HPE Morpheus VM Essentials Software

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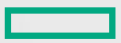
HPE Morpheus VM Essentials introduction



HPE Morpheus VM Essentials Software

- Reduce costs with HPE VM Essentials integrated hypervisor
- Simplify management across VMware and HPE clusters
- Future-proof IT with flexible consumption & upgrade paths
- Lower risk with enterprise-grade support & ecosystem

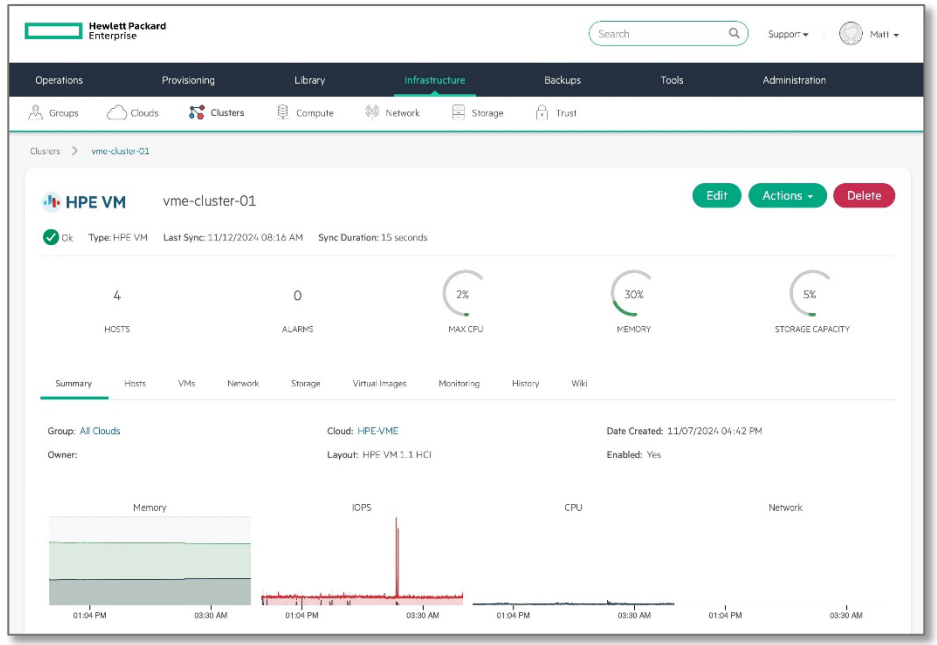
NEW: HPE VM Essentials Software to unify VMware & HPE VME hypervisor

- **Reduce costs with HPE VM Essentials integrated hypervisor**
  Featuring core capabilities to diversity VM estates including storage optionality (local, NFS, iSCSI, Fibre Channel), distributed workload placement, VM HA and live migration, data protection via snapshots and native backup, and DR with Zerto*

- **Simplify management across VMware and HPE**
  Connect existing VMWare® clusters for management and VM-vending into ESXi and HPE VME hypervisor from one interface. Also includes IPAM and DNS integration, automation execution, secrets management, and VMWare to KVM image conversion

- **Future-proof IT with flexible consumption & upgrade paths**
  Available as standalone software and integrated into HPE Private Cloud. Customers can upgrade to full Morpheus PlatformOps for hybrid cloud management, K8s support, governance, and FinOps capabilities

- **Lower risk with enterprise-grade support & ecosystem**
  Building on a proven KVM core, HPE VM Essentials includes HPE's enterprise-class global support. HPE is working with its ecosystem of ISVs to expand HPE VME hypervisor certification and support for Data Protection, VDI, ERP, etc.



* Zerto integration with HPE VM Essentials on roadmap for 1H 2026

HPE Morpheus VM Essentials Software

- KVM-based Hypervisor
- Highly Available Cluster
- Management & Orchestration

Subscription licensed per Socket:

S5Q81AAE	HPE VM Essentials Software per Socket 1-year E-LTU	€ 562,- List
S5Q82AAE	HPE VM Essentials Software per Socket 3-year E-LTU	€ 1.686,- List
S5Q83AAE	HPE VM Essentials Software per Socket 5-year E-LTU	€ 2.811,- List

HPE Morpheus VM Essentials Software

New since May 5th

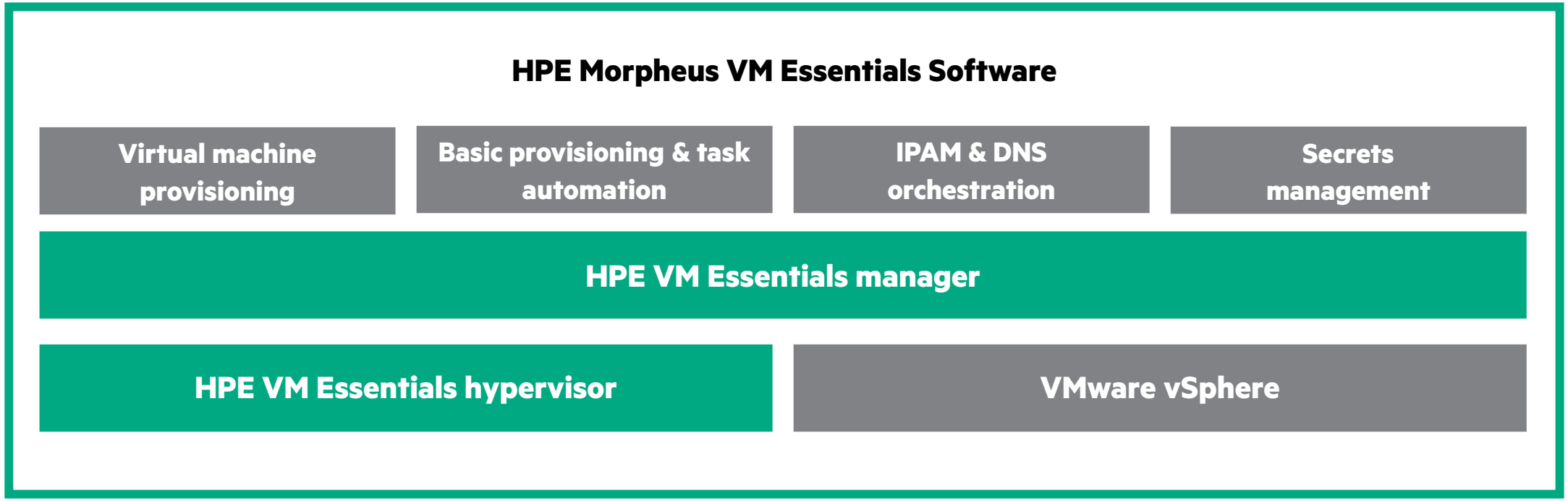
HPE Morpheus Enterprise Software

S6E64AAE HPE Morpheus Enterprise Software per Socket (15 WLE) 1-year 24x7 E-LTU	€ 2.342,-
S6E66AAE HPE Morpheus Enterprise Software per Socket (15 WLE) 3-year 24x7 E-LTU	€ 7.026,-
S6E68AAE HPE Morpheus Enterprise Software per Socket (15 WLE) 5-year 24x7 E-LTU	€ 11.710,-

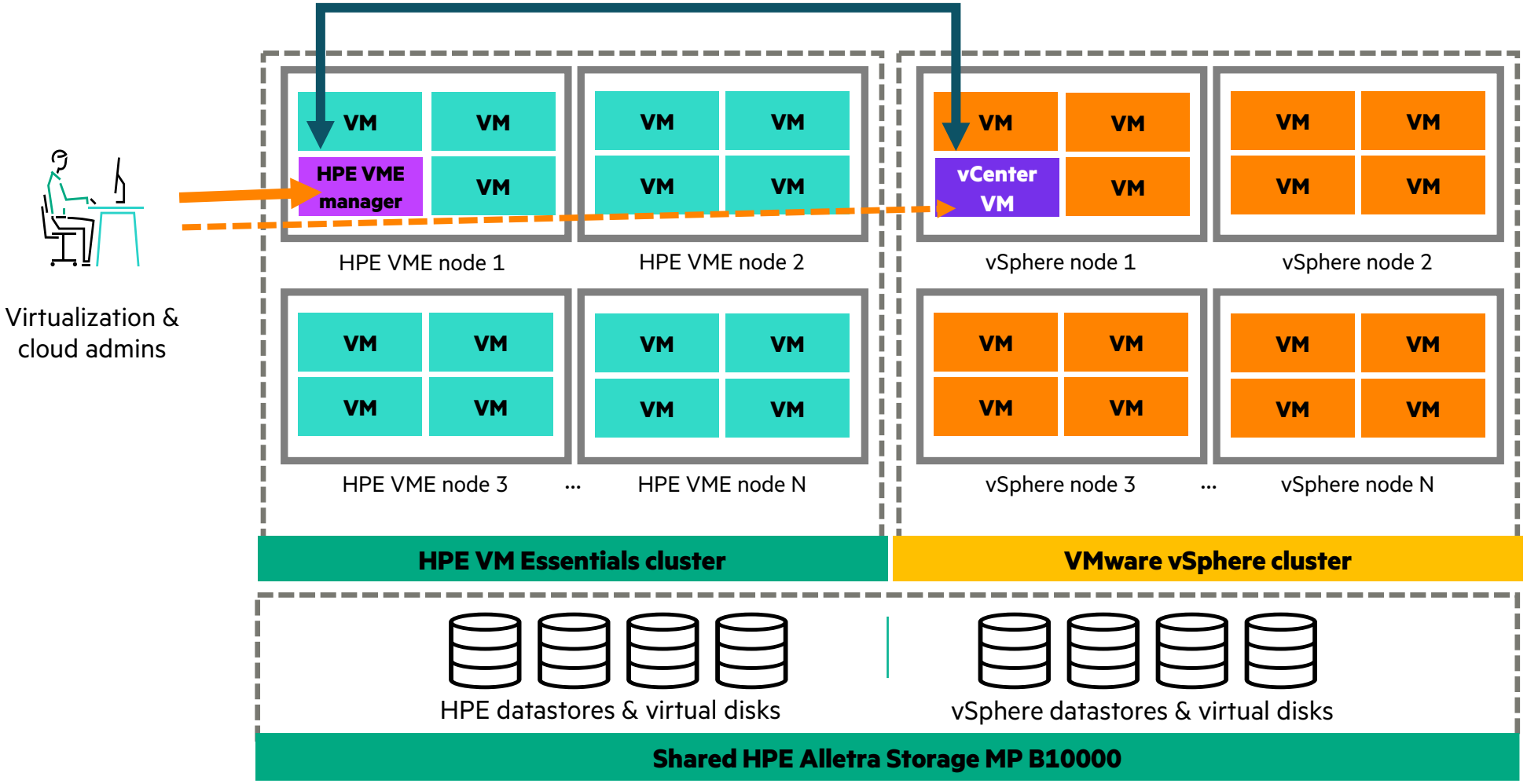
Upgrade from HPE Morpheus VM Essentials to Morpheus Enterprise

S6E69AAE HPE Morpheus VM Essentials to Morpheus Ent. SW Upgrade 1-year 24x7 E-LTU	€ 1.780,-
S6E71AAE HPE Morpheus VM Essentials to Morpheus Ent. SW Upgrade 3-year 24x7 E-LTU	€ 5.340,-
S6E73AAE HPE Morpheus VM Essentials to Morpheus Ent. SW Upgrade 5-year 24x7 E-LTU	€ 8.899,-

Solution overview



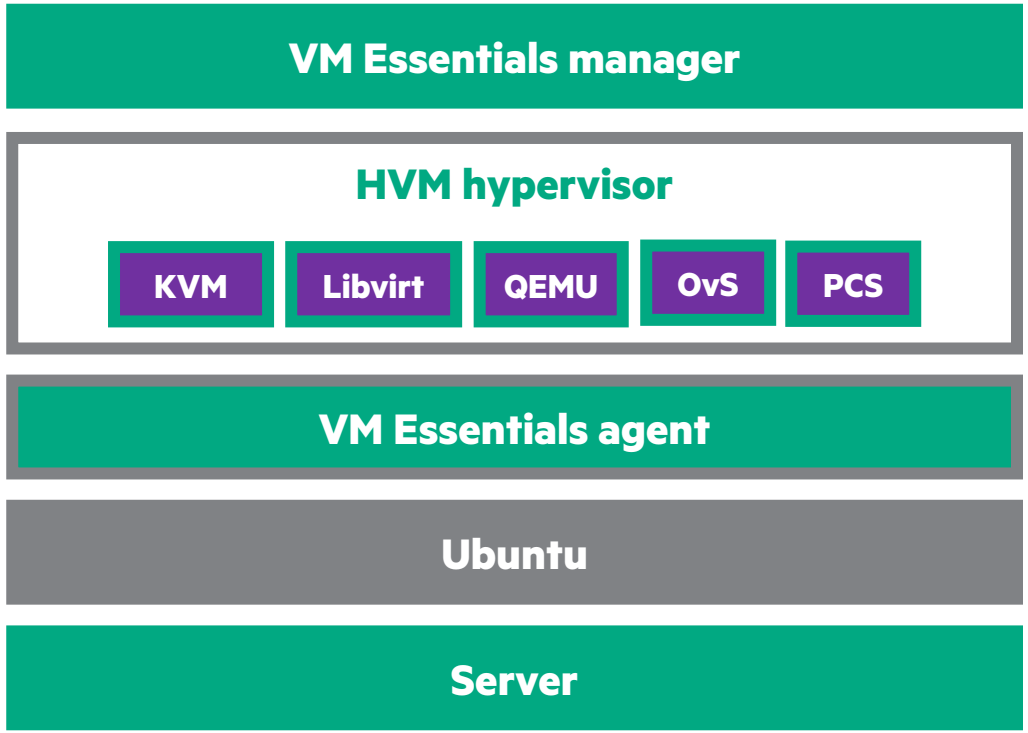
HPE Morpheus VM Essentials Software



Architecture

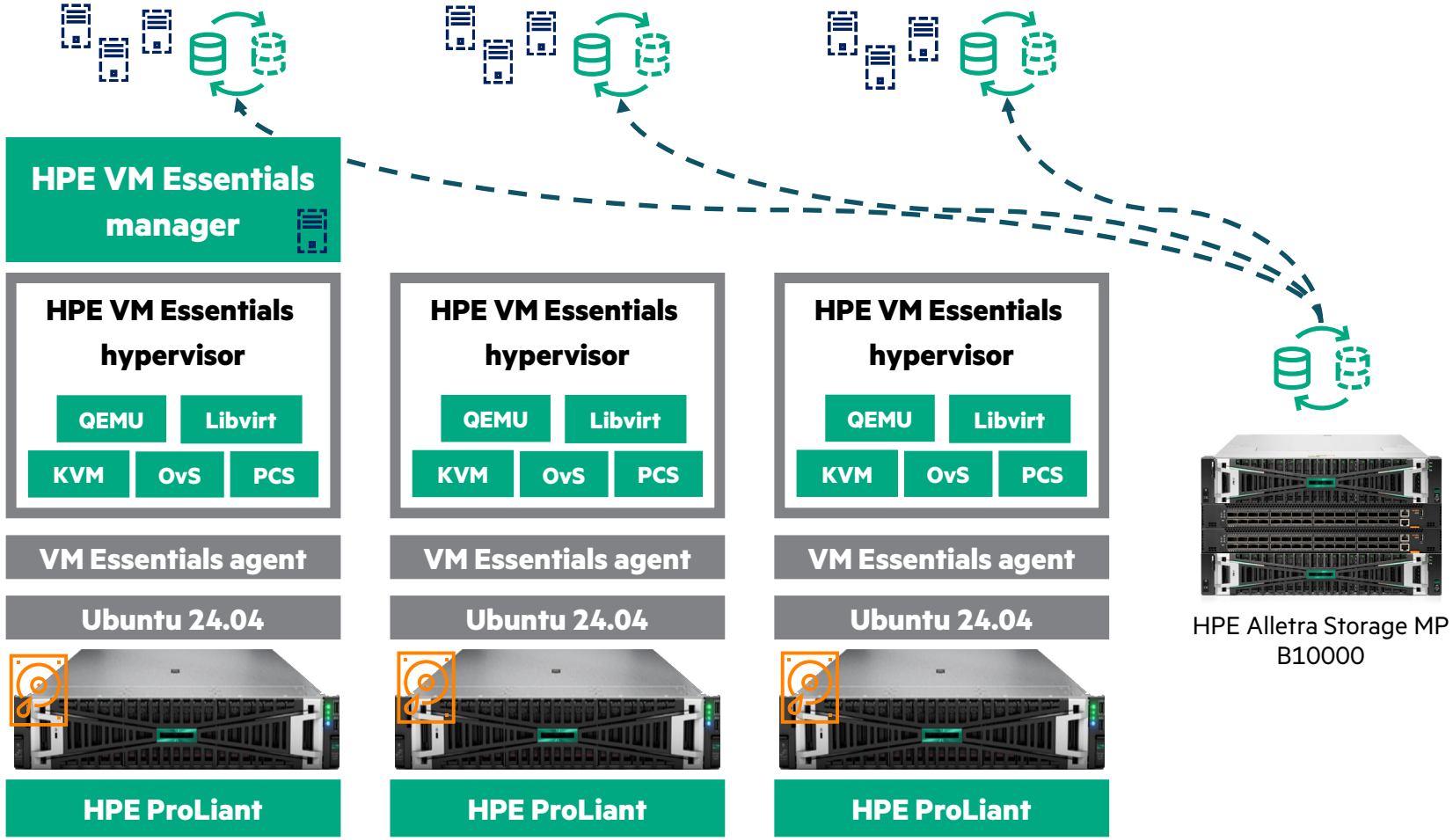
Theory of operation - logical architecture

	Year of introduction
Ubuntu • The base OS for the HPE VM Essentials hypervisor is Ubuntu 24.04 • HPE provides a ready to use Installer ISO.	2004
KVM • Underlying virtualization technology used in HPE VM Essentials	2006
QEMU • Generic machine emulator and virtualize for running Windows and Linux • operating systems	2003
Libvirt • A hypervisor-independent API for managing platform virtualization	2005
Open vSwitch (OvS) • Underlying virtual networking technology used in HPE VM Essentials	2009
Pacemaker Cluster Service • A high-availability cluster resource manager, that enables clustering and • clustered filesystem deployment and management	2004
Morpheus • Management and orchestration services providing integration for all services, identity management, monitoring, logging, web UI, etc.	2010



Theory of operation - logical architecture

- **Manager deployment:**
  - HPE VM Essentials manager runs on a single node
- **Local storage deployment:**
  - OS, VM Essentials agent, and VME hypervisor elements operate from local storage
- **VM hosting:**
  - VMs can be hosted on:
    - Local datastores
    - Shared datastores
- **Storage types:**
  - **Local storage:**
    - Local disk directory pool
  - **Converged storage:**
    - SimpliVity (or CEPH)
  - **Shared storage:**
    - Supported via NFS, iSCSI, or FC
  - **Enhanced storage integration:**
    - Optimized with HPE Alletra Storage MP B10000
  - **HPE SimpliVity**



Requirements

Pre-requisites

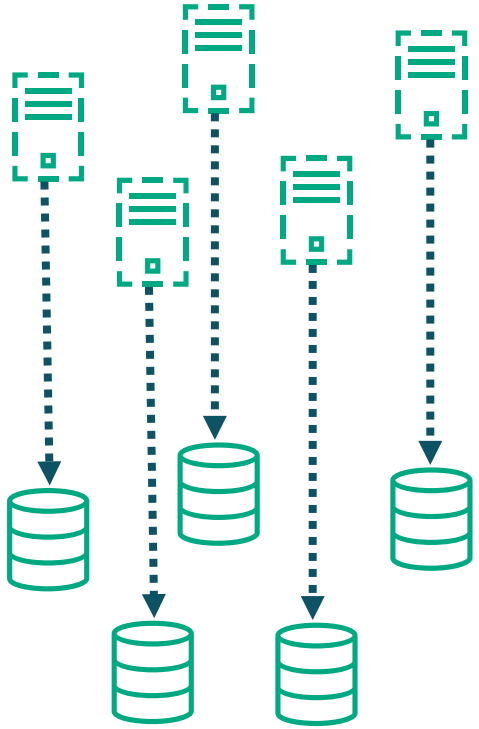
- Prior to installing HPE VM Essentials:
  - Install Ubuntu 24.04 on each host of the cluster
  - Patch the Ubuntu OS
- Configure host networking
  - Set static management IP:
    - Recommended: configure more than one interface in bonded network interface, e.g. `bond0`
  - DNS, NTP, proxy
- Configure any storage networking
- Configure HPE VM Essentials management VM hostname in DNS
- Minimum node count:
  - Local storage or NFS: 1 node
  - CEPH, iSCSI, FC: 3 nodes (iSCSI & FC 2 nodes on the roadmap)

HPE Alletra Storage MP B10000 integration

- HPE VM Essentials supports native integration with HPE Alletra Storage MP B10000
- Storage interaction enabled by storage plugin
  - VM granular storage management
  - Each VM is mapped to its own dedicate volume
  - Enables VM-native granular volume snapshots and storage management
  - VM granular replication

HPE ProLiant

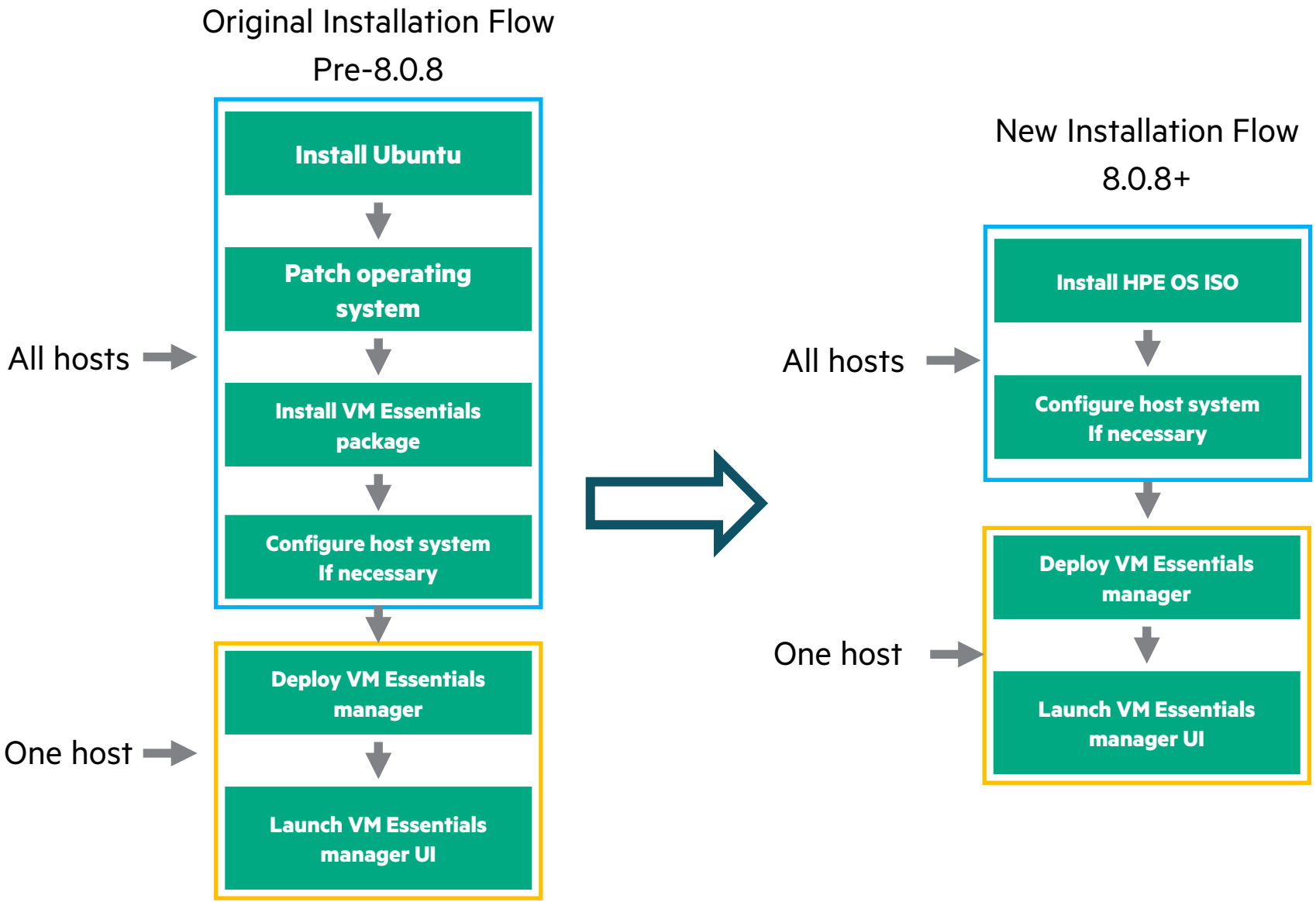
HPE Alletra Storage MP B10000



Installation and deployment

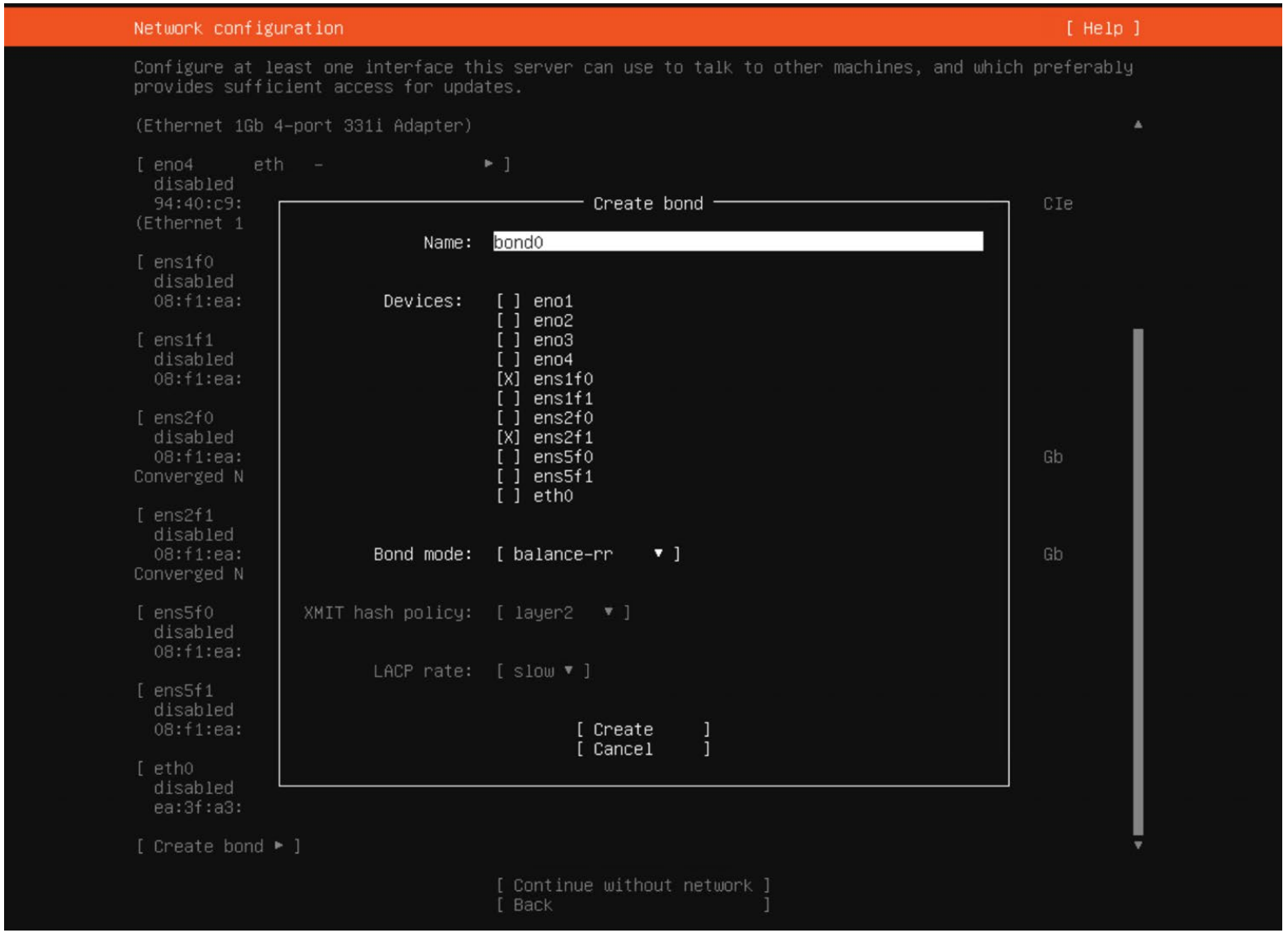
Unified installer ISO

- Unified ISO installer installs the underlying Ubuntu operating system and all necessary HVM components
- For ease of deployment and consistency, it is recommended to configure the bond and other interfaces during the installation wizard
- Ensure the same bond interface name is used on all hosts in a cluster for the management network
- Depending on external storage requirements, such as multipathing, additional host configuration may still be necessary

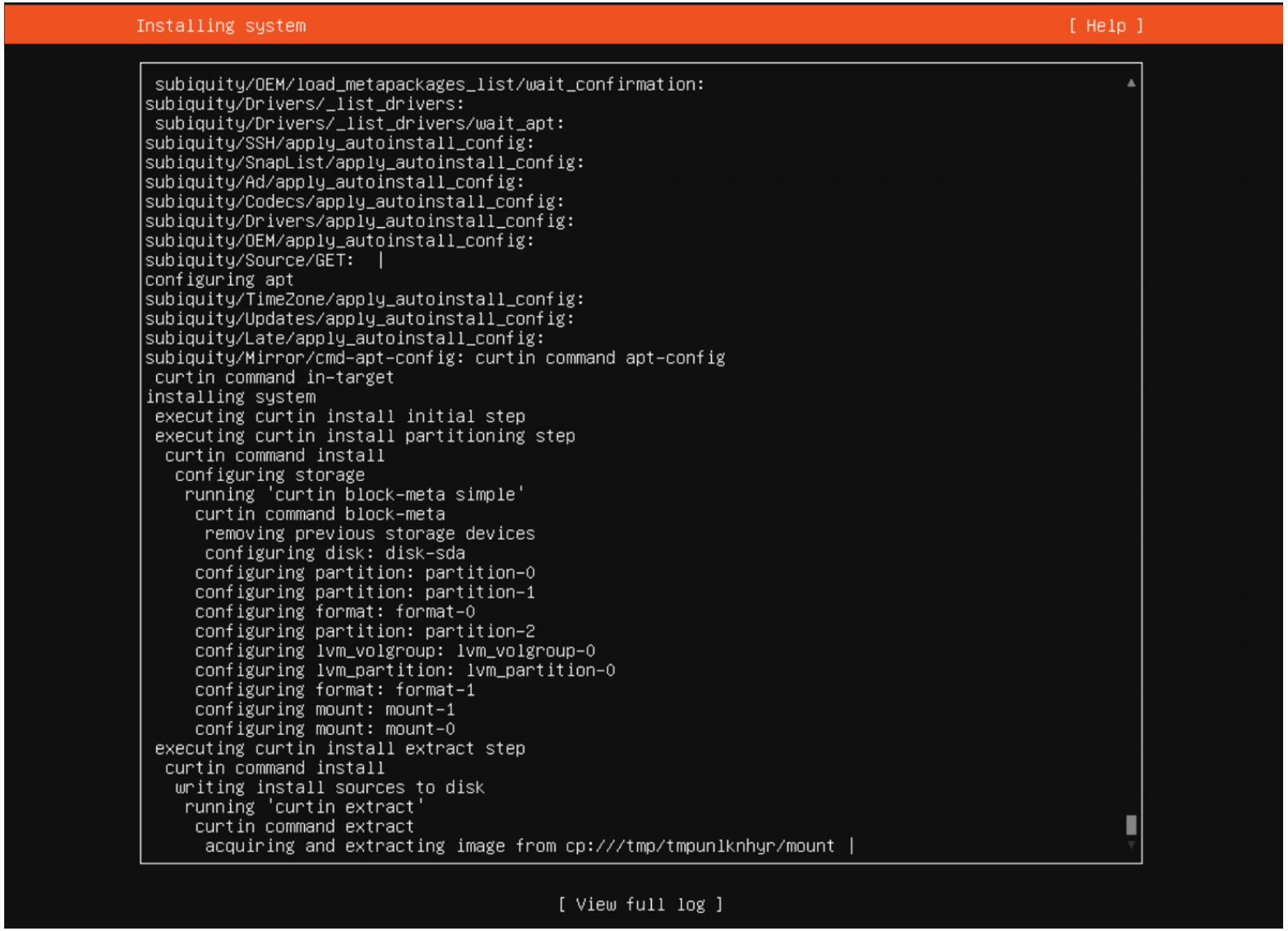


Unified installer flow

- Configuring the bond0 interface and any other interfaces at this stage is recommended
- Alternately, these interfaces can be configured via the HPE VM console tool or in the default netplan prior to deploying VM Essentials manager

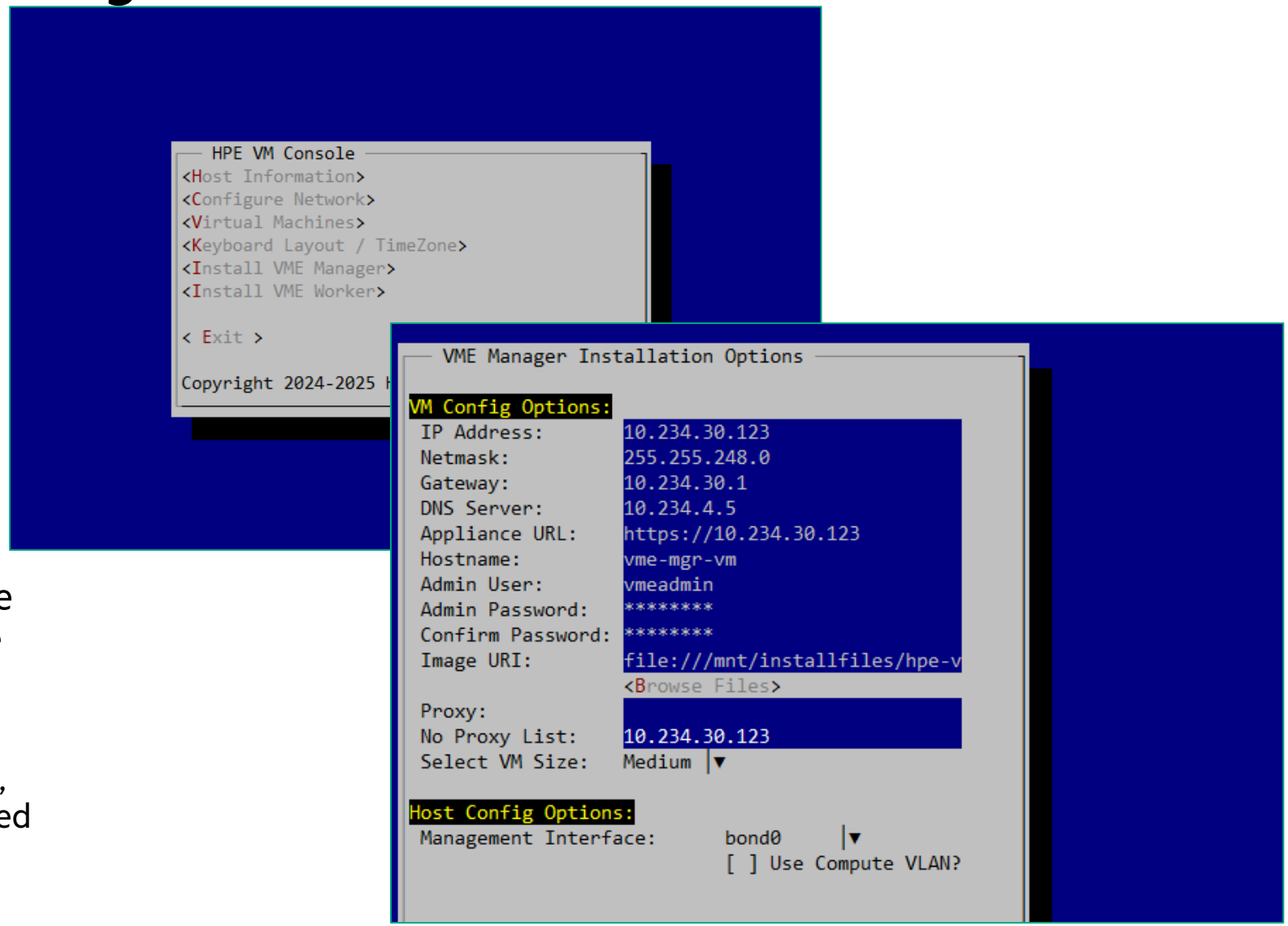


Unified installer flow



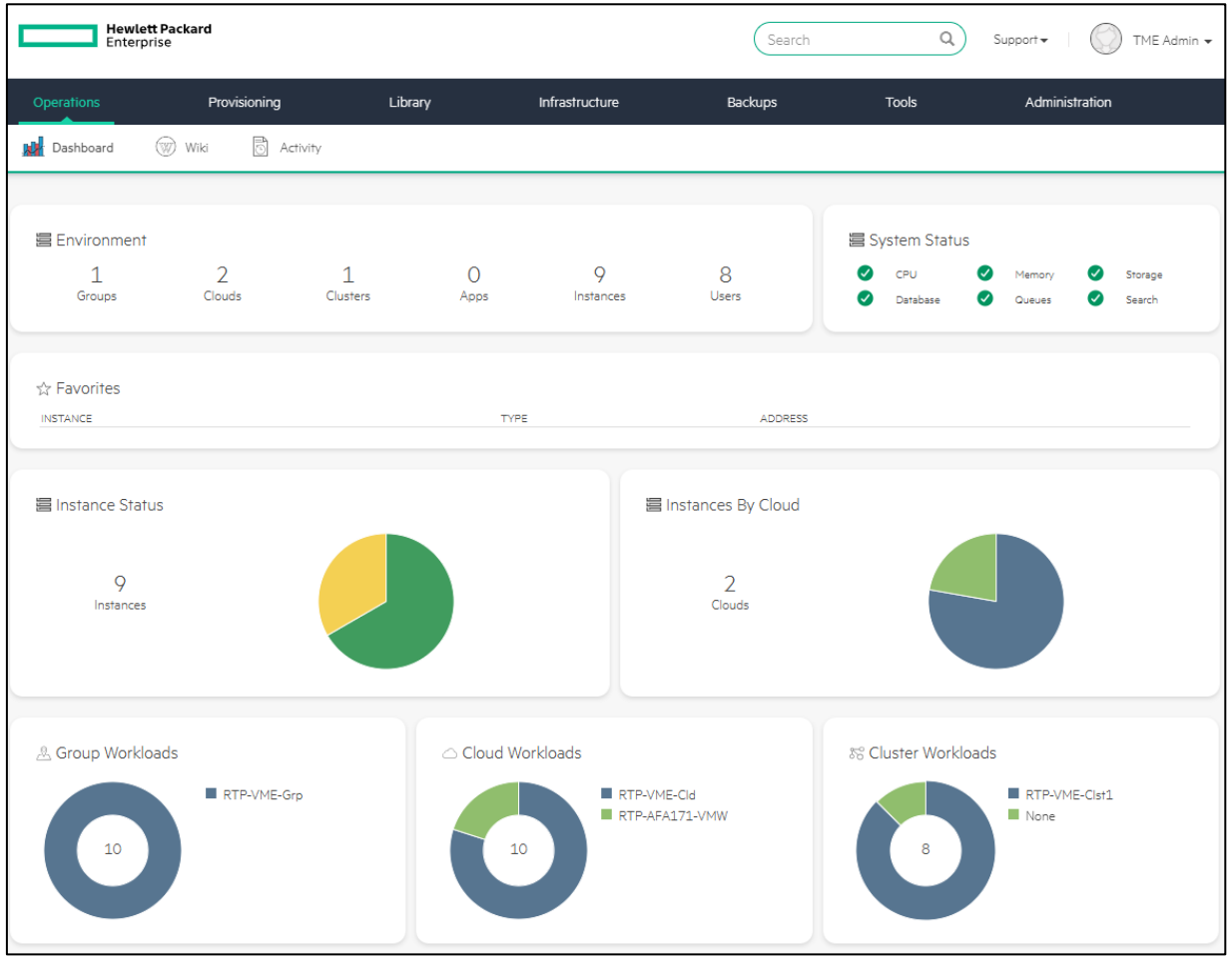
Install HPE VM Essentials management VM

- Open `hpe-vm` from the CLI
- Select `Install VME Manager`
- Specify the following:
  - Management VM IP address
  - Netmask
  - Gateway
  - DNS server
  - Appliance URL
  - Hostname
  - Admin credentials
  - Path to the appliance QCOW2 image on the ISO mount path – this can be typed or browsed to
  - Management interface:
    - If using a separate VLAN for Compute, the interface and VLAN can be specified here



Launch the HPE VM Essentials UI

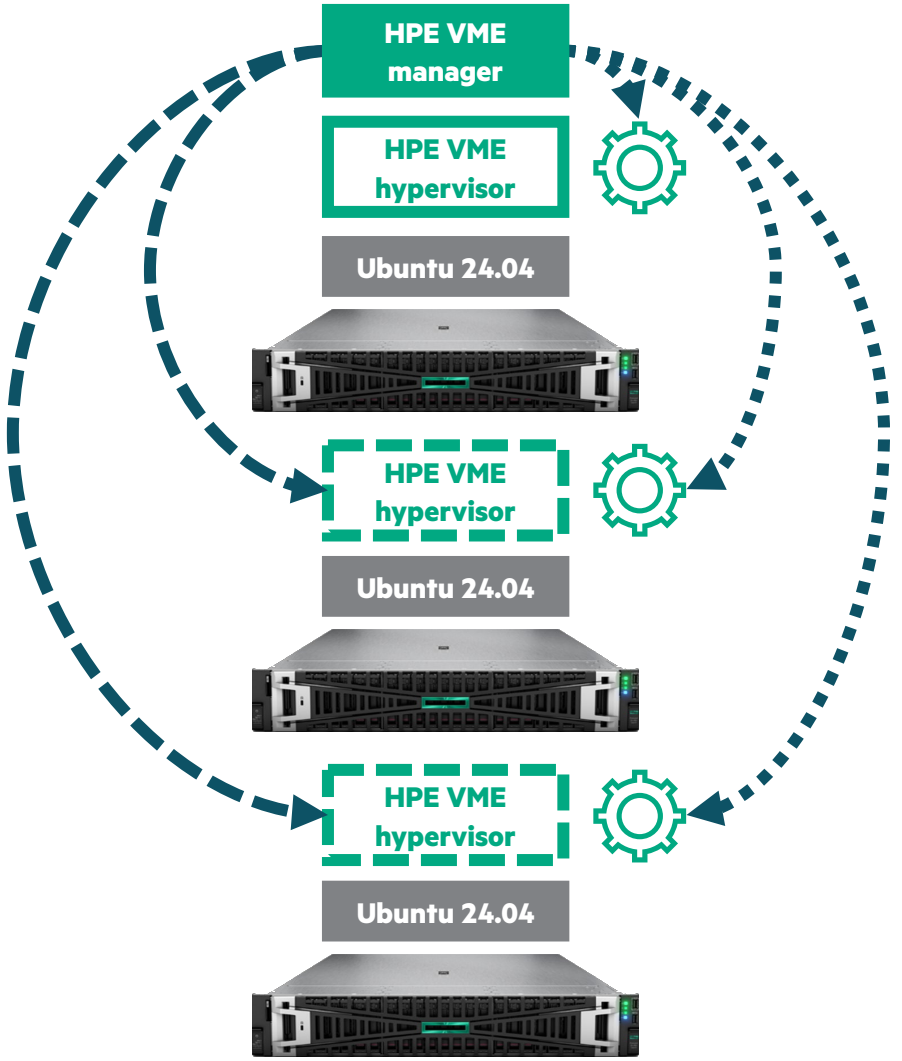
- Access via the URL set during appliance deployment:
  - https://hpe_vme_manager_ip_address
- Configure the environment and create the HPE VME cluster:
  - First create an infrastructure group
  - Create a cloud resource associated with the infrastructure group



Cluster configuration

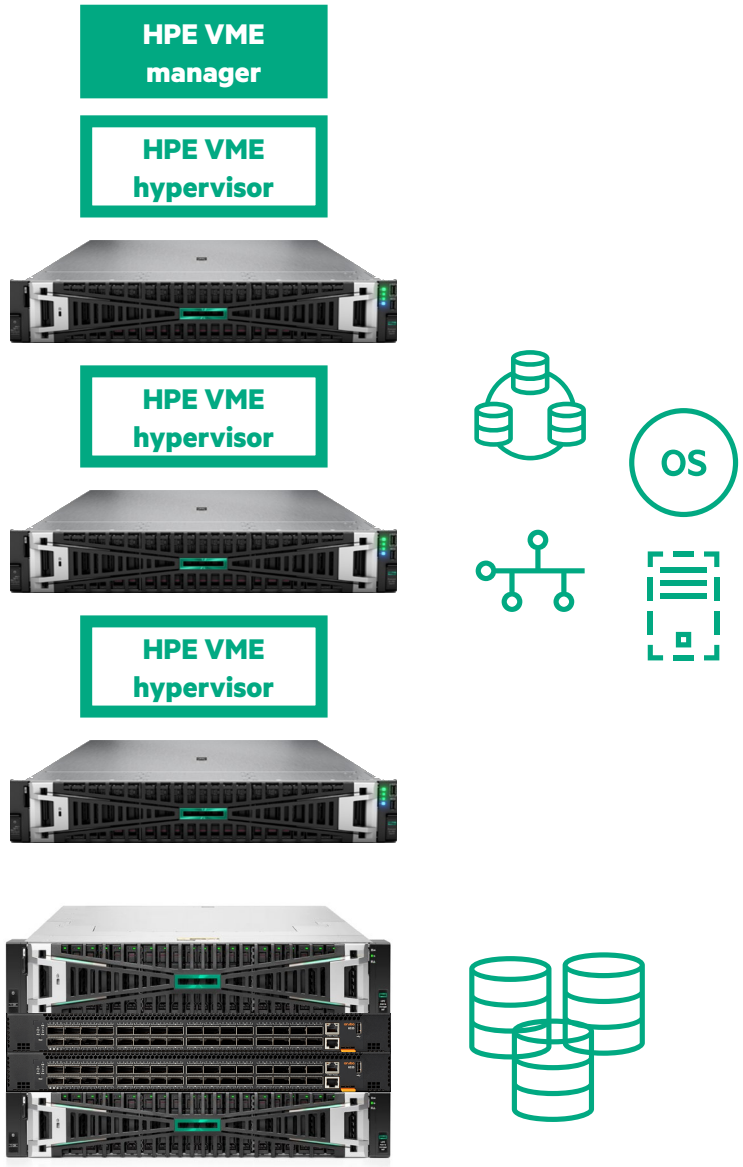
HPE VM Essentials cluster deployment

- From the HPE VME UI, a user initiates creation of a new HPE VME cluster:
  - `Infrastructure -> Clusters -> Add Cluster`
  - Select `HPE VM` cluster type
  - Select the created infrastructure group and cloud
- Specify the host names and management IP addresses of all hosts to add:
  - All hosts must have the same:
    - Credentials
    - Interface name(s)
- HPE VME manager orchestrates:
  - Installation of the HPE VME hypervisor stack on each host specified
  - Configuration of the compute cluster



Post-deployment steps

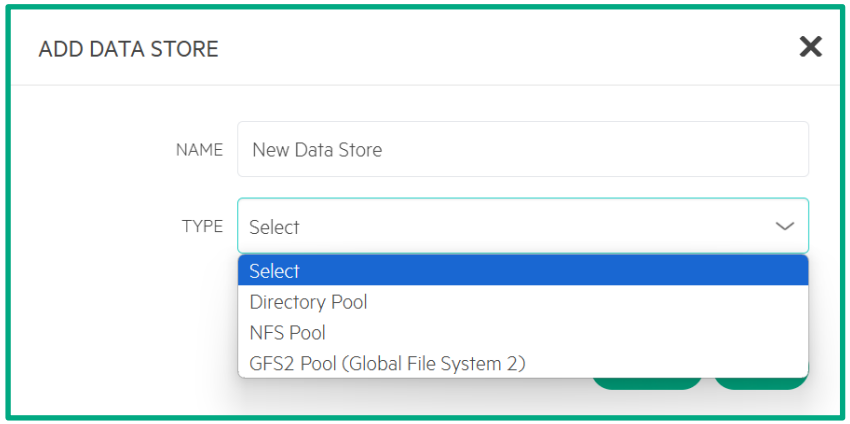
- Configure or adjust network access, if necessary:
  - Restrict access or configure additional networks
- Provision datastores if desired:
  - By default, local storage is configured
  - CEPH can optionally be configured during cluster deployment if there are spare data devices on each host
  - Supported storage protocols: NFS, iSCSI, FC
- Add ISOs, QCOW2 or VMDK images to the `Virtual Images` library:
  - Ensure the storage share has been configured in `Infrastructure -> Storage`

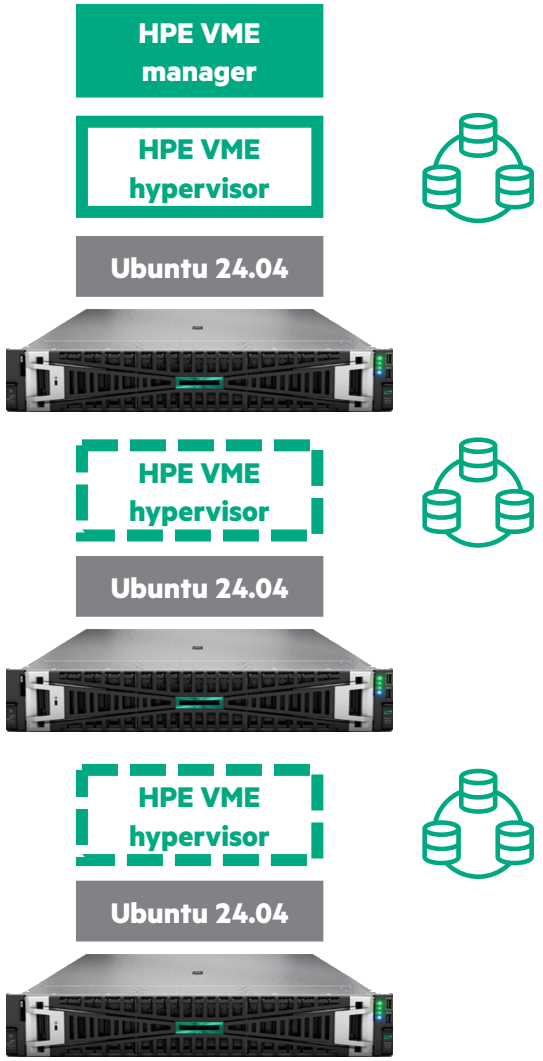


Storage

Storage overview

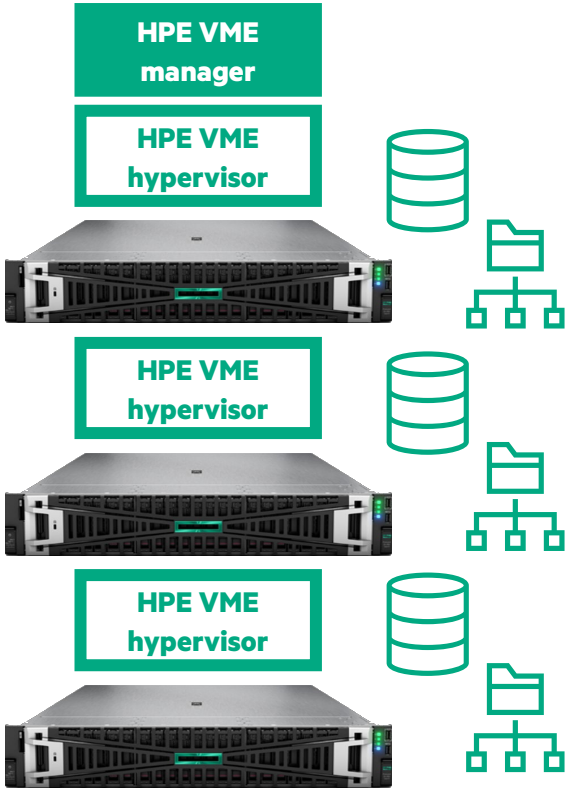
- Datastores are storage for virtual machines and optionally also virtual images (ISOs, QCOW2, VMDK, etc.)
- There are 3 type of datastores supported for hosting VMs and images:
  - `Directory Pool:`
    - Comprised of local storage on each server
    - The same directory path must exist on each node
  - `NFS:`
    - All nodes must have access to the share
  - `GFS2:`
    - iSCSI and FC supported
    - Clustered file system orchestrated by the *pacemaker* cluster service
    - Presented volumes must show with the same name on each host

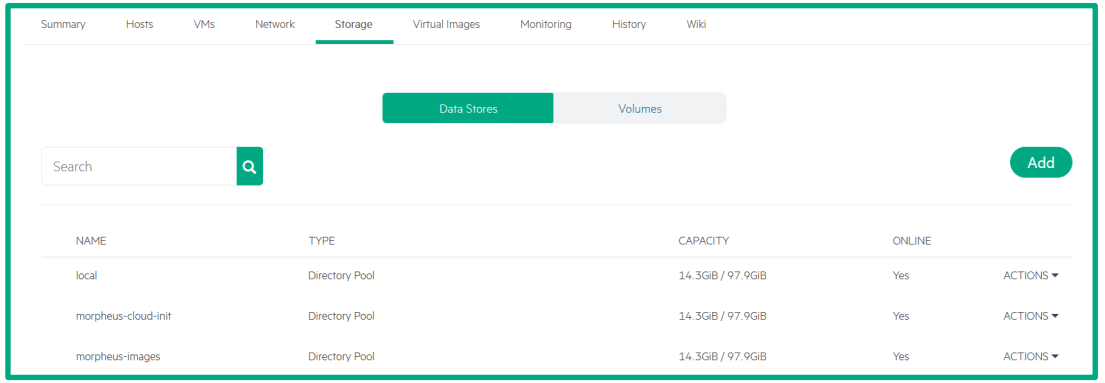




Storage – local

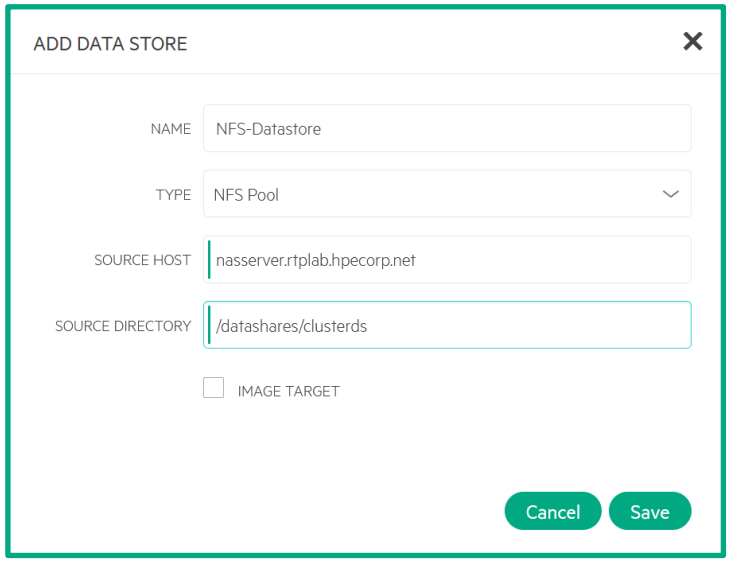
- Local storage on the servers
- If not leveraging CEPH:
  - VMs can be migrated between hosts, which will result in copying of the VM from one host's local storage to the destination host's local storage
  - Note that this is not shared nor HCI-type storage - if a host experiences a disruption, the VMs on that local storage will no longer be accessible
- By default, there are local directory pools created upon deployment:
  - `local`
  - `morpheus-cloud-init`
  - `morpheus-images`
- Additional directories can be specified:
  - The directory path must match on each host and the amount of available storage should be consistent across those hosts
- If CEPH was configured on initial cluster deployment, the local devices being used for that purpose on each host will act as a single large volume across all hosts:
  - Acts as converged storage

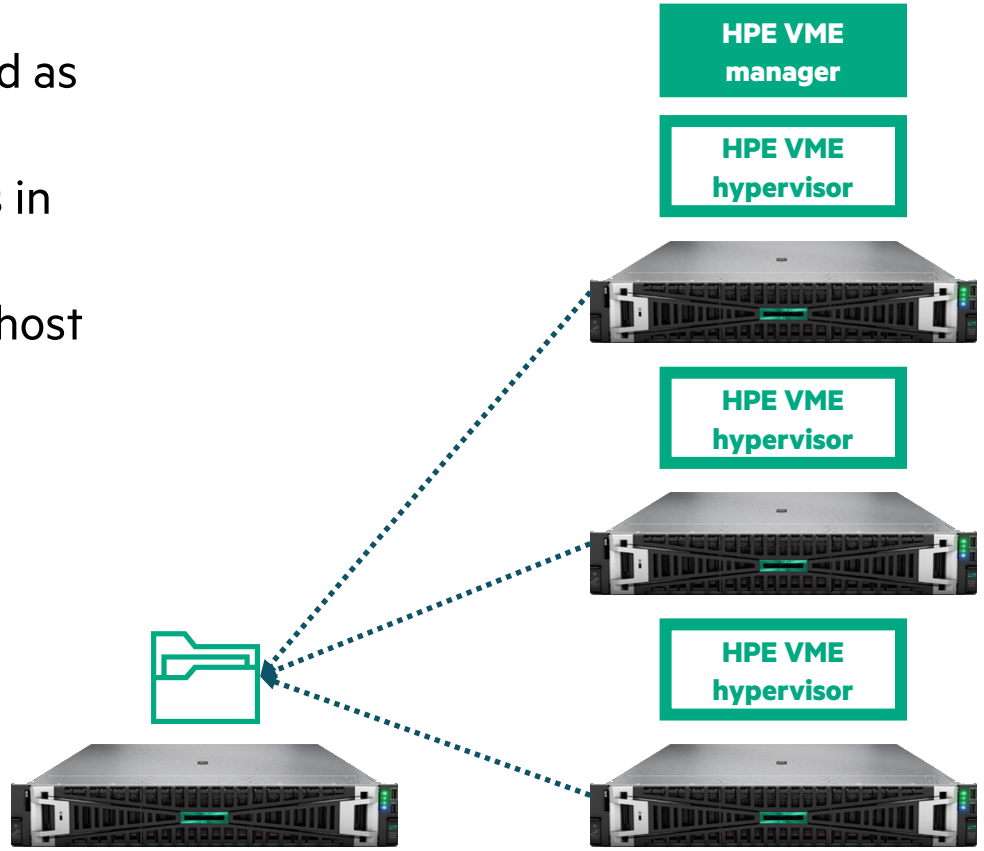




Storage – NFS

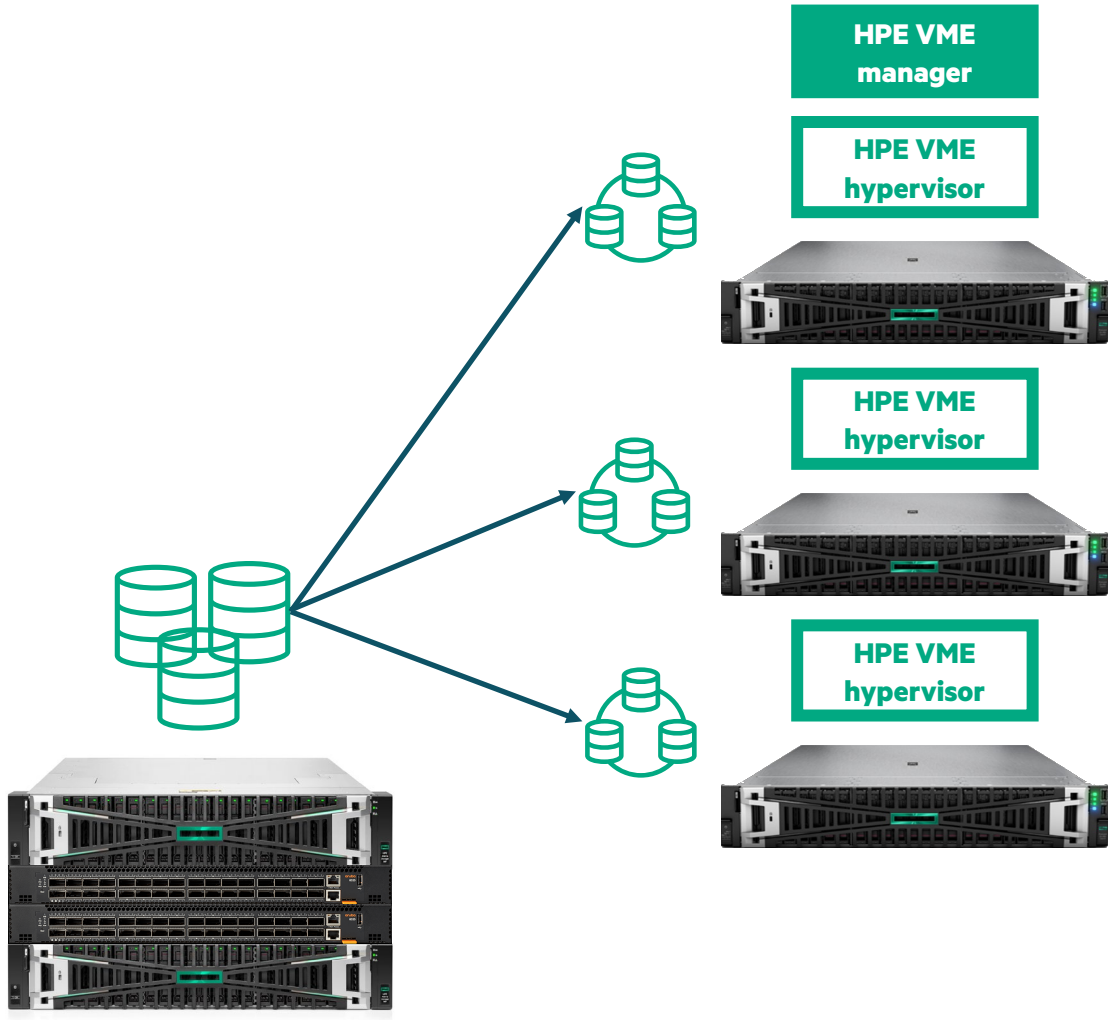
- File shares presenting from NAS servers can also be mounted as datastores
- Present a share from the server, providing access to all hosts in the cluster
- Within the VME cluster, add a datastore, specifying the NFS host presenting the share and the share path
- This will mount the file share on all hosts within the cluster





Storage – GFS2

- Global Filesystem 2 (GFS2) is a clustered filesystem that is used on shared SAN storage
- iSCSI and Fibre Channel supported at launch
- Volumes are presented from a storage array to all hosts in a cluster
- Note: a volume must appear with the same device name on all hosts in the cluster
- VME manager orchestrates mounting the device and creation of the filesystem during datastore creation

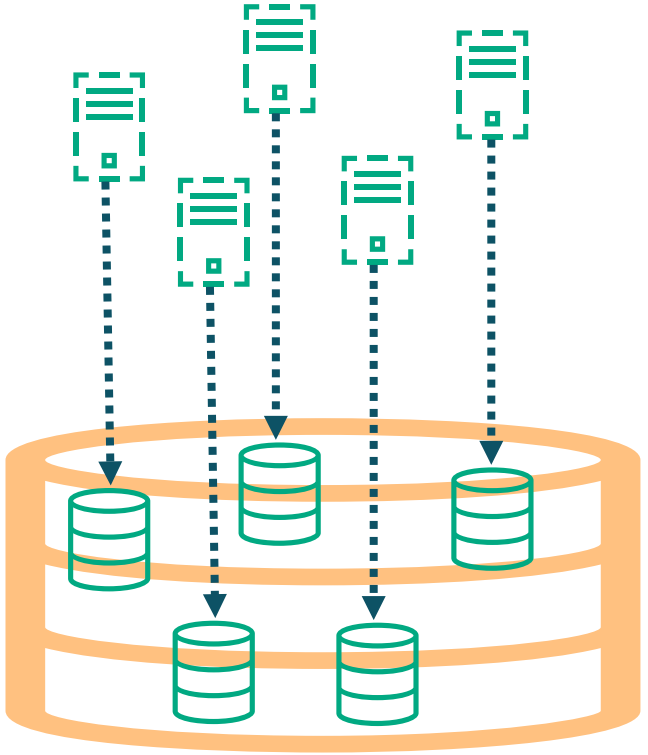


HPE Alletra Storage plugin

- An optional plugin for HPE Alletra MP B10000 storage arrays that acts as a storage abstraction layer between VM Essentials and the HPE Alletra MP array (via WS3 V3 APIs)
- During deployment, a logical datastore is created in VM Essentials
  - Each VM virtual disk gets a dedicated volume on the array
  - VM snapshot and backups leverage array volume snapshots
  - Operation is largely transparent in the VM Essentials UI
- Facilitated VM provisioning workflows:
  - Create VM
  - Clone VM
  - Resize VM
  - Migrate VM
  - Snapshot
  - Delete VM
  - Backup and Restore
    - Array snapshots are used as a consistency point while the backup is copied to its destination
- The plugin does not provide HA capabilities on its own. It is necessary to create a shared datastore on the cluster and enable heartbeat on that datastore to enable HA failover.

HPE ProLiant DL

HPE Alletra Storage MP B10000

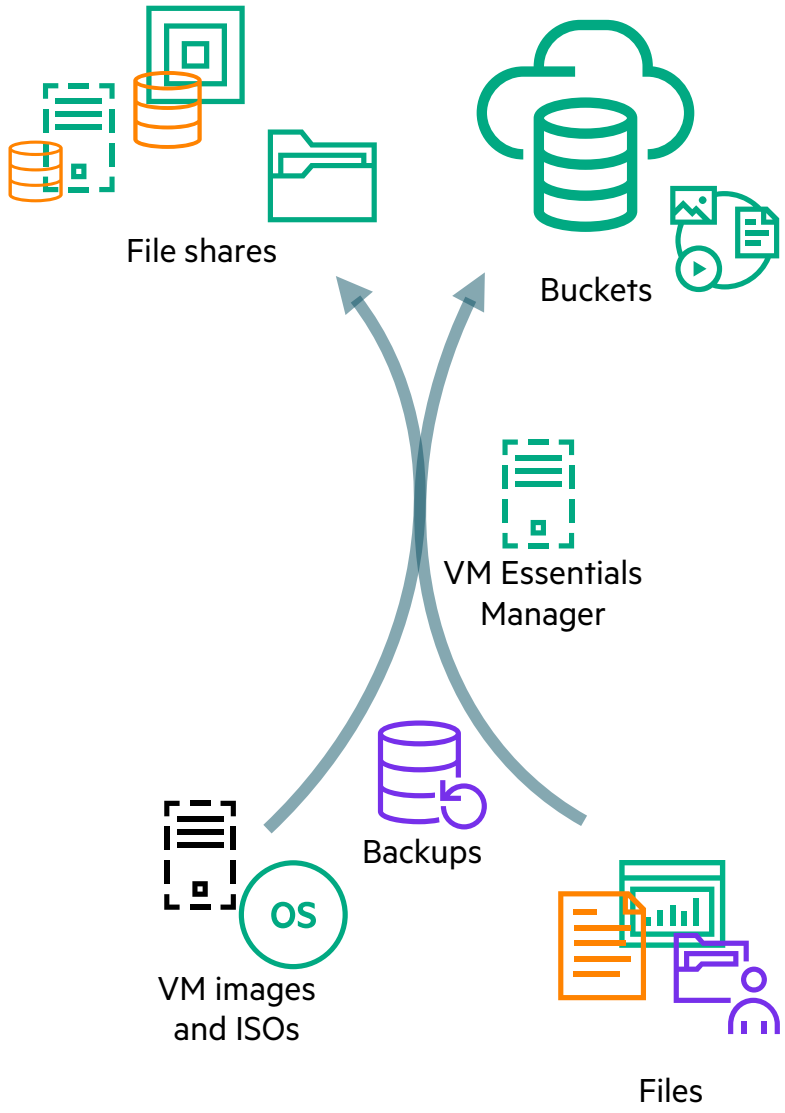


Non-datastore storage

- Storage capabilities for:
  - Destination for built-in backup
  - Virtual image repository
  - Archive

- Types of storage supported
  - Buckets
    - Local or cloud object storage (S3, Google Cloud Storage, etc.)
  - File Shares
    - Local storage (directory on VM Essentials Manager VM)
    - NFS
    - CIFS
    - Azure bucket

- VM Essentials Manager is the connection and routing point to the various storages if the hosts are unable to directly access the destination storage



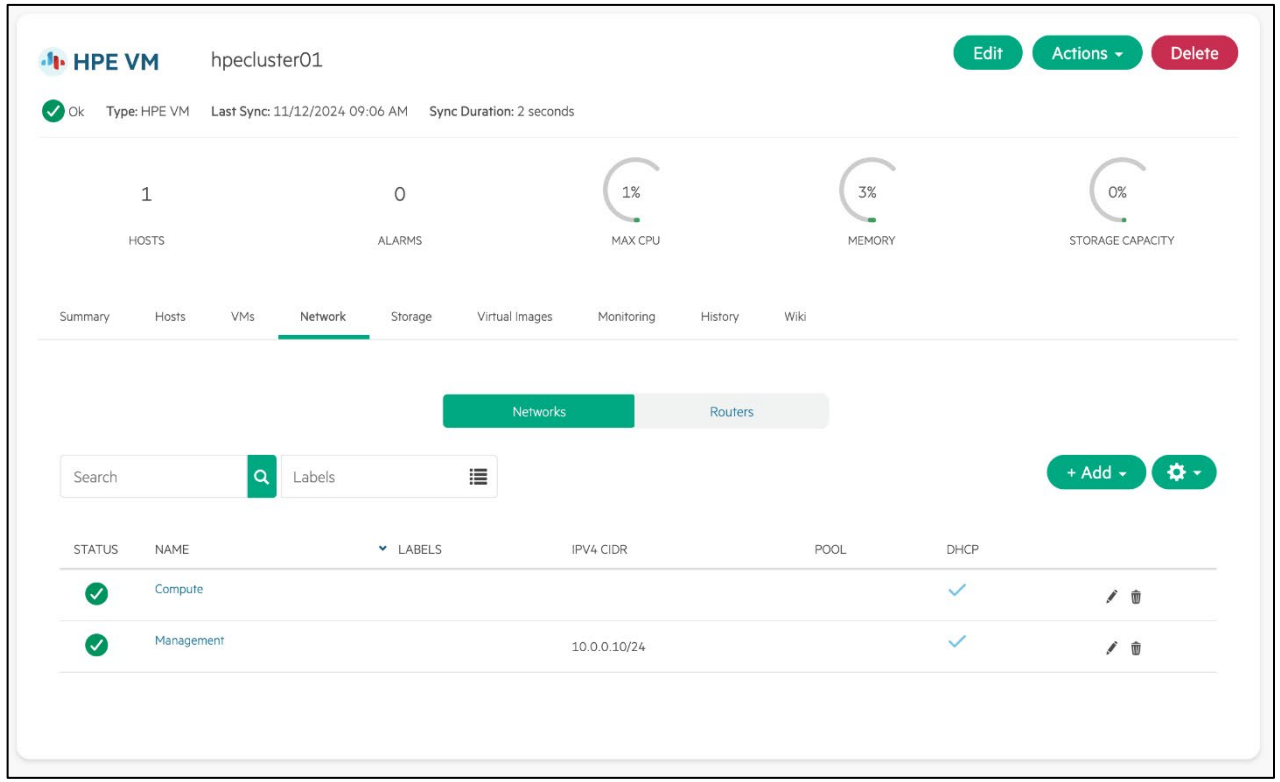
Networking

HPE VM Essentials – networking overview

- **Management network**
  - The network used for managing the HPE VME hypervisor hosts
- **Compute network**
  - The network used for VM traffic
- **Storage network**
  - The network used to interact with external storage, such as NFS or iSCSI

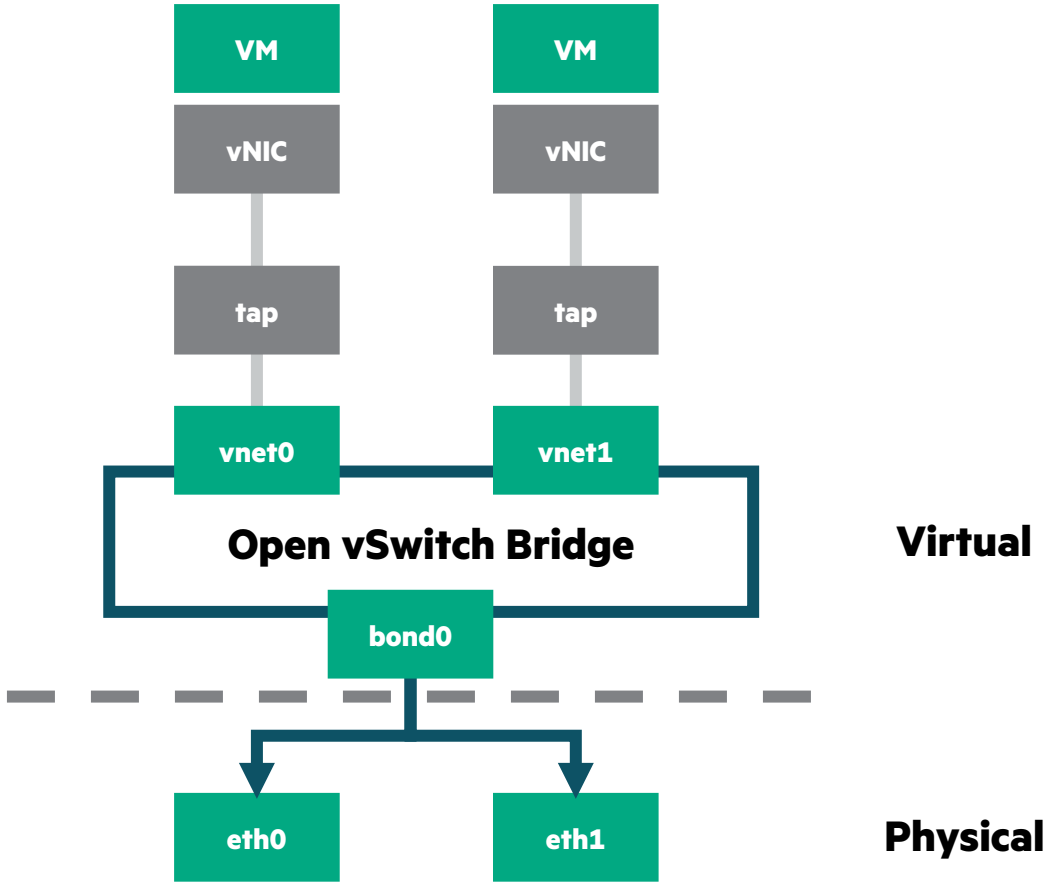
Note:

- Best practice is to have Compute and Management networks separate
- It is possible to deploy a cluster without a dedicated Compute network, running VM traffic over the Management network



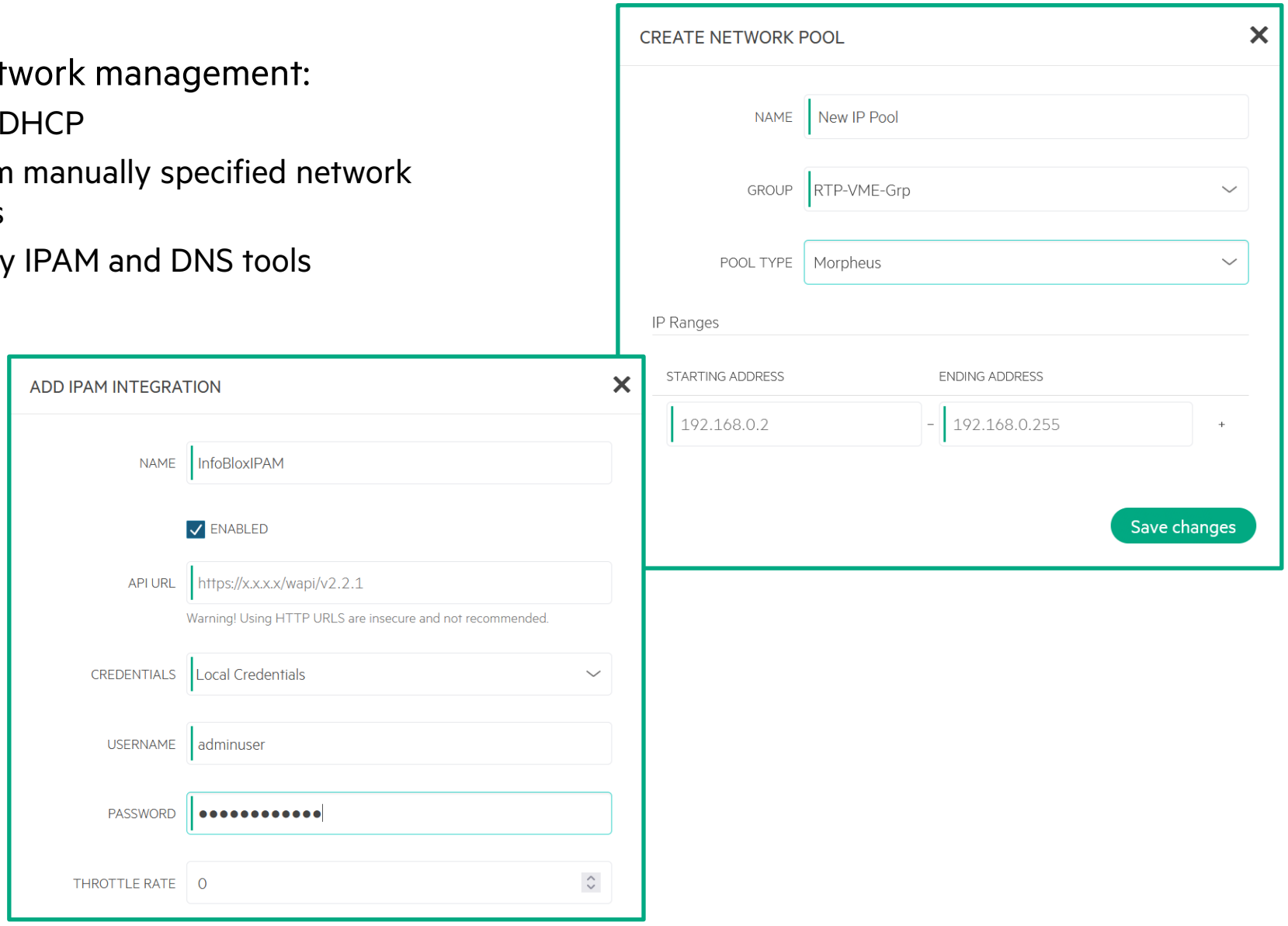
HPE VME VM networking

- **VM network interface**
  - The network interface attached to the VM that is visible from within the VM
- **Tap interface**
  - The virtual connection used to connect the virtual machine to the Open vSwitch Bridge
- **Open vSwitch port**
  - The virtual port on the Open vSwitch bridge that a network interface connects to
- **Open vSwitch bridge**
  - A virtual switch used to connect VMs and the physical network
- **Bonded network interface**
  - A virtual network interface used to aggregate multiple physical network interfaces into a single virtual interface
- **Physical network interface**
  - The physical network interface that connects to the physical network



VM IP assignment and domain management

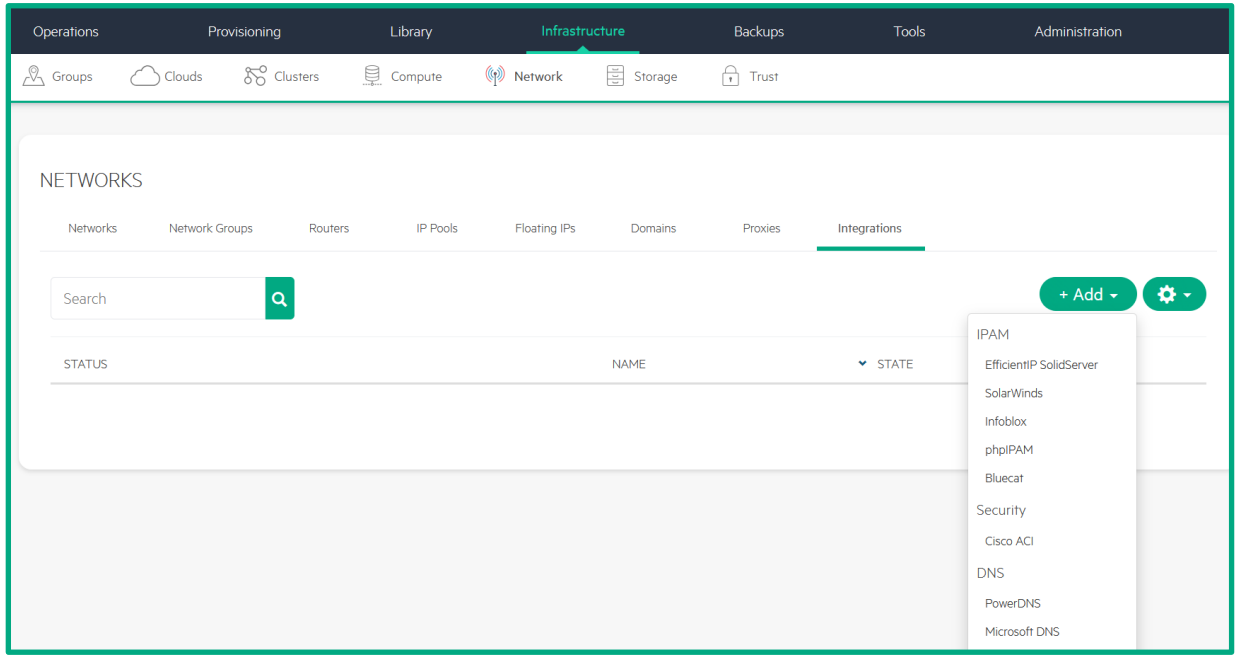
- Several options for VM network management:
  - IP addresses assigned via DHCP
  - IP addresses assigned from manually specified network pools within VM Essentials
  - Integration with third-party IPAM and DNS tools



Network integrations

- Two main network integrations:
  - IPAM:
    - IP Address Management: automates management and assignment of IP addresses
    - Supported IPAM tools:
      - phpIPAM, Bluecat, Infoblox, SolarWinds, EfficientIP Solid Server
  - DNS:
    - Automates integration with Domain Name Services
    - Supported DNS tools:
      - PowerDNS, Microsoft DNS

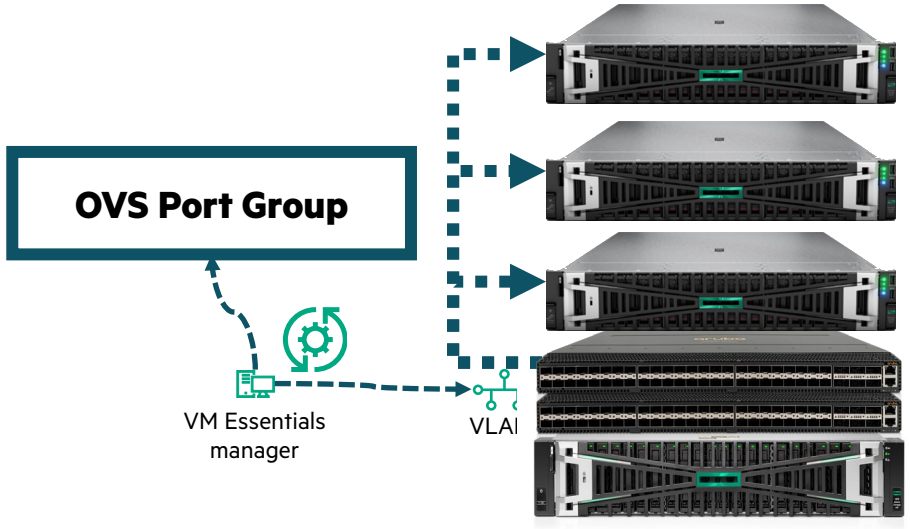
- These help automate the management of hostnames and IP addresses when deploying VMs
- Additionally, there is built in IPAM and domain functionality
  - IP pools can be manually specified for assignment to VMs when deploying.



HPE Aruba CX network plugin

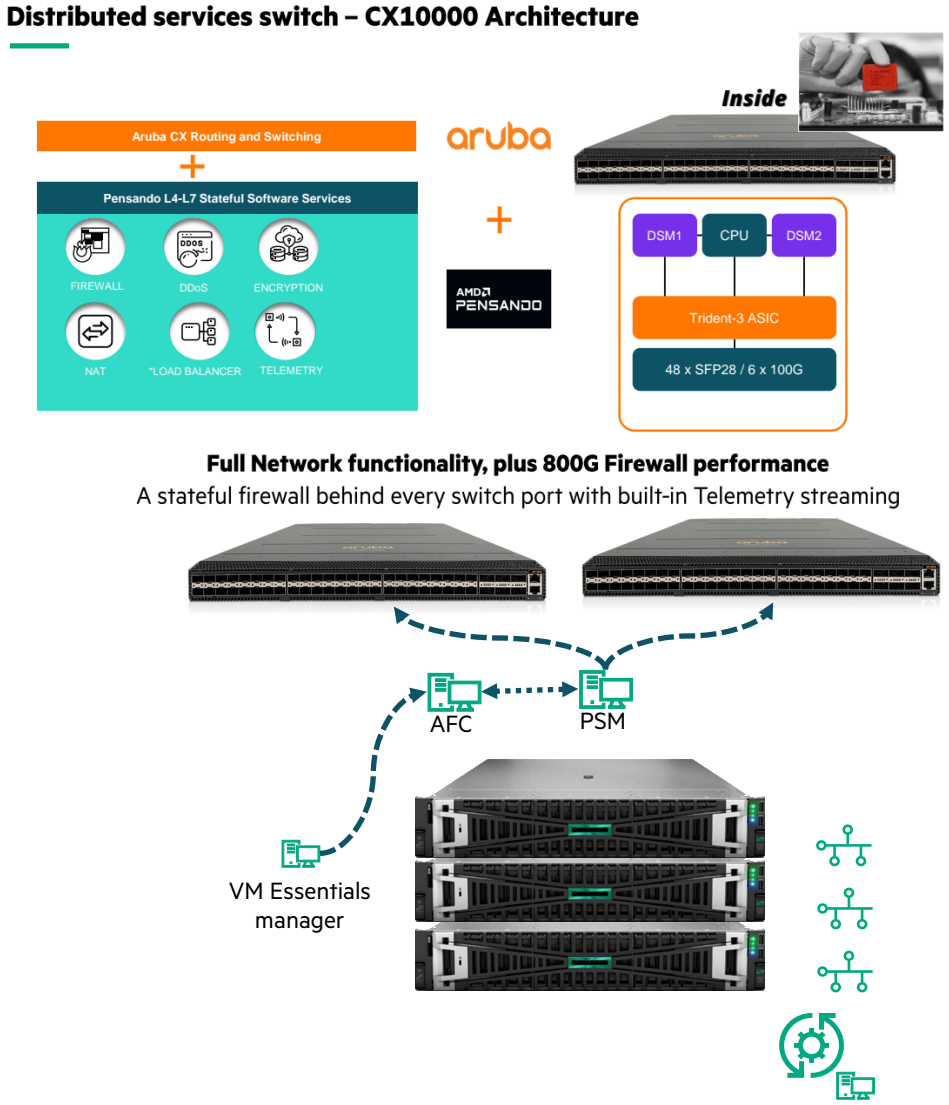
- An optional plugin for HPE Aruba CX switches that simplifies the over network provisioning process for users of certain Aruba CX models
- Configured and leveraged as part of the Network Automation feature
  - Also available separately for users leveraging Aruba CX switches but not Network Automation
- Acts as a network abstraction layer between VM Essentials and the HPE Aruba CX switches
  - Plugin interacts directly with Aruba CX switches
- Tasks managed as part of deployment
  - Integrate VM Essentials with the Aruba switch pair
  - Edit the cluster
- Tasks managed post deployment
  - Create/delete OVS port group
    - Creates/deletes associated VLANs on the switches
    - Assigns/unassigns VLANs to switch ports
    - Adds/removes VLAN to lag1 (uplink to the upstream network)

- The HPE Aruba CX network plugin is installed and leveraged by HPE Private Cloud Business Edition if the Network Automation feature is leveraged.



HPE Aruba DSS network plugin

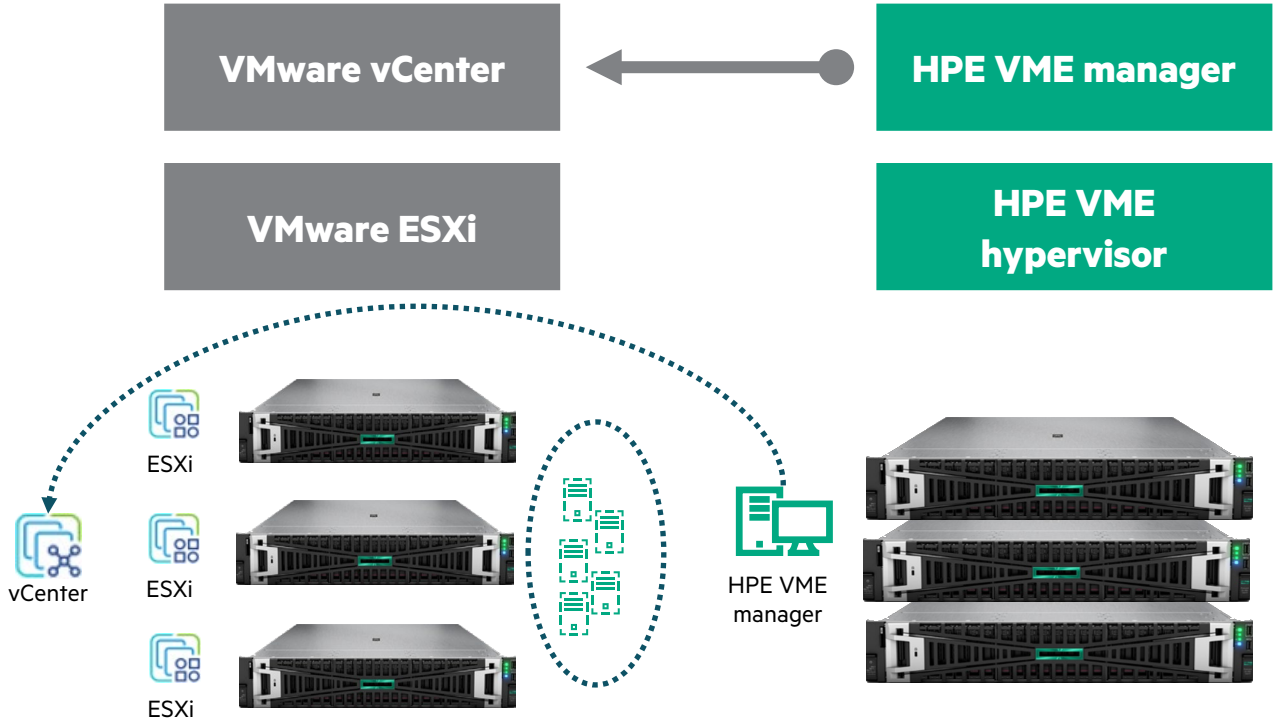
- Dedicated plugin providing enhanced networking integration and automation capabilities through the VM Essentials UI
  - Supports Aruba CX10000 switch capabilities
  - Basic micro- and macro-segmentation
  - Automates interface creation, security groups, network and switch configuration
  - Plugin interfaces with Aruba Fabric Composer (AFC)
  - Automates network creation/deletion/modification and associated network actions for VM creation/deletion/modification
  - Both AFC and PSM run as VMs within VM Essentials



VMware Integration

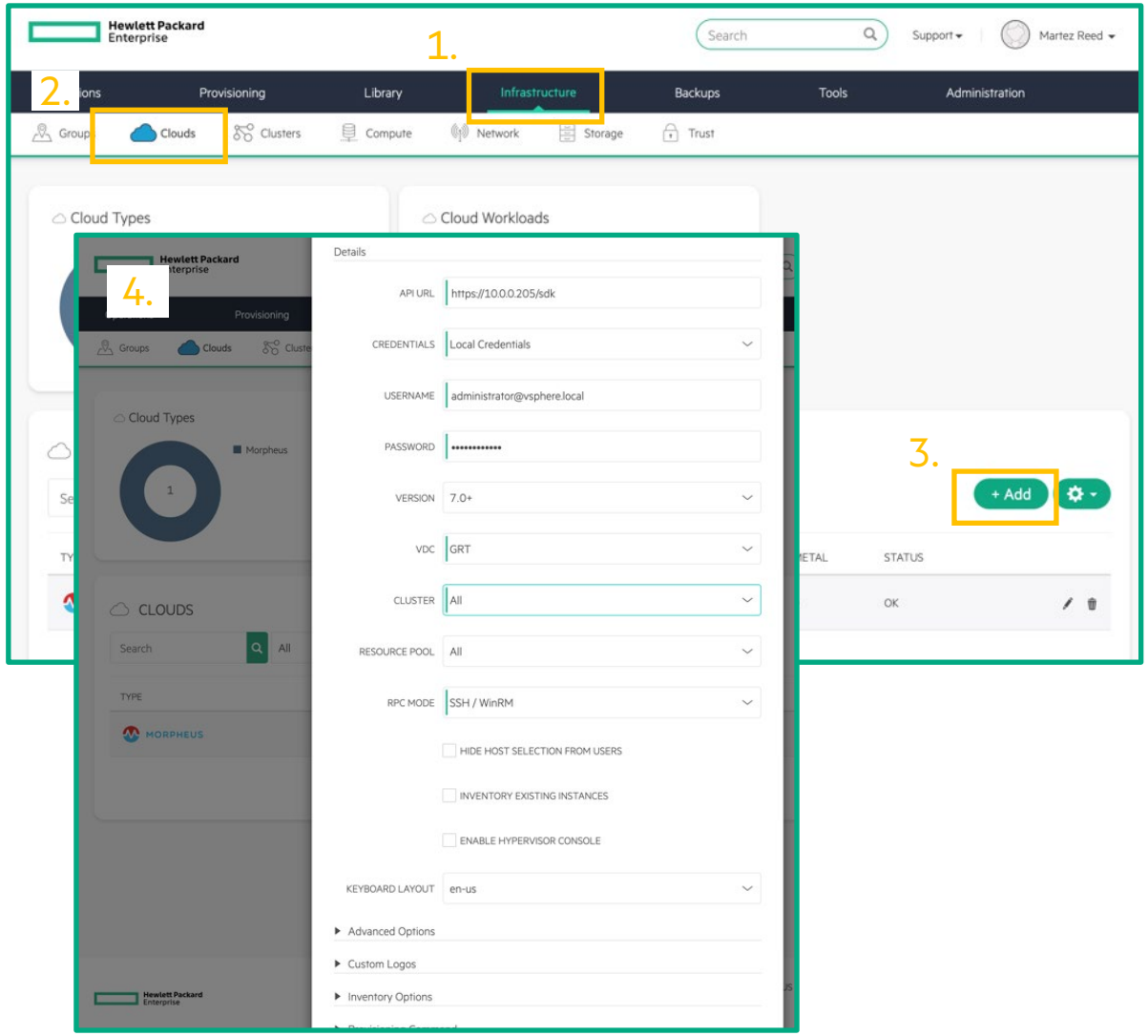
VMware integration overview

- Enables management of existing vSphere® clusters or datacenters through the VME UI
- **Integration functionality:**
  - Existing VM discovery and management
  - New VM provisioning and management
- **Cloud sync:**
  - The VMware integration performs a synchronization to collect information about the following resources every 5 minutes:
    - Networks
    - Datastores
    - VM Templates
    - Virtual Machines
    - Resource Pools
    - Folders



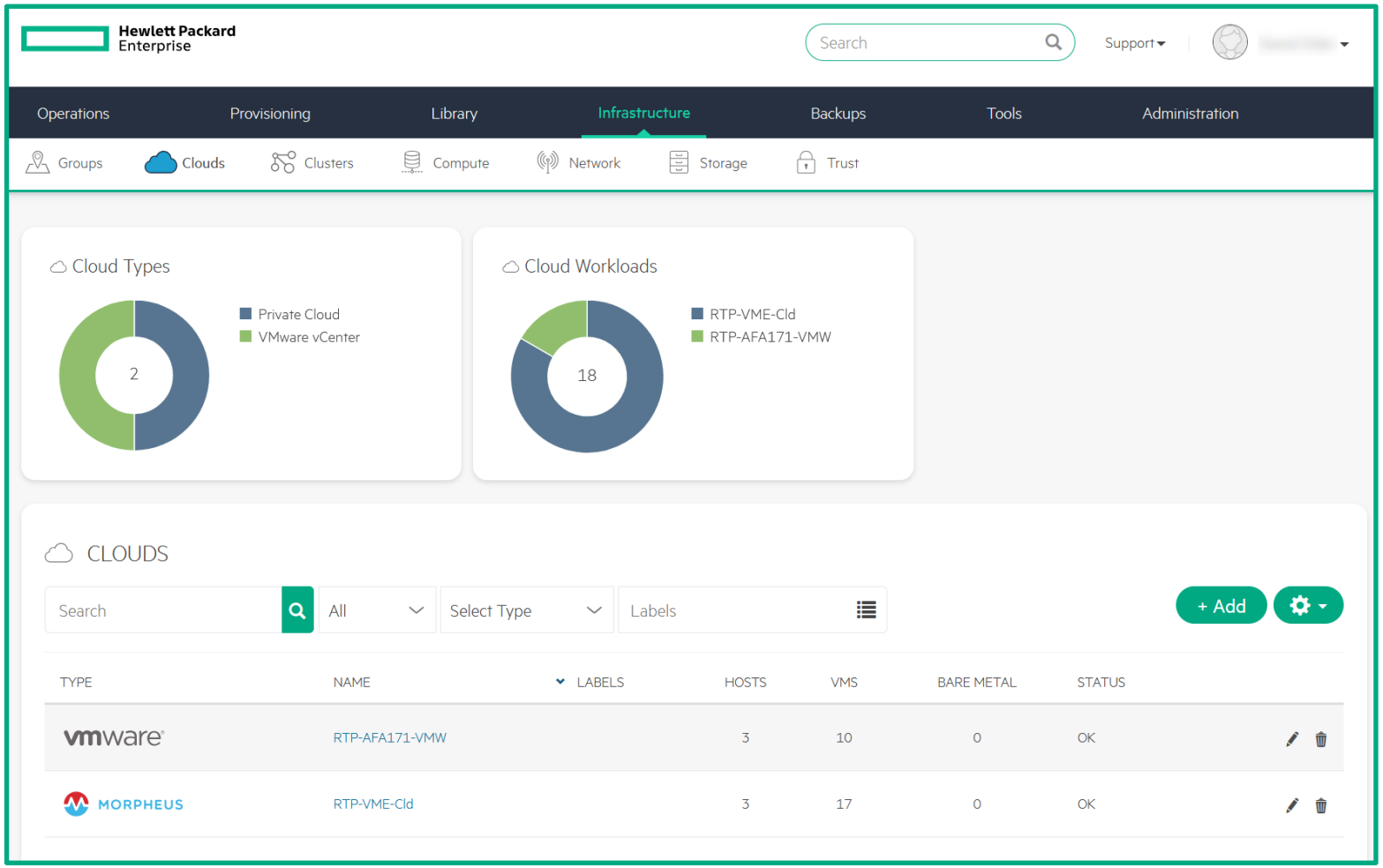
VMware integration – adding vSphere environment

- To add a vSphere environment:
  - VME UI -> `Infrastructure` -> `Clouds` -> `+Add`
  - Select `VMware vCenter` as the cloud type
  - Enter vCenter host information and administrator credentials
  - Select which resources in the environment to manage with VME
  - To manage existing virtual machines in the VMware environment, select `Inventory Existing Instances`
  - Select additional options if necessary
  - Assign to a group and submit



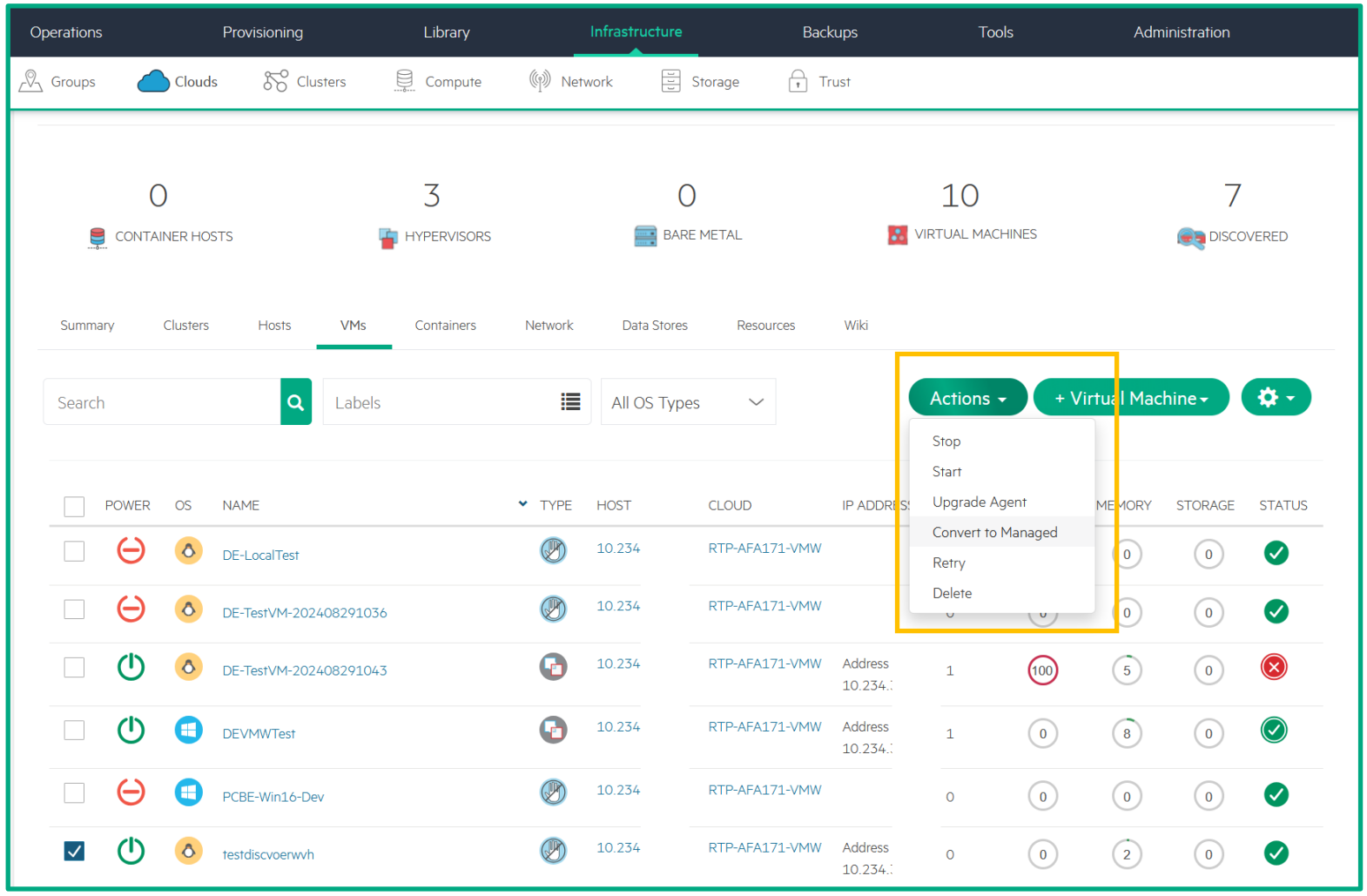
VMware integration

- The vSphere environment will show as a new cloud in `Infrastructure -> Clouds`
- Once added, access to vSphere networks and datastores can be modified



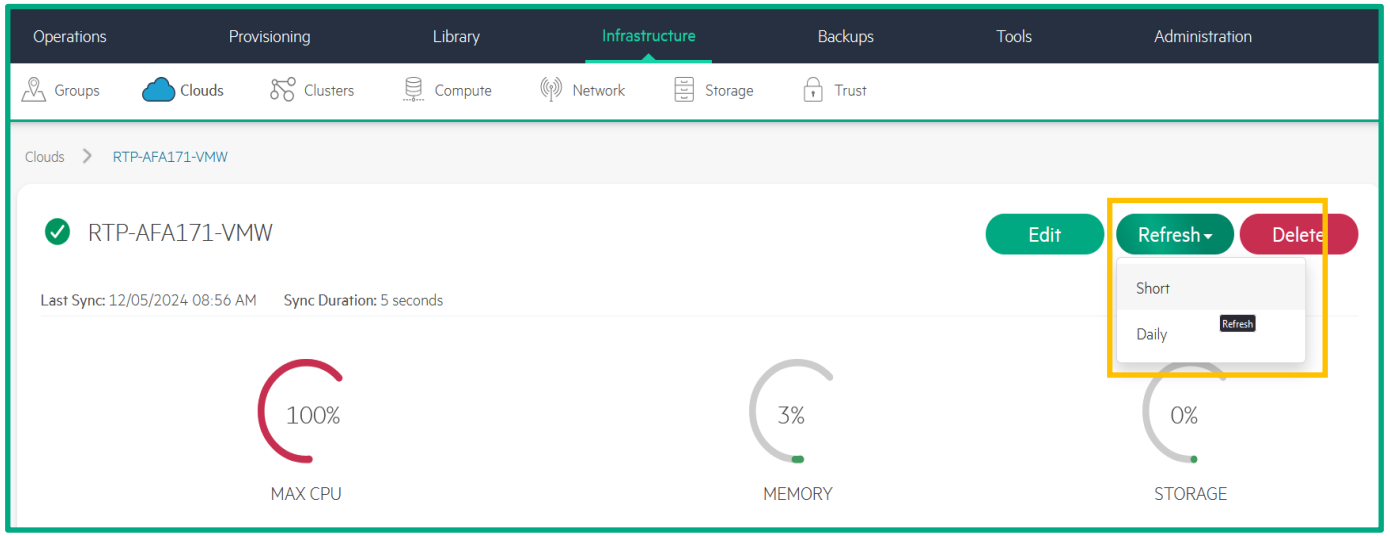
VMware integration

- If the option to inventory existing virtual machines was selected, the VMs in the selected vSphere resources will show as `Discovered`
- To manage a discovered VM through the VME manager UI, select the VM or VMs and select `Convert to Managed` from `Actions`



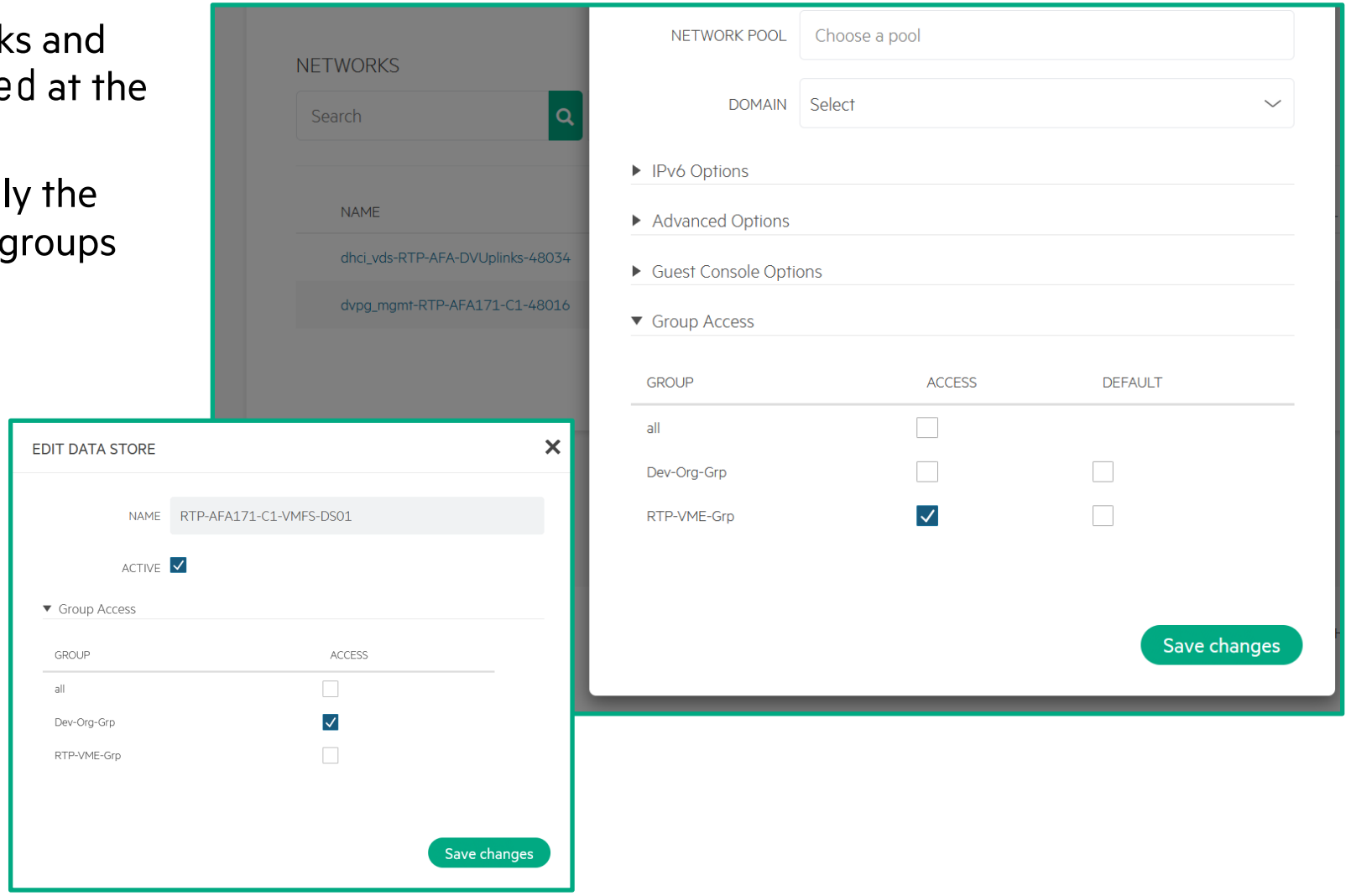
VMware integration

- Periodic cloud synchronizations will pull in changes within vSphere
- If there is a need to see those changes immediately, within the VMware cloud in VME, a user can select to initiate a manual refresh
- Selecting `Short refresh` will capture any relevant infrastructure changes, such as networks, VMs, datastores



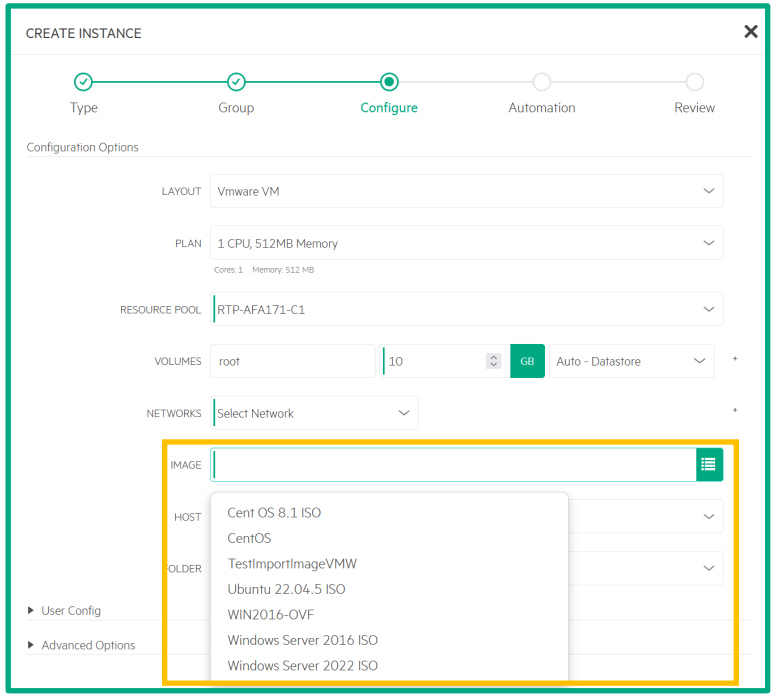
VMware integration – storage and network access

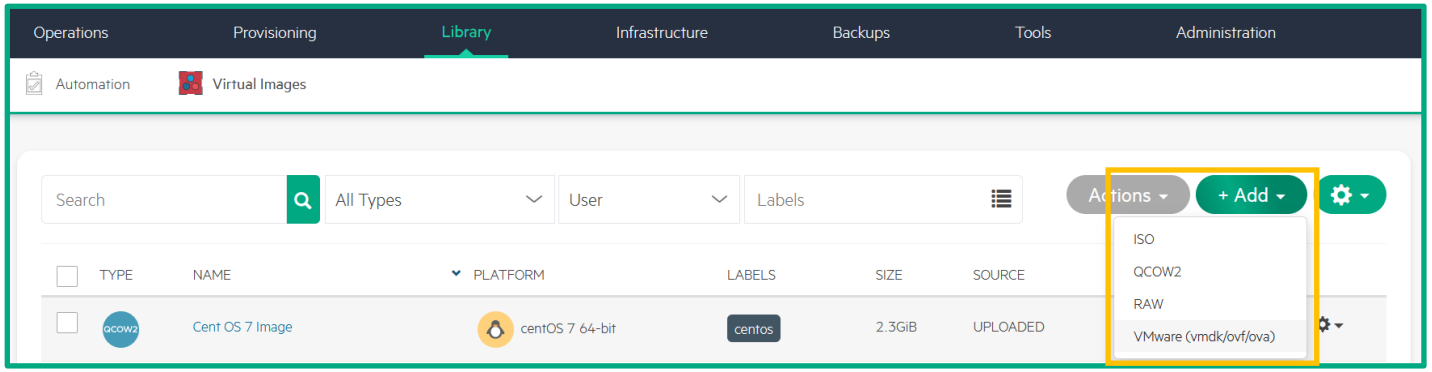
- If desired, access to specific networks and datastores can be granted to `denied` at the group level
- This enables providing access to only the necessary infrastructure to various groups



VMware integration – VM provisioning

- VMware VMs can be deployed from:
  - vSphere Content Libraries
  - VM Essentials `Virtual Images` library
- VMware-compatible image types:
  - ISO – for installing VM OS upon VM deployment
  - VMDK – standard VMware virtual disk format
  - OVA / OVF – open standard format for VMs

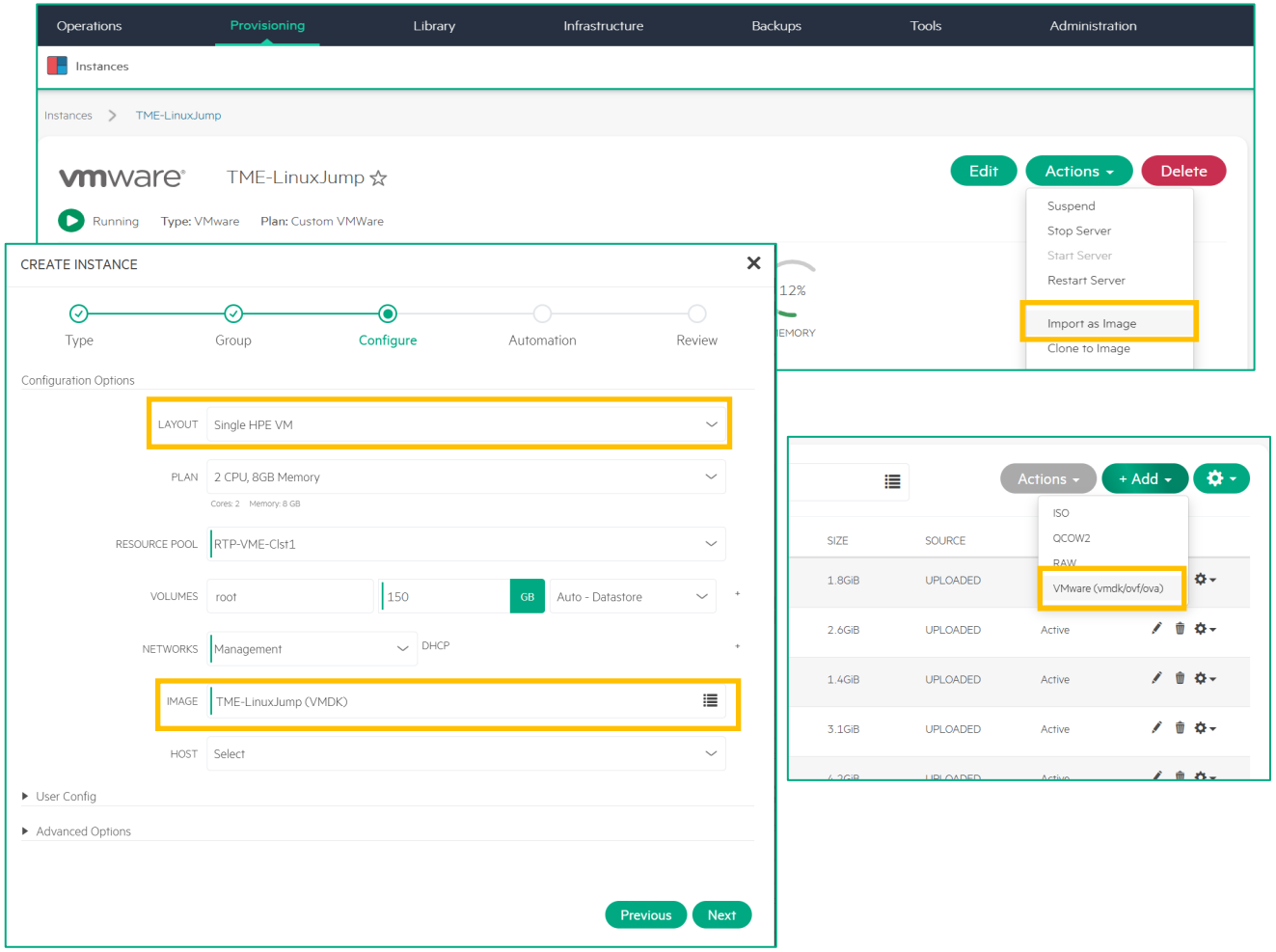




VMware to VM Essentials image conversion

- Built into VM Essentials is the capability to deploy imported VMware virtual machine images that are in the VM Essentials Virtual Images library
  - VMs are converted to QCOW2 format upon deployment
  - VMware VM images can be added to the Virtual Images library either by importing the VM as an image through Instances or by uploading VMDK/OVA/OVFs directly to the library
  - Prior to importing the VM image, some preparation of the VM is typically required, including VirtIO driver injection and modification of virtual disk mount points.
  - Refer to the HPE Morpheus VM Essentials Software migration guide for more information.

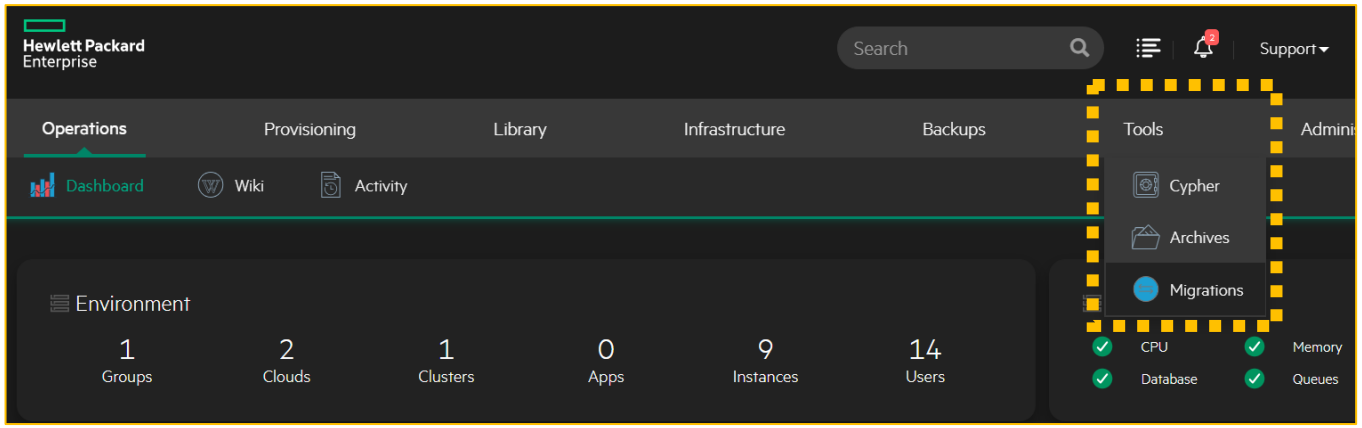
  - This feature is distinct from the VM migration feature

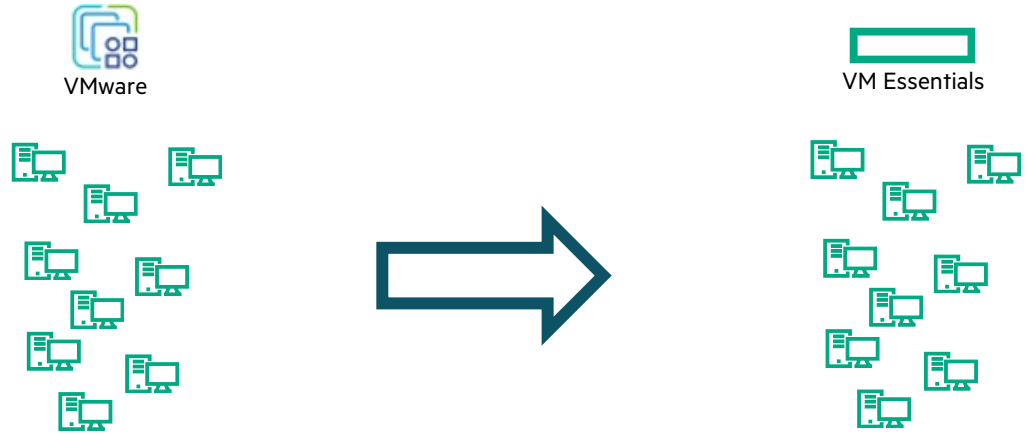


VMware to VM Essentials migration feature

VM Migration feature

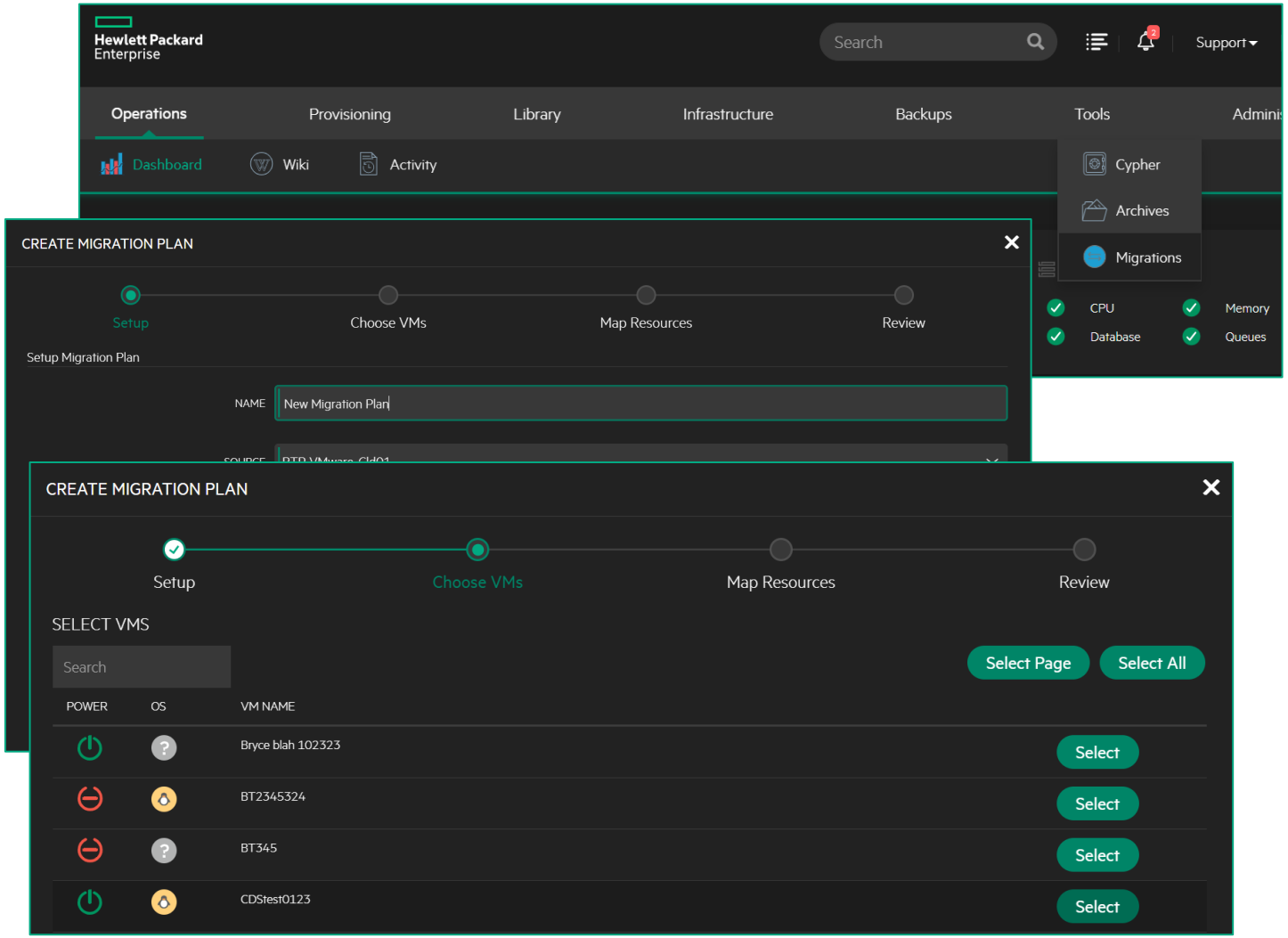
- Built in feature that facilitates conversion and import of VMware VMs into the HVM environment
- Can initiate multiple VM conversions simultaneously
  - Maximum of 20 simultaneous tested currently
- Depending on the guest OS, some preparation may be necessary before beginning migration
  - Verify virtio drivers are present and install if not
  - Verify qemu guest agent is present and install if not
  - Recommended to change mount points to utilize UUIDs.
    - /dev/sdX device names may change to /dev/vdX device names upon migration
    - If mount points are not changed to use UUID, it will be necessary to modify post migration to use the new device names
- The vCenter environment must have been added as a cloud to VM Essentials and the VMs inventoried
- Refer to the HPE Morpheus VM Essentials migration guide for more information





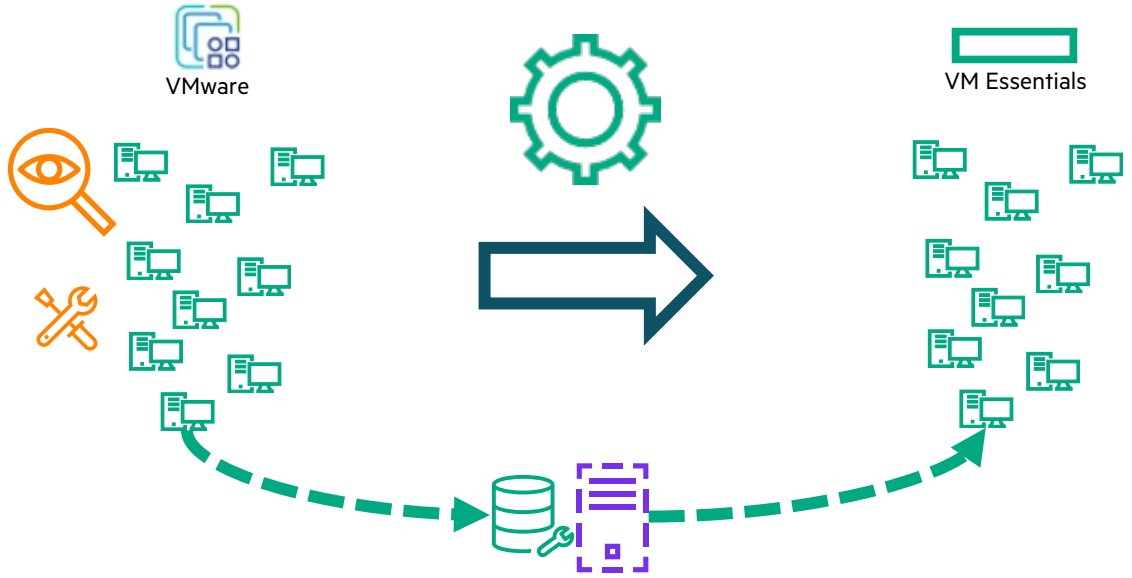
VM Migration feature workflow

1. In VM Essentials UI, click Tools -> Migrations
2. Click +Add to create a new migration plan
3. Specify the plan name, the source (VMware), the destination cloud, cluster, and group (HVM)
4. Select one or multiple VMs to migrate
5. Select the destination VM network and datastore
6. If the VMs to be migrated have not yet been prepared for migration, perform necessary steps*
7. When ready to start migration, click Run to initiate



VM Migration feature sequence of operation

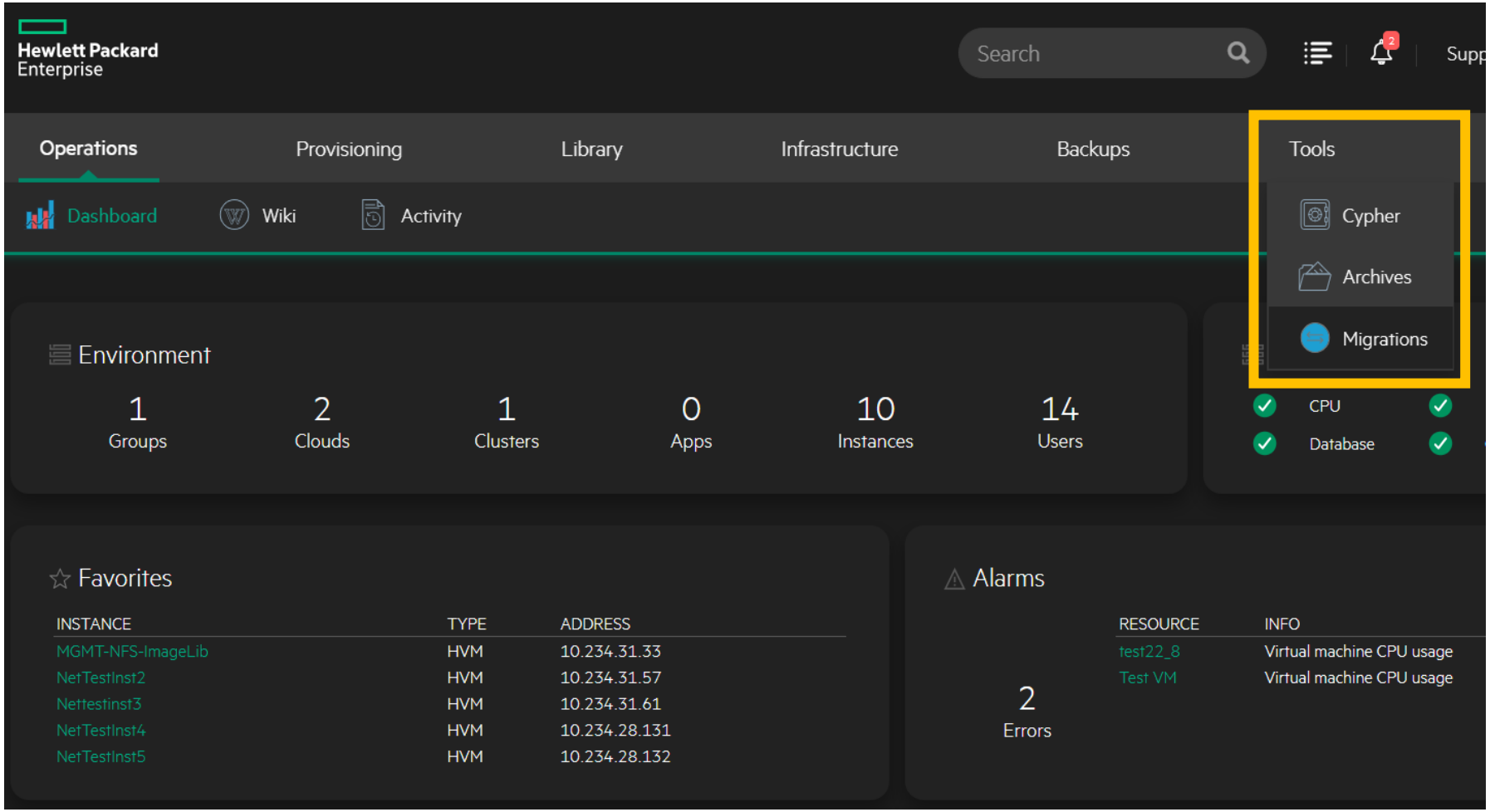
1. Migration plan is started
2. VM Essentials creates a VM on the destination HVM cluster
3. VM powered off on VMware side
4. Export of VM via OVF initiated
5. Virtual disk format is converted in transit and attached to the destination VM – the resultant VM disk format will be thick
6. Destination VM is powered on
7. VM guest agent installed, if not skipped
8. VM finalized and ready for use



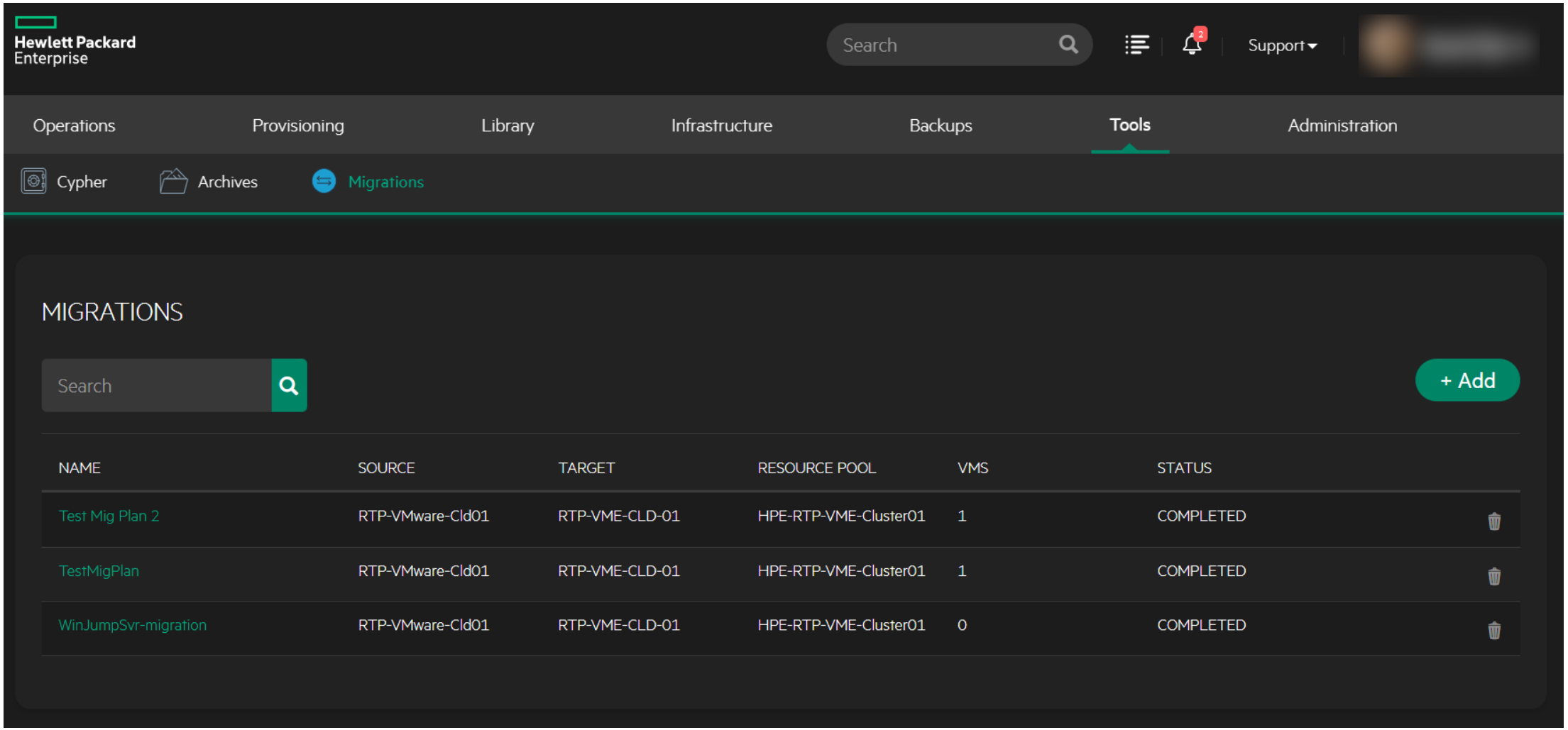
- Note this is not a live migration and downtime is required

Initiating a migration - UI

- Introduced in VM Essentials 8.0.8
- The migration feature is available under the Tools drop down menu

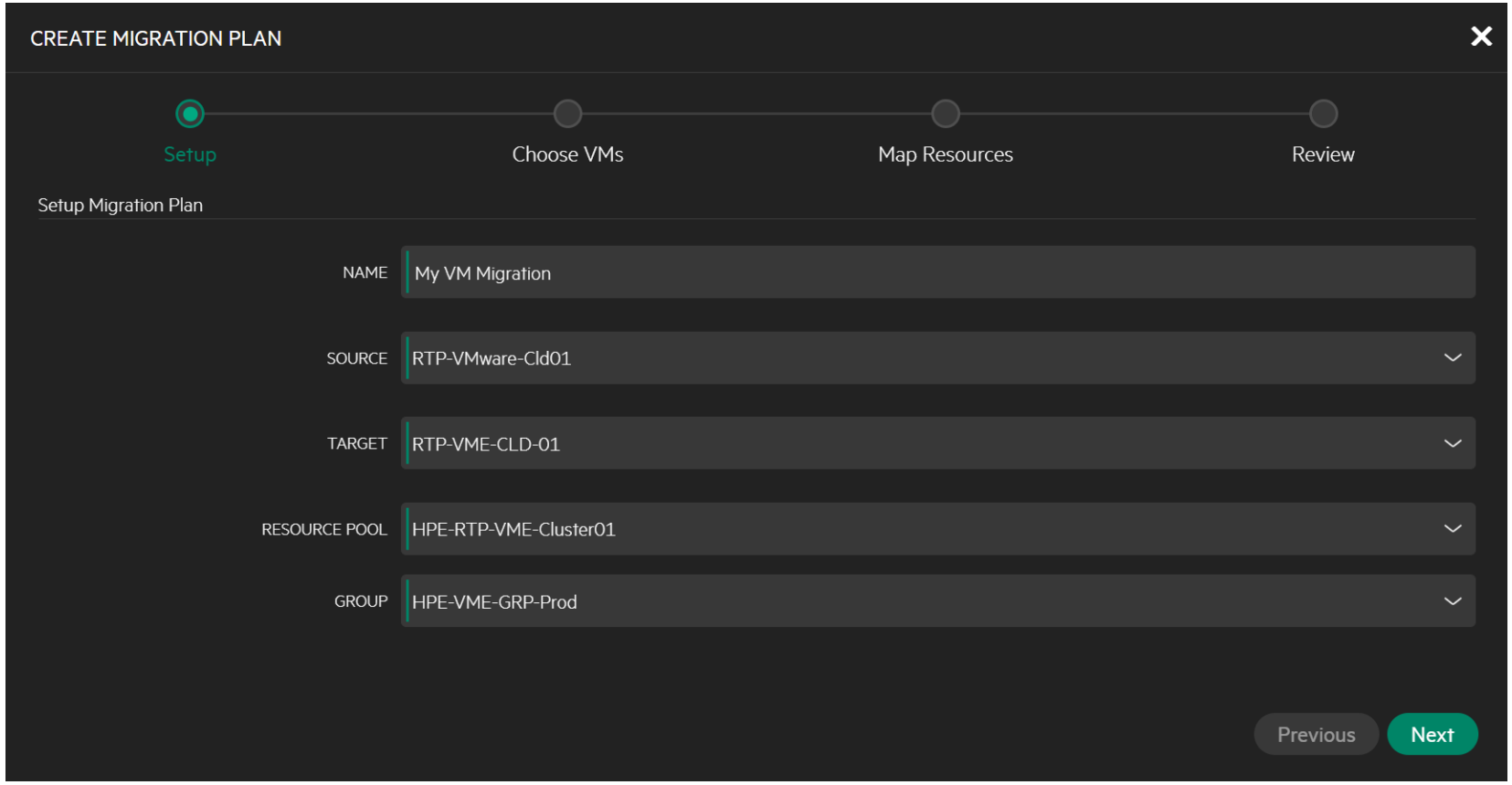


Initiating a migration - UI



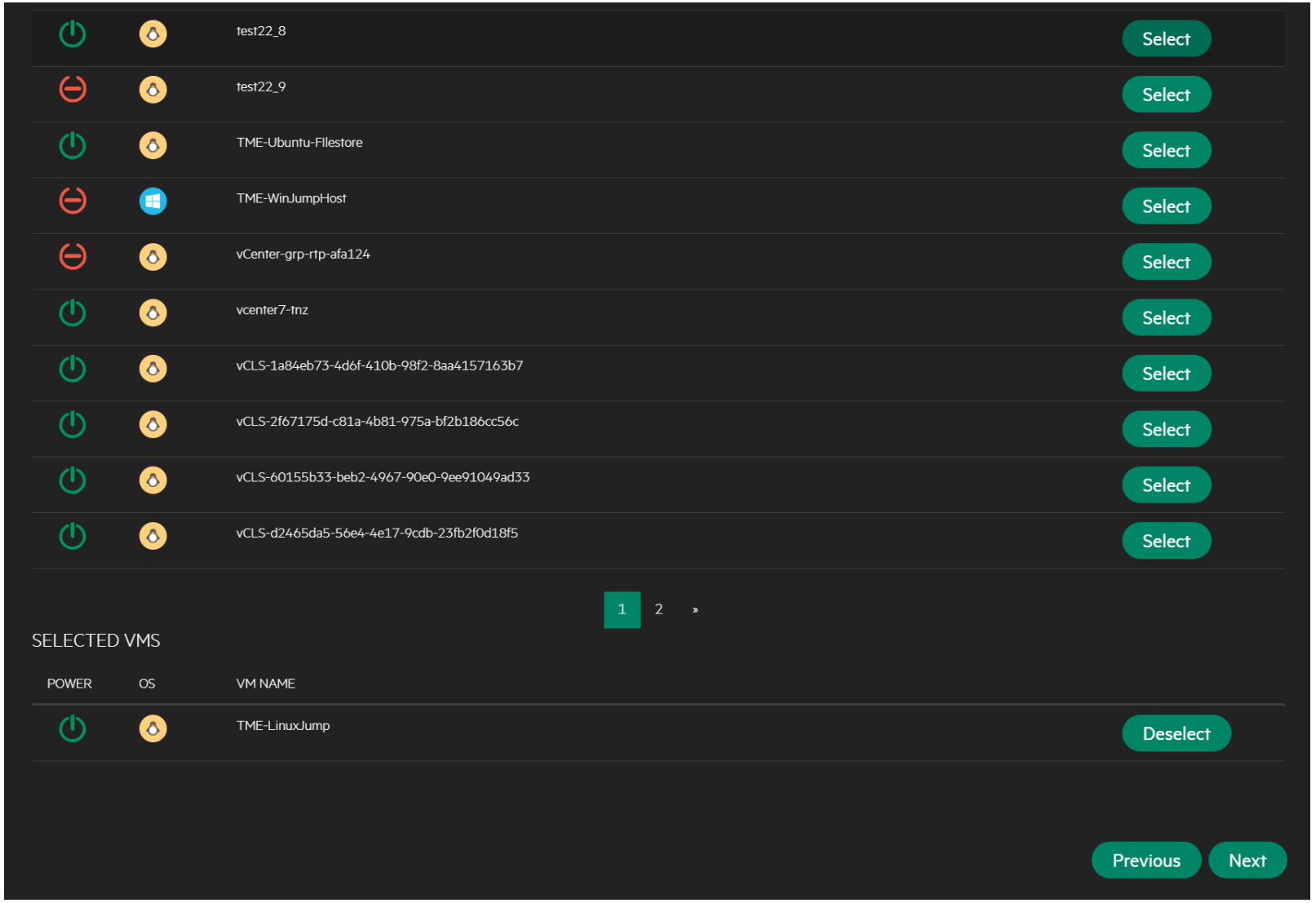
Initiating a migration - UI

- Give the migration plan a name
- Select the source cloud (VMware)
- Select the target cloud and resource pool
- The resource pool will be the HVM cluster the VMs will be run on



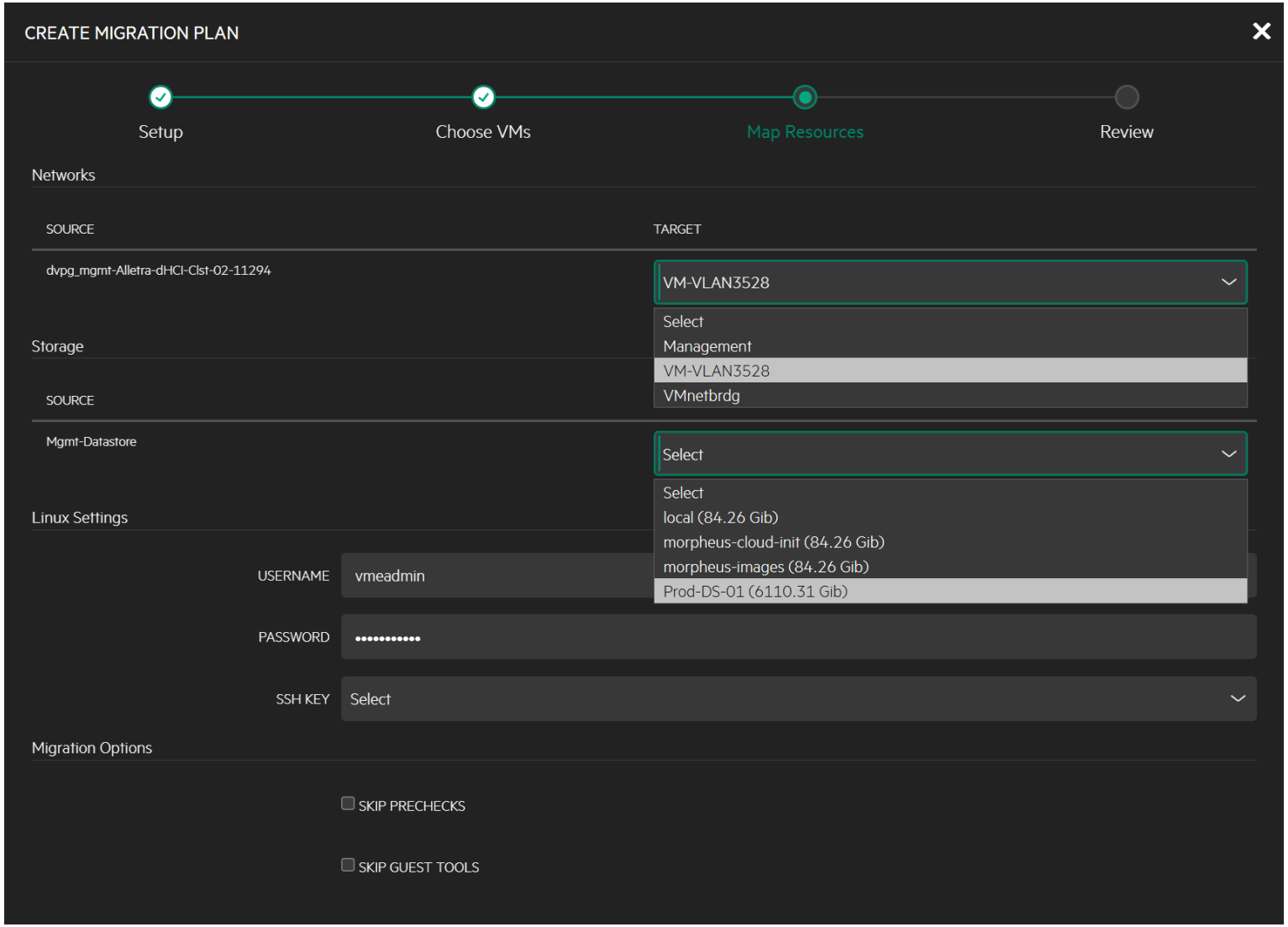
Initiating a migration - UI

- Select the VM or VMs to include in the migration plan
- It is recommended to create plans with VMs that are like each other
  - e.g. same datastores, VM networks, guest OS types



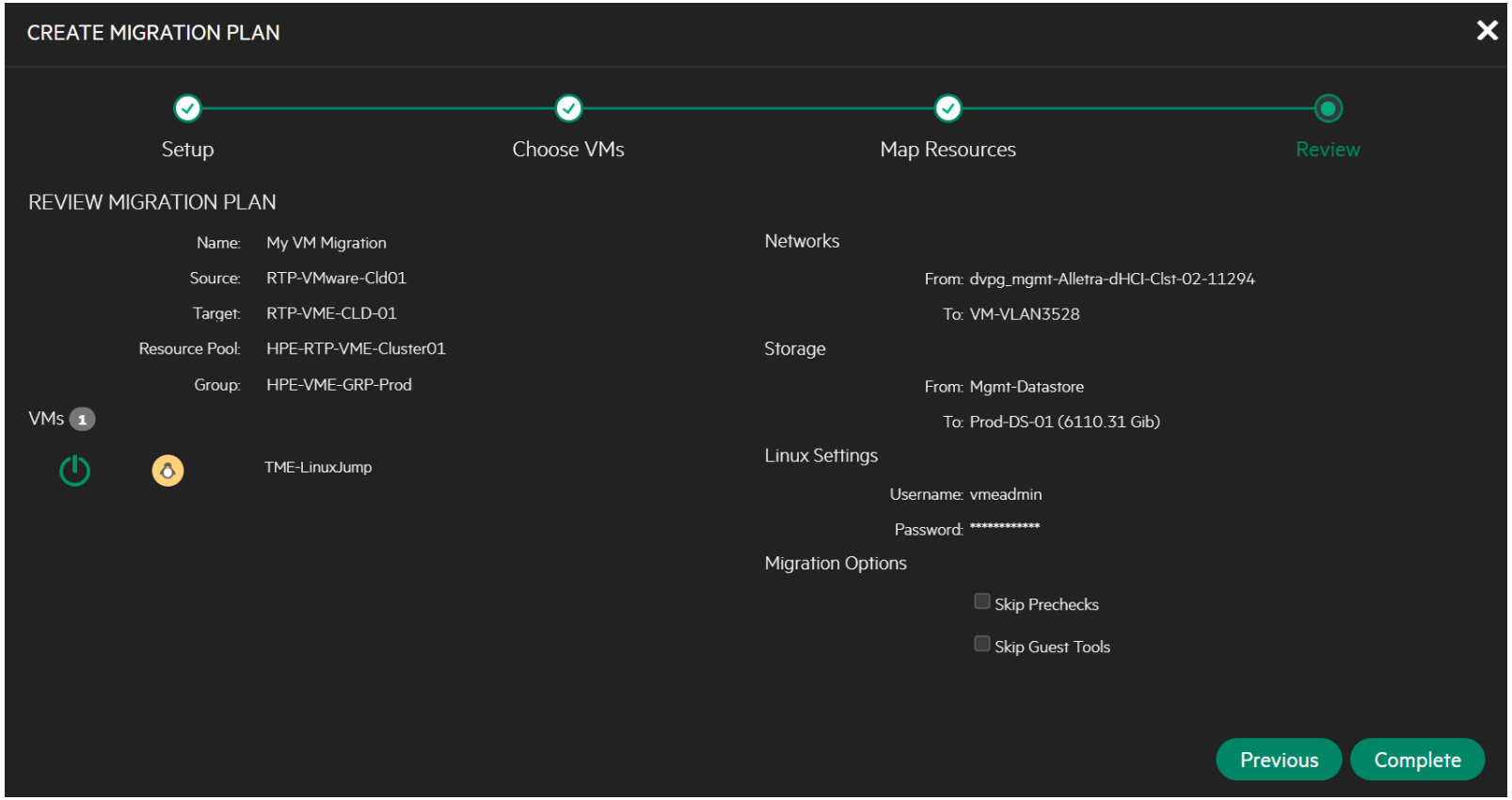
Initiating a migration - UI

- For each VM network on a VM or VMs on the source, a destination network is selected
- For each datastore that contains a VMDK of the VM or VMs a destination datastore would be selected
- Provide guest OS credentials to install guest tools if desired



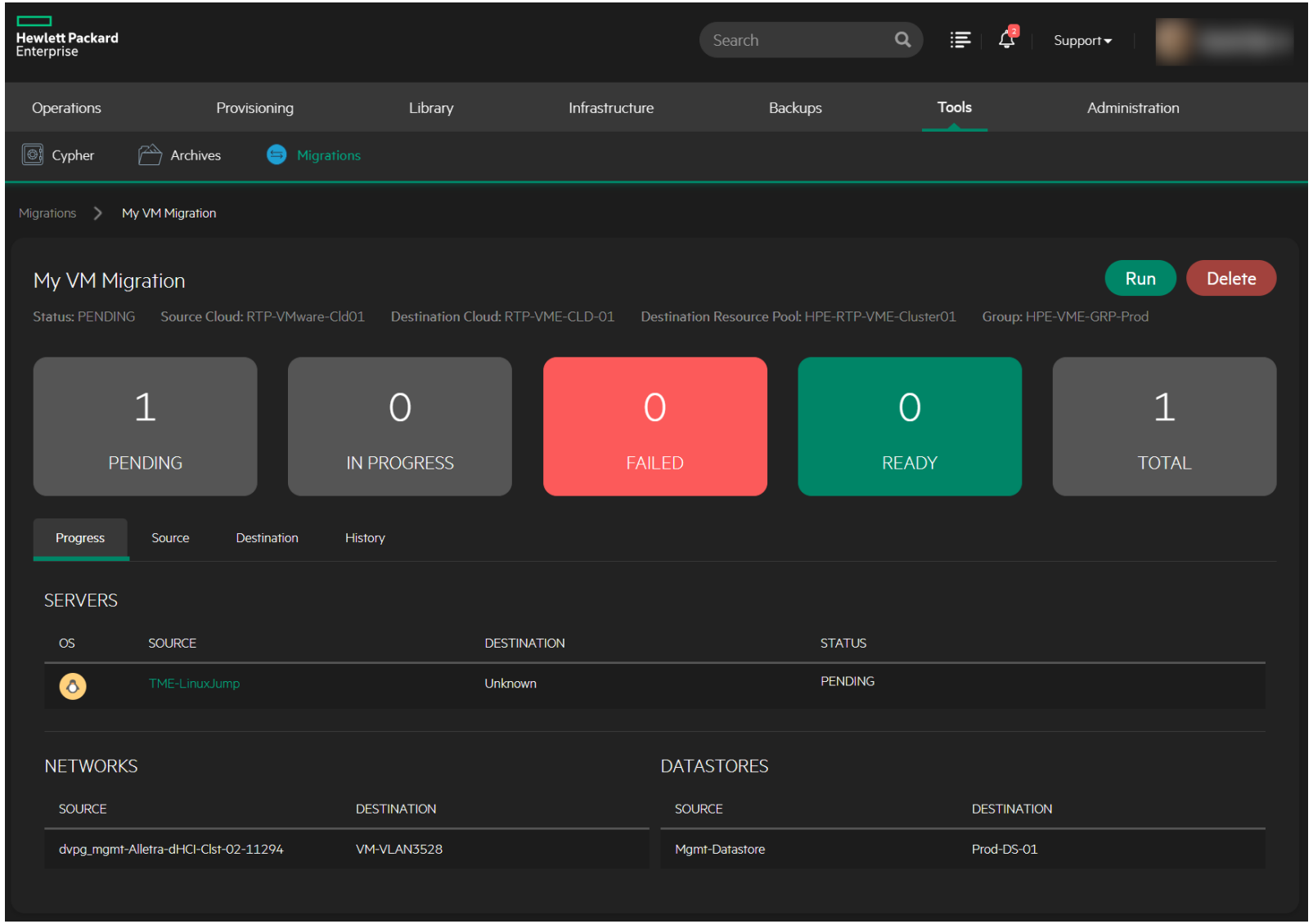
Initiating a migration - UI

- Review plan and complete
- The plan will not initiate until a user runs the plan



Initiating a migration - UI

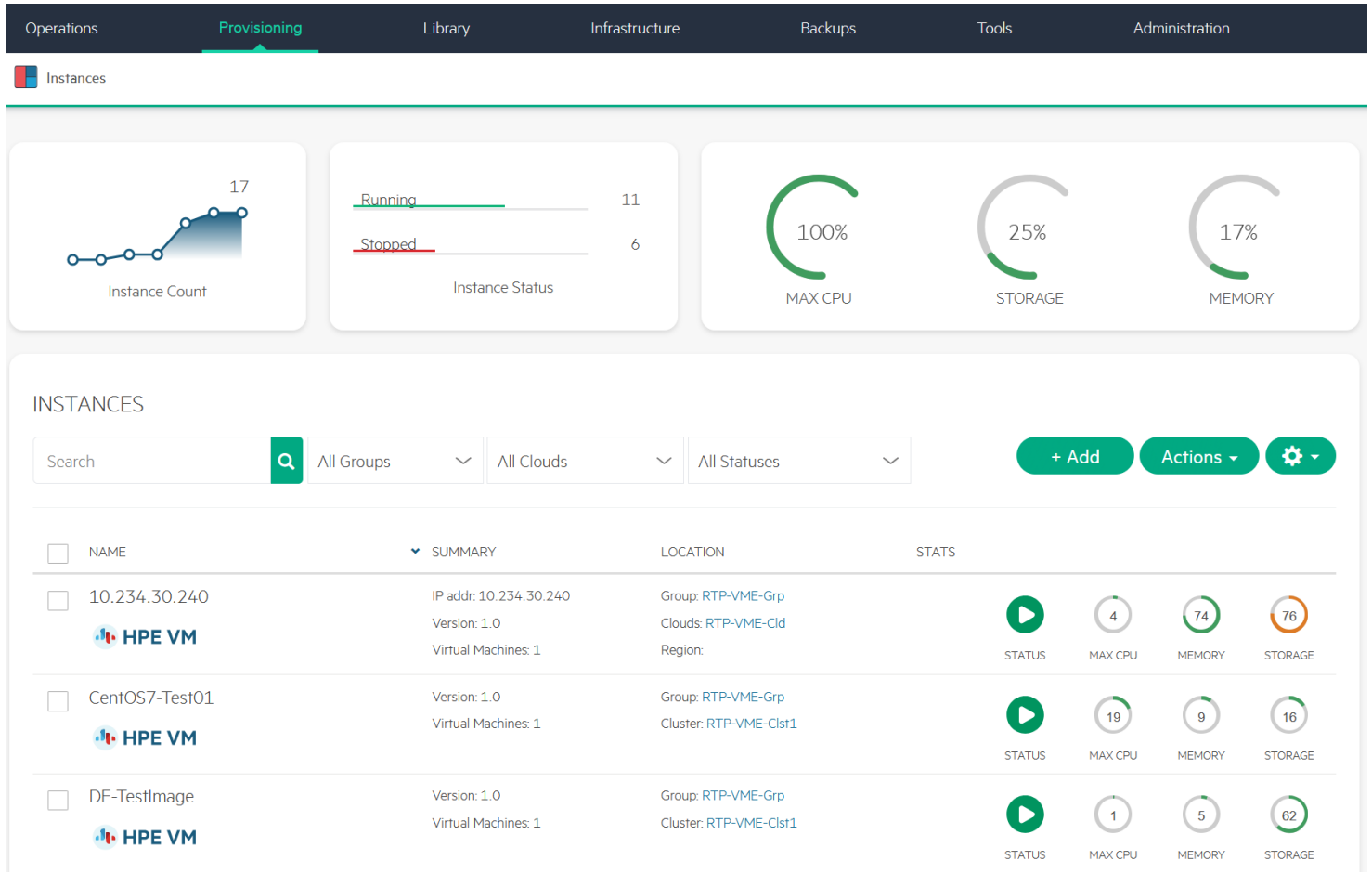
- The plan will not initiate until a user runs the plan
- Once run is initiated on the plan, the system initiates the migration process



Virtual machine management

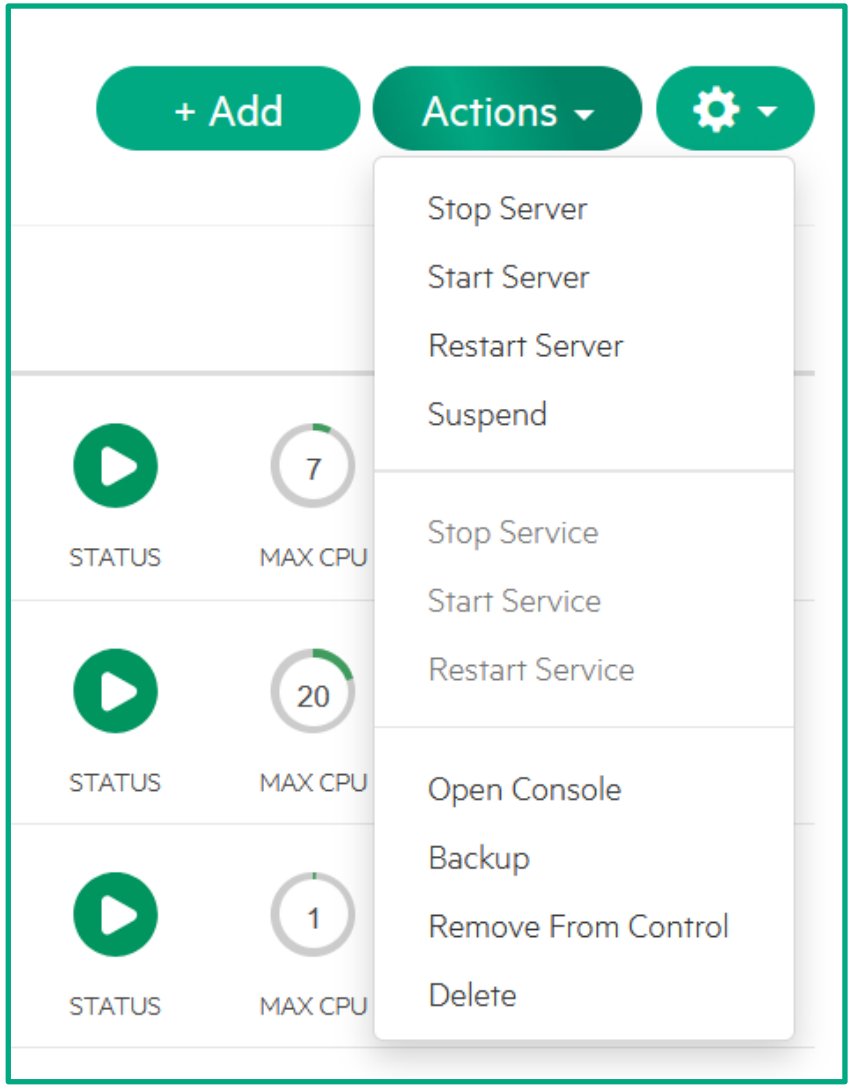
Virtual machine management

- Primary dashboard for VM management is `Provisioning -> Instances`
- An instance is not a VM, but contains one or more VMs that would correlate to a single horizontally scalable entity
- The VMs within an instance will be deployed from the same image
- Actions can be performed at the instance or individual VM level



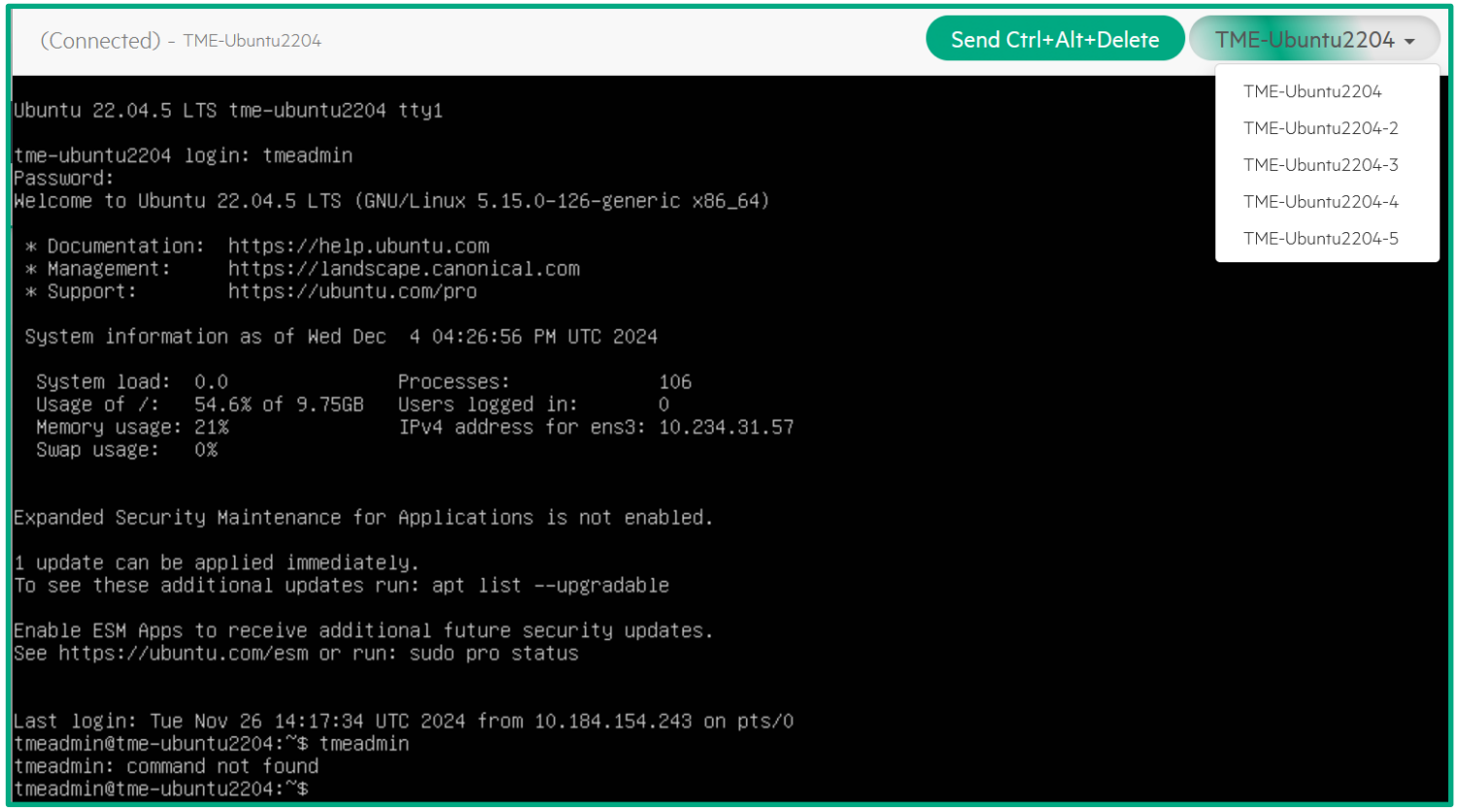
Instance main page actions

- From the main `Provisioning -> Instance` page, actions can be performed against one or more instances
- Actions performed against the instance are performed on any virtual machines associated with the instance:
  - Power operations
  - Open console
  - Backup initiation
  - Deletion
- `Open Console` performed at the `Instance` level will open a console to the first VM by default



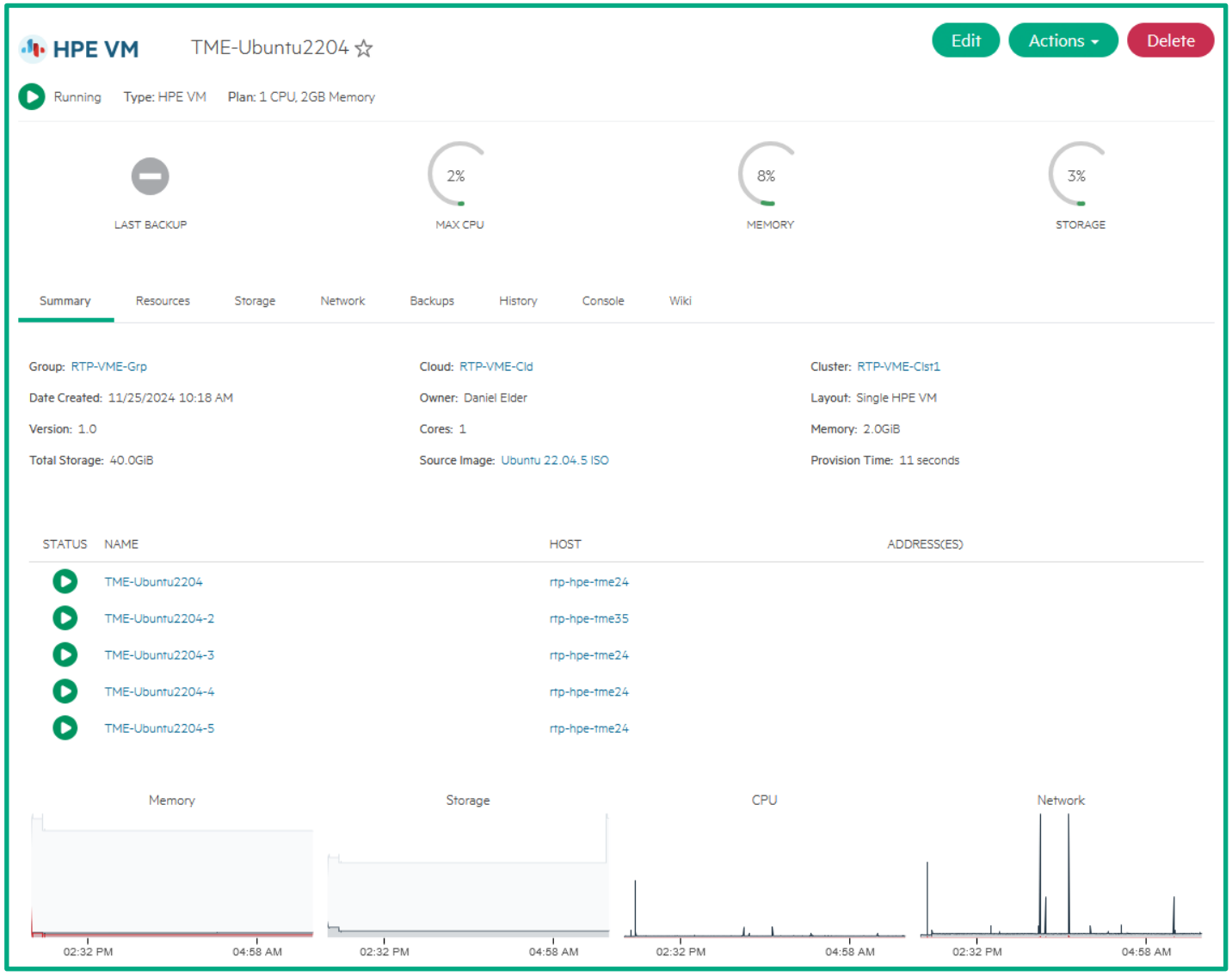
Instance-level console behavior

- If the console is opened at the instance level, by default, the first VM listed is connected
- The specific VM can be selected in the upper right drop down
- VMs can also be accessed via typical SSH / RDP methods



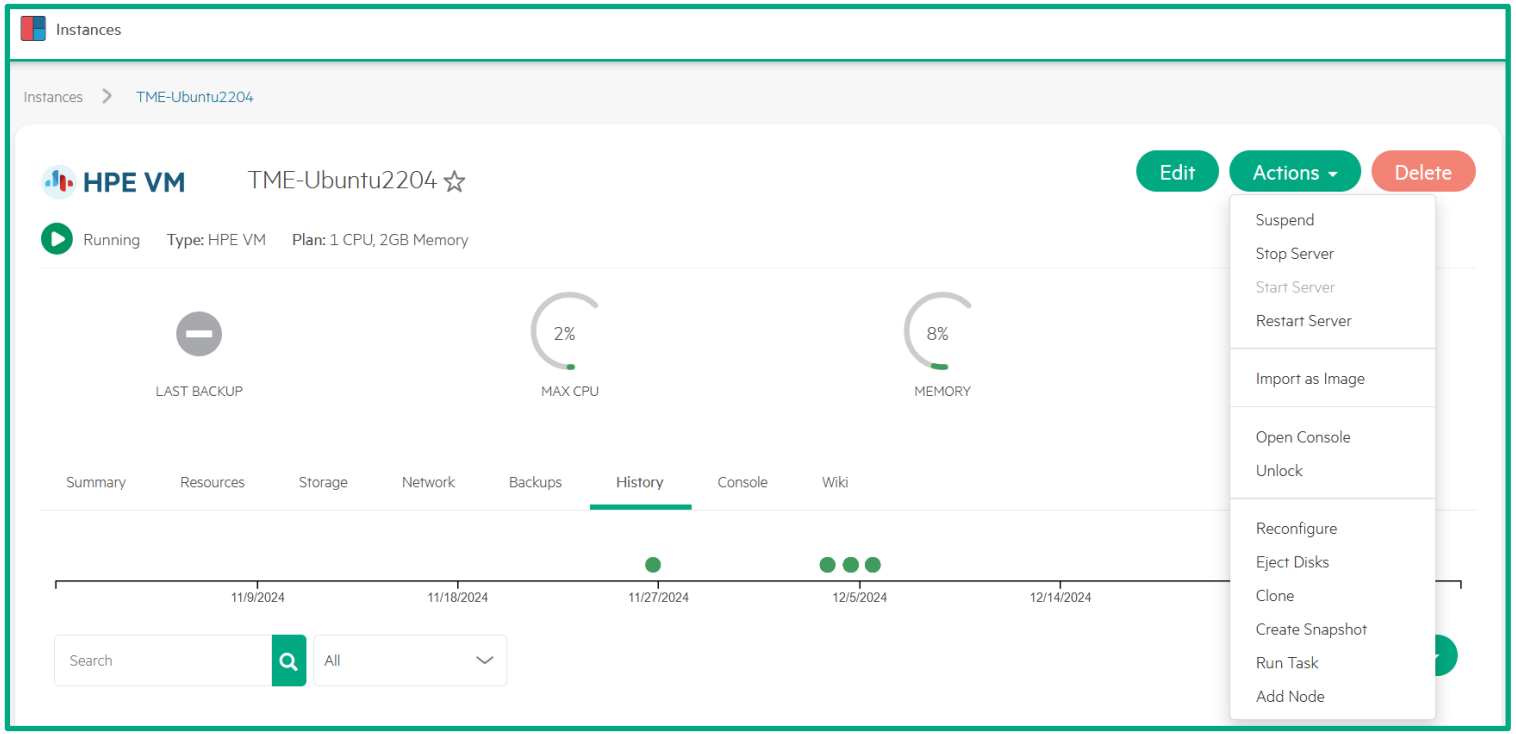
Instance internal dashboard

- Displays configuration and usage information of the instance:
  - CPU, memory, and storage utilization
  - Backup status
  - Summary
  - Resources – VMs running in instance
  - Storage – VM disks
  - Network – VM network interfaces
  - Backups – VM backups and snapshots
  - History – actions performed on the instance or VMs
  - Console
  - Wiki



Instance internal actions

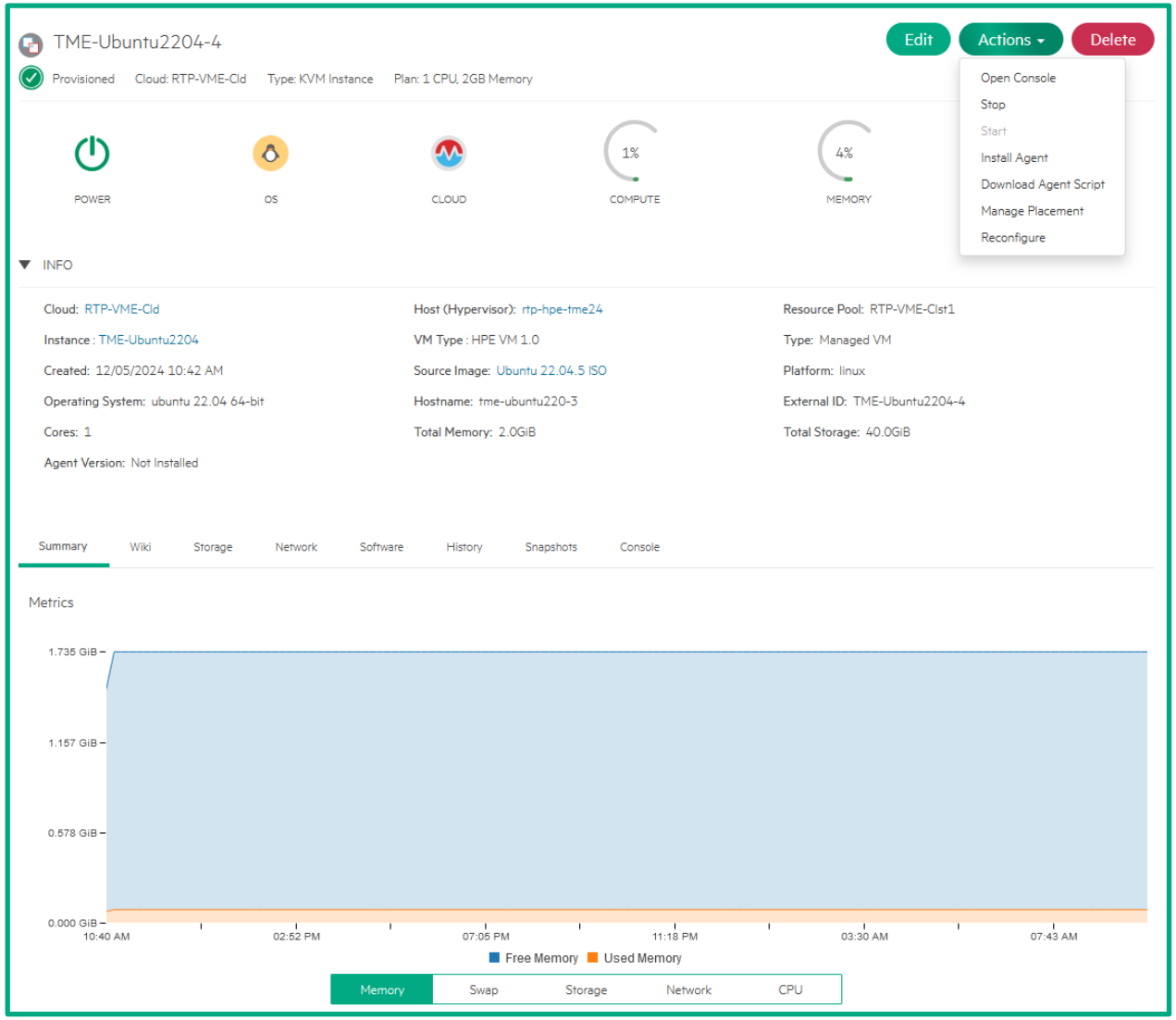
- From within an instance, additional actions are presented:
  - `Import as Image` – imports that instance as an image into the Virtual Images library
  - `Reconfigure` – modify virtual machine hardware configuration, some changes may require a reboot of the VM
  - `Eject Disks` – ejects and ISOs that were mounted during initial VM creation
  - `Lock / Unlock` – toggles lock, preventing instance deletion
  - `Clone` – creates a full, independent clone of the instance
  - `Create Snapshot` – creates a point in time snapshot of the instance (distinct from a backup job)
  - `Run Task` – execute tasks against the instance from `Library -> Automation`
  - `Add Node` – spins up additional VMs within the instance



Resource (VM) actions

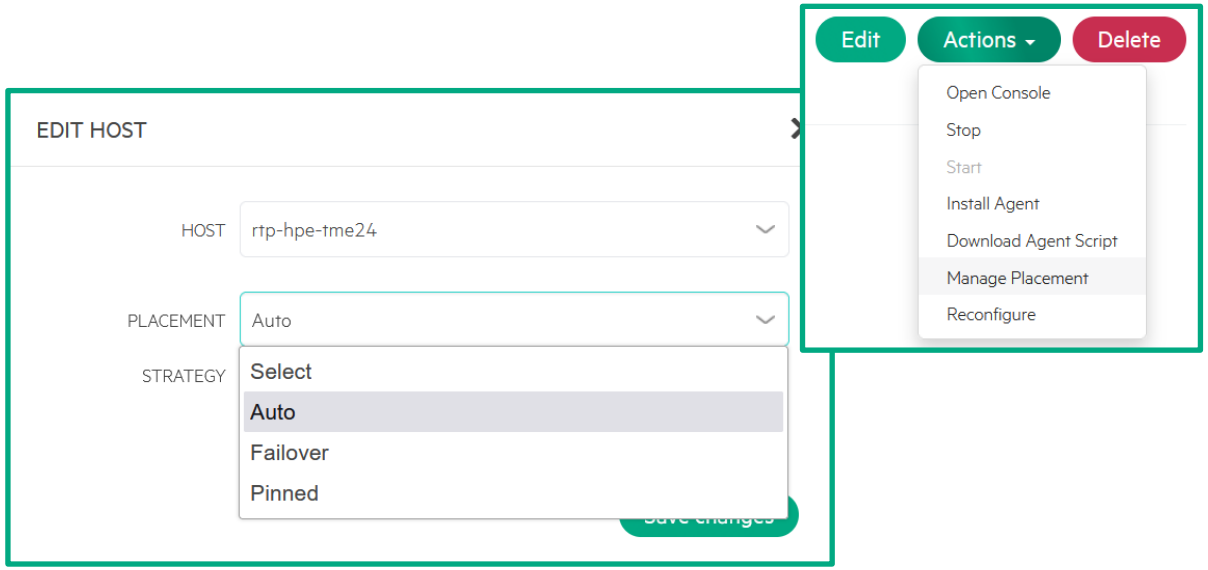
- Like the `Instance` view, but focused on the Resource (VM) level
- Actions are VM-specific:
  - `Start / Stop` – powers on or off that specific VM
  - `Install Agent` – installs Morpheus guest agent
  - `Download Agent Script` – provides a script for Morpheus guest agent install from within the VM
  - `Manage Placement` – migrate VM between hosts and adjust the placement strategy
  - `Reconfigure` – modify virtual hardware configuration of the VM, including:
    - Modify CPU and memory
    - Add, delete, or resize virtual disks
    - Change backing datastore of virtual disks
    - Modify, add, or delete virtual networks

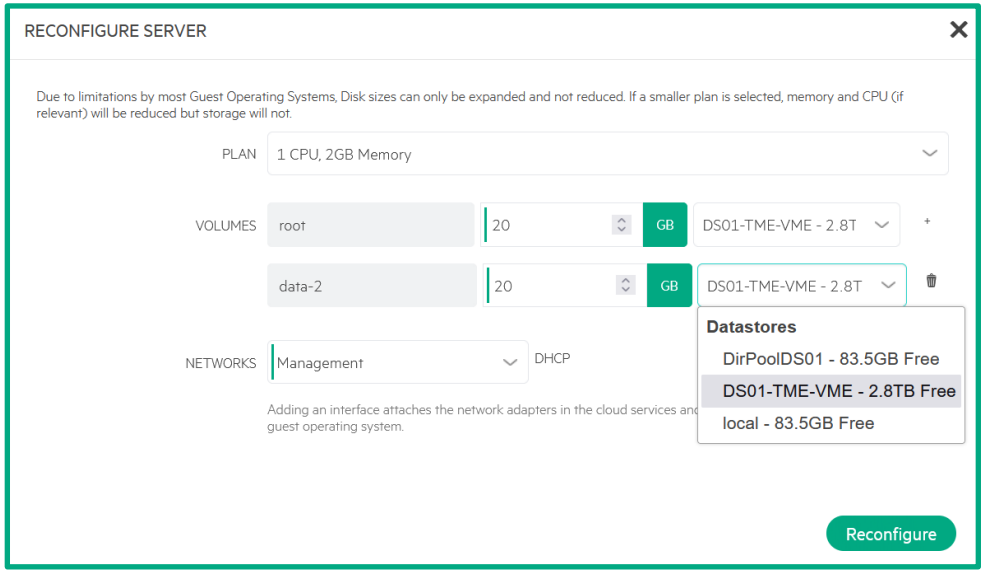
- Guest agent:
  - Software agent that can be install within the guest OS
  - Bidirectional secure communication via command bus, no network connectivity
  - Provides enhanced statistics, resource utilization, monitoring, and log capabilities as well as task execution without traversing the network



VM placement and migration

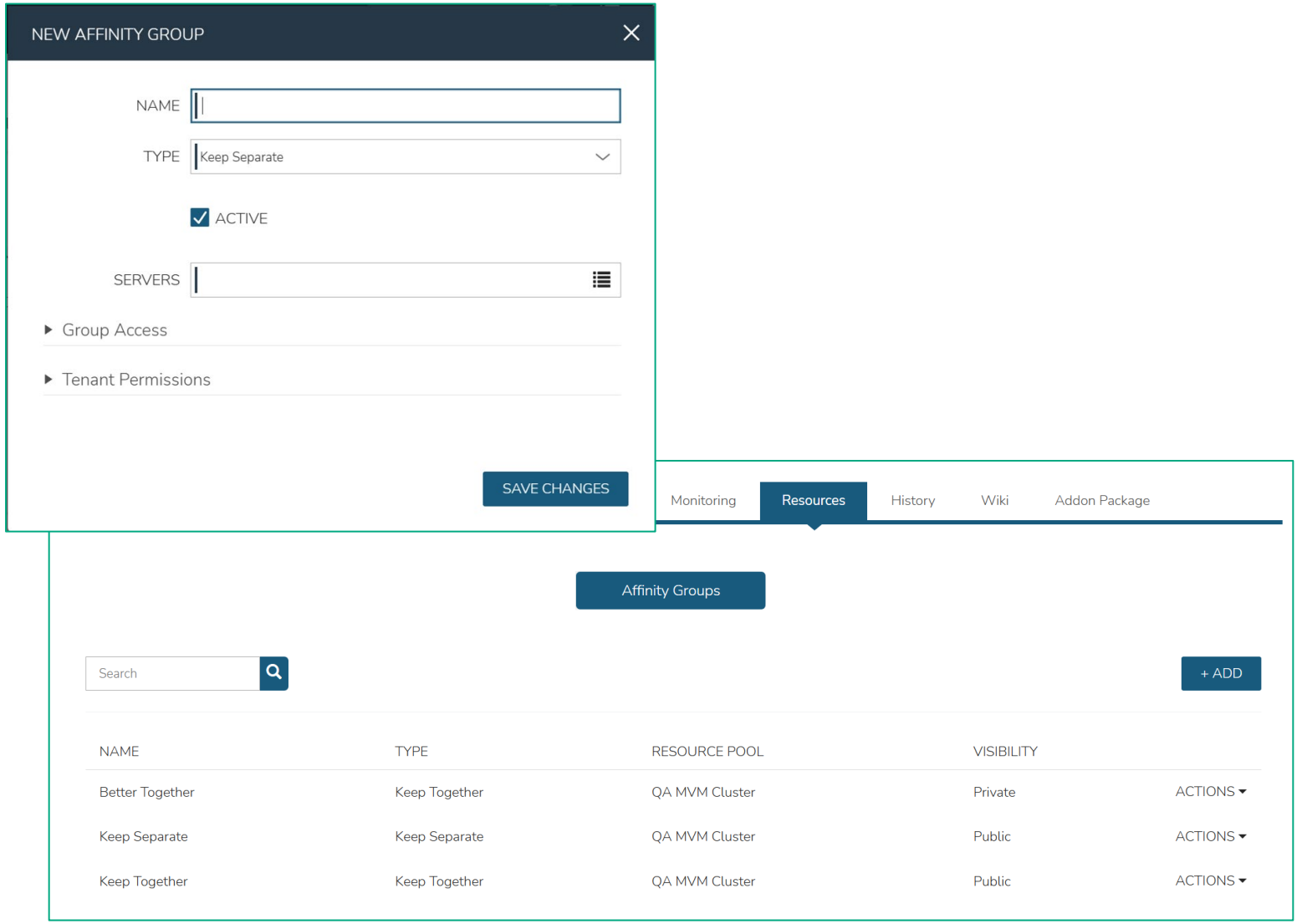
- When a VM is deployed, a host can be explicitly defined or left to VME manager to determine best placement
- Compute placement can be modified through the `Manage Placement` action
- The host the VM is running on can be changed by selecting a new host in the drop down
- Placement strategy defines how placement is handled:
  - `Auto` – VME will automatically migrate VM based on host workload or host failure
  - `Failover` – VM will remain on selected host until a host failure
  - `Pinned` – VM remains on selected host and will not migrate
- The datastore where the VM resides can be changed through the `Reconfigure` action and can be selected at the individual volume:
  - Changing this will migrate the data from one datastore to another
- Note that for proper failover handling and resiliency, the VMs should be on shared storage





Affinity / Anti-affinity

- HVM Clusters offer affinity groups and anti-affinity groups. These work similarly to affinity groups on other platforms, such as the affinity rules concept in VMware vSphere.
- An affinity group contains a type (either Keep Together or Keep Separate) and a list of servers which should have the rule applied.
- Whenever possible, servers configured to "Keep Together" will run on the same HVM Host. Servers (VMs) configured to "Keep Separate" will be balanced across HVM Hosts to the maximum extent possible.
- VM Affinity groups can also be created for VMware clouds



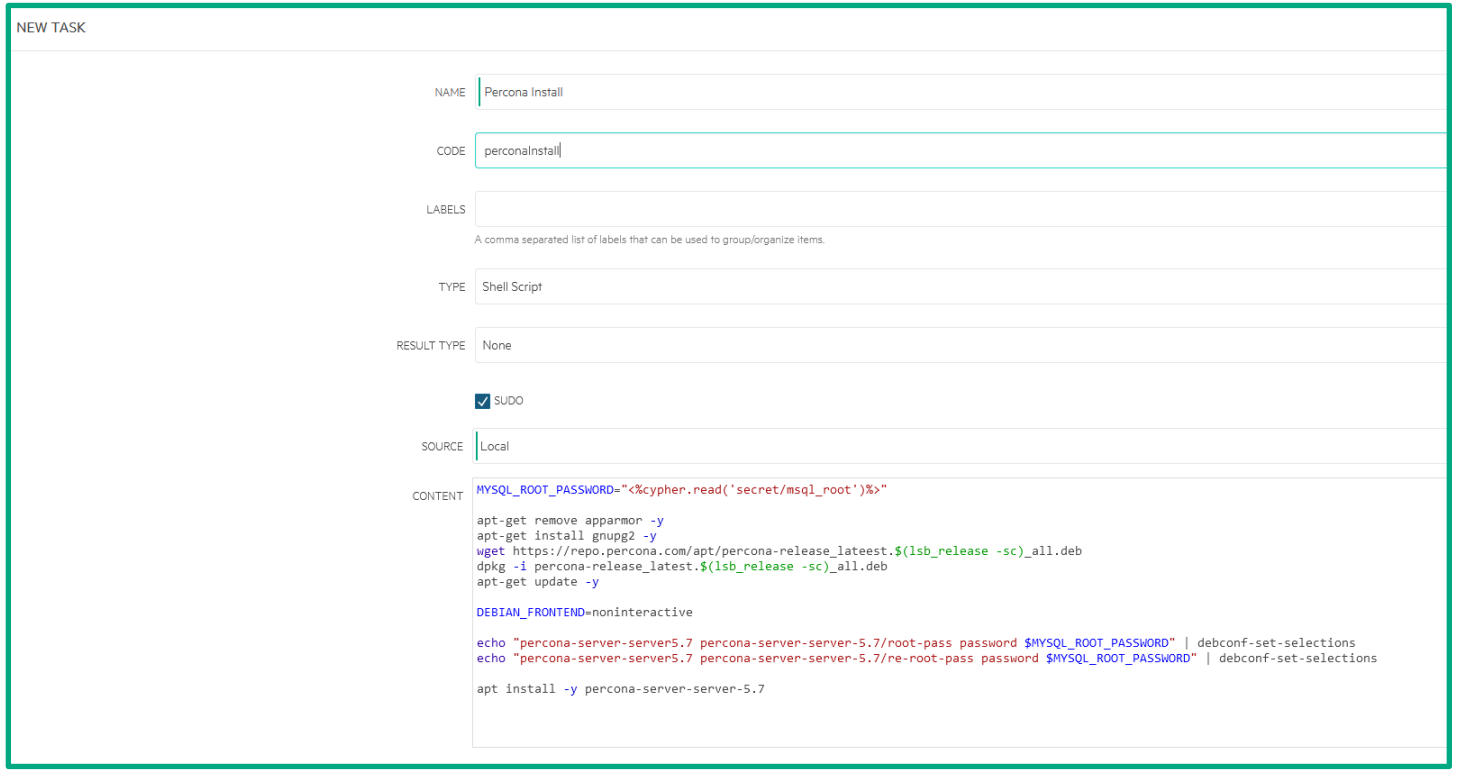
Automation

Automation - tasks

- Automation capabilities within HPE VM Essentials provide a set to tools enabling powerful capabilities at and post deployment
- HPE VM Essentials supports the following automation task types:
  - `Restart` – a dedicated task to restart the target before executing the next task
  - `Shell script` – Bash shell script for Linux based targets
  - `Powershell script` – Powershell script for Windows-based targets

- These scrips can be used to apply configurations and install software
- Variables can be passed from HPE VME manager to the scripts:
  - Many default variables are available
  - Custom variables can be specified on resources for use
  - Example variable call in a script calling the `vmetest` secret entry from the Cypher store:

    `- <%=cypher.read('secret/vmetest')%>`

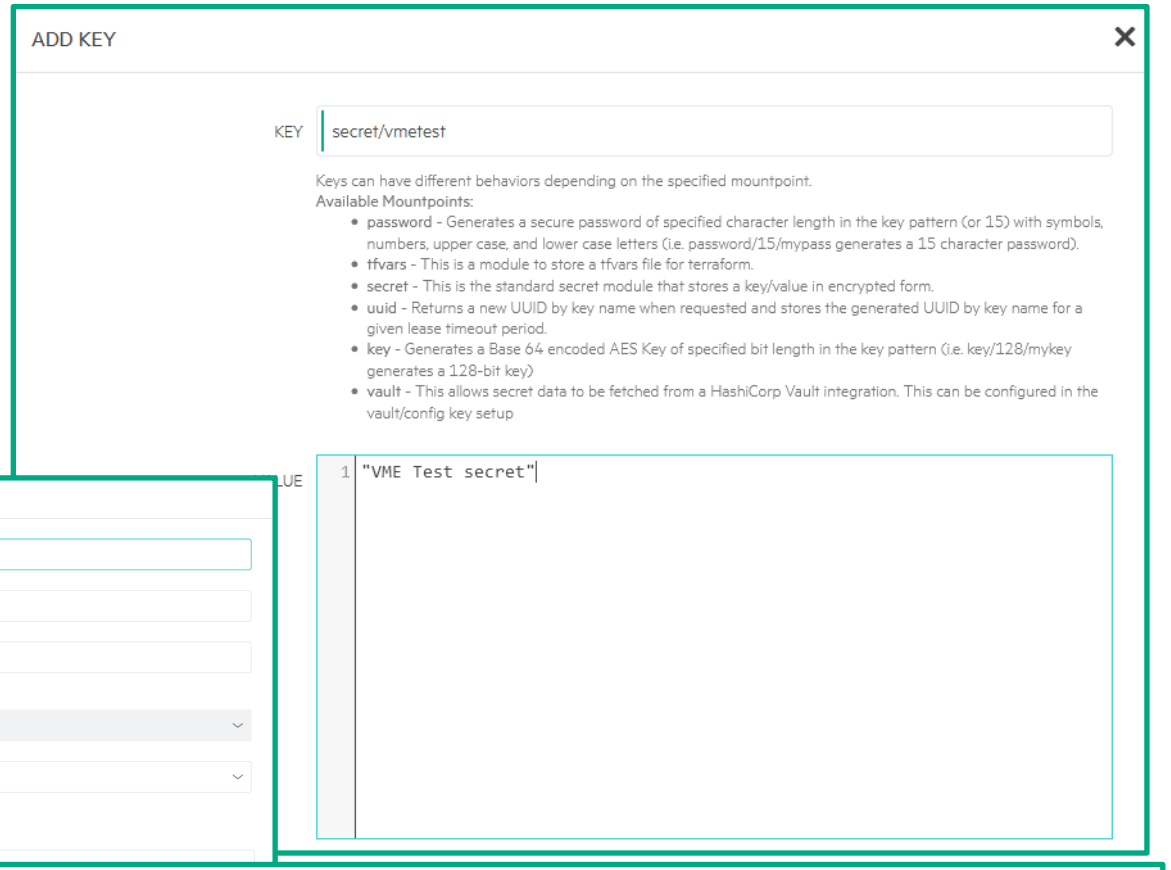


Automation - Cypher

Example of using a variable to return an entry from the Cypher store:

1. Add key to Cypher store
2. Create task calling the variable
3. Execute task against a VM

1.



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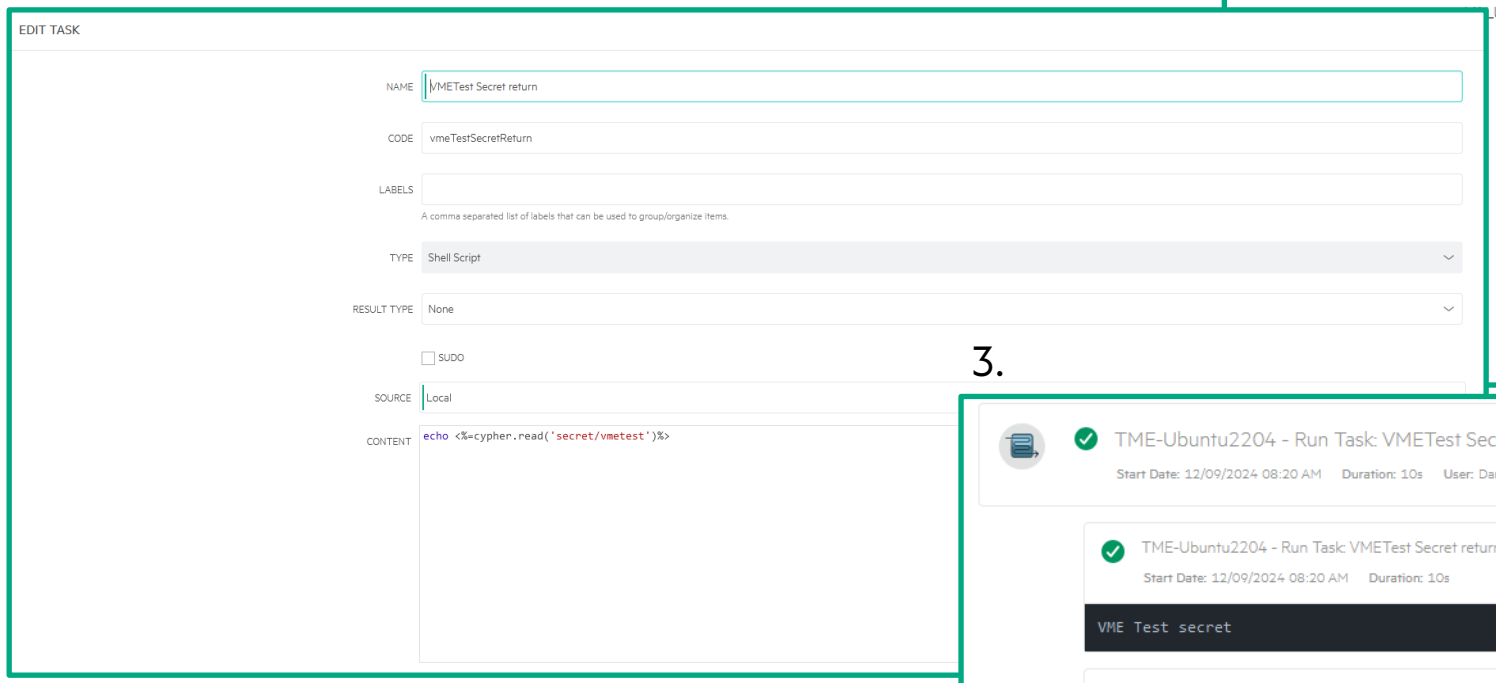

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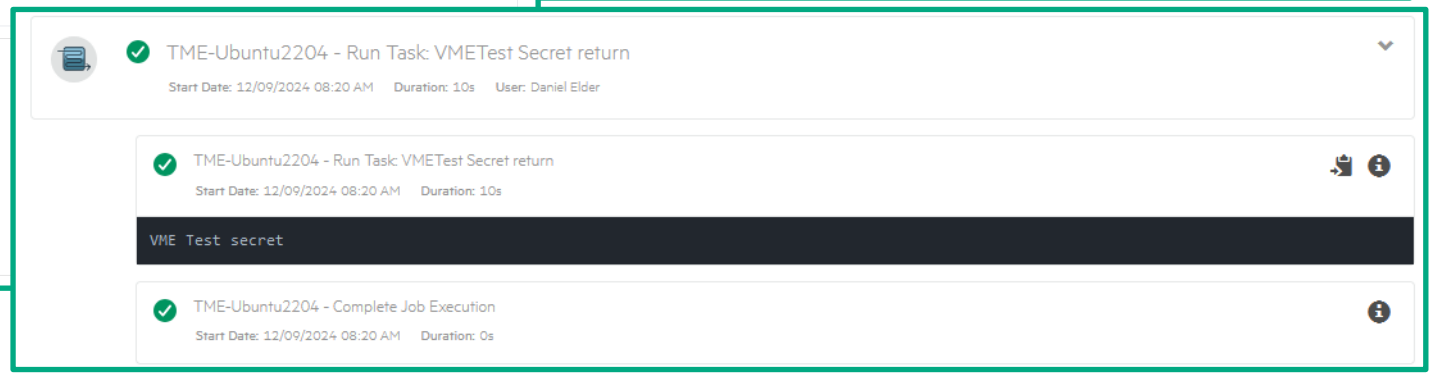
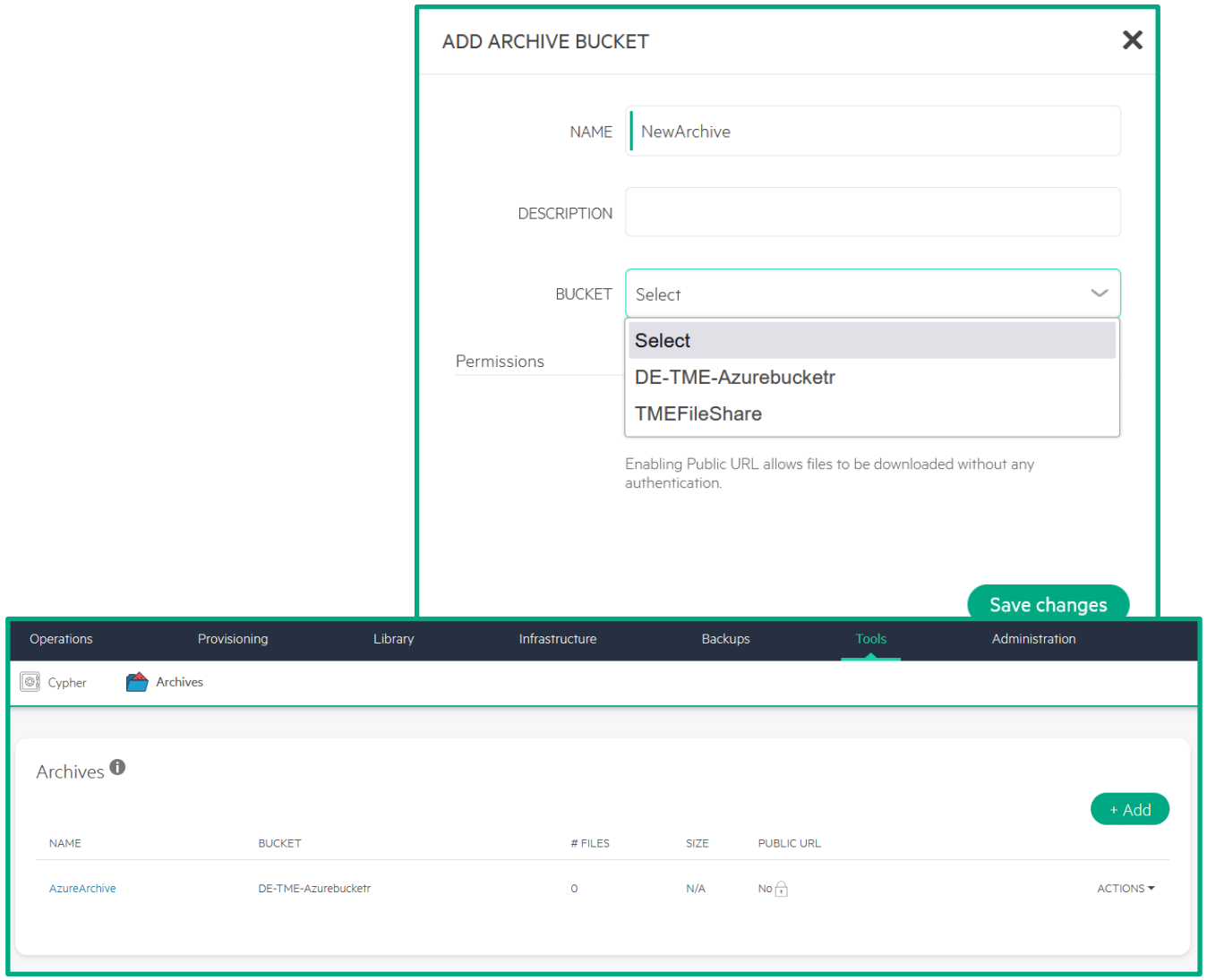


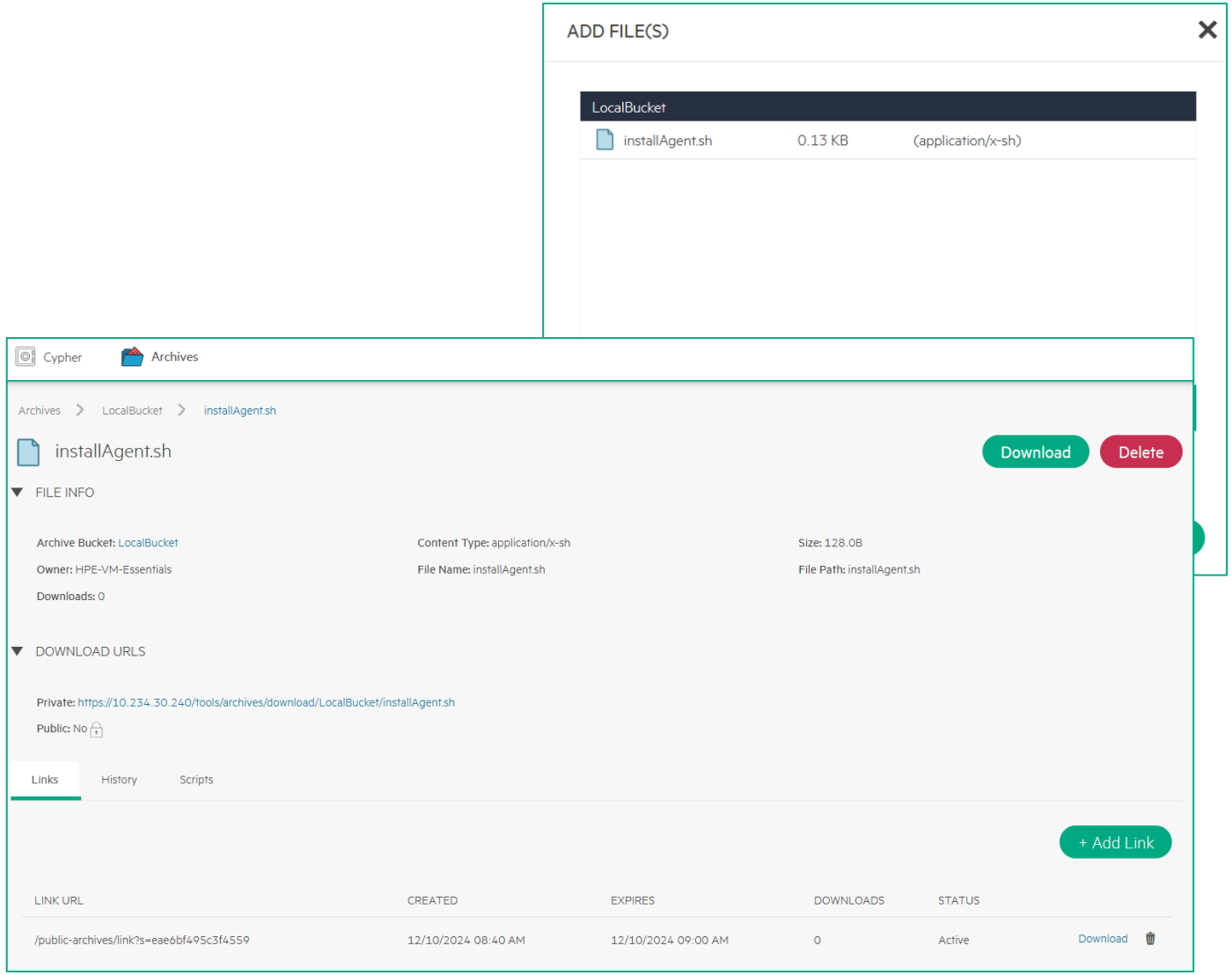
Automation - Archives

- `Archives` provide a way to store your files and make them available for download by your scripts and users
- Archives are created on buckets or file shares
- Buckets and file shares are created in `Infrastructure -> Storage`
- Supported storage types:
  - Local storage on VME manager appliance
  - Network storage
  - Public clouds:
    - Alibaba
    - Azure
    - Google Cloud Storage
    - OpenStack Swift
    - RackSpace CDN
    - S3



Automation - Archives

- Default Archives setting is `private`
- Archives can be set to `public`
  - Downloads require no authentication
- Expiring public download links can be created
- This enables programmatically generating download links that can be leveraged manually or via automation tasks



Features Comparison

HPE VM Essentials solution features

Multi-hypervisor support

HPE VM Essentials enables simple provisioning and management of HPE VM Essentials and VMware virtual machines

Centralized identity & single sign-on (SSO)

Enables external user authentication using Active Directory (AD) or LDAP. Optional SSO with Okta, OneLogin, Azure AD, or other SAML-enabled providers

IPAM integration

Integrate with external IP address management providers (Infoblox, phpIPAM, BlueCat) to automate the reservation of an IP address for the VM during the provisioning process

DNS integration

Integrate with external DNS providers (Infoblox, Microsoft DNS, BlueCat) to automate the creation of DNS records for a VM during the provisioning process

Provisioning automation

Execute Bash or PowerShell scripts during VM provisioning, to automate system bootstrapping operations

Day 2 automation

HPE VM Essentials supports the execution of Bash and PowerShell scripts on provisioned and discovered VMs

Secrets management

Securely store and retrieve secrets from the native secrets manager for use with the solution's task automation feature

HTML 5 virtual machine console

Access the dashboard of HPE VM Essentials and VMware virtual machines via the HTML 5 console

HPE VM Essentials hypervisor features

HPE-validated hardware

The HPE VM Essentials hypervisor will be validated on HPE servers to deliver an optimal experience and provide hardware compatibility assurance

VM live migration

Migrate a running HPE VM Essentials virtual machine from one host to another within the same cluster with zero downtime

VM high availability

Automatically restart HPE VM Essentials virtual machines on another host in the same cluster in the event of an unexpected host failure within the cluster

Dynamic workload scheduler

Dynamically schedule the placement of HPE VM Essentials virtual machines within a cluster, based upon optimal workload distribution across the cluster

Storage migration

Migrate the virtual disks of a running HPE VM Essentials virtual machine from one storage datastore to another with zero downtime

VMware VM migration

Convert existing VMware virtual machines to the HPE VM Essentials hypervisor using the Bulk Migration Tool

HPE VM Essentials hypervisor features

Virtual machine snapshots

Create and revert snapshots for HPE VM Essentials virtual machines

Native data protection

Backup and restore HPE VM Essentials virtual machines using the solution's native data protection feature

External storage support

The HPE VM Essentials hypervisor supports running virtual machines on external storage via iSCSI, NFS, and Fibre Channel

HPE Alletra Storage MP integration

HPE VM Essentials includes an integration with the HPE Alletra Storage MP B10000 storage array, that enables HPE VM Essentials virtual machines to natively reference the Alletra MP storage for their storage (1:1 VM-to-disk mapping)

HPE Alletra Storage MP array-based snapshots

The Alletra MP storage integration provides the ability to create and revert array-based snapshots for HPE VM Essentials virtual machines through the HPE VM Essentials UI

Value proposition

- **Competitively priced VMware alternative**
  - Priced per socket on VME hosts for significant savings in most configurations, compared to per-core licensing found in VMware, eliminating un-needed software which is forced into VMware suites like VVF and VCF
- **Unified management experience**
  - Connect existing brownfield VMware vCenter clusters for management and VM-vending into ESXi and HPE VME from one simple interface
- **Vertically integrated hardware and software solution**
  - Integrated into the HPE hardware portfolio to leverage software and hardware synergy to deliver differentiating technical capabilities
- **Scalable path to HPE Morpheus Enterprise Software**
  - Upgradable to full HPE Morpheus Enterprise Software to add support for other hypervisors, public clouds, and Kubernetes; governance policy enforcement, and cloud cost management and optimization capabilities (FinOps)

Virtualization Solution and Hypervisor Comparison

Category	Feature	HPE Morpheus VM Essentials	VMware vSphere Standard	VMware vSphere Ent. Plus	Nutanix Cloud Infrastructure	Microsoft Hyper-V	Red Hat OpenShift Virtualization	Proxmox Virtual Environment
Pricing structure	Pricing unit of measure	**Socket**	Core	Core	n/a	Core	Core-pair / socket-pair	Socket
Infrastructure Management	Centralized repo for VM templates and files	**Yes**	Yes	Yes	Yes	Yes	Yes	Yes
	Identity and Access Management Federation	**Yes**	Yes	Yes	Yes	Yes	Yes	Yes
Security	Secure Communication Protocols (TLS 1.2/1.3)	**Yes**	Yes	Yes	Yes	Yes	Yes	Yes
	Virtual Machine Encryption	No	No	Yes	Yes	Yes	Yes	No
	Virtual Trusted Platform Module (vTPM) 2.0	**Yes**	Yes	Yes	Yes	Yes	Yes	Yes
Migration and Replication	Live migration of VMs (like host to like host)	**Yes**	Yes	Yes	Yes	Yes	Yes	Yes
	Live migration of VM storage	**Yes**	Yes	Yes	Yes	Yes	Yes	Yes
	Built-in migration from VMware	**Yes**	No	No	Yes	Yes	No	Yes

Virtualization Solution and Hypervisor Comparison

Category	Feature	HPE Morpheus VM Essentials	VMware vSphere Standard	VMware vSphere Ent. Plus	Nutanix Cloud Infrastructure	Microsoft Hyper-V	Red Hat OpenShift Virtualization	Proxmox Virtual Environment
Networking	External IPAM and DNS integration	**Yes**	No	No	No	No	No	No
	Distributed Switch	**Yes**	No	Yes	Yes	Yes	Yes	Yes
	Micro segmentation (eg. VMW NSX)	**Yes (CX10K)**	No	No	Yes	Add-on	Add-on	No
Data Protection and DR	Stretch metropolitan cluster	Roadmap	No	Yes	Yes	No	Add-on	No
	Native VM snapshots	**Yes**	Yes	Yes	Yes	Yes	Yes	Yes
	Native VM backup and recovery	**Yes**	No	No	Yes	No	Add-on	Yes
	High Availability for automatic failover of VMs	**Yes**	Yes	Yes	Yes	Yes	Yes	Yes
	HA and Data protection for management server	**Yes**	Yes	Yes	Yes	Yes	Yes	Yes
Workload Management	Distributed Resource Scheduler (DRS)	**Yes**	No	Yes	Yes	No	Yes	Yes
	Affinity / Anti-Affinity Groups	**Yes**	Yes	Yes	Yes	Yes	Yes	Yes
	Storage DRS	No	No	Yes	Yes	No	Yes	No

Resources

- HPE VM Essentials Software documentation
- HPE VM Essentials Release Notes
- Download HPE VM Essentials (includes 60 day, 6 CPU Trial)
- HPE VM Essentials Landing Page
- HPE VM Essentials All Documents
- HPE VM Essentials product demo
- HPE VM Essentials Videos & Webinars

Thank You