

Module 2: Tools for Analyzing Performance

Upon completion of this module, you should be able to:

- Describe the basic operation and features of Unisphere for VMAX Performance Component and Unisphere for VMAX Performance Viewer
- View archives with Performance Viewer
- Configure backups and performance Reports



This module focuses on the Unisphere for VMAX tools available for collecting, monitoring, and analyzing performance data.

Module 2: Tools for Analyzing Performance

Lesson 1: Unisphere for VMAX Performance Overview

During this lesson the following topics are covered:

- Using the performance features of Unisphere for VMAX
- Array registrations
- Database backups
- Threshold and metric management
- Reports



This lesson covers the features and functions of Unisphere for VMAX Performance Viewer.

Unisphere for VMAX Performance Tools

There are two Unisphere for VMAX tools available:

- Unisphere for VMAX with the Performance Option
 - ▶ This is the live version and allows real time data to be displayed
 - ▶ It is installed on a server
- Unisphere for VMAX Performance Viewer
 - ▶ Allows offline, offsite analysis of archives
 - ▶ It is a VMware vApp
 - ▶ No real time data capability
 - ▶ UPV files are exported from a live version and imported
 - ▶ Can be run in a VM-Workstation or a VM-Player
 - ▶ Home and Performance Big Buttons only
- Generically called Performance Viewer in this course



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There are two products available, and both are called Unisphere for VMAX.

The live version requires a performance option during the installation. It must be installed on a server. The installation document is “Unisphere for VMAX 1.6 Installation Guide,” which will explain how to install the performance option. Installation and basic knowledge is also covered in the eLearning course “Unisphere for VMAX Implementation and Management.”

The offline version is called Unisphere for VMAX Performance Viewer, and is run under VMware (ESX, workstation, or player). Throughout this course the term “Performance Viewer” will be generically used to refer to both tools.

The major differences between the two are highlighted in this slide.

Installation of the vApp is not covered in this course, but is well documented in the “EMC Unisphere for VMAX Performance Viewer Installation Guide.” Documents can be found on support.emc.com.

Performance Viewer Overview

- Views are historic, diagnostic, or real-time
- Archives can be kept for extended periods
- Uses different graphs for different purposes:
 - ▶ Average or maximum value bar graphs for balance and utilization comparisons
 - ▶ “Heatmap” bar graph shows percentage of “hot” components
 - ▶ Long- or short-term time graphs to pinpoint when an event occurred
 - ▶ Trend projection graphs to predict long term performance growth



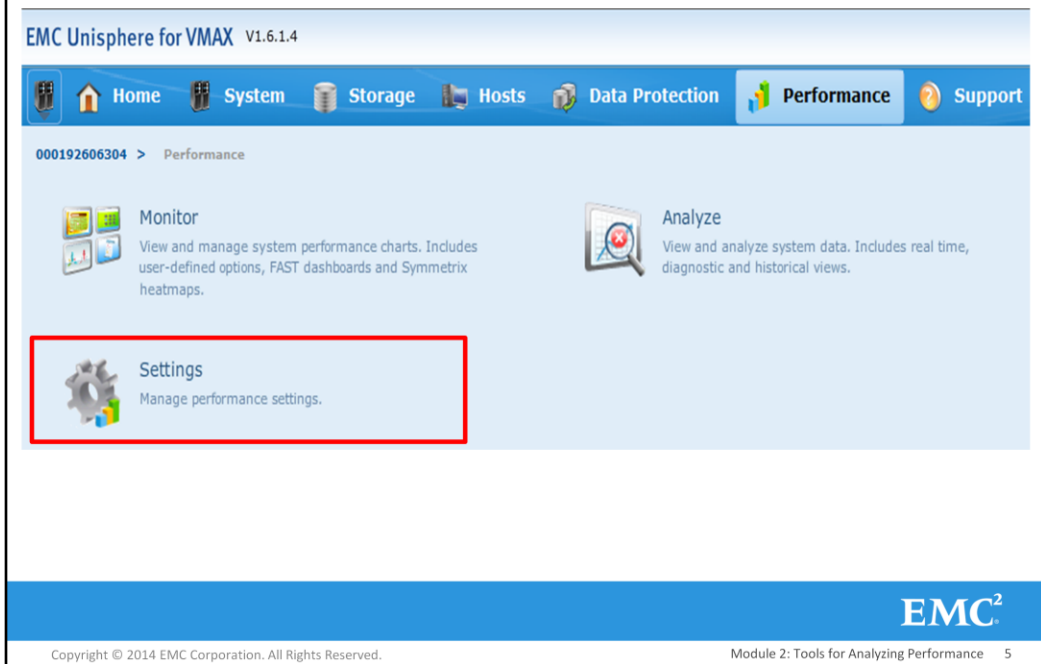
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Performance Viewer is a performance tool in Unisphere for VMAX and the underlying Solutions Enabler software. It is designed to be a simple, easy to use product that uses key performance indicators (KPIs) to identify performance issues. Although it can record data at intervals in minutes, it is intended to be both a real time (live version only) and a historic analysis tool. The archives can be exported and stored for an extended period for long-term trend analysis.

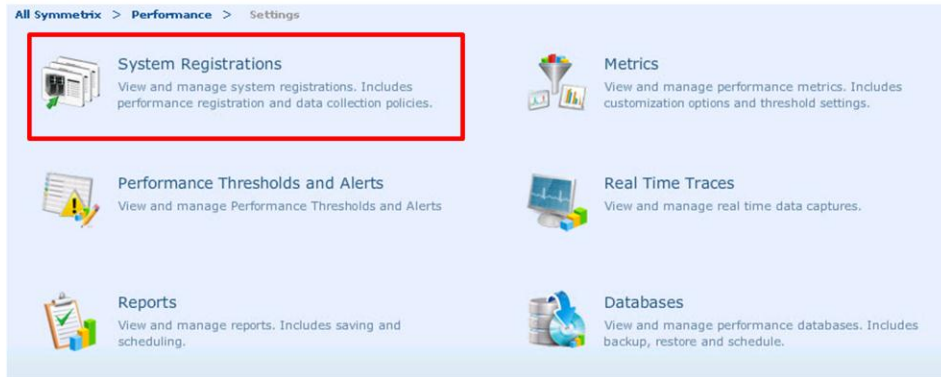
There are several graph types in Performance Viewer. Most of the displays use average or maximum value bar graphs, or time series graphs to show the balance and utilization across several components. Some of the bar graphs are colored to make a “heatmap” display. The colors show the percentage of components experiencing poor performance. There are also time graphs to pinpoint when an event has occurred. You can create trend projections of some of these graphs to help predict when performance issues will become critical.

Performance – Big Buttons



After installing Unisphere for VMAX with the Performance option, you have to register the local arrays for data collection, and adjust the data collection and retention policies, if necessary. This can be done from the Settings Big Button under the Performance Section. The tool will only collect data on the arrays you add through the Data Collection Registration Dialog.

System Registrations

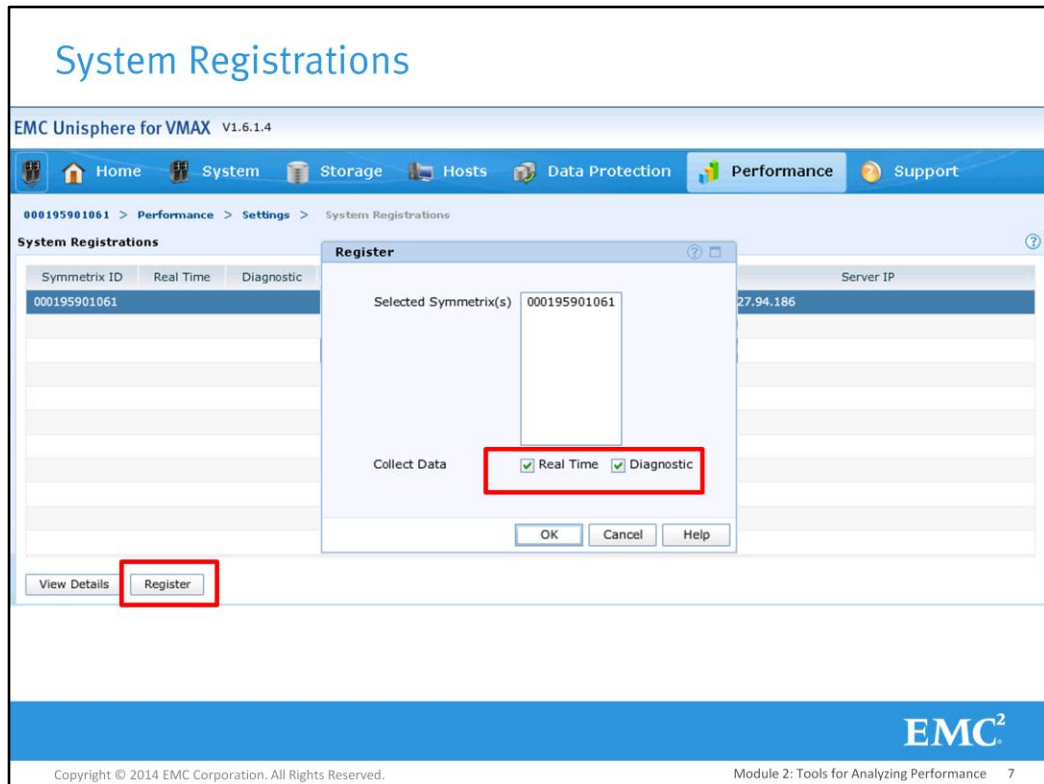


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Next, select the System Registrations Big Button.



Highlight the Symmetrix you want to register, then, click on Register.

The storstopd daemon needs to be running on the server. Listed here are some commands that may be useful:

- stordaemon list
- stordaemon install storstopd -autostart
- stordaemon start storstopd
- stordaemon list

You can select Real Time, Diagnostic, or both, which is also the default.

Up to ten arrays and 80,000 volumes may be registered on a single Unisphere server.

System Registrations – View Details

The screenshot displays the 'System Registrations' page in the EMC Performance Manager. The breadcrumb trail is 'All Symmetrix > Performance > Settings > System Registrations'. The 'System Registrations' table lists two entries:

Symmetrix ID	Real Time	Diagnostic	Collection Recovery (Hours)	Diagnostic Interval (Minutes)	Server IP
000192606304	☒	☒	24	5	10.127.94.186
000195901061	☒	☒	24	5	10.127.94.186

Below the table, the 'View Details' button is highlighted. The 'Details: System Registration: 000195901061' panel shows the following properties:

Property	Value
Symmetrix ID	000195901061
Real Time	☒
Diagnostic	☒
Collection Recovery (Hours)	24
Diagnostic Interval (Minutes)	5
Server IP	10.127.94.186
SE Server IP	10.127.94.186

The footer of the page includes the EMC logo, copyright information 'Copyright © 2014 EMC Corporation. All Rights Reserved.', and the page number '8'.

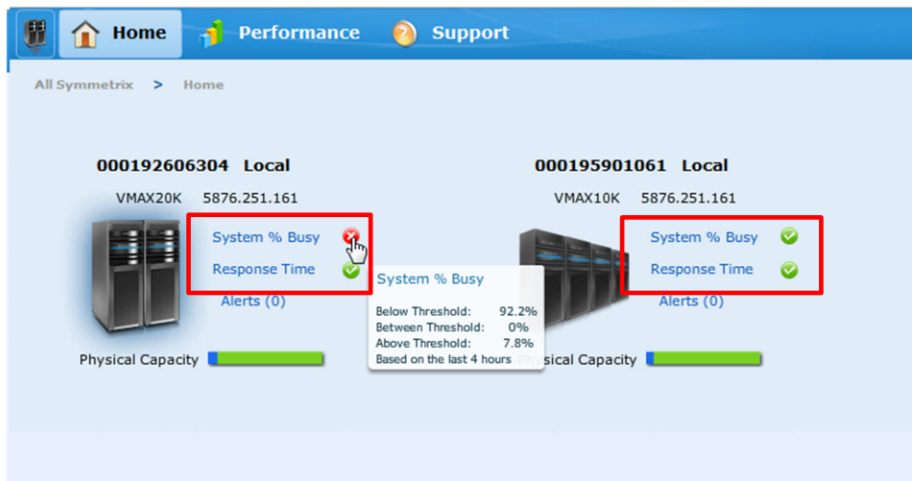
Highlight the array in the System Registrations view and then click on the View Details button to see the System Registration details.

This view can also be used to de-register/register the array for data collection. The Collection Recovery time and the Diagnostic Interval time can also be changed.

The Collection Recovery (Hours) is the amount of data that the storstd daemon will save if the performance server or the performance database is not ready to accept new data points. The default is 24 hours.

The Diagnostic Interval (Minutes) is the frequency of polling in the Analyze Diagnostic view. The default of 5 minutes is recommended. It will be available for the previous 7 days.

System Registrations – Results



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After registering systems, there will be links on the home page to the Symmetrix Performance Status Dashboard directly.

There is also a short summary shown if you hover the mouse over the icons, as displayed on this slide.

Metrics
View and manage performance metrics. Includes customization options and threshold settings.

All Symmetrix > Performance > Settings > Metrics

Metrics

Category	Metric	Display Group	First Threshold	Second Threshold
Array	Host IOs/sec	All, KPI	1000000	2000000
Array	Host Reads/sec	All	0	0
Array	Host Writes/sec	All	0	0
Array	Host MBs/sec	All, KPI	0	0
Array	Host MBs Read/sec			
Array	Host MBs Written/sec			
Array	FE Reqs/sec			
Array	Avg Read Response Tir			
Array	Avg Write Response Ti			
Array	% Reads			
Array	% Writes			
Array	% Hit			
Array	FE Read Reqs/sec			
Array	FE Write Reqs/sec			
Array	BE IOs/sec			
Array	BE Reqs/sec			
Array	BE Read Reqs/sec			

Details: Metric : % Hit

Properties

Category	Array
Metric	% Hit
Display Group(s)	☒ All ☒ KPI
First Threshold	70
Enable Alert	☐
Severity	Information
Occurrence	3 / 5 samples
Second Threshold	50
Enable Alert	☐
Severity	Warning
Occurrence	3 / 5 samples

View Details **Apply** **Cancel**

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All of the Symmetrix performance metrics are continuously collected and calculated. However, not all metrics are of equal importance to you. You can customize the list of metrics that display in the Performance Dialogs and Views.

Use the **Metrics** big button to manage the default thresholds for various metrics and to include them as Key Performance Indicators (KPIs). Click on the **Metrics** big button in the **Performance > Settings** page to change the view to the Metrics page.

On the Metrics page highlight a metric and click on the View Details button.

For Display Groups: Select All for any metric that you do not want to see by default, but may want to see occasionally. Select KPI to display this metric by default. Selecting KPI automatically adds the metric to the All list. Clearing both KPI and All boxes means the metric will not display for that category in Explore, Dashboards, Queries, and any other place metrics display. All metrics always display in Metric Management.

In addition, the Metric Manager allows for changing the default threshold values. Threshold values are not required, but can be entered for any metric. Default thresholds are predefined values assigned to a metric of a specific category. Changes to the default thresholds only affect the instances that are using the defaults.

Note that many of the metrics are marked as KPI metrics, and many of the metrics have default thresholds.

Performance Database Backup

000192606304 > Performance > Settings > Databases

Databases

View and manage performance databases. Includes backup, restore and schedule.

Symmetrix ID	Status	Load Status	Oldest Historical Data	Oldest Diagnostics Data	Last Backup	Last Retention	Scheduled Backup
000192606304	OK		Mon Dec 9 2013 10:00:00 AM	Thu Jan 16 2014 10:10:00 AM	N/A	0.6 hours	None

Backup Restore View Details Cancel Schedule Delete Database Remove Backup Files

Database Backup Wizard

1 Backup Parameters

* Symmetrix ID(s): 000192606304

* File Name(s): <SID>_<TIMESTAMP>_ SPAbackup

* Data to Save: ☒ Historical (always backed up) ☐ Last day of Diagnostics ** ☐ Named Real Time traces **

* Execution Time: ☐ Now ☒ Schedule

** This option is not recommended for recurring backups

< Back Next > Finish Cancel Help

Database Backup Wizard

2 Backup Execution Details

* Start Date: January 26 2014 12:00 am

* Recurring: ☒ Yes ☐ No

* Day(s) to run: ☒ Sunday ☐ Monday ☐ Tuesday ☐ Wednesday ☐ Thursday ☐ Friday ☐ Saturday

< Back Next > Finish Cancel Help

Schedule Recurring Backup

Databases

Symmetrix ID	Status	Load Status	Oldest Historical Data	Oldest Diagnostics Data	Last Backup	Last Retention	Scheduled Backup
000192606304	OK	Last Backup Successful	Mon Dec 9 2013 10:00:00 AM	Thu Jan 16 2014 10:10:00 AM	0 Days	0.8 hours	Sun Jan 26 2014 12:00:00 AM

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The Performance Database is managed by using the Databases big button on the **Performance > Settings** page. Click on the Databases big button to switch to the database's view. The databases for all the arrays for which performance is being collected will be displayed.

Click on a specific array instance. You can backup or restore the database.

Click on the Backup button to backup the database. The backup can be run immediately, or can be scheduled. A recurring schedule can be setup for the backup, as shown on the slide. The backup file is stored on the Unisphere server host in the <install_location>\SMAS\backup\SPA folder.

As noted on the screen, the two options, Last day of Diagnostics and Named Real Time Traces, are not recommended to be included in a recurring backup.

Performance Database Management

Databases

Symmetrix ID	Status	Task Status	Oldest Historical Data	Oldest Diagnostics Data	Last Backup	Scheduled Backup
000194901103	OK	Last Backup Successful	Fri May 11 2012 03:00:00 PM	Tue Oct 16 2012 02:10:00 PM	0.6 Days	Sun Oct 28 2012 12:02:00 AM

Backup Restore **View Details** Cancel Schedule Delete Database Remove Backup Files

Change Data Retention

Database Details

Symmetrix ID: 000194901103

Registered to Collection: Real Time, Diagnostics

Database Administration

Last backup time: Mon Oct 22 23:48:51 GMT-0400 2012

Last restore time: None

Last aggregation time: Tue Oct 23 14:07:07 GMT-0400 2012

Last retention time: Tue Oct 23 14:07:10 GMT-0400 2012

Last real time retention time: Tue Oct 23 14:07:09 GMT-0400 2012

Historical

Oldest available data: Fri May 11 15:00:00 GMT-0400 2012

Latest available data: Tue Oct 23 13:00:00 GMT-0400 2012

Set Historical data retention (months): 15

Diagnostics

Oldest available data: Tue Oct 16 14:10:00 GMT-0400 2012

Latest available data: Tue Oct 23 14:35:00 GMT-0400 2012

Set Diagnostics data retention (days): 7

Backup Files

Set Backup file retention (number of files): 7

Number of existing backup files: 0

Scheduled Backup Execution Options

Next Backup: Sun Oct 28 00:02:00 GMT-0400 2012

Recurring: Sunday

Last Day of Diagnostics: Not included

Named Real Time Traces: Not included

Apply Cancel

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Clicking on the View Details button for a specific database will show the details of this database. The Database Details page can be used to change the historical data retention and diagnostic data retention times. The Backup file retention can also be set.

Manage Reports

The screenshot shows the 'Manage Reports' interface. At the top, there is a breadcrumb trail: '000194901103 > Performance > Settings'. Below this, there is a 'Reports' section with a description: 'View and manage reports. Includes saving and scheduling.' Below the description, there is a list of actions: 'Create', 'Copy', 'Edit', 'Schedule', 'Cancel Schedule', 'Run Now', and 'Delete'. The 'Create', 'Schedule', and 'Run Now' buttons are highlighted with red boxes.

- Export data from the Performance Database
 - ▶ UPV, XML, CSV, or BTP Formats
- Set up a recurrent schedule or run on an ad hoc basis
 - ▶ Reports that are run on a schedule are stored on the Unisphere server
 - ▶ Install_Location\SMAS\jboss\server\default-em\data\spa\querydata

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The **Performance > Settings > Reports** big button can be used to export performance data from the Performance Database in different formats. You can set up a recurrent schedule, or run these reports on an ad hoc basis.

Select **Performance > Settings > Reports** to open the Reports view. Any reports that have been scheduled or run will be listed.

To create a new report, click on the Create button.

Reports that are run on a schedule are stored on the Unisphere server at the location shown on the slide (Install_Location\SMAS\jboss\server\default-em\data\spa\querydata).

BTP Reports

Note: Recurring scheduled BTP Reports will be exported and stored on the Unisphere server:

Install_Location\SMAS\jboss\server\default-em\data\spa\querydata

000192606304 > Performance > Settings > Reports

Reports					
Name	Symmetrix ID	Format	Recurring	Run Date	Description
BTPExport	000192606304	BTP	●	Thu Jan 23 2014 01:00:00 PM	Recurring BTP export

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To export BTP files every four hours on a recurrent basis, click the Create button on the Reports view page to launch the Create Report dialog.

Set the Format to BTP.

The type automatically defaults to Diagnostic for BTP reports. The time range can be the last hour, last 2 hours, or last 4 hours.

To set up a recurrent schedule, click on the days you want to run. Choose run date and time, and click OK.

Click OK in the Create Report dialog to finish setting up the BTP report.

The recurring schedule's BTP reports will be exported and stored on the Unisphere server in the location shown on the slide (Install_Location\SMAS\jboss\server\default-em\data\spa\querydata).

Creating a UPV report is done the same way, and you have the additional choice of including Real Time Traces in the Type field.

XML or CSV Reports

The screenshot shows the 'Create Report' dialog box. It has fields for Name (CSVReport), Symmetrix ID (000194901103), Format (CSV), Type (Diagnostic), Time Range (Last 4 Hours), Recurring (checked), and Description. Below these is a 'Queries' section with a table with columns Title, Category, and Description. At the bottom of the queries section are 'Add' and 'Delete' buttons. The 'Add' button is highlighted with a red box. Annotations include a list of choices and a note about the 'Add' button.

- Choose Format: XML/CSV
- Choose Type: Diagnostic/Historical
- Choose Time Range
- Optionally Choose: Recurring

XML or CSV Reports require one or more Queries to be set up

Click on Add to set up a query

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To export an XML or CSV report, click on the Create button on the Reports view page to launch the Create Report dialog.

Give the report a name, set the format to XML or CSV, choose the desired data type of Diagnostic or Historical, and then choose the desired time range.

XML or CSV reports require one or more queries to be set up. Click on the Add button in the Create Report Dialog to set up a new query.

We will discuss the Create Query dialog more in the next lesson.

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Lesson 1: Summary

During this lesson the following topics were covered:

- Using the performance features of Unisphere for VMAX
- Array registrations
- Database backups
- Threshold and metric management
- Reports



This lesson covered the features and functions of Unisphere for VMAX Performance Viewer.

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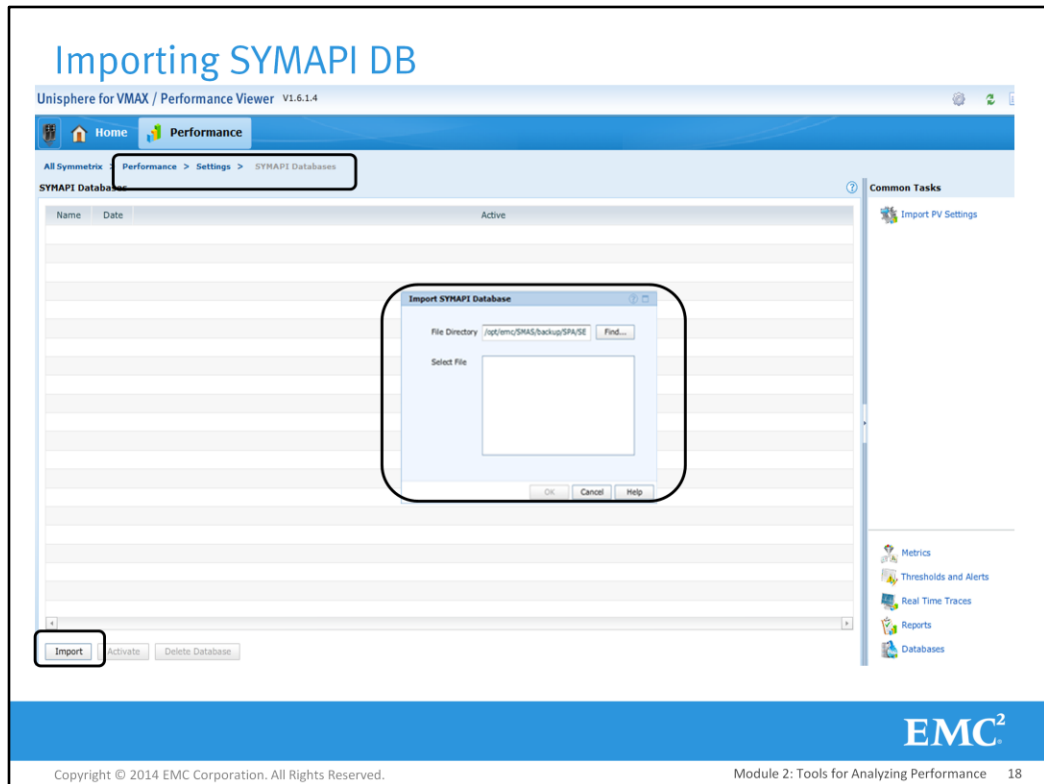
Lesson 2: Loading Data in Performance Viewer

During this lesson the following topics are covered:

- Loading the SYMAPI database
- Loading an archive file
- Activating a database

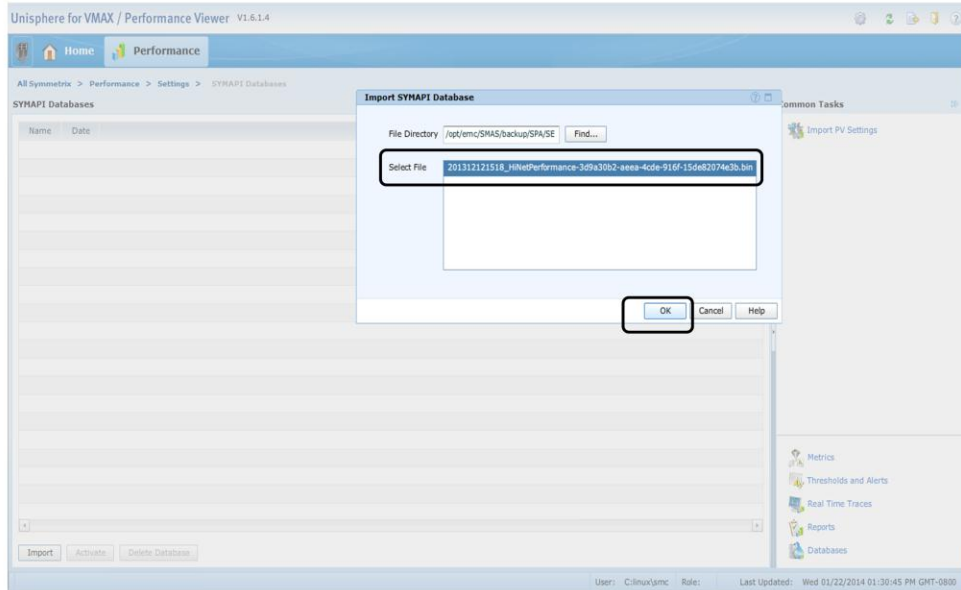


This lesson covers the loading and activating of databases in Unisphere for VMAX Performance Viewer.



After installation and your first login to the Unisphere for VMAX Performance Viewer vApp, it will automatically bring you to the performance SYMAPI Databases screen. You will need to FTP your SYMAPI databases and UPV files to the vApp. The default path it will look for to import is /opt/emc/SMAS/backup/SPA/SE, however, you may use your own directory. After copying your files to the vApp, click on Import. This will open the Import dialog box. After making any necessary changes to the path, click Find. This will display any .bin files found at the location specified.

Importing SYMAPI DB (Continued)



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Select the appropriate bin file, and click OK.

Importing SYMAPI DB (Continued)

The screenshot shows the 'Unisphere for VMAX / Performance Viewer' interface. The main content area displays a table titled 'SYMAPI Databases' with columns 'Name', 'Date', and 'Active'. A single row is visible with the name '201312121518_HilketPerformance-3d9a30b2-aea4-4cde-916f-15de82074c3b.bin' and the date 'Wed Jan 22 13:55:11 GMT-0800 2014'. An 'Adobe Flash Player Settings' dialog box is overlaid on the table, asking for permission to use local storage. The dialog shows 'Requested: up to 10 KB' and 'Currently Used: 0 KB'. The 'Allow' button is highlighted with a red box. On the right side of the interface, there is a 'Common Tasks' panel with links to 'Import PV Settings', 'Metrics', 'Thresholds and Alerts', 'Real Time Traces', 'Reports', and 'Databases'. The 'Databases' link is also highlighted with a red box. At the bottom of the interface, there is a status bar showing 'User: C:\linux\jmc', 'Role:', and 'Last Updated: Wed 01/22/2014 01:55:11 PM GMT-0800'. The EMC logo is visible in the bottom right corner.

Unisphere for VMAX / Performance Viewer V1.6.1.4

Home Performance

All Symmetrix > Performance > Settings > SYMAPI Databases

SYMAPI Databases

Name	Date	Active
201312121518_HilketPerformance-3d9a30b2-aea4-4cde-916f-15de82074c3b.bin	Wed Jan 22 13:55:11 GMT-0800 2014	

Adobe Flash Player Settings

Local Storage

192.168.1.15 is requesting permission to store information on your computer.

Requested: up to 10 KB

Currently Used: 0 KB

Allow Deny

Common Tasks

- Import PV Settings
- Metrics
- Thresholds and Alerts
- Real Time Traces
- Reports
- Databases

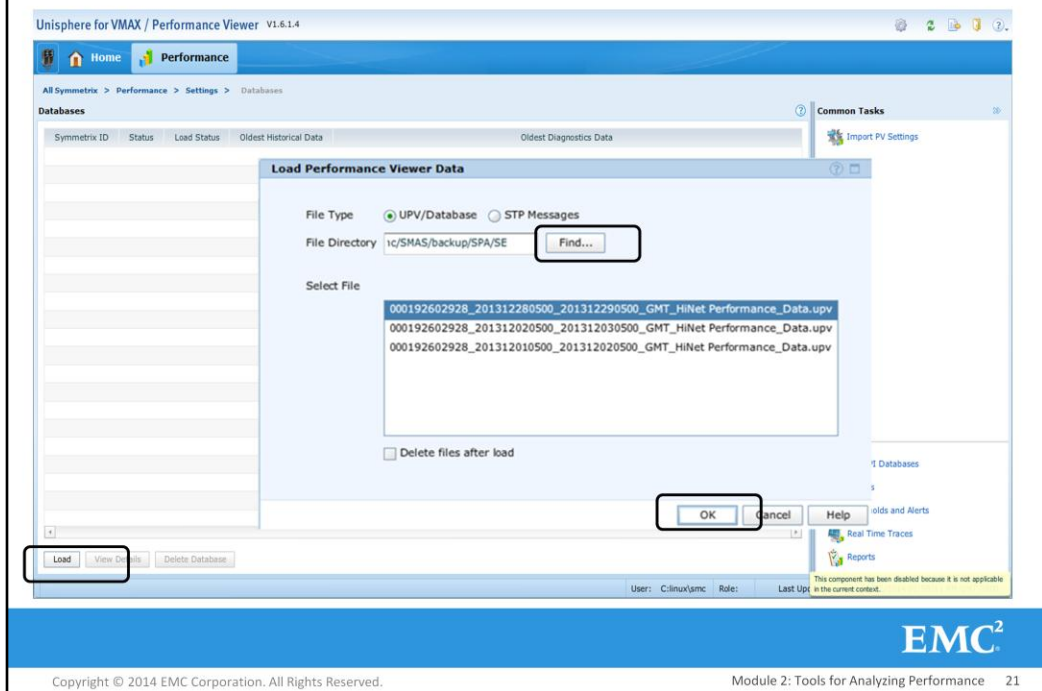
User: C:\linux\jmc Role: Last Updated: Wed 01/22/2014 01:55:11 PM GMT-0800

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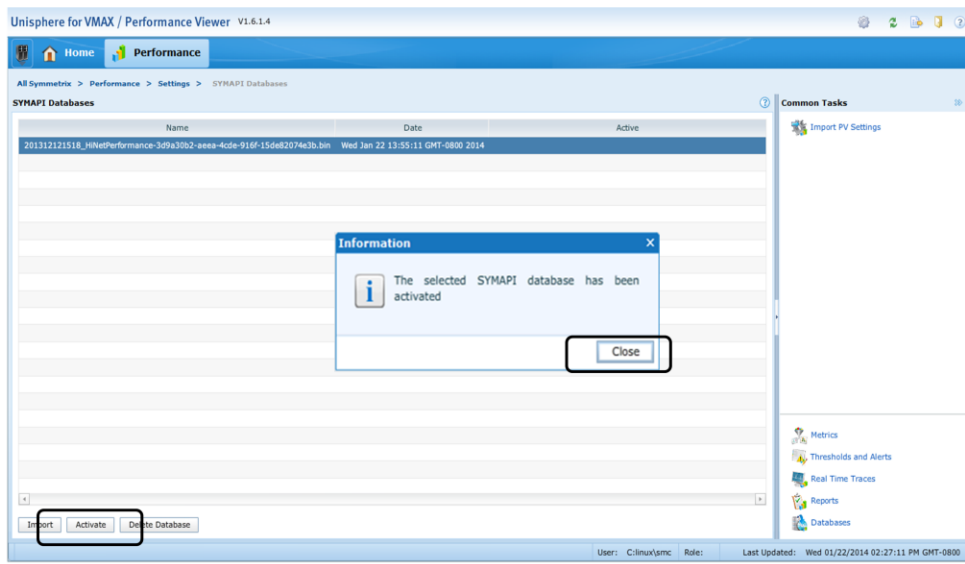
You may receive an Adobe Flash message about using storage. If so, click Allow. Click on Databases.

Loading Performance Data



Navigate to **Performance > Settings > Databases** and click Load. Make any necessary changes to the path, and click Find. Select your UPV file, and click Ok. You will receive a message “Selected PV Data is being loaded.” When this message appears, click Close. The load status will change to “Load in Progress” and then “Load Succeeded.”

Activating SYMAPI DB



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Switch back to the SYMAPI Databases. Click on the one you loaded, then click Activate, and lastly, click Close. You will now be able to use the archived data.

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Lesson 2: Summary

During this lesson the following topics were covered:

- Loading the SYMAPI database
- Loading an archive file
- Activating a database



This lesson covered the loading and activating of databases in Unisphere for VMAX Performance Viewer.

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Lesson 3: Navigating Performance Viewer

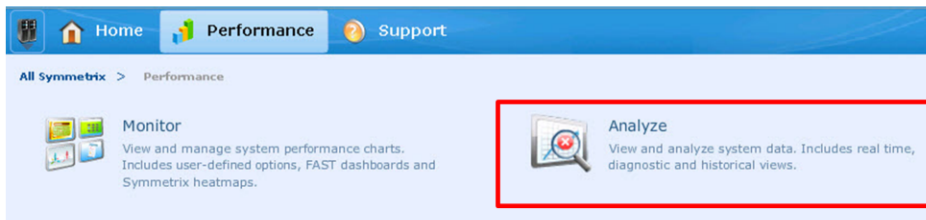
During this lesson the following topics are covered:

- The performance features of Unisphere for VMAX
- Navigating in Unisphere for VMAX Performance Viewer
- Using the Monitor Dashboards, Analyze, Trend, Historical, Diagnostic, and Real Time views to understand the performance of the VMAX
- Dashboard and template creation



This lesson covers navigating to the various views of Unisphere for VMAX Performance Viewer.

Performance – Analyze



- View Symmetrix Performance data for various collection ranges
 - ▶ Real Time
 - ▶▶ Data collected between 2 to 5 seconds
 - ▶ Diagnostic
 - ▶▶ Data collected every 5 min by default
 - ▶ Historical
 - ▶▶ Data collected every 15 min

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Use the system selector to choose a specific array, and then click on the Analyze big button in the Performance section.

The Analyze view can be used to view Symmetrix performance data for various collection ranges.

Real Time View: Collects data between 2 and 5 seconds for a limited group of metrics. The data is available for the previous hour. You can also use this to view any saved Real Time data traces.

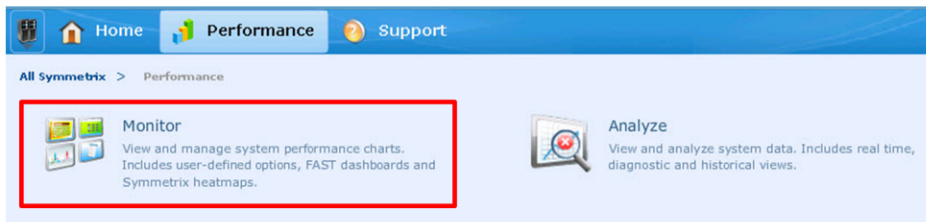
Diagnostic View: Collects data every 5 minutes for root cause analysis. The diagnostic data for the past four hours is typically shown. You can show up to 24 hours of diagnostic data. The diagnostic data is available for the previous 7 days.

Historical View: Collects data in 15 minute intervals for trending and planning, and shows the last 24 hours of data by default. Data is kept for a maximum of 3 years.

In **Analyze View** you can:

- Analyze and monitor data
- Create charts
- Change the time range
- Create a custom dashboard

Performance – Monitor



- Monitor allows you to view and manage system performance charts in the form of dashboards and heatmaps
 - ▶ 30 EMC predefined dashboards
 - ▶ 21 dashboards - including a heatmap
 - ▶ 9 Summary Dashboards
 - ▶ Users can create their own dashboards and templates

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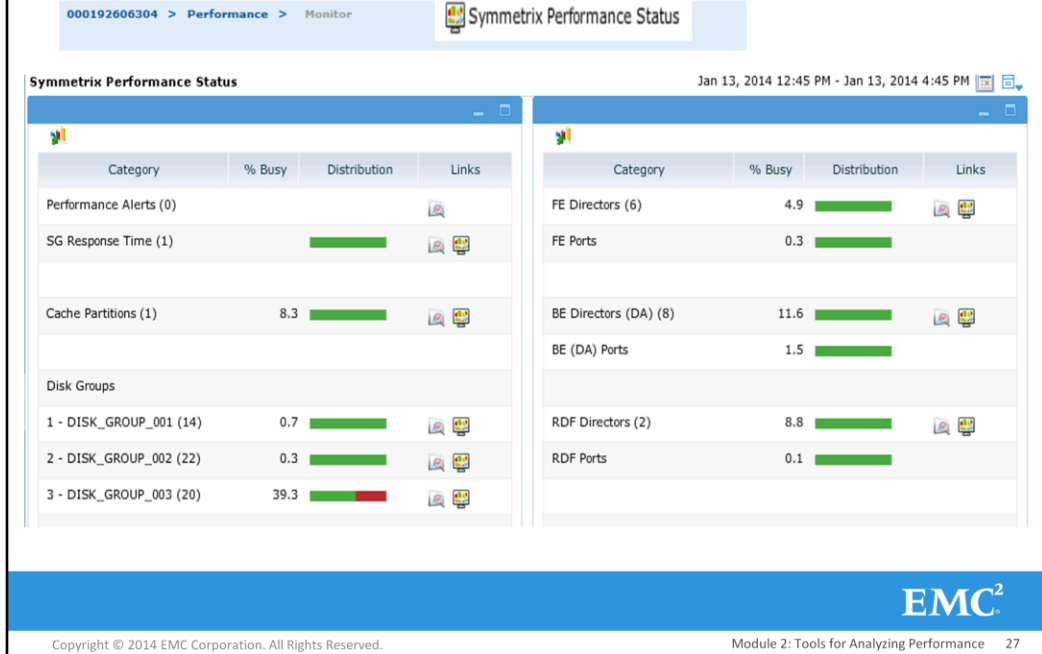
EMC and user defined dashboards can be viewed by clicking on the Monitor big button in the Performance section. The view will automatically show the user defined dashboard, which has been set as the default. If default has not been set, the All Arrays dashboard will be displayed.

To view a dashboard, click on the desired dashboard in the dashboard listing.

There are 21 EMC Dashboards and 9 Summary Dashboards.

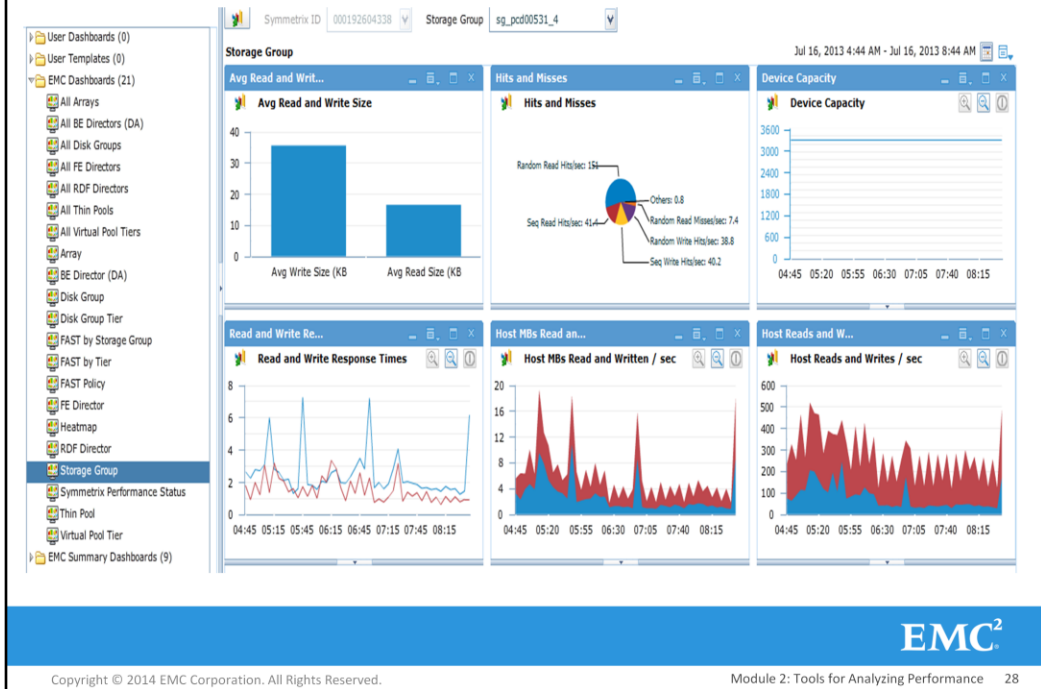
We will explore some of them in the next few slides.

Symmetrix Performance Status – Dashboard



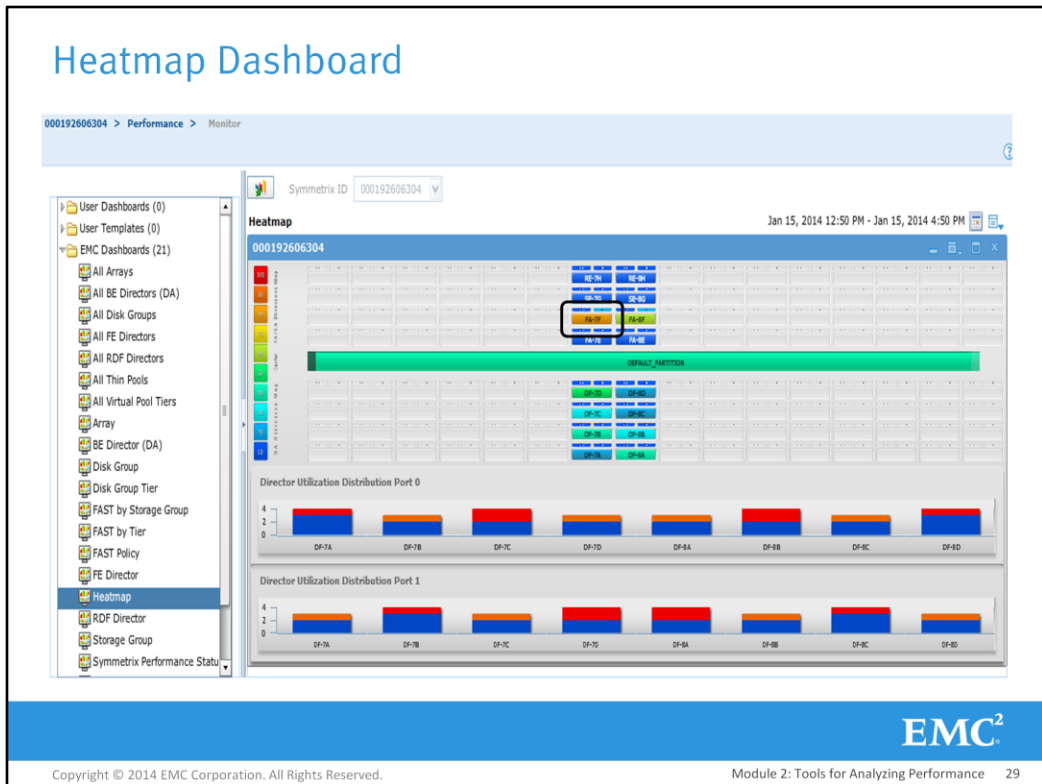
If you click on the Response Time or System % Busy links from the home page, you will be brought directly to the Symmetrix Performance Status Dashboard. It shows, at a glance, the status of the major portions of the Symmetrix, including; Front-end Directors and Ports, Cache, Backend Directors and Ports, RDF Directors and Ports, Disk Groups, and Alerts. For most of the categories you will find, under the links columns, the ability to go directly to the related details Analyze page or to one of the nine Summary Dashboards.

Storage Group Dashboard



In a virtually provisioned environment the Storage Group Dashboard shows several KPIs for the devices in the Storage Group. Other metrics, like IO Density and Workload Scores, are available from the Analyze Storage Group view.

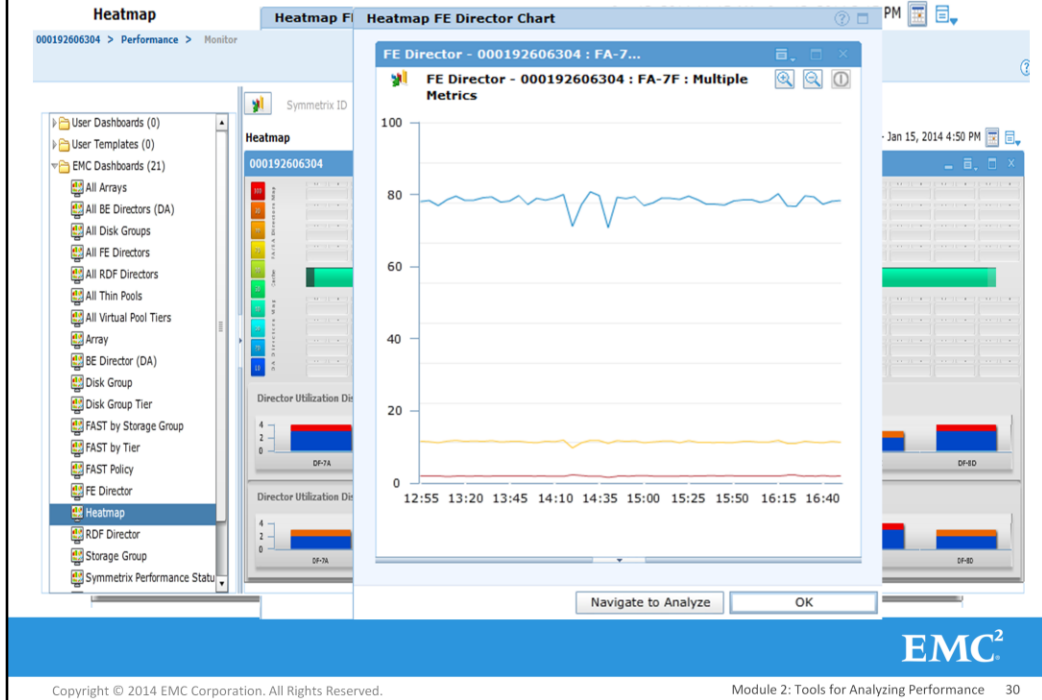
Heatmap Dashboard



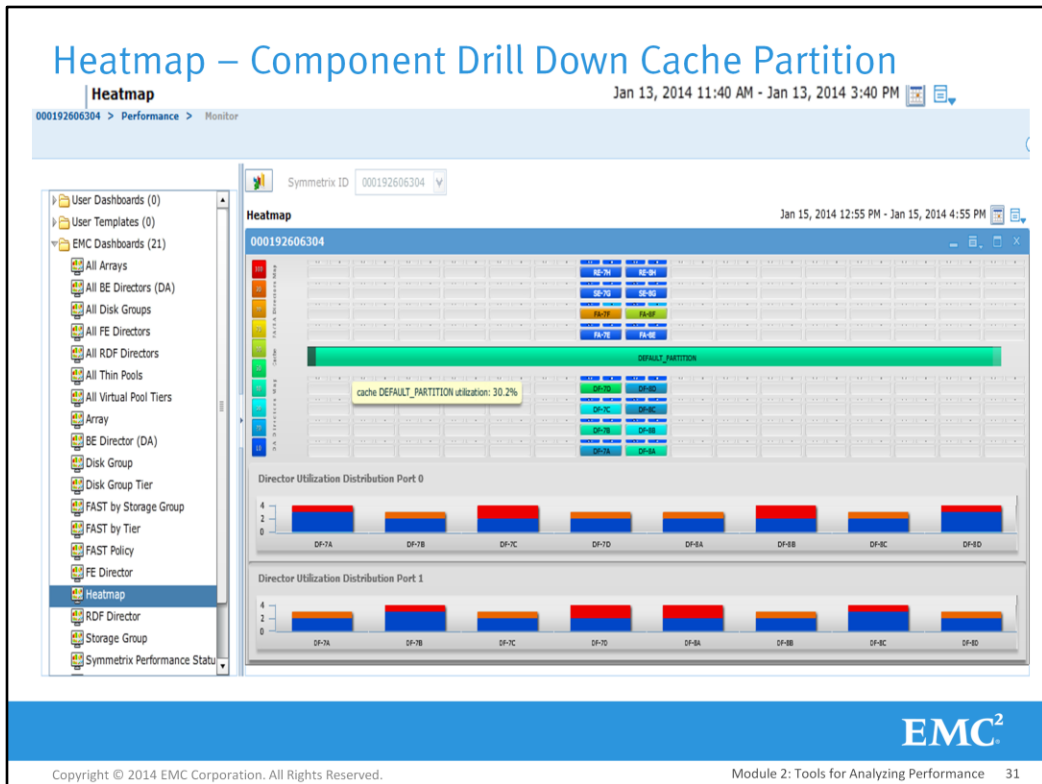
The Heatmap Dashboard represents components by color, blue being the least active or cold, and red being the hottest, or most active.

The component layout reflects the logical front to back nature of the array. Front-end directors on the top, then the cache, and the backend directors and disks on the bottom. In this example, FA:7F is color coded in orange, indicating a higher level of utilization.

Heatmap – Component Drill Down FA

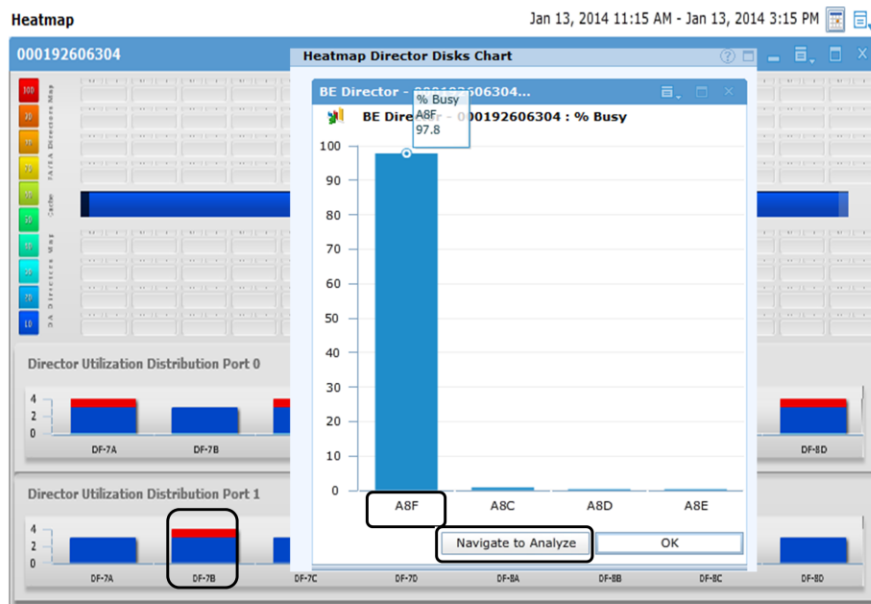


Clicking on FA-7F pops up a chart showing the %Busy as well as %Busy for each port of that Front-end Director.



Clicking on the named cache partition would pop up a chart showing the % Cache Used for that partition. In this case, we hover to get the percent utilization.

Heatmap – Component Drill Down Disk Utilization

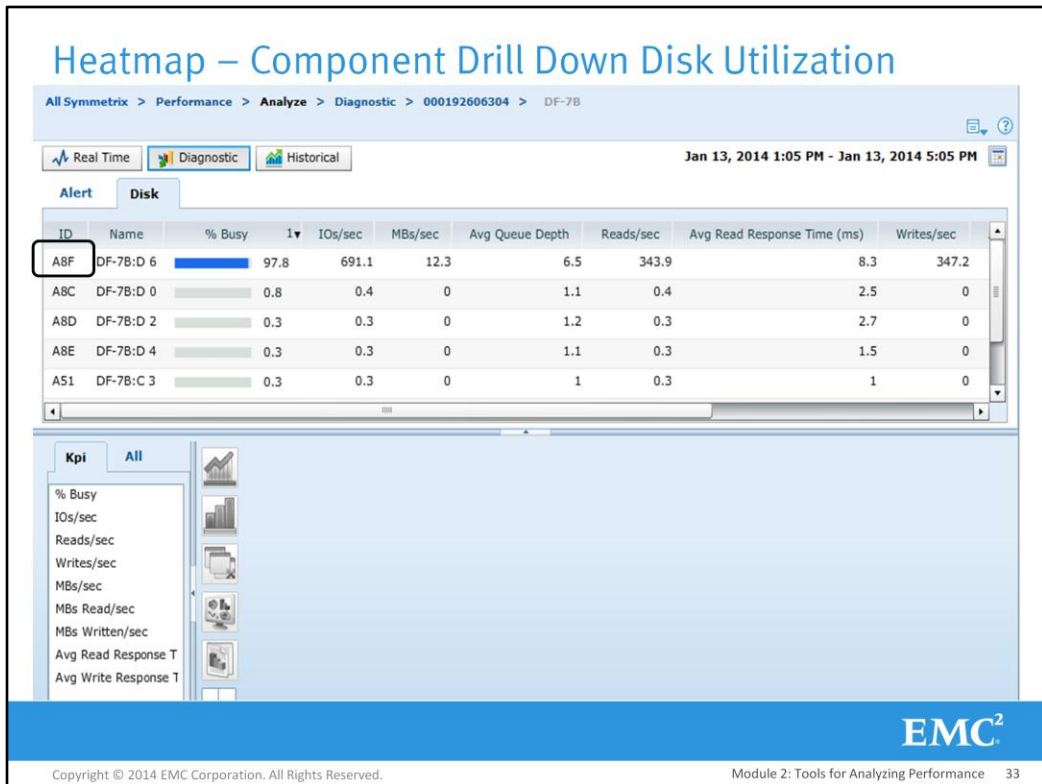


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Clicking on DF-7B (Disk Adapter) shows that there is one disk on port 1 that is very busy, while the other disks are mostly idle. In this case, the spindle is 97.8% busy.



Drill down can continue by clicking on the Navigate to Analyze button. This switches you from Monitor to Analyze view.

Here, you can get more details for the drives on this director.

Heatmap – Component Drill Down Disk Utilization

All Symmetrix > Performance > Analyze > Diagnostic > 000192606304 > DF-7B > A8F

Hyper

Hyper	Symm Volume	Name	Host IOs/sec	BE % Reads	BE % Writes	BE Disk Read Response Time (ms)	Group	Raid Type
1	0305	N/A	1704.9	0	100	0	esx251_SG-BC	Raid-5
40	0131	N/A	0	0	0	0		Raid-1
3	01B0	N/A	0	0	0	0		Raid-1
13	01EE	N/A	0	0	0	0		Raid-6
2	0196	N/A	0	0	0	0		Raid-1
23	0220	N/A	0	0	0	0		Raid-6
43	0315	N/A	0	0	0	0		Raid-1
33	006D	N/A	0	0	0	0	esx251_gk,esx251_parent	Raid-1
29	023E	N/A	0	0	0	0		Raid-6
39	0115	N/A	0	0	0	0		Raid-1
21	0216	N/A	0	0	0	0		Raid-6
19	020C	N/A	0	0	0	0		Raid-6
30	0243	N/A	0	0	0	0		Raid-6

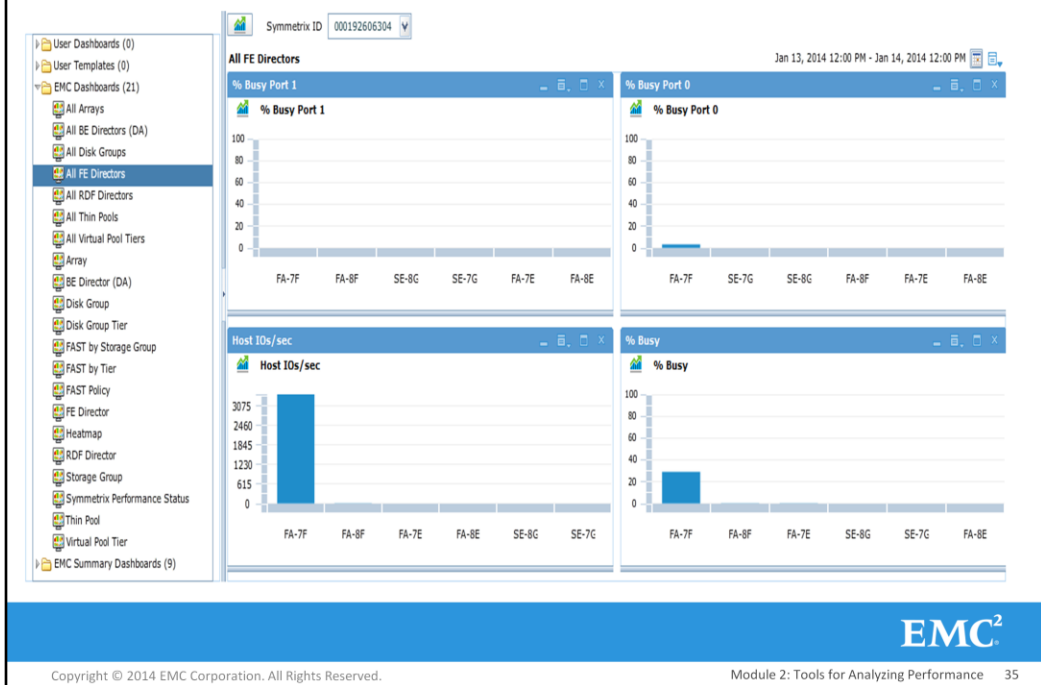
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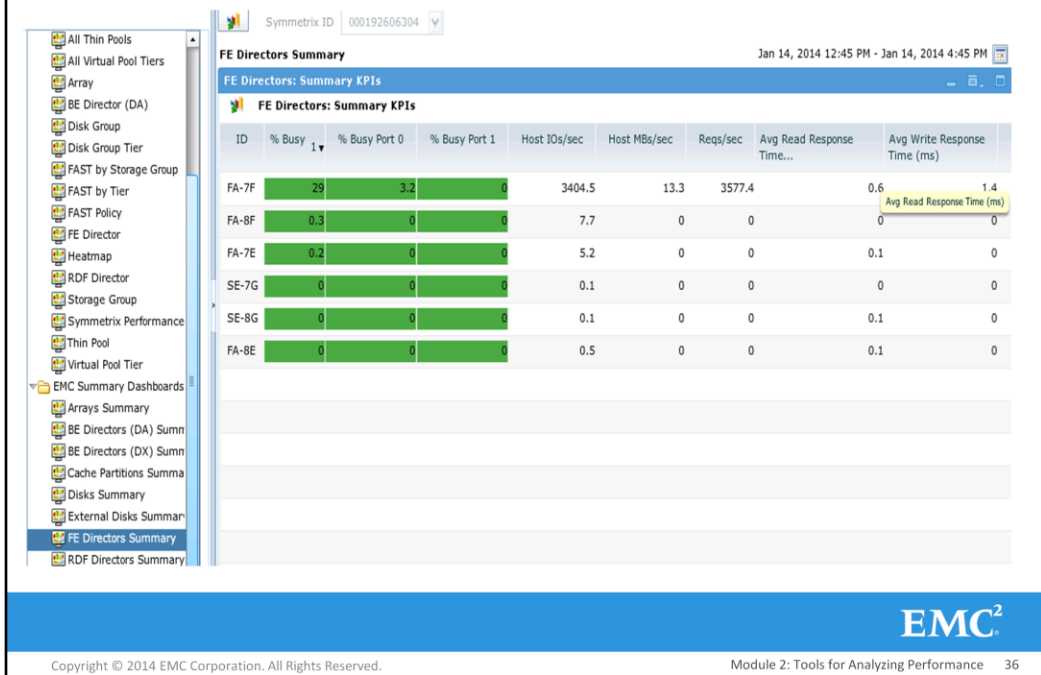
Double clicking on a spindle allows you to view the Hypers configured to this spindle.

All FE Directors – Dashboard

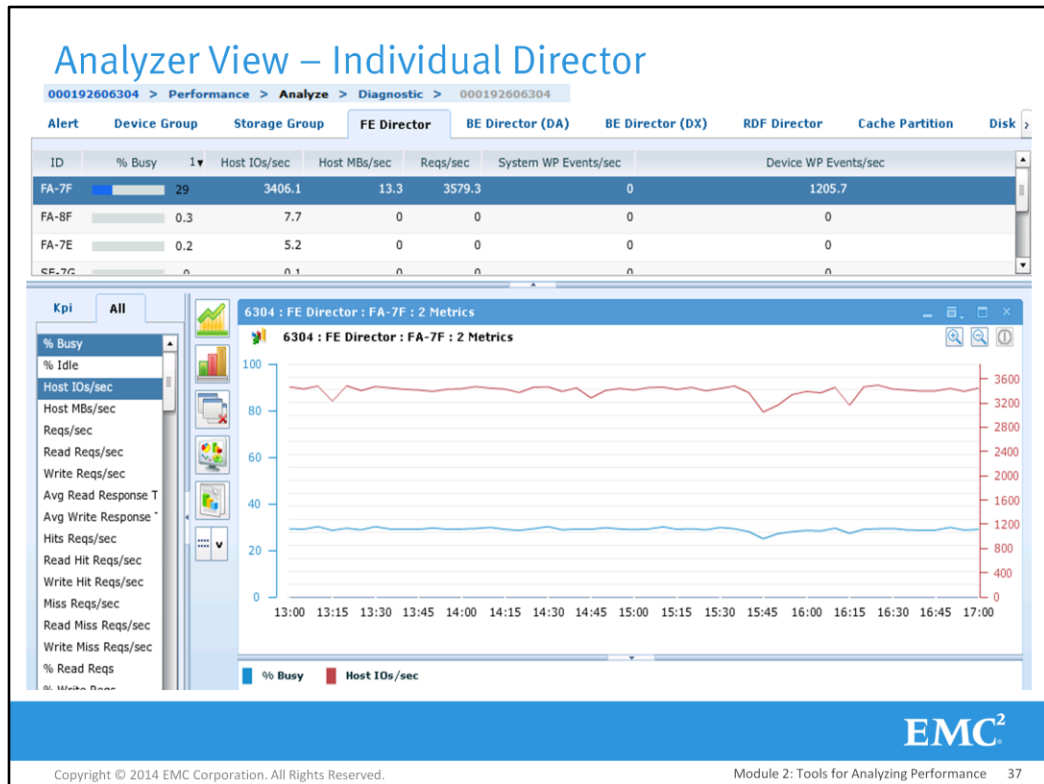


After identifying that FA-7F as the most heavily utilized, we can now take a look at the dashboard view of all the FE Directors. This, again, shows that FA-7F is the most active, and other Front-end Directors are mostly idle.

FE Directors Summary – Dashboard

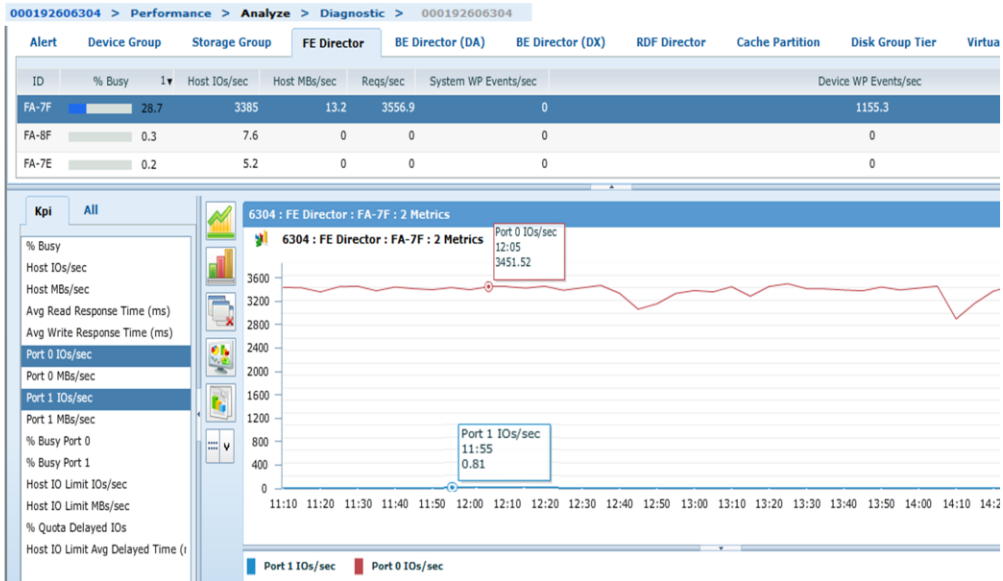


Optionally, we can also take a look at the Summary Dashboard view of all the FE Directors. This shows that FA-7F is the most active, and the activity is on port 0.



Selecting FA-7F and then %Busy and Host IOs/sec gives further insight into the activity on this director.

Analyzer View – Individual Director

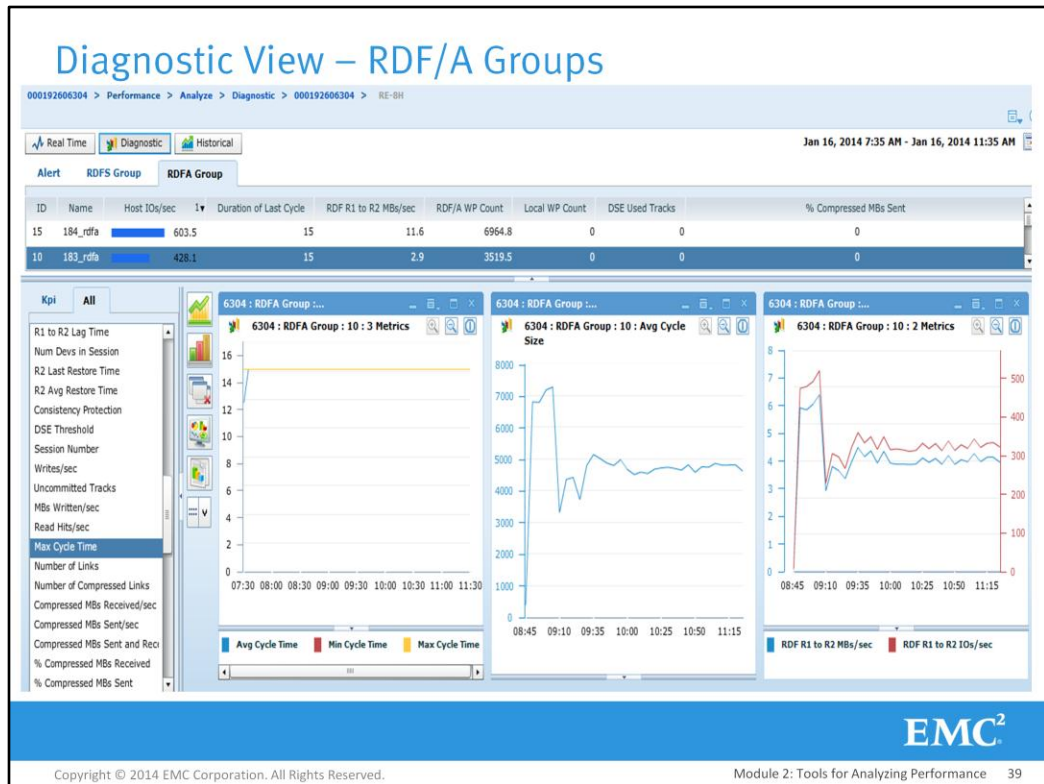


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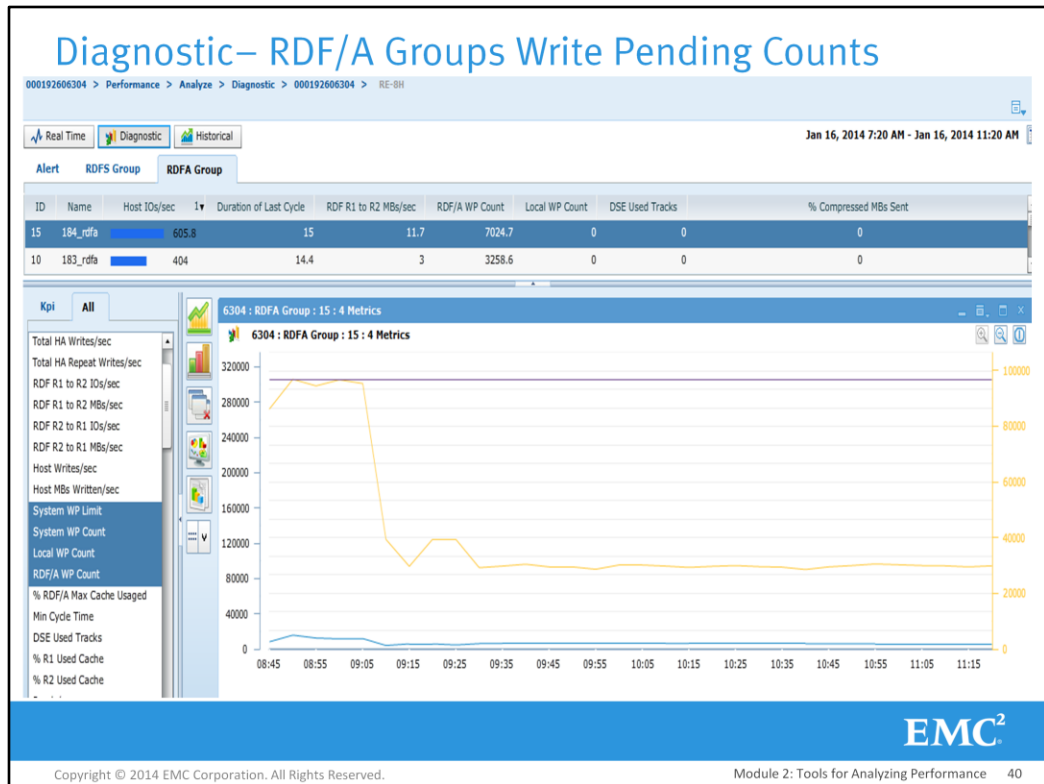
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Selecting Port 0 and 1 IOs per second gives more information about the activity on this director. Port 0 is currently doing all the work.

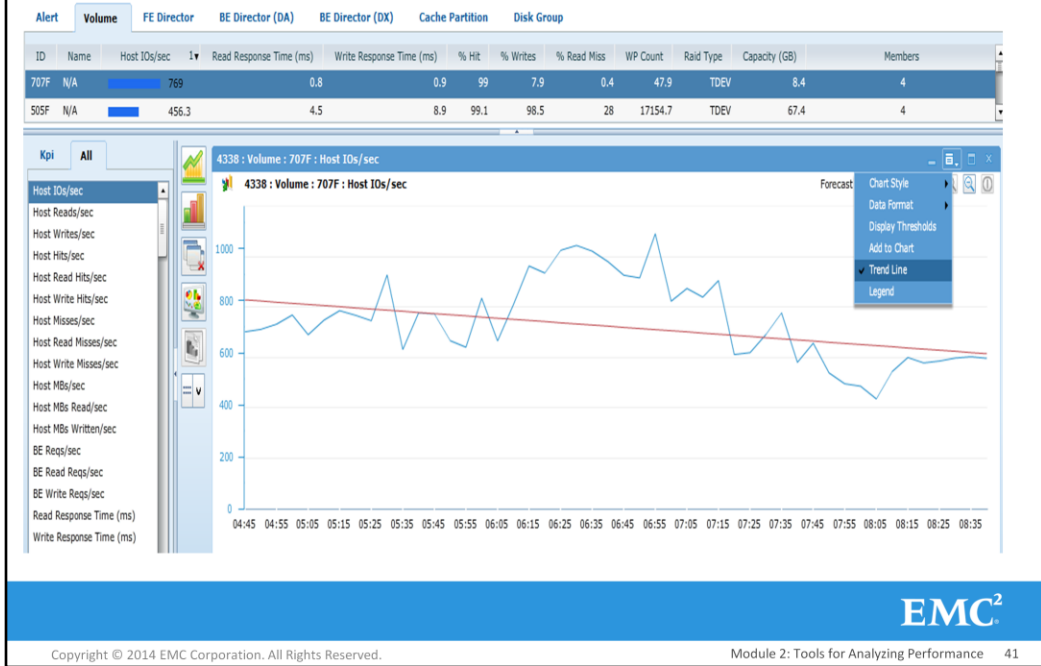


Diagnostic views of RDF Groups for RDFA can provide insight into the functionality of the SRDF/A cycles. If the chart indicates the average and maximum cycle times are higher than the minimum cycle time, this could indicate a problem with the resources allocated for SRDF/A and/or the configuration.

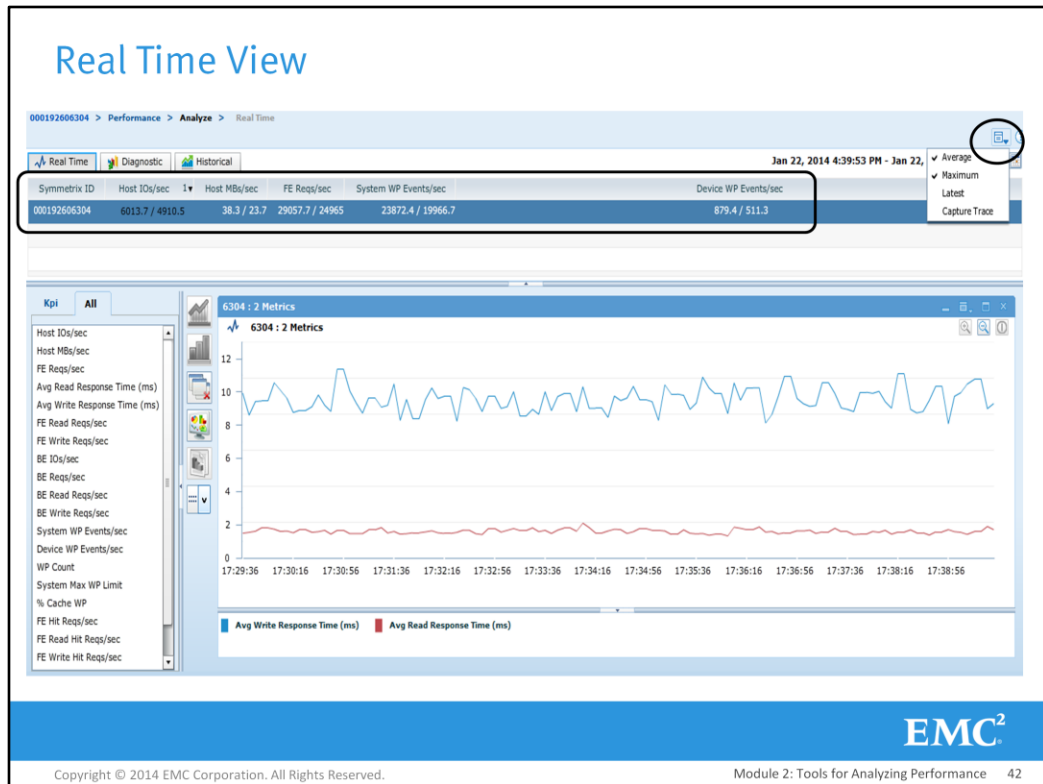


Charting the WP counts gives us an idea as to what is going on in the Symmetrix cache.

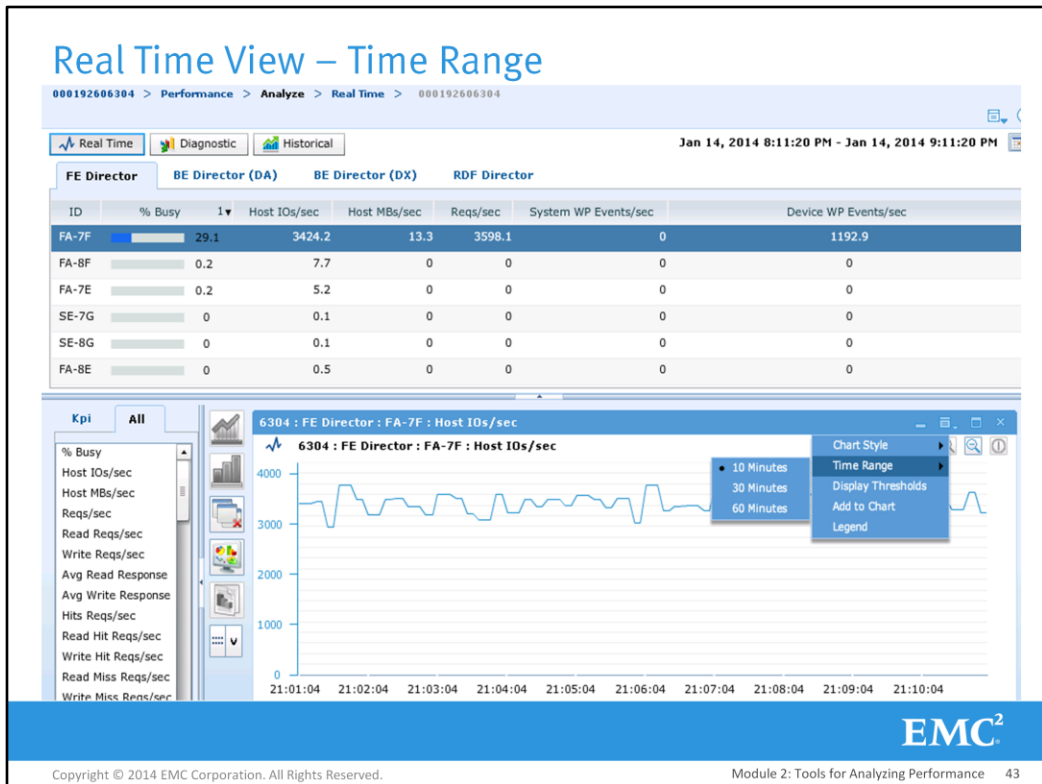
Trend Lines



Trend Lines are available for various objects from the Diagnostic or Historical views. Using the Change Chart Properties and Settings dropdown, select Trend Line and it will add it to the current chart. Additional data points will be plotted by increasing the “Forecast Points” counter in the upper right corner of the chart.

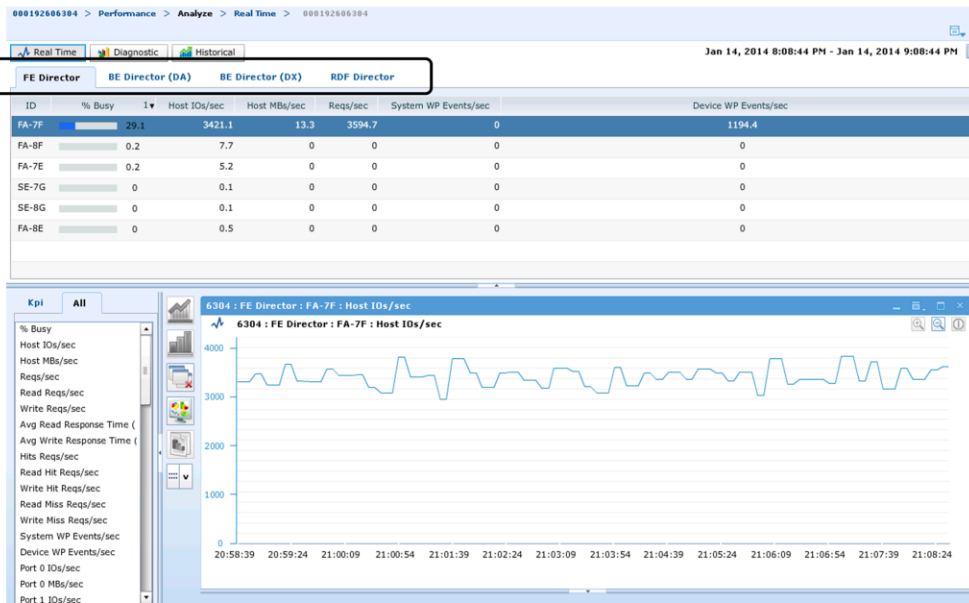


Real Time Views are available for the Symmetrix, FE, BE (both the internal DA and External DX), and RDF Directors. A number of relevant metrics for each component can be plotted. Select the instance (Symmetrix array in this example) → Select one or more metrics → Click on the graph icon. Select the Change Layout dropdown if you want to change (Latest, Maximum, Average). You can display multiple, as is shown in this example.



The time range defaults to 10 minutes. Using the Change Chart Properties and Settings dropdown you can optionally change the time range to 10, 30, or 60 minutes.

Real Time View – Directors

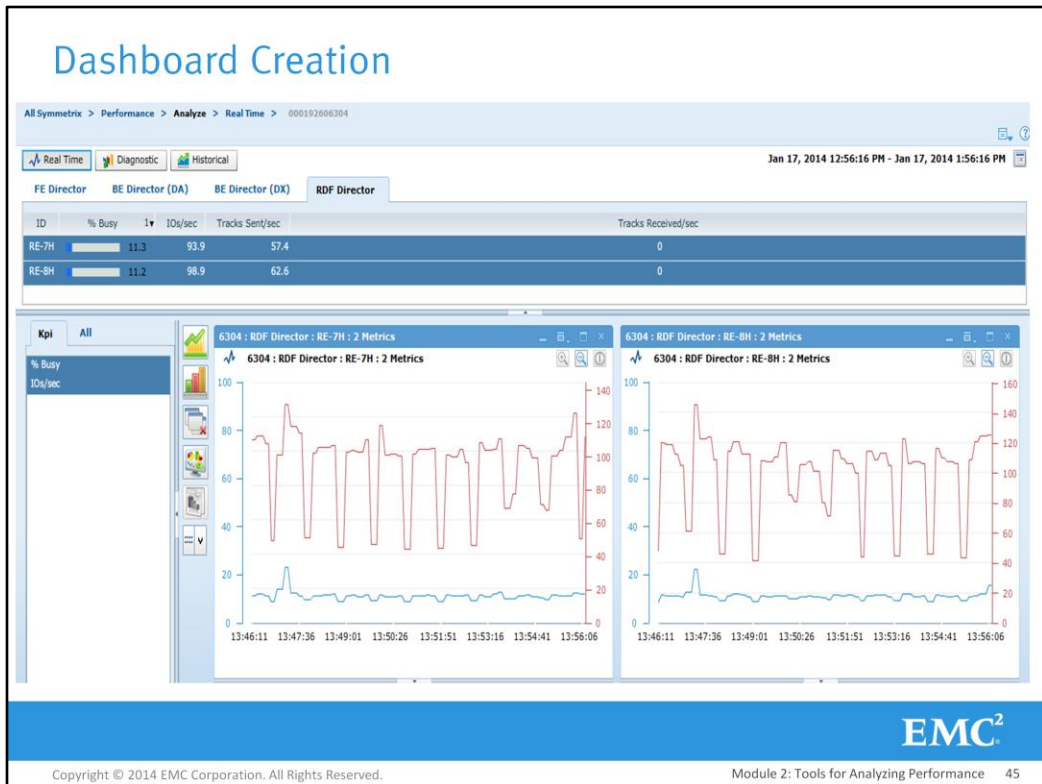


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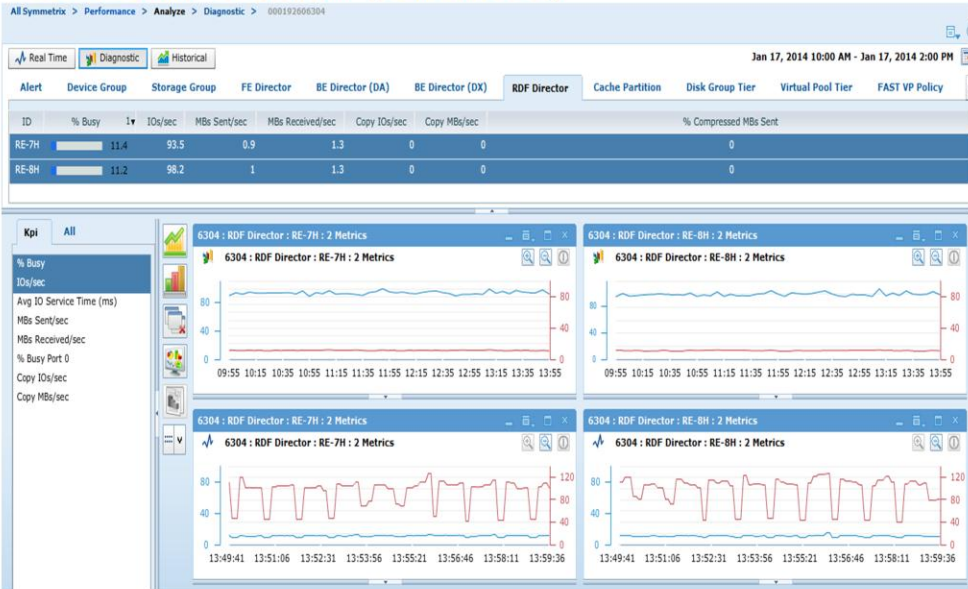
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In Real Time mode you can switch between the Director tabs for relevant metrics for each Director type.



In preparation of creating a dashboard, you must first build the charts. Anything shown in the canvas area is what will become your Dashboard. Here, we are selecting Real Time charts for two RDF directors.

Dashboard Creation (Continued)



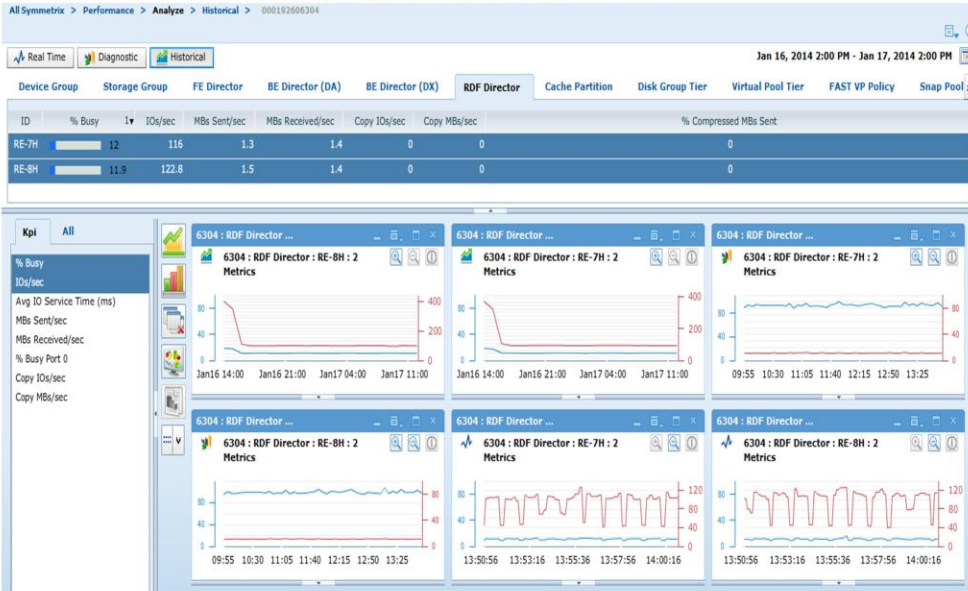
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Add two more Diagnostic charts to the display.

Dashboard Creation (Continued)



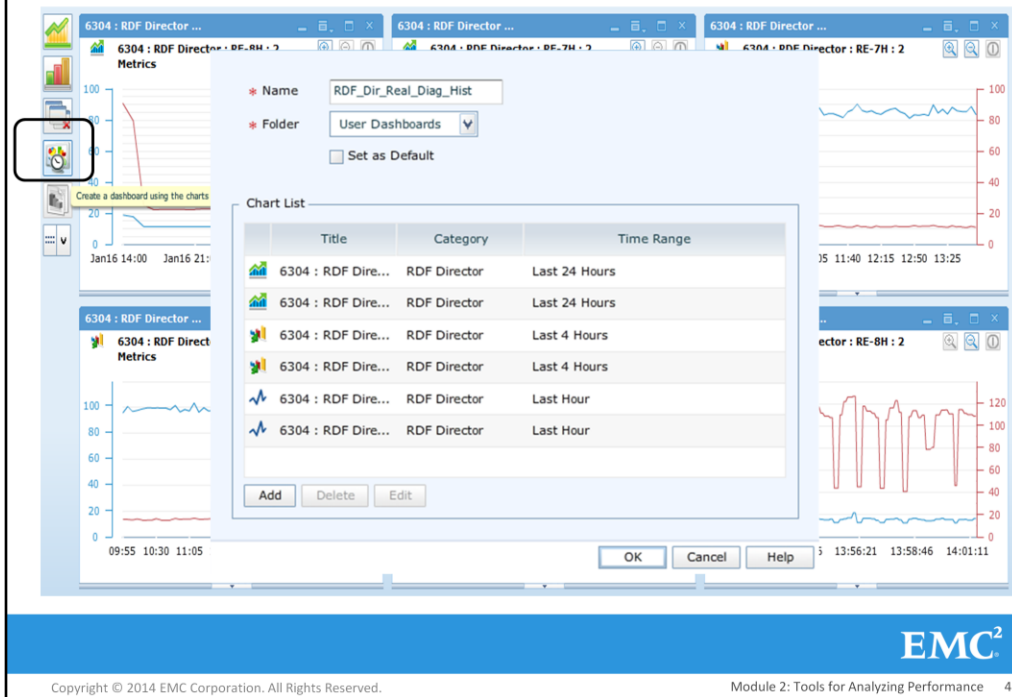
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Finally, the last two charts are Historical.

Dashboard Save



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In this case, we selected a series of charts that will show Real Time, Diagnostic, and Historical displays of % Busy and IOs per second for both of the RDF directors.

Creation of a user Dashboard is accomplished by clicking on the Create Dashboard button.

The Create Dashboard dialog will then allow you to name and select the folder to place it in.

If this dashboard is what you want displayed when first going to the Monitor page, then check the “Set As Default” box.

Click OK, and it will save the dashboard.

Dashboard Saved



The new dashboard will now show up in the User Dashboards section. Clicking on it will reshew the same charts.

Dashboard Template Creation

The screenshot displays the EMC Symmetrix Performance Analyzer interface. At the top, the navigation bar shows 'All Symmetrix > Performance > Analyze > Historical'. The main area features a dashboard with various performance metrics. A dialog box titled 'Create a template dashboard' is open, allowing the user to name the template (e.g., 'IOs MBs MBsWrt'), select a folder (e.g., 'User Templates'), and choose the number of instances (e.g., 'Single'). A 'Chart List' table is visible, listing metrics like '6304 : 3 Metrics' and '1061 : 3 Metrics' under the 'Array' category. The background shows a dashboard with various performance metrics and a table of Symmetrix IDs.

Symmetrix ID	Host IOs/sec	Host MBs/sec	FE Utilization	BE Utilization	RDF Utilization	% Cache WP	Disk Utilization	Avg Fall Thru Time
000192606304	4829.1	24.1						158.3
000195901061	13.1	0						150

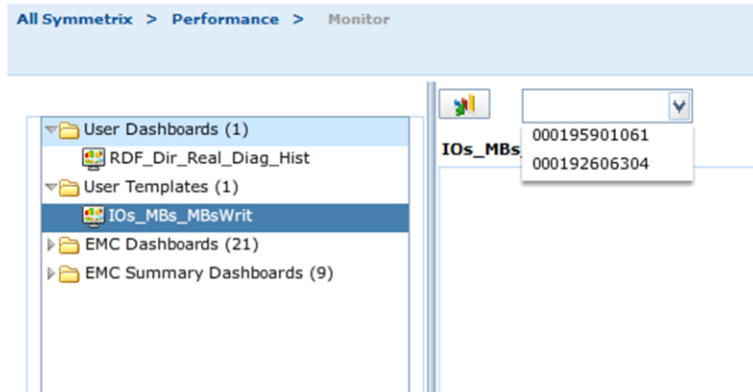
Title	Category
6304 : 3 Metrics	Array
1061 : 3 Metrics	Array

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Template creation is very similar to a dashboard creation.

Select the charts that you want displayed, then click on the Create Template button. Similar dialog will allow you to name and select the folder to save it in. After editing, click OK to finish the save.

Dashboard Template Usage



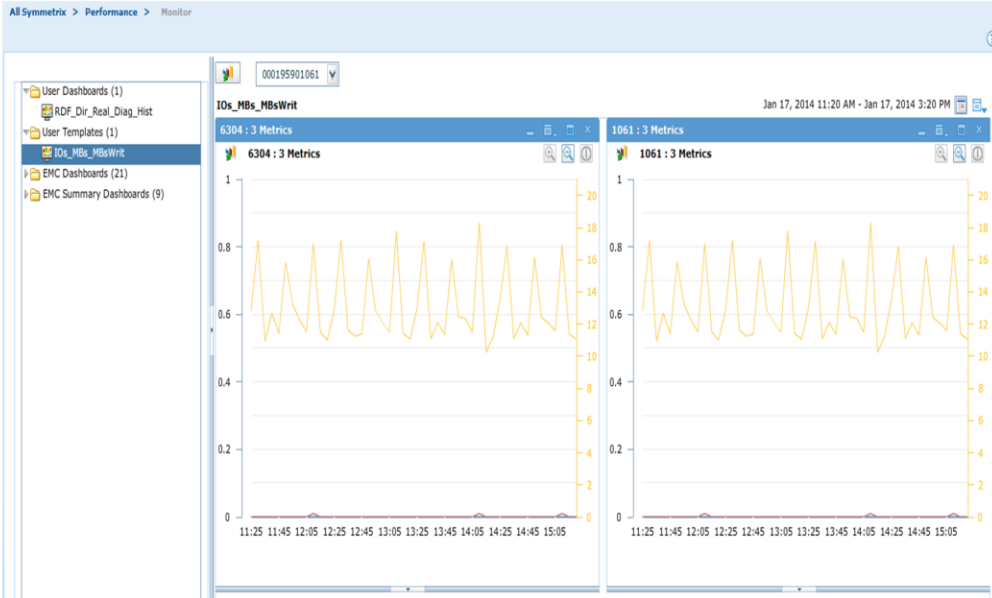
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Your template will now be found in the User Templates, or the folder you chose when saving. Selecting it will then allow you to use the dropdown and select an array or component.

Dashboard Template Usage (Continued)



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Lesson 3: Summary

During this lesson the following topics were covered:

- The performance features of Unisphere for VMAX
- Navigating in Unisphere for VMAX Performance Viewer
- Using the Monitor Dashboards, Analyze, Trend, Historical, Diagnostic, and Real Time views to understand the performance of the VMAX
- Dashboard and template creation



This lesson covered the navigation of various views of Unisphere for VMAX Performance Viewer.

Module 2: Summary

Key points covered in this module:

- Basic operation and features of Unisphere for VMAX Performance Component and Unisphere for VMAX Performance Viewer
- Viewing archives with Performance Viewer
- Loading and activating databases



This module covered tools available for collecting, monitoring, and analyzing performance data.