NetApp SANtricity® Management Pack for Microsoft System Center Operations Manager 3.0

# User Guide

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NetApp

# Table of Contents

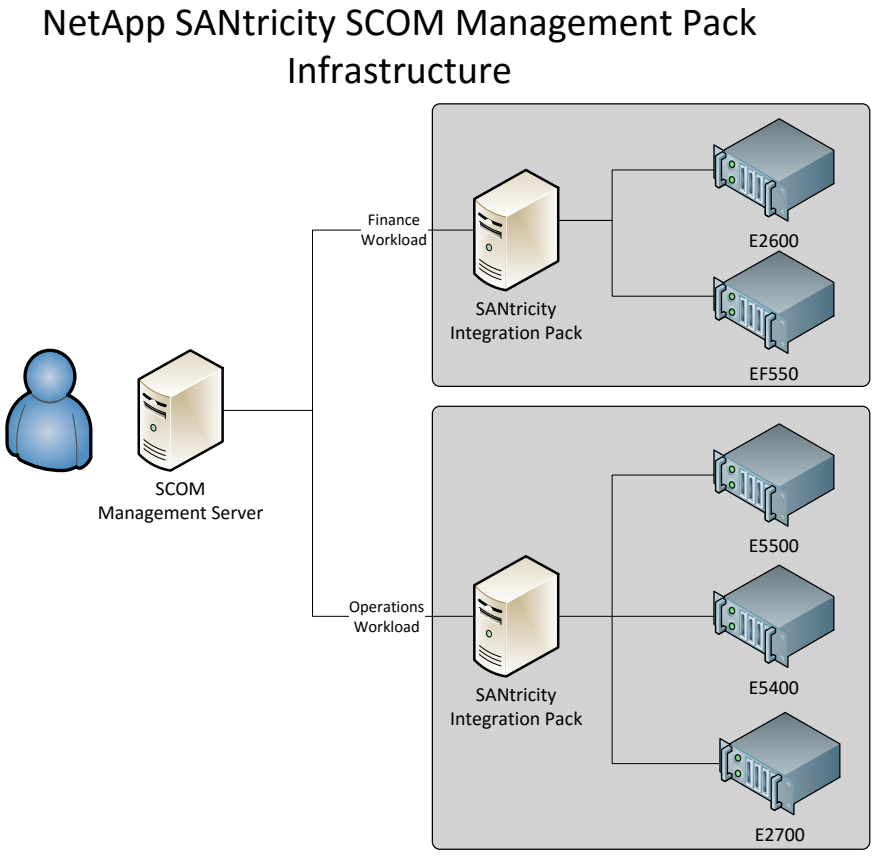
# Overview of the SANtricity Management Pack for Microsoft System Center Operations Manager (SCOM) 3.0

The NetApp SANtricity Management Pack helps you monitor your storage health status from within the System Center Operations Manager (SCOM) environment. The integration of the management pack and the SCOM enables you to extend SCOM 2012 and 2012 SP1 monitoring capabilities to include detailed storage array conditions and resolution steps for troubleshooting.

The NetApp SANtricity Management Pack provides critical alerts including storage array summary, details, and applicable recovery procedures. You can now troubleshoot NetApp storage arrays from one SCOM console, which reduces the complexity of dealing with multiple proprietary applications.

A script is available for downloading and importing volume performance data into a spreadsheet or other tool for detailed analysis. Obtaining Volume Performance Data provides detailed information about the script.

The NetApp SANtricity Management Pack for Microsoft System Center Operations Manager 3.0 does not support in-band NetApp storage array monitoring. In-band monitoring of the storage array manages through the host and not directly through the on-board management Ethernet connections.




## Purpose

This guide is for Operations and System Administrators who monitor and troubleshoot NetApp storage arrays. The NetApp SANtricity Management Pack is to be used only for monitoring and configuring performance thresholds for NetApp storage arrays. You cannot use the NetApp SANtricity Management Pack to perform storage management functions. For recovery procedures that require storage management functions that are listed in the alert knowledge base articles within the SCOM console, refer to the NetApp Storage Manager documentation.

## New in This Release

The information in this guide is based on version 3.0 of the NetApp SANtricity Management Pack.

**NOTE:** All references in this user guide to NetApp storage arrays include both E-Series storage arrays and EF-Series flash arrays.

The following features are new in this release of the NetApp SANtricity Management Pack:

- Summarized views of the state and health of storage resources through dedicated Dashboards
- The ability to graph various volume performance metrics through Performance Views
- Hierarchical view of all storage and hardware currently monitored by the plug-in through the Diagram View
- The ability to launch the NetApp Storage Array Discovery application for an agent machine through the operations manager

## Abbreviations, Acronyms, Terms and Definitions

The following table shows the abbreviations and acronyms used in this document and their definitions.

**Abbreviations, Acronyms, Terms, and Definitions**

| Abbreviations, Acronyms, and Terms | Definitions |
|---|---|
| MS | SCOM management server |
| SCOM | System Center Operations Manager |
| Storage Pool | Consists of disk pools or volume groups |
| Proxy | An agent computer that communicates with multiple storage arrays |

**NOTE:** The NetApp SANtricity Management Pack has been tested to support up to 30 NetApp storage arrays for each agent-managed computer.

## Software Configurations

For a complete and up-to-date listing of all compatible server and firmware for the SANtricity plug-in, refer to the NetApp Interoperability Matrix Tool.

# Downloading NetApp Storage Array Management Files

Download the SCOM-Management-Pack-WSX64-03.00.XXXX.3000.exe file from the Support Site at http://mysupport.netapp.com/.

# Required Microsoft Updates and Add-ons

For the NetApp SANtricity Management Pack to function properly, you must first install the latest Microsoft updates and add-ons on each of your management server and agent machines. Refer to the following for an overview on all updates and add-ons required for each software configuration:

| Root Management Servers | Update/Add-on |
|---|---|
| **All configurations** | SC Management Pack for Windows Server Operating System.msi |

| Root Management Servers | Update/Add-on |
|---|---|
| | Microsoft System Center Management Pack for SQL Server – SQLServerMP.msi |
| **SCOM 2012 R2 configuration only** | Update Rollup 9 for System Center 2012 R2 Operations Manager |
| **SCOM 2012 SP1 configuration only** | MS15-086: Security update for Update Rollup 10 for System Center 2012 Operations Manager Service Pack 1: August 11, 2015 |
| **SCOM 2016** | NA |

| Agent-Managed Computers | Update/Add-on |
|---|---|
| **Windows Server 2008 R2 agent / SCOM 2012 R2 management server configuration only** | An installation of Update Rollup 9 for System Center 2012 R2 Operations Manager is required for each agent under a SCOM 2012 R2 management server configuration.<br><br>**NOTE:** If you run this Windows Server 2008 R2 configuration without a prior installation of Update Rollup 9, the following error is captured under the Event Log, "NetApp SANtricity Storage Array MP scripts require Powershell version 3.0 or greater. This Agent is running version 2.0." |
| **Windows Server 2008 R2 agent / SCOM 2012 SP1 management server configuration only** | An installation of MS15-086: Security update for Update Rollup 10 for System Center 2012 Operations Manager Service Pack 1: August 11, 2015 is required for each agent under a SCOM 2012 SP1 management server configuration.<br><br>**NOTE:** If you run this Windows Server 2008 R2 configuration without a prior installation of Update Rollup 10, the following error is captured under the Event Log, "NetApp SANtricity Storage Array MP scripts require Powershell version 3.0 or greater. This Agent is running version 2.0." |

# Configuring Agent-Managed and Management Server Computers

Before you install the NetApp SANtricity Management Pack for Microsoft System Center Operations Manager 3.0, perform the following tasks to configure the management server and agent-managed computers.

## Enabling Proxy Server Capabilities

Enable agent-managed computers that monitor NetApp storage to act as proxy servers and discover managed objects on other computers in the RMS SCOM Server console.

If you do not enable agent-managed computers that monitor NetApp storage arrays to act as a proxy and discover managed objects on other computers from the root management server, the NetApp SANtricity Management Pack does not function.

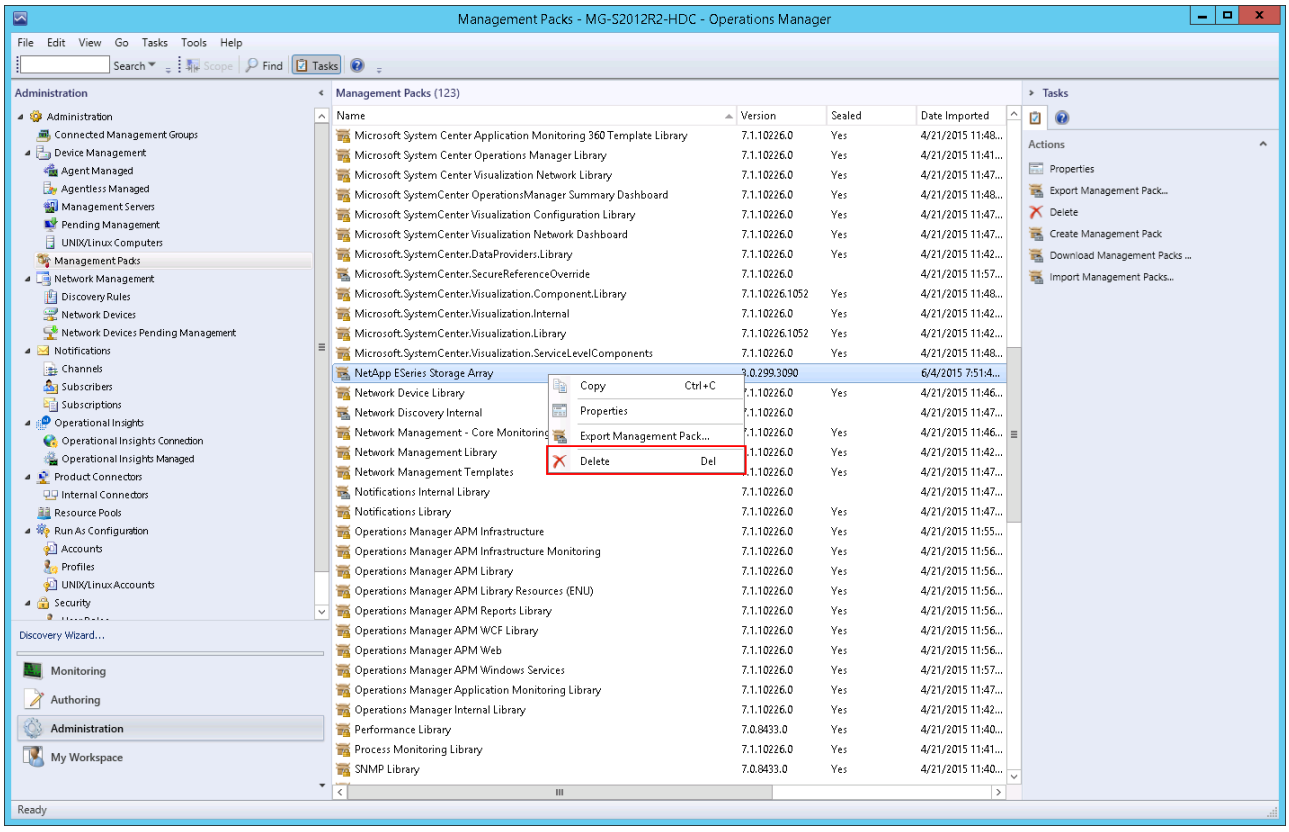
1. Open the SCOM Operations Console.

2. Open the Administration view, and select **Device Management >> Agent-Managed**.
3. Right-click the agent-managed computer that monitors NetApp storage arrays, and select **Properties**.
4. Select the Security tab, and enable **Allow this agent to act as a proxy and discover managed objects on other computers**.
5. Click **OK**.
6. Perform Step 1 through Step 5 for each agent-managed computer that is used to monitor NetApp storage arrays.
   **NOTE:** If an array fails to display under the StorageArray view, verify the **Allow this agent to act as a proxy and discover managed objects on other computers** box is checked for the corresponding agent-managed computer.

## Removing a previous version of the NetApp Management Pack on the Management Server Computer

Before installing the NetApp SANtricity Management Pack for Microsoft System Center Operations Manager 3.0, you must first uninstall any previous version of the NetApp SANtricity Management Pack for Microsoft System Center Operations Manager on the Management Server computer.

1. On the Management Server, select **Start >> All Programs >> Operations Console**.
   The Microsoft System Center 2012 Operations Manager console appears.
2. In the lower left corner of the Operations Manager window, click **Administration**.
   The Administration Overview window is displayed.
3. Under the Administration panel of the Administration Overview window, select **Administration >> Management Packs**.
   A list of management packs display within the Administration Overview window.
4. Locate NetApp Storage Array under the list of management packs.
5. Right-click **NetApp Storage Array** and select **Delete**.
   An Operations Manager dialog is displayed.

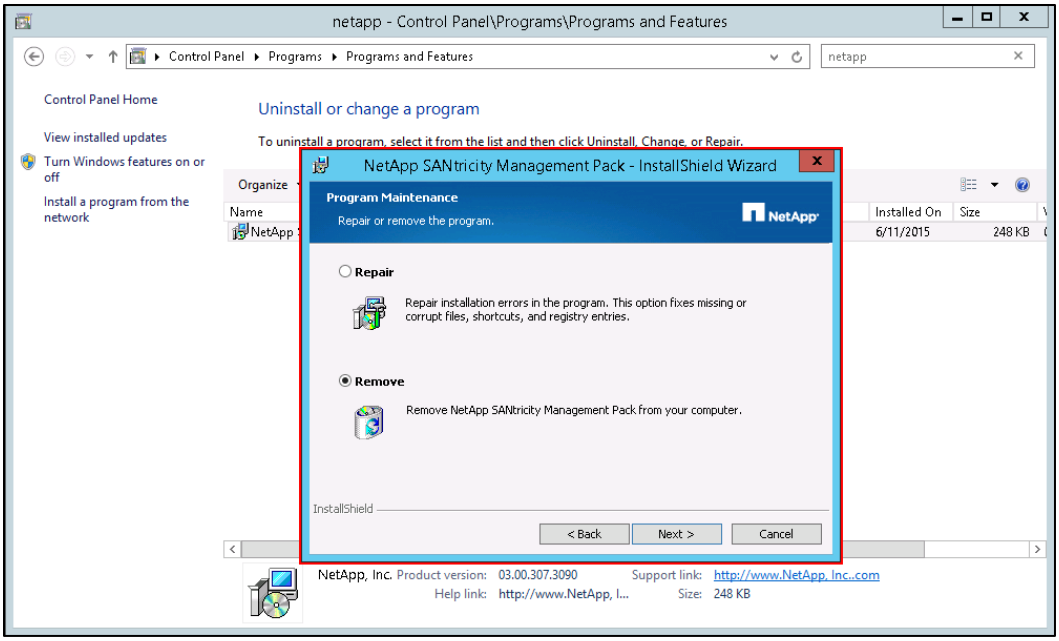


6. Click **Yes** within the Operations Manager dialog to remove the selected NetApp ESeries Storage Array management pack.
   The NetApp ESeries Storage Array management pack is removed.

## Removing a previous version of the NetApp Management Pack on the Agent-managed computers

Perform the following to remove a previous version of the NetApp Management Pack from an agent-managed computer:

1. On the Agent-managed computer, select **Start >> Control Panel >> Uninstall a Program**.
   The Uninstall or change a program window is displayed.
2. Under the Uninstall or change a program window, locate the NetApp Management Pack.
3. Right-click the NetApp Management Pack, and select **Change**.
   The NetApp Management Pack Installation Wizard is displayed.
4. Under the NetApp Management Pack Installation Wizard, click **Next**.
   The Program Maintenance dialog is displayed.




5. Under the Program Maintenance dialog, select **Remove,** and click **Next**.
   The Remove the Program dialog is displayed.
6. Under the Remove the Program dialog, click **Remove**.
   The Installation Complete dialog is displayed.
7. Click **Finish**.
   The NetApp Management Pack Installation Wizard closes.

## Installing the NetApp Management Package on an agent-managed computer

You must install the NetApp Management Pack on the agent-managed computer before you install the NetApp SANtricity Management Pack on a management server computer. Based on the operating system of the agent-

managed computer, the following Agent-Managed Computer Requirements table shows the software necessary for monitoring NetApp storage.

**Agent-Managed Computer Requirements table**

| Operating System | Software |
|---|---|
| Windows 2012 | • Power Shell version 3.0 or later<br>• .NET Framework version 4.5.1<br>• NetApp Management Pack (available x64 version) |
| Windows 2012 R2 | • Power Shell version 3.0 or later<br>• .NET Framework version 4.5.1<br>• NetApp Management Pack (available x64 version) |
| Windows Server 2008 R2 | • Power Shell version 3.0 or later<br>• .NET Framework version 4.5.1<br>• NetApp Management Pack (available x64 version) |
| Windows Server 2016 | • Power Shell version 3.0 or later<br>• .NET Framework version 4.5.1<br>• NetApp Management Pack (available x64 version) |

The NetApp Management Pack installation log file is located at the following location:

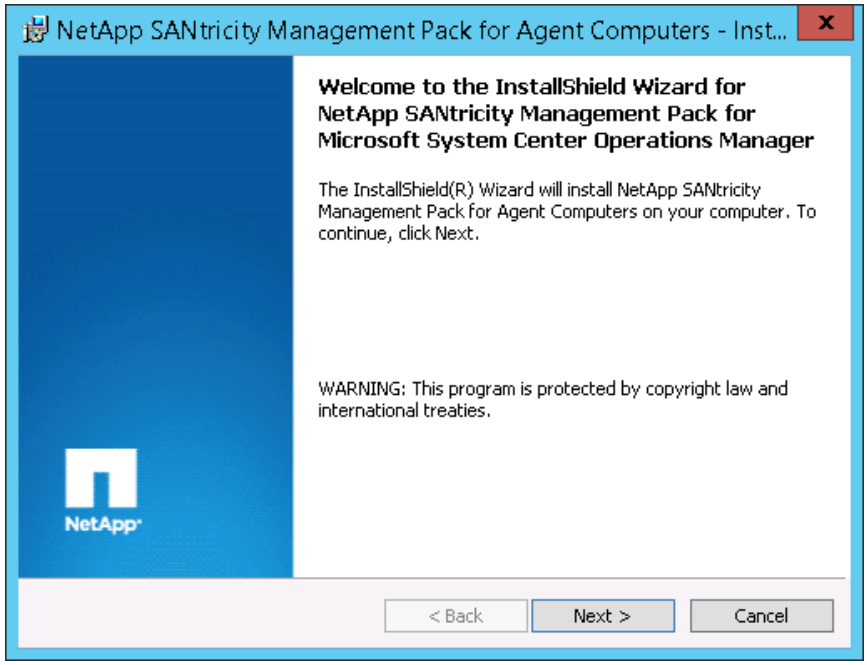
`%temp%\SCOMManagementPackInstalllog.txt`

To install the NetApp Management Package, perform the following steps:

1. Log in to the agent-managed computer with an account that has installation privileges.
2. Locate the desired NetApp Management Pack Installer for SCOM-WSX64-00.00.00.00 (x64 platforms).

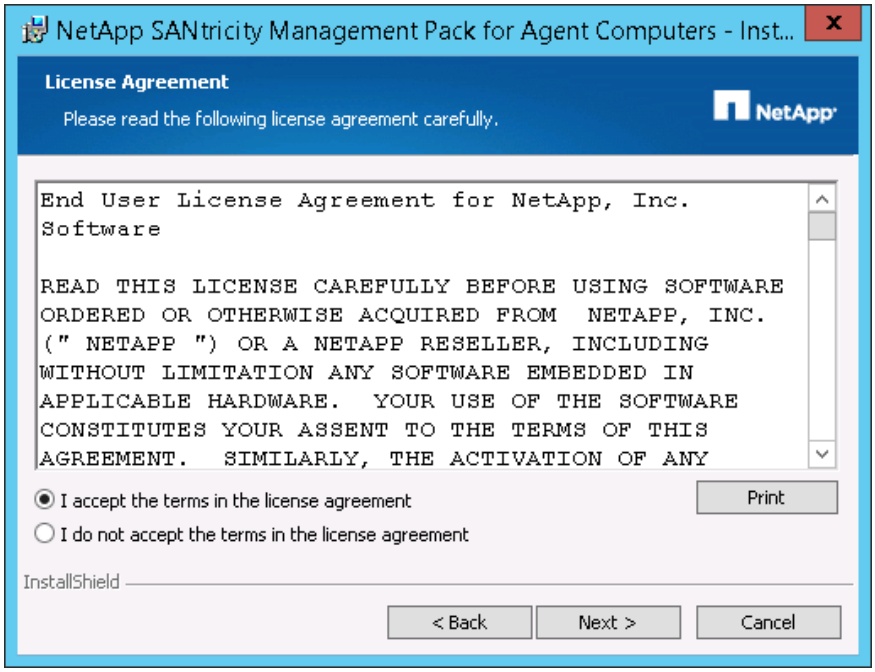
3. Run the Installer.

   The installation wizard is displayed.



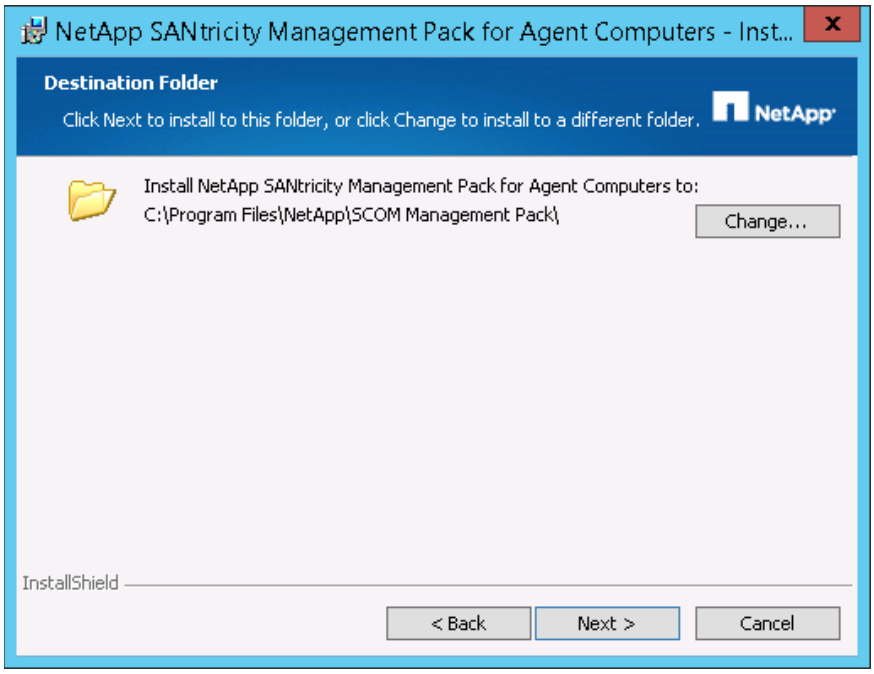

4. Click **Next**.

   The End-User License Agreement dialog is displayed.



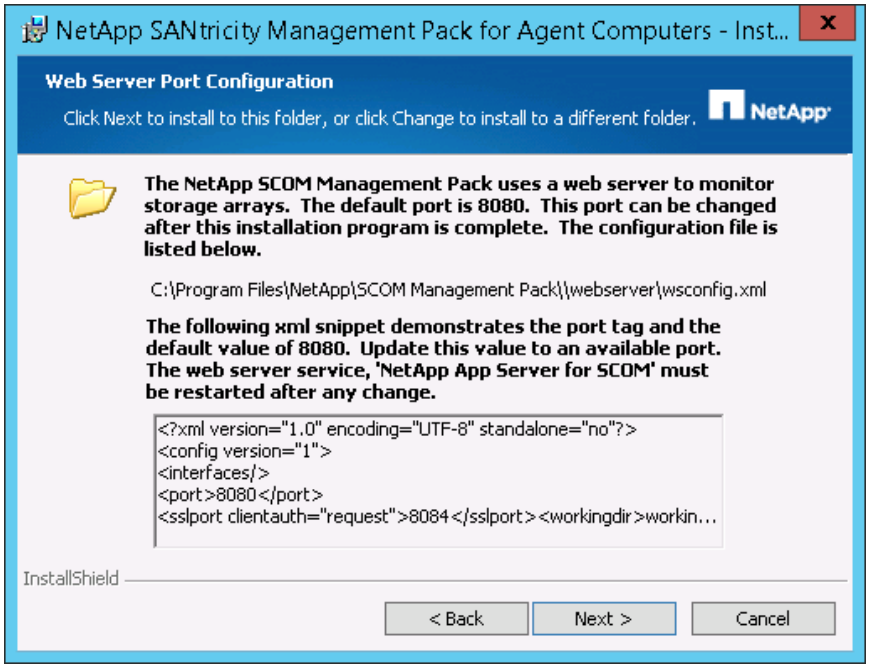

5. Select **I accept the terms in the license agreement,** and click **Next.**

   The Destination Folder dialog is displayed.



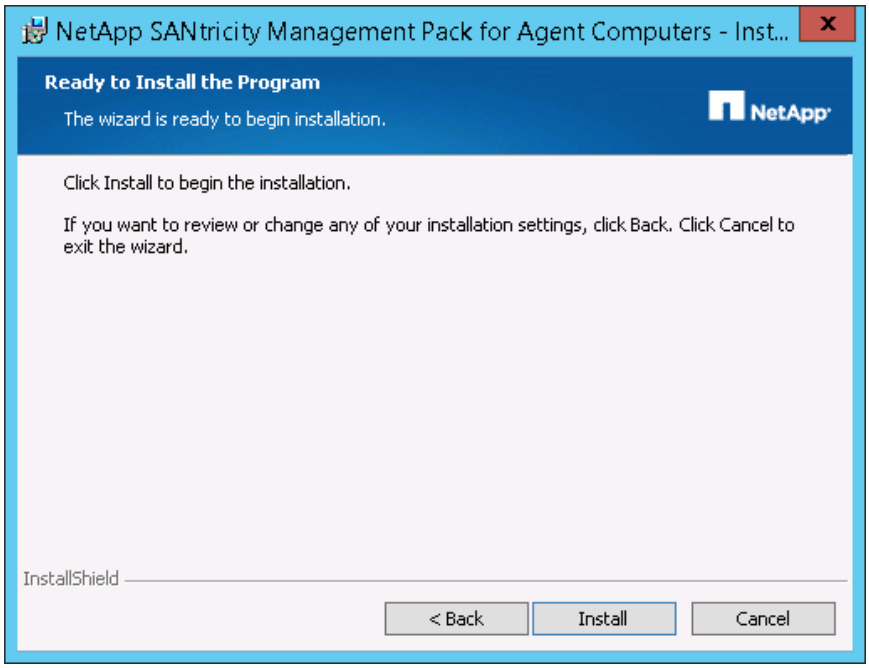

6. If needed, click Change to specify the desired folder location for the NetApp Management Pack.
7. Click **Next**.

   The Web Server Port Configuration dialog is displayed.



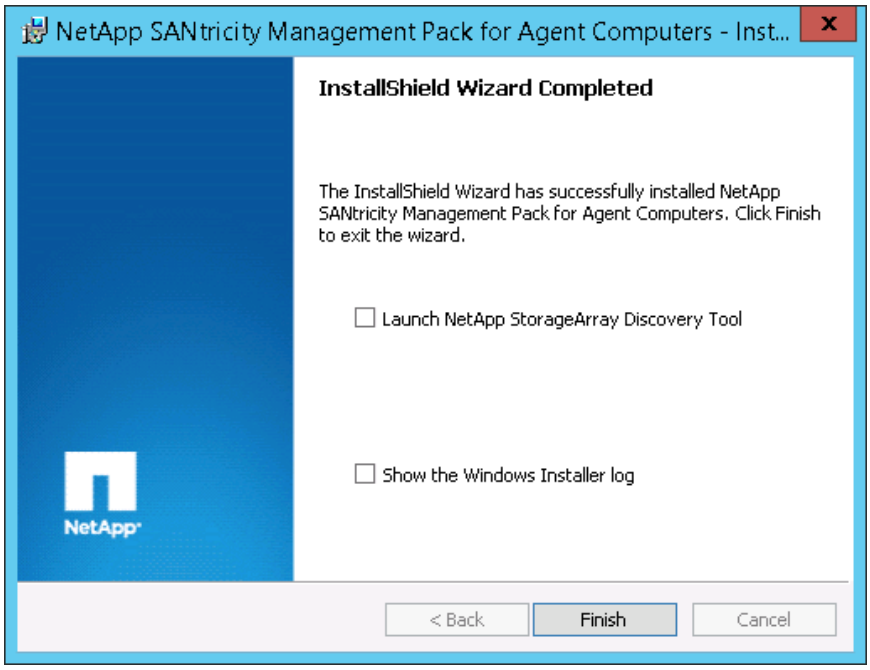

8. Click **Next.**

   The Ready to Install the Program dialog is displayed.




9. Click **Install**.

   The installation complete dialog is displayed.




10. If needed, select the **Launch NetApp StorageArray Discovery Tool** to access the NetApp Storage Array Discovery application upon exit of the installation wizard.
11. Click **Finish**.

    The Installation wizard closes. The NetApp SANtricity Management pack can now be installed on the management server computer. Refer to I[nstalling the NetApp SANtricity Management Package on a management server computer] for more information.

## Installing the NetApp SANtricity Management Package on a management server computer

Perform the following to install the NetApp SANtricity Management Package on a management server computer:

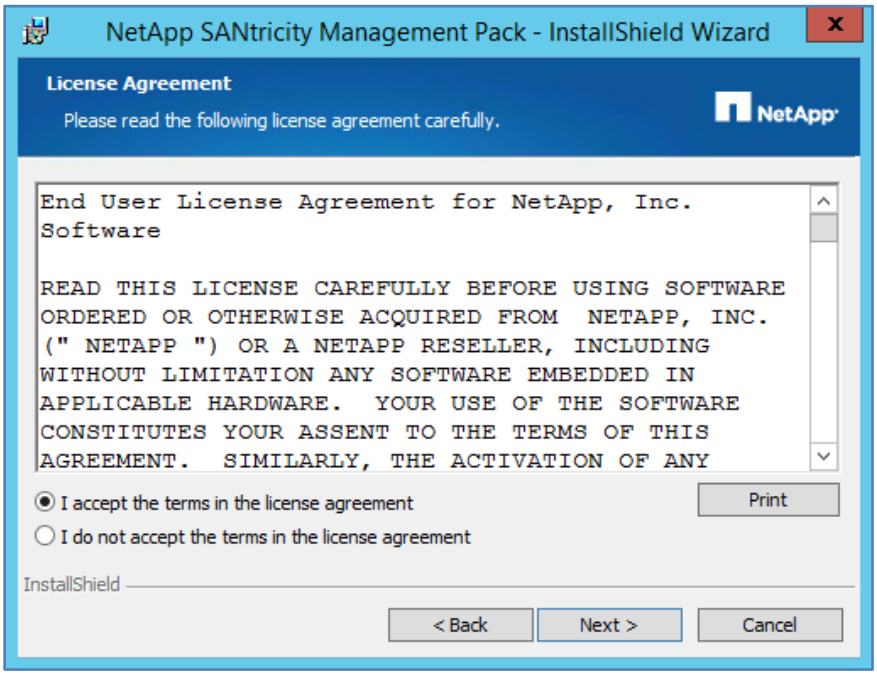
The NetApp Management Pack installation log file is located at the following location:

`%temp%\SCOMManagementPackInstalllog.txt`

1. Log in to the management server computer with an account that has installation privileges.
2. Locate the desired NetApp Management Pack Installer for SCOM-WSX64-00.00.00.00 (x64 platforms).
3. Run the Installer.

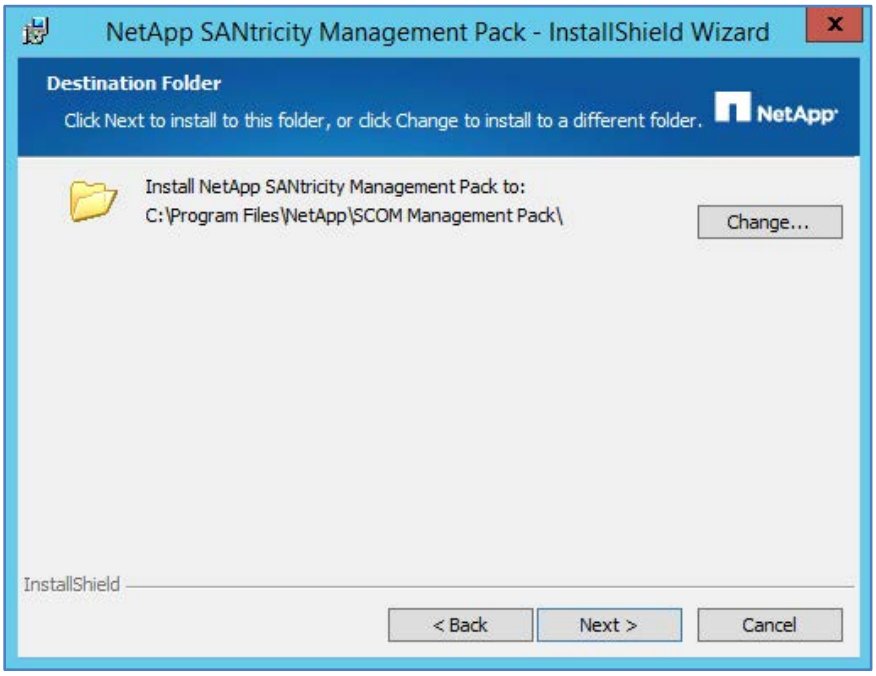
   The installation wizard is displayed.
4. Click **Next**.

   The End-User License Agreement dialog is displayed.



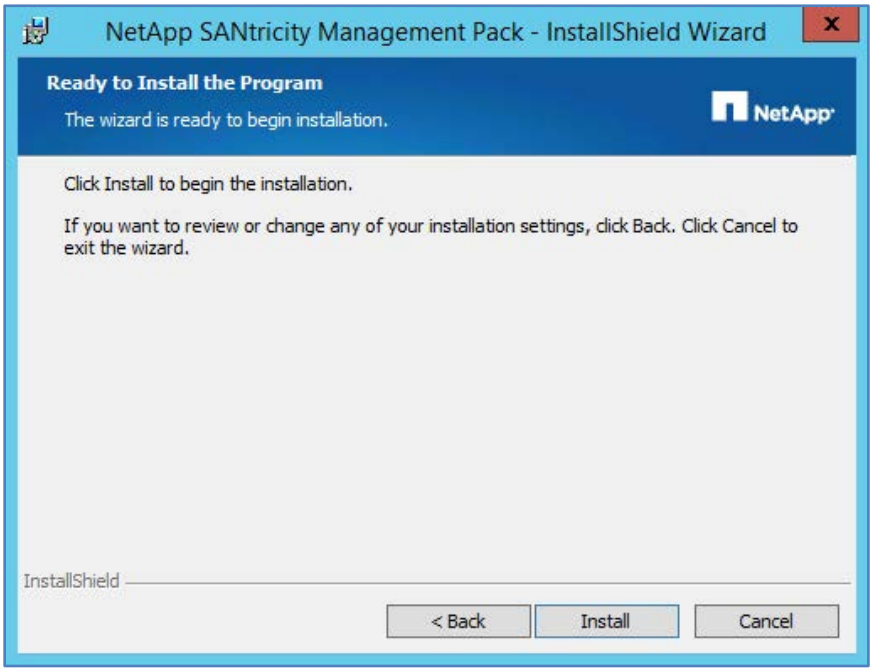

5. Select **I accept the terms in the license agreement,** and click **Next.**

   The Destination Folder dialog is displayed.



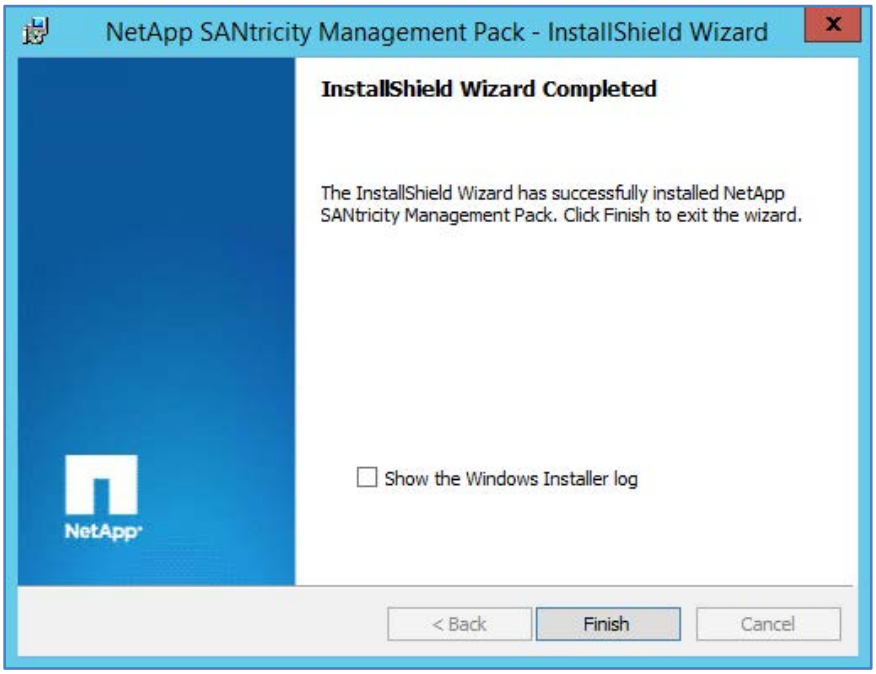

6. If needed, click Change to specify the desired folder location for the NetApp Management Pack.
7. Click **Next.**

   The Ready to Install the Program dialog is displayed.




8. Click **Install**.

   The installation complete dialog is displayed.




9. Click **Finish**.

   The Installation wizard closes.

## Discovering NetApp Storage Arrays

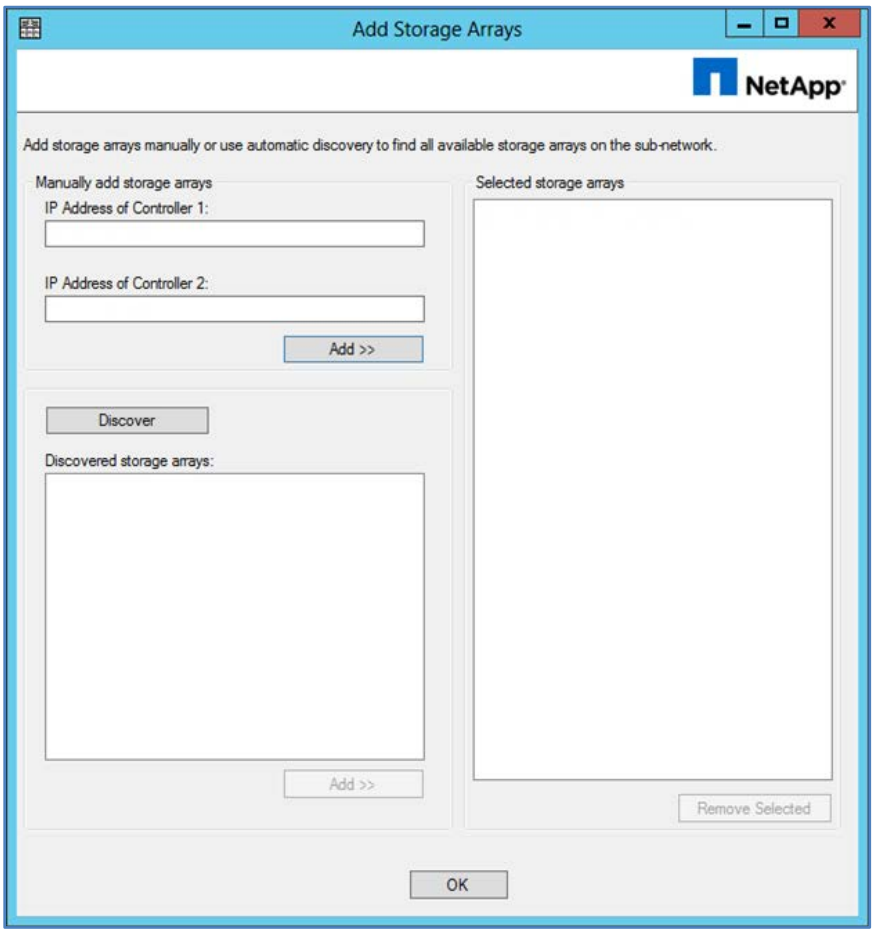
Perform the following actions to start the process of discovering NetApp storage arrays for SCOM monitoring.

The NetApp Storage Array Discovery application is at the following location:

```
..\NetApp\SCOM Management Pack
```

1. Select **Start >> All Programs**.
2. Locate the folder SCOM Management Pack.
3. Select the icon labeled NetApp Storage Array Discovery.
4. Run the NetApp Storage Array Discovery application.

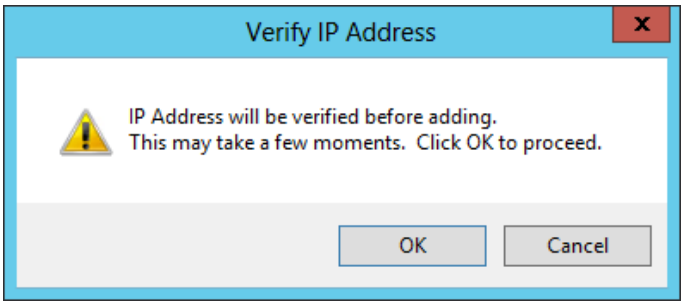
   The Add Storage Arrays window displays.




5. To add storage arrays manually, enter the IP address for each controller under the IP Address of Controller 1 and IP Address of Controller 2 fields and click **Add**.

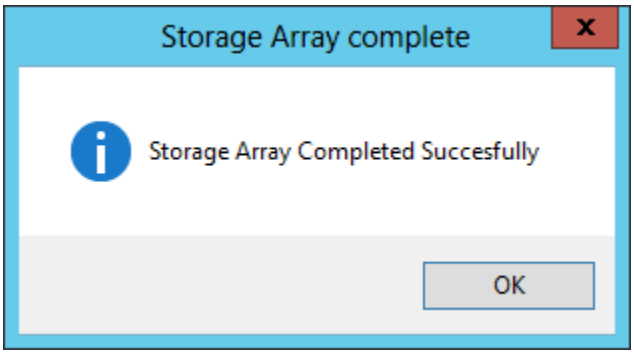
   The Verify IP Address dialog is displayed.

   **NOTE:** You can perform a manual discovery across subnets so long as the agent server and management server are within the same domain.




6. Click **OK**.

   The Storage Array complete dialog is displayed.



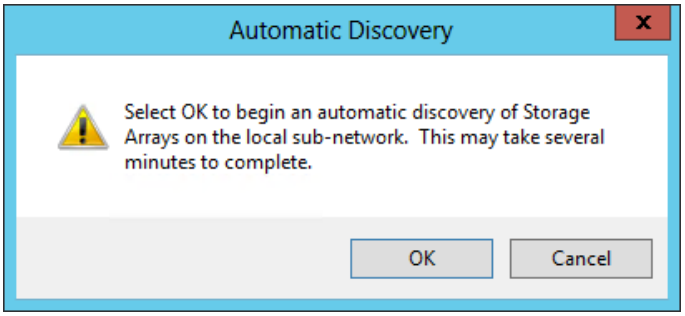

7. Click **OK**.

   The specified storage arrays displays under the Selected Storage Arrays section of the Add Storage Arrays window.

8. To add storage arrays automatically, click **Discover**.

   The Automatic Discovery dialog is displayed.

   **NOTE:** You can perform an auto-discovery only when the storage arrays are located within the same subnet that the proxy server is located. Multiple proxy servers can be located in different subnets. There is no limit to the number of proxy servers.




9. Click **OK**.

   The automatically discovered storage arrays display under the Discovered Storage Arrays section of the Add Storage Arrays window.

10. Under the Discovered Storage Arrays section, select the desired storage array IP addresses and click **Add**.

    The selected storage array IP addresses display under the Selected Storage Arrays section of the Add Storage Arrays window.

11. Click **OK**.

**NOTE:** If needed, the NetApp Storage Array Discovery application can be launched manually for Agent machines through the “Connect via RDP to manage Agent system” function under the SCOM operations manager. For more information, refer to Launching the NetApp Storage Array Discovery application through SCOM Operations Manager.

**NOTE:** NetApp recommends monitoring no more than 30 NetApp storage arrays for each agent-managed computer.

## Removing NetApp Storage Arrays

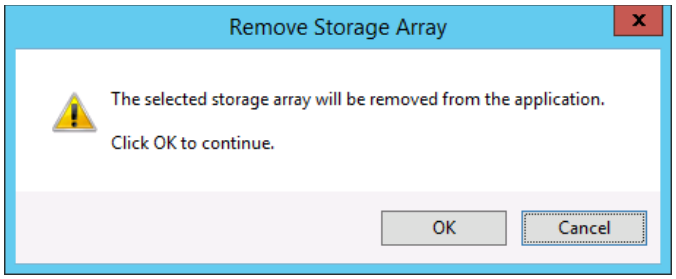
To remove a NetApp storage array from SCOM monitoring, perform these steps:

The NetApp Storage Array Discovery application is at the following location:

```
..\NetApp\SCOM Management Pack
```

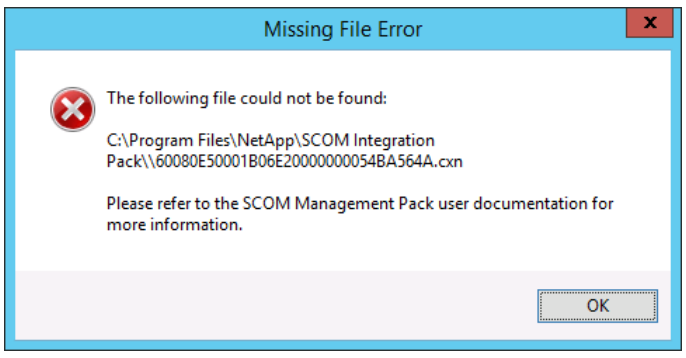
1. Select **Start >> All Programs** and locate the folder labeled SCOM Management Pack.
2. Select the **NetApp Storage Array Discovery** icon.
3. Run the NetApp Storage Array Discovery application.
4. Locate and select the storage array to be removed from SCOM monitoring in the Selected Storage Arrays pane.
5. Click **Remove Selected**.

   A confirmation dialog box appears followed by an option to continue or cancel the storage array removal process.




6. Click **OK**.

   **NOTE:** The Remove Selected function removes the array from the application, the <WWN>.cxn file, and from monitoring by the web server. Occasionally, the .cxn file might not be found when performing the Remove Selected function. In this instance, the array is removed; however, a Missing File Error dialog window also appears. The Missing File Error dialog window is a result of users deleting the .cxn file before performing the Remove Selected function.

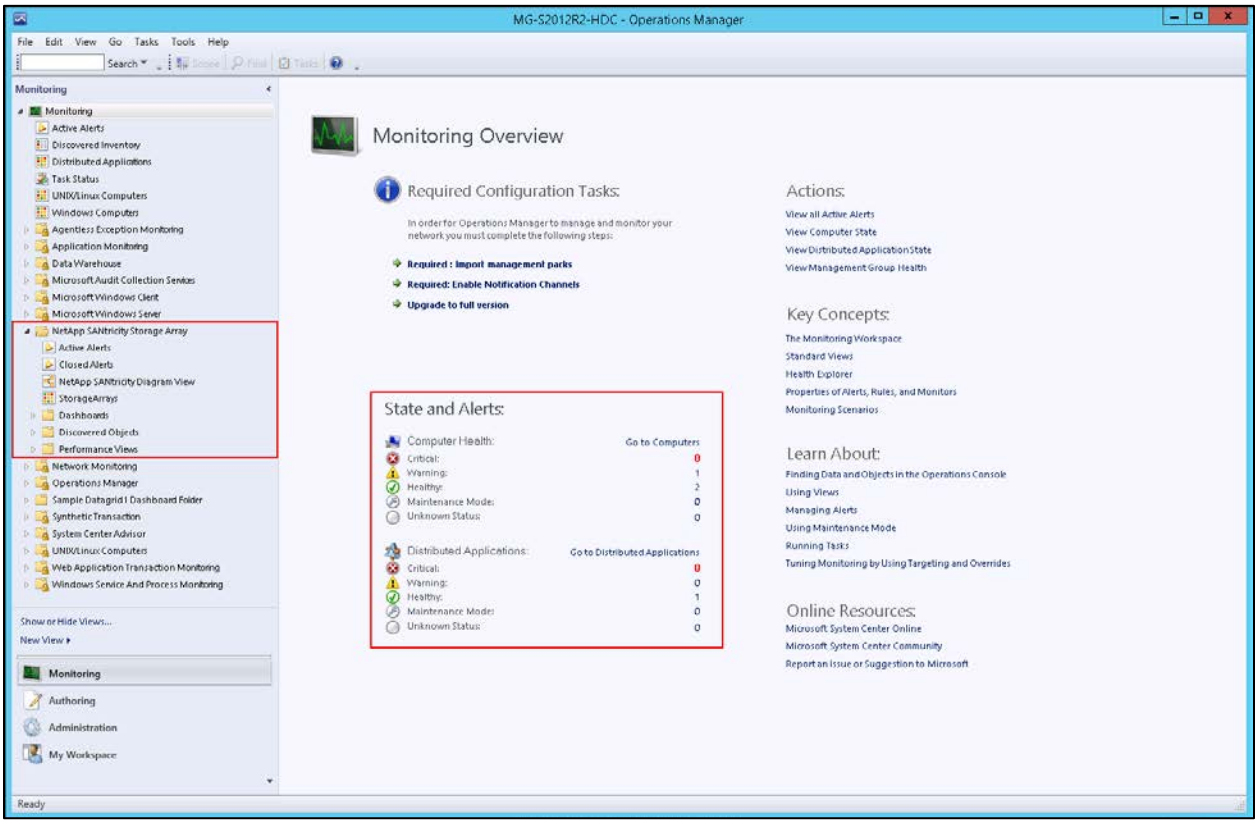


# NetApp Storage Arrays

The Monitoring pane in the Microsoft System Center 2012 Operations Manager console shows the expanded NetApp SANtricity Storage Array Storage Array folder containing the following views and subfolders:

- Active Alerts
- Closed Alerts
- Diagram View
- Storage Arrays
- Dashboards
- Discovered Objects
- Performance Views

The State and Alerts table shows the icons and descriptions for the health of computers and distributed applications.



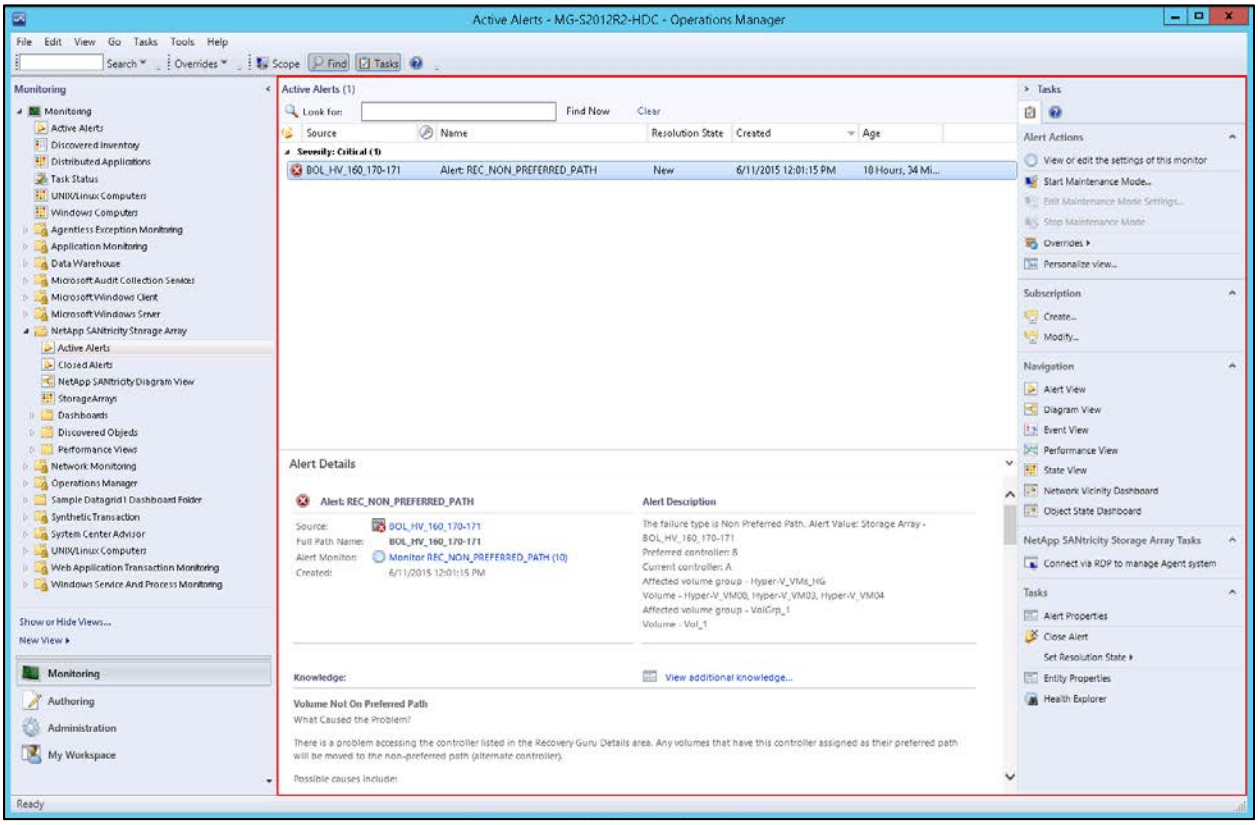

## Active Alerts

The Active Alerts pane shows the active alerts and corresponding summary information. Alert severity levels are separate. Alerts are grouped according to the severity of the alert. A storage array can have multiple alerts both within the same severity level and across multiple severity levels. Because the table can be sorted according to multiple criteria, the alerts might be grouped separately even within the same severity level.

Within severity levels, you can sort active alerts by the following criteria:

- Source
- Name
- Resolution State
- Created
- Age

To view the alerts that SCOM is actively monitoring for NetApp E-Series storage arrays, click **Active Alerts** in the NetApp E-Series Storage folder.




## Closed Alerts

The Closed Alerts pane shows the alerts that were manually closed and removed from the active alert state. The Closed Alerts pane displays alerts the same way that the Active Alerts pane displays alerts. You can sort closed alerts the same way as you sort active alerts.

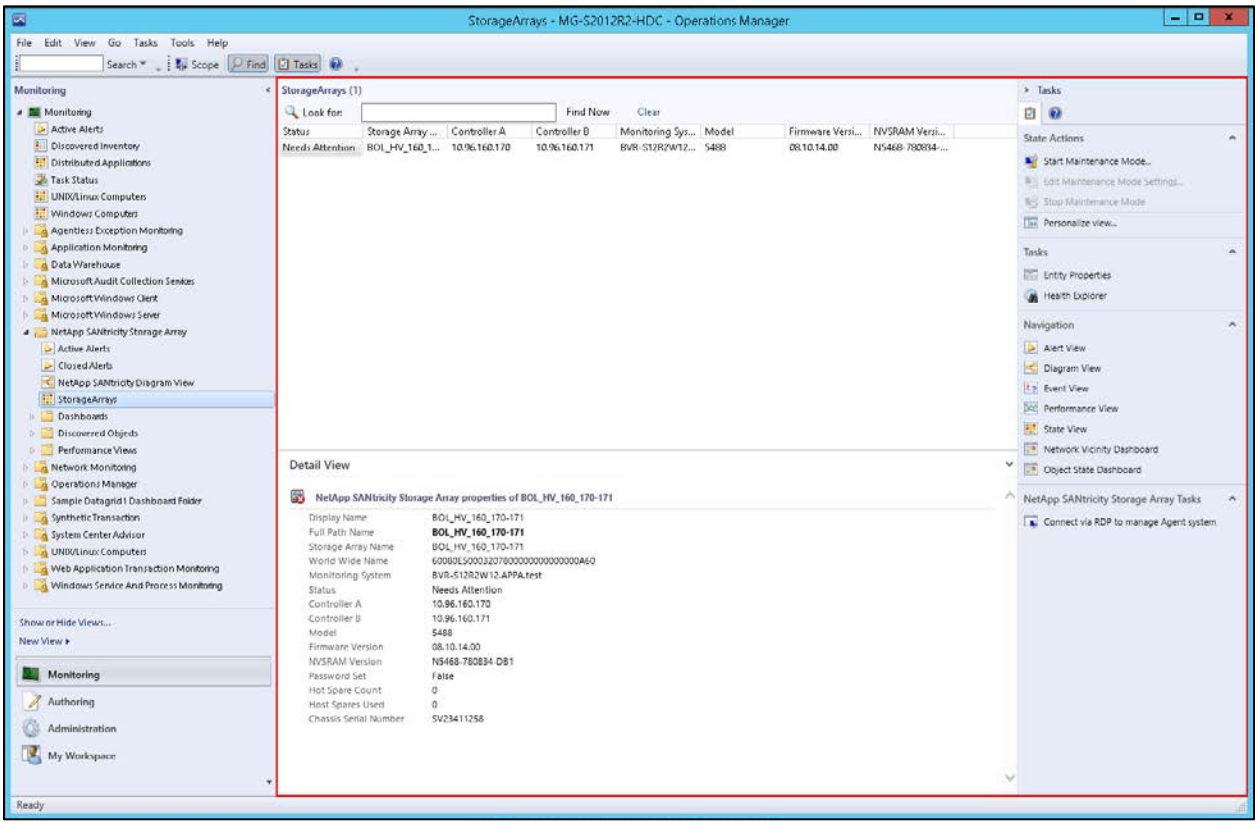
To view the closed alerts that SCOM is not monitoring for NetApp E-Series storage arrays, click **Closed Alerts** in the NetApp E-Series Storage folder.

## Storage Arrays

The Storage Arrays pane shows all storage arrays the SCOM is monitoring for health and performance. The State column shows both the storage array health and the storage array alert status. You can sort the storage arrays by the following criteria:

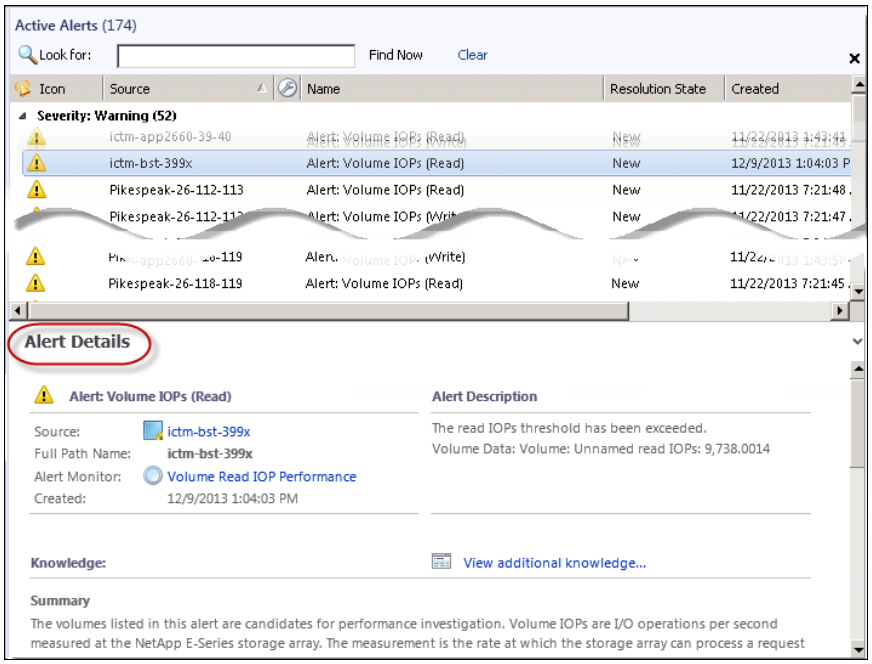
- State
- Status
- Controller A
- Controller B
- Model
- Firmware Version
- NVSRAM Version
- Name
- Monitoring System

To view the NetApp E-Series storage arrays that SCOM is actively monitoring for health and performance, click **StorageArrays** in the NetApp E-Series Storage folder.



# Viewing Alert Details

The SCOM Operations Manager shows alert details for both active and closed alerts. To view alert details, select an alert. The Alert Details pane displays detailed information for the selected alert.

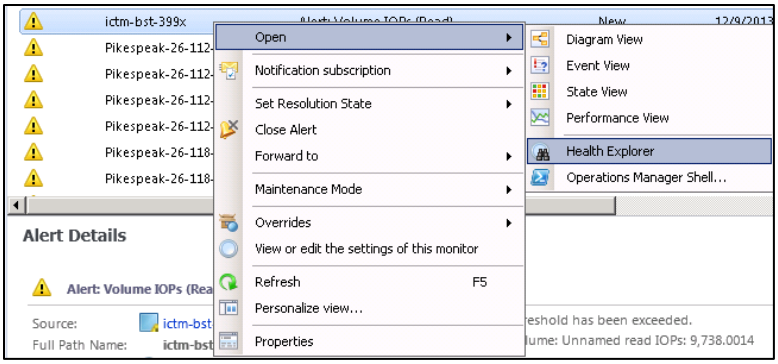



# Opening the Health Explorer

The Health Explorer shows the health of a storage array and its member volumes. You can open the Health Explorer from the Active Alerts view, Closed Alerts view, StorageArrays view, Diagram view, and Dashboards.

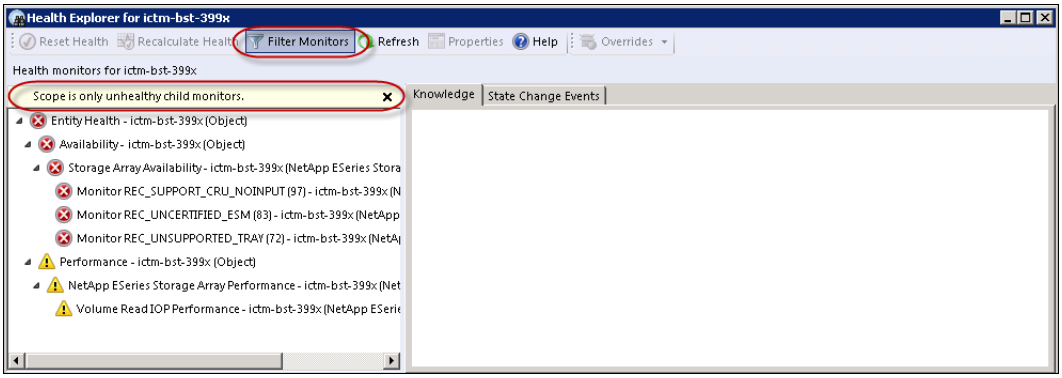
1. Right-click the alert or storage array.

   A pop-up menu appears.

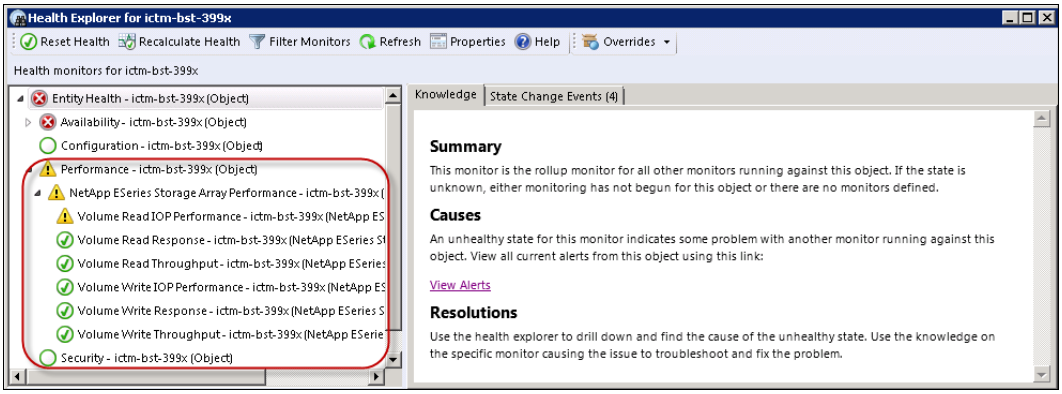



2. Select **Open >> Health Explorer**.

   The Health Explorer window opens.




- The initial view shows only unhealthy child monitors below the storage array as an object entity. You can filter the monitors to expand the entity to show both healthy and unhealthy child monitors.

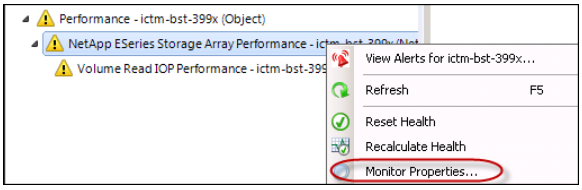



- To view all child monitors, click **Filter Monitors**. The Health monitors pane for the storage array shows both healthy and unhealthy child monitors and both critical alerts and performance warning alerts.
- To return to only unhealthy child monitors, click **Filter Monitors** on the top-line menu bar.

# Configuring Performance Properties

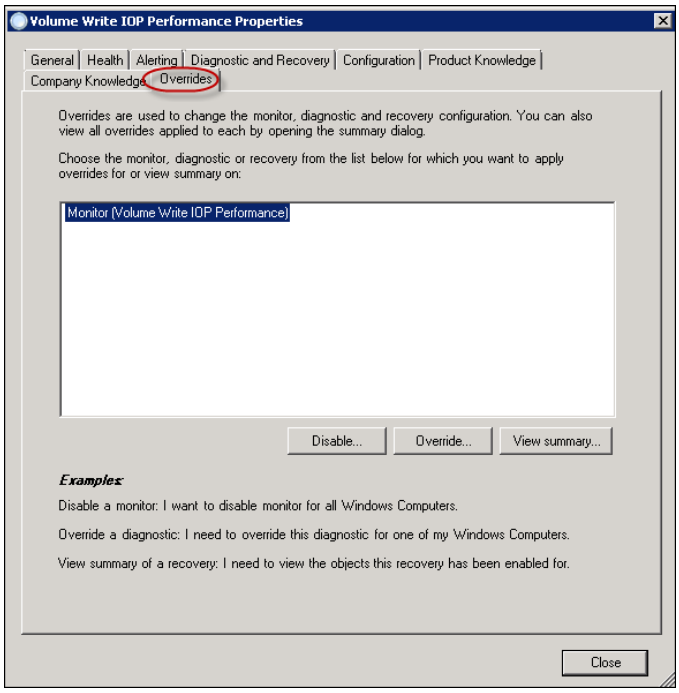
You can configure performance properties for a single volume or for a storage array.

1. Within the Health Monitor (accessible through the Health Explorer option), right-click the volume or storage array. A Performance pop-up menu appears.




- When you select a storage array, the NetApp ESeries Storage Array Performance Properties dialog box appears.
- When you select a volume, the Volume Performance Properties dialog box appears.

2. Click the **Overrides** tab.



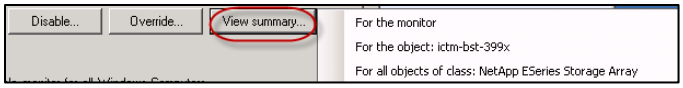

## Changing Override Values

You can view and change performance override values for the following volume and storage array entities:

- For a monitor
- For an object
- For all objects of a class

### Viewing Override Summaries

To view performance overrides summaries, click **View Summary** in the Volume Performance Properties dialog box. A View Summary pop-up menu appears.




- To view the summary for the monitor, click **For the Monitor**. See Overrides for a Monitor.
- To view the summary for the object, click **For the Object**. See Overrides for an Object.
- To view the summary for all objects of the class, click **For the Object**. See Overrides for all Objects of the Class.

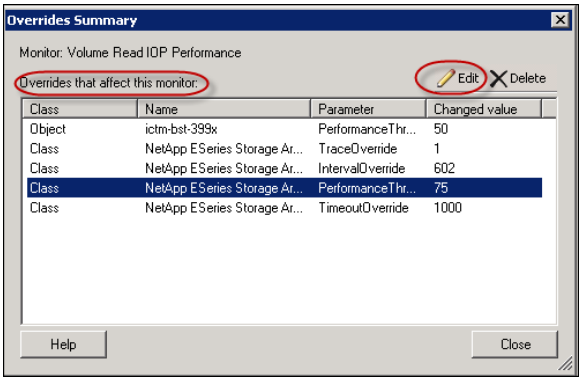
### Changing Override Values

You can change performance override values for the following volume or storage array entities:

- For a monitor
- For an object
- For all objects of a class

### Overrides for a Monitor

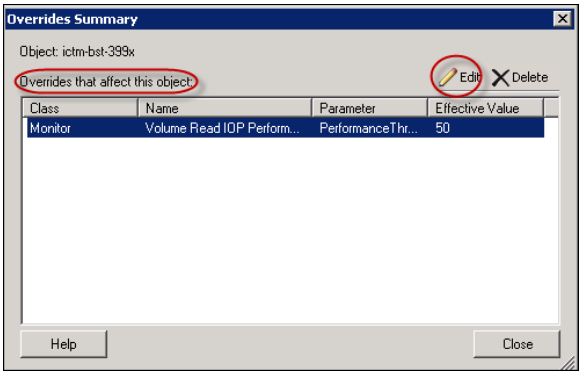
The Overrides Summary dialog box shows the performance overrides that affect the selected monitor. When the Overrides Summary dialog box shows performance overrides for multiple classes or objects, you can edit them all at one time.




- Overriding the performance monitor for an object changes the performance override value for only the object.
- Overriding the performance monitor for a class changes the performance override value for all objects in the class.
- To edit performance overrides for the monitor, select the class or object in the Class column of the Overrides that affect this monitor table.

### Overrides for an Object

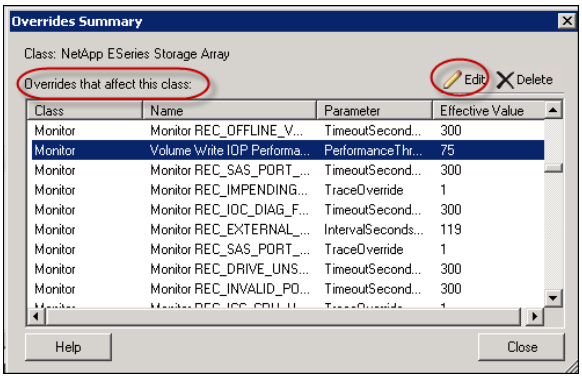
The Overrides Summary dialog box shows the performance overrides that affect the selected object. When the Overrides Summary dialog box shows performance overrides for multiple classes or objects, you can edit them all at one time.




- Overriding the performance monitor for an object changes the performance override value for only that object. The performance override values for all other objects in the class do not change.
- To edit performance overrides for the object, select the monitor in the Class column of the Overrides that affect this object table.

### Overrides for all Objects of the Class

The Overrides Summary dialog box shows the performance overrides that affect all objects within the selected class. When the Overrides Summary dialog box shows performance overrides for multiple classes or objects, you can edit them all at one time.



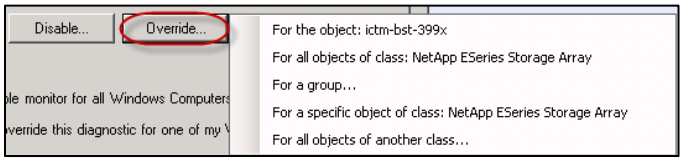

- Overriding the performance monitor for a class changes the performance override value for all objects in the class.
- To edit performance overrides for the object, select the monitor in the Class column of the Overrides that affect this monitor table.

## Editing Override Properties

You can edit performance override properties for the following volume or storage array entities:

- For an object
- For all objects of a class
- For a group
- For specific object of a class
- For all objects of another class

To override volume or storage array performance properties, click **Override** in the Volume Performance Properties dialog box. An Override pop-up menu appears.




## Overrides for the Object

Overriding the performance monitor for an object changes the performance override value for only the object. To edit performance override properties for an object, click **For the object**.

- The Override Properties dialog box appears.
- Performance Properties Overrides describes how to change performance override properties.

## Overrides for All Objects of Class

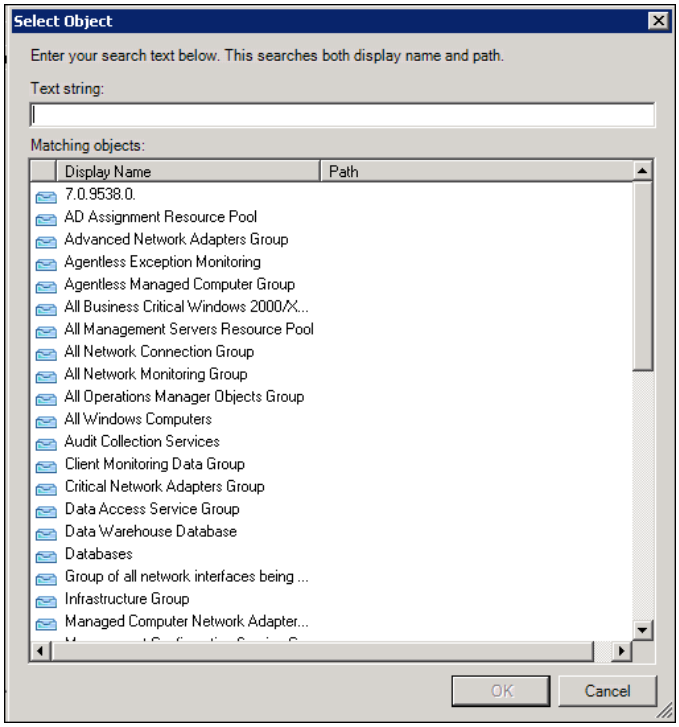
Overriding the performance monitor for an object changes the performance override value for only the object. To edit performance override properties for all objects of a class, click **For all objects of class**.

- The Override Properties dialog box appears.
- Performance Properties Overrides describes how to change performance override properties.

## Overrides for a Group

Overriding the performance monitor for a group changes the performance override value for all classes and objects that are members of the group. To edit performance override properties for a group, perform these steps:

1. Click **For a group**.
   The Select Object dialog box appears.




2. In the Display Name column, select the matching object.
3. Click **OK**.

   - The Override Properties dialog box appears.
   - Performance Properties Overrides describes how to change performance override properties.

## For a Specific Object of Class

Overriding the performance monitor for a specific object of a class changes the performance override value for only that object. The performance override values for all other objects in the class remain the same. To edit performance override properties for a specific object of a class, perform these steps:

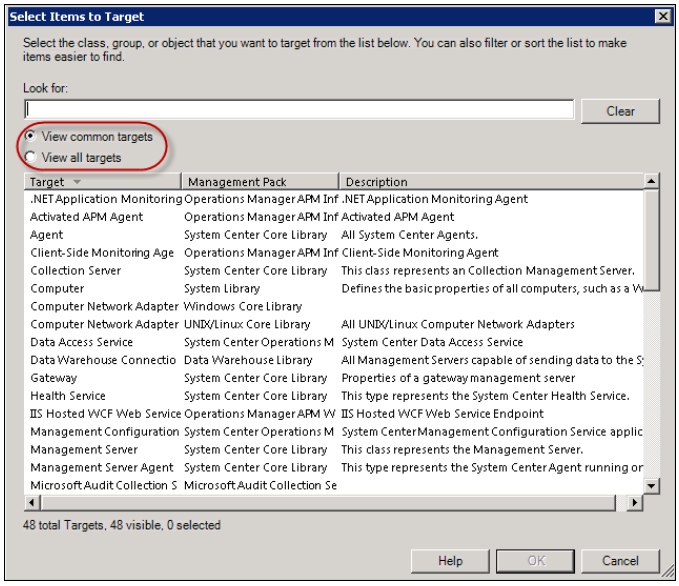
1. Click **For a specific object of class**.
   The Select Object dialog box appears.
2. In the Display Name column of the Select Object dialog box, select the matching object.
3. Click **OK**.

   - The Override Properties dialog box appears.
   - Performance Properties Overrides describes how to change performance override properties.

## For All Objects of Another Class

Overriding the performance monitor for all objects of another class changes the performance override value for all objects in that class. To override the performance monitor properties of all objects of another class, perform these steps:

1. Click **For all objects of another class**.
   The Select Items to Target dialog box appears.



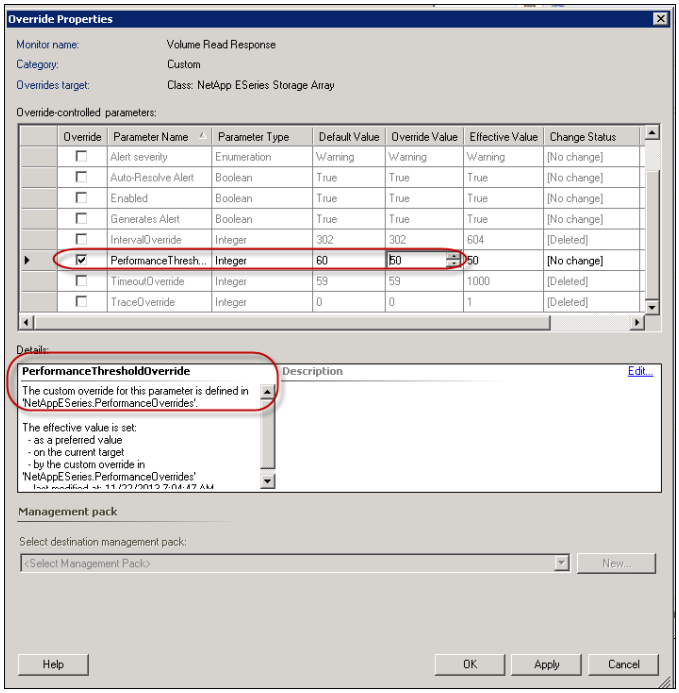

2. Select either View common targets or View all targets.
3. In the Target column, select the target class.
4. Click **OK**.

   - The Override Properties dialog box appears.
   - Performance Properties Overrides describes how to change performance override properties.

# Performance Properties Overrides

Use the Override Properties dialog box to configure performance property overrides for all entities.

- Monitor
- Object
- All objects of a class
- Group
- Specific object of a class
- All objects of another class




- The Override column identifies performance property overrides that apply to the monitor, object, or class.
- The Details section of the Override Properties dialog box identifies the custom overrides defined in the `NetAppESeries.PerformanceOverrides` management pack.
- The Default Value column shows the value assigned to the performance parameter in the default management pack.
- The Override Value column shows the override value assigned to the performance parameter in the `NetAppESeries.PerformanceOverrides` management pack.

## Configuring Performance Property Overrides

You can add, change, and delete performance property overrides.

### Adding a Performance Property Override

1. In the Override column, select the new performance override.
2. Change the performance override values.

    - To change the default performance value, type the new performance value in the Default Value column.
    - To change the performance override value, select the new performance value from the drop-down list in the Override Value column.

3. Save the new performance override.

   - To save the new performance override and continue configuring performance monitor overrides, click **Apply**.
   - To save the new performance override and close the Override Properties dialog box, click **OK**.

     The Overrides Summary dialog box appears.

### Removing a Performance Property Override

1. In the Override column, uncheck the performance override to remove.
2. Save the changed performance overrides.

   - To save the changes and continue configuring performance monitor overrides, click **Apply**.
   - To save the changes and close the Override Properties dialog box, click **OK**.

     The Overrides Summary dialog box appears.

### Changing a Performance Property Override

1. In the Override column, select the performance override to change.
2. Change the performance override values.

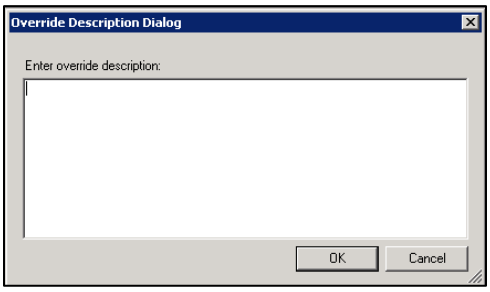
   - To change the default performance value, type the new value in the Default Value column.
   - To change the performance override value, select the new performance value from the drop-down list in the Override Value column.

     The Overrides Summary dialog box appears.

## Editing Performance Override Descriptions

The Details section contains the read-only, default description of the monitor override parameter. To add, change, or delete a customized description, perform these steps:

1. In top right corner of the Details text box, click **Edit**.
   The Override Description Dialog – Enter Override description dialog box appears.

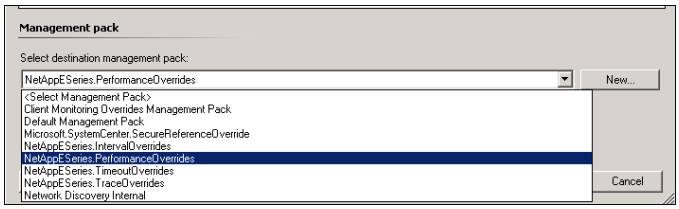



2. In the Enter override description text box, either type a new description, edit the current description, or delete the current description.
3. Click **OK**.

## Selecting the Management Pack

When you change a performance override value, the Select destination management pack drop-down list is active. To select the management pack, perform these steps:

1. In the Select destination management pack drop-down list, click **NetAppESeries.PerformanceOverrides**.




   The Select destination management pack drop-down list closes.

2. Save the performance override properties.

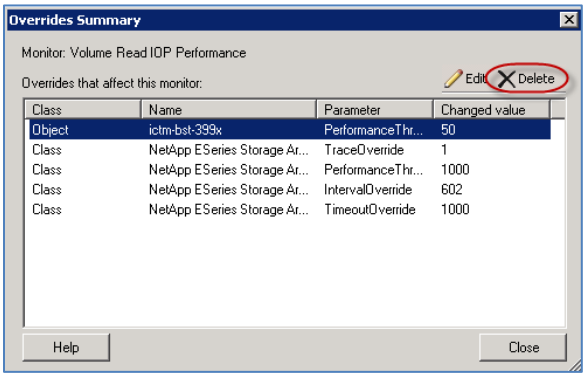
   - To save the changes and continue configuring performance monitor overrides, click **Apply**.
   - To save the changes and close the Override Properties dialog box, click **OK**.

## Deleting Monitor Overrides

To delete a monitor override, perform the following steps:

**CAUTION** When you delete a performance override, the performance override is deleted immediately. No confirmation message appears.

1. In the Overrides Summary dialog box, select the performance override to delete.

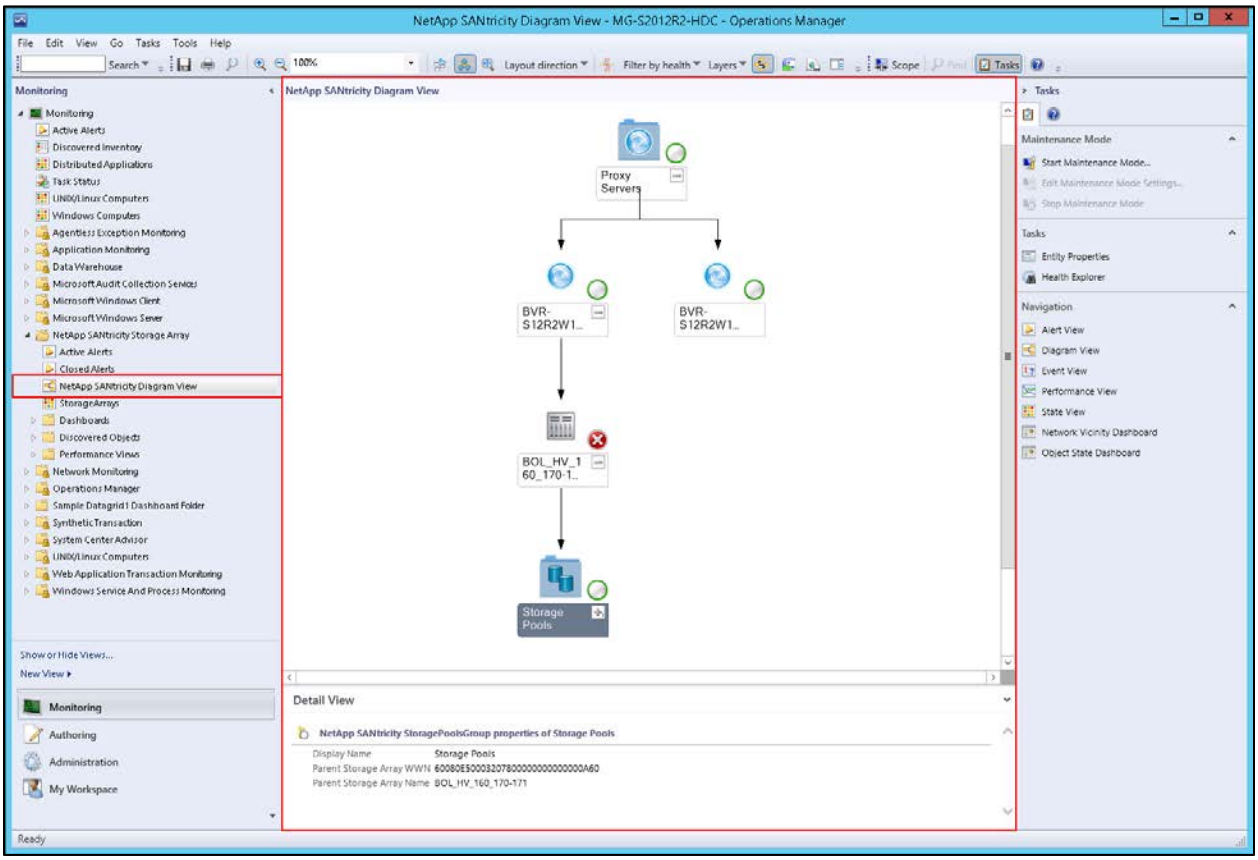



2. Click **Delete**.
3. Click **Close** to return to the Overrides Properties dialog box.

# Diagram View

The Diagram View enables you to see a hierarchical representation of all storage and hardware currently being monitored by the plug-in, so that you can more easily isolate problems to a specific storage object.

You can expand this view to display storage hierarchy, so that you can isolate problems to the exact component on which they occur. When you select a storage object, you can view information about in the Detail View window.




The following table shows an overview of the group and object icons used for each storage object type under the Diagram View window.

| Storage Object(s) | Diagram View Group icon |
|---|---|
| Proxy |  |
| Thin Volumes |  |
| Drives |  |
| Consistency Groups |  |

| Storage Object(s) | Diagram View Group icon |
|---|---|
| Volumes |  |
| Storage Pools |  |
| Asynchronous Mirror Groups |  |

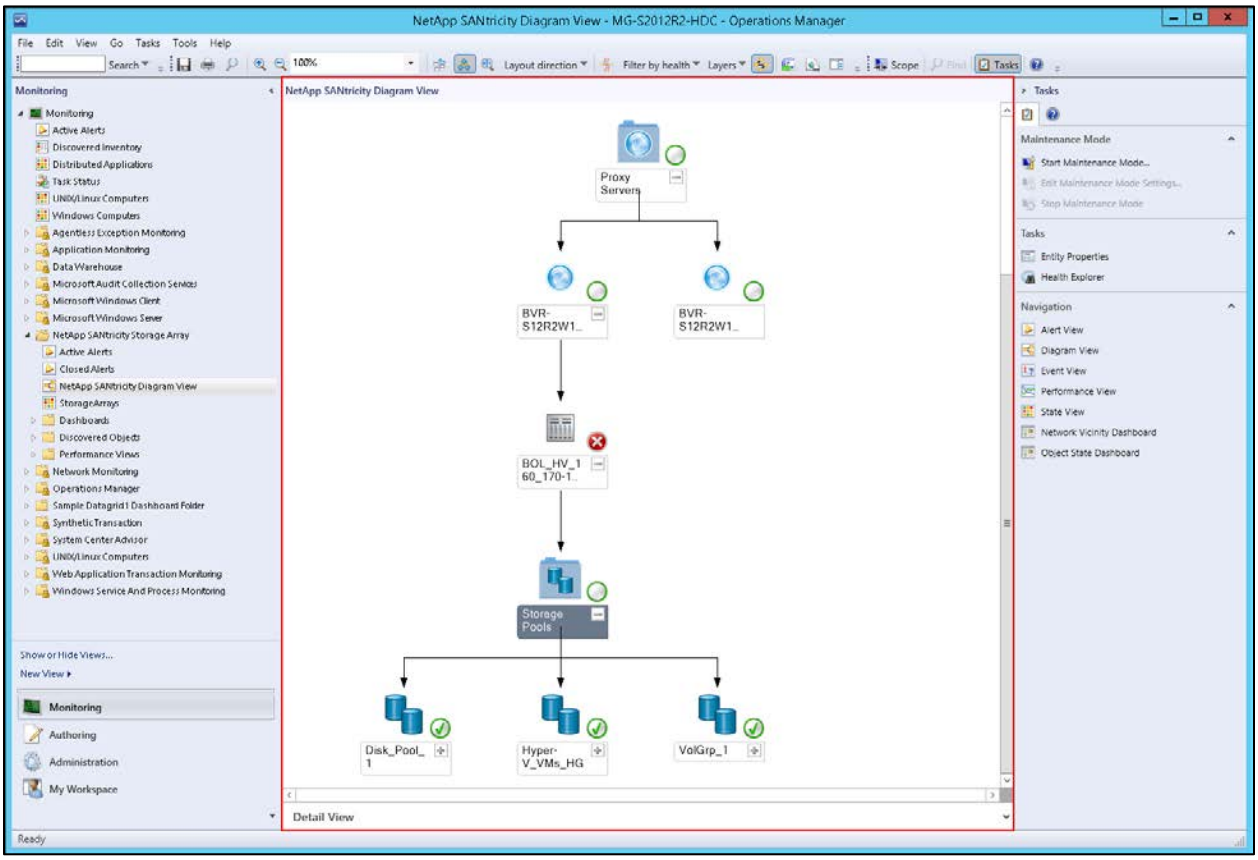
| Storage Object(s) | Diagram View Object icon |
|---|---|
| Storage Arrays |  |
| Snapshot |  |
| Proxy |  |
| AMG |  |
| AMG Pair |  |
| Consistency Group |  |
| Consistency Group Volume |  |

| Storage Object(s) | Diagram View Object icon |
|---|---|
| Volume |  |
| Thin Volume |  |
| Storage Pool |  |
| Drive |  |

## Customizing the Storage Hierarchy Display

To customize the storage hierarchy display under the Diagram View window, perform the following:

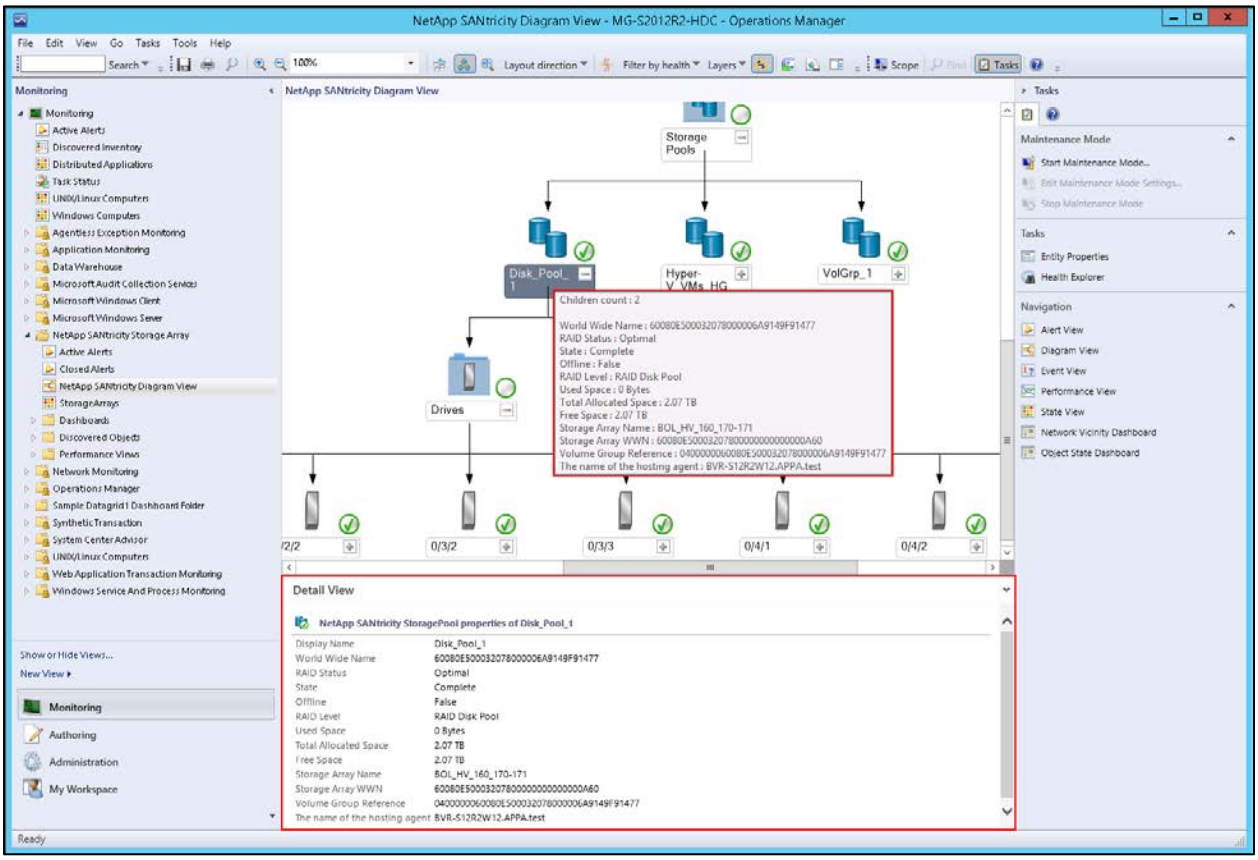
1. Under the Monitoring panel, expand the NetApp E-Series Storage folder and select **Diagram View**.
   The Diagram View window is displayed.
2. To display the subtree for an applicable storage object, click  **Plus**.
   The subtree for the root storage object expands under the Diagram View window.
3. To hide the subtree for an applicable storage object, click  **Minus**.
   The subtree for the root storage object contracts under the Diagram View window.
4. If needed, repeat Step 2 and/or Step 3 to further customize the display of the storage hierarchy under the Diagram View window.
5. To adjust the scale of the storage hierarchy display, select the desired setting under the Zoom field (located under the top toolbar of the Diagram View window).




## Viewing Detailed Information for a Storage Object

To view detailed information for a storage object under the Diagram View window, perform the following:

1. Under the Monitoring panel, expand the NetApp E-Series Storage folder and select **Diagram View**.
   The Diagram View window is displayed.
2. If needed, click **Minus** under the appropriate root storage object(s) to access the desired subtree storage object.
3. Click the desired storage object icon under the Diagram View window.
   Detailed information for the storage object appears under the Detail View panel of the Diagram View window.
4. Alternatively, move the cursor over the desired storage object icon under the Diagram View window to view the corresponding detailed information as hover text.

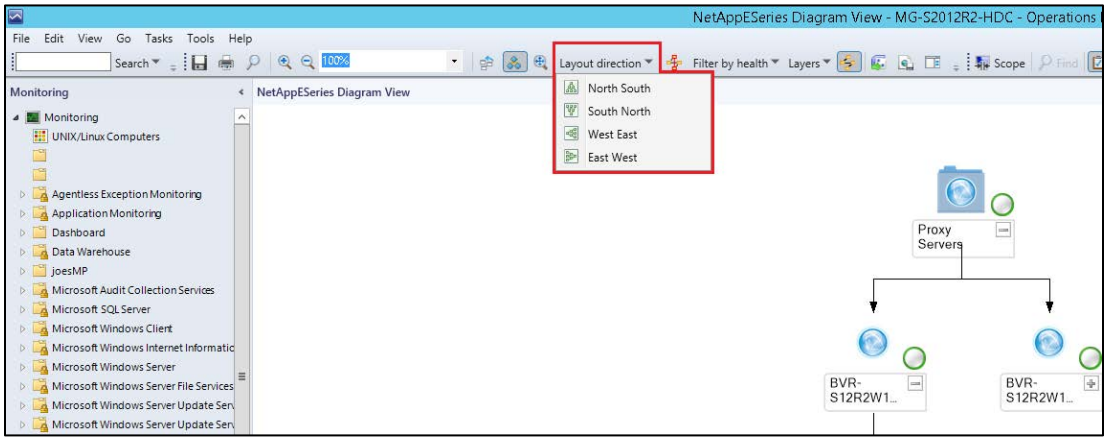



## Customizing Layout Direction

To customize the layout direction under the Diagram View window, perform the following:

1. Under the Monitoring panel, expand the NetApp E-Series Storage folder and select **Diagram View**.
   The Diagram View window is displayed.
2. Under the toolbar section of the Diagram View window, click **Layout direction** and select one of the following drop-down options:
   -  - North South
   -  - South North
   -  - West East
   -  - East West

   The storage hierarchy under the Diagram View window appears in the selected layout direction.




## Filtering Storage Objects by Health State

To filter storage objects under the Diagram View window by assigned health state, perform the following:

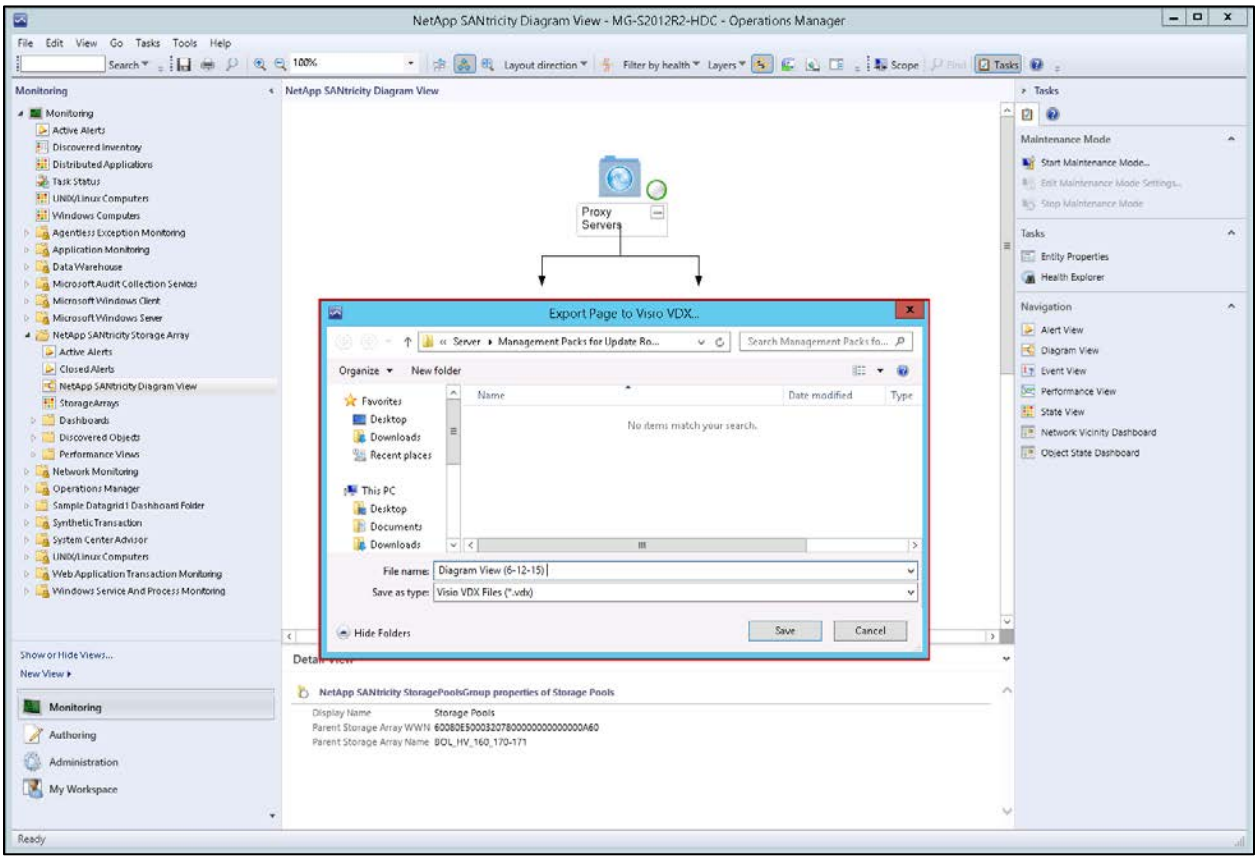
1. Under the Monitoring panel, expand the NetApp E-Series Storage folder and select **Diagram View**.
   The Diagram View window is displayed.
2. Under the toolbar section of the Diagram View window, click **Filter By Health** and select one of the following drop-down options:
   - - All
   - - Unknown State
   - - Healthy State
   - - Warning State
   - - Unhealthy State

   The Diagram View window filters the display of storage objects by the selected health state.

## Exporting Diagram View Pages to Visio VDX

To export the displayed Diagram View page to Visio VDX, perform the following:

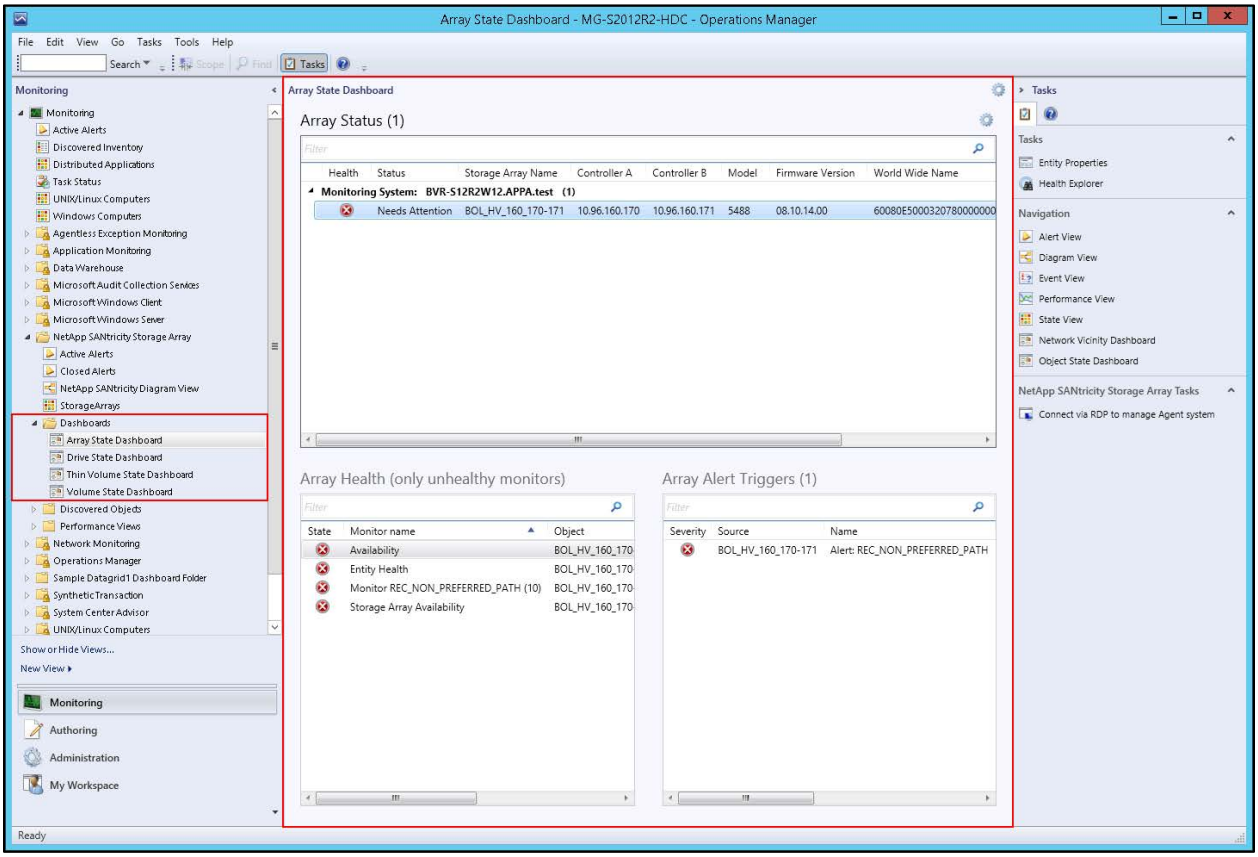
1. Under the Monitoring panel, expand the NetApp E-Series Storage folder, and select **Diagram View**.
   The Diagram View window is displayed.
2. As needed, customize the display of the storage hierarchy under the Diagram View window via the available options (i.e., Plus, Minus, Filter by Health, Layout Direction, etc).
3. Under the toolbar section of the Diagram View window, click **Export**.
   The Export Page to Visio VDX window displayed.
4. Specify the folder location to save Visio VDX file under the Export Page to Visio VDX window.
5. Under the File Name field, enter the desired name for the Visio VDX file.




6. Click **Save**.
   A Visio VDX file is saved under the specified folder location.

# Dashboards

The Dashboards under the NetApp SANtricity Management Pack for Microsoft System Center Operations Manager (SCOM) provide you with a summarized view of the state and health of your storage resources. Functionality for the Dashboard feature is divided into separate Array State, Drive State, Thin Volume State, and Volume State dashboards. Each Dashboard allows you to filter and drill down summary results to view more detailed analysis for specific storage objects.

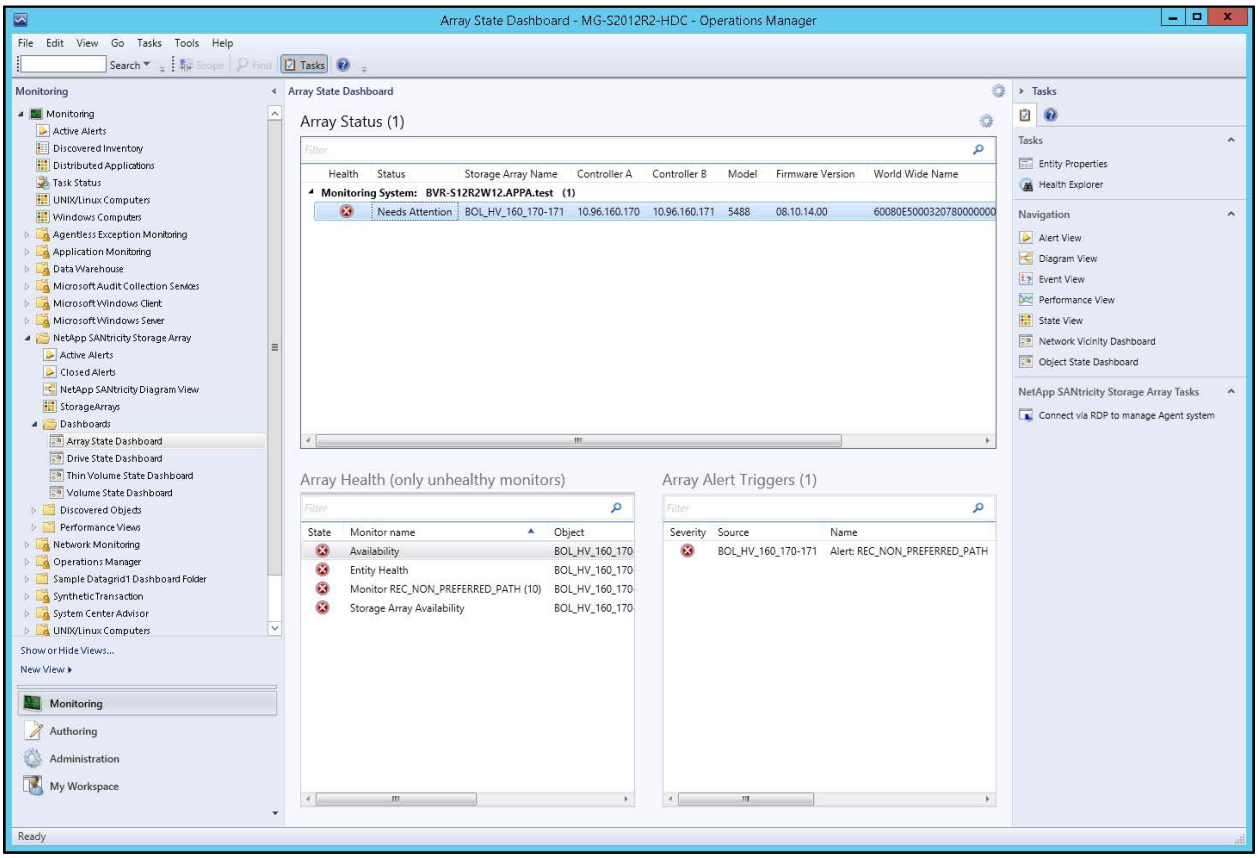



## Using the Array State Dashboard

Perform the following to access and use the Array State Dashboard:

1. Under the Monitoring panel, expand **NetApp E-Series Storage Array >> Dashboards** and select **Array State Dashboard**.
   The Array State Dashboard is displayed.
2. To filter results by specific monitoring system, enter the desired alphanumeric criteria under the Filter field of the Array Status panel and click **Search**.
   The Array Status panel displays monitoring systems matching the specified filter criteria.
3. To view additional information for any monitoring system, select the desired item under the Array Status panel and select the desired option under the Tasks, Navigation, or Report Tasks menus (accessible through the right-click menu and Tasks panel).
   Based on the selected menu option, detailed information for the monitoring system is displayed.
4. If available, select an unhealthy monitor under the Array Status panel.
   Related array data for the selected unhealthy monitor appears under the Array Health (only unhealthy monitors) panel.
5. To view available alert data for an item, select the desired item under the Array Health (only unhealthy monitors) panel.
   Related alert data appears under the Array Alert Triggers panel.
6. To close an alert, select the desired alert under the Array Alert Triggers panel and click **Close Alert** under the Navigation menu (accessible through the right-click menu and right panel).
   The selected alert is closed and removed from the Array Alert Triggers panel.

7. To apply a resolution to an alert, select the desired alert under the Array Alert Triggers panel, click **Set Resolution State,** and select the desired resolution option (accessible through the right-click menu and right panel).
   The selected resolution option is applied to the alert under the Array Alert Triggers panel.

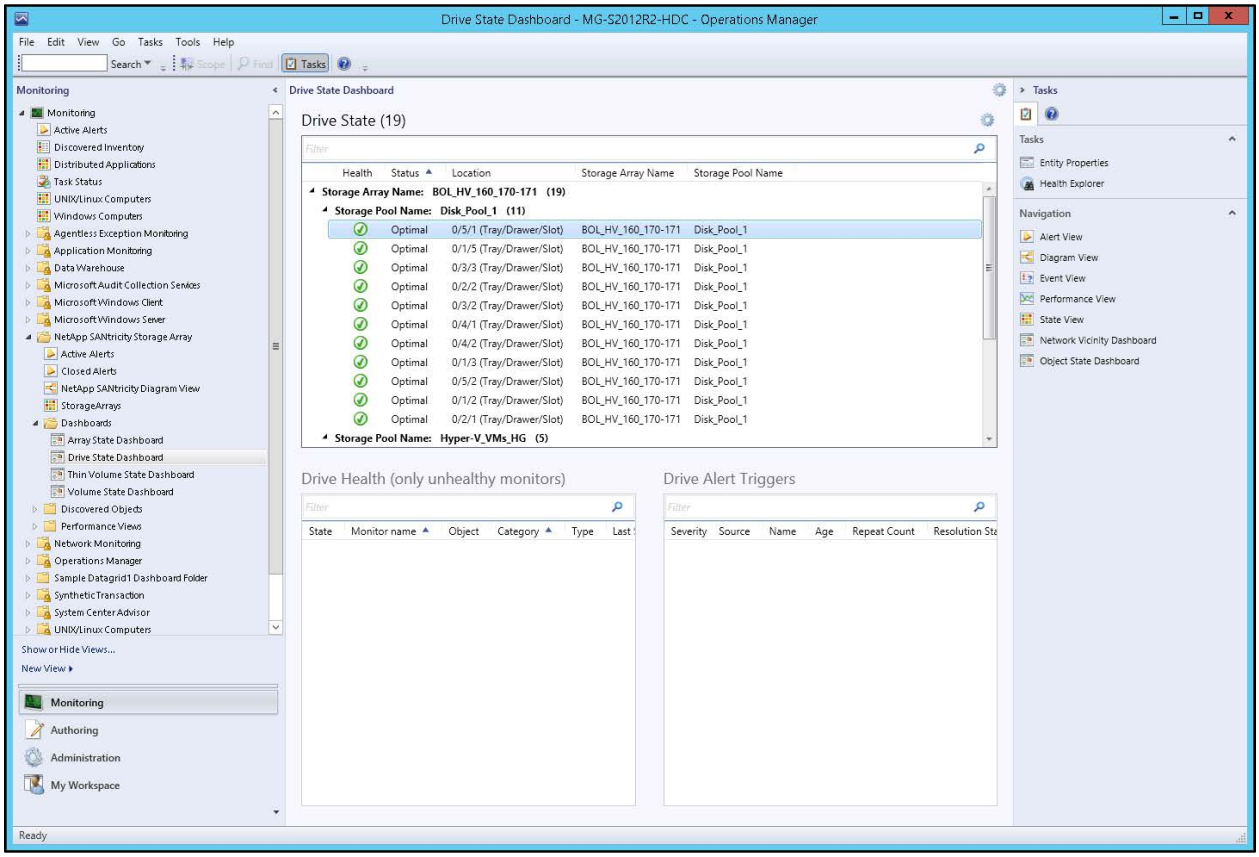



## Using the Drive State Dashboard

Perform the following to access and use the Drive State Dashboard:

1. Under the Monitoring panel, expand **NetApp E-Series Storage Array >>Dashboards,** and select Drive State Dashboard.
   The Drive State Dashboard is displayed.
2. To filter results by specific drive, enter the desired alphanumeric criteria under the Filter field of the Drive State panel and click **search**.
   The Drive State panel displays drives matching the specified filter criteria.
3. To view additional information for any drive, select the desired item under the Drive State panel, and select the desired option under the Tasks, Navigation, or Report Tasks menus (accessible through the right-click menu and Tasks panel).
   Based on the selected menu option, detailed information for the drive state is displayed.
4. If available, select an unhealthy drive under the Drive State panel.
   Related drive data for the selected unhealthy drive appears under the Drive Health (only unhealthy monitors) panel.
5. To view available alert data for an item, select the desired item under the Drive Health (only unhealthy monitors) panel.
   Related alert data appears under the Drive Alert Triggers panel.

6. To close an alert, select the desired alert under the Drive Alert Triggers panel, and click **Close Alert** under the Navigation menu (accessible through the right-click menu and right panel).
   The selected alert is closed and removed from the Drive Alert Triggers panel.
7. To apply a resolution to an alert, select the desired alert under the Drive Alert Triggers panel, click **Set Resolution State**, and select the desired resolution option (accessible through the right-click menu and right panel).
   The selected resolution option is applied to the alert under the Drive Alert Triggers panel.




## Using the Thin Volume State Dashboard

Perform the following to access and use the Thin Volume State Dashboard:

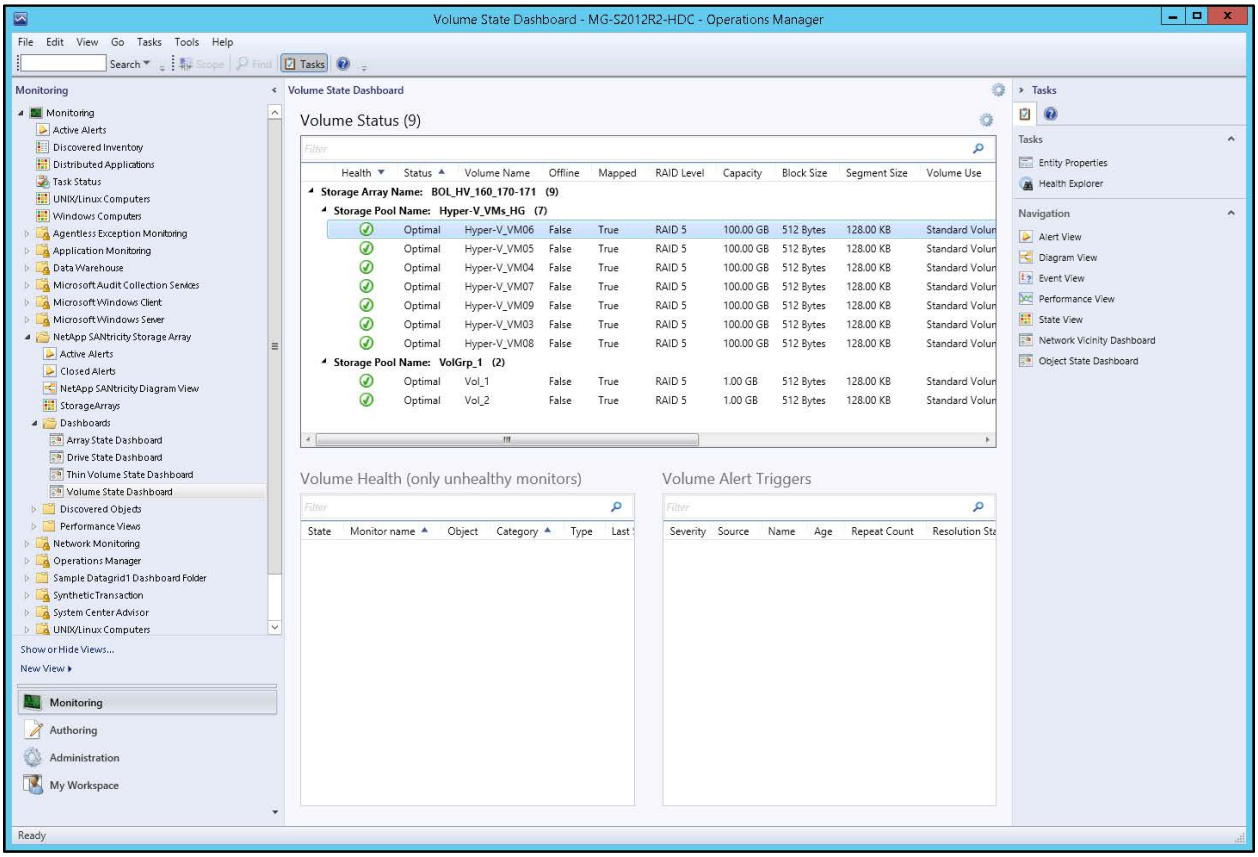
1. Under the Monitoring panel, expand **NetApp E-Series Storage Array >> Dashboards**, and select **Thin Volume State Dashboard**.
   The Thin Volume State Dashboard is displayed.
2. To filter results by specific thin volume, enter the desired alphanumeric criteria under the Filter field of the Thin Volume Status panel, and click **search**.
   The Thin Volume Status panel displays thin volumes matching the specified filter criteria.
3. To view additional information for any thin volume, select the desired item under the Thin Volume Status panel, and select the desired option under the Tasks, Navigation, or Report Tasks menus (accessible through the right-click menu and Tasks panel).
   Based on the selected menu option, detailed information for the thin volume is displayed.
4. If available, select an unhealthy thin volume under the Thin Volume Status panel.
   Related thin volume data for the selected unhealthy storage item appears under the Thin Volume Health (only unhealthy monitors) panel.

5. To view available alert data for an item, select the desired item under the Thin Volume Health (only unhealthy monitors) panel.
   Related alert data appears under the Thin Volume Alert Triggers panel.
6. To close an alert, select the desired alert under the Thin Volume Alert Triggers panel, and click **Close Alert** under the Navigation menu (accessible through the right-click menu and right panel).
   The selected alert is closed and removed from the Thin Volume Alert Triggers panel.
7. To apply a resolution to an alert, select the desired alert under the Thin Volume Alert Triggers panel, click **Set Resolution State**, and select the desired resolution option (accessible through the right-click menu and right panel).
   The selected resolution option is applied to the alert under the Thin Volume Alert Triggers panel.

## Using the Volume State Dashboard

Perform the following to access and use the Volume State Dashboard:

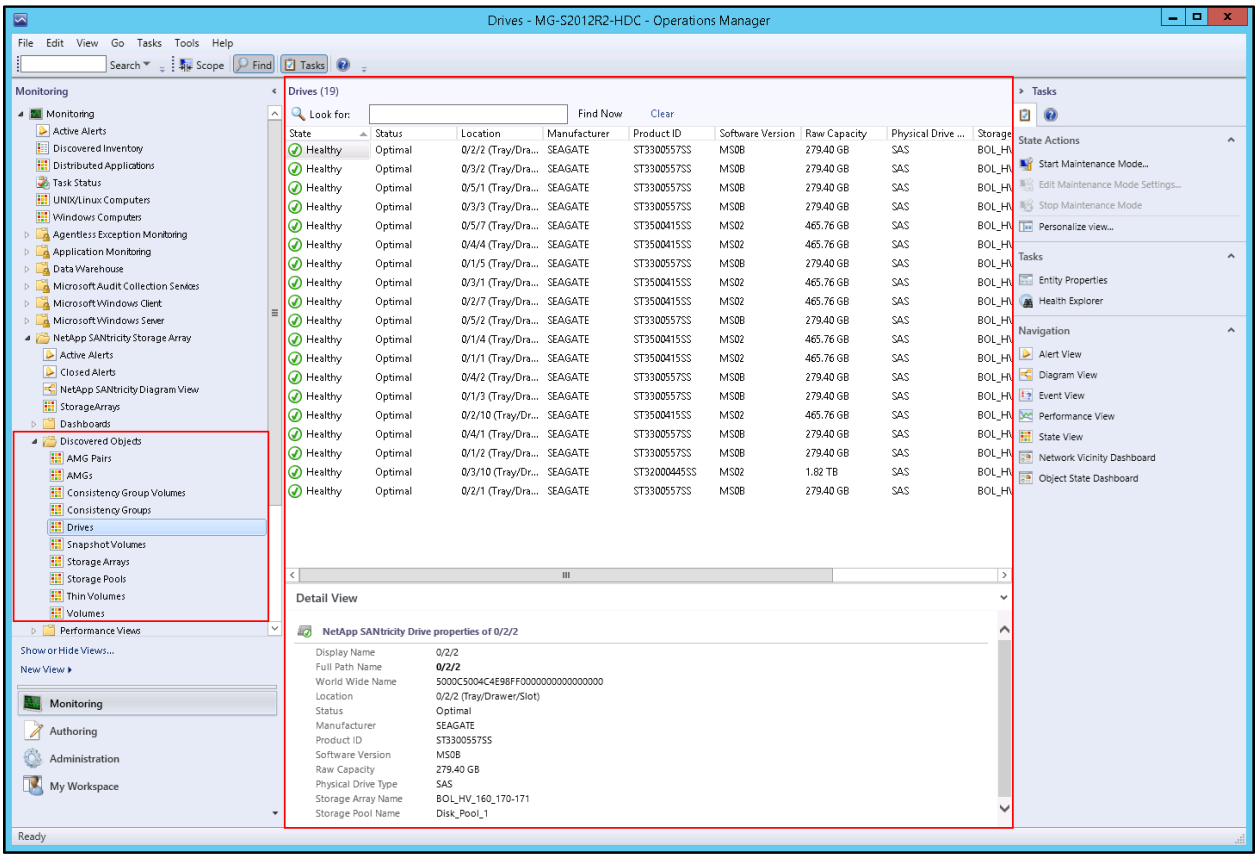
1. Under the Monitoring panel, expand **NetApp E-Series Storage Array >> Dashboards,** and select **Volume State Dashboard**.
   The Volume State Dashboard is displayed.
2. To filter results by specific volume, enter the desired alphanumeric criteria under the Filter field of the Volume Status panel and click **search**.
   The Volume Status panel displays volumes matching the specified filter criteria.
3. To view additional information for any volume, select the desired item under the Drive State panel, and select the desired option under the Tasks, Navigation, or Report Tasks menus (accessible through the right-click menu and Tasks panel).
   Based on the selected menu option, detailed information for the volume state is displayed.
4. If available, select an unhealthy monitor under the Volume Status panel.
   Related drive data for the selected unhealthy volume appears under the Volume Health (only unhealthy monitors) panel.
5. To view available alert data for an item, select the desired item under the Volume Health (only unhealthy monitors) panel.
   Related alert data appears under the Volume Alert Triggers panel.
6. To close an alert, select the desired alert under the Volume Alert Triggers panel, and click **Close Alert** under the Navigation menu (accessible through the right-click menu and right panel).
   The selected alert is closed and removed from the Volume Alert Triggers panel.
7. To apply a resolution to an alert, select the desired alert under the Volume Alert Triggers panel, click **Set Resolution State**, and select the desired resolution option (accessible through the right-click menu and right panel).
   The selected resolution option is applied to the alert under the Volume Alert Triggers panel.




# Discovered Objects

The Discovered Objects dashboard allows you to view all NetApp discovered objects. You can view the following discovered objects through the Discovered Objects dashboard:

- AMG Pairs
- AMGs
- Consistency Group Volumes
- Consistency Groups
- Drives
- Snapshot Volumes
- Storage Arrays
- Storage Pools
- Thin Volumes
- Volumes



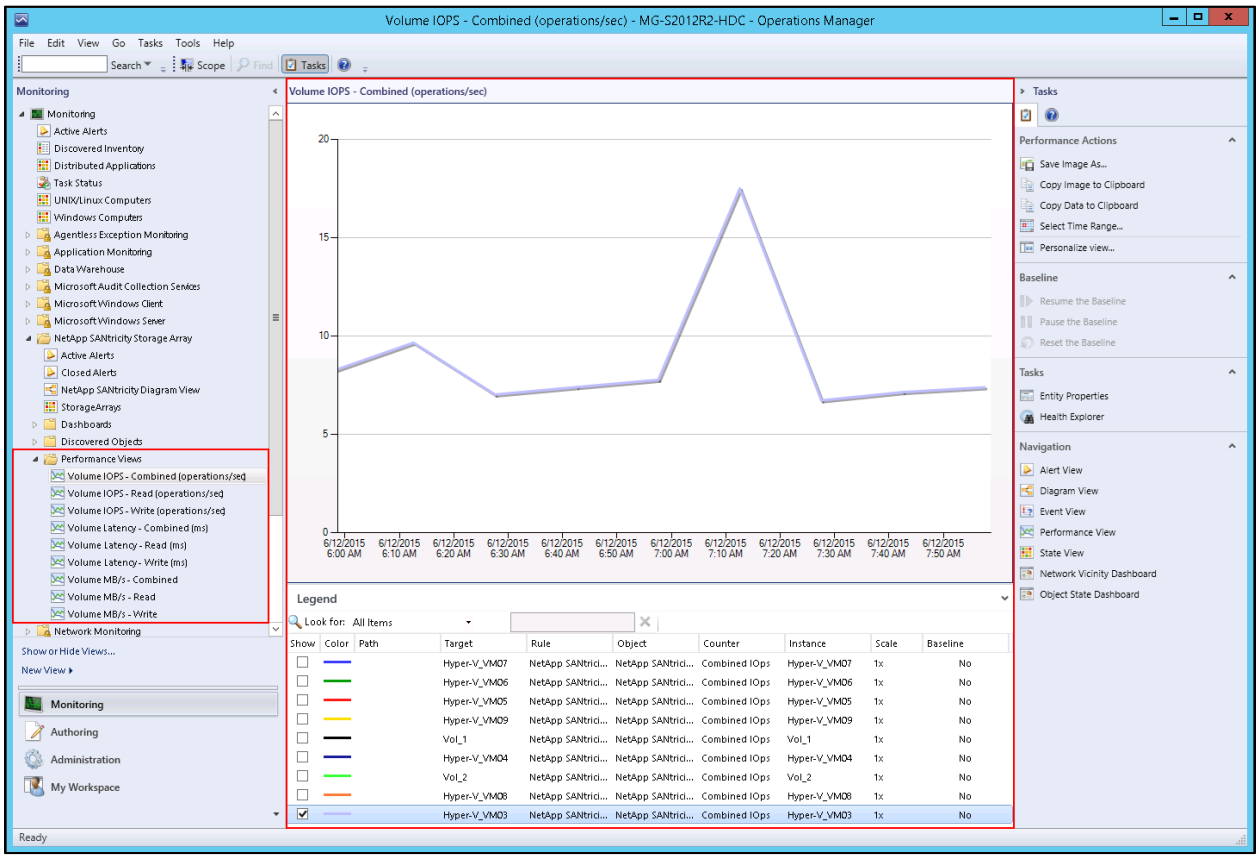

**NOTE:** Exceeding the recommended number of 30 NetApp storage arrays for an agent-managed computer might result in Not Monitored objects within the Discovered Objects view. For more information, please refer to Objects not monitored in Discovered Objects view.

# Performance Views

The Performance Views dashboard allows you to view data for various volume performance metrics through a graphical chart. Specific volume performance metrics are selectable through the Monitoring panel of the SCOM Operations Manager Console. The following performance metrics are selectable through the Performance View Dashboard:

- Volume IOPs – Combined (operations/sec)
- Volume IOPs – Read (operations/sec)
- Volume IOPs – Write (operations/sec)
- Volume Latency – Combined (ms)
- Volume Latency – Read (ms)
- Volume Latency – Write (ms)
- Volume MB/s – Combined
- Volume MB/s – Read
- Volume MB/s – Write

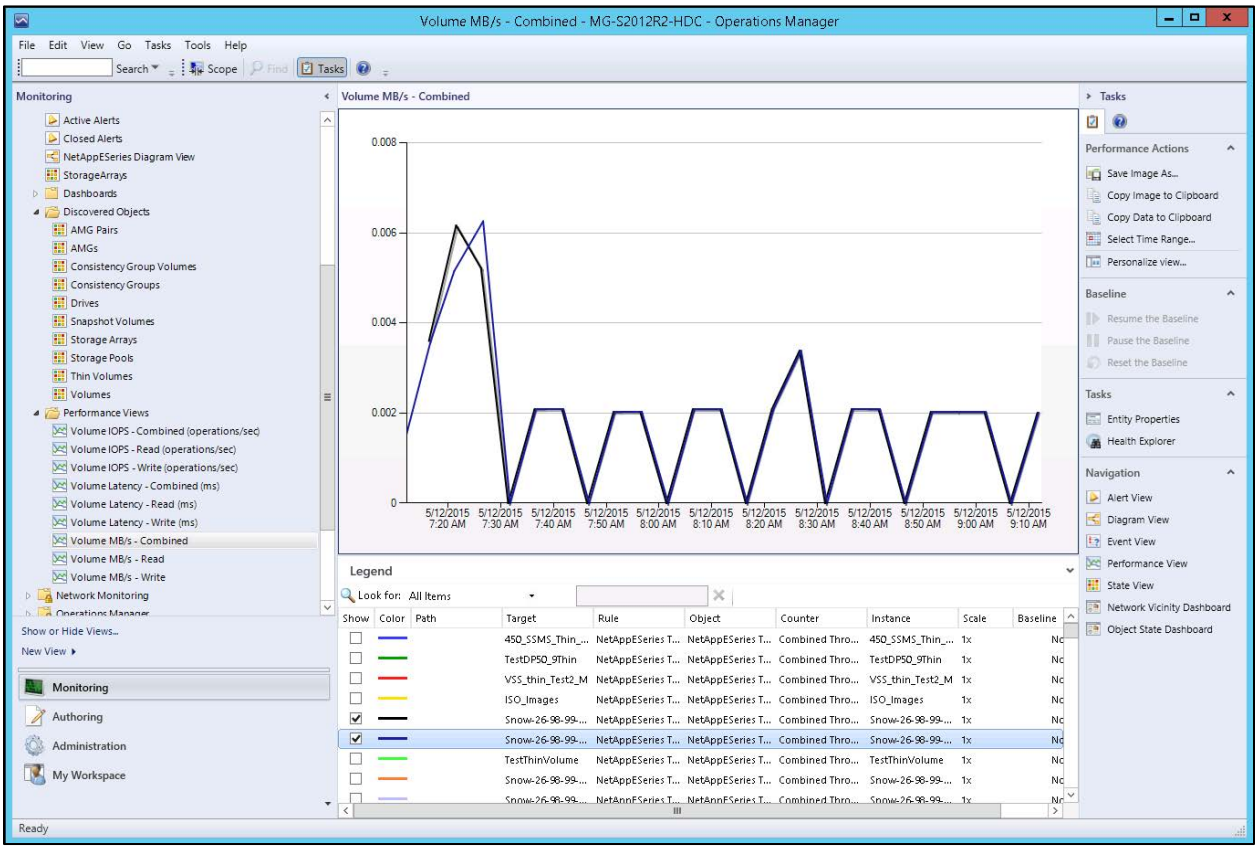
When a performance metric is selected, you can chart data for a specific volume by selecting the item under the Legend section of the Performance Views dashboard. You also can select and chart multiple volumes simultaneously with the Performance Views dashboard. Based on the selection or selections under the Legend section, the Performance Views dashboard displays the corresponding volume performance data on an X/Y axis chart. The date range applied to the displayed chart is customizable through the Select Time Range option under the Performance Actions menu of the Performance Views dashboard.




## Using the Performance Views Dashboard

Perform the following to access and use the Performance View dashboards:

1. Under the Monitoring panel, expand **NetApp E-Series Storage Array >> Performance Views**, and select the desired performance view dashboard.
   The selected performance view dashboard is displayed.
2. Under the Legend section, click the **Show** column to display the corresponding target data within the performance view dashboard.
   The selected target data appears within the chart section of the Performance Views dashboard.




3. To filter displayed targets under the Legend section, select one of the following options under the Look For field:

   - **All Items** – Lists all available targets.
   - **Items in the Chart** – Lists all targets currently displayed under the chart section of the performance view dashboard.
   - **Items not in the Chart** – Lists all targets not displayed under the chart section of the performance view dashboard.
   - **Items by text search** – Enables the filtering of targets by partial or complete alphanumeric entries through the adjacent text search field.

4. If needed, click **Select Time Range** under the Performance Actions menu to customize the timeline view under the displayed chart.
   The Time Range dialog window is displayed.

   a. To chart target data by specific time, check the **Specific start and end times** radio button.

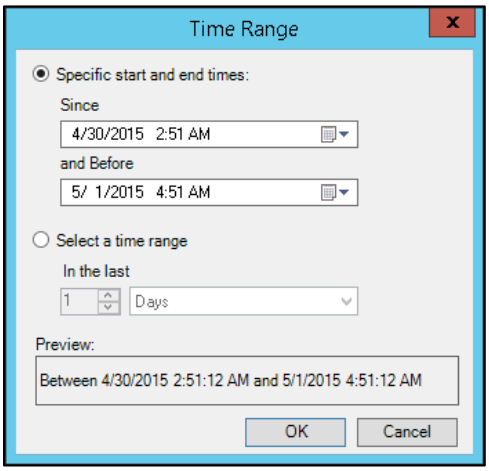
      Select the desired start and end date/time under the corresponding **Since** and **Before** fields.

   b. To chart target data by time range, check the **Select a time range** radio button.

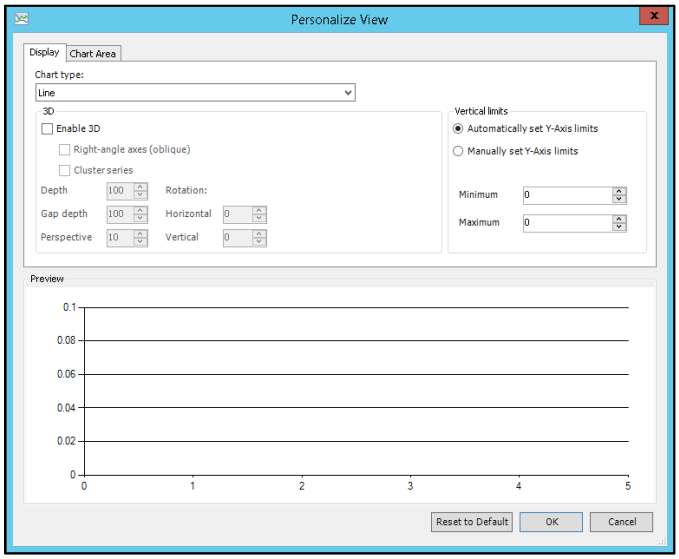
      Select the desired time interval under the **In the last** fields.

   c. Click **OK**.

      The performance view chart displays target data by the specified time range filter criteria.




5. To customize the view of the displayed chart, click **Personalize View** under the Performance Actions menu. The Personalize View dialog is displayed.




a. Select the desired visual options under the Display or Chart Area tabs.

b. Click **OK**.

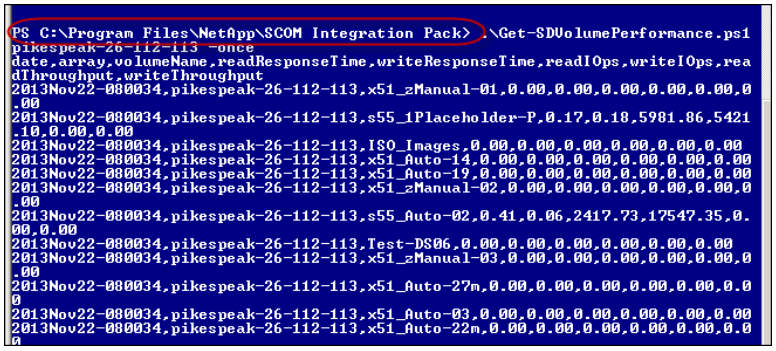
The performance view chart displays target data by the specified visual options.

# Obtaining Volume Performance Data

The NetApp Storage Array Management Pack contains a script for obtaining the performance data of storage arrays and volumes that the SCOM Management pack is monitoring.

## Performance Monitor Data Output

You can import the data into a spreadsheet as a tool to organize the data, sort it, chart it, and analyze it for debugging purposes when a performance alert is triggered. The following screenshot displays an example of a data performance script.




**NOTE:** You must run the script from a proxy server.

You can obtain performance data on only one storage array at a time. The script returns the following performance data:

- Response time (latency) - The amount of time expressed in milliseconds that the array takes to perform an I/O operation
- Input/output operations per second
- Throughput expressed as MB per second

Performance statistics are returned from the NetApp E-Series web service API. The Performance Date is refreshed with new analyzed data every 300 seconds. By default, the script returns the performance data for all volumes on a storage array and returns performance data only when requested. However, you can edit the script in the following ways:

- Continuously poll a storage array and return the data as terminal window output. The script returns performance data for the specified volume and then sleeps before returning performance data again.
- Change the data collection interval.
- Specify individual volumes on a storage array for which to return performance data.

Configuration for the Web Services API is available through the `wsconfig.xml` file. The `wsconfig.xml` file is located in the webserver directory of the installation path of the NetApp SCOM Management Pack at the following location:

```
..\NetApp\SCOM Management Pack\webserver
```

You can run a script to download the performance data for a single volume as a comma-delimited spreadsheet. The spreadsheet provides a tool for you to use to analyze volume performance data. You can run the script to query the web server and output the data to the terminal two modes.

- The default mode is a one-time query.
- The script can run in continuous mode. To interrupt the continuous output, press **Ctrl+C**.

The script returns the following volume performance data:

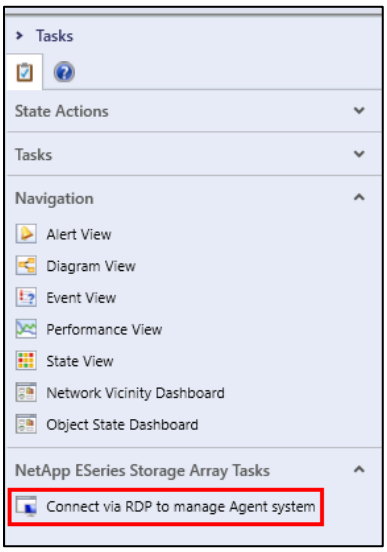
- Read response time
- Write response time
- Read IOPs
- Write IOPs
- Read throughput
- Write throughput

To run the script, the SCOM Management Pack must be monitoring the storage array. By default, the script returns the data for all volumes on the storage array, but you can filter the list of volumes on which to run the script.

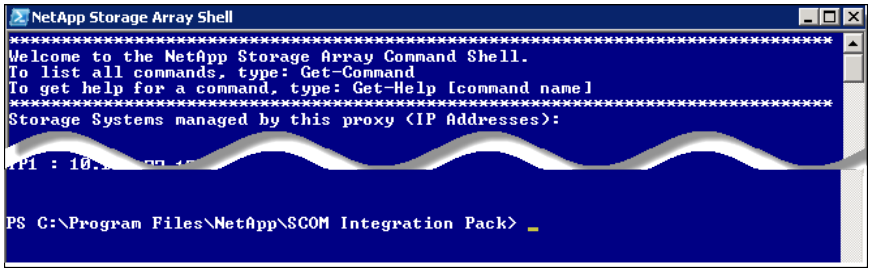
## Running the Performance Data Script

You must run the script from the NetApp Storage Array Shell. To run the script, perform these steps:

1. In the SCOM Operations Manager window, select a volume or storage array on which to run the script.
2. In the right pane of the SCOM Operations Manager window, click **Connect via RDP to manage Agent system**.




   The proxy server opens.
3. On the proxy server desktop, select **Start >> NetApp StorageArray Console**.
   The NetApp Storage Array Shell terminal window opens and shows all storage arrays managed by the proxy server.



4. At the command prompt, type one of the following commands:

   - For a one-time return of volume performance data:

     `.\Get-SDVolumePerformance.ps1 <array name> –once`

     **EXAMPLE:**

     `.\Get-SDVolumePerformance.ps1 ictm-bst-399x -once`

   - For a continuous return of volume performance data:

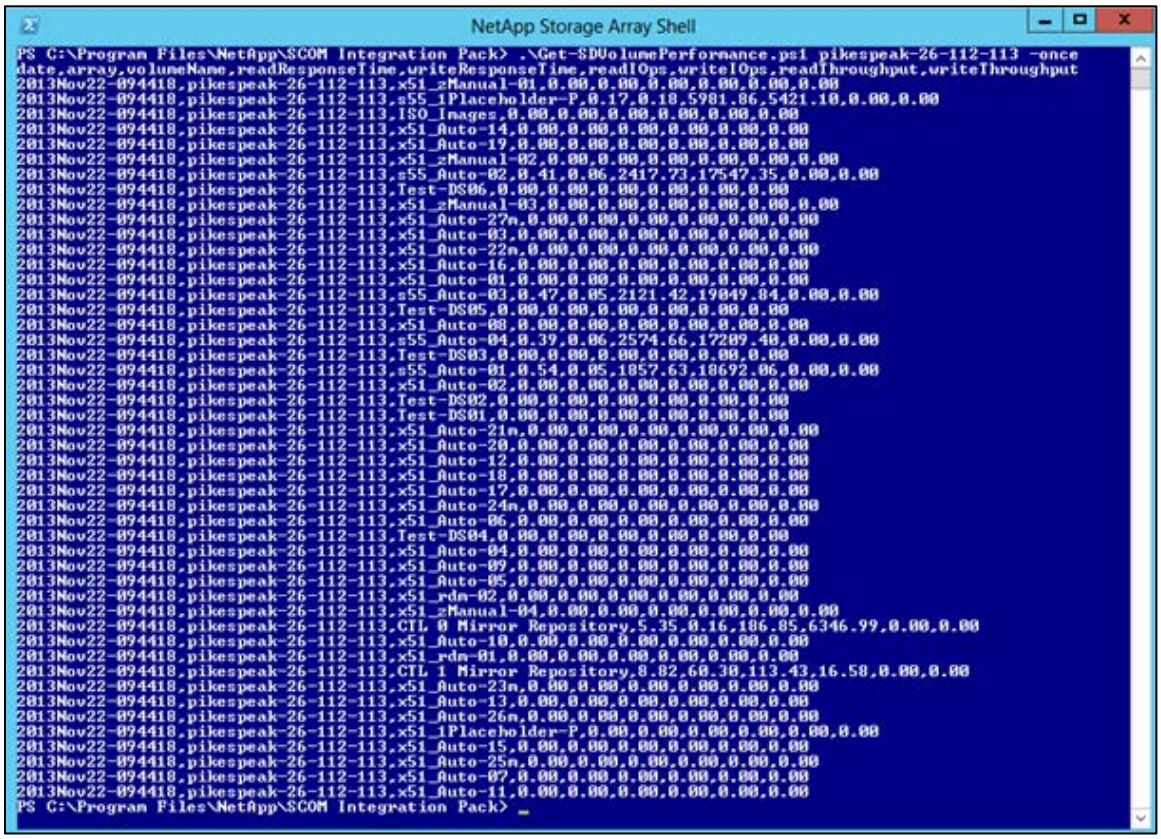
     `.\Get-SDVolumePerformance.ps1 <array name> –continuous`

     **EXAMPLE:**

     `.\Get-SDVolumePerformance.ps1 ictm-bst-399x -continuous`

     - The terminal window returns the volume performance data
     - To end a continuous return of volume performance data, type **Ctrl+C**.

The following screenshot displays the volume performance data for a storage array.



## Downloading the Performance Data

You can download the performance data to your local workstation and then import it as a comma-delimited file into a spreadsheet or other application.

**NOTE:** In order for the imported file to format the data correctly, the file must be comma-delimited.

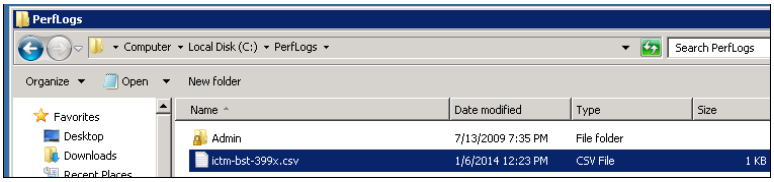
1. To download the performance data, type the following command at the command prompt:

   `.\Get-SDVolumePerformance.ps1 < array name> –once | out-file <location> < array name>.csv`

   **EXAMPLE:**

   `.\Get-SDVolumePerformance.ps1 ictm-bst-399x –once | out-file C:\PefLogs\ictm-bst-399x.csv`

   The following screenshot displays the downloaded file.



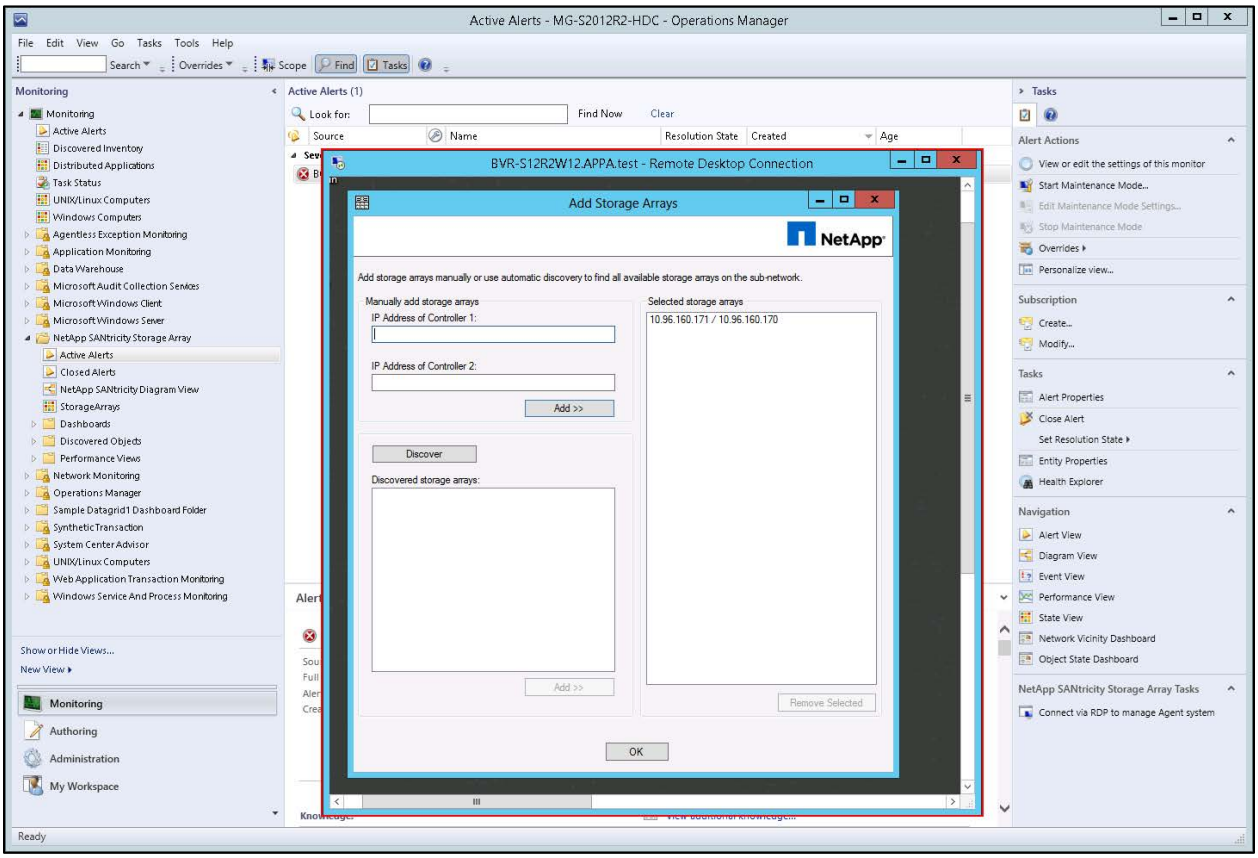

2. Import the file as a comma-delimited file into a spreadsheet of another application.

   - Import the data From Text
   - Make sure the file type is Delimited
   - Make sure the delimiter is Comma
   - Make sure YMD is selected in the Column data format

# Launching the NetApp Storage Array Discovery through the SCOM Operations Manager

Perform the following steps to launch the NetApp Storage Array Discovery application for an agent machine through the operations manager:

1. Under the Monitoring panel, expand the NetApp E-Series Storage folder, and select the desired subfolder or view.
   The selected subfolder or view appears within the operations manager.
2. Click **Connect via RDP to manage Agent system** under the NetApp ESeries Storage Array Tasks section of the operations manager.
   A remote desktop session for the agent machine is displayed.
3. Within the remote desktop session, select **Start >> All Programs**.
4. Locate the folder SCOM Management Pack.
5. Select the icon labeled **NetApp Storage Array Discovery**.
6. Run the NetApp Storage Array Discovery application.
   The Add Storage Arrays window displays.
   **NOTE:** For information on how to add storage arrays, refer to Discovering NetApp Storage Arrays.



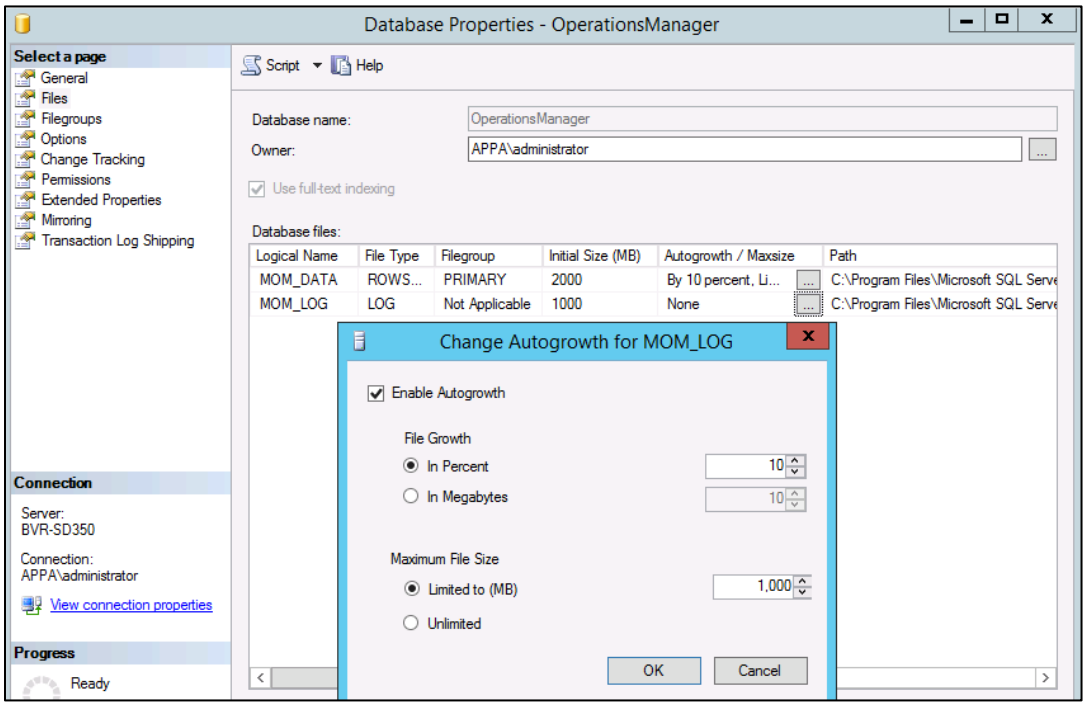

# Troubleshooting

## SQL Primary filegroup is full error

In certain instances, an error might occur if the SQL Primary filegroup is full when performing a save action within the NetApp SANtricity Management Pack for Microsoft System Center Operations Manager (SCOM). To mitigate this issue, the database autogrowth setting must be turned on through the SQL SSMS Database Properties – OperationsManager.

Perform the following to access and configure the autogrowth setting under the database:

1. Open SQL SSMS.
2. Right-click the database, and select **Properties**.
   The Database Properties – OperationsManager window is displayed.
3. Under the Select a Page panel, select **Files**.
   The corresponding files appear under the Database files section of the Database Properties – OperationsManager window.
4. Click the **icon** under the AutoGrowth/MaxSize column for the desired database file.
   The Change AutoGrowth window appears for the selected database file.
5. Under the Change AutoGrowth window, check the **Enable Autogrowth** box and click **OK**.
   The AutoGrowth setting is now enabled for the selected database.
6. Reboot of the Management Server (RMS).
   If the database is on a different server, reboot the SQL server.




## Health Service exceeds maximum allowed item amount error

Occasionally, the Health Service might continually reset whenever the maximum amount of allowed items is exceeded. This error is usually attributable to improperly configured registry keys. Appropriate registry key settings are typically configured through the installer; however, unique installation scenarios might prevent the proper automated configuration of registry keys (e.g., SCOM installed on agent side before setting up server, no established communication between server and agent, or renaming the management group). If you receive an error stating the Health Service exceeds the maximum amount of allowed items, the following registry keys must be configured manually:

| Key | Property | New Value |
|---|---|---|
| `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\HealthServices\Parameters` | `Persistence Version Store Maximum` | `5120 (Default value=1920)` |
| `HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\HealthService\Parameters\ManagementGroups\<MG NAME>` | `MaximumQueueSizeKb` | `102400 (Default value=15360)` |

The `<MG NAME>` segment under the second registry key varies based on the user. The `<MG NAME>` is configured by the user during installation and can be changed anytime thereafter. If the `<MG NAME>` is modified after installation, the value for the registry key retains the default value of 15360. To mitigate any Health Service errors, you also should manually configure the registry key value to 102400 when modifying the `<MG NAME>` post-installation. Alternatively, you can run the `ScomSetRegistryValues.ps1` script under the root installation directory to adjust the appropriate registry keys automatically. This script will only adjust the aforementioned registry values if their current values are less than the “New Value” listed above.

## Objects not monitored in Discovered Objects view

If objects are displayed as Not Monitored in the Discovered Objects view, the storage object threshold limit might have been exceeded. It is highly recommended users not exceed 30 NetApp storage arrays for each agent-managed computer. Exceeding the recommended number of 30 NetApp storage arrays for an agent-managed computer might result in unmonitored objects within the NetApp SANtricity Management Pack.

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