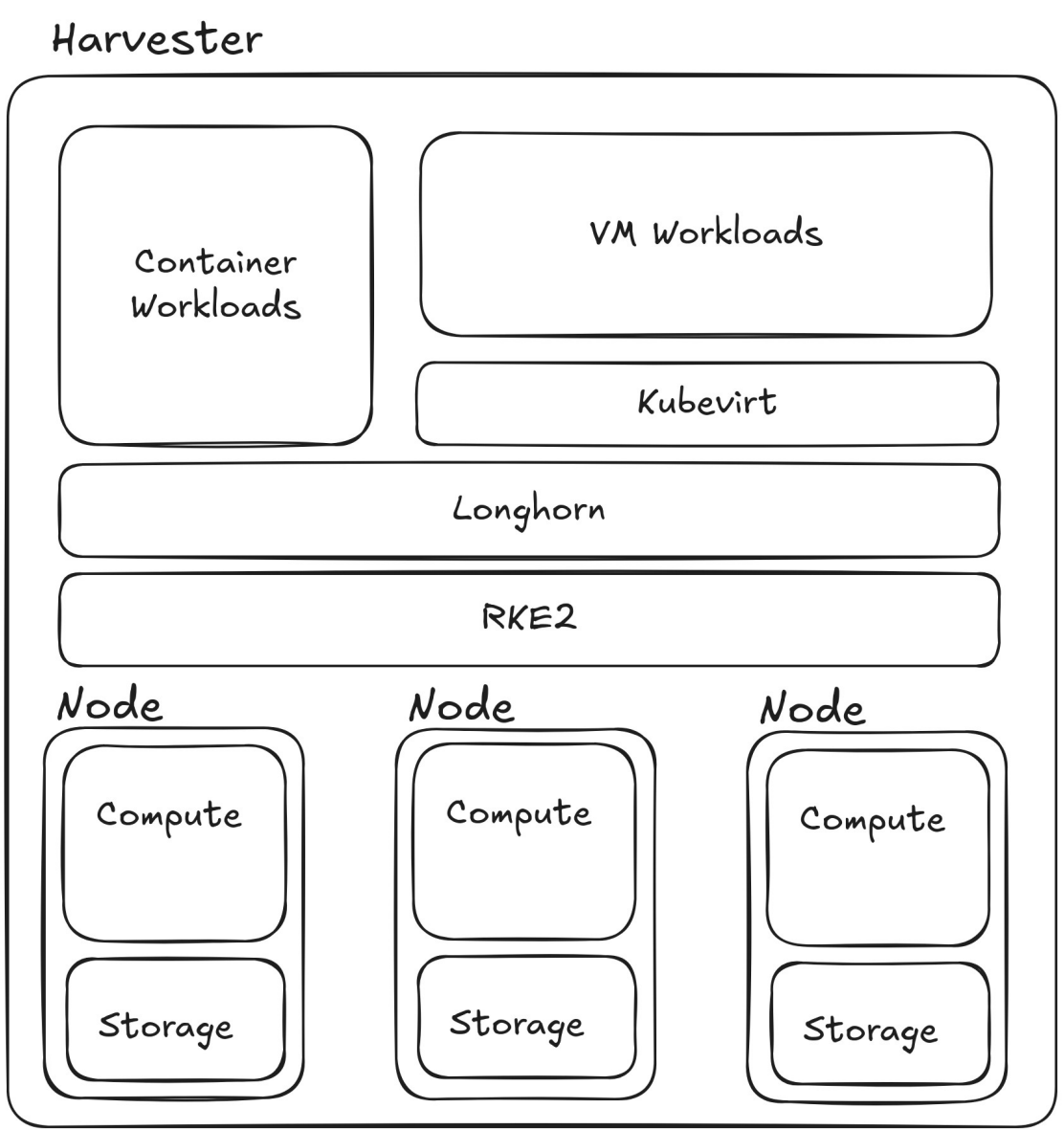
## Snapshots and Backups

Take Snapshot | Create Backup

Show System Hidden:

snapshot 2 months ago
snapshot 2 months ago
f18905d0 2 months ago
snapshot 2 days ago
snapshot 20 hours ago
snapshot 20 hours ago
Volume Head

# Harvester in a Nutshell



# Thank You!

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github.com/xelab04/Slides

moris.social/@AlexB