



Technical Report

OnCommand Unified Manager: Best Practices Guide

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Abstract

NetApp® OnCommand® Unified Manager is the most comprehensive product for managing and monitoring NetApp ONTAP® systems. The need to support various installation platforms, infrastructure scalability, and deployment scenarios creates such a complex list of requirements that one configuration might not fit all. This document outlines basic deployment and best practice guidelines for Unified Manager 7.2 and greater. The document is for users who are already familiar with the fundamentals of the ONTAP operating system and Unified Manager.

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1 Introduction

NetApp OnCommand Unified Manager (OCUM) is the most comprehensive product for managing and monitoring performance, capacity, and health in ONTAP® systems through features like events, alerts, performance troubleshooting, capacity reporting, and more. Starting with Unified Manager 7.2, Unified Manager and Performance Manager are available in a single download and a single server.

Because performance monitoring is now fully integrated into the Unified Manager product, OnCommand Performance Manager (OPM) is no longer available as a separate product. NetApp provides a migration tool to copy the historical performance data from OPM 7.1 to OCUM 7.2. For more information, read the technical report [Migrating Performance Data to NetApp OnCommand Unified Manager 7.2](#).

The purpose of this guide is to inform you about all the design questions you may need to consider in building an OnCommand Unified Manager 7.2 instance and greater versions. Especially if you have a large ONTAP footprint, proper planning of Unified Manager deployments is essential to help you to scale later.

2 Architecture

When using Unified Manager 7.2, and greater, health and performance data are collected into a single unified MySQL database, and health and performance events can be configured from the same interface. Also, you can add user-defined performance alerts from the Unified Manager Alert tab. And you need to maintain only one SSL certificate for connecting to ONTAP clusters.

On a high level, Unified Manager software consists of the following four main components:

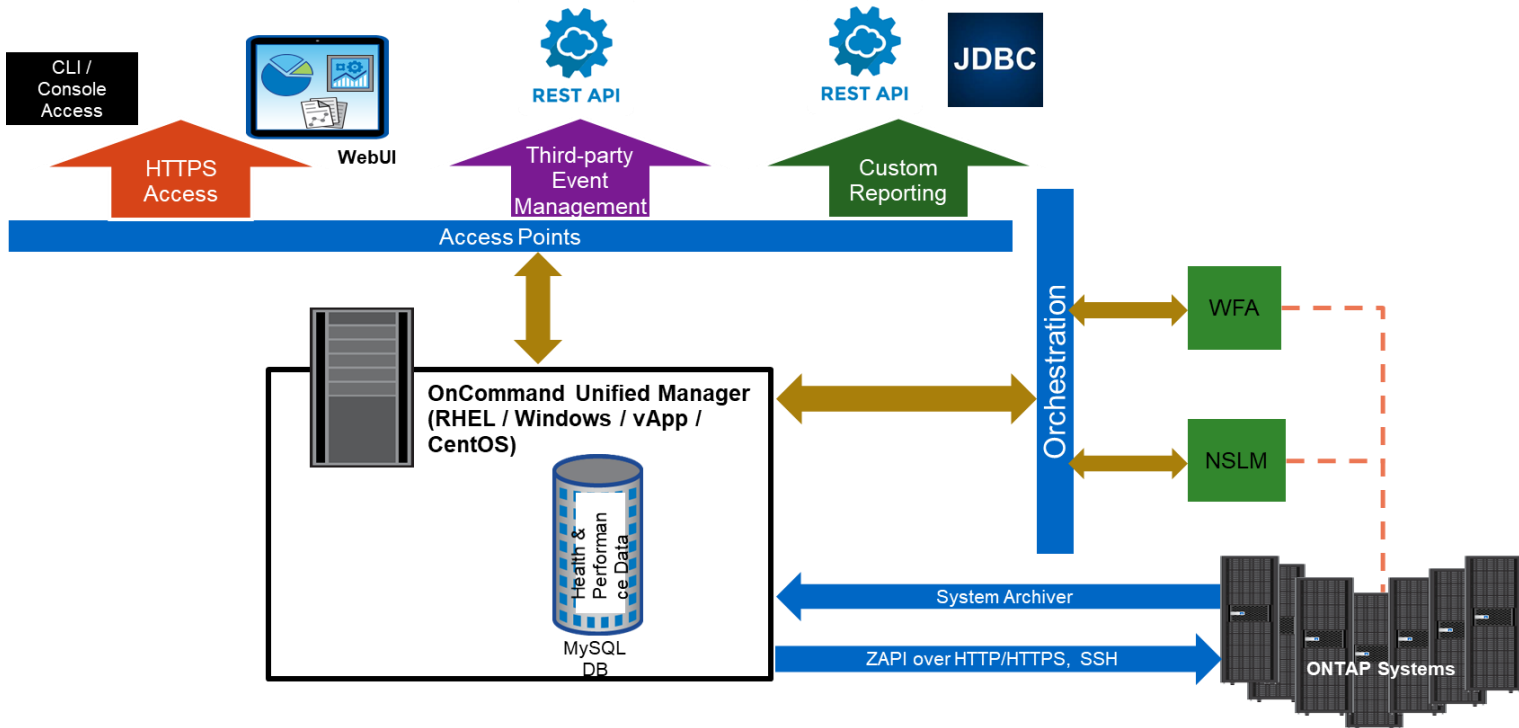
Acquisition unit. Collects and normalizes configuration, capacity, and performance statistics from ONTAP systems and sends each collected information set to the OCIE server.

OCIE server. Writes the collected ONTAP information into the database. Also provides public interfaces to retrieve the data via EJBs (Enterprise JavaBeans) and sends notifications to listening parties when collections have completed.

Unified Manager Health and Performance. These components heuristically monitor and analyze all the capacity, protection, and performance-based features of the monitored ONTAP systems and provide the customer with visible events, alerts, and reports.

Unified Manager UI. This component presents a friendly, easy-to-use interface for all the features of OCUM and the ONTAP systems.

Figure 1) OnCommand Unified Manager architecture



3 Sizing Guidelines

There is no one size that fits all in planning compute resources for Unified Manager because every environment is different. Various factors determine resource requirements for each Unified Manager instance. Customers use Unified Manager for various purposes; some use only the alerting and event functionality, and some use it for operational reporting. Some advanced customers use it for end-to-end monitoring and management of NetApp resources with various integrated solutions, such as Workflow Automation (WFA) and API Services.

3.1 Challenges to Providing Scaling Precision

Unified Manager is a monitoring solution. Many resource requirements depend on various factors, some of which are under the control of Unified Manager, and some of which are beyond Unified Manager's scope. This section describes the challenges to providing scale precision.

Note: The items in red are beyond the control of Unified Manager for discovery.

- Number of clusters per OCUM instance
- Number of nodes per cluster
- Number of each type of storage object (physical or logical) in a cluster
- Number of concurrent OCUM users
- Web pages that each OCUM user requests
- External load (e.g., WFA)
- Reports that are generated, on demand or scheduled
- ONTAP version for objects managed and collection method
- Time between performance collection periods (5 min to 15 min)
- Network issues or latency
- Frequency of object configuration changes on the cluster.

In addition, load on the cluster also increases ZAPI response time. This is ONTAP related, so it cannot be discovered by Unified Manager.

3.1.1 vApp Configuration and Run Time

Note: The items in red are beyond the control of Unified Manager for discovery

- Amount of actual RAM memory that VMware provides
- Amount of actual CPU cycles that VMware provides
- Competition from other workloads in VMware
- Underlying storage technology in VMware
- Host OS performance
- Any hardware failures
- Underlying JVM used by OCUM
- Class libraries and memory efficiency
- Garbage collector behavior with collection times from 20 second to 10 minutes

These factors explain why precision in Unified Manager scale is challenging; there are so many attributes that are beyond the scope of the Unified Manager instance. The following general sizing rules may help you with your decisions.

3.1.2 Sizing Rules

The built-in Scale Monitor feature indicates when to either increase resources or stop adding clusters to your Unified Manager instance. The general rule for sizing is to add additional resources (disk, memory, and/or CPU) to your required or planned capacity. The following pointers might help you with your decision:

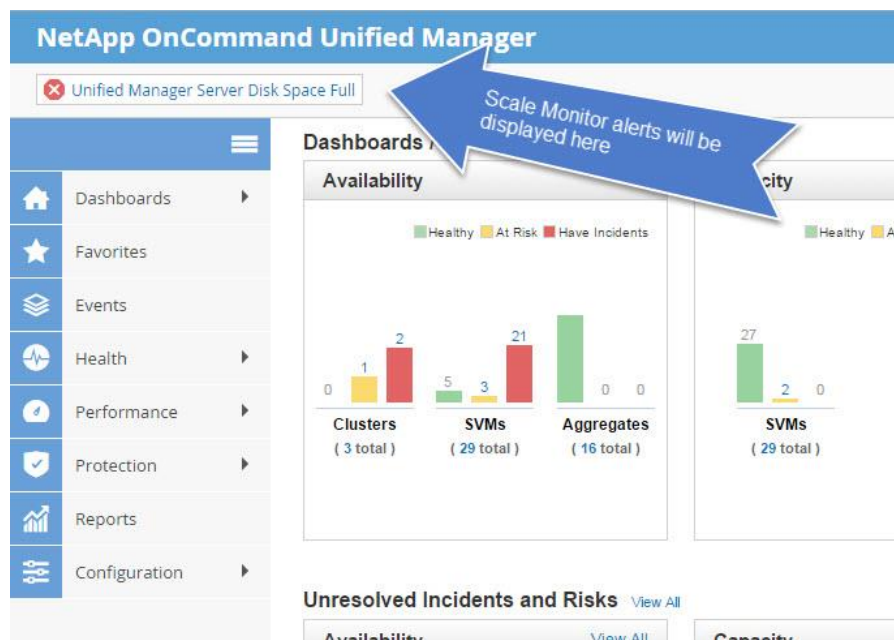
- Always add some additional resources to your planned capacity to allow for growth. This buffer depends on how quickly your environment will grow. Plan to provision least 10% to 20% above your requirements.
- It's always good to oversize, because:
 - Users often don't know their peak loads in advance.
 - Even if you are confident of your Unified Manager capacity, your environment may grow and need more resources.
- Never undersize your disk and memory requirements, always oversize.

Additional resources requirement is addressed with Scale Monitor alerts, as described in the next section.

3.2 Scale Monitor

Starting with Unified Manager 7.2, NetApp introduced a built-in Scale Monitor feature that tracks disk and memory usage and advises in scenarios where increasing these system resources enables scaling your Unified Manager instance. Scale Monitor offers predefined alerts for monitoring disk and memory, which aids in vertical scaling. The alerts are displayed separately in the top left corner of the screen. Warning events also display a possible remediation step.

Figure 2) Scale Monitor Alerts



The following categories of alerts notify you about issues with Unified Manager scaling:

- Disk space nearly full (/opt/netapp/data > 90%)
- Disk space full (/opt/netapp/data > 95%)
- Performance analysis impacted
- Performance collection impacted

Figure 3) Performance Data Collection Event Example

The screenshot shows an alert titled "Event: Performance Data Analysis Is Impacted" with a warning icon and a timestamp of "(Triggered Time: 0 Min Ago)". In the top right corner, there are buttons for "Assign To", "Acknowledge", and "M". The main content is a "Summary" section with the following details:

- Severity: Warning
- State: New
- Impact Level: Risk
- Impact Area: Availability
- Source: setup-virtual-machine
- Source Type: Management Station
- Acknowledged By:
- Resolved By:
- Assigned To:
- Triggered Time: 0 Min Ago
- Trigger Condition: During the previous 24-hour period, analysis of collected performance data did not complete on time more than 2% of the time.
- Alert Settings: [Add](#)

Below the summary is a section for "Suggested Corrective Actions" with an information icon. It contains a single action: "Add more memory to the Unified Manager server." To the right of this action is a descriptive text box: "Unified Manager analyzes cluster performance data after each data collection poll completes. Analysis is skipped when there is not enough memory to complete the analysis before the next data collection."

It takes meticulous planning to provide adequate resources to your Unified Manager instance in order to support the scale of your storage infrastructure. This section describes some of the guidelines that you can use to plan and deploy your own Unified Manager instance.

As general rules of thumb, consider the following scale strategy for your Unified Manager instance:

- Always overprovision, do not underprovision.
- When Unified Manager starts monitoring beyond 48 node count, rely on Scale Monitor (Management Station) alerts.

3.3.1 Minimum Guaranteed Support

To accommodate numerous sizes of configurations and deployments, Unified Manager has no hard limit on the space and memory reservations from Unified Manager 7.2. This is particularly helpful for customers with smaller ONTAP footprints and those who have an instance deployed on a host with a very small configuration.

You can use the following resource recommendations for planning your Unified Manager instance; however, these are recommendations; they are not required.

Table 1) Resource recommendations for Unified Manager.

Node Count	Memory (GB)	Disk Space (GB)	Backup Space (GB)
Up to 48	12	400	3 times /opt/netapp/data size
49 - 72	Scale monitor guidance up to 96GB	Scale monitor guidance	3 times /opt/netapp/data size
> 72	Not recommended – Divide your clusters across multiple Unified Manager instances		

For example, if the MySQL directory (/opt/netapp/data) space is set to 150GB, the backup space should be set to 450GB (3 times the MySQL data space).

Notes:

- If you plan to create Unified Manager backups, configure your backup destination to have 3 times the primary data (/opt/netapp/data) consumed space.
- The space requirement for backup is different from the MySQL data space (/opt/netapp/data). You can provision another network path, either NAS or SAN.
- In general, 5GB disk space is required per node for performance data retention. This is a general observation; and actual requirements can vary.
- You can also plan for horizontal scaling; this is, having more than one instance of Unified Manager as a scale solution. This is intended for large environments where the number of ONTAP nodes monitored is on the higher side.

3.4 Reference Study for Scale Guidance

The data in Table 2 was collected from four customers for their Unified Manager deployments.

Table 2) Customer case study to measure scale.

Particulars		Customer 1	Customer 2	Customer 3	Customer 4
Platform and Version Information	UM Platform	RHEL	RHEL	vApp (OVA)	vApp (OVA)
	UM Version	7.2	7.3RC1	7.2P1	7.2P1
Unified Manager Resource Summary	CPU cores	16	8	4 vCPU	4 vCPU
	RAM	128GB	30GB	24GB	16GB
	Disk Size	1.3TB	65GB	72GB	72GB
	External Storage	No	100GB	No	No

Monitored Objects	Total Nodes Monitored	108	60	62	138
	Health Monitoring Object Count (Clusters, Nodes, Aggregates, SVMs, Volumes)	25014	916	5007	15126
	Performance Monitoring Object Count (Clusters, Nodes, Aggregates, Volumes, Ports, SVMs, LUNs, LIFs)	36022	2900	6830	23989
Database Size	UM DB size	1.2TB	77GB	144GB	124GB

3.4.1 Observations and Recommendations from the Reference Study

As shown in Table 2, Customer 4 received multiple Scale Monitor (Management Station) alerts related to disk capacity when the nodes monitored count was around 110 (3 to 4 alerts in 4 weeks). NetApp investigated the issue and came up with the following guidelines:

- Node count is on the high side for the Unified Manager instance to handle. The recommendation was to perform horizontal scaling for load=balancing purposes:
 - Create a new Unified Manager instance, deployed on a RHEL platform
 - Move 50% of the monitored nodes to the new instance
- The backup space requirement for scaled environments is on the high side. The recommendation was to migrate the current instanced hosted from a vApp to a RHEL instance, for the following reasons:
 - Backup space requirement is three times that of the Unified Manager database.
 - In a virtual appliance, the backup resides on the same file system that is hosting the Unified Manager database. That makes it hard to scale up as the monitored node count rises.
 - It's always better to have the Unified Manager deployed on a supported RHEL/CentOS or a Windows platform where you can segregate the backup space from the Unified Manager database home.

This [KB article](#) provides step-by-step guidance on splitting the Unified Manager database

3.4.2 Guidance Summary

1. The deployment just described suggests that you rely on Scale Monitor alerts when your Unified Manager instance monitors nodes beyond the recommended 48 node count.
2. It's better to deploy a Unified Manager instance on a RHEL or Windows platform if you currently have too many nodes monitored or if you are planning to add many nodes in the future.
3. There cannot be uniformity in guidance when it comes to scale.
 - Customers 1 and 4 are monitoring beyond a 100-node count. There is no scale issue with Customer 1, whereas Customer 4 was alerted multiple times on the resource usage.
 - This explains the challenges to scale discussed in [Section 3.1](#).
4. Follow the deployment strategy guidelines described in [Section 6](#).
5. Always act on the Scale Monitor alerts.
6. Always overprovision.

3.5 Scale Monitor Events

The Scale Monitor events can be a useful key in overcoming most of your scale issues. This will hugely depend on how you understand these alerts and how judiciously you use them.

3.5.1 Performance Analysis Impacted

Performance monitoring can be impacted if there are not enough resources available and the application slows down. The scale monitor can defect and report for common conditions of low resources. Scale monitor allows yellow warning icon and event summary text link also appear to the right.

Performance data is polled every 5 minutes (by default). Scale Monitor determines that over the past 24 hours, the number of times during which the duration of a collection poll and associated analysis exceeds the polling interval has exceeded the warning threshold, triggering the 2% warning threshold event. Data acquisition and analysis have not been able to keep up with the polling interval. The Data Continuity feature was invoked to retrieve the stats for the subsequent missed polls. Data Continuity is able to fill in the missing gaps in a timely manner after which data acquisition resumes normal performance polling. Since dynamic analysis does not occur during Data Continuity polls, there will be no dynamic events during this period for volumes on the affected cluster(s). A new Management Station event will be created with warning status and risk impact.

Note:

When you receive disk full warnings, please:

- Do not add any new clusters/nodes
- Do not run any Unified Manager backups.

First, increase the disk space and then perform any operation listed above.

3.5.2 Performance Collection Impacted

Performance data collection can be impacted when there is some mismatch in the data collection versus the polling cycles (every 5 minutes). Scale monitor can detect the performance data collection issue and report for common conditions that may have caused this. Scale Monitor shows a warning icon which appears on the Unified Manager GUI followed by a matching event summary.

During a periodic check (every 5 minutes), Scale Monitor determines if:

- a) Data acquisition has not been able to keep up with the polling interval. All performance charts for any affected cluster(s) are missing data points during these missed polls.
- b) the Acquisition Unit is out of memory

A new Management Station event will be created, or an outstanding Management Station event will be updated, with critical status and incident impact. Scale Monitor shows red and a red critical icon and event summary text link also appear to the right.

The user may also receive email alerts and SNMP traps depending on how the user has configured Health Alerting. The user clicks on the event summary text link which brings up the Health Event page that displays a red critical icon and the title "Event: Performance Data Collection Is Impacted" along with a summary, possible cause, and suggested corrective action(s). The summary statement indicates that data collection did not finish on time more than 2% of the time. There are several possible cause scenarios here:

- a) Acquisition unit has run out of memory. A recommendation is made to add more memory to the Unified Manager server
- b) All clusters are running versions of ONTAP *greater than or equal to* 8.3.1. A recommendation is made to add more memory to the UM server
- c) The polling interval is < 15 minutes. A recommendation is made to increase the polling interval
- d) The polling interval is = 15 minutes. A recommendation is made to move clusters to another UM server or to upgrade the version of ONTAP on clusters running <= 8.3.0

Figure 4) Event displaying Performance Data Analysis is Impacted

Event: Performance Data Analysis is Impacted (Triggered Time: 0 Min Ago) Assign To Acknowledge M

Summary

- Severity: Warning
- State: New
- Impact Level: Risk
- Impact Area: Availability
- Source: setup-virtual-machine
- Source Type: Management Station
- Acknowledged By:
- Resolved By:
- Assigned To:
- Triggered Time: 0 Min Ago
- Trigger Condition: During the previous 24-hour period, analysis of collected performance data did not complete on time more than 2% of the time.
- Alert Settings: [Add](#)

Suggested Corrective Actions ⓘ

- Add more memory to the Unified Manager server.
- Unified Manager analyzes cluster performance data after each data collection poll completes. Analysis is skipped when there is not enough memory to complete the analysis before the next data collection.

4 Installation Guidelines

Organizations have requirements for certifying software versions and security updates in their environment. These requirements may force you to decide on a platform to host your software. Before you start a fresh installation of Unified Manager 7.2 or greater, you must decide on the platform (vApp, Red Hat Enterprise Linux, CentOS, or Windows) that best suits your environment.

4.1 Selecting the Right Platform

Organizations have different security procedures, patching policies, and regulations that limit the way a product is installed. With Unified Manager, you have the flexibility to install your Unified Manager instance in the platform that best suits your organizational needs. Although there is no significant performance, operational, or functional differences among the three platforms, you should understand how your platform selection affects your operations:

With the **virtual appliance (vApp) distribution**, the underlying operating system is locked down behind a network firewall. There is no user access to the file system or to the operating system components. Any updates to the software must be applied via a Unified Manager patch downloaded from the NetApp Support site. Scale may be limited by VMWare's CPU and RAM allocation capability. vApp is an excellent choice for customers who have less need for independent verification and control of software components. Deployments are up and running in a matter of minutes.

With the **Red Hat Enterprise Linux and CentOS distribution**, the customer retains control of the operating system. Any required agents (such as backup, auditing, and so on) can be installed, and the customer is free to choose the patch levels for third-party software packages used by Unified Manager, such as Java and MySQL. Customers can also patch the server on their schedule. Additional security hardening is possible if it doesn't interfere with required network connections. This is a great option for customers who have very specific corporate security requirements.

With the **Windows distribution**, customers fully control the Windows server and the environment. They can patch the server and choose to change the versions of third-party components. However, the process is not as simple as on Linux.

Use Table 2 in deciding which platform to select.

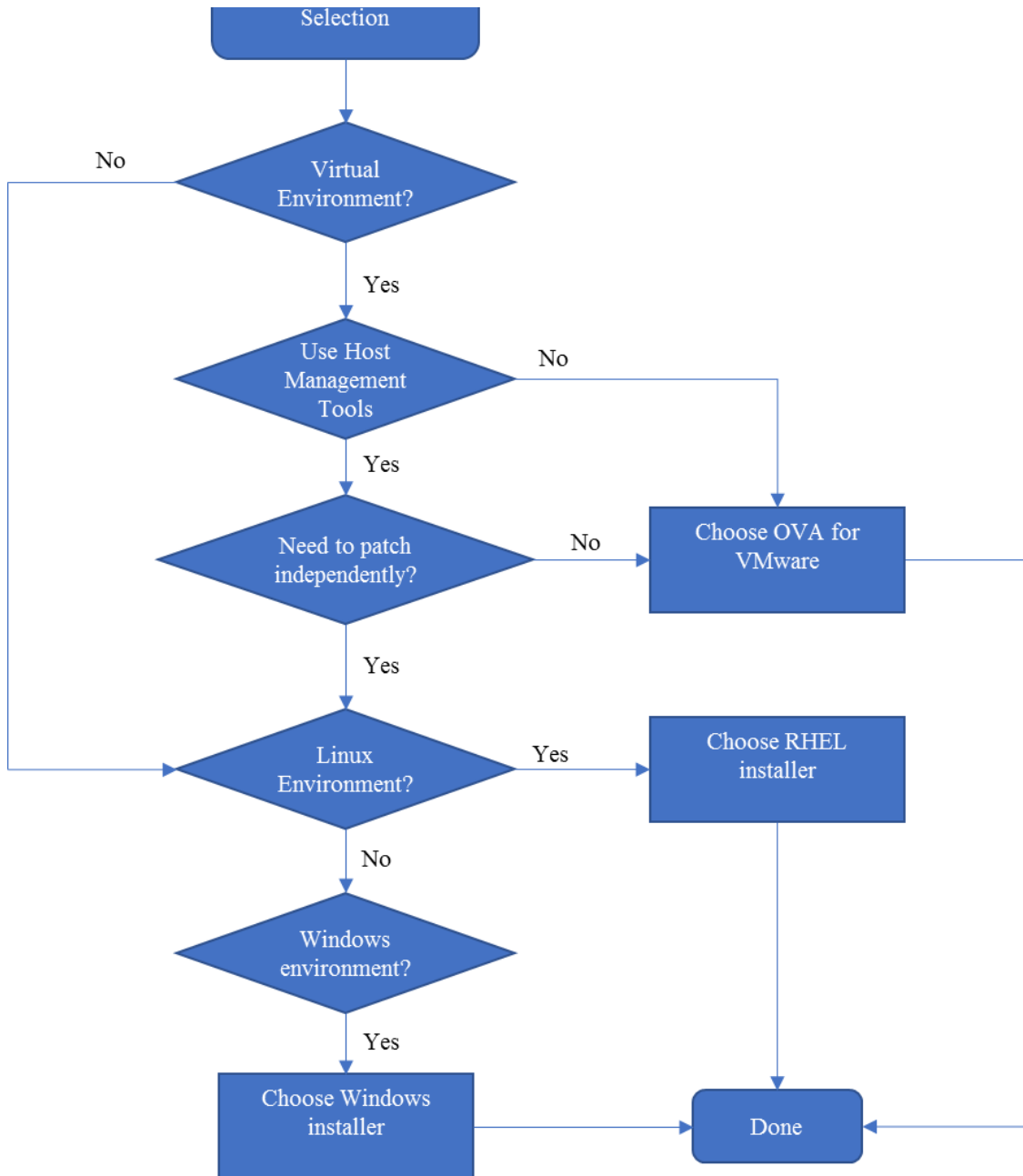
Table 3) Choosing the right platform

Functional Requirement	vApp	Windows (Guest OS)	Red Hat / CentOS (Guest OS)	Windows (Physical)	Red Hat (Physical)
Platform hosting Unified Manager requires regular patching in your environment.					
Platform hosting Unified Manager requires OS hardening.					
Unified Manager requires a certain software component version. For example, MySQL version 5.7.23 is required but the built-in package in vApp (OVA) is currently 5.7.17.					
Unified Manager instance needs to scale up its resources (memory, disk space) to satisfy new nodes or clusters being added.				*	*
You have delegated management roles in your environment for operations and administrative roles.					
You expect to have a higher node count, requiring you to scale Unified Manager instance vertically.				*	*

* You cannot auto-scale resources in physical servers directly. You can add resources (memory and disk) only during downtime, provided that your hardware supports extra DIMM and disk slots.

Alternatively, you can use the logic shown in Figure 5 to identify the right platform.

Figure 5) Identifying the right platform



4.2 Resource Allocation

With OnCommand Unified Manager 7.2, there are no reservations on CPU, memory, and disk requirements, which means that the installation is not going to fail because it does not meet the 150GB disk space recommendation. Follow the sizing recommendations in Section 3.

4.3 Planning Your MySQL (/opt/netapp/data) Space

With increasing business needs, your OnCommand Unified Manager instance will need to scale vertically to monitor and manage additional storage infrastructure. Increasing object counts result in additional space requirements in the /opt/netapp/data space, requiring a flexible /opt/netapp/data partition that can grow with new resource requirements. You may also have to plan for additional space for backups, because the partition is homed under /opt/netapp/data. For these reasons, your /opt/netapp/data space needs to be flexible to allow expansion. NetApp recommends:

- For RHEL and Windows installations: /opt/netapp/data mounted from a LUN for physical installations.
- For vApp installations: Rely on the datastore where MySQL database is hosted from.

Note: For large MySQL databases, you can plan on keeping the support bundles in a different location than /opt/netapp/data. This will prevent unnecessary space consumption in the /opt/netapp/data space.

To enable your MySQL DB data (/opt/netapp/data) to auto-expand, NetApp recommends having a volume manager manage your LUN mount. Requirements for the different platforms are discussed in the rest of this section.

4.3.1 Red Hat Enterprise Linux or CentOS

NetApp recommends mounting /opt/netapp/data from a LUN mount for Unified Manager and to use a volume manager to mount it as a filesystem in your host. This gives you the flexibility of adding LUNs for additional disk space while keeping the /opt/netapp/data mount constant. You can add multiple LUNs under the same mount point with the help of logical expansion.

If you need to increase /opt/netapp/data for an existing Unified Manager instance that is installed on /opt/netapp/data mounted locally, follow these steps:

1. Install an iSCSI adapter in your Linux server.
2. Create a new LUN and map it to the Unified Manager server.
3. Use LVM or a similar volume manager to mount the LUN.
4. Shut down the Unified Manager instance and then copy the entire contents of /opt/netapp/data into the new mountpoint.
5. After copying is completed, rename the new mountpoint as /opt/netapp/data and bring up the Unified Manager services again.

Plan to mount /opt/netapp/data from separate LUN and mount it with a volume manager. This gives you flexibility in granting additional /opt/netapp/data space by using volume managers like Linux native LVM. You can add multiple LUNs under the same mount point with the help of logical expansion.

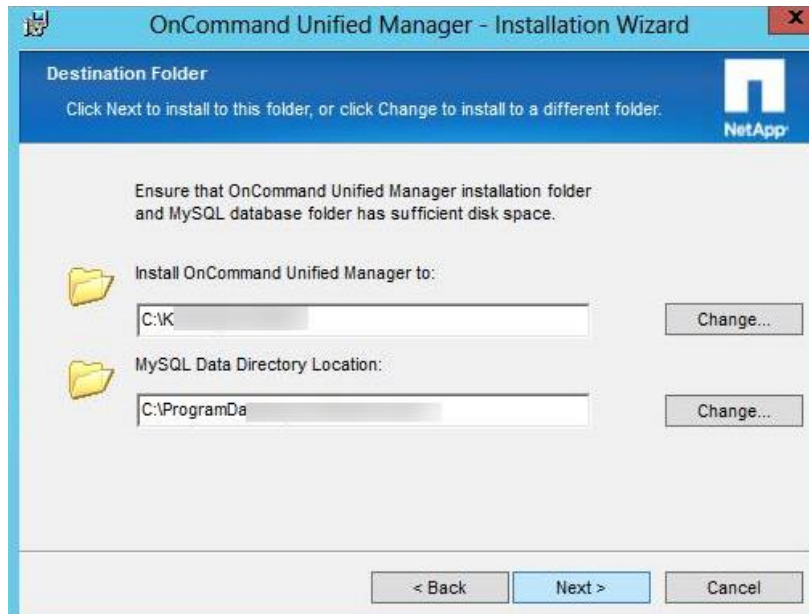
4.3.2 Windows

Always plan to put your Unified Manager data directory in a non-system drive (if your system drive is C drive, do not use C drive for MySQL data); you cannot expand your system drive. NetApp recommends mounting a LUN for placing your MySQL data and making the disk dynamic for future expansions as the need increases.

Alternatively, you can have a volume manager offer a non-system drive; you can always add space to this drive for future expansion.

During installation, you can specify where you want to keep MySQL data, as shown in Figure 6.

Figure 6) Specifying MySQL directory path during Windows installation



4.3.3 Virtual Appliance (vApp)

The procedure is simple for vApp deployments. The underlying datastore helps in auto-expansion; you can always expand the current installation space from the underlying datastore.

To expand the /data space, you must first expand the hard disk space at the virtual machine's resource tab and then expand the actual space of the MySQL data partition from the vApp's maintenance console.

Note: The underlying datastore should have the extra space required for you to provision for the VM in question.

5 Unified Manager Backup

Unified Manager 7.2, and greater, collects and maintains performance, capacity, and health data in a single MySQL database. When a backup is triggered, a temporary dump of the MySQL database is created in the backup directory, requiring additional temporary space for every iteration of backup. For every incremental backup, the backup file is appended with the new delta. Therefore, NetApp recommends configuring the backup space to be 3 times the size of the MySQL database.

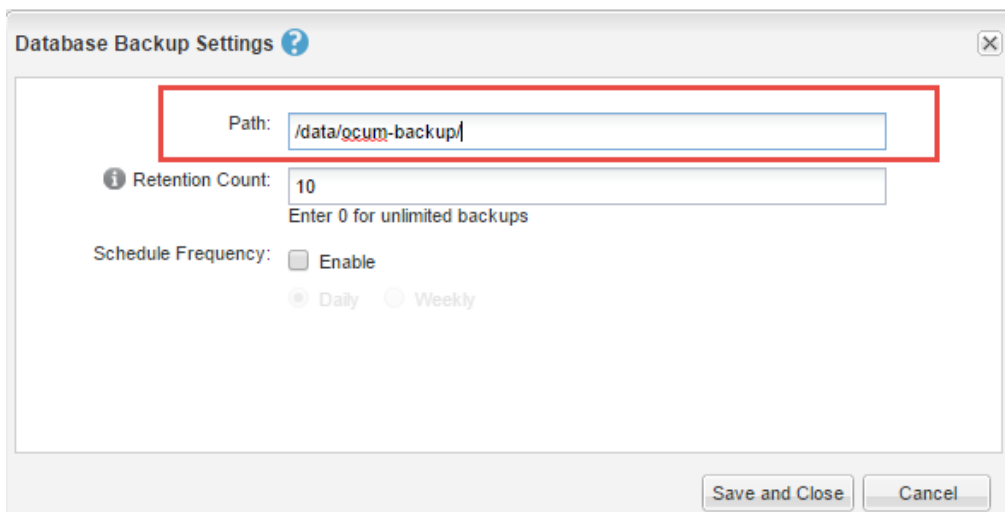
This configuration comes with some additional cost to maintain the temporary space inside the /opt/netapp/data space. You should plan to have the backup directory mounted from low-cost storage and from an independent network location, for two reasons:

- Having your backups in a different location helps in recovering your database when the primary location (/opt/netapp/data) is unavailable.
- The space requirement for backups is 3 times the size of the MySQL database. Therefore, it is best to store backup data in cheaper, cost effective storage

5.1 Defining a Custom Backup Path

To store your backup data in a different location, define the network path in the backup settings as shown in Figure 7.

Figure 7) Define the backup path for RHEL hosts



Note: The path shown in Figure 7 is different for vApp and Windows environments.

5.2 Prerequisites for Selecting a different backup location in RHEL and Windows

For the custom backup location to work, it is necessary to reassign ownership of a new backup path to User:jboss and Group:jboss.

For example, in a Red Hat installation, the custom backup directory should have the use: group permission as jboss:jboss.

Note: For vApp instances, the backup recommendations are different, as described in Section 5.3.

5.3 vApp Backup

For Unified Manager instances deployed on vApp, you cannot move data out of the vApp instance. Therefore, NetApp recommends taking backups only by VMware consistent snapshots.

5.3.1 vApp Backup Procedure

For Unified Manager vApp deployments, NetApp recommends the following backup procedure:

1. Create a VMware consistent snapshot.

Note: You cannot move data out of vApp instance. Taking VMware consistent backup snapshots is the best way to maintain backups for longer retention periods.

2. Take a backup of the VMware snapshot with your vendor-specific backup solution, for longer retention.

6 WFA Pairing Guidelines

You can pair OnCommand Workflow Automation with a Unified Manager instance as the data source for active management of your protection relationships. By design, the OnCommand Workflow Automation and Unified Manager instances must be monitoring source and destination clusters involved in protection relationships for active management.

Figure 8) WFA pairing with Unified Manager.



6.1 WFA Pairing Best Practice

As per the best practices detailed in [Section 3.3](#), Unified Manager needs to be split into two when the instance has more than 72 ONTAP nodes to monitor. This would ideally mean that the Workflow Automation instance now needs to monitor two or more Unified Manager instances as data sources.

In any scenario, NetApp recommends pairing each OnCommand Workflow Automation instance with Unified Manager in such a way that each WFA instance has access to source and destination clusters in the protection relationship, where each Unified Manager instance acts as a data source.

WFA needs access to source and destination clusters; active management is required on both sides.

7 Deployment Guidelines

Enterprises usually deploy multiple management servers to manage and monitor their data centers. Starting with Unified Manager 7.2, you need only one system to manage, monitor, and alert on the health and performance metrics of your NetApp systems. NetApp recommends having a single instance manage individual data centers. Although it's always beneficial to manage smaller data centers with a single Unified Manager, you need a dedicated management network between sites to monitor NetApp systems with a single Unified Manager instance. This approach requires meticulous planning with your network experts.

8 References

For specific implementation steps, consult the following videos, guides, and technical reports.

8.1 Unified Manager Videos

- Unified Manager 7.2 overview video: <https://www.youtube.com/watch?v=i5u9z1-saqQ&t=2s>
- Unified Manager video channel link: <https://www.youtube.com/watch?v=i5u9z1-saqQ&list=PLdXI3bZJEw7mp3jFSg0IJgo3oeDQRY-GI>

8.2 Technical Reports and Documentation

- Migrating Performance Data from Performance Manager 7.1 to Unified Manager 7.2: <http://www.netapp.com/us/media/tr-4589.pdf>
- OnCommand Unified Manager Reporting for NetApp ONTAP: <http://www.netapp.com/us/media/tr-4565.pdf>
- OnCommand Unified Manager Schemas Explained: <https://www.netapp.com/us/media/tr-4709.pdf>
- OnCommand Unified Manager documentation: <https://www.netapp.com/us/documentation/oncommand-unified-manager.aspx>

Version History

Version	Date	Author	Description
1.0	17 th Aug 2017	Dhiman Chakraborty	Added best practices for Installation guidelines, sizing, backup, and deployment scenarios for OnCommand Unified Manager 7.2.
1.1	18 th Dec 2018	Dhiman Chakraborty	<ul style="list-style-type: none">• Added more granular details to scaling guidelines, including case studies• Added WFA pairing guidelines

Refer to the [Interoperability Matrix Tool \(IMT\)](#) on the NetApp Support site to validate that the exact product and feature versions described in this document are supported for your specific environment. The NetApp IMT defines the product components and versions that can be used to construct configurations that are supported by NetApp. Specific results depend on each customer's installation in accordance with published specifications.

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