

# Reference Architecture

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vRealize Operations Manager 7.5

You can find the most up-to-date technical documentation on the VMware website at:

<https://docs.vmware.com/>

**VMware, Inc.**  
3401 Hillview Ave.  
Palo Alto, CA 94304  
[www.vmware.com](http://www.vmware.com)

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# Reference Architecture Overview

# 1

The *vRealize Operations Manager Reference Architecture Guide* provides recommendations for deployment topology, hardware requirements, and interoperability, and scalability for VMware vRealize Operations Manager.

For information about software requirements, installation, and supported platforms see [VMware vRealize Operations Manager Documentation](#).

# Best Practices for Deploying vRealize Operations Manager

# 2

Implement all best practices when you deploy a production instance of vRealize Operations Manager.

## Analytics Nodes

Analytics nodes consist of a primary node, primary replica node, and data nodes.

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**Note** The master node is now referred to as the primary node. The master replica node is now referred to as the primary replica node.

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- Deploy analytics nodes in the same vSphere Cluster.
- Deploy analytics nodes on storage of the same type.
- Depending on the size and performance requirements for analytics nodes, apply Storage DRS Anti-Affinity rules to ensure that nodes are on separate datastores.
- Set Storage DRS to manual for all vRealize Operations Manager analytics nodes.
- If you deploy analytics nodes into a highly consolidated vSphere cluster, configure resource reservation to ensure optimal performance. Ensure that the virtual CPU to physical CPU ratio is not negatively impacting the performance of analytic nodes by validating CPU ready time and CPU co-stop.
- Analytics nodes have a high number of vCPUs to ensure performance of the analytics computation that occurs on each node. Monitor CPU Ready time and CPU Co-Stop to ensure that analytics nodes are not competing for CPU capacity.

If the sizing guideline provides several configurations for the same number of objects, use the configuration which has the least number of nodes. For example, if the number of objects is 120,000, configure the node size as 4 extra large nodes instead of 12 large nodes.

## Management Packs and Adapters

Various management packs and adapters have specific configuration requirements. Ensure that you are familiar with all prerequisites before you install a solution and configure the adapter instance.

## Deployment Formats

- Deploy vRealize Operations Manager with VMware virtual appliance.

# Initial Considerations for Deploying vRealize Operations Manager

## 3

For the production instance of vRealize Operations Manager to function optimally, your environment must conform to certain configurations. Review and familiarize yourself with these configurations before you deploy a production instance of vRealize Operations Manager.

### Sizing

vRealize Operations Manager supports up to 240,000 monitored resources spread across six extra large analytic nodes.

Size your vRealize Operations Manager instance to ensure performance and support. For more information about sizing, see the following KB article [2093783](#).

### Environment

Deploy analytic nodes in the same vSphere cluster and use identical or similar hosts and storage. If you cannot deploy analytic nodes in the same vSphere cluster, you must deploy them in the same geographical location. vRealize Operations Manager does not support deploying analytics nodes in multiple geographical locations.

Analytics nodes must be able to communicate with one another always. The following vSphere events might disrupt connectivity.

- vMotion
- Storage vMotion
- High Availability (HA)
- Distributed Resource Scheduler (DRS)

Due to a high level of traffic between analytics nodes, all analytics nodes should be located on the same VLAN and IP subnet, and that VLAN is not stretched between data centers. Latency between analytics nodes cannot exceed 5 milliseconds, and the bandwidth must be equal to or higher than 1 GB per second. It is recommended that bandwidth be 10 GB per second at minimum.

If you deploy analytics nodes in to a highly consolidated vSphere cluster, configure resource reservations. A full analytics node, for example a large analytics node that monitors 10,000 resources, requires one virtual CPU to physical CPU. If you experience performance issues,

review the CPU ready and co-stop to determine if the virtual to physical CPU ratio is the cause of the issues. For more information about how to troubleshoot VM performance and interpret CPU performance metrics, see [Troubleshooting a virtual machine that has stopped responding: VMM and Guest CPU usage comparison \(1017926\)](#).

You can deploy remote collectors behind a firewall. You cannot use NAT between remote collectors and analytics nodes.

## Multiple Data Centers

If vRealize Operations Manager is monitoring resources in additional data centers, you must use remote collectors and deploy the remote collectors in the remote data centers. You might need to modify the intervals at which the configured adapters on the remote collector collect information depending on latency.

It is recommended that latency between sites is less than 200ms.

## Certificates

A valid certificate signed by a trusted Certificate Authority, private, or public, is an important component when you configure a production instance of vRealize Operations Manager. Configure a Certificate Authority signed certificate against the system before you configure End Point Operations Management agents.

You must include all analytics, remote collectors, and load balancer DNS names in the Subject Alternative Names field of the certificate.

You can configure End Point Operations Management agents to trust the root or intermediate certificate to avoid having to reconfigure all agents if the certificate on the analytics nodes and remote collectors are modified. For more information about root and intermediate certificates, see [Specify the End Point Operations Management Agent Setup Properties](#).

## Adapters

It is recommended that you configure adapters to remote collectors in the same data center as the analytics cluster for large and extra large deployment profiles. Configuring adapters to remote collectors improves performance by reducing load on the analytics node. As an example, you might decide to configure an adapter to remote collectors if the total resources on a given analytics node begins to degrade the node's performance. You might configure the adapter to a large remote collector with the appropriate capacity.

Configure adapters to remote collectors when the number of resources the adapters are monitoring exceeds the capacity of the associated analytics node.

## Authentication

You can use the Platform Services Controller for user authentication in vRealize Operations Manager. For more information about deploying a highly available Platform Services Controller instance, see [VMware vCenter Server 6.0 Deployment Guide](#).

## Load Balancer

For more information about load balancer configuration, see the *vRealize Operations Manager Load Balancing Guide*.

# Scalability Considerations

# 4

Configure your initial deployment of vRealize Operations Manager based on anticipated usage.

## Analytics Nodes

Analytics nodes consist of a primary node, primary replica node, and data nodes.

For enterprise deployments of vRealize Operations Manager, deploy all nodes as large or extra large deployments, depending on sizing requirements and your available resources.

## Scaling Vertically by Adding Resources

If you deploy analytics nodes in a configuration other than large, you can reconfigure the vCPU and memory. It is recommended to scale up the analytics nodes in the cluster before scaling out the cluster with additional nodes. vRealize Operations Manager supports various node sizes.

**Table 4-1. Analytics Nodes Deployment Sizes**

Node Size	vCPU	Memory
Extra small	2	8 GB
Small	4	16 GB
Medium	8	32 GB
Large	16	48 GB
Extra large	24	128 GB

## Scaling Vertically -by Increasing Storage

You can increase storage independently of vCPU and Memory.

To maintain a supported configuration, data nodes deployed in the cluster must be the same node size.

For more information about increasing storage, see the topic, *Add Data Disk Space to a vRealize Operations Manager vApp Node*. You cannot modify the disks of virtual machines that have a snapshot. You must remove all snapshots before you increase disk size.

## Scaling Horizontally (Adding nodes)

vRealize Operations Manager 6.7 supports up to 6 extra large analytic nodes in a cluster.

To maintain a supported configuration, analytics nodes deployed in the cluster must be the same node size.

## Remote Collectors

vRealize Operations Manager supports two sizes for remote collectors, standard and large. The maximum number of resources is based on the aggregate resources that are collected for all adapters on the remote collector. In large-scale vRealize Operations Manager monitored environment, you might experience a slow responding UI, and metrics are slow to be displayed. Determine the areas of the environment in which the latency is greater than 20 milliseconds and install a remote collector in those areas.

**Table 4-2. Supported Remote Collector Sizes**

<b>Collector Size</b>	<b>Resources</b>	<b>End Point Operations Management Agents</b>
Standard	6000	250
Large	32,000	2,000

For more information about sizing see the following KB article [2093783](#).

# High Availability Considerations

# 5

High availability creates a replica for the vRealize Operations Manager primary node and protects the analytics cluster against the loss of a node.

## Cluster Management

Clusters consist of a primary node, and primary replica node.

When you enable High Availability, information is stored in two different analytics nodes within the cluster which consist of a primary node, and primary replica node, or data nodes.

If either the primary node, and primary replica node is permanently lost, then you must disable and re-enable high availability to reassign the primary role or replica role. This process, which includes a hidden cluster rebalance, can take a long time.

## Analytics Nodes

Analytics nodes consist of a primary node, and primary replica node and data nodes.

Enabling High Availability within vRealize Operations Manager is not a disaster recovery solution. Enabling High Availability duplicates data in the system, and doubles the system's compute and capacity requirements. When you enable high availability, you protect vRealize Operations Manager from data loss in the event that a single node is lost. If two or more nodes are lost, there may be permanent data loss.

Deploy all analytics nodes to separate hosts to reduce the chance of data loss in the event that a host fails. You can use DRS anti-affinity rules to ensure that VMs remain on separate hosts.

## Remote Collectors

In vRealize Operations Manager 6.1 and later, you can create a collector group. A collector group is a collection of nodes (analytic nodes and remote collectors). You can assign adapters to a collector group, rather than assigning an adapter to a single node.

If the node running the adapter fails, the adapter is automatically moved to another node in the collector group.

Assign all normal adapters to collector groups, and not to individual nodes. Do not deploy hybrid adapters in collector groups. For more information about adapters, see the documentation for the specific adapters.

# Adapter and Management Packs Considerations

# 6

Adapters and management packs have specific configuration considerations.

## Normal Adapters

Normal adapters require one-way communication to the monitored endpoint. Deploy normal adapters into collector groups, which are sized to handle failover.

Following is a sample list of adapters provided by VMware for vRealize Operations Manager. Additional adapters can be found on the VMware Solutions Exchange website.

- VMware vSphere
- Management Pack for NSX for vSphere
- Management Pack for OpenStack
- Management Pack for Storage Devices
- Management Pack for Log Insight

## Hybrid Adapters

Hybrid adapters require two-way communication between the adapter and the monitored endpoint.

You must deploy hybrid adapters to a dedicated remote collector. Configure only one hybrid adapter type for each remote collector. You cannot configure hybrid adapters as part of a collector group. For example, two vRealize Operations for Published Applications adapters can exist on the same node, and two vRealize Operations for Horizon adapters can exist on the same node, but a vRealize Operations for Published Applications adapter and a vRealize Operations for Horizon adapter cannot exist on the same node.

Several hybrid adapters are available for vRealize Operations Manager.

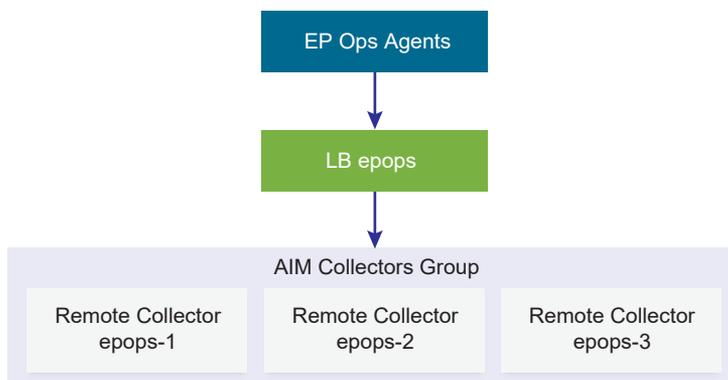
- vRealize Operations for Horizon adapter
- vRealize Operations for Published Applications adapter
- Management Pack for vRealize Hyperic

## End Point Operations Management Adapter

By default, End Point Operations Management adapters are installed on all data nodes. Large and extra large analytic nodes can support 2,500 end point agents and large remote collectors can support 2,000 per node. To reduce ingestion load on the cluster, you can point End Point Operations Management adapters at remote collectors. Assign the dedicated remote collectors to their own collector group, which helps the End Point Operations Management adapter maintain the state of End Point Operations Management resources if a node in the collector group fails.

To reduce the cost of reconfiguring the system, it is recommended that you install End Point Operations Management agents against a DNS entry specific to End Point Operations Management agents if you plan to scale the system beyond a single node.

## Remote Collectors Behind a Load Balancer for End Point Operations Management Agents



# Hardware Requirements for Analytic Nodes and Remote Collectors

# 7

Analytics nodes and remote collectors have various hardware requirements for virtual machines and physical machines.

The following table specifies the components to install on each server profile in your deployment, and the required hardware specifications.

**Table 7-1. Hardware Requirements for System Components**

<b>Server Roles</b>	<b>Virtual CPU</b>	<b>Memory</b>	<b>CPU Requirements</b>	<b>Storage Requirements</b>
Medium analytic node	8 vCPU	32 GB	2.0 Ghz minimum, 2.4 Ghz recommended	1875 IOPS
Large analytic node	16 vCPU	48 GB	2.0 Ghz minimum, 2.4 Ghz recommended	3750 IOPS
Standard remote collector	2 vCPU	4 GB	2.0 Ghz minimum, 2.4 Ghz recommended	N/A
Large remote collector	4 vCPU	16 GB	2.0 Ghz minimum, 2.4 Ghz recommended	N/A

Storage requirements are based on the maximum supported resources for each node.

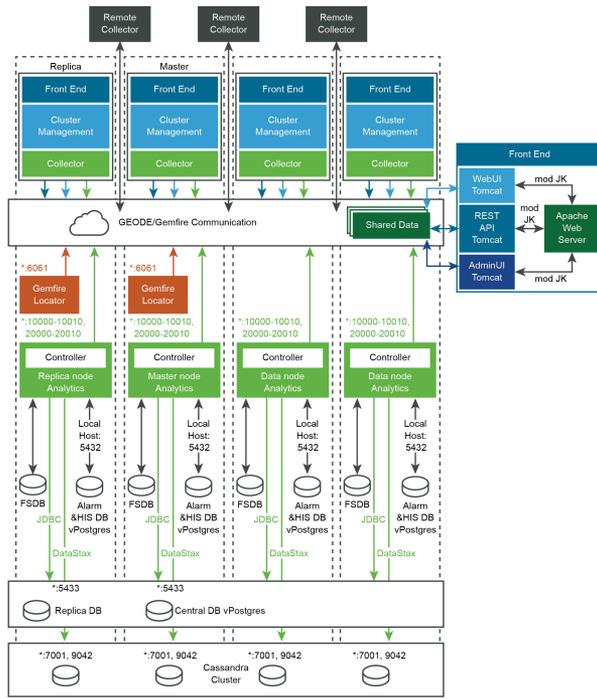
vRealize Operations Manager has a high CPU requirement. In general, the more physical CPU that you assign to the analytics cluster, the better the performance. You must use a minimum of eight physical CPU dual socket hosts.

# Port Requirements for vRealize Operations Manager



vRealize Operations Manager has certain port requirements for its components. All ports specified are default ports.

## Port Requirements for vRealize Operations Manager



## Ports Information for vRealize Operations Manager

Ports information for vRealize Operations Manager is available on [Ports and Protocol](#).

# Small Deployment Profile for vRealize Operations Manager

# 9

The small deployment profile is intended for systems that manage up to 20,000 resources.

## Virtual Appliance Name

The small deployment profile contains a single large analytics node, `analytic-1.ra.local`.

## Deployment Profile Support

The small deployment profile supports the following configuration.

- 20,000 resources
- 2,500 End Point Operations Management agents
- Data retention for six months
- Additional Time Series Retention for 36 months

## Additional DNS Entries

You can add additional DNS entries for your organization's future requirements. If you do not expect your planned deployment to exceed a single node, you can configure End Point Operations Management agents against the analytics nodes.

`epops.ra.local -> analytic-1.ra.local`

## Certificate

The certificate must be signed by a Certificate Authority. The Subject Alternative Name contains the following information.

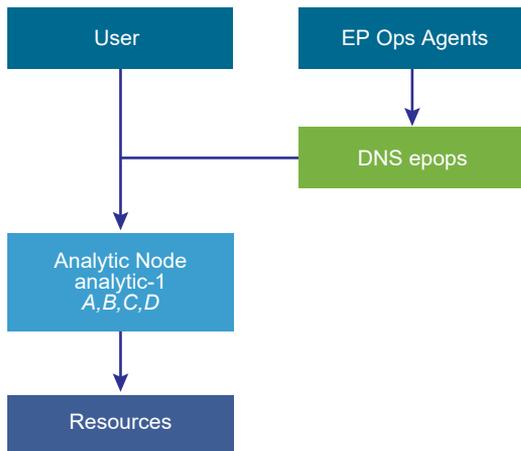
- DNS Name = `epops.refarch.local`
- DNS Name = `analytic-1.ra.local`

This is an example of a small deployment profile.

Table 9-1. Adapter Properties

Collector Group	Collector	Adaptor	Resources
DEFAULT	analytic-1	A	2,000
DEFAULT	analytic-1	B	4,000
DEFAULT	analytic-1	C	2,000
DEFAULT	analytic-1	D	3,000

## vRealize Operations Manager Small Deployment Profile Architecture



# Medium Deployment Profile for vRealize Operations Manager

# 10

The medium deployment profile is intended for systems that manage 68,000 resources, 34,000 of which are enabled for High Availability. In the medium deployment profile, adapters are deployed on the analytics nodes by default. If you experience problems with data ingestion, move these adapters to remote controllers.

## Virtual Appliance Names

The medium deployment profile contains eight medium analytics nodes.

- analytic-1.ra.lcoal
- analytic-2.ra.lcoal
- analytic-3.ra.lcoal
- analytic-4.ra.lcoal
- analytic-5.ra.lcoal
- analytic-6.ra.lcoal
- analytic-7.ra.lcoal
- analytic-8.ra.lcoal

## Deployment Profile Support

The medium deployment profile supports the following configuration.

- 68,000 total resources, 34,000 enabled for HA
- 9,600 End Point Operations Management agents
- Data retention for six months
- Additional Time Series Retention for 36 months

## Load Balanced Addresses

- analytics.ra.local

- `epops.ra.local`

## Certificate

The certificate must be signed by a Certificate Authority. The Subject Alternative Name contains the following information.

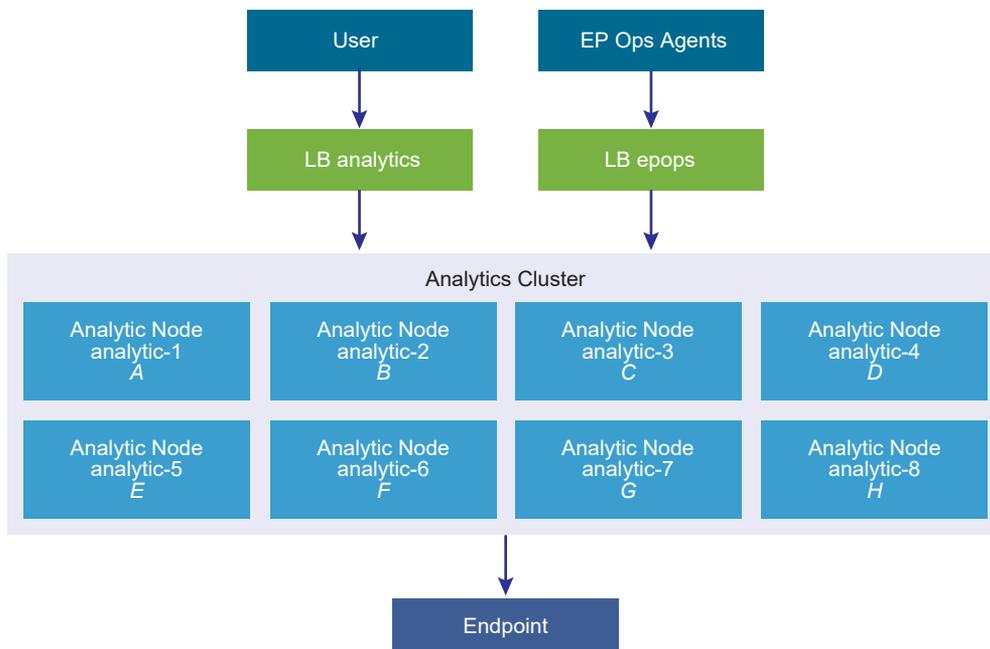
- DNS Name = `epops.refarch.local`
- DNS Name = `analytic-1.ra.local`

This is an example of a medium deployment profile.

**Table 10-1. Adapter Properties**

Collector Group	Collector	Adaptor	Resources
DEFAULT	analytic-1	A	2,000
DEFAULT	analytic-2	B	4,000
DEFAULT	analytic-3	C	2,000
DEFAULT	analytic-4	D	3,000
DEFAULT	analytic-5	E	1,000
DEFAULT	analytic-6	F	2,000
DEFAULT	analytic-7	G	1,500
DEFAULT	analytic-8	H	4,500

## vRealize Operations Manager Medium Deployment Profile Architecture



# Large Deployment Profile for vRealize Operations Manager

# 11

The large deployment profile is intended for systems that manage 128,000 resources, 64,000 of which are enabled with High Availability. All adapters are deployed to remote controllers in large deployment profiles to offload CPU usage from the analytics cluster.

## Virtual Appliance Names

The large deployment profile contains eight large analytics nodes, large remote collectors for adapters, and large remote collectors for End Point Operations Management agents.

- analytic-1.ra.lcoal
- analytic-2.ra.lcoal
- analytic-3.ra.lcoal
- analytic-4.ra.lcoal
- analytic-5.ra.lcoal
- analytic-6.ra.lcoal
- analytic-7.ra.lcoal
- analytic-8.ra.lcoal

## Deployment Profile Support

The large deployment profile supports the following configuration.

- 128,000 total resources, 64,000 enabled for HA
- 20,000 End Point Operations Management agents
- Data retention for six months
- Additional Time Series Retention for 36 months

## Load Balanced Addresses

- analytics.ra.local

- `epops.ra.local`

## Certificate

The certificate must be signed by a Certificate Authority. The Subject Alternative Name contains the following information.

- DNS Name = *analytic.refarch.local*
- DNS Name = *epops.refarch.local*
- DNS Name = *analytic-1.ra.local* to DNS Name = *analytic-8.ra.local*
- DNS Name = *remote-1.ra.local* to DNS Name = *remote-N.ra.local*
- DNS Name = *epops-1.ra.local* to DNS Name = *epops-N.ra.local*

This is an example of a large deployment profile.

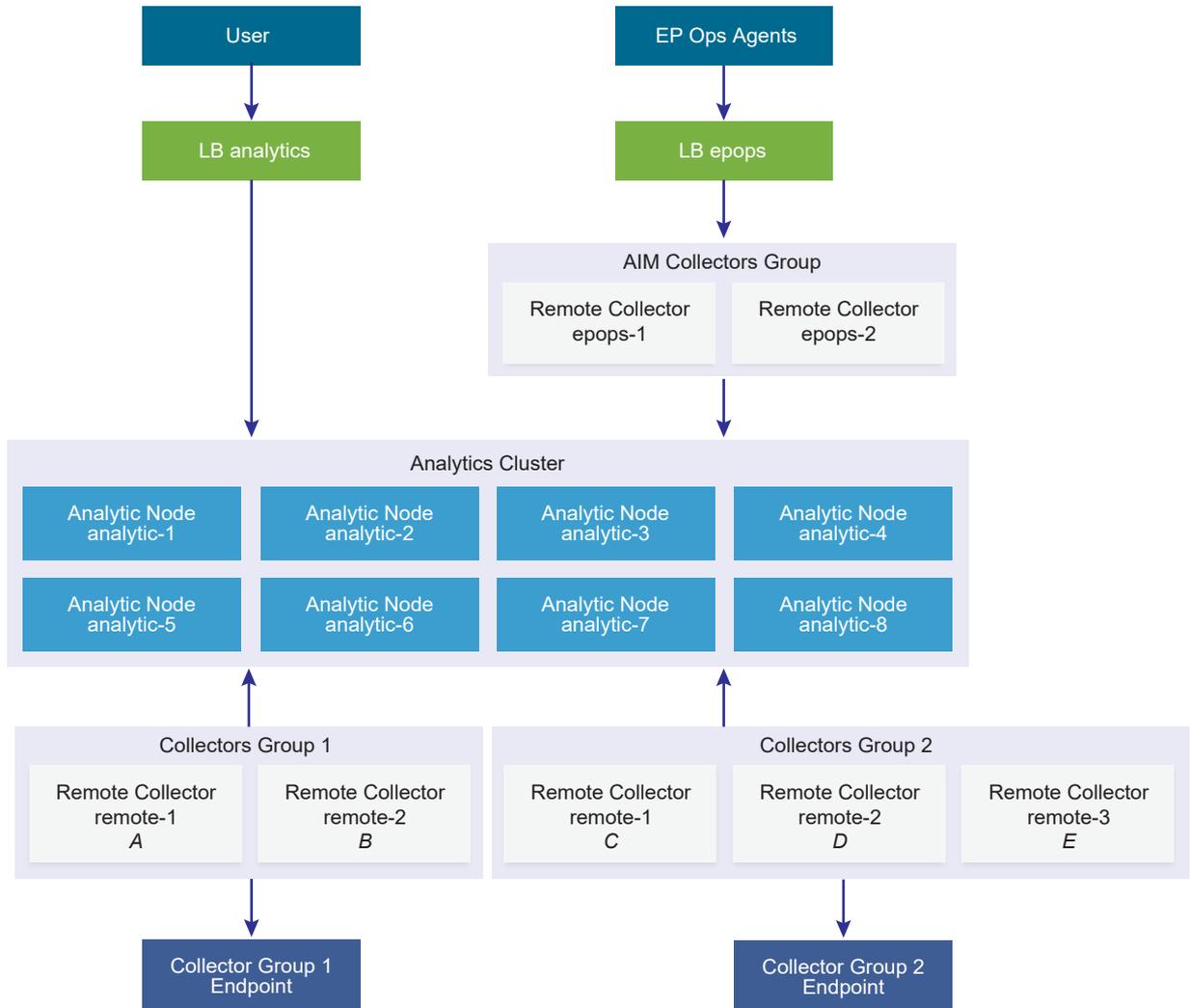
Table 11-1. Adapter Properties

Collector Group	Remote Collector	Adapter	Resources	End Point Operations Management Agents
1	remote-1	A	5,000	N/A
1	remote-2	B	5,000	N/A
		Total	10,000	N/A
2	remote-3	C	10,000	N/A
2	remote-4	D	5,000	N/A
2	remote-5	E	5,000	N/A
		Total	20,000	N/A
AIM	epops-1	epops	4,800	800
	epops-2	epops	4,800	800
		Total	9,600	1,600

If a remote collector is lost from these collector groups, you might have to manually rebalance the adapters to comply with the limit of 32,000 resource for each remote collector.

The estimate of 9,600 resources uses six resources for each End Point Operations Management agent.

# vRealize Operations Manager Large Deployment Profile Architecture



# Extra Large Deployment Profile for vRealize Operations Manager

# 12

The extra large deployment profile is intended for systems that manage 240,000 resources, 120,000 of which are enabled for High Availability. This deployment is divided into two data centers and is the maximum supported analytics cluster deployment.

## Virtual Appliance Names

The extra large deployment profile contains six extra large analytics nodes, X large remote collectors for adapters, and Y large remote collectors for End Point Operations Management agents.

- `analytic-1.ra.local`
- `analytic-2.ra.local`
- `analytic-3.ra.local`
- `analytic-4.ra.local`
- `analytic-5.ra.local`
- `analytic-6.ra.local`

## Deployment Profile Support

- 240,000 total resources, 120,000 enabled for HA
- 20,000 End Point Operations Management agents
- Data retention for six months
- Additional Time Series Retention for 36 months

## Load Balanced Addresses

- `analytics.ra.local`
- `epops-a.ra.local`
- `epops-b.ra.local`

## Certificate

The certificate must be signed by a Certificate Authority. The Subject Alternative Name contains the following information.

- DNS Name = *analytic.refarch.local*
- DNS Name = *epops-a.refarch.local*
- DNS Name = *epops-b.refarch.local*
- DNS Name = *analytic-1.ra.local* to *analytic-16.ra.local*
- DNS Name = *remote-1.ra.local* to *remote-N.ra.local*
- DNS Name = *epops-1.ra.local* to *epops-N.ra.local*

This is an example of an extra large deployment profile. The adapter in the example provides N-1 redundancy, meaning, if two adapters support 20,000 resources, then a third adapter is added to attain a supported configuration that allows for a single failure.

**Table 12-1. Adapter Properties**

Collector Group	Data Center	Remote Collector	Adapter	Resources	End Point Operations Management agents
1	A	remote-1	A	5,000	N/A
1	A	remote-2	B	5,000	N/A
			Total	10,000	
2	A	remote-3	C	2,000	N/A
2	A	remote-3	D	2,000	N/A
2	A	remote-3	E	1,000	N/A
2	A	remote-4	F	7,000	N/A
2	A	remote-5	G	8,000	N/A
2	A	remote-6	H	5,000	N/A
2	A	remote-7	I	6,000	N/A
			Total	31,000	
3	B	remote-8	J	10,000	N/A
3	B	remote-9	K	5,000	N/A
3	B	remote-10	L	5,000	N/A
			Total	20,000	
AIM-1	A	epops-1	epops	8,004	1,334
AIM-1	A	epops-2	epops	7,998	1,333
	A	epops-3	epops	7,998	1,333
			Total	24,000	4,000

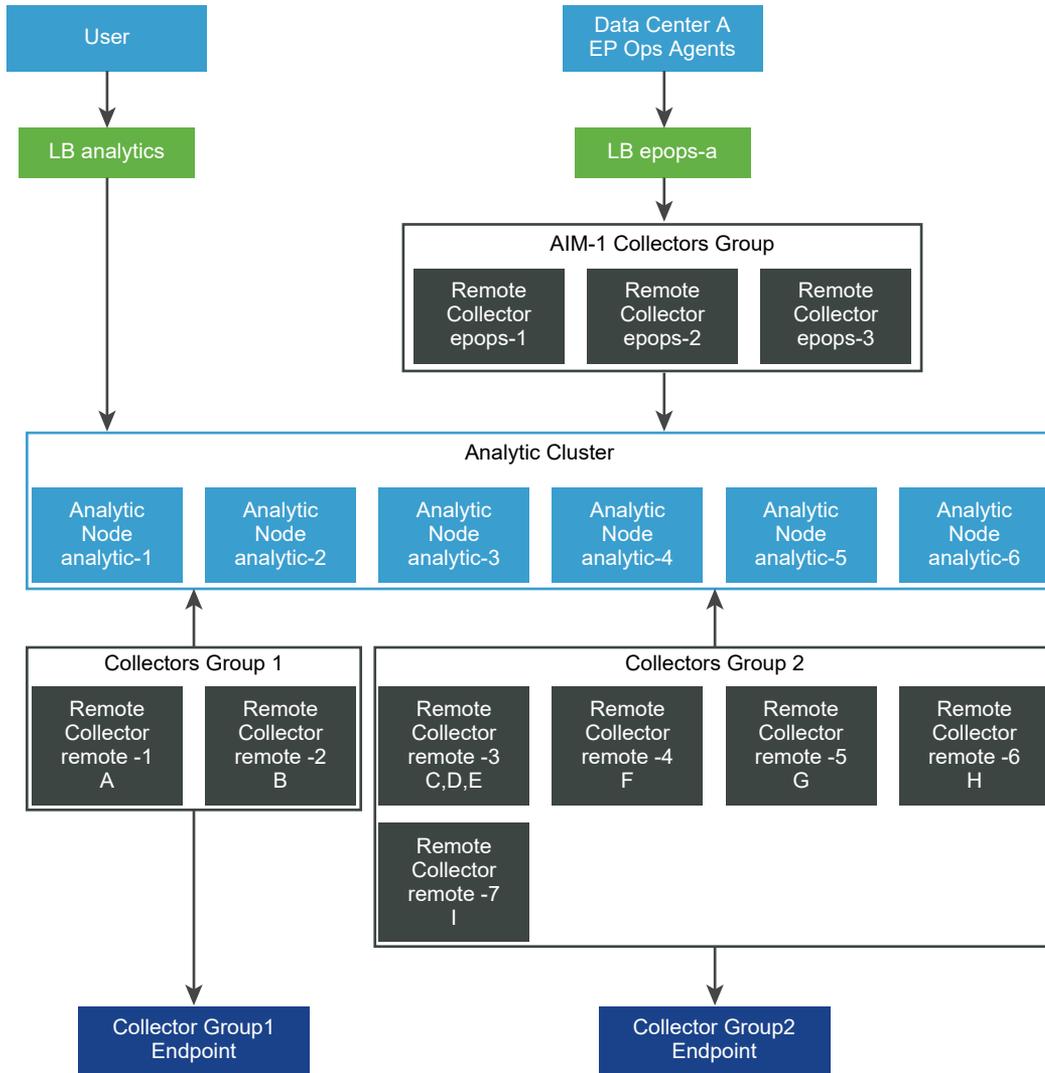
Table 12-1. Adapter Properties (continued)

<b>Collector Group</b>	<b>Data Center</b>	<b>Remote Collector</b>	<b>Adapter</b>	<b>Resources</b>	<b>End Point Operations Management agents</b>
AIM-2	B	epops-4	epops	8,004	1,334
AIM-2	B	epops-5	epops	7,998	1,333
AIM-2	B	epops-6	epops	7,998	1,333
			Total	24,000	4,000

If a remote collector is lost from these collector groups, you might have to manually rebalance the adapters to comply with the limit of 32,000 resource for each remote collector.

The estimate of 24,000 resources for AIM-1 and AIM-2 collector groups uses six resources for each End Point Operations Management agent.

# vRealize Operations Manager Extra Large Deployment Profile Architecture - Data Center A



# vRealize Operations Manager Extra Large Deployment Profile Architecture - Data Center B

