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This preface includes the following information:

- Product version
- Intended audience
- Release notes
- Related documents
- Document conventions
- Conventions for storage capacity values
- Accessing product documentation
- Getting help
- Comments
Product version
This document revision applies to Infrastructure Analytics Advisor 2.1 or later.

Intended audience
This document provides an overview of the Hitachi Infrastructure Analytics Advisor software. This document is intended for storage administrators and infrastructure administrators.

Release notes
Read the release notes before installing and using this product. They may contain requirements or restrictions that are not fully described in this document or updates or corrections to this document. Release notes are available on Hitachi Data Systems Support Connect: https://knowledge.hds.com/Documents.

Related documents
The following documents are referenced or contain more information about the features described in this manual.
• Hitachi Infrastructure Analytics Advisor Installation and Configuration Guide, MK-96HIAA002
• Hitachi Infrastructure Analytics Advisor REST API Reference Guide, MK-96HIAA003
• Hitachi Infrastructure Analytics Advisor Data Analytics and Performance Monitoring Overview, MK-96HIAA004
• Hitachi Data Center Analytics User Guide, MK-96HDCA002
• Hitachi Data Center Analytics REST API Reference Guide, MK-96HDCA006
• Hitachi Data Center Analytics Query Language User Guide, MK-96HDCA005

Document conventions
This document uses the following typographic conventions:

<table>
<thead>
<tr>
<th>Convention</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bold</strong></td>
<td>Indicates text in a window, including window titles, menus, menu options, buttons, fields, and labels. Example: Click OK. Indicates emphasized words in list items.</td>
</tr>
<tr>
<td><em>Italic</em></td>
<td>Indicates a document title or emphasized words in text.</td>
</tr>
<tr>
<td>Convention</td>
<td>Description</td>
</tr>
<tr>
<td>---------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>• Indicates a variable, which is a placeholder for actual text provided by the user or for output by the system. Example: <code>pairdisplay -g group</code></td>
<td>(For exceptions to this convention for variables, see the entry for angle brackets.)</td>
</tr>
<tr>
<td>Monospace</td>
<td>Indicates text that is displayed on screen or entered by the user. Example: <code>pairdisplay -g oradb</code></td>
</tr>
</tbody>
</table>
| < > angle brackets  | Indicates variables in the following scenarios:  
  • Variables are not clearly separated from the surrounding text or from other variables. Example: `Status-<report-name><file-version>.csv`  
  • Variables in headings.                                                                              |
| [ ] square brackets | Indicates optional values. Example: `[ a | b ]` indicates that you can choose a, b, or nothing.                                              |
| { } braces          | Indicates required or expected values. Example: `{ a | b }` indicates that you must choose either a or b.                                     |
| | vertical bar       | Indicates that you have a choice between two or more options or arguments. Examples:  
  `[ a | b ]` indicates that you can choose a, b, or nothing.  
  `{ a | b }` indicates that you must choose either a or b.                                              |

This document uses the following icons to draw attention to information:

<table>
<thead>
<tr>
<th>Icon</th>
<th>Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Note]</td>
<td>Note</td>
<td>Calls attention to important or additional information.</td>
</tr>
<tr>
<td>![Tip]</td>
<td>Tip</td>
<td>Provides helpful information, guidelines, or suggestions for performing tasks more effectively.</td>
</tr>
<tr>
<td>![Caution]</td>
<td>Caution</td>
<td>Warns the user of adverse conditions and/or consequences (for example, disruptive operations, data loss, or a system crash).</td>
</tr>
<tr>
<td>![WARNING]</td>
<td>WARNING</td>
<td>Warns the user of a hazardous situation which, if not avoided, could result in death or serious injury.</td>
</tr>
</tbody>
</table>

**Conventions for storage capacity values**

Physical storage capacity values (for example, disk drive capacity) are calculated based on the following values:

<table>
<thead>
<tr>
<th>Physical capacity unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 kilobyte (KB)</td>
<td>1,000 (10^3) bytes</td>
</tr>
</tbody>
</table>
# Physical capacity unit

<table>
<thead>
<tr>
<th>Physical capacity unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 megabyte (MB)</td>
<td>1,000 KB or 1,000(^2) bytes</td>
</tr>
<tr>
<td>1 gigabyte (GB)</td>
<td>1,000 MB or 1,000(^3) bytes</td>
</tr>
<tr>
<td>1 terabyte (TB)</td>
<td>1,000 GB or 1,000(^4) bytes</td>
</tr>
<tr>
<td>1 petabyte (PB)</td>
<td>1,000 TB or 1,000(^5) bytes</td>
</tr>
<tr>
<td>1 exabyte (EB)</td>
<td>1,000 PB or 1,000(^6) bytes</td>
</tr>
</tbody>
</table>

Logical storage capacity values (for example, logical device capacity) are calculated based on the following values:

<table>
<thead>
<tr>
<th>Logical capacity unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 block</td>
<td>512 bytes</td>
</tr>
<tr>
<td>1 cylinder</td>
<td>Mainframe: 870 KB</td>
</tr>
<tr>
<td></td>
<td>Open-systems:</td>
</tr>
<tr>
<td></td>
<td>• OPEN-V: 960 KB</td>
</tr>
<tr>
<td></td>
<td>• Others: 720 KB</td>
</tr>
<tr>
<td>1 KB</td>
<td>1,024 (2(^{10})) bytes</td>
</tr>
<tr>
<td>1 MB</td>
<td>1,024 KB or 1,024(^2) bytes</td>
</tr>
<tr>
<td>1 GB</td>
<td>1,024 MB or 1,024(^3) bytes</td>
</tr>
<tr>
<td>1 TB</td>
<td>1,024 GB or 1,024(^4) bytes</td>
</tr>
<tr>
<td>1 PB</td>
<td>1,024 TB or 1,024(^5) bytes</td>
</tr>
<tr>
<td>1 EB</td>
<td>1,024 PB or 1,024(^6) bytes</td>
</tr>
</tbody>
</table>

## Accessing product documentation

Product user documentation is available on Hitachi Data Systems Support Connect: [https://knowledge.hds.com/Documents](https://knowledge.hds.com/Documents). Check this site for the most current documentation, including important updates that may have been made after the release of the product.

## Getting help

[Hitachi Data Systems Support Connect](https://support.hds.com/en_us/contact-us.html) is the destination for technical support of products and solutions sold by Hitachi Data Systems. To contact technical support, log on to Hitachi Data Systems Support Connect for contact information: [https://support.hds.com/en_us/contact-us.html](https://support.hds.com/en_us/contact-us.html).

[Hitachi Data Systems Community](https://community.hds.com) is a global online community for HDS customers, partners, independent software vendors, employees, and prospects. It is the destination to get answers, discover insights, and make connections. **Join the conversation today!** Go to [community.hds.com](https://community.hds.com), register, and complete your profile.
Comments

Please send us your comments on this document to doc.comments@hds.com. Include the document title and number, including the revision level (for example, -07), and refer to specific sections and paragraphs whenever possible. All comments become the property of Hitachi Data Systems Corporation.

Thank you!
Infrastructure Analytics Advisor overview

Infrastructure Analytics Advisor is data center management software for monitoring and reporting end-to-end performance from hosts through shared storage resources.

- Product overview
- Features of Infrastructure Analytics Advisor
- Logging on to Infrastructure Analytics Advisor
- Direct access to Infrastructure Analytics Advisor windows
- Accessing Data Center Analytics
Product overview

With Infrastructure Analytics Advisor, you can define and monitor storage service level objectives (SLOs) for resource performance. You can identify and analyze historical performance trends to optimize storage system performance and plan for capacity growth.

Using Infrastructure Analytics Advisor, you register resources (storage systems, hosts, servers, and volumes) and set service-level thresholds. You are alerted to threshold violations and possible performance problems (bottlenecks). Using analytics tools, you find which resource has a problem and analyze its cause to help solve the problem.

The following figure describes how the Infrastructure Analytics Advisor ensures the performance of your storage environment based on real-time service level objectives (SLOs).

The system administrator uses Hitachi Infrastructure Analytics Advisor (HIAA) to manage and monitor the IT infrastructure based on SLOs, which match the service-implementation guidelines that are negotiated under a service level agreement (SLA) with consumers.

Infrastructure Analytics Advisor monitors the health of the IT infrastructure using performance indicators and generates alerts when SLOs are at risk.

Having data center expertise, the service administrator uses Infrastructure Analytics Advisor to assign resources, such as VMs and storage capacity from registered storage systems, to consumer applications. The purpose of doing this is to manage critical SLO violations and to ensure that service performance meets the service level agreements.
Features of Infrastructure Analytics Advisor

Infrastructure Analytics Advisor provides IT analytics capabilities and business benefits.

SLO enforcement
Monitoring and enforcement of storage SLOs.

Change monitoring
Ability to accurately log storage configuration changes and compare their impact with performance degradation.

End-to-end monitoring
Topology mapping of all networked storage resources: hosts, virtual machines, storage paths, SAN switches, storage ports, storage pools, and physical and logical storage resources.

In-depth reporting capability

Standard reports
- Default reports. The first time you log on to Infrastructure Analytics Advisor, the Dashboard shows the following reports by default: System Status Summary for Consumers and User Resources, Event Trends, System Resource Status, and Resource Events. You can customize which reports display by default.
- Critical reports. Critical reports show resources in your storage infrastructure that exceeded their thresholds. Critical reports are available for consumers, VMs, volumes, hosts, and system resources.
- Summary reports. Summary reports give you a high-level view of storage infrastructure resources. These reports are available for consumers, VMs, volumes, and system resources. Each summary report shows the number of resources with critical and warning alerts.
- Other reports. Infrastructure Analytics Advisor provides additional reports about hypervisors, switches, and system and resource events.

Custom reports
By integrating with Data Center Analytics, you can create custom reports by running queries on performance data that is collected from monitored resources.

Problem identification and analysis
Intelligent diagnostics to isolate and analyze the root cause of performance bottlenecks.

Storage IO control settings
Capability to optimize IO activity of multiple storage resources for consumers at the volume level.
Logging on to Infrastructure Analytics Advisor

Access the Infrastructure Analytics Advisor web interface from a supported browser.

Procedure

1. Open a web browser.
2. Enter the URL for Infrastructure Analytics Advisor in the address bar:
   http://host-name-or-ip-address-of-the-server-where-Infrastructure Analytics Advisor-is-installed:port-number/Analytics/login.htm

   where port-number is the port number of the Infrastructure Analytics Advisor management server. The default port number is 22015.

   To access Infrastructure Analytics Advisor in secure mode, enter: https://host-name-or-ip-address-of-the-server-where-Infrastructure Analytics Advisor-is-installed:port-number/Analytics/login.htm

   The default port number for secure mode is 22016.
3. Type a user ID and password to log on.
4. Click Log In.

Direct access to Infrastructure Analytics Advisor windows

You can access the following windows in the web interface directly:

- Dashboard: To review the overall performance health of your storage environment.
- Search resources: To search for resources in your storage environment to analyze and troubleshoot performance problems.
- Events: To manage all events (critical, warning, and information) received from the monitored resources in your storage environment.
- Administration: To administer the Infrastructure Analytics Advisor environment and manage settings.

To access these windows directly, specify the URL in the following format:

http[s]:ip-address:port number/Analytics/main.htm?module=ID-of-the-window-to-display&param[key-name]=key-value

where:

- ip-address is the IP address of the Infrastructure Analytics Advisor management server.
- port-number is the port number of the Infrastructure Analytics Advisor management server. The default port number is 22015. For secure mode, the default port is 22016.
• Valid values for *ID-of-the-window-to-display* are:
  ○ dashboard
  ○ analytics
  ○ events
  ○ administration

• Valid values for the *key-name* parameter are:
  ○ searchType is the type of the resource you want to search. 
    Valid *key-value* values are:
    - groups: Use this keyword to search for consumers registered in Infrastructure Analytics Advisor. This is the default keyword if you do not specify any value.
    - servers: Use this keyword to search for servers registered in Infrastructure Analytics Advisor.
    - switches: Use this keyword to search for switches registered in Infrastructure Analytics Advisor.
    - storages: Use this keyword to search for storage systems registered in Infrastructure Analytics Advisor.
    - volumes: Use this keyword to search for volumes in registered storage systems.
  ○ searchKey is the resource name you want to search for in consumers, servers, switches, storage systems, volumes, and hypervisors. To search for all resources, do not specify a value.

Examples:
• To access the Dashboard:
• To access the Search resources window and search for a server:
  http://172.17.80.200:22015/Analytics/main.htm?
  module=analytics&param[searchType]=servers&param[searchKey]=hyperv-SC

---

**Accessing Data Center Analytics**

Use Data Center Analytics to conduct historical trend analysis across a wide set of infrastructure statistics, create advanced monitoring custom reports, and to interactively do additional troubleshooting and diagnostics.

Access Data Center Analytics from the **Tools** menu.

Use the Data Center Analytics online help to view details about reporting tasks and features.
Quick access to vital performance reports

Infrastructure Analytics Advisor communicates various types of information to you about the resources in your Data Center through vital performance reports.

Monitoring performance is crucial to effective Data Center management. System administrators require access to resource information in at any moment, and information must display in a way that facilitates a comprehensive understanding of the complex processes in the Data Center.

Infrastructure Analytics Advisor offers numerous gauges and reports for instant recognition of problems and also long-term tracking of resource usage and events. In addition, customization allows for modifying the User Interface based on the requirement.

- Dashboard overview
- System Status Summary for Consumers and User Resources
- System Resource Status report
- Event Trends report
- Resource Events report
- Customizing the dashboard
Dashboard overview

The Infrastructure Analytics Advisor dashboard provides access to the status of your storage environment through reports that display the performance status of system resources (hypervisors, storage systems, and switches), user resources (volumes, hosts, and VMs) and consumers (user resources such as virtual machines or volumes grouped by company name or business system consumer).

The dashboard shows IT infrastructure health based on real-time service level objective (SLO) information, and provides status reports that display the capacity and performance data of all your monitored system and user resources.

When you first log on after the product is installed, the dashboard is unavailable and you are prompted for setup tasks. If you click OK, the DCA Management Server window appears, and you can begin the initial set up by clicking Edit Settings.

After the initial setup, the dashboard by default displays the following reports:

- System Status Summary for Consumers and User Resources report: Displays the performance and status summary of monitored consumers and gauges of the number of VMs, hosts, and volumes with alerts in the environment
- Event Trends report: Displays the changes in the number of critical, warning, and information alerts for the past 72 hours.
- System Resource Status report: Displays the status of monitored server, SAN, and storage components.
- Resource Events report: Displays a list of resource events based on the time of event occurrence. The most recent events are listed at the top of the list.

You can customize the dashboard to display reports that you want to monitor. To reset the dashboard to display default reports, click Restore Default Settings.

The status indicator displays the number and severity of alerts generated by the storage environment.

<table>
<thead>
<tr>
<th>Icon</th>
<th>Color</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Alert Icon" /></td>
<td>Red</td>
<td>Critical</td>
</tr>
</tbody>
</table>

Quick access to vital performance reports
Hitachi Infrastructure Analytics Advisor User Guide
<table>
<thead>
<tr>
<th>Icon</th>
<th>Color</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Icon" /></td>
<td>Yellow</td>
<td>Warning</td>
</tr>
<tr>
<td><img src="image2.png" alt="Icon" /></td>
<td>Blue</td>
<td>Information</td>
</tr>
<tr>
<td><img src="image3.png" alt="Icon" /></td>
<td>Green</td>
<td>Normal</td>
</tr>
</tbody>
</table>

**Overall performance summary**

If the summary bar is green, then all SLOs have been met. However, this status and empty reports can also indicate that you did not set up the Infrastructure Analytics Advisor for performance monitoring. Use the configuration workflow to set up the Infrastructure Analytics Advisor to monitor managed resources.

If the summary bar is red, a critical error was detected. Alert bars are listed in order of priority:
- Consumer
- User Resource
- System Resource

The dashboard displays the critical and warning status in the system in order of priority.

For example, if a warning alert occurs in a Consumer or User Resource, and a critical alert occurs in a System Resource, the indicator bar displays the status of the Consumer or User Resources. This is because Consumer and User Resources have a higher priority than System Resources.

The default refresh time for the dashboard is 5 minutes. You can manually refresh the dashboard by clicking **Refresh** at the top of the dashboard, or by configuring the refresh interval time in the **Default Settings** window.

**Search**

The search feature on the home page lets you search for a resource in the Consumers, Servers, Storage Systems, and Volumes categories. From the returned search results, select the resources you must analyze, and launch the E2E view or Sparkline view for further analysis.

**Related topics**

- [Customizing the dashboard](#) on page 27
- [Consumers report](#) on page 78
- [VMs report](#) on page 81
- [Volumes report](#) on page 86
System Status Summary for Consumers and User Resources

The System Status Summary for Consumers and User Resources report displays the performance status summary of monitored consumers, VMs, hosts, and volumes.

Related topics

- System Status Summary for Consumers on page 22
- System Status Summary for User Resources on page 23

System Status Summary for Consumers

Consumers are business management units under which user resources such as virtual machines, hosts, or volumes can be grouped by company name, or business system consumer and assigned grades based on their importance.
The Consumer pane displays the consumer grades, the total number of alerts for each, and a bar graph of the highest alert severity in each grade, as follows:

- Consumer grades are listed from the highest to the lowest grade. Consumers with a bronze grade are grouped under Others.
- The total number of critical or warning alerts display above the total number of consumers for each consumer grade. If there are critical and warning alerts for a specific consumer grade, then the alert for the highest severity displays.
- The number of alerts for each grade is a link that displays the Consumers - Critical/Warning window.
- If more than one alert exists for any specific grade, a bar graph appears. A red bar indicates critical errors, and a yellow bar is warning. If the number of resources with critical and warning alerts exceed 10, only the critical alerts display.
- If there are no consumers associated with a specific type of grade, - / - displays for the number of alerts.
- If no consumers are associated with a grade, or if no data is available, No Data displays instead of a bar graph.

**System Status Summary for User Resources**

The System Status Summary - VM/Host and Volume reports display the status of all monitored VMs, hosts, and volumes.

![Resource Status Information Gauge](image)

Both the VM/Host pane and the Volume pane display a Resource Status information gauge, where the top number is the total critical or warning alerts received from the VMs and hosts, or volumes that exceeded the critical or warning thresholds for any monitored metric. The bottom number indicates the total number of VMs, hosts, or volumes in the system.
Under Metrics, a bar graph displays the total number of VMs and hosts with critical and warning alerts for any monitored metric.

For the Volume summary, Metrics displays a bar graph of the total number of volumes with critical and warning alerts for any metrics. In the bar graph, red is the total number of critical alerts and yellow is the number of warning alerts.

For example, if there are 3 critical alerts and 5 warning alerts, then both critical and warning display in the gauge. If the number of critical alerts is greater than 9, only the red bar (critical) displays because the maximum value of the gauge is 10.

To view details about the volumes that exceeded the defined critical or warning thresholds, click the number link in the information gauge chart or bar graph. A list of affected resources displays in a new window. You can select the resource and then click Show E2E View to view the data center topology and review the system configuration to analyze the performance problem.

**System Resource Status report**

The System Resource Status report is one of the default reports that appears on the Infrastructure Analytics Advisor dashboard. It provides a heat map of the current status of system resources such as server (CPU, memory, NIC, HBA, disk), SAN (switches), and storage (ports, processors, cache, pools, and parity groups) components.

![System Resource Status report](image)

Each red tile shows a critical alert, and each yellow tile shows a warning alert. Unknown resources are considered Normal and are represented by green tiles.

To view details about the resources that exceeded the defined thresholds, click the number link. A list of affected resources displays in a new window. You can select the resource and then click Show E2E View to view the data center topology and review the system configuration.
Event Trends report

The Event Trends report is one of the default reports that appears on the Infrastructure Analytics Advisor dashboard. It provides a trend report of all critical and warning alerts in your environment for the past 72 hours. It is useful in comparing the change history and the number of critical alerts, especially for an administrator who manages the entire system.

• When you hover over a specific bar in the trend report, a tool tip displays the total number of alerts, the number of critical alerts, and the number of warning alerts for a specific time period. Each bar represents an hour.
• Blue blocks at the bottom of the trend report indicates configuration changes for a specific time period. The darker the shade of blue, the larger the configuration change from one time period to the next.
• When you hover over a change history at the bottom of the trend report, the tool tip displays the number of changes in a specific time period. The date is in the format yyyy-mm-dd, and the time hh:mm.

If you see a spike on the trend report, navigate to the E2E View from the System Status Summary report to view the data center topology and review the configuration and status information. You can then use the Sparkline View and analytics workflow to solve the problem.

Related topics
• E2E infrastructure topology view on page 42
Resource Events report

The Resource Events report table on the Infrastructure Analytics Advisor dashboard lists the most current resource events in descending order, based on the Date Time column. You can view a maximum of 500 critical and warning events that occurred in the past 24 hours.

<table>
<thead>
<tr>
<th>Level</th>
<th>Message</th>
<th>Date Time</th>
<th>Category</th>
<th>Device Name</th>
<th>Component Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warning</td>
<td>“Virtual Nic Dropped IP Packets.”</td>
<td>2016-04-11 01:22:00</td>
<td>Performance</td>
<td>172.19.36.43</td>
<td>HCSBeta</td>
</tr>
<tr>
<td>Critical</td>
<td>“Virtual Nic Dropped IP Packets.”</td>
<td>2016-04-11 01:07:00</td>
<td>Performance</td>
<td>172.19.36.43</td>
<td>HCSBeta</td>
</tr>
<tr>
<td>Warning</td>
<td>“Virtual Nic Dropped IP Packets.”</td>
<td>2016-04-11 00:37:00</td>
<td>Performance</td>
<td>172.19.36.43</td>
<td>HCSBeta</td>
</tr>
<tr>
<td>Critical</td>
<td>“Virtual Nic Dropped IP Packets.”</td>
<td>2016-04-11 00:07:00</td>
<td>Performance</td>
<td>172.19.36.43</td>
<td>HCSBeta</td>
</tr>
<tr>
<td>Critical</td>
<td>“CPU Ready” changed from “Wa.”</td>
<td>2016-04-10 23:59:00</td>
<td>Performance</td>
<td>172.19.36.62</td>
<td>172.19.36.62</td>
</tr>
</tbody>
</table>

The report contains information for each column head: Level, Message, Date Time, Category, Device Name, and Component Name.

To view details about the resources that exceeded the defined thresholds, click the associated message link. Click **Show E2E View** from the Event Detail tab to view the data center topology and review the configuration and status information.

**Related topics**
- [System Event Status report](#) on page 98
- [Resource Event Status report](#) on page 99
- [E2E infrastructure topology view](#) on page 42

**System and Resource Events**

You can view the latest events in one place and manage the events based on the status.

The Events tab allows you to display details about significant events in your monitored environment.
There are two categories of events:

- **System Events**
  The System Events tab displays Management and Event Action events generated when system settings must be verified or configured.

- **Resource Events**
  The Resource Events tab displays Performance events generated when a device or component (server, storage system, network device, and so on) does not perform optimally.

  You can analyze the Resource events by using the end-to-end network topology view to identify the resource that generated the event.

The All Events tab displays both System and Resource events. Each event indicates the level of the alert, the date and time of the alert message, category, device name, and component name. Click a message in the Message column to display the Event Detail window.

Use the Event Detail window to display more event details, such as the device type and component type. You can scroll through the list for more events. For Resource events, you can click Show E2E View to view the network topology.

The Event levels classifications are as follows:

- **Critical**: Event that requires immediate attention
- **Warning**: Event that might become critical in the future
- **Informational**: No immediate action required

**Customizing the dashboard**

You can customize the dashboard settings to display the reports that you must monitor. The system saves the changes made to the dashboard settings.
and the next time you log in, previously selected reports display on the dashboard.

**Procedure**

1. On the **Dashboard** tab, click **Dashboard Settings**.
2. (Optional) In the **Dashboard Settings** window, change the dashboard refresh time.
   
   You can change the refresh time interval by using the Refresh Interval text box. (The default is 5 minutes.)
3. Check the boxes next to the reports that you want on the dashboard and uncheck the other reports.
4. (Optional) To reset the dashboard to display default reports, click **Restore Default Settings**.
5. Click **OK**.
Analyzing performance problems

Infrastructure Analytics Advisor provides analytical diagnostics to quickly identify, isolate, and determine the root cause of problems.

The traditional approach of troubleshooting performance problems in the unified infrastructure poses several challenges. For example, it can be difficult to identify performance problem in a storage infrastructure environment that includes various virtual machines, servers, network, and storage.

Infrastructure Analytics Advisor offers an out-of-the-box analytics solution which lets you identify and troubleshoot performance problems at the node level. The topology view lets you view the graphical representation of the infrastructure components and their dependencies, which is crucial for troubleshooting the infrastructure performance problems. The troubleshooting aids helps in efficient root cause analysis.

- Analytics workflow
- Detecting performance problems
- Analyzing performance bottleneck
- Identify affected resources
- Analyzing the cause of the bottleneck
- Solving performance problems
- Executing actions
Analytics workflow

The workflow for analyzing performance problems and identifying the root cause is as follows:

1. **Detecting performance problems** on page 30
2. **Identifying the bottleneck in E2E view** on page 32
3. **Comparing performance trends in Sparkline view** on page 34
4. **Identify affected resources** on page 35
5. **Analyzing shared resources** on page 36
6. **Analyzing configuration changes** on page 37
7. **Solving performance problems** on page 38

Detecting performance problems

You can view the threshold violations using the Dashboard tab and Events tab. You can configure the system to send email notifications when the threshold values are exceeded. You can also use the search feature in the Analytics tab to find the target resources for performance analysis.

**Dashboard**

The dashboard displays when you log on to the Infrastructure Analytics Advisor. You can create a custom dashboard, and choose to view the reports of monitored resources.
The dashboard displays summary reports for the monitored resources, system and resource events, event trends and consumer groups. The report widgets display the threshold violations and critical alerts detected on all monitored resources when threshold values are exceeded.

In the following figure, the warnings display on the monitored VMs and volumes. From the report widgets, you can click links to access the E2E view to analyze the cause of the threshold violations.

**Events tab**

The Events tab displays a list of resource and system events. You can view the severity of each event, date and time of the occurrence, category, device, and the component name. You can navigate from the Events tab to the E2E view for further analysis.

**Email notifications**

Infrastructure Analytics Advisor allows you to configure email notifications. When the threshold values are exceeded, the system sends an email to notify you of the potential performance problem.

**Search**

The search feature in the Analytics tab lets you search for a resource in the Consumers, Servers, Switches, Storage Systems, and Volumes categories. From the returned search results, you can select the resources to analyze, and launch the E2E view or Sparkline view for further analysis.
Analyzing performance bottleneck

The performance degradation in the user resources is caused by performance bottleneck on the server, network, or storage components.

The performance bottleneck occurs due to various reasons, such as CPU contention, inefficient load balancing, applications sharing storage pools, port and parity group utilization in shared infrastructure, cache utilization, changes in dynamic tiering policies, and configuration changes.

You can identify and analyze the component causing the bottleneck in any of the following views:

- E2E view
- Analyze bottleneck > Verify Bottleneck tab
- Sparkline view
- Detail view

Identifying the bottleneck in E2E view

You can analyze the configuration of the infrastructure components in the E2E topology view.

The following describes the workflow of tasks for troubleshooting the problem that occurred in a VM component:

Procedure

1. You can navigate to the E2E view in any of the following ways:
   - On the Analytics tab, perform a search for the target resources, from the returned search results, select the target resource for analysis and click Show E2E View.
   - On the Dashboard, the report widgets display the number of affected resources that exceeded the threshold values. For example, the VMs/Host report displays the number of affected VMs, when you click the number link, a new window displays a list of monitored VMs. Select the resources to analyze and click Show E2E View.
2. In the **E2E View**, analyze the server-related and storage-related components to identify the resources causing performance problems.

   - **Click Server View** to get a server-oriented view of the business system configuration. Following are the key components to monitor while analyzing the server performance:
     - CPU
     - Memory
     - NIC
     - HBA
     - Disk

   - **Click Storage View** to get a storage-oriented view of the business system configuration. Following are the key components to monitor while analyzing the storage performance:
     - Port
     - Processor
     - Cache
     - Pool
     - Parity Group

In the following example, you can see that the alert indicators display on the VMs. When you analyze the VMs in the Server View, you can view alerts associated with the CPU server components.

3. To analyze the resource associated with an alert, right-click the resource icon and select **Verify Bottleneck**.
   For example, to check whether CPU is the bottleneck candidate, right-click the CPU icon and select **Verify Bottleneck**.

4. In the **Analyze Bottleneck** window, the performance trend reports of the bottleneck candidate and the resource used as the base point of analysis display. If the performance charts display similar trend patterns in the same time period, you can assume that the selected resource is the bottleneck candidate. If not, you can repeat the analysis for other resources with alerts in the **Verify Bottleneck** window.

   For example, in the **Verify Bottleneck** window, the bottleneck candidate (CPU) appears in a graph in the upper pane, and the **VM** where the
problem occurred appears in a graph in the lower pane. The performance charts display similar trend patterns in the same time period, which leads to the confirmation that the CPU is the bottleneck candidate.

5. You can also use the resource sharing percentage to identify the bottleneck in the shared infrastructure. On the E2E view tool bar, from the **High Share Rate** menu, select an option which displays the highest resource sharing percentage. When you hover over the icons in the E2E view, the shared percentage of each resource displays. Resources with a high sharing rate can be the potential bottleneck candidates. For example, when no alerts display on the dashboard, or in the E2E view, and when you cannot identify the bottleneck candidate using the **Analyze Bottleneck** window, you can use the resource sharing percentage to identify the affected resources in the shared infrastructure.

**Comparing performance trends in Sparkline view**

In the Sparkline view, you can analyze the health and performance of the resources in your monitoring environment. The Sparkline view displays performance reports for multiple nodes in the same pane to enable a quick comparison between different nodes. You can display detailed performance metrics for each node and find the correlation with other nodes.

The following procedure contains the workflow of tasks for troubleshooting the problem that occurred in a VM component:

**Procedure**

1. You can navigate to the Sparkline view in any of the following ways:
On the Analytics tab, search for the target resources, from the returned search results, select the target resources for analysis and click **Show Sparkline View**.

Go to the E2E view, select a resource and then from the tool bar, click **Sparkline View**.

2. In the Sparkline view, you can analyze and compare the performance trends of the target resources and all the related resources. You can select more than one target resource for analysis in the Sparkline view. In the following example, you can analyze the performance trends of the VM and the associated server components. The VM and CPU display similar trends in the same time period which leads to the confirmation that the CPU is the component that is affecting the performance of the VM.

3. To analyze data with finer granularity, you can navigate to the Detail view. To navigate to the Detail view, select the graphs, and click **Show Performance**.

   The performance window displays trends for the selected components.

**Identify affected resources**

In the Analyze Bottleneck window, click the Identify affected resources tab. In this window, you can identify the consumers, hosts, VMs, and volumes that use the bottleneck candidate. You can also verify the status of each...
resource. Based on the severity level displayed, you can troubleshoot the performance problems associated with the resources.

Analyzing the cause of the bottleneck

The root cause can be because of the resource contention issues in the shared infrastructure, or configuration changes in the environment.

Analyzing shared resources

The performance problem arises in the shared infrastructure when an application or a resource uses the majority of the available resources and causes performance problems for other resources in the shared infrastructure. Infrastructure Analytics Advisor supports efficient optimization of the shared infrastructure by quickly identifying the resource contention problems.

Procedure

1. In the Analyze Bottleneck window, click Analyze Shared Resources.
2. In the Analyze Shared Resources window, the performance charts for the bottleneck candidate and the resources using the bottleneck candidate are displayed.
3. Compare the performance trends of the bottleneck candidate with the resources using the bottleneck candidate. If the compared resources display similar trends, then you can assume that the resource in the shared infrastructure is causing the bottleneck.
If you cannot determine the cause of the bottleneck from the displayed graphs, check the graphs of different metrics. To view the graph of a different metric, select the metric from the Metric list. You can also add a performance graph of a different component from the Add Graph menu.

In the following example, the CPU utilization value of a virtual machine is compared with the CPU utilization of other virtual machines and volumes. The performance trends confirm that one of the VMs in the shared infrastructure is overutilizing the CPU.

The CPU bottlenecks occur when several VMs run on the same physical machine, and end-up sharing the same CPU. If the VMs (logical resources) share the same CPU (physical resource) and if one of the VMs utilizes the CPU more than the others, the total efficiency of the shared resource is degraded and the CPU utilization rate increases. The CPU could become saturated with requests because of resource contention problems.

Related topics
- IO controls for optimizing IO performance after the bottleneck analysis on page 48

**Analyzing configuration changes**

Infrastructure Analytics Advisor supports the tracking of infrastructure configuration changes. Analyzing these changes and correlating them with the performance data lets you determine the effects of configuration changes on the systems performance and behaviour.

**Procedure**

1. In the Analyze Bottleneck window, click Analyze Related Changes.
2. In the **Analyze Related Changes** window, you can analyze whether the bottleneck is caused by the changes in the system configuration.

In the **Analyze Related Changes** window, a combination chart that combines the features of the line chart and bar chart displays. The line indicates the performance of the bottleneck candidate and bars indicate the configuration change events that occurred in your monitored environment. You can analyze the change events to see if any of these changes caused performance variations in the bottleneck candidate.

The Change Events table in the lower pane displays a list of configuration related changes and their details. You can also zoom in on the performance trend chart to select a shorter time period, and view the change events that occurred in the selected time range.

In the following example, the performance data of the bottleneck candidate (CPU) is compared with the change events that occurred in the specified time period. You can correlate the performance data of the CPU and the change events to determine the effects on the system performance. Based on the analysis you can confirm that there were no configuration change events that caused performance degradation in the CPU.

---

### Solving performance problems

The common performance problems and the possible solutions are described as follows. The possible causes and solutions are intended to provide guidance, and might not satisfy your business process performance requirements.
The following table lists the commonly observed storage related problems and possible solutions.

<table>
<thead>
<tr>
<th>Bottleneck area</th>
<th>Root cause and possible solutions</th>
</tr>
</thead>
</table>
| Parity Group utilization | • Root cause  
The usage rate of the Parity Group increases because of the following possible causes:  
• Some volumes might be under heavy load.  
• Volumes (Logical resources) might belong to the same Parity Group (physical resource) which might cause resource contention issues in the shared infrastructure.  
• Possible solutions  
  ○ Consider moving some volumes to another Parity Group with a lower usage rate or higher performance.  
  ○ Consider increasing the number of drives (by concatenating Parity Groups).  
  ○ To manage a Parity Group that is part of a pool, consider adding another Parity Group to the pool. |
| MPB utilization       | • Root cause  
The usage rate of the MP Blade (average usage rate of the MP cores in the MP Blade) increases because of an increased load. Too many busy resources such as, internal volumes, external volumes, or journal groups accessing the same MP Blade might cause performance degradation.  
• Possible solutions  
  Consider allocating the busy resources (internal volumes, external volumes, or journal groups) to another MP Blade (changing the ownership). |
| Port utilization      | • Root cause  
The usage rate of the port (amount of data forwarded by the port divided by the amount of data that can be forwarded by the port) increases because of a number of volumes accessing the same port.  
• Possible solutions  
  Consider allocating some volumes (or host groups) to a different port.  
  Note: When the connected port is changed, the host might need to be restarted. |
| Cache utilization     | • Root cause  
Out of the total cache memory allocated to the CLPR, the percentage occupied by the data waiting to be written to the drive increases because of the following possible causes:  
  ○ The usage rate of the drive might be high, delaying write processing to the drive. |
The usage rate of the processors might be high, delaying write processing to the drive.

The capacity of the installed cache memory might be insufficient.

Possible solutions
- Consider allocating some volumes to another cache partition.
- Consider increasing the cache memory.

The following table lists the commonly observed server related problems and possible solutions.

<table>
<thead>
<tr>
<th>Bottleneck area</th>
<th>Root cause and possible solutions</th>
</tr>
</thead>
</table>
| CPU utilization | • Root cause
The CPU bottlenecks occur when several VMs run on the same physical machine, and end-up sharing the same CPU. If the VMs (logical resources) share the same CPU (physical resource) and if one of the VMs utilizes the CPU more than the others in the shared infrastructure, the total efficiency of the CPU is degraded and the CPU utilization rate increases. The CPU could become saturated with requests because of resource contention issues.

Possible solutions
- Consider moving the VMs to another server. |
| Memory utilization | • Root cause
The memory bottlenecks occur when several VMs (logical resources) share the available memory (physical resources) which might result in the performance degradation of the physical memory.

Possible solutions
- Consider allocating additional physical memory, or moving the VMs to another server. |

**Executing actions**

You can execute predefined actions on a resource node. These predefined actions allow you to notify the appropriate IT administrators to troubleshoot the resource node problems.

You can configure the system to perform the following actions:
- Send email notifications
For example, if a problem arises on a resource node, you can configure the system to send e-mail notifications to the concerned administrator to troubleshoot the problem. You can include the resource node information, troubleshooting methodology, and other information in the email template.

- **Run a command**
  For example, if a problem arises on a resource node, you can execute the command action to automatically register the problem in a trouble-ticketing system, so that the concerned IT administrator can troubleshoot the node.

**Procedure**

1. In the E2E view, right-click a resource icon, and then select **Execute Action**.
2. In the **Execute Action** window, you can view the list of actions that you have defined.
   The Actions list will be empty, if you have not defined any actions previously. Following is the high-level procedure for creating event actions:
   1. Create an event action definition file and save it under the following directory: `Infrastructure-Analytics-Advisor-installation-folder\Analytics\conf`.
      The default installation folder for Infrastructure Analytics Advisor is as follows:
      - For Windows:
        `C:\Program Files\HITACHI`
      - For Linux:
        `/opt/hitachi`
   2. Restart Infrastructure Analytics Advisor, or run the `reloadtemplate` command to view the defined actions.
3. Under Actions, select an action.
   - To send email notification, select the action type Mail and then click **Launch Editor**.
     The email template is launched in the email editor. You can alter the template if required before sending it.
   - To run a command, select the action type Command.
     The details of the command display. If required, you can edit the **Command Arguments** field. After specifying the required conditions, click **Execute Command**. In the **Execute Command** window, you can review the details of the command and then click **OK**.

**Related topics**

- [Event action definition file format](#) on page 102
- [Format of the email template definition file](#) on page 104
- [Command template definition files formats](#) on page 109
E2E infrastructure topology view

The E2E topology view provides the detailed configuration of the infrastructure resources and lets you view the relationship between the infrastructure components. You can manually analyze the dependencies between the components in your environment and identify the resource causing performance problems. By using the topology maps, you can easily monitor and manage your resources. You can use this view to monitor resources in your data center from applications, virtual machines, servers, networks to storage systems.

In the E2E view, each node represents a resource and the connecting links represent the relationship between the infrastructure components. You can analyze a resource which is the target of analysis and all the associated resources. You can also view the alerts associated with all the related resources and trace the problem at the root level. The node based E2E view helps you analyze the problem on the affected node and its impact on the rest of the infrastructure resources.

Topology view components

The E2E view displays the topology related to the selected resource(s) under the following default infrastructure groups:

- **Consumer**: The name of the consumer group to which the selected resource belongs and the details about the consumer grade level.
- **Server**: The associated server components such as VMs and hosts.
- **Network**: The associated network components such as switches.
- **Storage**: The associated storage components such as volumes.

A number link is shown next to each resource icon. For example, when you select a storage subsystem as a target resource for analysis, and if 50 volumes belong to this storage subsystem, the value Volumes 50 is shown under the Storage infrastructure group. Click the Volumes link to open the Volumes - Storage window, which displays details about all the volumes in the storage subsystem. From the Volumes list, you can select the priority of volumes that you would like to analyze in the E2E view.

E2E view tool bar

The tool bar provides quick access to frequently used menu options and icons:

<table>
<thead>
<tr>
<th>Icons</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Sparkline View]</td>
<td>You can navigate to the Sparkline view to analyze the performance of the base point</td>
</tr>
</tbody>
</table>
### Icons and Description

<table>
<thead>
<tr>
<th>Icons</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Critical Icon" /></td>
<td>resource and the related resources to identify the bottleneck. Displays the number of critical alerts in the topology view.</td>
</tr>
<tr>
<td><img src="image" alt="Warning Icon" /></td>
<td>Displays the number of warnings in the topology view.</td>
</tr>
<tr>
<td><img src="image" alt="High Share Rate" /></td>
<td>High Share Rate displays the resource sharing percentage of a shared resource. When you hover over the resource icons, the share percentage for each resource displays. Resources with high share rate can be the potential bottleneck candidates. The Share Rate value is not displayed when you set a Hypervisor or Storage System as the base point of analysis. You can select OFF to turn off this feature.</td>
</tr>
</tbody>
</table>
| ![View Icon](image) | The following topology views are supported:  
- Storage View: The Storage View maps the storage-related components, such as, ports, processors, cache, pools, and parity groups.  
- Server View: The Server View maps the server-related components, such as, CPU, memory, NIC, HBA, disk. |
| ![Lock Highlight Icon](image) | When you select a resource and click Lock Highlight, the resource node in focus and all the related components are highlighted in the topology view. The highlighting of the resource configuration is retained until you release the lock on the resource node. The highlighting feature lets you understand the interlinking between the components and analyze the system configuration in detail. To release the lock, click Lock Highlight again. |
| ![Repaint Icon](image) | When you select a resource node and click Repaint, the resource is moved either from bottom-to-top, or right-to-left to take the prime position in the resource order. You can use this option to change the display order of resources. |

### E2E view menu bar

<table>
<thead>
<tr>
<th>Menu bar items</th>
<th>Menu items and description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Show Detail button</td>
<td>Select a resource and click Show Detail. The performance summary report of the resource displays in a new window. You can also view the events related to the resource in the Events tab.</td>
</tr>
<tr>
<td>Analyze Bottleneck menu</td>
<td>Select a resource and click Analyze Bottleneck. The Analyze Bottleneck Summary window displays. From the</td>
</tr>
<tr>
<td>Menu bar items</td>
<td>Menu items and description</td>
</tr>
<tr>
<td>---------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td></td>
<td>summary window, you can display the following tabs for the detailed analysis:</td>
</tr>
<tr>
<td></td>
<td>• Verify Bottleneck</td>
</tr>
<tr>
<td></td>
<td>• Identify Affected Resources</td>
</tr>
<tr>
<td></td>
<td>• Analyze Shared Resources</td>
</tr>
<tr>
<td></td>
<td>• Analyze Related Changes</td>
</tr>
</tbody>
</table>

| Action menu | • Change Base Point: Select a resource and click Change Base Point to change the node of analysis. The topology view displays for the selected resource in a new window. |
|            | • Execute Actions: Select a resource and click Execute Actions to run predefined actions on a resource node. The event actions allow you to send notifications to your administrator for troubleshooting performance problems. |

| Set Flag menu | Select a resource and click Set Flag to flag a resource, so you can analyze the flagged resource at a later point. To remove the flag, click Unset Flag. |
Managing IO control operations

Infrastructure Analytics Advisor enables management capabilities over IO activity for storage administrators.

In the Data Center, some types of resources often require higher performance than others. For example, production servers such as database and application servers that are used to perform daily tasks of business organizations usually require high performance. However, if production servers experience decreased performance, productivity in business activities is negatively affected.

To prevent this from happening, the storage administrator must maintain high performance of production servers. A drop in development server performance does not have as much of a negative effect to the entire organization as a drop in production server performance. In this case, you set upper limits to give higher priority to IO activity from the production server over IO activity from the development server to manage and control the impact of development activities.

- IO control overview
- IO controls for optimization of Infrastructure resources
- IO control settings for a SLO
- IO controls for optimizing IO performance after the bottleneck analysis
- Setting up a connection with Hitachi Automation Director
- Setting IO control limits
- Clearing IO control limits
**IO control overview**

Infrastructure Analytics Advisor enables storage administrators to prioritize IO activity in a shared infrastructure.

Storage IO controls are available in Infrastructure Analytics Advisor when your storage systems have enabled the Server Priority Manager function. You can invoke this functionality through Hitachi Automation Director after establishing a connection between the two servers. In the Infrastructure Analytics Advisor Operations window, you can search for consumers affecting resources and then set limits for selected candidates at the volume and consumer level. Using the IO control setting, you can enable upper limits for the storage IO activity of volumes that belong to consumers. You can disable the IO control settings when the traffic between the server and storage system drops to acceptable levels.

For storage operations, "StorageOps" permissions must be set in Infrastructure Analytics Advisor to enable you to set or modify an upper limit on IO traffic from the server to storage system. Furthermore, you have the option of limiting the data transfer rate on volumes affecting critical resources.

Set IO control limits for the following:
- To achieve overall optimization of infrastructure resources during periods of IO-intensive activity
- To maintain a quality of service benchmark for an SLO
- To prioritize IO activity to optimize performance

The Operations window includes a History tab that displays a list of tasks created for each IO control setting enabled in Infrastructure Analytics Advisor. This tab allows users to confirm that the upper limit setting is processed and track the status of multiple tasks.

**Search capabilities**

In the Operations window, you can search for consumer names, volume names, consumer grades, storage systems, host groups, and task descriptions that contain a keyword used in the search. Search any of these categories to find volumes on which to set the upper limits. If you leave the search field empty and click Search, the tab displays all consumers, volumes, and tasks. When selecting targets to set the upper limit, you can view all the associated volumes for the consumer or task. This feature is useful when you need to modify IO control limits that have already been set.

**IO control settings**

Select from the following categories to monitor and regulate IO activity:
• Tasks: For enabling and disabling IO control settings frequently or modifying or disabling previous settings
• Consumers: For regulating IO for specific user groups
• Volumes: For regulating the resources affected by application usage

When you choose the volumes for which to apply the limit, a dialog appears.

**IO control metrics**

When applying limits, you have the choice of metric for establishing IO control:

• IOPS: Use this metric if the target volume is issuing a high number of IO requests. The maximum value is 65,535 OPs.
• Transfer Rate [MBps]: Use this metric if the target consumer's IO requests are small in number but large in data size. The maximum value is 31 MBps.

Setting upper limits typically requires the storage administrator to revisit IO control settings. When upper limits are established, you can view these entries in the History tab in **Operations**.

**Requirements for using IO controls**

The IO Control feature uses the Server Priority Manager function to set limits on IO activity. To enable the feature:

• You must have a Server Priority Manager license
• You must install and register the license key in Storage Navigator before using this feature

For details, see the Performance Guide available with your storage system.

**Related topics**

• [Setting IO control limits](#) on page 51
• [Clearing IO control limits](#) on page 52
• [IO control settings for a SLO](#) on page 48
• [IO controls for optimizing IO performance after the bottleneck analysis](#) on page 48
• [Setting up a connection with Hitachi Automation Director](#) on page 50

**IO controls for optimization of Infrastructure resources**

Infrastructure Analytics Advisor features storage IO controls for optimization of the resources in your infrastructure.

You can achieve optimization of your resources if you set limits on storage IO for noncritical applications. Setting these limits is like applying caps on IO usage to free up more resources in the infrastructure. When you foresee
increased IO activity, you can set upper limits on volumes identified with applications or host servers issuing many IO requests.

When development or testing efforts require more resources than usual, you set IO control limits on the volumes associated with these IO-intensive applications for that period. This IO control setting then allows the business-critical applications sufficient access to storage resources.

When IO activity decreases to acceptable levels, you clear the IO control limits from those volumes. By establishing these temporary limits on storage IO, the infrastructure achieves overall optimization during periods of increased IO activity.

**IO control settings for a SLO**

IO controls enable you to meet the goals of your SLO.

SLAs specify a quality of service benchmark for an SLO. For storage IO throughput, this benchmark is typically measured in IOPS or MBps. As a pre-emptive measure, Infrastructure Analytics Advisor enables you to set limits on storage IO activity for applications on servers that issue too many IO requests, and therefore provide sufficient resources in the infrastructure to meet the SLOs. After identifying the consumers with a specific SLO, you select the volumes and set an upper limit to guarantee the quality of service benchmark for that SLO. You can set different storage IO upper limits for consumers based on grade.

**Related topics**

- [IO control overview](#) on page 46

**IO controls for optimizing IO performance after the bottleneck analysis**

To prevent an increased workload from affecting critical resources, set upper limits for servers issuing many IO requests and affecting critical resources.

Daily, storage administrators must respond quickly to sudden changes in IO traffic. Shared infrastructure resources can degrade in performance at unpredictable times. If the bottleneck analysis reveals a spike in total IOPS, as shown in the following figure, the root cause is an insufficient amount of resources available.
Because adding resources cannot be done quickly or might not be possible, the most efficient solution is to manage the IO traffic. For a storage administrator, this situation must be treated as an emergency. In the Set IO Control window, respond to the emergency by setting an upper limit for the volumes affecting resources immediately when you detect them.

You might use the upper limit setting as a temporary measure to allow more important tasks the sufficient resources as planned for daily operations. In the situation where critical resources require less IO prominence, you might need to remove the upper limit setting. All upper limit settings are saved to the History tab.

You can continue checking the History tab to monitor the upper limit settings by either searching for volume, consumer, or task. This three-part approach provides the granularity of user selection when monitoring and controlling IO activity.

**Preventing noncritical resources from causing performance degradation**

When you are notified of performance degradation through an alert, perform the bottleneck analysis to detect the disruptive resource:

- Review the trend charts through E2E or Sparkline View to compare performance of selected resources.
- Use the Analyze Shared Resources to identify which noncritical resources are disrupting IO traffic.
• When the Resources by bottleneck displays, you see a list of volumes that correspond to the trend chart.
• Identify the target volumes issuing many IO requests.
• Select the target volumes and then apply the upper limit setting. For your reference, give the task an appropriate name in the description field.
• Continue monitoring the History tab. If use of available resources has leveled to the point that IO Control is no longer needed, select the target volumes of the task in IO Control Settings and click Off or modify those limits as needed.

Related topics
• IO control overview on page 46
• Analyzing shared resources on page 36

Setting up a connection with Hitachi Automation Director

Log on to Infrastructure Analytics Advisor, to set up the connection with Hitachi Automation Director.

Before you begin
Obtain the following information related to Automation Director:
• IP Address/Host Name
• User Name
• Password
• Protocol
• Port

For details on preparing your environment for a connection to Automation Director, see the Hitachi Infrastructure Analytics Advisor Installation and Configuration Guide.

Procedure
1. In the Administration tab, select System Settings > Automation Director Server.
2. Click Edit Settings, and then provide the information for each field.
3. Click Check Connection to verify a connection with Hitachi Automation Director is established.
4. Click OK.

Related topics
• IO control overview on page 46
• Setting IO control limits on page 51
Setting IO control limits

You can set IO control limits on volumes associated with a consumer.

Before you begin

To perform the following tasks:
- You must be logged in as a user with "StorageOps" permissions.
- The Server Priority Manager function is enabled in the storage system.
- The connection between Infrastructure Analytics Advisor and Automation Director is set.

Procedure

1. From the Operations tab, search for and select the volumes, and click Set IO Control.

   **Note:** If you are modifying the Target Volumes list, click Remove Volumes and a window appears where you can add or remove volumes from the Set IO Control task.

2. In the Set IO Control window, make the following selections:
a. In **Upper Limit Setting**, select **On**.
b. In **Collective Settings**, select the metric and enter the limit in **Upper Limit for each volume**.
c. Enter a task name and description, then click **Next**.

   A default task name based on the date and time is automatically assigned: `yyyyymmdd_hhmm_IOControlSettings`.

3. In **Confirm the settings**, review the information and click **Submit**.

   You can confirm the status of the task in the **History** tab by selecting **View task status**.

**Related topics**
- [IO control settings for a SLO](#) on page 48
- [IO controls for optimizing IO performance after the bottleneck analysis](#) on page 48
- [Setting up a connection with Hitachi Automation Director](#) on page 50
- [Clearing IO control limits](#) on page 52

**Clearing IO control limits**

You clear IO control limits when there is a change in storage IO priorities.
Procedure

1. From **Operations**, search for volumes on which IO control limits have been enabled.
2. Click **Set IO Control** and a window displays.
   a. In **Upper Limit Setting**, select **Off**.
   b. Click **Next** and verify the information.
3. Click **Submit**, then go to the **History** tab to verify the status of the new task.

Related topics

- [IO control overview](#) on page 46
- [IO controls for optimizing IO performance after the bottleneck analysis](#) on page 48
- [Setting IO control limits](#) on page 51
Configuring resource monitoring

Infrastructure Analytics Advisor ensures health of your data center by measuring, monitoring, and optimizing performance of your infrastructure resources.

- Resource monitoring settings
- Monitoring using a dynamic threshold
- Monitoring using a static threshold
- Setting thresholds for user resources
- Creating a user resource assignment rule
- Changing user resource assignment rule priority
- Running a user resource assignment rule
- Setting thresholds for system resources
Resource monitoring settings

To monitor management targets, define the following conditions:

- Monitoring conditions for user resources
  Define the monitoring conditions for detecting deterioration in the service performance of virtual machines and volumes.
  You can monitor using dynamic thresholds or static thresholds.

- Monitoring conditions for system resources
  Define monitoring conditions for detecting performance bottlenecks in infrastructure devices such as hypervisors and storage systems.
  You can monitor using static thresholds.

Monitoring using a dynamic threshold

In monitoring using dynamic thresholds, the thresholds are automatically calculated and set based on performance information collected from monitored user resources over a specific time period. This type of monitoring is useful when you want to detect degradation in service performance or when, for example, you have not established a service level agreement with customers. The appropriate thresholds are automatically set according to the resource configuration and changes in the load status. For this reason, system administrators do not need to manage the threshold values. In addition, based on the importance of the applicable system, you can set the margin levels for the calculated thresholds.

To monitor by using dynamic thresholds, you can create threshold profiles for user resources and then assign the resources you want to monitor. You can set more than one monitoring plan for each user resource threshold profile. For the monitoring plan, specify threshold values for the monitoring schedule or for each monitoring item. By creating multiple monitoring plans, you can schedule changes to the threshold values or items to be monitored.

By creating assignment rules for user resources, the discovered user resources are automatically assigned to threshold profiles in accordance with the assignment rules. You can also edit and delete the created threshold profiles or assignment rules for user resources.

Monitoring using a static threshold

In monitoring by using static thresholds, you can detect service performance degradation and performance bottlenecks for user resources and system resources by setting thresholds for each monitored item based on the type of resource. This type of monitoring is useful when you have established a service level agreement with users and threshold values can be defined based on the agreement, or when threshold values are defined based on the
configuration of resources. You can set two threshold levels such as Error and Warning. If the system detects that a threshold is exceeded, you are notified of the event and can then verify information such as the names of the resources for which errors or warnings occurred.

To monitor by using static thresholds, you can create threshold profiles for user resources or system resources based on the type of resources, and then assign the resources you want to monitor. You can set more than one monitoring plan for each user resource threshold profile. For the monitoring plan, specify threshold values for the monitoring schedule or for each monitoring item. By creating multiple monitoring plans, you can schedule changes to the threshold values or items to be monitored.

By creating assignment rules for user resources, the discovered resources are automatically assigned to threshold profiles in accordance with the assignment rules. You can also edit and delete the created threshold profiles or assignment rules.

### Setting thresholds for user resources

To detect service performance degradation of a virtual machine or volume, create a profile and assign rules.

#### Procedure

1. In the Administration tab, select Monitoring Settings > User Resource Threshold Profiles.
2. Click Create Threshold Profile.
3. In the Create User Resource Threshold Profile window, define the Profile Name and Resource Type.
4. Select a resource to be monitored from Resource Type, and then click Create Plan.
5. In the displayed box, create a monitoring plan.
   
   Define the necessary items, and then click OK.
6. For Target Metric, select a monitoring mode for each monitoring item. If you select Static, define a threshold.
7. In the Create User Resource Threshold Profile window, click OK.
   
   The window automatically switches to the detailed window for the user resource threshold profile that was created.
8. Click the Assignment Rules tab to create resource assignment rules.
9. Click Create Rule, and then specify the necessary items in the displayed box.
10. Define conditions for Condition, and then click Preview.
    
    A list of the resources that match the specified conditions and are not assigned to the threshold profiles of other user resources appears.
11. Click OK.
The user resource threshold profile is associated with the resource, and thresholds are set for the resource.

Note: You can verify which resources are associated with a user resource threshold profile by clicking the Target Resources tab.

Result
The created profile displays in the user resource threshold profiles list.

Creating a user resource assignment rule
When you create user resources assignment rules, the discovered user resources are automatically registered in a threshold profile 24 hours after discovery.

Procedure
1. In the Administration tab, select Monitoring Settings > User Resource Assignment Rules.
2. Select the tab for the user resource you are creating, and then click Create Rule.
3. In the box, define assignment conditions and the assignment destination.
4. Click OK.

Result
The created user resource assignment rule displays in the user resource assignment rules list.

Changing user resource assignment rule priority
You can change the order of priority for the user resource assignment rule.

Procedure
1. In the Administration tab, select Monitoring Settings > User Resource Assignment Rules.
2. Select the tab for the resource assignment rule whose priority you want to change, and then click Change Priority.
3. In the box, change the priority.
4. Click OK.
Running a user resource assignment rule
For resources that have yet to be assigned to a threshold profile, run a user resource assignment rule to assign these resources to threshold profiles according to the assignment rule.

Procedure
1. In the Administration tab, select Monitoring Settings > User Resource Assignment Rules.
2. Select the tab for the resource for which you want to run the assignment rule, and then assign the target resource.
3. Verify user resources to which threshold profiles have been set. To do so, select Monitoring Settings > User Resource Threshold Profiles. Select the target threshold profile, and then click the Target Resources tab to display the resources list.

Setting thresholds for system resources
To detect hardware bottlenecks in system resources such as hypervisors and storage systems, create a profile and set thresholds.

Procedure
1. In the Administration tab, select Monitoring Settings > System Resource Threshold Profiles.
2. Click Create Threshold Profile.
3. Define the resources to monitor and the threshold values.
4. Click OK.

Result
The created profile displays in the threshold profiles lists for system resources.
Managing consumers

Infrastructure Analytics Advisor simplifies management of infrastructure resources and the users of those resources. You can create consumers to associate users with the resources they are using.

- Consumer settings
- Creating a consumer
- Creating a resource assignment rule
- Changing a resource assignment rule priority
- Running a resource assignment rule
Consumer settings

Create consumers to associate user resources with users of those resources.

Resources used by consumers, such as virtual machines or volumes, are grouped by company or business system consumer (also called management unit). Consumer definitions allow you to do the following:

- Search for consumer resources when the number of customer managed-resources increases.
- Verify which consumers are affected by failures on managed resources.
- Define the level of importance (grade) for each consumer to help you understand the problem severity and number of problems for each grade.

The table that follows is an example of creating four consumers based on the level of importance of business systems used by two companies.

In this example, four consumers are created.

<table>
<thead>
<tr>
<th>Company name</th>
<th>Business system name</th>
<th>Importance of business system</th>
<th>Virtual machine name</th>
<th>Consumer name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Company A</td>
<td>Call center system</td>
<td>Very important</td>
<td>VM1</td>
<td>Company A (very important system)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>VM2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>VM3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Email management system</td>
<td>Important</td>
<td>VM4</td>
<td>Company A (important system)</td>
</tr>
<tr>
<td></td>
<td>Attendance management system</td>
<td>General</td>
<td>VM5</td>
<td>Company A (general system)</td>
</tr>
<tr>
<td></td>
<td>Company SNS system</td>
<td>General</td>
<td>VM6</td>
<td></td>
</tr>
<tr>
<td>Company B</td>
<td>Email management system</td>
<td>Important</td>
<td>VM7</td>
<td>Company B</td>
</tr>
<tr>
<td></td>
<td>Sales management system</td>
<td>Important</td>
<td>VM8</td>
<td></td>
</tr>
</tbody>
</table>

Creating a consumer

Create consumers to associate managed devices with the customers who use those devices.

Procedure

1. In the Administration tab, select Consumer Settings > Consumers.
2. Click Create Consumer.
3. Define the consumer name and grade, and then click OK.
There are four default grades that you can use to assign consumers. The grades and their order of importance are Platinum, Gold, Silver, and Bronze.

Creating a resource assignment rule

By creating resource assignment rules, the discovered resources are automatically registered to consumers 24 hours after discovery.

Procedure

1. In the Administration tab, select Consumer Settings > Resource Assignment Rules.
2. Select the tab for the resource for which you want to create an assignment rule, and then click Create Rule.
3. In the box, define the assignment conditions and assignment destination.
4. Click OK.

Result

The created user resource assignment rule displays in the resource assignment rules list.

Changing a resource assignment rule priority

Change the priority for a created resource assignment rule.

Procedure

1. In the Administration tab, select Consumer Settings > Resource Assignment Rules.
2. Select the tab for the resource assignment rule whose priority you want to change, and then click Change Priority.
3. In the box, change the priority.
4. Click OK.

Running a resource assignment rule

Run a resource assignment rule to automatically assign resources to consumers.

Procedure

1. In the Administration tab, select Consumer Settings > Resource Assignment Rules.
2. Select the tab for the resource for which you want to run the assignment rule, and then assign the target resource.
3. Verify resources are assigned to consumers. To do so, select **Consumer Settings > Consumers**. Select a consumer, and then click the tab for the resource to display the resources list.
Setting notifications

Setting notifications is an easy way to stay informed on the status of infrastructure resources and events.

Monitoring resources is an active and passive activity for IT administrators. Infrastructure Analytics Advisor allows you to configure email notifications that provide information about problems with resource management with details. If multiple administrators rely on the Infrastructure Analytics Advisor service, you can create different profiles to deliver different types of information based on the profile settings.

- Email notification settings
- Configuring the mail server
- Creating a condition profile
- Enabling or disabling email addresses
Email notification settings

You can define who receives email notifications and when to send the notifications. Configuring email notification settings enable you to notify administrators about problems with management resources and provide details.

To enable email notifications, set up an email server, and then create condition profiles. You can edit and delete the created condition profiles.

Configuring the mail server

Configure the mail server and the email address of the sender to notify the administrator of problems that occur in target resources and information related to Infrastructure Analytics Advisor server operations.

Procedure

1. In the Administration tab, select Notification Settings > Email Server.
2. Click Edit Settings to specify information about the mail server.
3. To verify mail server is configured correctly, click Send Test Mail, and in the box, send a test email.
4. Confirm that the test email arrives, and then click Save Settings.

Creating a condition profile

To receive emails from Infrastructure Analytics Advisor, create a condition profile and register email addresses.

Before you begin

To do this operation, you must have the Admin permission of Infrastructure Analytics Advisor.

Procedure

1. In the Administration tab, select Notification Settings > Notification Conditions.
2. Select the Condition Settings tab, and then click Create Notification Profile.
3. Define the necessary items.
4. To add email addresses to which notifications are to be sent, click Add Email Address and then specify the email addresses. Select the check boxes for the email addresses for which you want to enable email notifications.
You can change the status or descriptions of **Delivery Address** in the **Email Addresses** tab of the **Notification Conditions** window.

5. Click **OK**.

**Enabling or disabling email addresses**

Enable or disable registered email addresses to start or stop receiving email notifications.

**Procedure**

1. In the **Administration** tab, select **Notification Settings > Notification Conditions**.
2. Select the **Email Addresses** tab, and then select the check boxes for the email addresses to enable or disable.
3. To enable email notifications, click **Activate**. To disable email notifications, click **Suspend**. Verify that the specified content is correct, and then click **OK**.
Managing users

Add multiple user accounts to Infrastructure Analytics Advisor and set permissions based on predefined roles.

Infrastructure Analytics Advisor allows you to create multiple user accounts with different permissions. For security, you can enable user account locking and password protection.

- User management
- Security
User management

Create a user account in Infrastructure Analytics Advisor, and then set permissions by the user role.

After installation, a default system account is set up. Use this account to do all tasks and manage users in Infrastructure Analytics Advisor. You cannot delete or change the default user ID.

When registering new user accounts, set permissions for the types of tasks each user can do based on the user role.

After adding basic user information such as username, password, email, and description, set permissions for available applications, such as:
- User Management
- IAA

There are four types of user permissions:
- **Admin**
  Users with Administrator permissions can perform all management tasks in Infrastructure Analytics Advisor except those related to managing users, configuring security options and modifying IO control settings.

- **Modify**
  Users with Modify permissions can perform all management tasks in Infrastructure Analytics Advisor except those related to managing users, configuring security options, setting up email notifications, configuring the connection settings for the Data Center Analytics server server and modifying IO control settings.

- **User Management**
  Users with User Management permissions can perform all tasks related to managing users and configuring security options. You can use this type of permission with other types of permissions.

- **StorageOps**
  Users with StorageOps permissions can perform all tasks related to the IO control settings on the Operations tab. These users can monitor and regulate the IO rate of the monitored volumes. Only users with Admin or Modify permissions can be assigned StorageOps permissions.

You can do the following tasks on the Administration tab. Select User Management> Users and Permissions.
- Add or delete user accounts.
- Set permissions for user accounts.
- Reference or edit user account profiles.
• Change the password of a user account.
• Change the status of a locked user account.

Security

Set the appropriate security options for user logon.

You can do the following operations in Infrastructure Analytics Advisor:

• Set a password policy
  To prevent third parties from guessing passwords, define conditions such as a minimum number of characters required for a password and the type of characters to include in a password.

• Configure settings to automatically lock accounts
  If repeated attempts are made to log on to a user account by using an incorrect password, the user account is locked to prevent unauthorized access.

• Set warning banners
  As a security measure for logon, you can customize the message (warning banner) to display in the logon window.

When you are in the Administration tab, you can do these operations in the window that appears when you select User Management > Security.
Additional dashboard reports

Use additional dashboard reports to collect information for statistical analysis and performance trends.

Infrastructure Analytics Advisor offers numerous types of reports that provide information on various resources.

- System Status Summary for Storage Resources
- System Status Summary for Infrastructure Resources
- Consumer reports
- VM reports
- Volume reports
- Host reports
- System resource reports
- Storage system reports
- Hypervisor reports
- Switch reports
- User resource reports
- Event reports
System Status Summary for Storage Resources

The System Status Summary for Storage Resources report displays the performance status summary of your monitored volumes and system resources such as SAN and storage components.

Related topics
- System Status Summary for Volumes on page 74
- System Status Summary for System Resources on page 75

System Status Summary for Volumes

The Volume pane displays an information gauge chart using three colors to depict the severity levels of alerts. Green indicates normal status, red indicates critical status, and yellow indicates warning status. The chart also displays the number of volumes that triggered alerts out of the total number of monitored volumes.

You can analyze the status of monitored volumes based on the key performance metrics such as Response Time, IO Rate, and IOPS. The bar graph displays the number of volumes that triggered critical or warning alerts when the value of any monitored metric exceeds the defined threshold values.

To view details about the volumes that exceeded the defined critical or warning thresholds, click the number link in the information gauge chart or bar graph. A list of affected volumes displays in a new window. You can select the volume and then click Show E2E View to view the data center topology and review the system configuration.
System Status Summary for System Resources

The System Resources pane displays the following reports:

- A heat map using three colors to depict the severity levels of alerts triggered by the SAN (switches) and storage components (ports, processors, cache, pools, and parity groups). The green tiles indicate normal status, red tiles indicate critical status and yellow tiles indicate warning status. The heat map also displays the number of SAN and storage components associated with alerts. To view details about the resources that exceeded the defined critical or warning thresholds, click the number link in the heat map. A list of affected SAN and Storage resources displays in a new window. You can select the resource and then click Show E2E View to view the data center topology and review the system configuration.

- A list displays the top 3 critical storage systems with critical and warning alerts. To view details about the storage system components that exceeded the defined thresholds, click the number link. A list of components associated with the selected storage system displays in a new window. You can select the resource and then click Show E2E View to view the data center topology and review the system configuration.

System Status Summary for Infrastructure Resources

The System Status Summary for Infrastructure Resources report displays the performance status summary of monitored user resources (such as VMs, hosts, volumes) and system resources (such as server, SAN, and storage components).
System Status Summary for User Resources

The System Status Summary - VM/Host and Volume reports display the status of all monitored VMs, hosts, and volumes.

Both the VM/Host pane and the Volume pane display a Resource Status information gauge, where the top number is the total critical or warning alerts received from the VMs and hosts, or volumes that exceeded the critical or warning thresholds for any monitored metric. The bottom number indicates the total number of VMs, hosts, or volumes in the system.

Under Metrics, a bar graph displays the total number of VMs and hosts with critical and warning alerts for any monitored metric.

For the Volume summary, Metrics displays a bar graph of the total number of volumes with critical and warning alerts for any metrics. In the bar graph, red is the total number of critical alerts and yellow is the number of warning alerts.

For example, if there are 3 critical alerts and 5 warning alerts, then both critical and warning display in the gauge. If the number of critical alerts is greater than 9, only the red bar (critical) displays because the maximum value of the gauge is 10.
To view details about the volumes that exceeded the defined critical or warning thresholds, click the number link in the information gauge chart or bar graph. A list of affected resources displays in a new window. You can select the resource and then click Show E2E View to view the data center topology and review the system configuration to analyze the performance problem.

**System Resource Status report**

The System Resource Status report is one of the default reports that appears on the Infrastructure Analytics Advisor dashboard. It provides a heat map of the current status of system resources such as server (CPU, memory, NIC, HBA, disk), SAN (switches), and storage (ports, processors, cache, pools, and parity groups) components.

![System Resource Status](image)

Each red tile shows a critical alert, and each yellow tile shows a warning alert. Unknown resources are considered Normal and are represented by green tiles.

To view details about the resources that exceeded the defined thresholds, click the number link. A list of affected resources displays in a new window. You can select the resource and then click Show E2E View to view the data center topology and review the system configuration.

**Related topics**

- [System Status Summary for Consumers](#) on page 22
- [Storage Systems report](#) on page 94
- [System Resources report](#) on page 92
- [Storage Systems report](#) on page 94
- [Switches report](#) on page 96
- [E2E infrastructure topology view](#) on page 42

**Consumer reports**

[Consumer Summary report on page 78](#)
**Consumers report on page 78**

**Consumers - Critical report on page 79**

**Consumers - Critical Each Grade report on page 80**

**Consumer Summary report**

The Consumer Summary report on the Infrastructure Analytics Advisor dashboard provides a summary of the status of consumers. It displays the total number of consumers that are affected by critical and warning alerts from VMs, hosts, or volumes assigned to consumers. This report also displays a table by consumer name, grade, and status for each alert.

To view details about the affected consumers, click the number link in the left pane.

![Consumer Summary](image)

The Consumers window lists the consumer name, consumer grade, overall status, and the detailed status of each assigned user resource. To view details about the resources that exceeded the defined thresholds, click the number link. A list of affected resources displays in a new window. You can select the resource and then click Show E2E View to view the data center topology and review the system configuration.

**Related topics**

- [System Status Summary for Consumers](#) on page 22

**Consumers report**

The Consumers report on the Infrastructure Analytics Advisor dashboard displays the total number of consumers that are affected when critical and warning thresholds are exceeded for VMs, hosts, or volumes assigned to consumers. To view details about the affected consumers, click the number link in the pane that shows the critical and warning alerts. A list of affected resources displays in a new window. You can select the resource and then click Show E2E View to view the data center topology and review the system configuration.
The Consumers window lists the following:

- **Grade:** This is the grade associated with the consumer.
- **Status:** This is the most severe status for all user resources assigned to the consumer.
- **Summary status:** This is the most severe status for VMs, hosts, and volumes of the affected consumer.

**Related topics**

- [Consumer Summary report](#) on page 78

**Consumers - Critical report**

The Consumers - Critical report on the Infrastructure Analytics Advisor dashboard provides the total number of consumers that are affected by critical thresholds exceeded by VMs, volumes, or hosts assigned to consumers.

To view details about the affected consumers, click the number link in the report. A list of affected resources displays in a new window. You can select the resource and then click Show E2E View to view the data center topology and review the system configuration.
Related topics

- Consumer Summary report on page 78

**Consumers - Critical Each Grade report**

The Consumers - Critical Each Grade report on the Infrastructure Analytics Advisor dashboard displays the number of platinum, gold, silver, and bronze, or Others that are affected by critical alerts in any of their managed resources, such as volumes, VMs, and hosts. This report is useful if you want to know which consumers are affected by critical alerts based on grades.

![Consumers - Critical Each Grade](image)

To view more details about the affected consumers, click the number link next to the grade. The Consumer window lists the consumer name, consumer grade, overall status, and detailed status of each assigned user resource.

To view details about the resources that exceeded the defined critical thresholds, click the **E2E View** on the Consumers window. You can view the data center topology, review the configuration and status information.

Related topics

- Consumer Summary report on page 78
- System Status Summary for Consumers on page 22

**VM reports**

- VM Summary report on page 81
- VMs report on page 81
- VM CPU Ready report on page 82
- VM NIC Dropped report on page 83
- VM Disk Latency report on page 84
- Total VMs report on page 84
VM Summary report

The VM Summary report on the Infrastructure Analytics Advisor dashboard provides a summary of the performance and status of your registered virtual machines.

If the numbers are above 0, VMs exceeded the critical and warning thresholds. The horizontal bar graph provides a breakdown of the overall VM status, which indicates the total number of critical and warning alerts compared to the number of affected resources from the following monitored metrics:

- CPU ready: This is the CPU metric SLO status of all your monitored VMs.
- NIC dropped: This is the NIC metric which measures the rate of IP packets drops sent or received by the NIC.
- Disk latency: This is the read and write latency status of all your monitored VMs.

You can hover over the bar graph to view the VM alert status. The status indicates how many resources are affected by critical and warning alerts.

To view details about the affected resources, click the number link in the report. A list of affected resources displays in a new window. You can select the resource and then click Show E2E View to view the data center topology and review the system configuration.

Related topics
- System Status Summary for Consumers on page 22

VMs report

The VMs report on the Infrastructure Analytics Advisor dashboard displays the total number of VMs with critical and warning alerts.
To view details about the affected resources, click the number link in the report. A list of affected resources displays in a new window. You can select the resource and then click Show E2E View to view the data center topology and review the system configuration.

**Related topics**
- [VM Summary report](#) on page 81

**VMs - Critical**

The VMs - Critical report on the Infrastructure Analytics Advisor dashboard displays the number of virtual machines that exceeded the defined critical threshold for any monitored metric.

To view details about the affected resources, click the number link in the report. A list of affected resources displays in a new window. You can select the resource and then click Show E2E View to view the data center topology and review the system configuration.

**VM CPU Ready report**

The VM CPU Ready report on the Infrastructure Analytics Advisor dashboard displays the CPU metric SLO status of all your monitored virtual machines. The CPU metric refers to the ratio of time that the virtual machine was ready
but could not be scheduled to run on a physical CPU. The numbers indicate the total critical and warning alerts received based on the relevant thresholds set for the CPU metric.

All critical and warning alerts directly affects the SLO, so start analyzing the problem quickly.

To view details about the affected resources, click the number link in the report. A list of affected resources displays in a new window. You can select the resource and then click Show E2E View to view the data center topology and review the system configuration.

**Related topics**
- [VM Summary report](#) on page 81

### VM NIC Dropped report

The VM NIC Dropped report on the Infrastructure Analytics Advisor dashboard displays the IP packets sent or received IP packets that were dropped for all your monitored virtual machines. The numbers indicate the total critical and warning alerts received compared to the relevant thresholds set for the NIC metric. The metric refers to sent or received packets that were dropped of the virtual NIC.
All critical or warning alerts directly affects the SLO, so start analyzing the problem quickly.

To view details about the affected resources, click the number link in the report. A list of affected resources displays in a new window. You can select the resource and then click Show E2E View to view the data center topology and review the system configuration.

**Related topics**
- [VM Summary report](#) on page 81

### VM Disk Latency report

The VM Disk Latency report on the Infrastructure Analytics Advisor dashboard displays the disk read and write latency status of all your monitored virtual machines. The numbers indicate the total critical and warning alerts received compared to the relevant thresholds set for the disk latency metric. The disk latency metric refers to the read and write latency to and from the virtual machine disk.

All critical or warning alert directly affects the SLO, so start analyzing the problem quickly.

![VM Disk Latency](image)

To view details about the affected resources, click the number link in the report. A list of affected resources displays in a new window. You can select the resource and then click Show E2E View to view the data center topology and review the system configuration.

**Related topics**
- [VM Summary report](#) on page 81

### Total VMs report

The Total VMs report on the Infrastructure Analytics Advisor dashboard displays the total number of monitored virtual machines.
If you plan to register VMware vCenter server, then all VMs connected to this server are monitored.

Related topics
• VM Summary report on page 81

Volume reports

Volume Summary report on page 85
Volumes report on page 86
Volumes - Critical report on page 87
Volume IO Rate report on page 87
Volume IOPS report on page 88
Volume Response Time report on page 88
Total Volumes report on page 89

Volume Summary report

The Volume Summary report on the Infrastructure Analytics Advisor dashboard provides an overview of the performance of your storage system volumes. It shows total number of volumes with critical and warning alerts and also a summary of alerts received for the following three monitored metrics:
• IOPS: IO operations per second of the monitored volume.
• Response time: Average response time of the volume based on the IO count.
• IO rate: IO operations transfer rate.
You can hover over the bar graph to view the alerts type and number of volumes with critical and warning alerts for these three metrics.

To view details about the affected resources, click the number link in the report. A list of affected resources displays in a new window. You can select the resource and then click Show E2E View to view the data center topology and review the system configuration.

**Related topics**
- [System Status Summary for Consumers](#) on page 22
- [Volume IO Rate report](#) on page 87
- [Volume IOPS report](#) on page 88
- [Volume Response Time report](#) on page 88

**Volumes report**

The Volumes report on the Infrastructure Analytics Advisor dashboard displays the total number of volumes with critical and warning alerts.

To view details about the affected resources, click the number link in the report. A list of affected resources displays in a new window. You can select the resource and then click **Show E2E View** to view the data center topology and review the system configuration.
**Related topics**

- [VM Summary report](#) on page 81

### Volumes - Critical report

The Volumes - Critical report on the Infrastructure Analytics Advisor dashboard displays the total number of volumes that exceeded the critical threshold for any metric.

![Volumes - Critical report](image)

To view details about the affected resources, click the number link in the report. A list of affected resources displays in a new window. You can select the resource and then click **Show E2E View** to view the data center topology and review the system configuration.

### Volume IO Rate report

The Volume IO rate report on the Infrastructure Analytics Advisor dashboard displays the total number of critical and warning alerts received from volumes that exceeded the critical and warning thresholds for the IO rate metric.

![Volume IO Rate report](image)

To view details about the affected resources, click the number link in the report. A list of affected resources displays in a new window. You can select
the resource and then click **Show E2E View** to view the data center topology and review the system configuration.

**Related topics**
- [Volume Summary report](#) on page 85

**Volume IOPS report**

The Volume IOPS report on the Infrastructure Analytics Advisor dashboard displays the total number of critical and warning alerts received from volumes that exceeded the critical and warning thresholds for the IOPS metric.

![Volume IOPS](image)

To view details about the affected resources, click the number link in the report. A list of affected resources displays in a new window. You can select the resource and then click **Show E2E View** to view the data center topology and review the system configuration.

**Related topics**
- [Volume Summary report](#) on page 85

**Volume Response Time report**

The Volume Response Time report on the Infrastructure Analytics Advisor dashboard displays the response time status for all monitored volumes. The numbers indicate the total number of critical and warning alerts received from volumes that exceeded the critical and warning thresholds for the response time metric.

![Volume Response Time](image)
To view details about the affected resources, click the number link in the report. A list of affected resources displays in a new window. You can select the resource and then click **Show E2E View** to view the data center topology and review the system configuration.

**Related topics**
- [Volume Summary report](#) on page 85

**Total Volumes report**

The Total Volumes report on the Infrastructure Analytics Advisor dashboard displays the total number of volumes.

**Related topics**
- [Volume Summary report](#) on page 85

**Host reports**

- [Hosts report](#) on page 90
- [Hosts - Critical report](#) on page 90
- [Total Hosts report](#) on page 91
Hosts report

The Hosts report on the Infrastructure Analytics Advisor dashboard displays the total number of hosts that have critical and warning alerts.

To view details about the affected resources, click the number link in the report. A list of affected resources displays in a new window. You can select the resource and then click Show E2E View to view the data center topology and review the system configuration.

Related topics
• System Status Summary for Consumers on page 22

Hosts - Critical report

The Hosts - Critical report on the Infrastructure Analytics Advisor dashboard displays the number of hosts that exceeded the defined critical threshold for any monitored metric. The host is monitored with the thresholds defined with Windows-based profiles in the user resource thresholds.

To view details about the affected resources, click the number link in the report. A list of affected resources displays in a new window. You can select
the resource and then click **Show E2E View** to view the data center topology and review the system configuration.

**Total Hosts report**

The Total Hosts report on the Infrastructure Analytics Advisor dashboard displays the total number of hosts monitored in the environment.

![Total Hosts report](image)

**System resource reports**

- [System Resource Summary report on page 91](#)
- [System Resources - Critical report on page 92](#)
- [Total System Resources report on page 93](#)

**System Resource Summary report**

The System Resource Summary report on the Infrastructure Analytics Advisor dashboard provides a summary of the performance and status of your registered system resources such as hypervisors, switches, and storage systems. The report provides the total number of critical and warning alerts, and also includes these numbers in a bar graph.

![System Resource Summary report](image)
If the numbers are above 0, the system resources exceeded the critical and warning thresholds. The bar graph provides a summary of the total number of resources with critical and warning alerts, by each resource type:

- Server
- Network
- Storage

You can hover over the bar graph to view the system resource alert status. The status indicates how many system resources are affected by critical or warning alerts. To view details about the resources that exceeded the defined critical and warning thresholds, click the number link.

The System Resource window lists the resource name, IP address, status, device type, and description of each assigned system resource. On the System Resource window, click **E2E View** to view the data center topology and review the configuration and status information.

**Related topics**
- [Hypervisors report](#) on page 95
- [Storage Systems report](#) on page 94
- [Switches report](#) on page 96
- [E2E infrastructure topology view](#) on page 42

**System Resources - Critical report**

The System Resources - Critical report on the Infrastructure Analytics Advisor dashboard displays the number of system resources that exceeded the defined critical threshold for any monitored metric.

To view details about the affected resources, click the number link in the report. A list of affected resources displays in a new window. You can select the resource and then click **Show E2E View** to view the data center topology and review the system configuration.
The System Resources report Infrastructure Analytics Advisor displays the total number of monitored system resources such as hypervisors, switches, and storage systems that have critical and warning alerts.

To view details about the affected system resources, click the number link in the pane that shows the critical and warning alerts to display the System Resources window that displays the following:

- Resource Name: This is the name of the system resource.
- IP Address: This is the IP address of the system resource.
- Status: This is the most severe status of the system resource.
- Description: This is a short description of the system resource.

To view details about the affected resources, click the number link in the report. A list of affected resources displays in a new window. You can select the resource and then click Show E2E View to view the data center topology and review the system configuration.

**Total System Resources report**

The Total System Resources report on the Infrastructure Analytics Advisor dashboard displays the total number of monitored system resources. It also shows a breakdown of the total number of each resource type:

- Hypervisors
- Storage systems
- Switches
Storage system reports

Storage Systems report on page 94
Total Storage Systems report on page 95

Storage Systems report

The Storage Systems report on the Infrastructure Analytics Advisor dashboard displays the total number of storage systems that have critical and warning alerts.

To view details about the affected storage systems, click the number link in the critical and warning alerts pane to display the following on the Storage Systems window:

- Storage System Name: The name of the storage system.
- IP Address: The IP address of the storage system.
- Status: The most severe status for the storage system resource.
- Description: A short description of the storage system.

To view details about the affected resources, click the number link in the report. A list of affected resources displays in a new window. You can select
the resource and then click **Show E2E View** to view the data center topology and review the system configuration.

**Total Storage Systems report**

The Total Storage Systems report on the Infrastructure Analytics Advisor dashboard displays the total number of monitored storage systems.

![Total Storage Systems](image)

**Hypervisor reports**

[Hypervisors report on page 95](#)

[Total Hypervisors report on page 96](#)

**Hypervisors report**

The Hypervisors report on the Infrastructure Analytics Advisor dashboard displays the total number of monitored hypervisors that have critical and warning alerts.

![Hypervisors](image)
To view details about the affected hypervisors, click the number link in the critical and warning alerts pane to display the following on the Hypervisors window:

- Hypervisor Name: The name of the hypervisor.
- IP Address: The IP address of the hypervisor.
- Status: The most severe status for hypervisor.
- Cluster Name: The cluster name of the hypervisor.
- Description: A short description of the hypervisor.

To view details about the affected resources, click the number link in the report. A list of affected resources displays in a new window. You can select the resource and then click **Show E2E View** to view the data center topology and review the system configuration.

**Total Hypervisors report**

The Total Hypervisors report on the Infrastructure Analytics Advisor dashboard displays the total number of monitored hypervisors.

![Total Hypervisors](image)

**Switch reports**

- [Switches report on page 96](#)
- [Total Switches report on page 97](#)

**Switches report**

The Switches report on the Infrastructure Analytics Advisor dashboard displays the total number of FC switches that have critical and warning alerts.
To view details about the affected switches, click the number link in the critical and warning alerts pane to display the following on the Switches window:

- Switch Name: The name of the switch.
- IP Address: The IP address of the switch.
- Status: The most severe status for the switch.
- Description: A short description of the switch.

To view details about the affected resources, click the number link in the report. A list of affected resources displays in a new window. You can select the resource and then click **Show E2E View** to view the data center topology and review the system configuration.

**Total Switches report**

The Total Switches report on the Infrastructure Analytics Advisor dashboard displays the total number of monitored FC switches.

**User resource reports**

**Total User Resources report**
The Total User Resources report on the Infrastructure Analytics Advisor dashboard displays the total number of monitored user resources. It also shows a breakdown of the total number for each resource type:

- Volumes
- VMs
- Hosts

### Event reports

- [System Event Status report on page 98](#)
- [Resource Event Status report on page 99](#)

### System Event Status report

The System Event Status report on the Infrastructure Analytics Advisor dashboard displays the number of critical, warning, and information events for Management or Event Action events that occurred in the past 24 hours. An example of a Management event is a service start event. An Event Action event is a return code notification of the executed action. For example, when launching an event action the command fails, a failure notification is sent. These types of events are generated when the system settings need to be verified or configured.
To view more details for each event, see the **Events > System Events** tab.

**Resource Event Status report**

The Resource Event Status report on the Infrastructure Analytics Advisor dashboard displays the number of critical, warning, and informational events for resource events that were generated in the past 24 hours. The events are generated when a device or component such as servers or network devices has a problem or does not performing optimally.

<table>
<thead>
<tr>
<th>Event Type</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical</td>
<td>4</td>
</tr>
<tr>
<td>Warning</td>
<td>7</td>
</tr>
<tr>
<td>Information</td>
<td>25</td>
</tr>
</tbody>
</table>

To view more details for each error, see the **Events > Resource Events** tab.

**Related topics**

- [Event Trends report](#) on page 25
Definition file templates

Infrastructure Analytics Advisor provides users with definition file templates that can be customized to run actions based on specific events along with email notifications.

- Setting event actions
- Format of the email template definition file
- Command template definition files formats
Setting event actions

Setting event actions allows you to run a batch file for running an event action when a Infrastructure Analytics Advisor event is registered. You can enable automatic notifications when an error is detected by Infrastructure Analytics Advisor by defining commands to run when an event is registered in the file for running an event action.

Defining a file for running an event action

To run an event action, create a file that defines the commands to run when a specific event is registered.

You can specify any file name. However, the extension must be .bat.
- Windows: .bat
- Linux: .sh

In the file for running an event action, you can view information about the event that triggered an event action through environment variables. The table shows the environment variables that you can specify in a file for running an event action.

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANALYTICS_SOURCE</td>
<td>Device name</td>
</tr>
<tr>
<td>ANALYTICS_DEVICE</td>
<td>Device type</td>
</tr>
<tr>
<td>ANALYTICS_DESCRIPTION</td>
<td>Message</td>
</tr>
<tr>
<td>ANALYTICS_CATEGORY</td>
<td>Category</td>
</tr>
<tr>
<td>ANALYTICS_SEVERITY</td>
<td>Level</td>
</tr>
<tr>
<td>ANALYTICS_DATE</td>
<td>Registration date</td>
</tr>
<tr>
<td>ANALYTICS_EVENTID</td>
<td>Event ID</td>
</tr>
<tr>
<td>ANALYTICS_GROUPSNnnn</td>
<td>Group name</td>
</tr>
<tr>
<td>ANALYTICS_NODEID</td>
<td>Node ID</td>
</tr>
<tr>
<td>ANALYTICS_COMPONENTID</td>
<td>Component ID</td>
</tr>
<tr>
<td>ANALYTICS_PERFCOMPONENTID</td>
<td>Performance</td>
</tr>
<tr>
<td>ANALYTICS_NAME</td>
<td>Name of a host where Infrastructure Analytics Advisor is running</td>
</tr>
</tbody>
</table>

Example of specifying an environment variable:
- Windows: %ANALYTICS_SOURCE%
- Linux: ${ANALYTICS_SOURCE}

Event action definition file format

The following describes the format to enter data and the settings to specify in EventAction.properties. The timing at which the specified definitions are applied is also described.
Format

specified-key-name=specified-value

File

EventAction.properties

Save the file in UTF-8 format. When you save the file, prevent a BOM (byte order mark) from being added to the file.

Folder

Infrastructure Analytics Advisor-installation-folder
\Analytics\conf

The default installation folder for Infrastructure Analytics Advisor is as follows:

- **Windows:**
  C:\Program Files\HITACHI
- **Linux:**
  /opt/hitachi

Update frequency

Infrastructure Analytics Advisor regularly monitors (at 5-minute intervals) the event action definition file. If the file is updated, the changes are automatically applied.

Content to specify

Specify each key name and value on a single line. When you create the event action definition file, the following rules apply:

- A line starting with # is treated as a comment line
- Blank lines are ignored
- The entered values are case-sensitive
- If the same key is specified more than once in the same file, the last specification is valid
- To specify a tab character, enter \t
- To specify a backslash (\), enter \n
To display %, specify %
- To specify an apostrophe (‘), enter \
- To display a double quotation mark ("), specify \"
- Specify only an absolute path. A path specified in an environment variable cannot be set for the path

Setting description
<table>
<thead>
<tr>
<th>Key name</th>
<th>Setting description</th>
<th>Specifiable values</th>
<th>Default value</th>
<th>Optional or required</th>
</tr>
</thead>
<tbody>
<tr>
<td>EventAction.cmd</td>
<td>Specifies the absolute path of the batch file for running an event action.</td>
<td>ASCII characters and characters in 260 bytes, excluding control characters Note: Spaces are excluded.</td>
<td>Null character</td>
<td>Optional If this key is omitted, no event action will be run. This key also enables or disables the function.</td>
</tr>
<tr>
<td>EventAction.max Count</td>
<td>Specifies the maximum number of event actions that can be run simultaneously.</td>
<td>1 to 100</td>
<td>10</td>
<td>Optional If this key is omitted, the default value will be used.</td>
</tr>
<tr>
<td>EventAction.timeout</td>
<td>Specifies the time-out time for event actions (in milliseconds).</td>
<td>1 to 3,600,000</td>
<td>300,000</td>
<td>Optional If this key is omitted, the default value will be used.</td>
</tr>
</tbody>
</table>

**Format of the email template definition file**

To create emails more efficiently, you can create an email template definition file and then use an email template to create emails from the **Execute Action** window. You can also create emails that contain Infrastructure Analytics Advisor-managed resource data. For example, you can create an email template that provides information on how to troubleshoot a resource failure. When a failure occurs, email templates allow you to create emails from the **Execute Action** window to quickly notify the system administrator.

**Prerequisite**
- To send email messages from Infrastructure Analytics Advisor, configure the email server for Infrastructure Analytics Advisor.

**Format**

specified-key-name=specified-value

**File**
- Use any file.
- Save the file in UTF-8 format.
• A maximum of 1,000 files can be set in Infrastructure Analytics Advisor. Files are loaded in alphabetical order by file name, and any files after the 1,000th file are not loaded.

**Folder**

*Infrastructure Analytics Advisor-installation-folder*
\Analytics\conf\template\mail

The default installation folder for Infrastructure Analytics Advisor is as follows:

- **Windows:**
  C:\Program Files\HITACHI
- **Linux:**
  /opt/hitachi

**Update frequency**

When Infrastructure Analytics Advisor is started or the `reloadtemplate` command is run.

**Content to specify**

Specify each key name and value on a single line. When you create the email template definition file, change as previous:

- A line starting with # is treated as a comment line
- Blank lines are ignored
- The entered values are case-sensitive
- If the same key is specified more than once in the same file, the last specification is valid
- To specify a tab character, enter \\t
- To display \, specify \\\\n- To display %, specify %%
- If the filter condition SE.template.filter.xxxxxx.string is specified more than once, settings will be displayed when all of the conditions are met
- If you specify "LFCR" for the setting value, it displays in a new line in a preview window

**Setting description**
<table>
<thead>
<tr>
<th>Key name</th>
<th>Setting description</th>
<th>Specifiable values</th>
<th>Default value</th>
<th>Optional or required</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE.template.name.string</td>
<td>Specify the action name.</td>
<td>Values of no more than 127 bytes that do not include control characters</td>
<td>Null character</td>
<td>Required</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If this key is omitted, the processing to read files will fail.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>The name of this key is the same as the name specified in a command template definition file.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE.template.description.string</td>
<td>Specify a description of the action.</td>
<td>Values of no more than 255 bytes that do not include control characters</td>
<td>Null character</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If this key is omitted, the default value will be used.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE.mail.template.title.string</td>
<td>Specify the subject of the email template.</td>
<td>Values of no more than 255 bytes that do not include control characters</td>
<td>Null character</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If this key is omitted, the default value will be used.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE.mail.template.body.string</td>
<td>Specify the body of the email template.</td>
<td>Values of no more than 4,096 bytes that do not include control characters</td>
<td>Null character</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If this key is omitted, the default value will be used.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE.mail.template.address.string</td>
<td>Specify the address of the email template.</td>
<td>Values of no more than 255 bytes that do not include control characters</td>
<td>Null character</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td></td>
<td>If this key is omitted, the default value will be used.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE.template.filter.resourceN</td>
<td>Specify conditions for the names of the resources that are starting points and that</td>
<td>Values of no more than 255 bytes that do not include control characters</td>
<td>Null character</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td>display in the action list during resource selection.</td>
<td>Setting display only when the Execute Action window is called from a resource that matches the</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Settings display only when the Execute Action window is called from a resource that matches the</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>options that match the settings display only when the Execute Action window is called from a resource that matches the</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Definition file templates**

Hitachi Infrastructure Analytics Advisor User Guide
<table>
<thead>
<tr>
<th>Key name</th>
<th>Setting description</th>
<th>Specifiable values</th>
<th>Default value</th>
<th>Optional or required</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE.template.filter.resourceType.string</td>
<td>Specify conditions for the types of resource that are starting points and that display in the action list during resource selection. Settings display only when the Execute Action window is called from a resource that matches the specified conditions.</td>
<td>Values of no more than 32 bytes that do not include control characters</td>
<td>Null character</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE.template.filter.vmHostName.string</td>
<td>Specify conditions for the virtual machine names that display in the action list during resource selection. Settings display only when the Execute Action window is called from a resource that matches the specified conditions.</td>
<td>Values of no more than 64 bytes that do not include control characters</td>
<td>Null character</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE.template.filter.ipaddress.string</td>
<td>Specify conditions for the IP addresses that display in the action list during resource selection. Settings display only when the Execute Action window is called from a resource that matches the specified conditions.</td>
<td>Values of no more than 255 bytes that do not include control characters</td>
<td>Null character</td>
<td>Optional</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SE.template.filter.upperResourceName.string</td>
<td>Specify conditions for the names of higher-level resources of a starting</td>
<td>Values of no more than 512 bytes that do not include control characters</td>
<td>Null character</td>
<td>Optional</td>
</tr>
</tbody>
</table>

Definition file templates

Hitachi Infrastructure Analytics Advisor User Guide
<table>
<thead>
<tr>
<th>Key name</th>
<th>Setting description</th>
<th>Specifiable values</th>
<th>Default value</th>
<th>Optional or required</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE.template.filter.upperResourcetype.string</td>
<td>Specify conditions for the types of higher-level resources of a starting point that display in the action list during resource selection. Settings display only when the Execute Action window is called from a resource that matches the specified conditions.</td>
<td>Values of no more than 32 bytes that do not include control characters</td>
<td>Null character</td>
<td>Optional</td>
</tr>
</tbody>
</table>

If this key is omitted, the default value will be used, and the key will not be used as a filter condition.

By using variables, you can set information about a selected resource as the value of a setting.

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Description</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>%ANALYTICS_RESOURCENAME%</td>
<td>Name of the selected resource</td>
<td>Not applicable</td>
</tr>
<tr>
<td>%ANALYTICS_UPPERRESOURCENAME%</td>
<td>Name of the higher-level resource of the selected resource</td>
<td>Not applicable</td>
</tr>
<tr>
<td>%ANALYTICS_IPADDRESS%</td>
<td>IP address</td>
<td>Not applicable</td>
</tr>
<tr>
<td>%ANALYTICS_VIRTUALMACHINENAME%</td>
<td>Name of the virtual host</td>
<td>Displays only when the resource is a virtual machine.</td>
</tr>
<tr>
<td>%ANALYTICS_RESOURCETYPE%</td>
<td>Resource type</td>
<td>Not applicable</td>
</tr>
<tr>
<td>%ANALYTICS_UPPERRESOURCETYPE%</td>
<td>Type of the higher-level resource</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

If no value is set for the selected resource, a null character displays.

To display information about virtual hosts and IP addresses, VMware Tools must be on virtual hosts.
**Note:** The email template definition file restricts the maximum number of characters that can be displayed in the email editor.

If the maximum number of specifiable characters is exceeded in an email template's address, subject, and body, clicking Launch Mailer in the **Execute Action** dialog box might not start the email editor normally.

If the email editor does not start normally, manually start the email editor, and then copy the contents of the preview to use them.

The maximum number of specifiable characters depends on the web browser. As a guideline, the maximum number of characters for web browsers is 2059 characters for the Firefox browser, and 200 characters for Internet Explorer 11 browser.

---

**Command template definition files formats**

If you create a command template definition file, you can use the **Execute Action** window to run commands of other products, user programs, and resources on the Infrastructure Analytics Advisor management server.

**Format**

```
specified-key-name=specified-value
```

**File**

- You can specify any file name and file extension.
- Save the file in UTF-8 format.
- The maximum number of files that can be set in Infrastructure Analytics Advisor (including the number of email template definition files) is 1,000. Files are loaded in alphabetical order by file name, and any files after the 1,000th file are not loaded.

**Folder**

```
Infrastructure Analytics Advisor-installation-folder
\Analytics\conf\template\command
```

The default installation folder for Infrastructure Analytics Advisor is as follows:

- **Windows:**
  C:\Program Files\HITACHI
- **Linux:**
  /opt/hitachi

**Update frequency**

When Infrastructure Analytics Advisor is started or the `reloadtemplate` command is run.
Content to specify
Specify each key name and value on a single line. Note the following when specifying settings in a command template definition file:
• A line starting with # is treated as a comment line
• Blank lines are ignored
• The entered values are case-sensitive
• If an invalid value is specified, the default value is used
• If the same key is specified more than once in the same file, the last specification is valid
• To specify a tab character, enter \t
• To display \, specify \\n• To display %, specify %%
• If the filter condition SE.template.filter.xxxxxxx.string is specified more than once, settings will be displayed when all of the conditions are met

Setting description

<table>
<thead>
<tr>
<th>Key name</th>
<th>Setting description</th>
<th>Specifiable values</th>
<th>Default value</th>
<th>Optional or required</th>
</tr>
</thead>
<tbody>
<tr>
<td>SE.template.name.string</td>
<td>Specify the action name.</td>
<td>Values of no more than 127 bytes that do not include control characters</td>
<td>This setting has no default value, because specification of this setting is required.</td>
<td>Required</td>
</tr>
<tr>
<td>SE.template.description.string</td>
<td>Specify a description of the action.</td>
<td>Values of no more than 255 bytes that do not include control characters</td>
<td>Null character</td>
<td>Optional</td>
</tr>
<tr>
<td>SE.cmd.template.cmdName.string</td>
<td>Specify the name of the command to run.</td>
<td>Values of no more than 255 bytes that do not include control characters</td>
<td>This setting has no default value, because specification of this setting is required.</td>
<td>Required</td>
</tr>
<tr>
<td>Key name</td>
<td>Setting description</td>
<td>Specifiable values</td>
<td>Default value</td>
<td>Optional or required</td>
</tr>
<tr>
<td>----------</td>
<td>---------------------</td>
<td>--------------------</td>
<td>---------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>SE.cmd.template.cmdArgs.string</td>
<td>Specify arguments for the command to run.</td>
<td>Values of no more than 4,096 bytes that do not include control characters</td>
<td>Null character</td>
<td>Optional</td>
</tr>
<tr>
<td>SE.cmd.template.timeout.num</td>
<td>Specify the timeout period for the command to run (in milliseconds).</td>
<td>1 to 2,147,483,647</td>
<td>30,000</td>
<td>Optional</td>
</tr>
<tr>
<td>SE.template.filter.resourceName.string</td>
<td>Specify conditions for the names of the resources that are starting points and that display in the action list during resource selection. Settings display only when the <strong>Execute Action</strong> window is called from a resource that matches the specified conditions.</td>
<td>Values of no more than 255 bytes that do not include control characters</td>
<td>Null character</td>
<td>Optional</td>
</tr>
<tr>
<td>SE.template.filter.resourceType.string</td>
<td>Specify conditions for the types of resource that are starting points and that display in the action list during resource selection. Settings display only when the <strong>Execute Action</strong> window is called from a resource that matches the specified conditions.</td>
<td>Values of no more than 32 bytes that do not include control characters</td>
<td>Null character</td>
<td>Optional</td>
</tr>
<tr>
<td>SE.template.filter.vmHostname.string</td>
<td>Specify conditions for the virtual machine names that display in the action list during resource selection. Settings display only when the <strong>Execute Action</strong> window is called from a resource that matches the specified conditions.</td>
<td>Values of no more than 64 bytes that do not include control characters</td>
<td>Null character</td>
<td>Optional</td>
</tr>
<tr>
<td>SE.template.filter.ipaddress.string</td>
<td>Specify conditions for the IP addresses that display in the action list during resource selection. Settings display only when the <strong>Execute Action</strong> window is called from a resource that matches the specified conditions.</td>
<td>Values of no more than 255 bytes that do not include control characters</td>
<td>Null character</td>
<td>Optional</td>
</tr>
<tr>
<td>Key name</td>
<td>Setting description</td>
<td>Specifiable values</td>
<td>Default value</td>
<td>Optional or required</td>
</tr>
<tr>
<td>----------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------</td>
<td>------------------------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>SE.template.filter.upperResourceName.string</td>
<td>Specify conditions for the names of higher-level resources of a starting point that display in the action list during resource selection. Settings display only when the Execute Action window is called from a resource that matches the specified conditions.</td>
<td>Values of no more than 512 bytes that do not include control characters</td>
<td>Null character</td>
<td>Optional</td>
</tr>
<tr>
<td>SE.template.filter.upperResourceType.string</td>
<td>Specify conditions for the types of higher-level resources of a starting point that display in the action list during resource selection. Settings display only when the Execute Action window is called from a resource that matches the specified conditions.</td>
<td>Values of no more than 32 bytes that do not include control characters</td>
<td>Null character</td>
<td>Optional</td>
</tr>
</tbody>
</table>

By using variables, you can set information about a selected resource as the value of a setting.

The following table lists the variables that can be used.

<table>
<thead>
<tr>
<th>Variable name</th>
<th>Description</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>%ANALYTICS_RESOURCENAME%</td>
<td>Name of the selected resource</td>
<td>N/A</td>
</tr>
<tr>
<td>%ANALYTICS_UPPERRESOURCENAME%</td>
<td>Name of the higher-level resource of the selected resource</td>
<td>N/A</td>
</tr>
<tr>
<td>%ANALYTICS_IPADDRESS%</td>
<td>IP address</td>
<td>N/A</td>
</tr>
<tr>
<td>%ANALYTICS_VIRTUALMACHINENAME%</td>
<td>Name of the virtual host</td>
<td>Displays only when the resource is a virtual machine.</td>
</tr>
<tr>
<td>%ANALYTICS_RESOURCETYPE%</td>
<td>Resource type</td>
<td>N/A</td>
</tr>
<tr>
<td>Variable name</td>
<td>Description</td>
<td>Remarks</td>
</tr>
<tr>
<td>------------------------</td>
<td>-----------------------------------------</td>
<td>---------</td>
</tr>
<tr>
<td>%ANALYTICS_UPPERRESOURCEYPE%</td>
<td>Type of the higher-level resource</td>
<td>N/A</td>
</tr>
</tbody>
</table>

If no value is set for the selected resource, a null character displays.

To display information about virtual hosts and IP addresses, VMware Tools must be installed on virtual hosts.

Definition example where the selected resource names are specified for command arguments

SE.template.name.string=001_task-execution
SE.template.description.string=Executes the scheduled tasks
SE.cmd.template.cmdName.string=schtasks
SE.cmd.template.cmdArgs.string=/run /tn /*TaskName*/ /s
%ANALYTICS_RESRCNAME% /*User*/
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