What's New in Apache CloudStack

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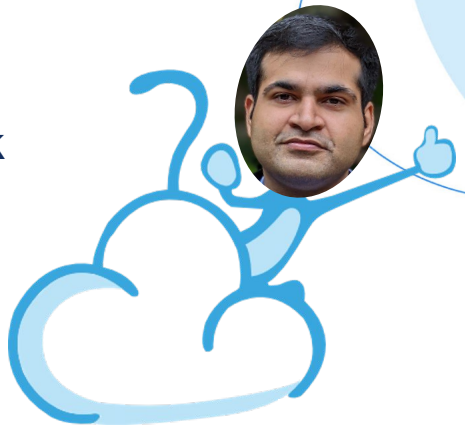
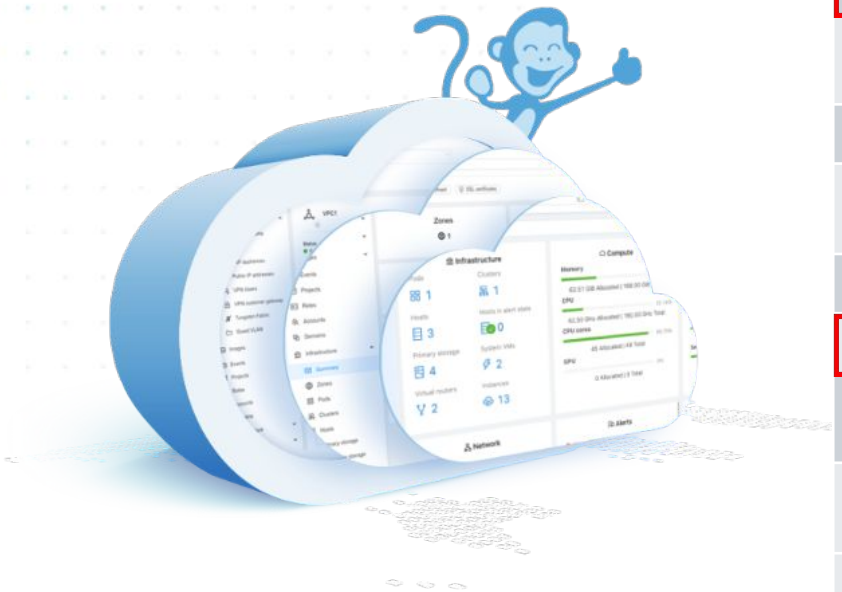
Who is Rohit?

- PMC Member, Committer & ex-VP, Apache CloudStack
- VP Engineering, ShapeBlue
- Mentor & Leader | Author of several flagship CloudStack features, frameworks and tools
- Release Manager of several past releases
- Homelabber, Tinkerer, Cat Servant



Apache CloudStack 2024 Releases

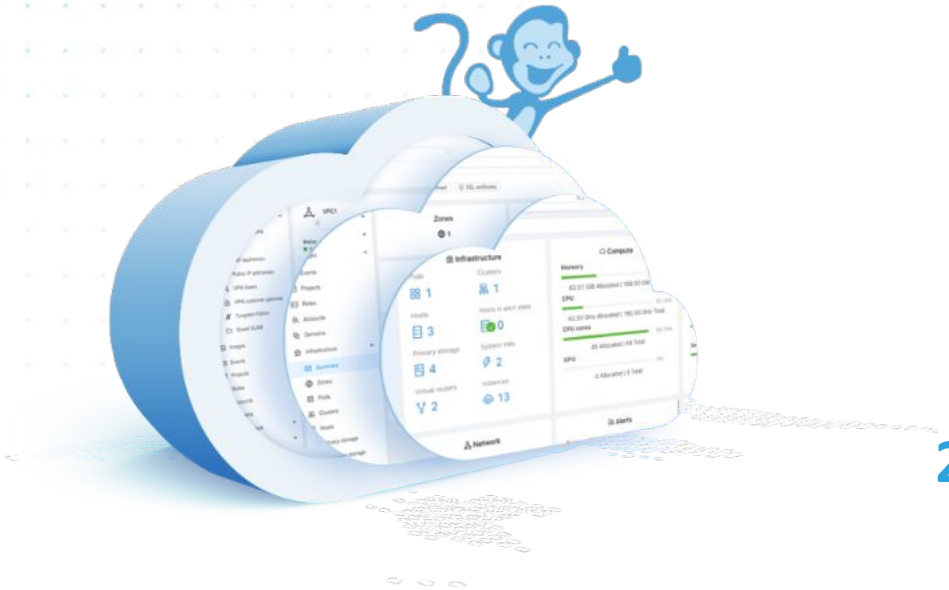
Releases History



Release	Date/ 2024	Type
4.19.0.0	2 February	LTS
4.19.0.1 & 4.18.1.1	4 April	Security
4.18.2.0	25 April	Maintenance
4.18.2.1 & 4.19.0.2	5 July	Security
4.18.2.2	19 July	Security
4.19.1.0	19 July	Maintenance
4.18.2.3 & 4.19.1.1	6 August	Security
4.18.2.4 & 4.19.1.2	15 October	Security
4.18.2.5 & 4.19.1.3	12 November	Security
4.20.0.0	Voting/RC	LTS

Apache CloudStack 4.19 RECAP

Release Information

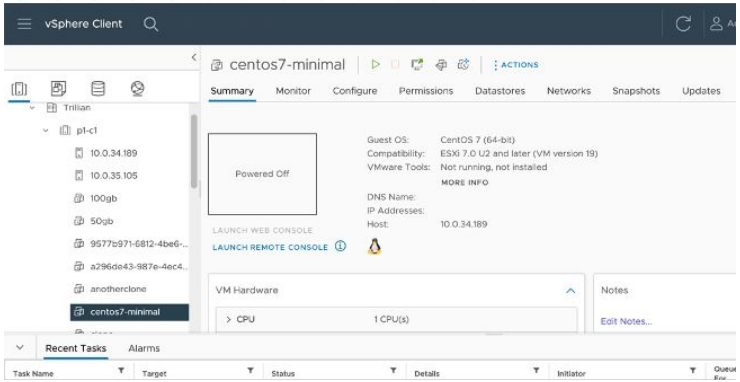


- Released on 2 Feb 2024
- 315 new features, improvements & fixes
- 4.19 is an LTS Release
  - EOL August 2025

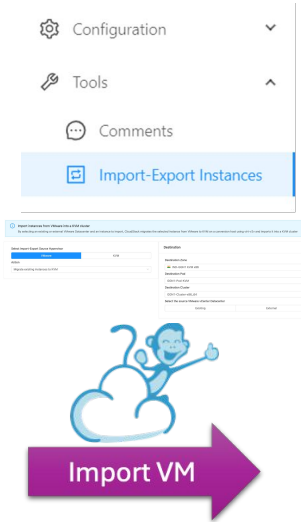
26 New Features!

VMware to KVM Migration

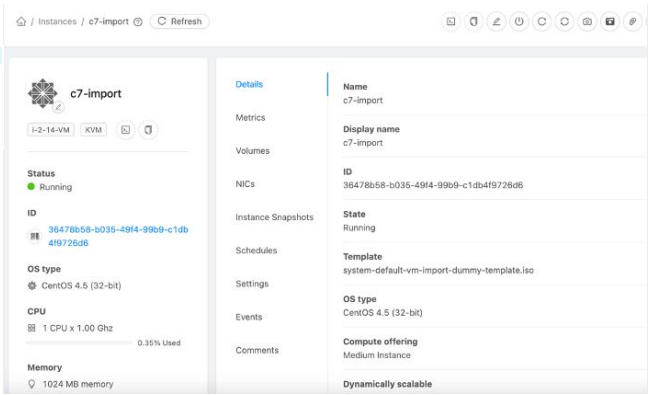
Apache CloudStack 4.19
VMware to KVM Migration



Source Instances on vSphere

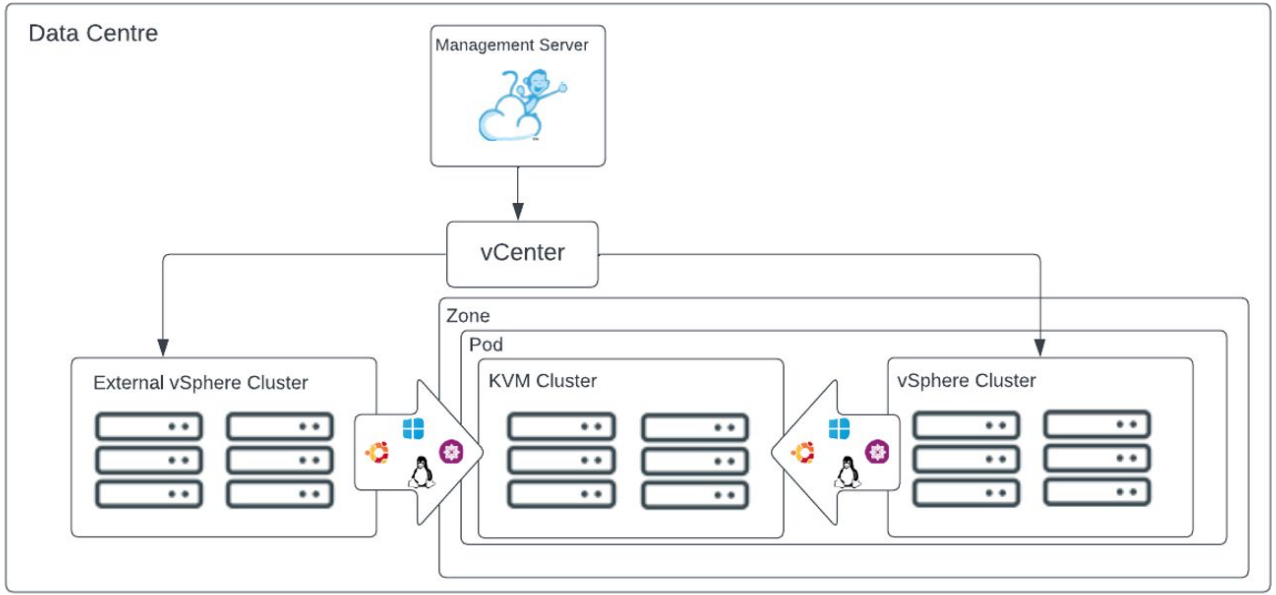


virt-v2v



Admin(s) convert and import source VMware Instances to run on CloudStack managed KVM hosts

Apache CloudStack 4.19
VMware to KVM Migration



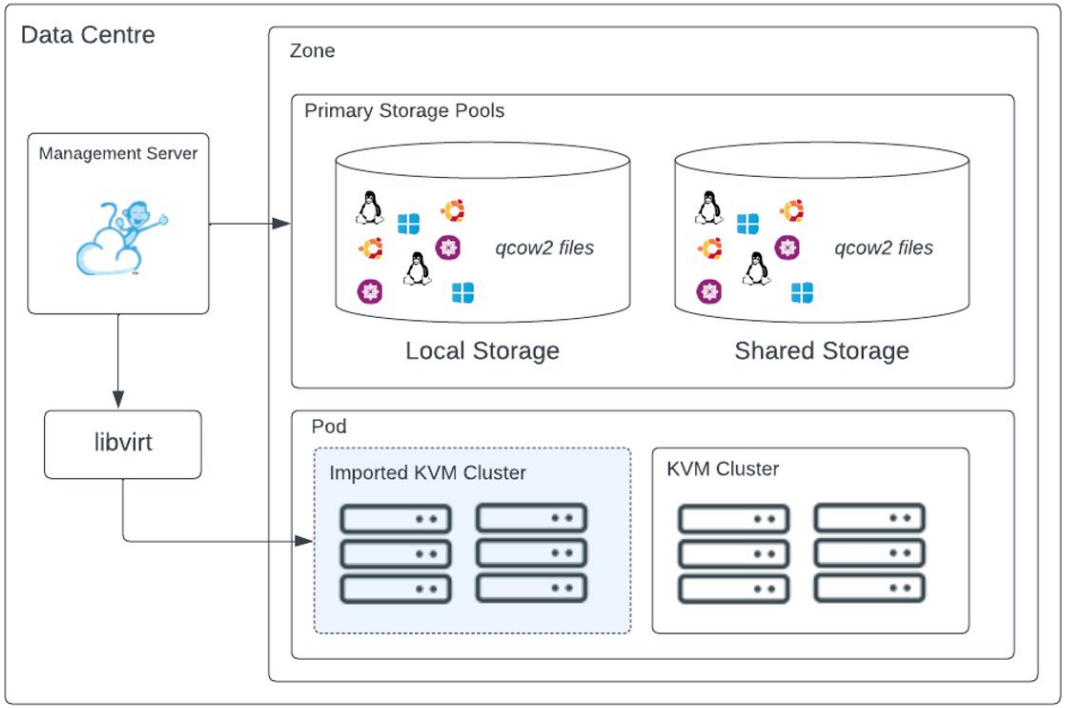
Apache CloudStack 4.19
VMware to KVM Migration

Learn more at Andrija Panic's talk - "VMware/KVM to CloudStack/KVM Migration - tools and options within CloudStack"

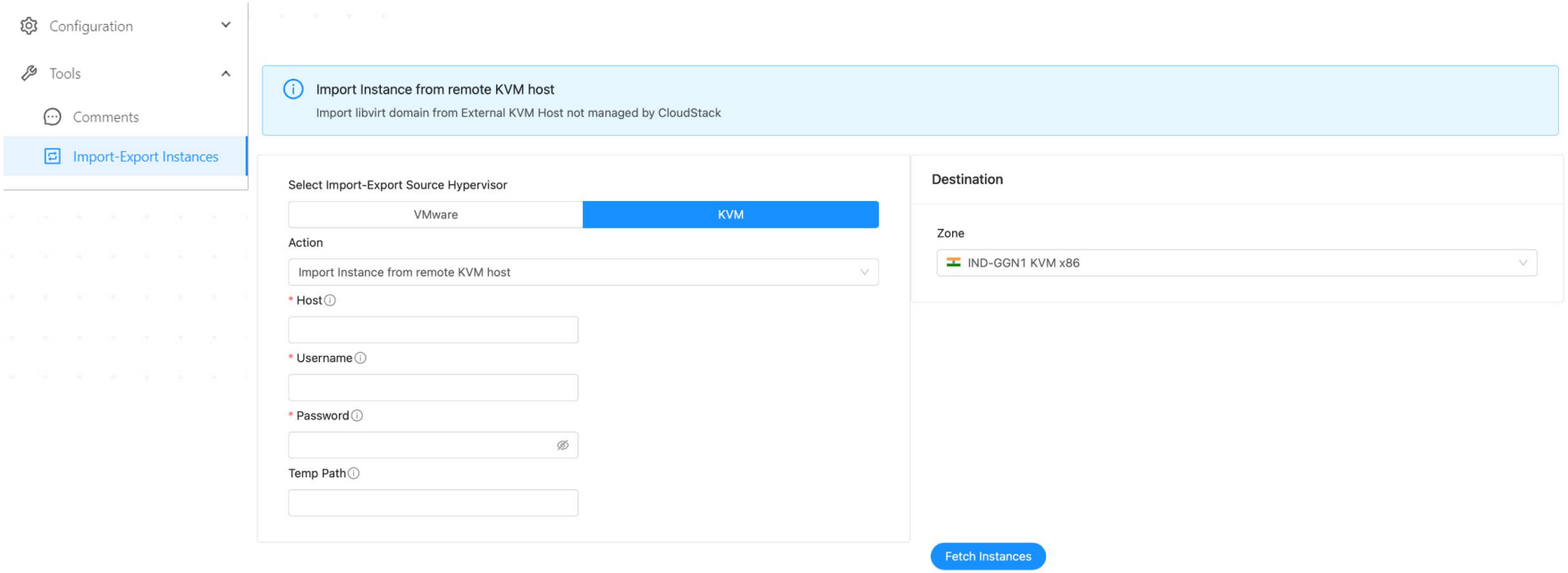
(Today/Thursday, 21st Nov 2024)

KVM Import

Apache CloudStack 4.19
KVM Import



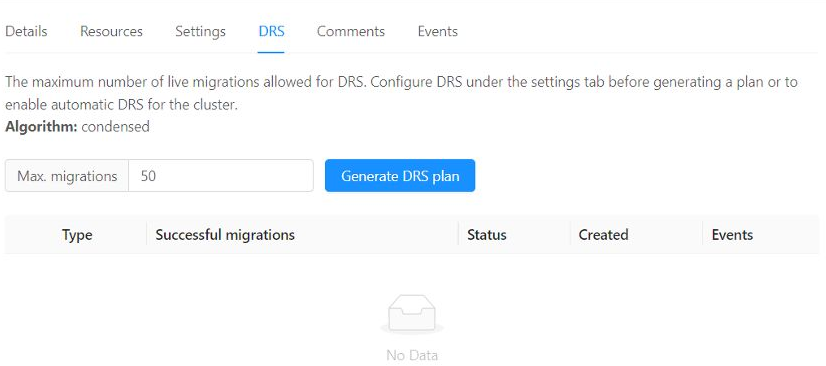
Apache CloudStack 4.19
KVM Import



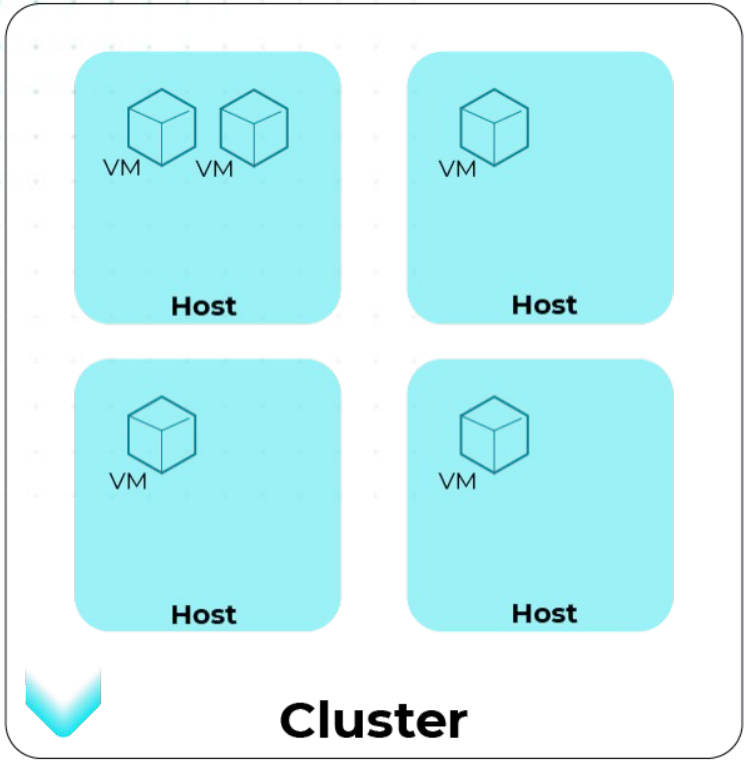
CloudStack DRS

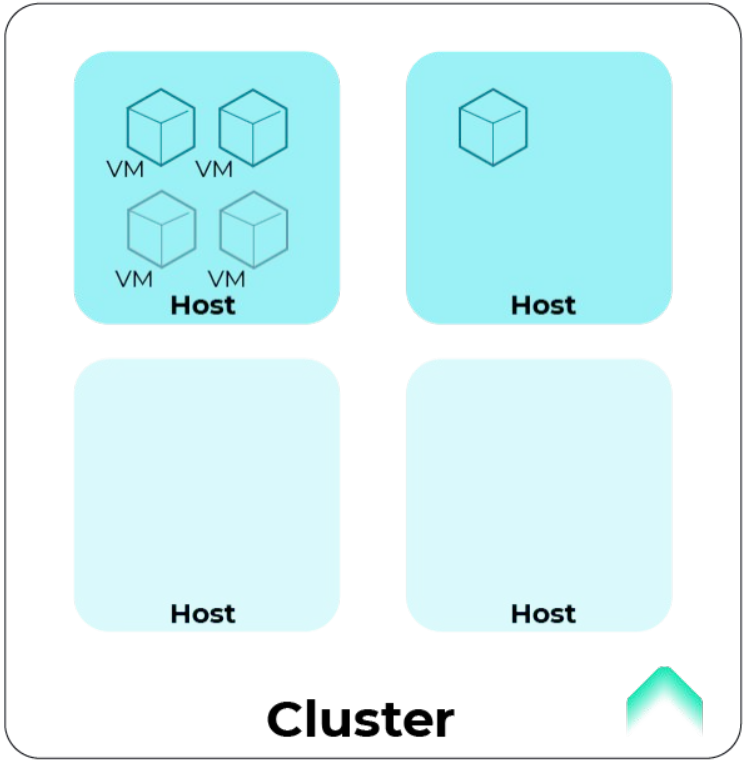
Apache CloudStack 4.19
CloudStack DRS

- Hypervisor Agnostic
- DRS automatically moves Instances between Hosts
- Can be set globally or by per Cluster basis
- Supports two algorithms:
  - Balanced
  - Condensed



Apache CloudStack 4.19
CloudStack DRS

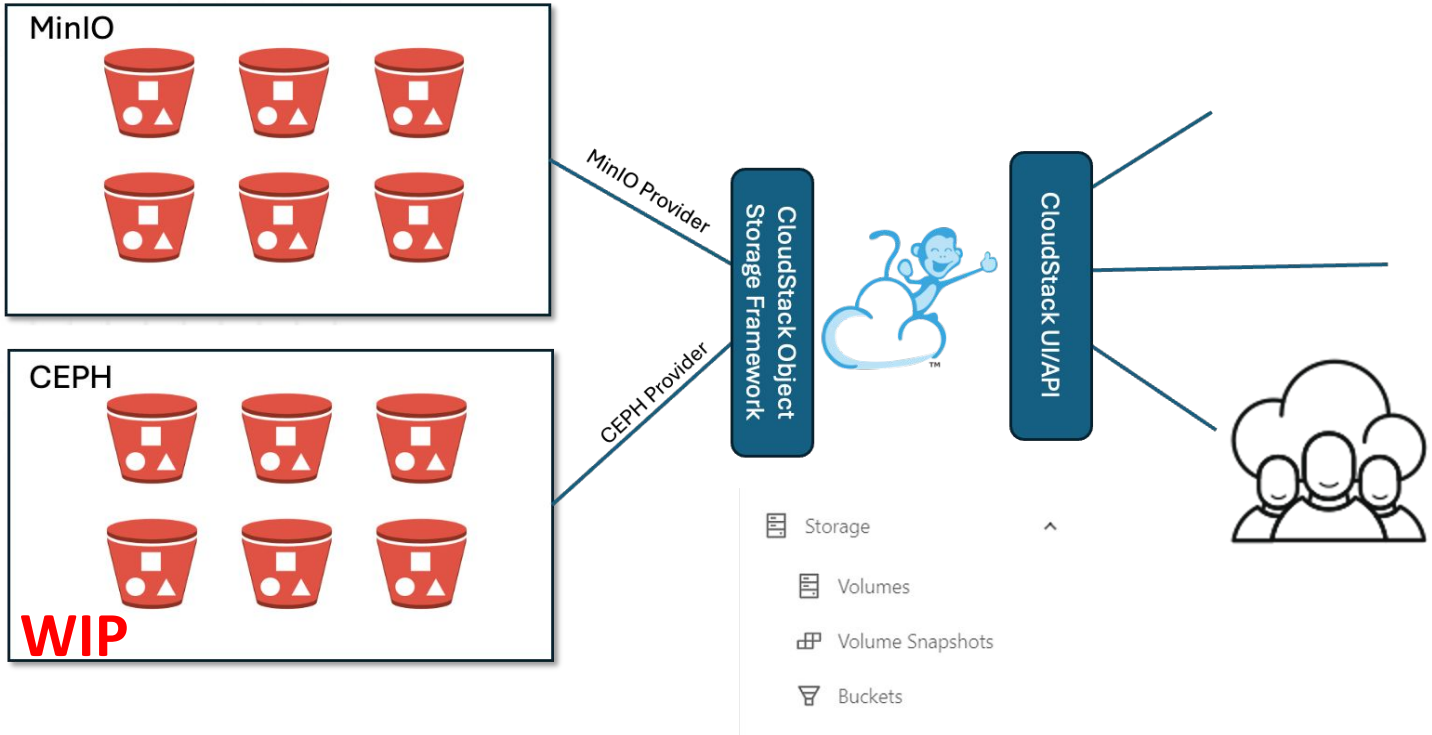




CloudStack Object Storage

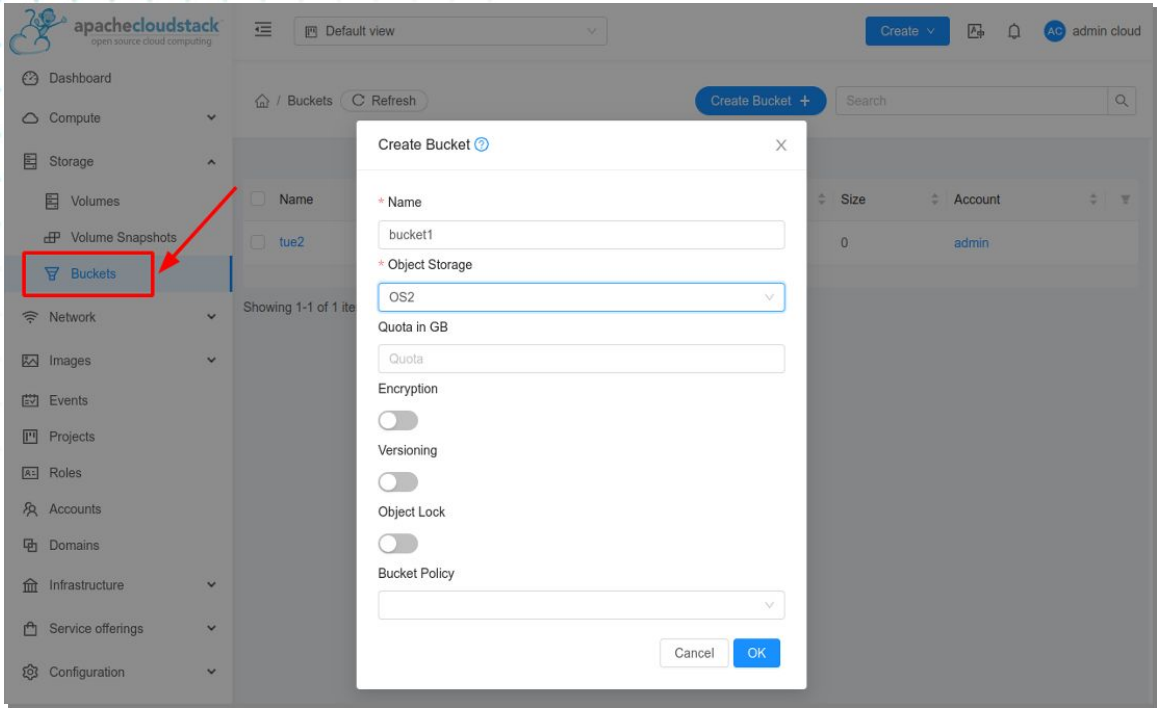
Apache CloudStack 4.19

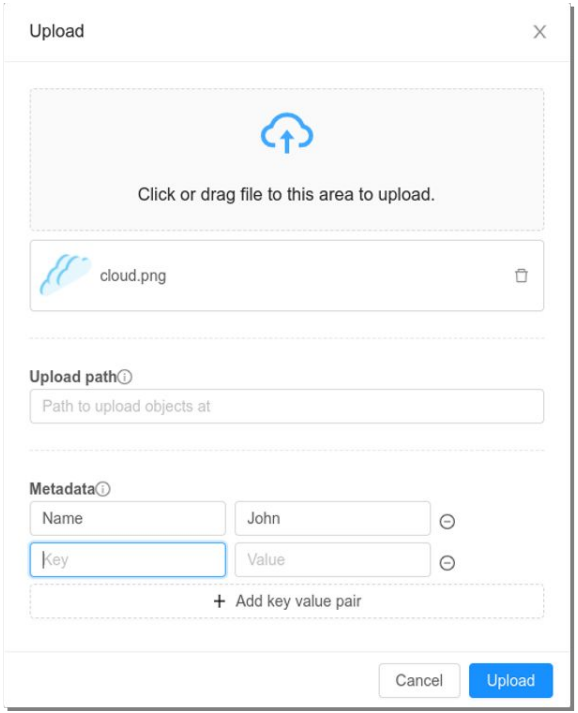
CloudStack Object Storage



Apache CloudStack 4.19

CloudStack Object Storage



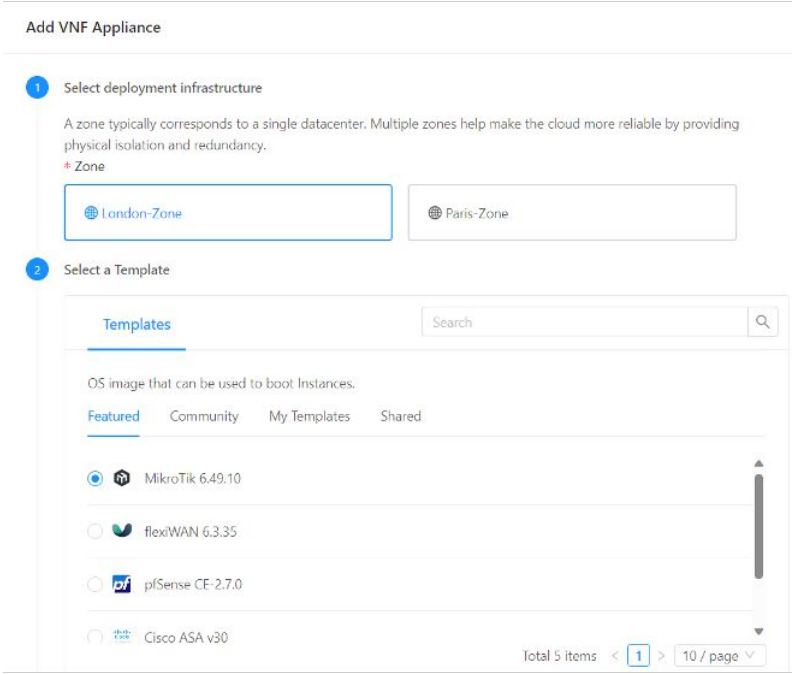


VNF Appliance Support

Apache CloudStack 4.19

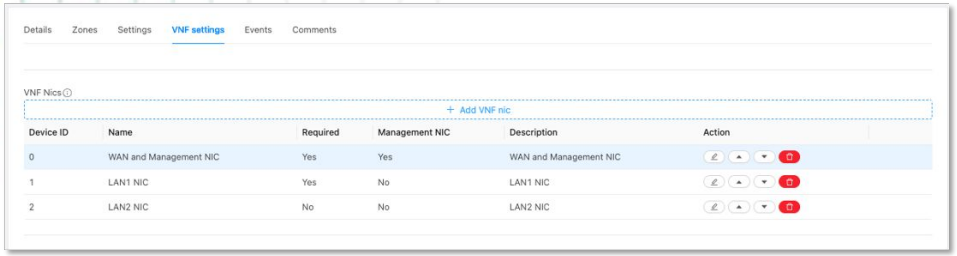
VNF Appliance Support

- Allows users to deploy and configure 3rd party VNF appliances in their CloudStack environment, using VNF templates created by admins
- Configures required network interfaces & network rules for access to the Appliance admin console
- Usage recorded for billing by CSP
- Support API and UI Set-up and Deployment



Apache CloudStack 4.19

VNF Appliance Support



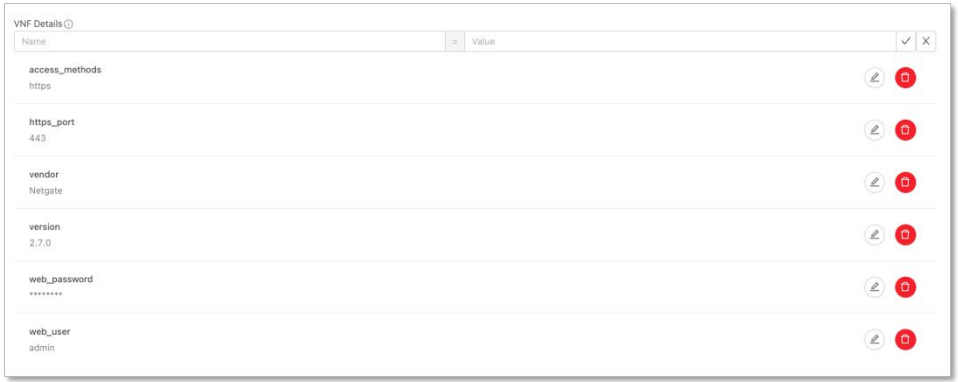
Template NIC Management

- Management
- WAN
- LANs

Template VNF Details

Used to add firewall rules and display VNF details to the Users:

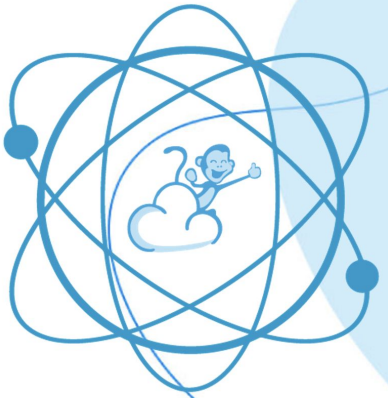
- User credentials
- Service port and protocol
- Vendor and Maintainer
- VNF Version
- Others



CloudStack 4.19: Other Mentions

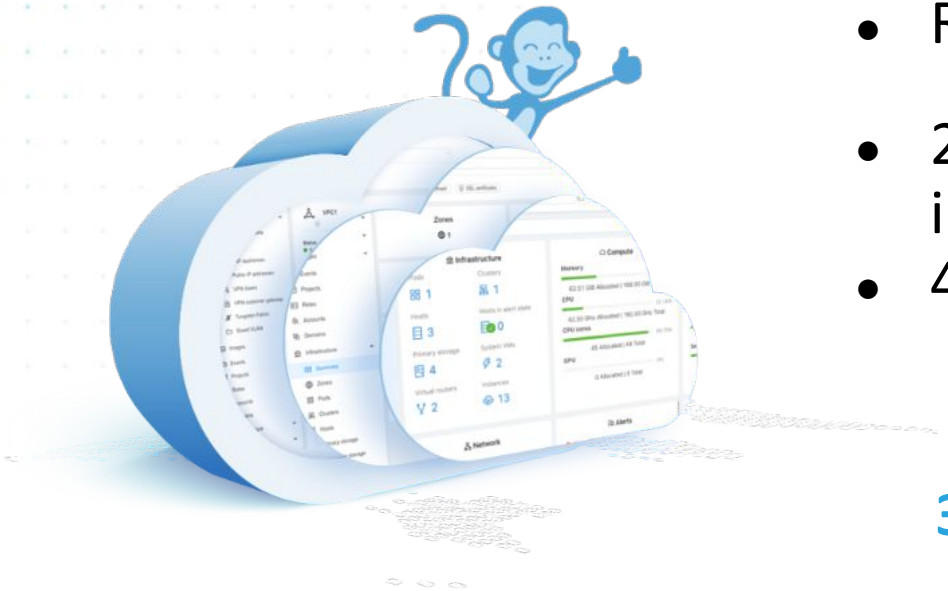
- OAuth2 Authentication
- Scheduled Lifecycle Operations
- Snapshot Copy (Cross-zones)
- Configurable SNAT IP for VR
- Domain migration (Move sum domains between domains)
- Dynamic secondary storage selection
- New Storage Support: HPE Primera & Pure Flasharray
- Redesigned New Dashboard for non-root accounts and projects
- KVM Host HA for StorPool
- CAPC aware CKS
- Granular Storage Management
- Support for vSphere 8.0.0
- Safe ACS Shutdown Feature

New Apache CloudStack 4.20 Release!



Apache CloudStack 4.20

Release Information



- RC/Voting in progress
  - Release expected end-Nov or early-Dec
- 230+ new features, improvements & fixes
- 4.20 is an LTS Release
  - EOL May 2026 (expected)

30+ New Features!

Apache CloudStack 4.20

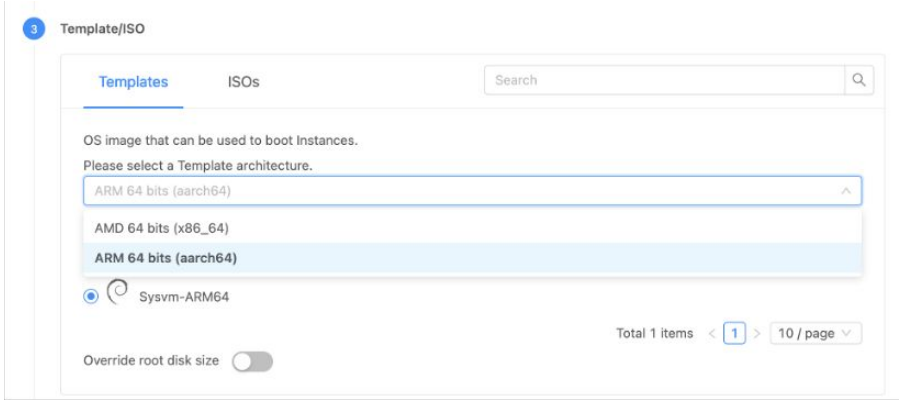
Resources (available on release)

- Source release
  https://cloudstack.apache.org/downloads/
- Documentation
  https://docs.cloudstack.apache.org/en/4.20.0.0/
- Convenience Packages
  https://download.cloudstack.org/
  https://www.shapeblue.com/cloudstack-packages
- Contribute
  https://github.com/apache/cloudstack

ARM64 Support & Multi-Architecture Zone

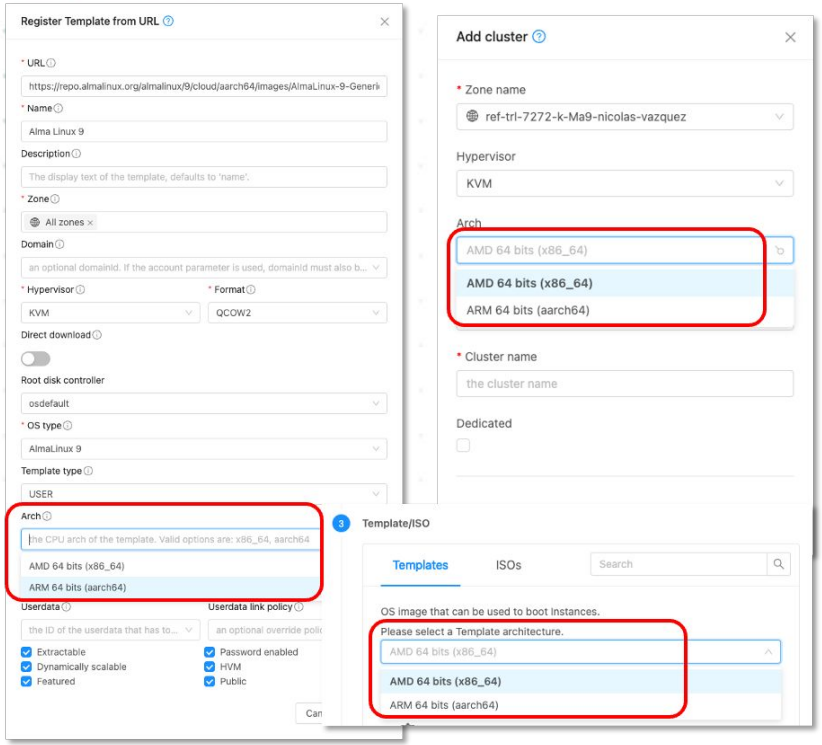
ARM64 Support & Multi-architecture Zone

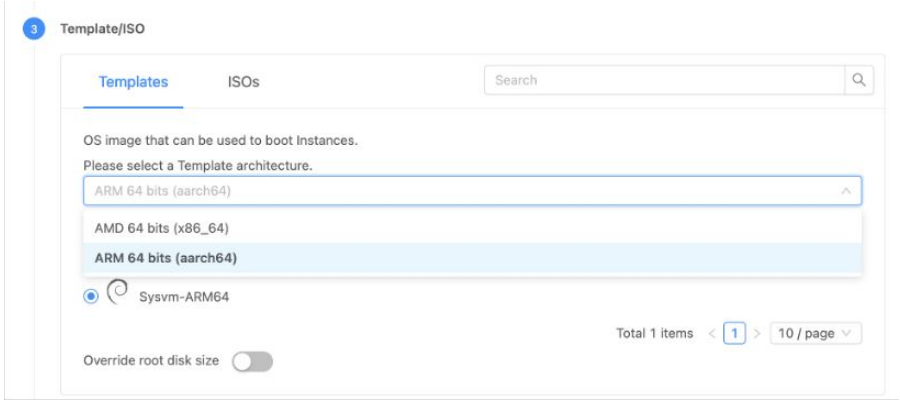
- When creating an Instance, Users can now choose between x86_64 and ARM64 Architectures
- Architecture type is specified when creating:
  - Templates
  - ISO’s
  - Kubernetes Versions
- CloudStack Clusters now have an assigned Architecture type
- A zone can support both types simultaneously



Apache CloudStack 4.20

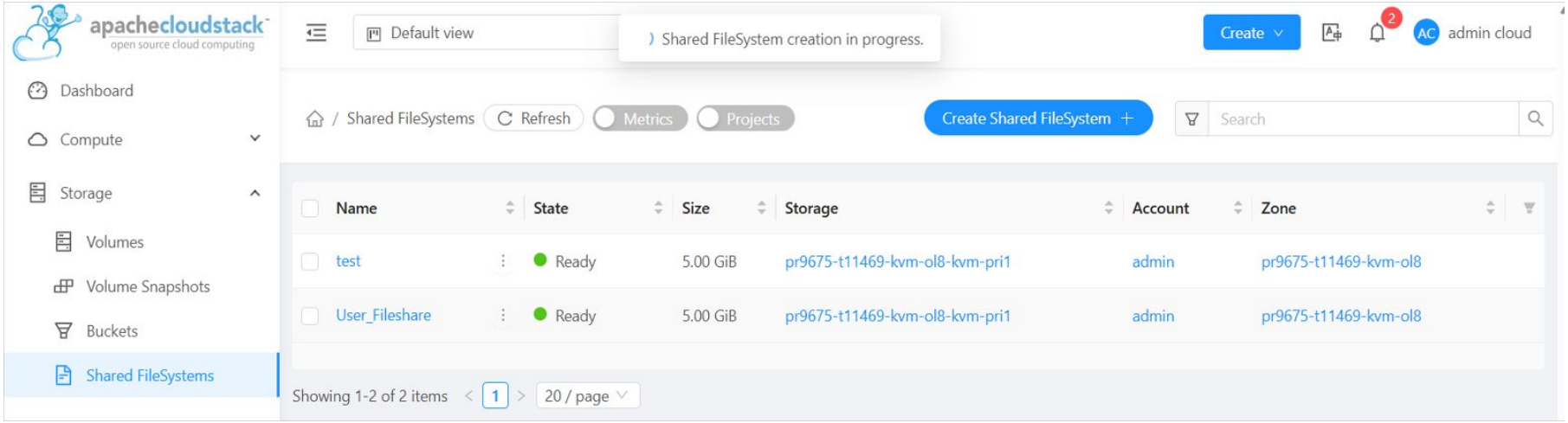
ARM64 Support & Multi-architecture Zone





Shared FileSystems

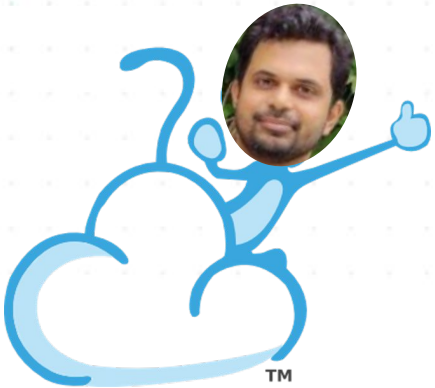
Apache CloudStack 4.20
Shared FileSystems

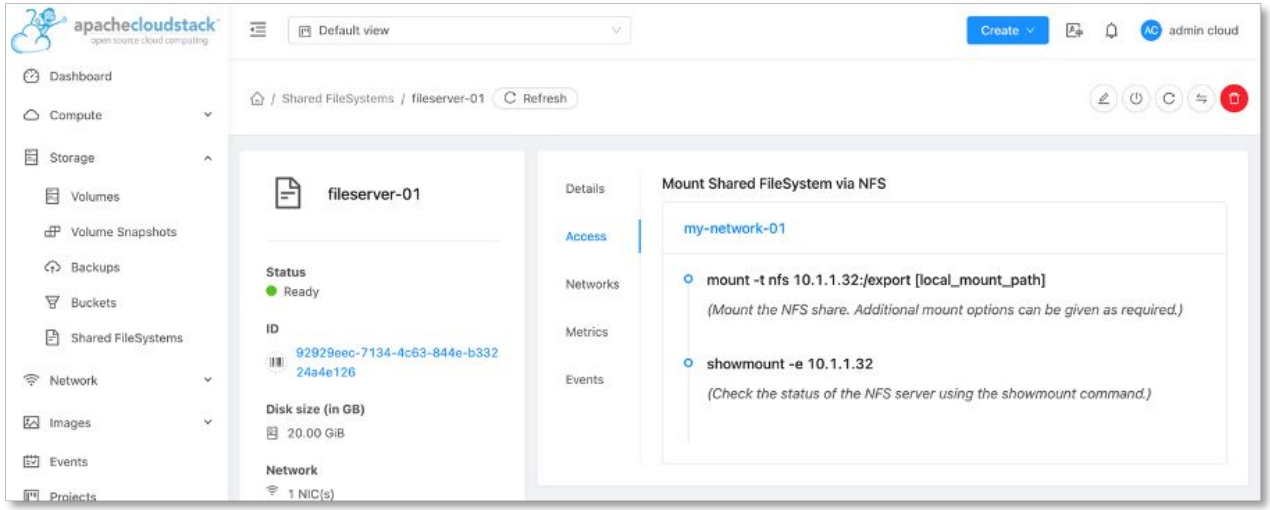


- Users can create a file share for consumption in other Instances (think EFS)
- CloudStack orchestrates the creation of an underlying Instance, Volume, etc.
- Hypervisor & Storage Agnostic!

Apache CloudStack 4.20

Shared FileSystems





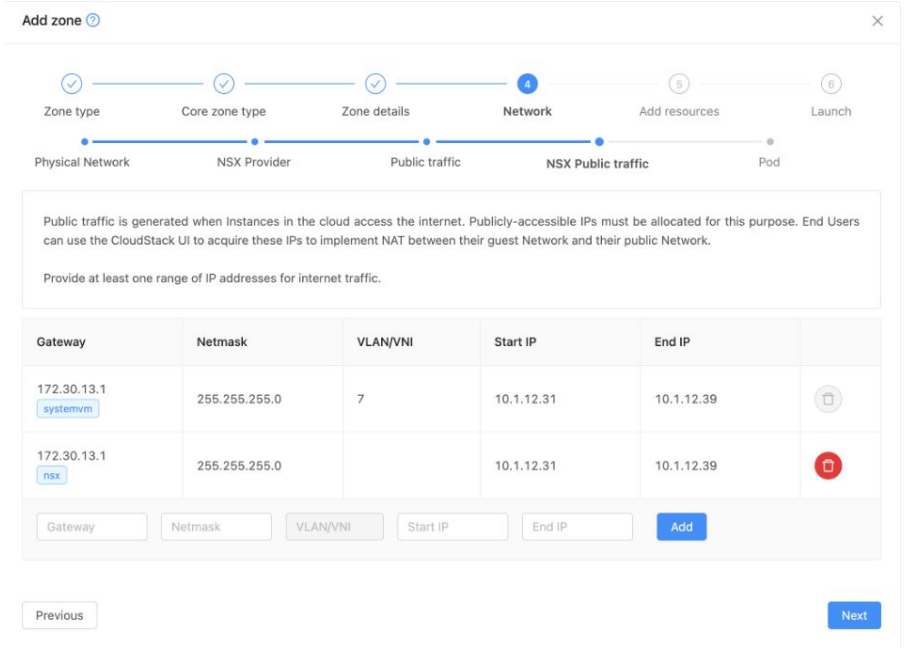
Learn more at Abhisar's talk - "Shared FileSystem as a First Class Feature" (Tomorrow/Friday, 22nd Nov 2024)

VMware NSX Support

Apache CloudStack 4.20

VMware NSX Support

- New NSX 4 Network Plugin
  (Similar as Tungsten Fabric Plugin)
- Enterprise-Grade Networking to CloudStack env based on VMware vSphere
- Configured at Zone level (Isolation method)
- Offloads network operations from VR to NSX



Apache CloudStack 4.20

VMware NSX Support

Learn more at Nicolas Vazquez's talk - "NSX Integration on CloudStack"

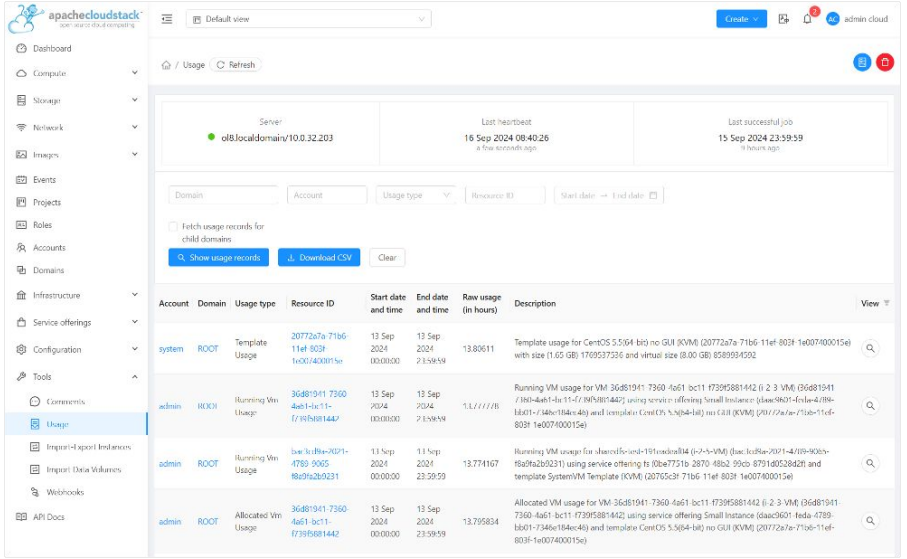
(Tomorrow/Friday, 22nd Nov 2024)

Usage Management UI

Apache CloudStack 4.20

Usage Management UI

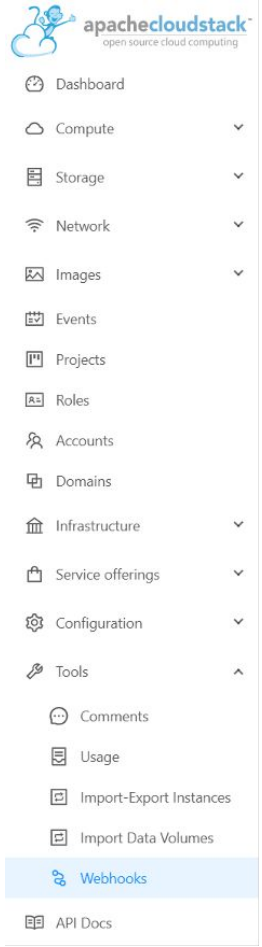
- Management Interface for CloudStack Usage Service
- Enables:
  - Search/Browse of Usage Data
  - Usage Generation
  - Purge Old Data
  - Export Data as CSV



CloudStack Webhooks

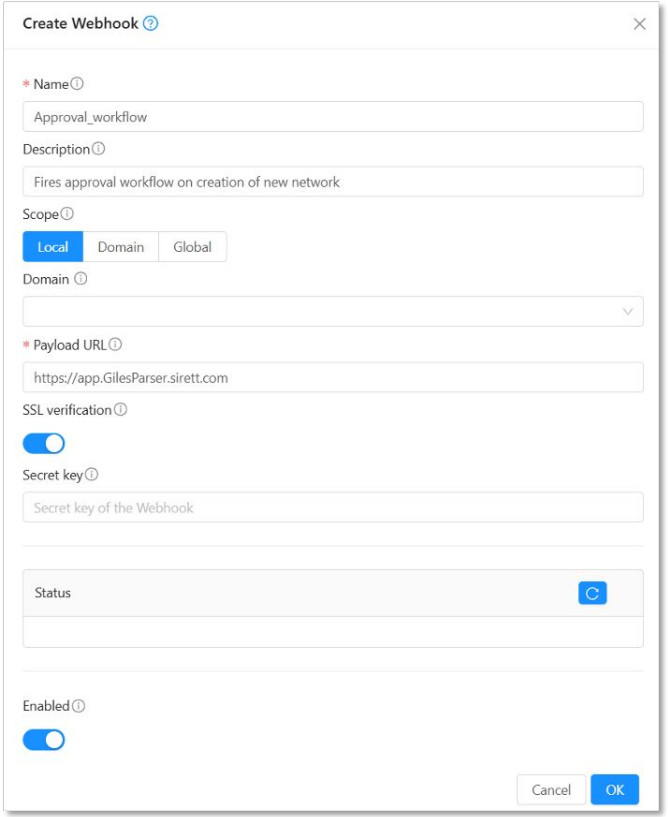
CloudStack Webhooks

- Webhooks provide a way for notifications to be delivered to an external web server whenever certain events occur in CloudStack.
- Allows end users to consume CloudStack events
- Use-cases:
  - Notifications
  - Workflow automation
  - Custom integrations
  - Data synchronization
  - Real-time data processing



CloudStack Webhooks

- Admin accounts can choose scope
- No event further filtering at this stage
- Requires the parser to select the right events



Implicit Hardware-based Host Tags

Implicit Hardware-based Host Tags

- Host tags now automatically populated by agent.properties file
- Agent properties file can be created during physical host deployment (via Ansible, etc)

Can be used for:

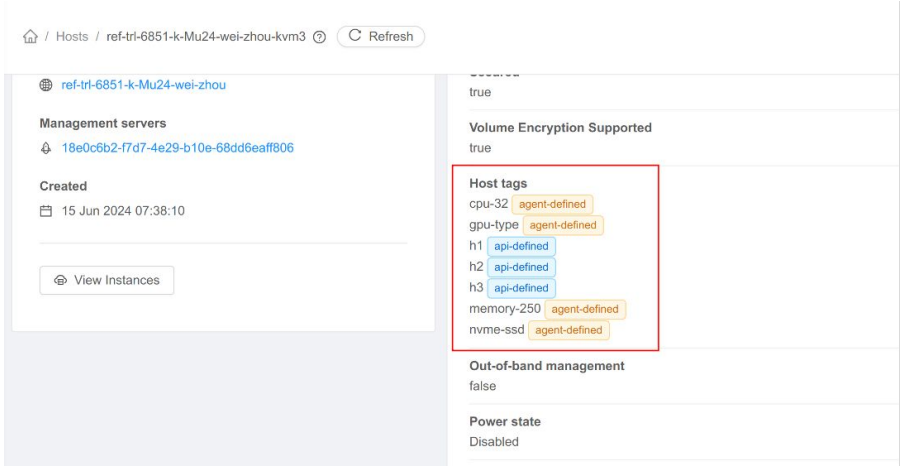
- Different hardware types:
  - GPU
  - GPU type
  - SSD
  - Raid type
  - Network card type
- Different workloads:
  - cpu-intensive application
  - memory-intensive application
  - windows Instances

Implicit Hardware-based Host Tags

- Explicit tags: The host tags managed by CloudStack API/UI
- Implicit tags: The host tags managed by agent.properties

- Usage: Add tags to agent.properties, restart cloudstack-agent

  host.tags=cpu-32,memory-250,gpu-type,nvme-ssd



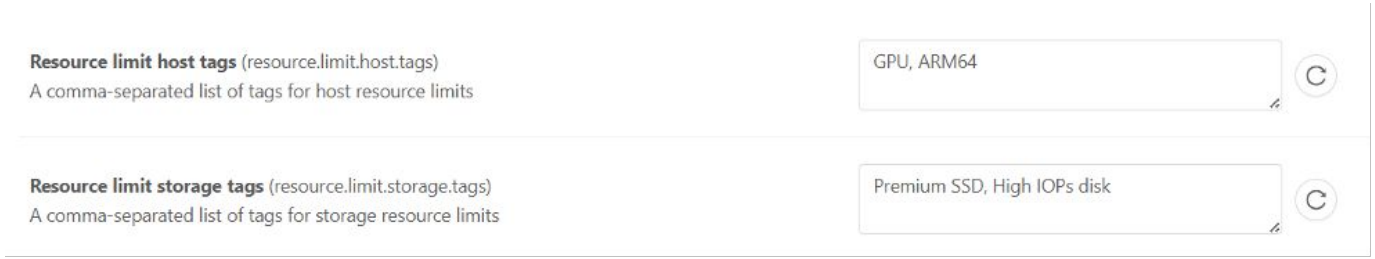
Granular Resource Limits

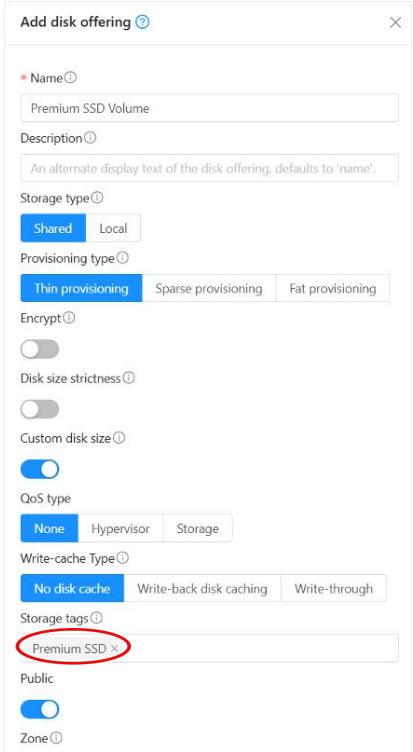
Apache CloudStack 4.20

Granular Resource Limits

- Extensible limits based on tagging for Compute & Storage Service Offerings
- Can be User, Account, Domain level

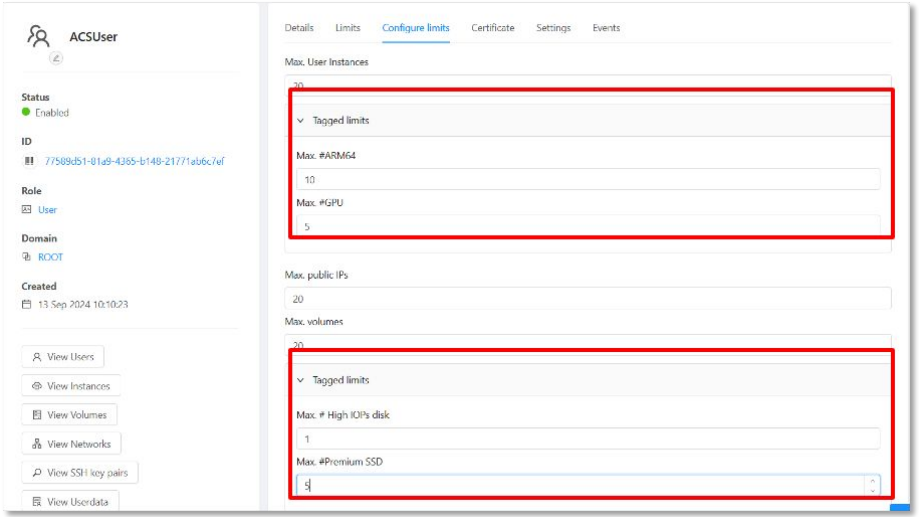
- Configured with 2 global settings and then tags added to Service Offerings:





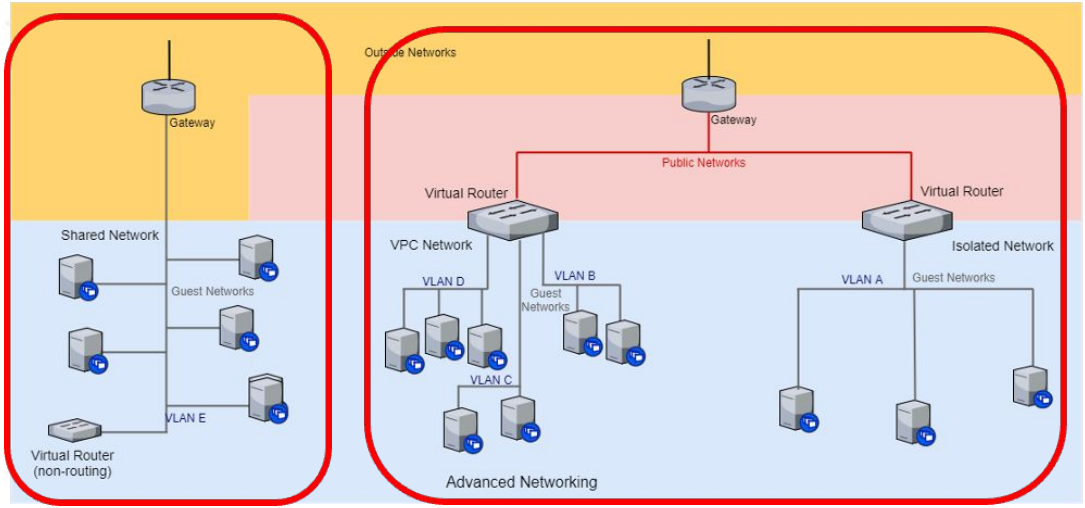
Granular Resource Limits

New “Tagged Limits” appear at Account, Domain or Global levels



Dynamic & Static Routing

Dynamic & Static Routing



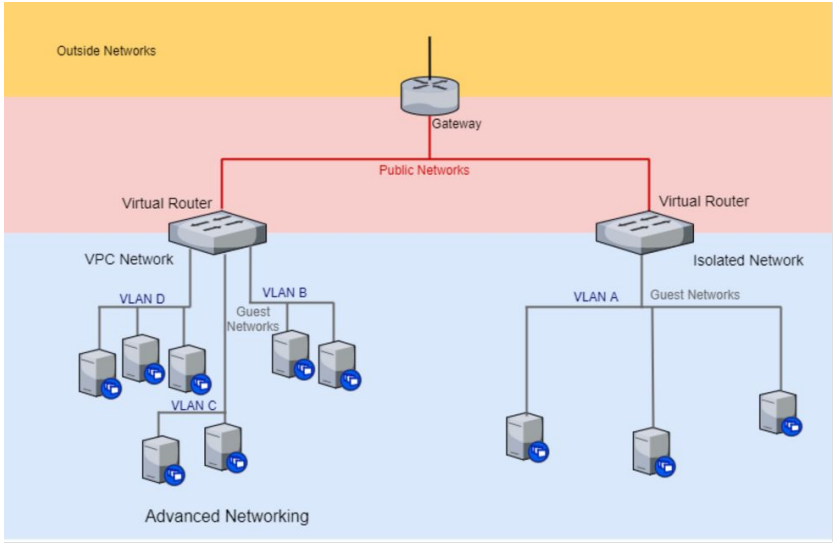
Shared networks

- VMs use direct IPs (public or internal)
- Operators configure gateway on upstream router
- Can only added by ROOT admin
- VR provides Dhcp/Dns/Userdata

Isolated networks and VPC

- Can be created by regular users.
- VMs use private IPs.
- VMs are not directly accessible
- VMs can be accessed via Static NAT, LB, PF, VPN, etc
- VR as Source NAT gateway (performance !)

Dynamic & Static Routing



ROUTED isolated network and ROUTED VPC:

- Can be created by regular users.
- **VMs are directly accessible**
  - DNAT/Lb/PF/VPN are not needed
- VR as gateway (not Source NAT!)
  - Low overload
  - High throughput (2-2.5X gain)

Dynamic & Static Routing

Challenge: Gateway (upstream router) and CloudStack VR must know how to forward the packets:

- from VMs to outside
- from outside to VMs

Routing mode	What operators need to do
Static	Operators have to add routes for each network manually in gateway (upstream router)
Dynamic	Operators configure dynamic BGP in gateway (upstream router) The routes will be automatically advertised to routers (upstream and virtual) via BGP

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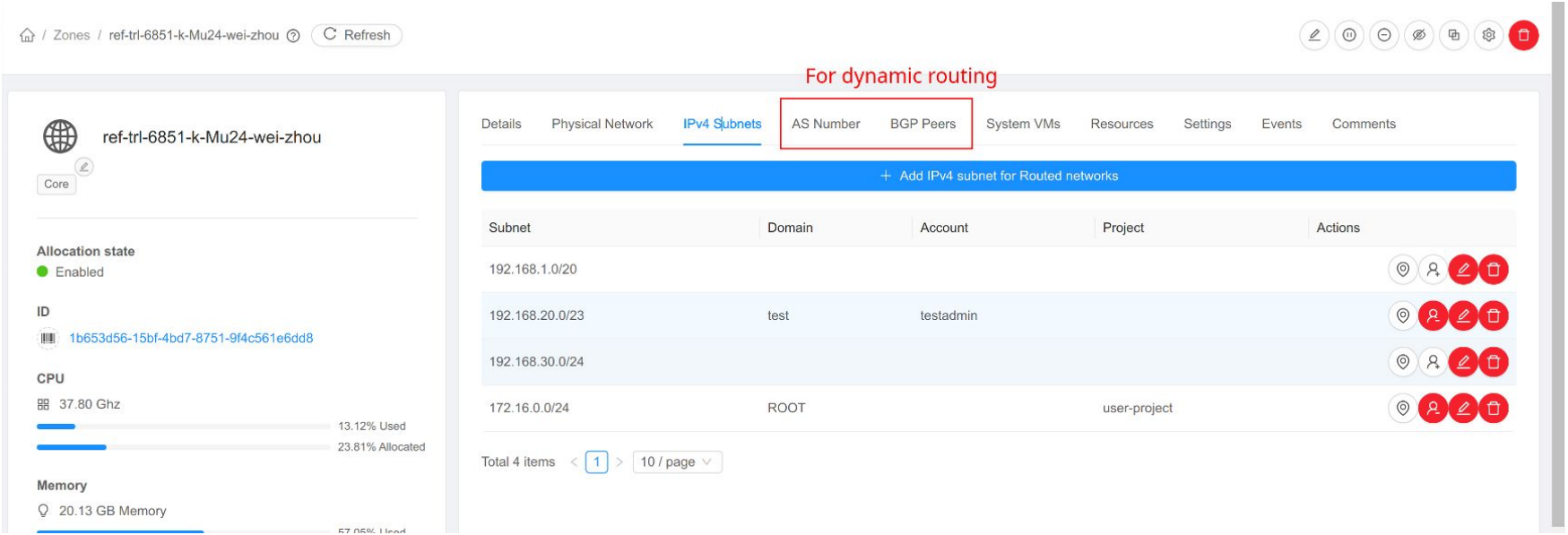
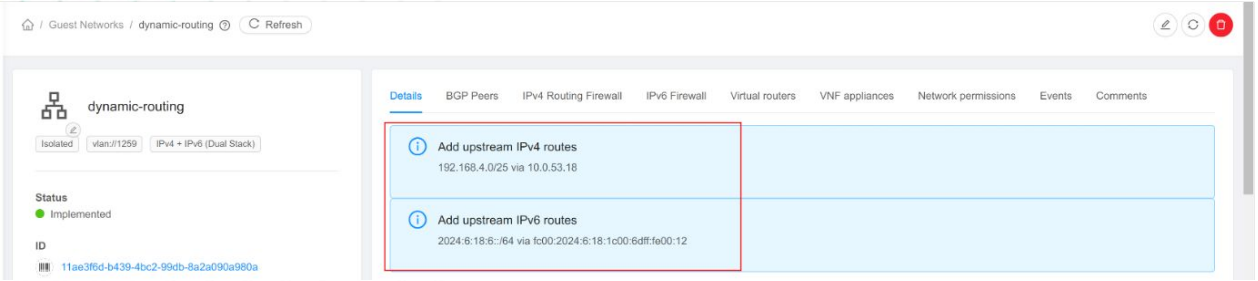
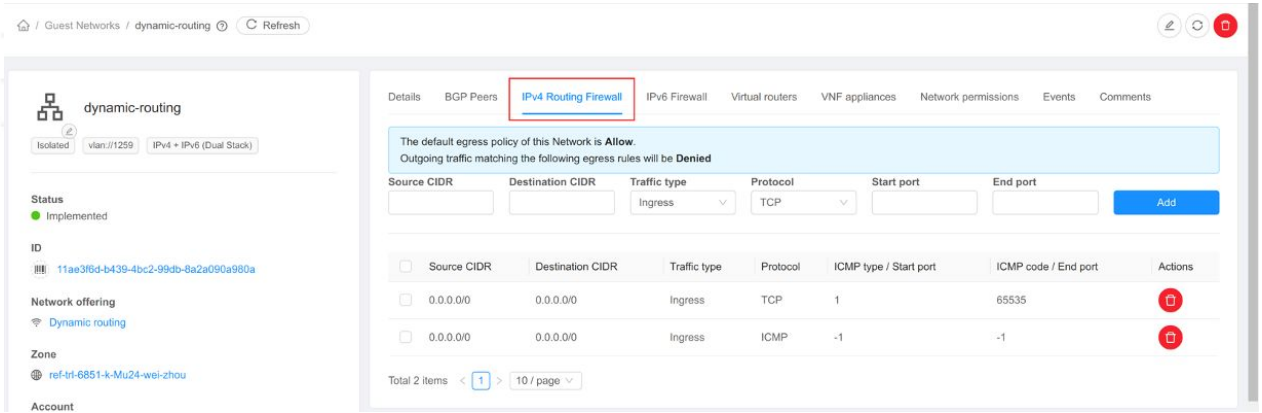
Dynamic & Static Routing



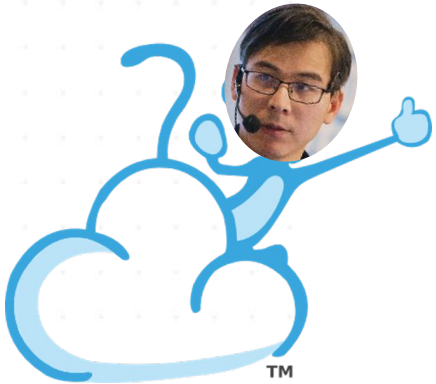
Apache CloudStack 4.20

Dynamic & Static Routing





Dynamic & Static Routing



Learn more at Wei Zhou's talk - "Routed Mode: Static and Dynamic Routing"

(Tomorrow/Friday, 22nd Nov 2024)

Simple NAS B&R Provider

Apache CloudStack 4.20
Simple NAS B&R Provider

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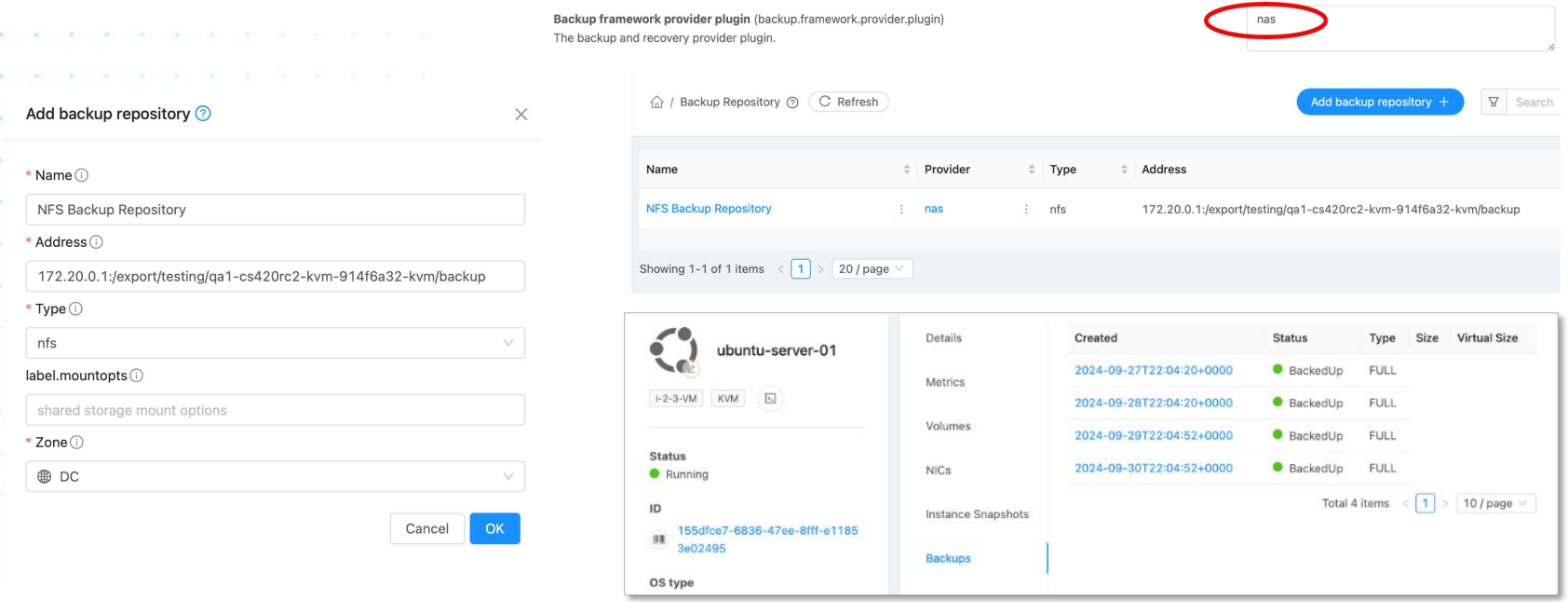
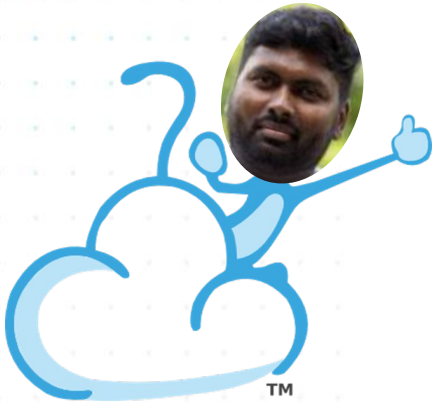


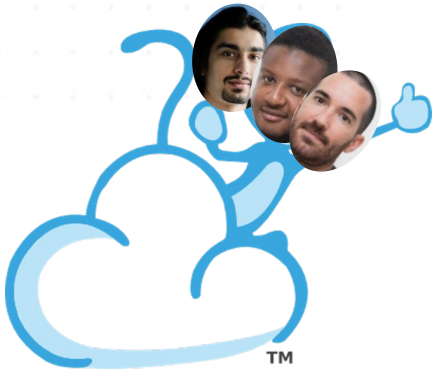
Simple NAS-based B&R Provider (for KVM)

(in addition to Veeam, Dell/Networker and Backroll)



Learn more about B&R at Jithin Raju's talk - "Backup & Recovery in CloudStack"

(Tomorrow - Friday, 22nd Nov 2024)

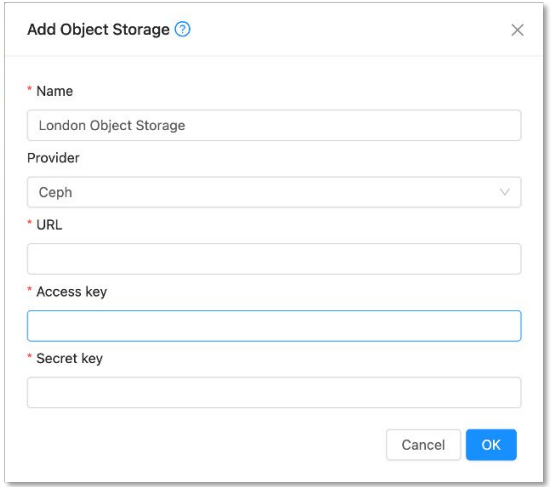


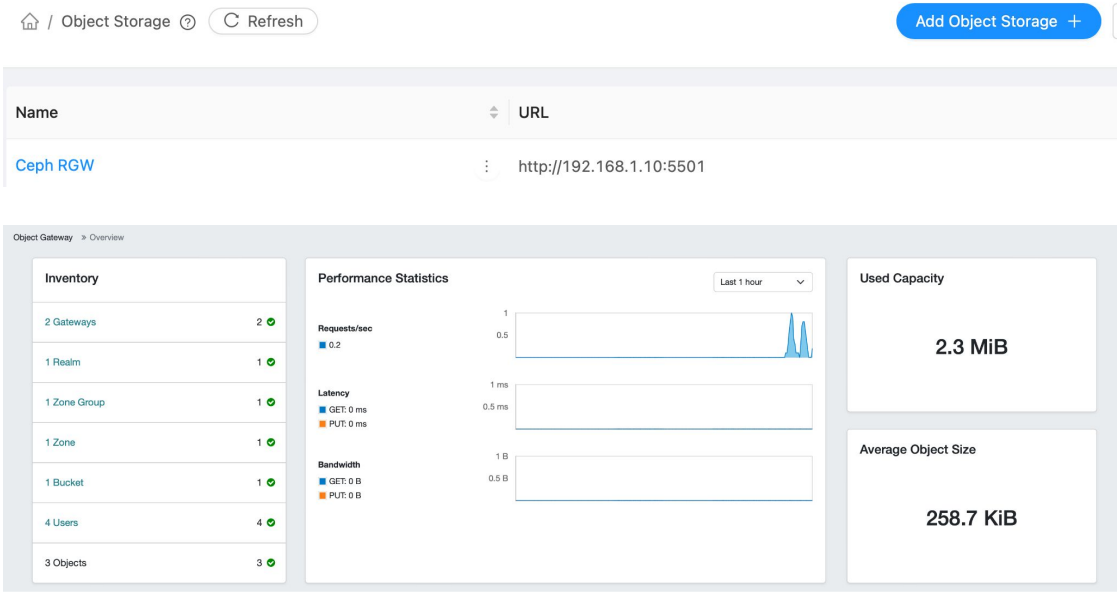
Learn more about Backroll B&R at talk by Matthias/Ousmane/Pierre - "BACKROLL 1.0 is Out!"

(Tomorrow - Friday, 22nd Nov 2024)

Ceph RGW
Object Storage Provider

Apache CloudStack 4.20
Ceph RGW Object Storage Provider



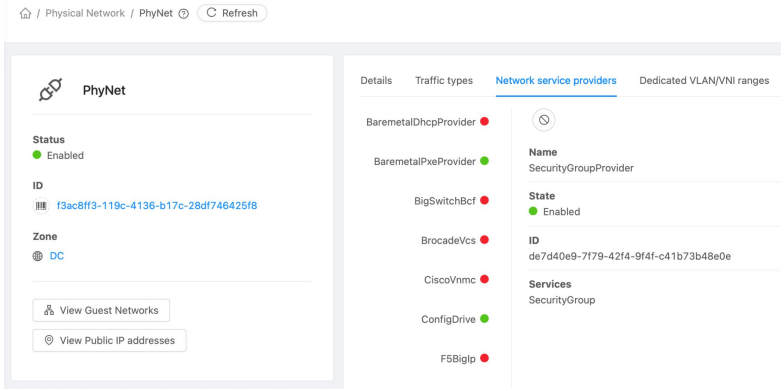


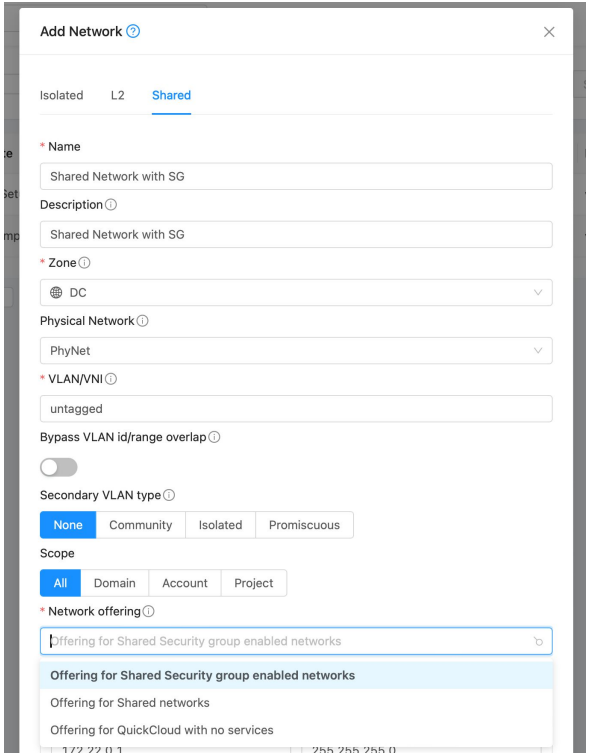
CEPH RGW Provider (in addition to Min.IO)

Security Group for Shared Networks in Advanced Zones

Apache CloudStack 4.20

Security Group for Shared Networks in Advanced Zones



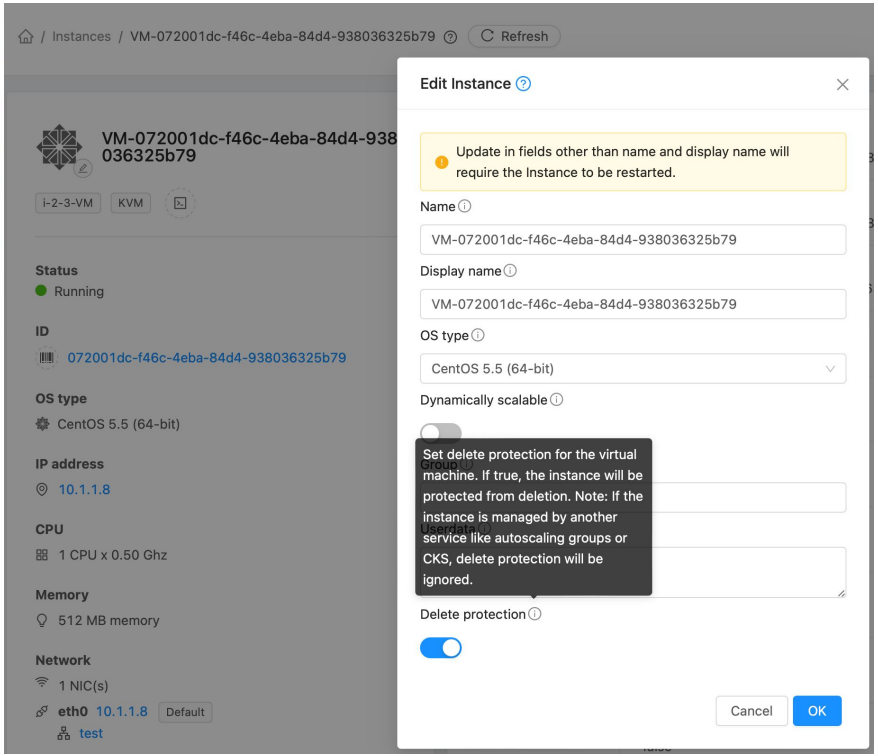


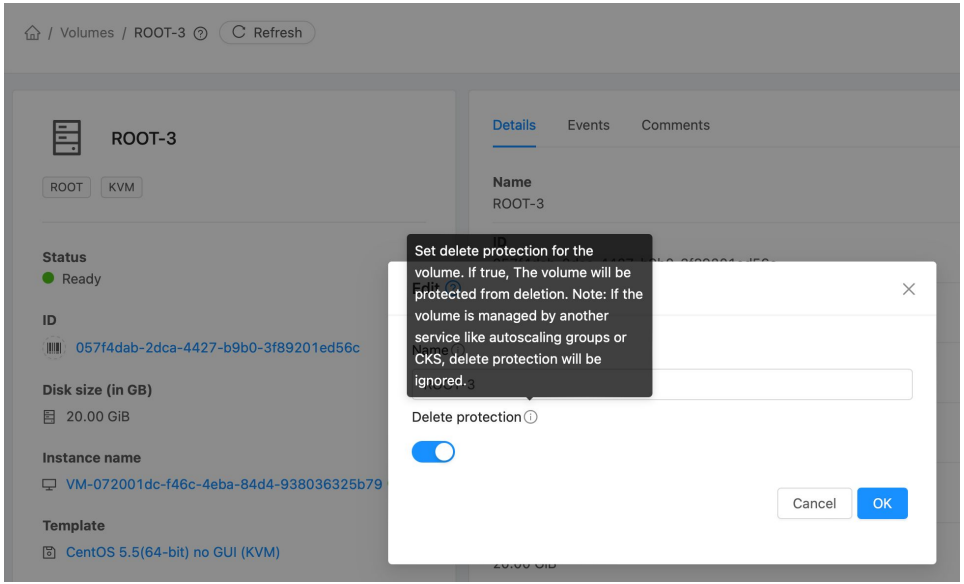
- SG for Shared Networks in Advanced Zones
  - Even when SG not enabled for that zone
  - Allows multiple network topologies in that zone
- Simplifying - Zone Deployments

Deletion Protection of Instances & Volumes

Apache CloudStack 4.20

Deletion Protection of Instances & Volumes





Apache CloudStack 4.20

Other Notable Changes

- Quota Improvements
- Purge Expunged Resources
- Enable/Disable Roles
- Users allowed to power off instances
- Notify Admins on New Releases
- Forget Account Password
- Download Volume Snapshot
- Improved VMware to KVM import performance
- Network Metrics for SystemVMs
- Network Data in Config Drive
- Dynamic API Docs in UI

Other Notable Changes

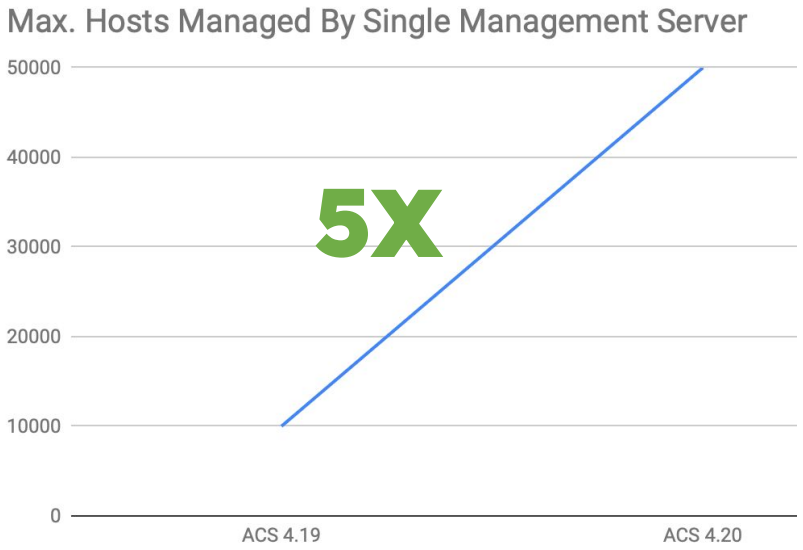
- 3rd Party/Vendor plugin improvements:
  - Linstor
  - Storpool
  - Powerflex
  - Cloudian
- VMware 8 u2 & u3 Support
- Ubuntu 24.04 Support as Mgmt server distro & KVM
- Log4J 2.x Upgrade
- JRE17 Support
- SystemVM Template Changes:
  - ARM64 build support
  - Debian 12 as base OS
  - Python3, JRE17

One more thing…

CloudStack HyperScale Scalability

Apache CloudStack 4.20

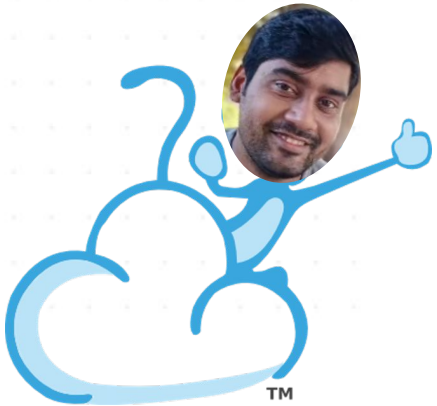
CloudStack HyperScale Scalability



** Illustrative comparison Between ACS 4.19 and 4.20 management server using lab-based simulated hosts

- We know CloudStack's already massively scalable.
- A collection of scalability improvements to push the boundary even further.

CloudStack HyperScale Scalability



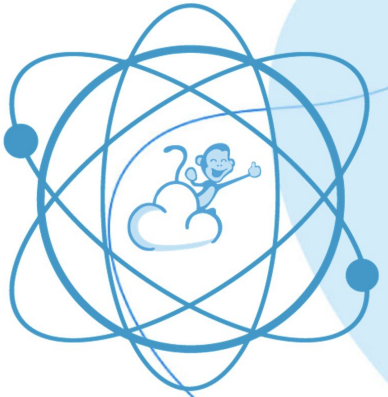
Learn more at Abhishek Kumar’s talk - “Scaling CloudStack to 100K Hosts and Millions of Instances”

(Today - Thursday, 21st Nov 2024)

Other Releases

- Cluster API Provider for CloudStack (CAPC) v0.5.0 (4 July 2024)
  - CAPC-Aware CKS Feature (ACS 4.19 & above)
- CloudStack Kubernetes Provider v1.1.0 (25 June 2024)
- CloudStack Go-SDK v2.16.1 (20 May 2024)
- CloudStack Terraform Provider v0.5.0 (9 April 2024)
- CloudStack CloudMonkey CLI v6.4.0 (21 March 2024)
- CloudStack CSBench v0.1.0-alpha (15 Feb 2024) (alpha/test Github Release, not an official release)

Upcoming ACS Releases



Upcoming Releases Schedule**

4.19.2	Early 2025
4.20.1	Q1 2025
4.21	Q2 2025
4.20.2	Q3 2025
4.22 & 4.21.1	Q4 2025

*** Tentative and subject to community discussions & processes*

Also: CloudStack Terraform Provider, CloudMonkey CLI, CAPC and CSBench and CloudStack Go-SDK releases

Gracias!

#CSCollab2024

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