



# INTRODUCING THE SYNNEFO OPEN SOURCE IAAS PLATFORM. VANGELIS KOUKIS TECHNICAL LEAD, ~OKEANOS

# ~okeanos: The service

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## Our choices

- Build own AWS-like service (Compute, Network, Storage)
- Own the engineering
- Everything open source
- Production-quality IaaS
- Persistent VMs
- Commodity hardware – No SAN
- Large-scale Installations
- Super-simple UI

# Current production ~okeanos

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## History

- Design started late 2010
- Production since July 2011

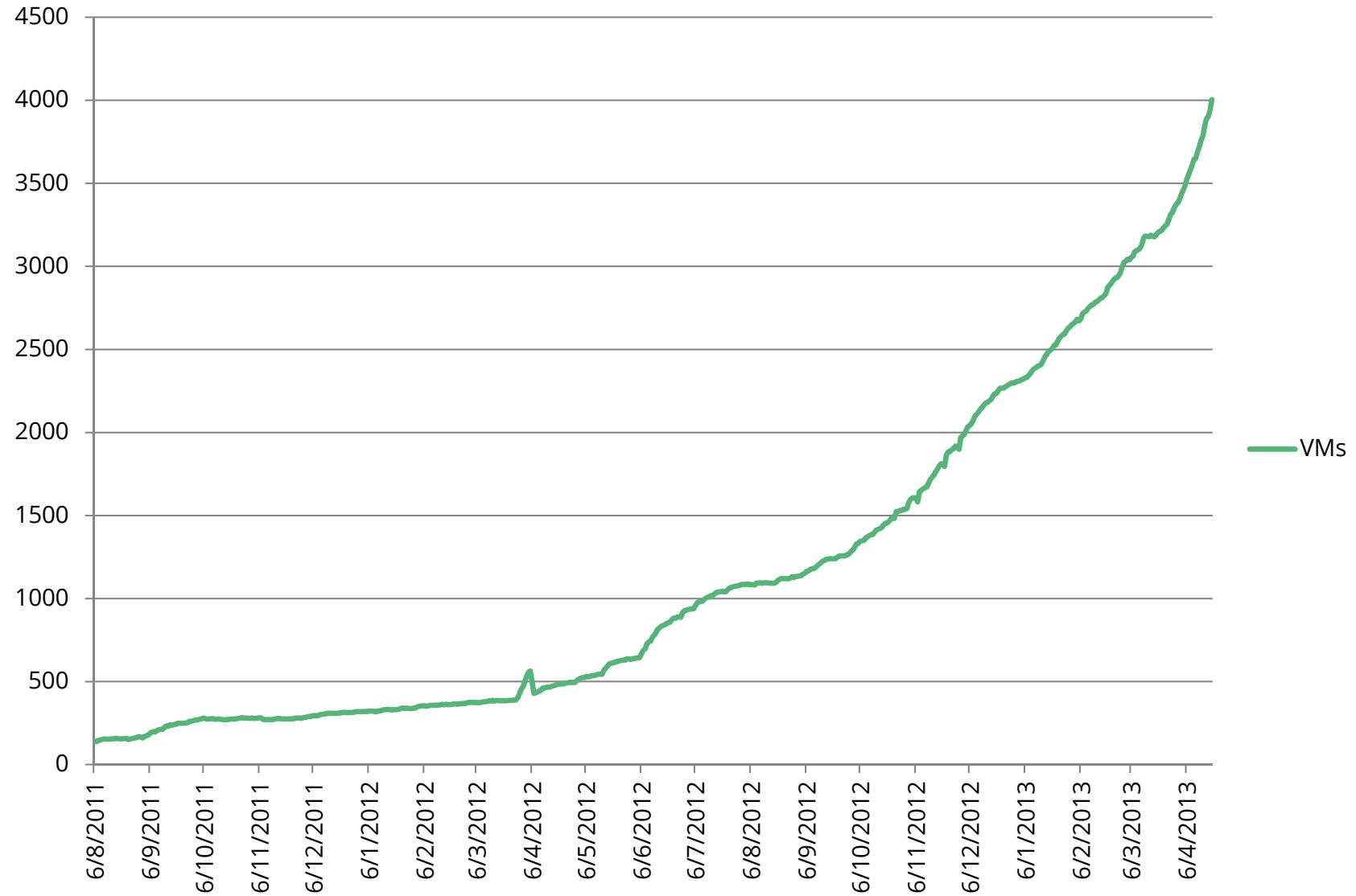
## Numbers

- Users: > 3500
- VMs: > 5000 currently active
- More than 130k VMs spawned so far, more than 35k networks
- 10 compute clusters in production

# ~okeanos VMs

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# Synnefo: The software

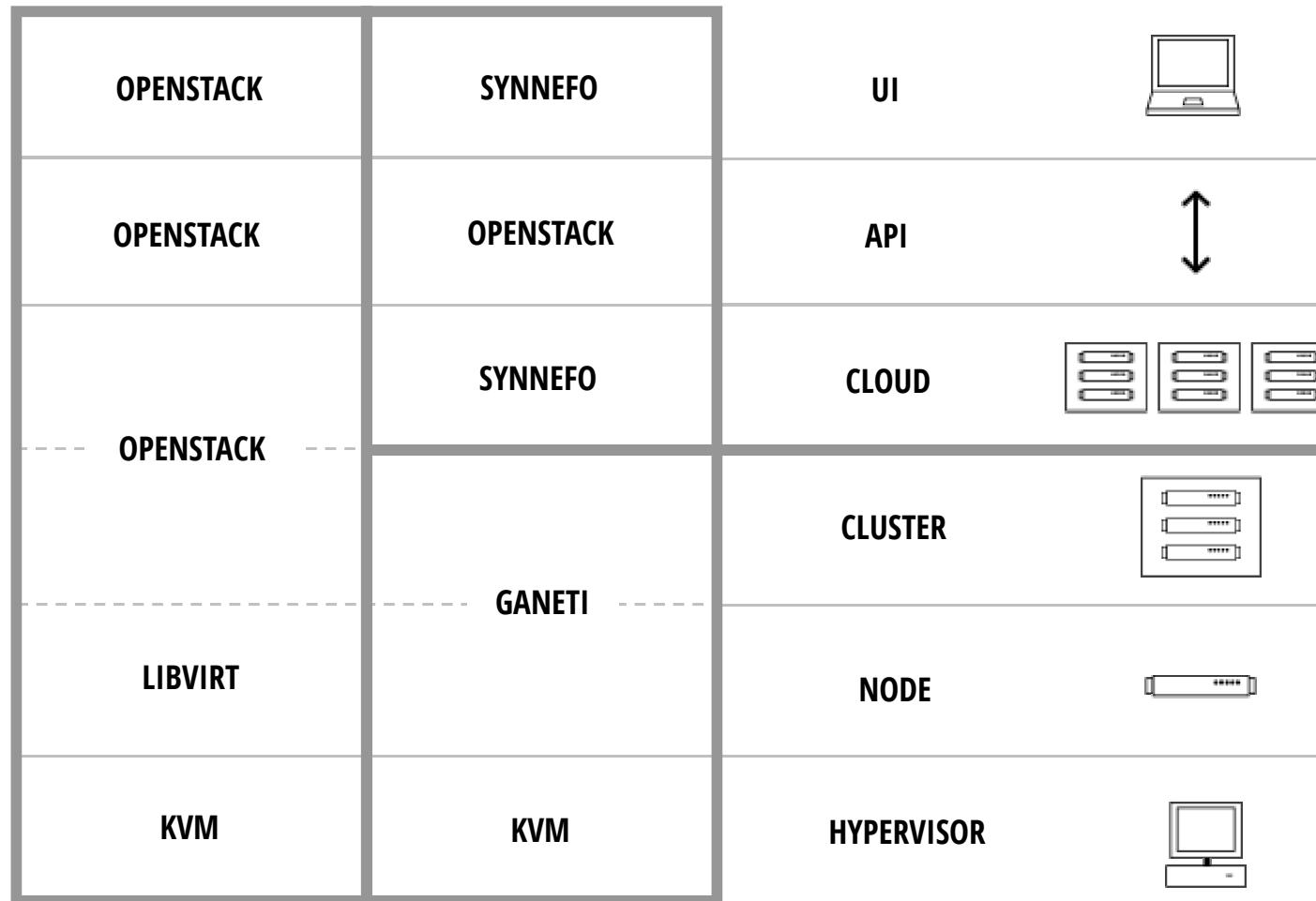
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Custom software to power ~okeanos

- Google Ganeti for low-level VM management
- Synnefo on top
- Compute, Network and Storage part
- Everything open source

# Cluster vs Cloud

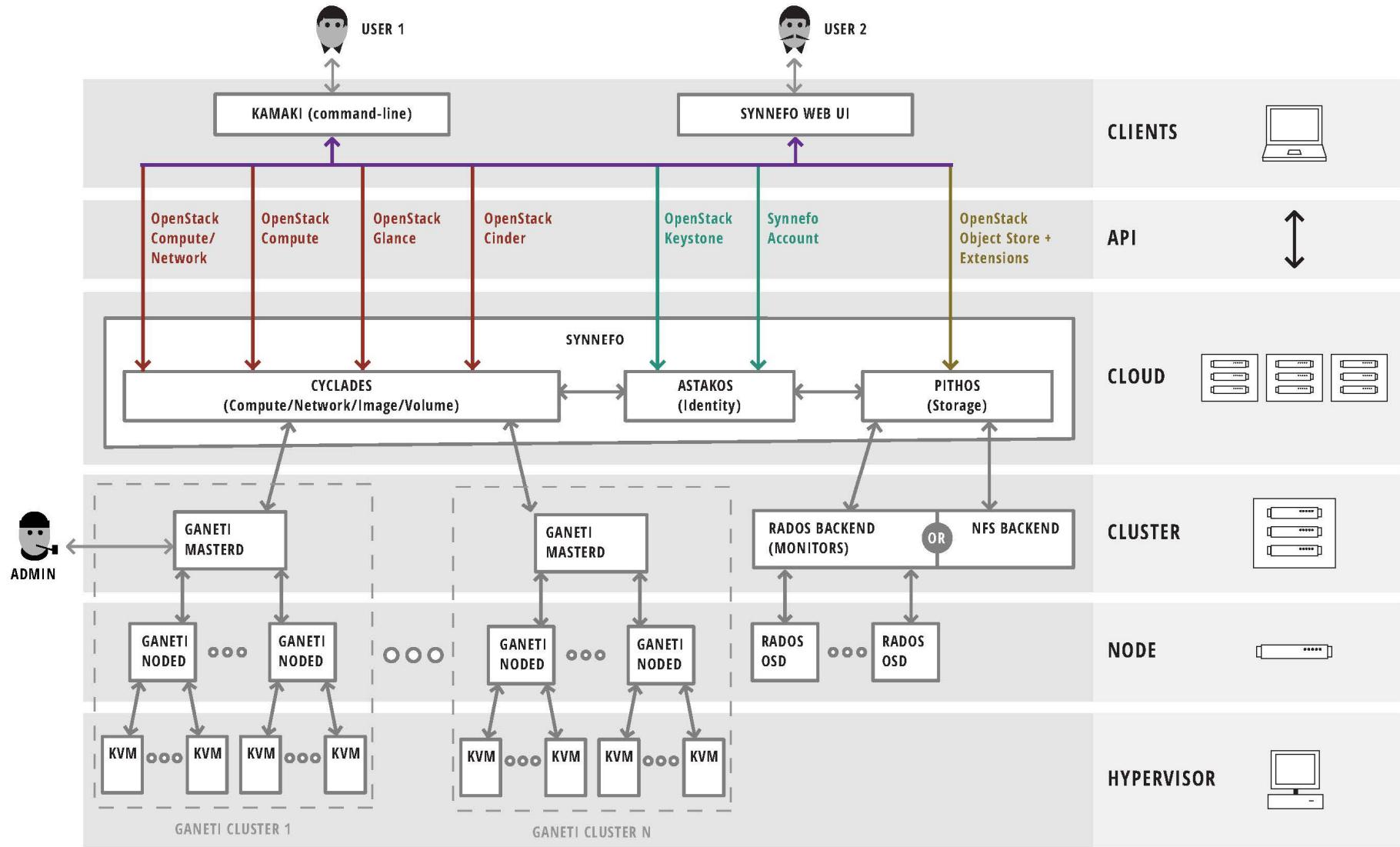
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# Architecture

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# Compute – Network: Cyclades

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## Thin Compute layer over Ganeti

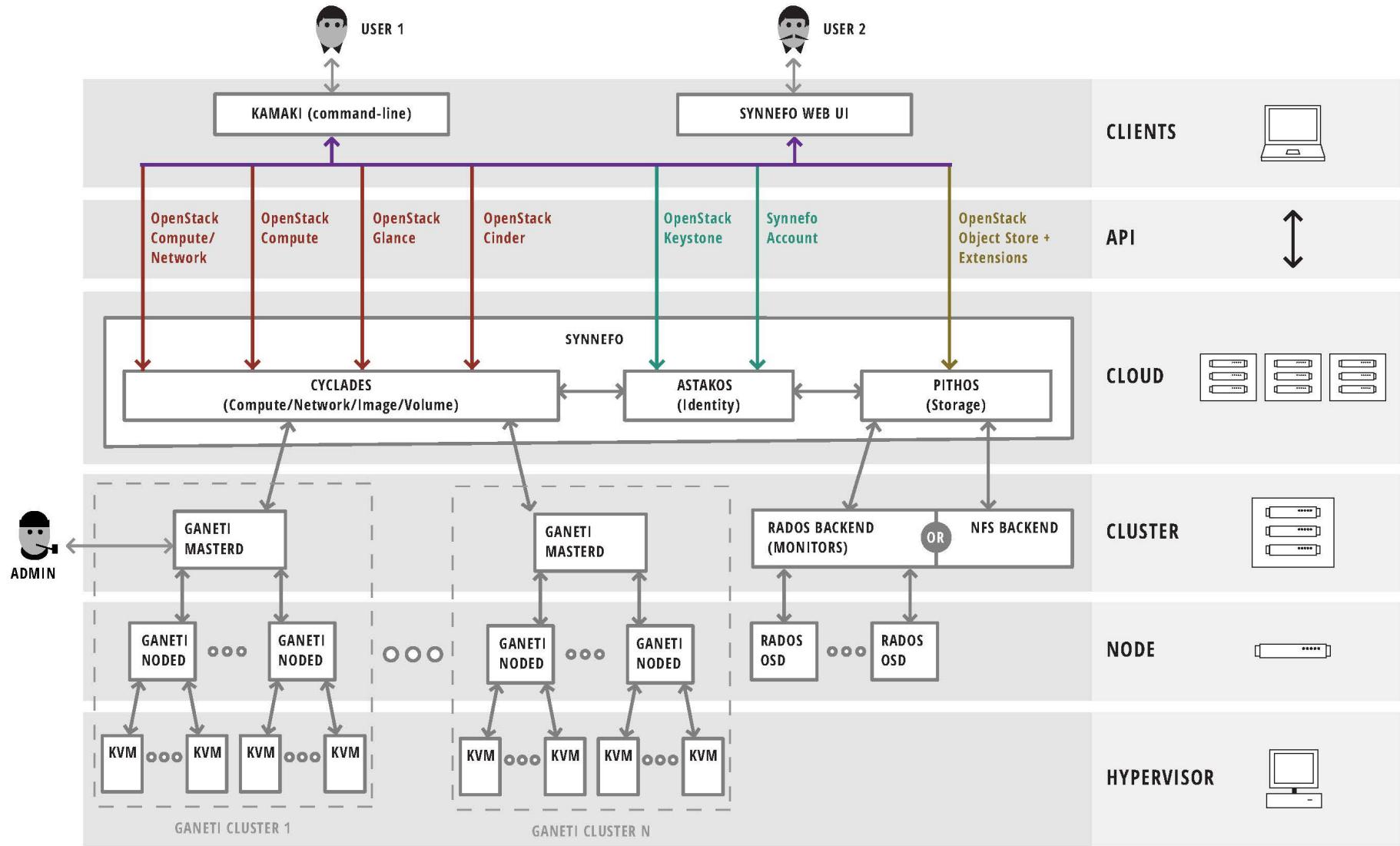
- Python/Django
- Supports *multiple* Ganeti clusters, for scaling
- OpenStack Compute API

## Networking

- No restrictions on deployment – it's the *Ganeti* side
- IPv4/IPv6 public networks, complete isolation among VMs
- Thousands of private networks, private L2 segments over single VLAN

# Compute – Network: Cyclades

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# Interaction with Ganeti

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Support for all Ganeti storage templates

External Storage Interface for SAN/NAS support

Networking = gnt-network +  
                  snf-network (KVM ifup scripts) +  
                  nfdhcpd (custom NFQUEUE-based DHCP server)

Asynchronous operation

- Effect path:    Receive API requests, enqueue requests over RAPI
- Update path:    Receive asynchronous notifications, update DB

# Storage: Pithos

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Every file is a collection of blocks

Content-based addressing for blocks

Partial file transfers, deduplication, efficient syncing

Independent of storage backend (NFS, RADOS, ...)

OpenStack Object Storage API plus extensions

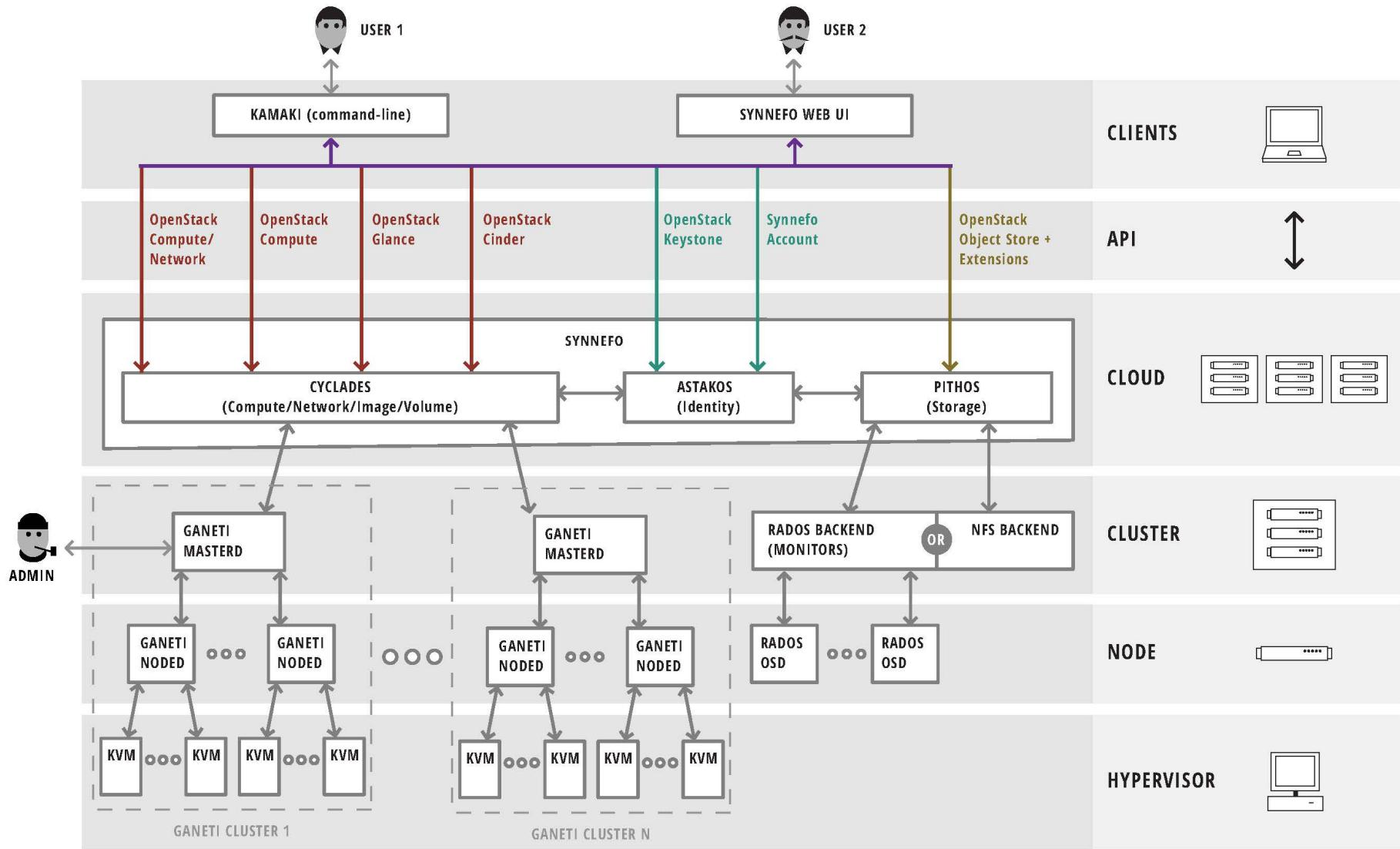
An integral part of Synnefo

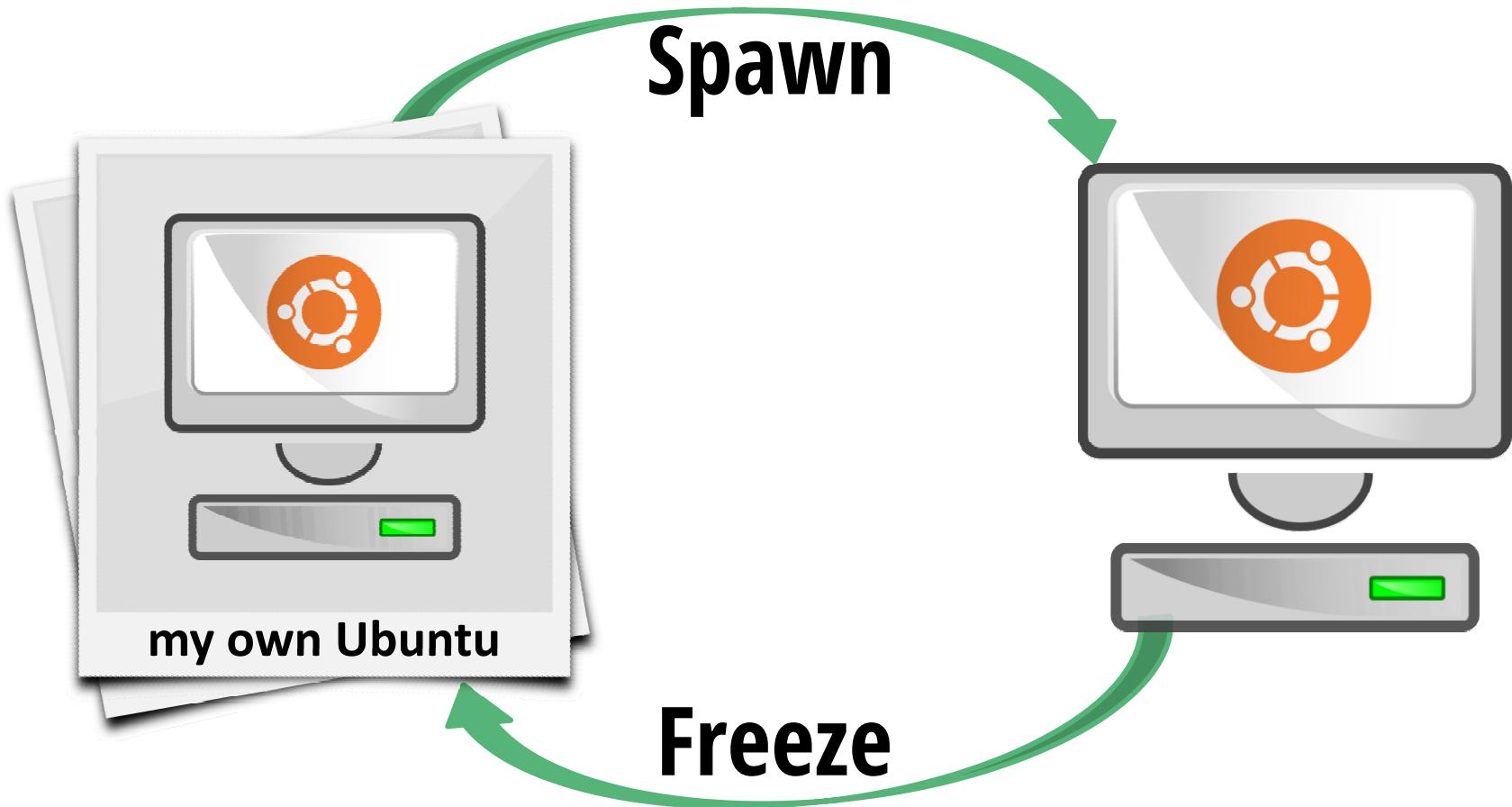
- Single store for Files, VM Images
- Uses common backend with Archipelago (Volumes)

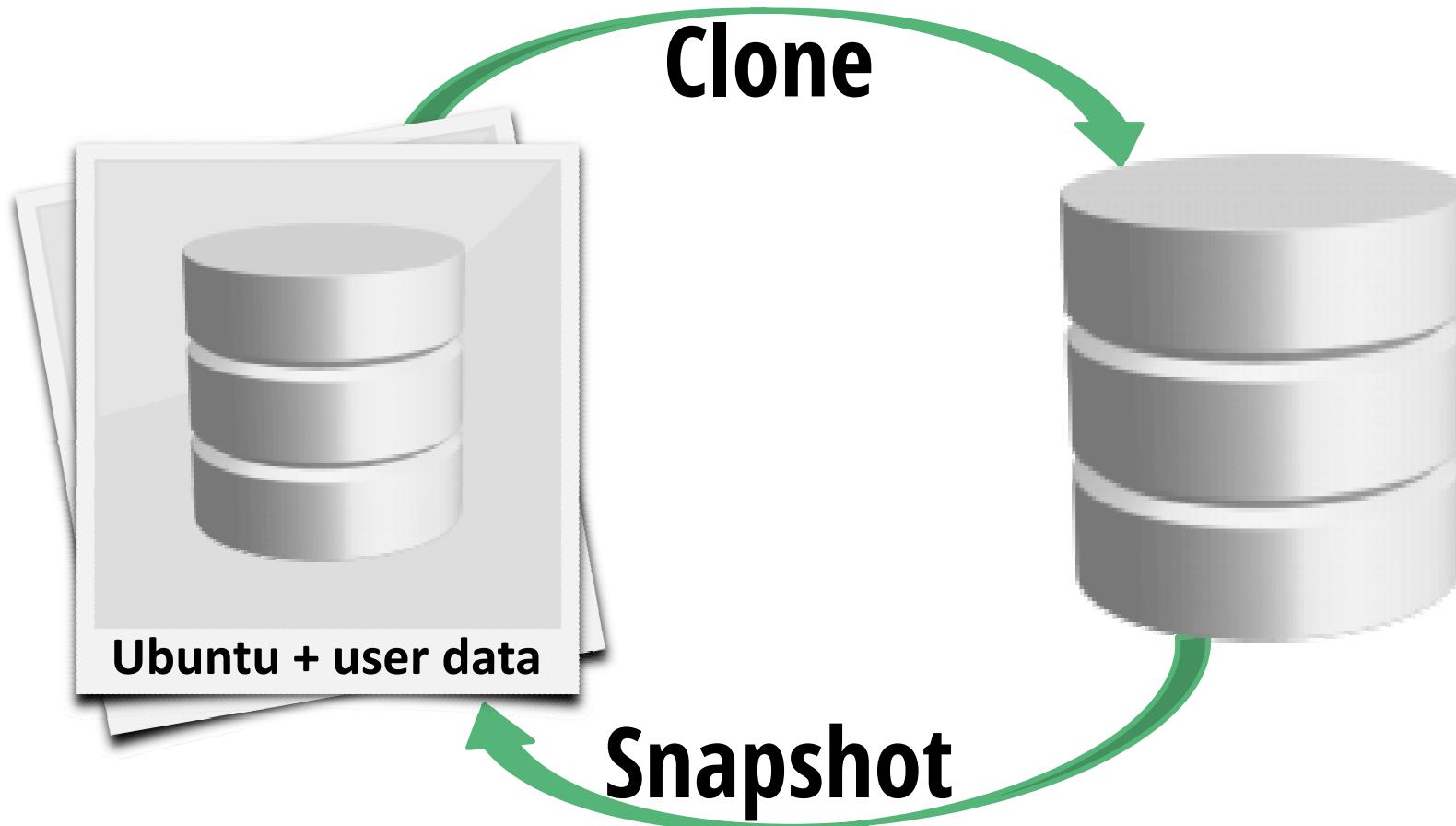
# Storage: Pithos

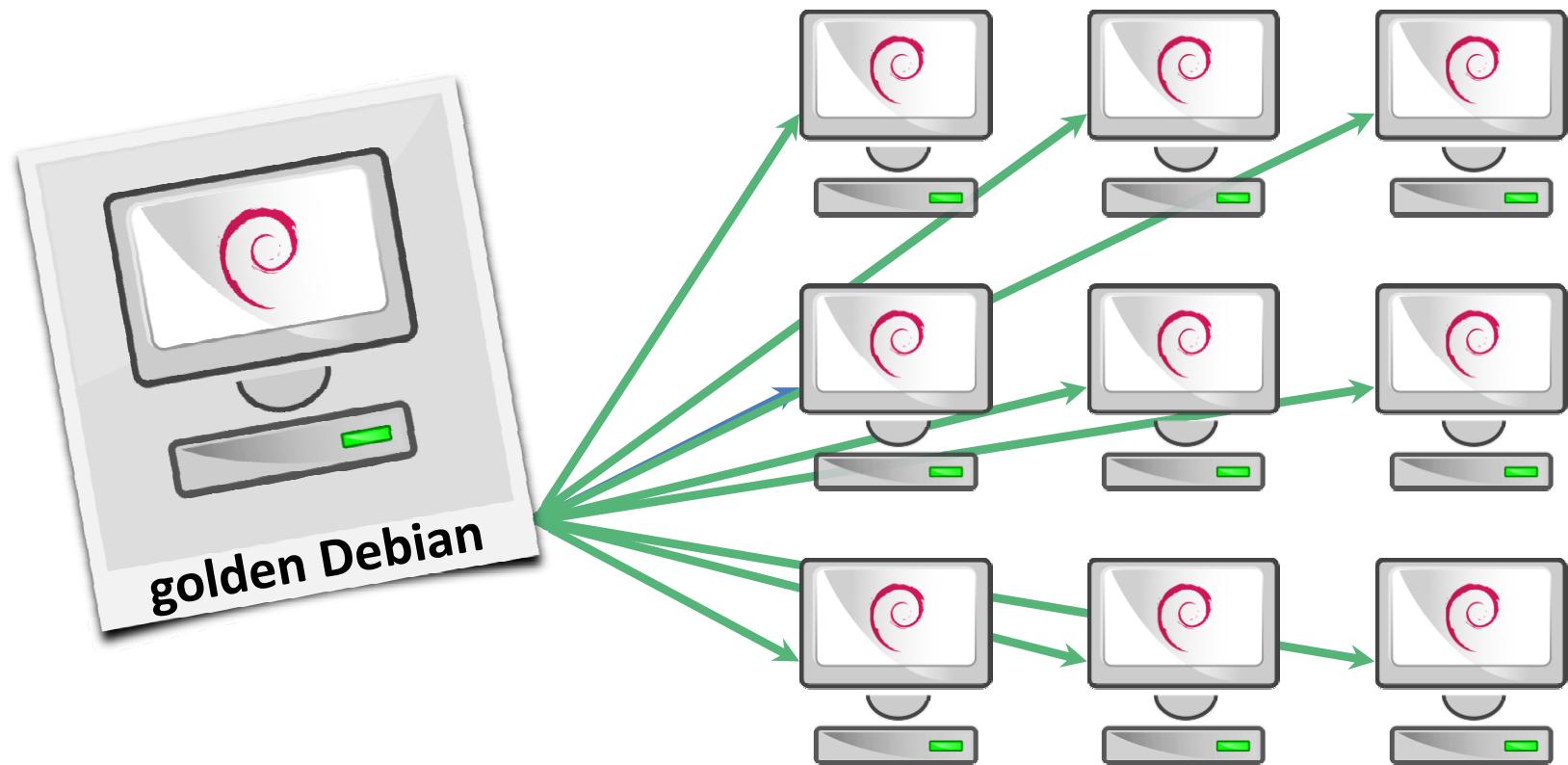
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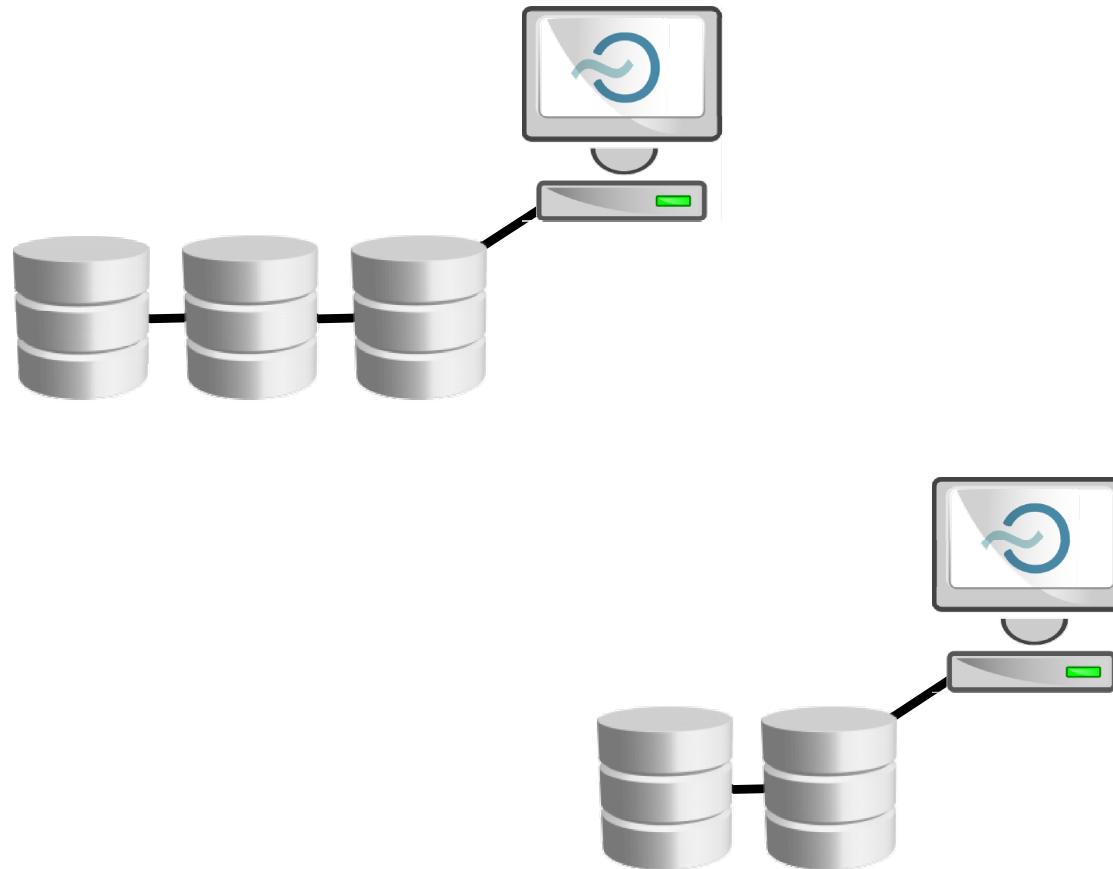
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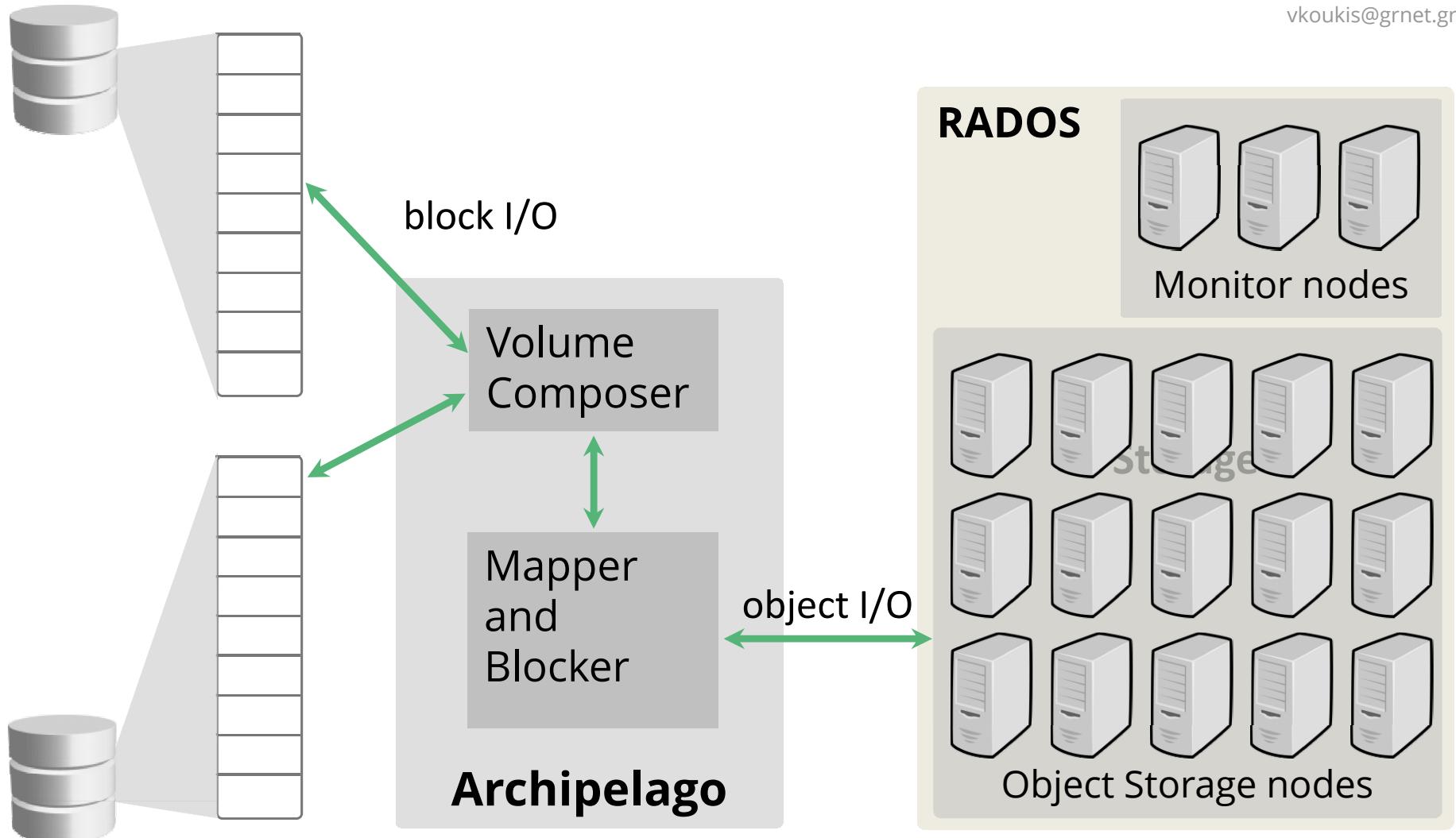












# Volumes: Archipelago

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Unified storage for Files, Images ↔ Volumes

Thin layer over the actual storage cluster

Storage backend agnostic

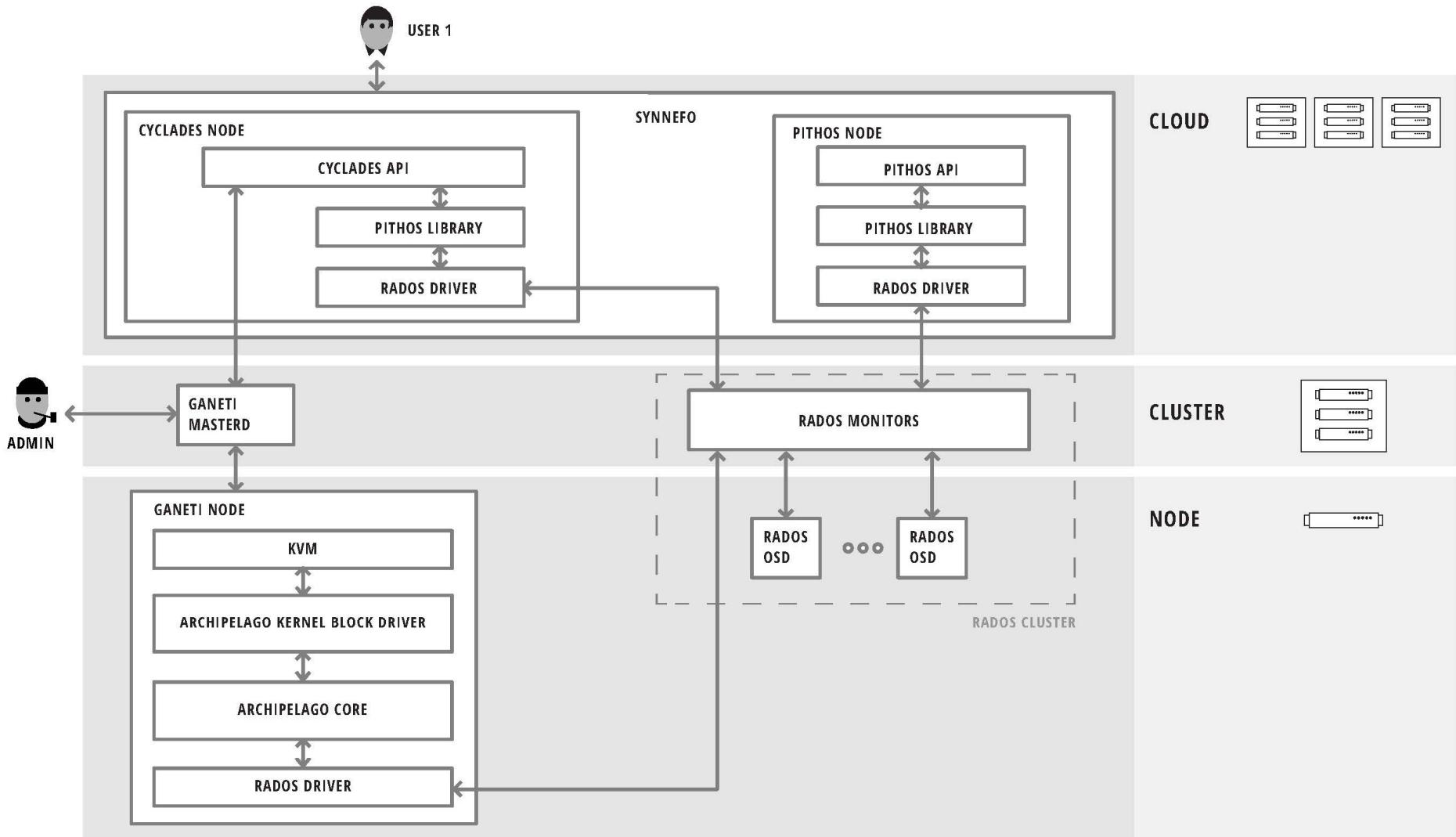
- NFS, RADOS, ...

Efficient syncing / sharing of Images as files on Pithos

Zero-copy cloning of volumes from Images

# Volumes: Archipelago

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# Features

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## Integrated Compute and Storage

- Spawning VMs from custom Images
- Images on Storage service
- Thin provisioning from existing Images
- Volume clones and snapshots independently of underlying hw

## Storage

- Efficient syncing with native clients

## Identity

- Multiple login methods, Shibboleth-based federated logins

# Features

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## Quotas

- Per-user, per-resource quotas
- Usage reports on UI

## Projects

- Granting extra virtual resources to members
- UI to create/approve/join projects
- Current use case: virtual labs, R&D project proposals

# Experience

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## Operations

- Rolling hardware and software upgrades
- Node evacuations with live VM migrations
- Cross-datacenter move, Intel → AMD, no VM downtime
- IP renumbering of all VMs

## Scalability

- Scale as you go: add new compute clusters dynamically
- Assign distinct IPv4 address blocks as needed



**Try it out!**

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**<http://www.synnefo.org>**



# Thank you!

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