



Reporting

OnCommand Insight

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Reporting

Welcome to OnCommand Insight reporting

OnCommand Insight reporting is a business intelligence tool that enables you to view pre-defined reports or create custom reports. OnCommand Insight reporting generates reports from the Data Warehouse (DWH) data.

With OnCommand Insight reporting you can perform the following tasks:

- Run a pre-defined report
- Create a custom report
- Customize the report format and delivery method
- Schedule reports to run automatically
- Email reports
- Use colors to represent thresholds on data

Pre-defined reports are the standard OnCommand Insight reports. This guide describes the pre-defined reports that are available with all of the product licenses.

Accessing the OnCommand Insight Reporting Portal

You can access the OnCommand Insight Reporting Portal directly from a web browser, from the Data Warehouse, or from the Insight server . You use the Reporting Portal to access predefined reports or to create your own reports using Data Warehouse data.

Access the reporting portal from a web browser

Steps


1. Open a web browser.
2. Enter the following URL: `https://server-name:9300/bi`

9300 represents the default port that was specified during installation. If another port was specified, you must change the port.

3. Enter your user name and password, and then click **OK**.

Accessing the reporting portal from the Insight server


Steps

1. Open a web browser.
2. Enter the following URL to access the the Insight server: `https://server-name`
3. Enter your user name and password, and then click **OK**.
4. In the Insight toolbar, click .

5. In the login page that appears, enter your user name and password, and then click **OK**.

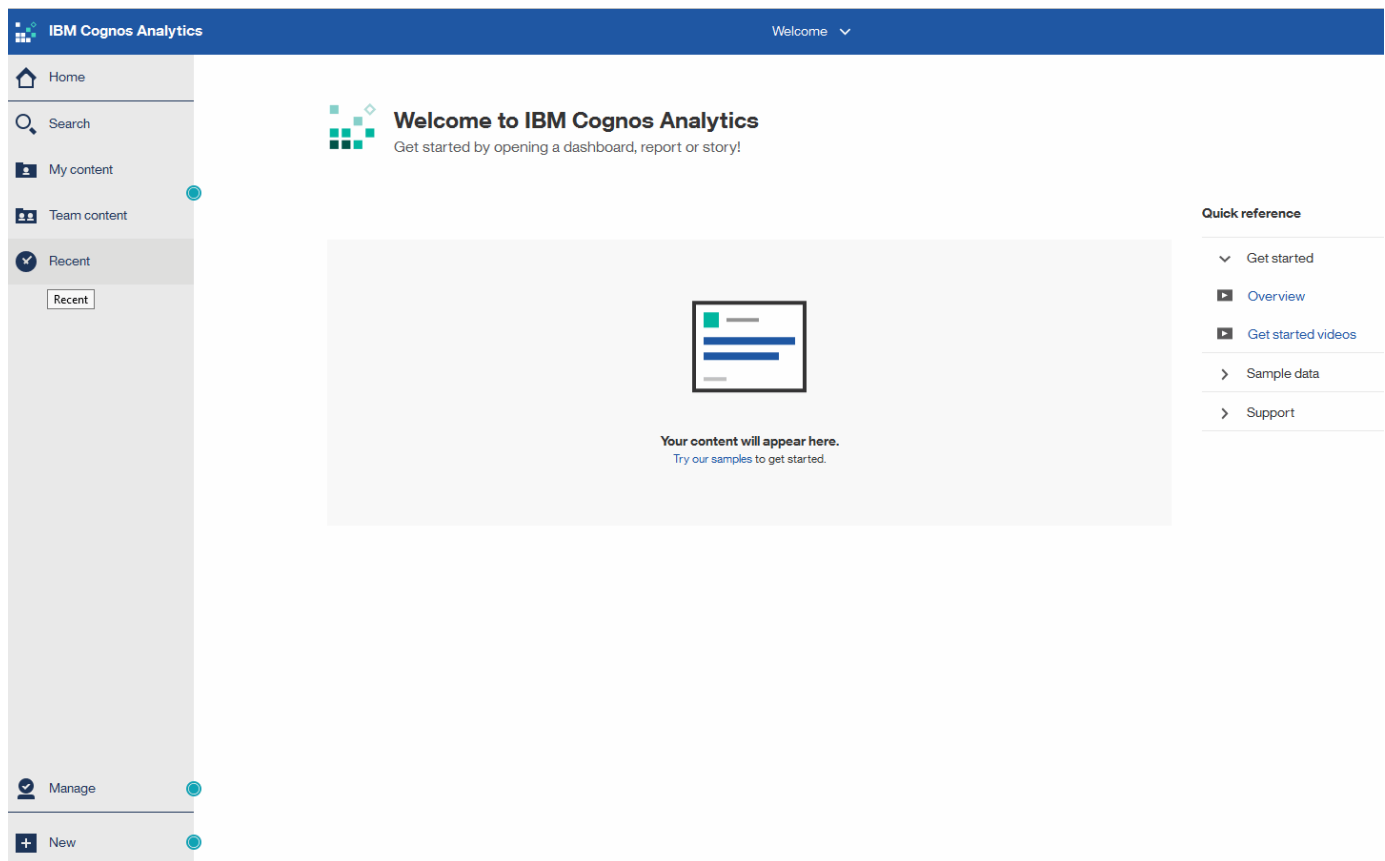
Accessing the reporting portal from the Data Warehouse

Steps

1. Open a web browser.
2. Enter the following URL to access the Data Warehouse: `https://server-name/dwh`
3. Enter your user name and password, and then click **OK**.
4. In the Data Warehouse toolbar, click .
5. In the login page that appears, enter your user name and password, and then click **OK**.

Results

The IBM Cognos Analytics welcome page is displayed. This is the default landing page of the OnCommand Insight Reporting Portal.



Variations due to installed licenses

Data in the OnCommand Insight reports is based upon the OnCommand Insight licenses that you have purchased. For example without the Plan license, you get point in time data (today) in the Inventory datamart for capacity and performance, but you do not have the ability to trend (report over a time period) the capacity or performance data for any device.

The absence of a Plan license removes the ability to create new reports or edit existing reports. You might see differences between the available reports in your OnCommand Insight system compared to the illustrations in the documentation. These variations are due to differences between the installed licenses on your system and the licenses on the system used to create the illustrations.

For more information about Licenses, see the OnCommand Insight Installation guide.


Reporting user roles

Each user account is assigned a role with a set of permissions. The number of users is limited by the number of Reporting licenses attached to each role.

Each role can perform the following actions:

- Recipient**

Views OnCommand Insight Reporting portal reports and sets personal preferences such as those for languages and time zones.



Recipients cannot create reports, run reports, schedule reports, export reports, nor perform administrative tasks.

- Business Consumer**

Runs reports and performs all Recipient options.

- Business Author**

Views scheduled reports, runs reports interactively, creates stories, in addition to performing all Business Consumer options.

- Pro Author**

Creates reports, creates packages and data modules, in addition to performing all Business Author options.

- Administrator**

Performs reporting administrative tasks such as the import and export of report definitions, configuration of reports, configuration of data sources, and the shutdown and restart of reporting tasks.

The following table shows the privileges and the maximum number of users allowed for each role:

Feature	Recipient	Business Consumer	Business Author	Pro Author	Admin
View reports in the Team Content tab	Yes	Yes	Yes	Yes	Yes
Run reports	No	Yes	Yes	Yes	Yes

Schedule reports	No	Yes	Yes	Yes	Yes
Upload external files	No	No	Yes	Yes	No
Create stories	No	No	Yes	Yes	No
Create reports	No	No	No	Yes	No
Create Packages and Data Modules	No	No	No	Yes	No
Perform administrative tasks	No	No	No	No	Yes
Number of users	Number of OnCommand Insight users	20	2	1	1

When you add a new Data Warehouse and Reporting user, if you exceed the limit in a role, the user is added as “deactivated,” and you need to deactivate or remove another user with that role to give a new user membership.



Report authoring capabilities require Insight Plan license. You can add additional Business Author and Pro Author users by purchasing the ARAP (Additional Report Authoring Package). Contact your OnCommand Insight representative for assistance.

These reporting user roles do not affect direct database access. These reporting user roles do not impact your ability to create SQL queries using the data marts.

Enabling Security Headers

HTTP headers can be configured to enhance the overall security of the Cognos Analytics web application.

To add the response headers:

- Log in to the Cognos Analytics UI and navigate to **Manage -> Configuration -> System -> Advanced Settings**
- Add the following Key/Value and apply:
 - Key: `BIHeaderFilter.responseHeaders`
 - Value: `[{"name": "X-FRAME-OPTIONS", "value": "SAMEORIGIN"}, {"name": "X-XSS-Protection", "value": "1"}, {"name": "X-Content-Type-Options", "value": "nosniff"}]`
- Refresh your browser to enable the headers.

Reporting made easy

You can generate pre-defined reports from the OnCommand Insight Reporting Portal, email them to other users, and even modify them. Several reports enable you to filter by device, business entity, or tier. The reporting tools use IBM Cognos as a foundation and give you many data presentation options.

- The OnCommand Insight pre-defined reports show your inventory, storage capacity, chargeback, performance, storage efficiency, and cloud cost data. You can modify these pre-defined reports and save your modifications.

The report data available to you is controlled by several things, including the following:

- Login access to the OnCommand Insight Reporting Portal, which is defined by roles.
- The setup of the OnCommand InsightData Warehouse, which stores the data for the reports.

You can generate reports in various formats, including HTML, PDF, CSV, XML, and Excel.

OnCommand Insight accommodates multiple tenancy in reporting by enabling you to associate users with business units. With this feature, administrators can separate data or reports according to the attributes of a user or his affiliation.



With Cognos version 11.1.2 onward, reporting URLs are not considered "stable" and are subject to change. If you have bookmarked reporting URLs, these bookmarks may subsequently fail. More information can be found here: <http://queryvision.com/ibm-analytics-11-x-urls-they-are-a-changing/>



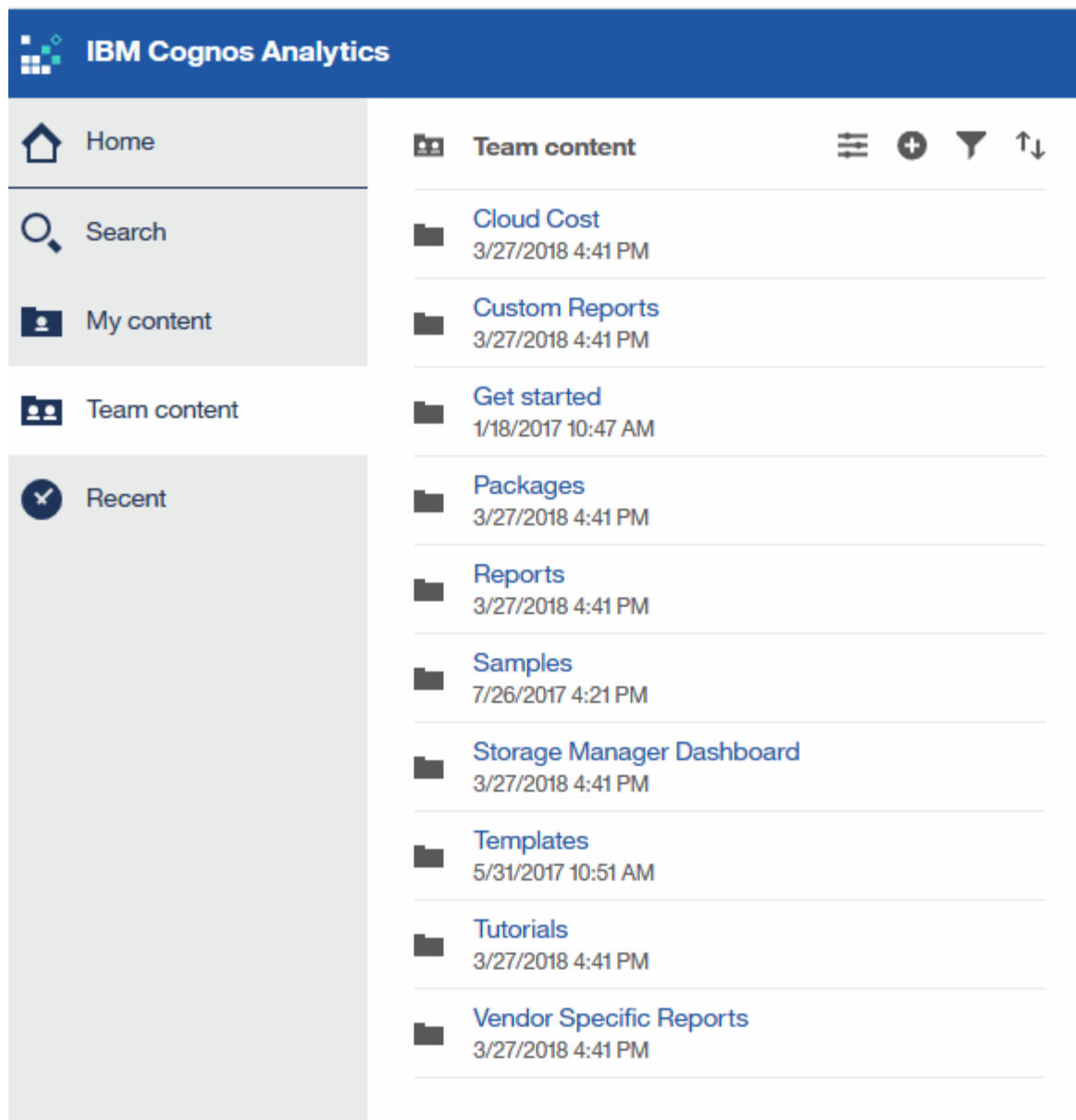
OnCommand Insight does not support any Dashboards created using Packages in IBM Cognos, unless using the new Data Module feature.

Navigating to pre-defined OnCommand Insight reports

When you open the Reporting Portal, the Team content folder is the starting point for you to select the type of information that you require in the OnCommand Insight reports.

Steps

1. In the left navigation pane, click **Team content** and select the information category that you want to use.



2. Click **Reports** to access the pre-defined reports.
3. Click **Get Started**, **Samples** or **Tutorials** to learn how to create reports.

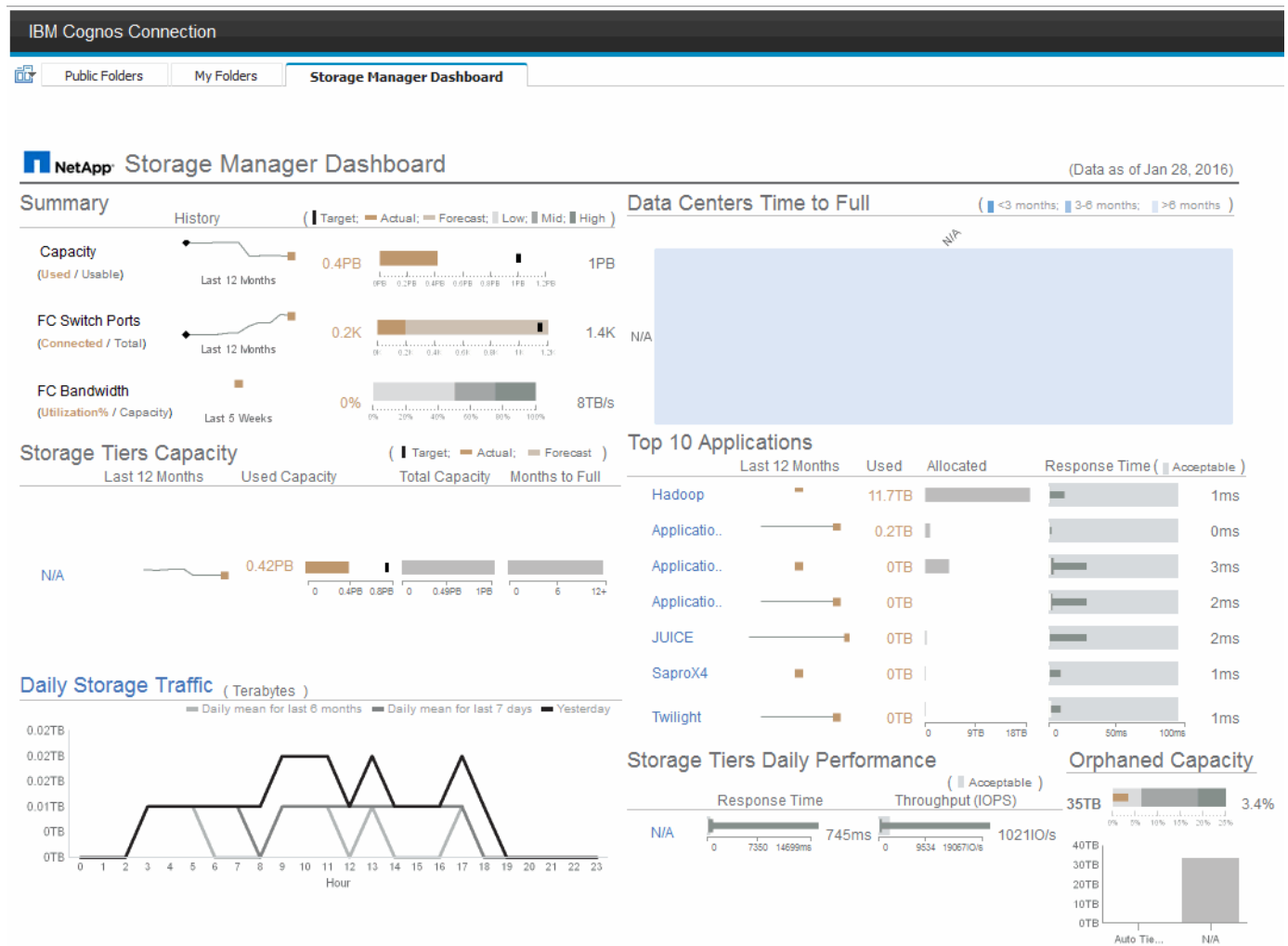
What the Storage Manager Dashboard enables you to do

You can use the Storage Manager Dashboard for the daily management of your storage services.

The Storage Manager Dashboard provides you with a centralized visualization that enables you to compare and contrast resource usage over time against the acceptable ranges and previous days of activity. Showing only the key performance metrics for your storage services, you can make decisions about how to maintain your data centers.

The dashboard comprises seven components that contain contextual information on certain aspects of your storage environment. You can drill down on the aspects of your storage services to perform an in-depth of analysis of a section that interests you most.

Summary



This component shows the used versus usable storage capacity, total switch ports versus the number of switch ports connected, and total connected switch port utilization versus the total bandwidth, and how each of these trend over time. You can view the actual utilization compared against the low, mid, and high ranges, which enables you to compare and contrast usage between Insight projections and your desired actuals, based on a target. For capacity and switch ports, you can configure this target. The forecast is based on an extrapolation of the current growth rate and the date you set. When the forecasted used capacity, which is based on future usage projection date, exceeds the target, an alert (solid red circle) appears next to Capacity.

Storage Tiers Capacity

This component shows the tier capacity used versus the capacity allocated to the tier, which indicates how the used capacity increases or decreases over a 12-month period and how many months are remaining to full capacity. Capacity usage is shown with values provided for actual usage, the usage forecast by Insight, and a target for capacity, which you can configure. When the forecasted used capacity, which is based on future usage projection date, exceeds the target capacity, an alert (solid red circle) appears next to a tier.

You can click any tier to display the Storage Pools Capacity and Performance Details report, which shows free versus used capacities, number of days to full, and performance (IOPS and Response Time) details for all the pools in the selected tier. You can also click any storage or storage pool name in this report to display the asset page summarizing the current state of that resource.

Daily Storage Traffic

This component shows how the environment is performing, if there is any large growth, changes, or potential issues compared to the previous six months. It also shows the average traffic versus the traffic for the previous seven days, and for the previous day. You can visualize any abnormalities in the way the infrastructure is performing because it provides information that highlights both cyclical (previous seven days) and seasonal variations (previous six months).

You can click the title (**Daily Storage Traffic**) to display the Storage Traffic Details report, which shows the heat map of the hourly storage traffic for the previous day for each storage system. Click any storage name in this report to display the asset page summarizing the current state of that resource.

Data Centers Time to Full

This component shows all the data centers versus all of the tiers and how much capacity remains in each data center for each tier of storage based on Insight forecasted growth rates. Tier capacity level is shown in blue; the darker the color, the lesser time the tier at the location has left before it is full.

You can click a section of a tier to display the Storage Pools Days to Full Details report, which shows total capacity, free capacity, and number of days to full for all the pools in the selected tier and the data center. Click any storage or storage pool name in this report to display the asset page summarizing the current state of that resource.

Top 10 Applications

This component shows the top 10 applications based on the used capacity. Regardless of how the tier organizes the data, this area displays the current used capacity and share of the infrastructure. You can visualize the range of user experience for the previous seven days to see if consumers experience acceptable (or, more importantly, unacceptable) response times.

This area also shows trending, which indicates if the applications meet their performance service level objectives (SLO). You can view the previous week's minimum response time, the first quartile, the third quartile, and the maximum response time, with a median shown against an acceptable SLO, which you can configure. When the median response time for any application is out of the acceptable SLO range, an alert (solid red circle) appears next to the application. You can click an application to display the asset page summarizing the current state of that resource.

Storage Tiers Daily Performance

This component shows a summary of the tier's performance for response time and IOPS for the previous seven days. This performance is compared against a SLO, which you can configure, enabling you to see if there is opportunity to consolidate tiers, realign workloads delivered from those tiers, or identify issues with particular tiers. When median response time or median IOPS is out of the acceptable SLO range, an alert (solid red circle) appears next to a tier.

You can click a tier name to display the Storage Pools Capacity and Performance Details report, which shows free versus used capacities, number of days to full, and performance (IOPS and response time) details for all the pools in the selected tier. Click any storage or storage pool in this report to display the asset page summarizing the current state of that resource.

Orphaned Capacity

This component shows the total orphaned capacity and orphaned capacity by tier, comparing it against acceptable ranges for total usable capacity and showing the actual capacity that is orphaned. Orphaned capacity is defined by configuration and by performance. *Storage orphaned by configuration* describes a

situation in which there is storage allocated to a host. However, the configuration has not been performed properly and the host cannot access the storage. *Orphaned by performance* is when the storage is correctly configured to be accessed by a host. However, there has been no storage traffic.

The horizontal stacked bar shows the acceptable ranges. The darker the gray, the more unacceptable the situation is. The actual situation is shown with the narrow bronze bar that shows the actual capacity that is orphaned.

You can click a tier to display the Orphaned Storage Details report, which shows all the volumes identified as orphaned by configuration and performance for the selected tier. Click any storage, storage pool, or volume in this report to display the asset page summarizing the current state of that resource.

Using predefined reports to answer common questions

OnCommand Insight includes predefined reports that address a number of common reporting requirements, providing critical insight that stakeholders need to make informed decisions about their storage infrastructure.

The following predefined reports are available in **Team content > Reports** or **Team content > Vendor Specific Reports**.

Newer versions of reports might be available at the NetApp Storage Automation Store. You should check the Automation Store regularly for reports.

- **AWS Cloud Cost Data**

The Cloud cost report provides a consolidated view of all assets so you can track, analyze and optimize usage and cost of cloud-based as well as on-prem services as they dynamically scale in your environment.

The report provides infrastructure-to-cost correlation, giving clear and actionable reporting to ensure right-sizing through focused capacity planning and waste detection.

- **Application Service Level Capacity and Performance**

The Application Service Level Capacity and Performance report provides a high level overview of your applications. You can use this information for capacity planning or for a migration plan.

- **Chargeback**

The Chargeback report provides storage capacity chargeback and accountability information by hosts, application, and business entities, and includes both current and historical data.

To prevent double counting do not include ESX servers, only monitor the VMs.

An updated version of this report is available at the NetApp Storage Automation Store.

- **Data Sources**

The Data Sources report shows all the data sources that are installed on your site, the status of the data source (success/failure), and status messages. The report provides information about where to start troubleshooting data sources. Failed data sources impact the accuracy of Insight reporting and the general usability of the product.

- **ESX vs VM Performance**

The ESX vs VM Performance report provides a comparison of ESX servers and VMs, showing average and peak IOPs, throughput, and latency and utilizations for ESX servers and VMs. To prevent double counting, exclude the ESX servers; only include the VMs.

An updated version of this report is available at the NetApp Storage Automation Store.

- **Fabric Summary**

The Fabric Summary report identifies switches and switch information, including port counts, firmware versions, and license status. The report does not include NPV switch ports.

- **Host HBAs**

The Host HBAs report provides an overview of the hosts in the environment and provides the vendor, model, and firmware version of HBAs, and the firmware level of the switches to which they are connected. This report can be used to analyze firmware compatibility when planning a firmware upgrade for a switch or an HBA.

- **Host Service Level Capacity and Performance**

The Host Service Level Capacity and Performance report provides an overview of storage utilization by host for block only applications.

- **Host Summary**

The Host Summary report provides an overview of storage utilization by each selected host with information for Fibre Channel and iSCSI hosts. The report enables you to compare ports and paths, the Fibre Channel and iSCSI capacity, and violation counts.

- **License Details**

The License Details report shows the entitled quantity of resources you are licensed for across all sites with active licenses. The report also shows a summation of actual quantity across all the sites with active licenses. The summation may include overlaps of storage arrays managed by multiple servers.

- **Mapped but not Masked Volumes**

The Mapped but not Masked Volumes report lists the volumes whose logical unit number (LUN) has been mapped for use by a particular host, but is not masked to that host. In some cases these could be decommissioned LUNs that have been unmasked. Unmasked volumes can be accessed by any host, making them vulnerable to data corruption.

- **NetApp Capacity and Performance**

The NetApp Capacity and Performance report provides global data for allocated, utilized, and committed capacity with trending and performance data for NetApp capacity.

- **OCI Scorecard**

The OCI Scorecard report provides a summary and general status of all assets discovered by OnCommand Insight. Status is indicated with green, yellow, and red flags:

- Green indicates normal condition
- Yellow indicates a potential issue in the environment
- Red indicates an issue that requires attention All of the fields in the report are described in the Data

Dictionary provided with the report.

- **Storage Summary**

The Storage Summary report provides a global summary of used and unused capacity data for raw, allocated, storage pools, and volumes. This report provides an overview of all of the storage discovered.

A newer version of this report is available at the NetApp Storage Automation Store.

- **VM Capacity and Performance**

Describes the virtual machine (VM) environment and its capacity usage. VM tools must be enabled to view some data, such as when VMs were powered down.

- **VM Paths**

The VM Paths report provides data store capacity data and performance metrics for which virtual machine is running on which host, which hosts are accessing which shared volumes, what the active access path is, and what comprises capacity allocation and usage.

- **HDS Capacity by Thin Pool**

The HDS Capacity by Thin Pool report shows the amount of usable capacity on a storage pool that is thin provisioned.

- **NetApp Capacity by Aggregate**

The NetApp Capacity by Aggregate report shows raw total, total, used, available, and committed space of aggregates.

- **Symmetrix Capacity by Thick Array**

The Symmetrix Capacity by Thick Array report shows raw capacity, useable capacity, free capacity, mapped, masked, and total free capacity.

- **Symmetrix Capacity by Thin Pool**

The Symmetrix Capacity by Thin Pool report shows raw capacity, useable capacity, used capacity, free capacity, used percentage, subscribed capacity, and subscription rate.

- **XIV Capacity by Array**

The XIV Capacity by Array report shows used and unused capacity for the array.

- **XIV Capacity by Pool**

The XIV Capacity by Pool report shows used and unused capacity for storage pools.


Creating a report using Cognos 11

Creating reports with Cognos 11 differs from previous versions of Cognos. Use this procedure to create a report using the pre-defined OnCommand Insight reports.

About this task

Use the following steps to generate a simple report on physical capacity of storage and storage pools in a number of data centers.

Steps

1. In the toolbar, click 
2. Click **Report**
3. Click **Templates > Blank**
4. Click **Themes > Cool Blue > OK**

The Source and Data tabs is displayed


5. Click **Source >** 
6. In the Open file dialog, click **Team content > Packages**

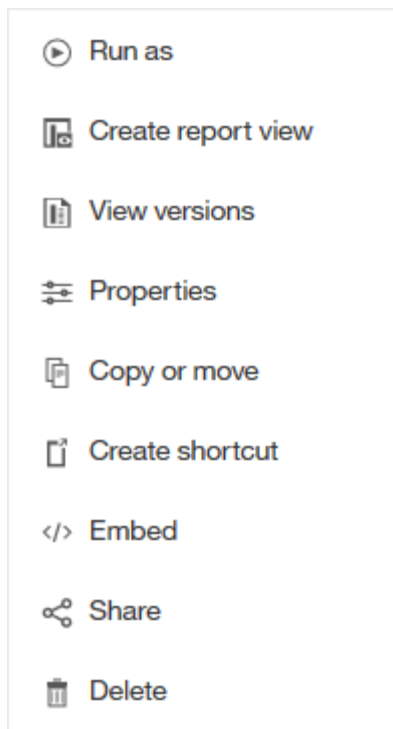
A list of available packages is displayed.

7. Click **Storage and Storage Pool Capacity > Open**
8. Click 

The available styles for your report are displayed.

9. Click **List**
Add appropriate names for List and Query














10. Click **OK**
11. Expand **Physical Capacity**
12. Expand to the lowest level of **Data Center**
13. Drag  **Data Center** to the Reporting palate.
14. Expand **Capacity (MB)**
15. Drag **Capacity (MB)** to the Reporting palate.
16. Drag **Used Capacity (MB)** to the Reporting palate.
- 17.



Run the report, by clicking  and selecting an output type.

Results

A report similar to the following is created:

	Data Center	Capacity (MB)	Used Capacity (MB)
	Asia	122,070,096.00	45,708,105.00
	BLR	100,709,506.00	54,982,204.00
	Boulder	22,883,450.00	12,011,075.00
	DC01	1,707,024,715.00	1,407,609,686.00
	DC02	732,370,688.00	732,370,688.00
	DC03	314,598,162.00	65,448,975.00
	DC04	573,573,884.00	282,645,615.00
	DC05	89,245,458.00	62,145,011.00
	DC06	19,455,433,799.00	11,283,487,744.00
	DC08	100,709,506.00	44,950,171.00
	DC10	112,916,718.00	43,346,818.00
	DC14	23,565,735,054.00	17,357,431,924.00
	DC56	137,549,084.00	10,657,793.00
	Europe	743,942,208.00	240,369,325.00
	HIO	9,823,036,853.00	4,216,750,338.00
	London	0.00	0.00
	N/A	9,049,939,023.00	5,887,911,992.00
	RTP	12,386,326,262.00	5,638,948,477.00
	SAC	9,269,642,330.00	6,197,549,437.00
 Top  Page up  Page down  Bottom			

Managing reports

For each report, you can select the **More** link in the Actions column, and access all of the report operations, such as setting report properties, scheduling reports, or emailing reports. Administrators have more management options available than other users.

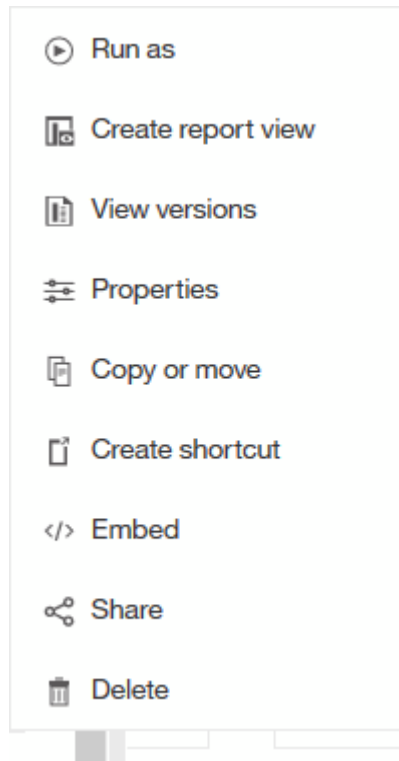
Administrators can set permissions for other report users according to their OnCommand Insight roles.

Customizing a report's output format and delivery

You can customize the format and delivery method of reports.

Steps

1. Open the OnCommand Insight Reporting Portal and select the report you want to customize and click [...].



2. Click **Properties > Schedule**

[< Back](#)
Create schedule

Period

Start

2018-04-06

1:49 PM

End

2018-07-06

1:49 PM

☐ No end date

Run every

1

week(s)

On day(s)

M

T

W

T

F

S

S

☐ Daily time interval

Options

Format

HTML

>

Delivery

Save

>

Prompts

Set values

>

Languages

English (United States)

>

3. You can set the following options:

- **Schedule** when you want reports to run.
- **Format** the report output.
- **Delivery** print, save, or email the report.
- **Languages** define the language the report is delivered in.

4. Click **Create** to produce the report using the selections you made.

Copying a report to the clipboard


Use this process to copy a report to the clipboard.

Steps

1. Open the Cognos 11 Reporting Portal: <https://server-name:9300/bi/>
2. In the toolbar, click

3. Click **Report**

4. Click the **Pages** icon 

The **Report** icon  **Report** is displayed

5. Left click the **Report** icon

Report options are displayed.

6. Click **Copy Report to Clipboard**.

Opening reports (xml) from the clipboard


You can open a report specification that was previously copied to the clipboard.

About this task

You enter the Reporting user interface by creating a new report or opening an existing report


Steps

1. Open the Cognos 11 Reporting Portal: <https://server-name:9300/bi/>

2. In the toolbar, click 

3. Click **Report**

4. Click the **Pages** icon 

The **Report** icon  **Report** is displayed

5. Left click the **Report** icon

Report options are displayed.

6. Click **Open report from clipboard**.

Creating custom ad hoc reports

You can use the report authoring tools to create custom reports. After creating reports, you can save them and run them on a regular schedule. The results of reports can be automatically sent by email to yourself and others.

The examples in this section show the following process, which can be used for any of the OnCommand Insight data models:

- Identifying a question to be answered with a report
- Determining the data needed to support the results
- Selecting data elements for the report

What you need to do before you design your report

Before you design your custom report, you need to complete some prerequisite tasks. If you do not complete these, reports could be inaccurate or incomplete.

For example, if you do not finish the device identification process, your capacity reports will not be accurate. Or, if you do not finish setting annotations (such as tiers, business units, and data centers), your custom reports might not accurately report data across your domain and might show "N/A" for some data points.

Before you design your reports, complete the following tasks:

- Configure all data sources. For details, see the *OnCommand Insight Configuration and Administration Guide*.
- Enter annotations (such as tiers, data centers, and business units) on devices and resources in your environment. It is beneficial to have annotations stable before generating reports, because OnCommand Insight Data Warehouse collects historical information.
- Configure OnCommand Insight Data Warehouse to accept the data from the OnCommand Insight server in the Extract, Transform, and Load (ETL) process.

Process of creating reports

The process of creating ad hoc reports involves several tasks.

- Plan the results of your report.
- Identify data to support your results.
- Select the data model (for example, Chargeback data model, Inventory data model, and so on) that contains the data.
- Select data elements for the report.
- Optionally format, sort, and filter report results.

How to plan the results of your custom report

Before you open the report design tools, you might want to plan the results you want from the report. With report authoring tools, you can create reports easily and might not need a great deal of planning; however, it is a good idea to get a sense from the report requestor about the report requirements.

- Identify the exact question you want to answer. For example:
 - How much capacity do I have left?
 - What are the chargeback costs per business unit?
 - What is the capacity by tier to ensure that business units are aligned at the proper tier of storage?
 - How can I forecast power and cooling requirements? (Add customized metadata by adding annotations to resources.)
- Identify the data elements that you need to support the answer.
- Identify the relationships between data that you want to see in the answer. Do not include illogical relationships in your question, for example, "I want to see the ports that relate to capacity."
- Identify any calculations needed on data.

- Determine what types of filtering are needed to limit the results.
- Determine if you need to use current or historical data.
- Determine if you need to set access privileges on reports to limit the data to specific audiences.
- Identify how the report will be distributed. For example, should it be emailed on a set schedule or included in the Team content folder area?
- Determine who will maintain the report. This might affect the complexity of the design.
- Create a mockup of the report.

Tips for designing reports

Several tips might be helpful when you are designing reports.

- Determine whether you need to use current or historical data.

Most reports only need to report on the latest data available in the Data Warehouse.

- Data Warehouse provides historical information on capacity and performance, but not on inventory.
- Everybody sees all data; however, you might need to limit data to specific audiences.

To segment the information for different users, you can create reports and set access permissions on them.

Reporting data model

Your enterprise can benefit from the data that is discovered and stored in OnCommand Insight Data Warehouse. The OnCommand Insight Data Warehouse is a centralized repository that stores data from multiple information sources and transforms them into a common, multidimensional data model for efficient querying and analysis.

From this repository, you can generate custom reports such as chargeback, consumption analysis, and forecasting reports that answer questions such as the following:

- What inventory do I have?
- Where is my inventory?
- Who is using our assets?
- What is the chargeback for allocated storage for a business unit?
- How much headroom do I have on switch ports?
- How long until I need to acquire additional storage capacity?
- Are business units aligned along the proper storage tiers?
- How is storage allocation changing over a month, quarter, or year?

Using the data model provided with OnCommand Insight Reporting, you can use report authoring tools to design and schedule reports.

Data model overview

OnCommand Insight provides several data models for use in report development. Each

data model is an aggregation that summarizes data so that it can be queried and searched. For example, reports about capacity planning use the Capacity data model.

The OnCommand Insight enterprise reporting data models provide data elements and interactive relationships among data elements that yield business views of the data. Using the data elements and relationships, you can create reports using the IBM Cognos Analytics report generation tools recommended by NetApp.

OnCommand Insight also provides data marts that can be used to develop your own SQL queries. There is a distinction between these SQL query data marts and the data models used in reporting. The individual OnCommand Insight reporting data models use the underlying OnCommand Insight database schema provided in the data marts; however, the data models use additional tables and sometimes new elements in the tables. For instance, the data model includes a Monthly Capacity Fact table in the Storage Capacity data model that is based on the Capacity Fact table from the database schema and data mart. The data model filters out the values from the database schema table to show only month information.

Another example of a difference between the database schema used in data marts and the data model is in the Violation table and the Violation Type column. The data model translates programmatic-named values in the database to match the text displayed in the OnCommand Insight web UI.

OnCommand Insight data models

OnCommand Insight includes several data models from which you can either select predefined reports or create your own custom report.

Each data model contains a simple data mart and an advanced data mart:

- Simple data mart provides quick access to the most commonly used data elements and includes only the last snapshot of Data Warehouse data; it does not include historical data.
- Advanced data mart provides all values and details available from the simple data mart and includes access to historical data values.
- **Capacity data model**

Enables you to answer questions about storage capacity, file system utilization, internal volume capacity, port capacity, qtree capacity, and virtual machine (VM) capacity. The Capacity data model is a container for several capacity data models. You can create reports answering various types of questions using this data model:

- **Storage and Storage Pool Capacity data model**

Enables you to answer questions about storage capacity resource planning, including storage and storage pools, and includes both physical and virtual storage pool data. This simple data model can help you answer questions related to capacity on the floor and the capacity usage of storage pools by tier and data center over time.

If you are new to capacity reporting, you should start with this data model because it is a simpler, targeted data model. You can answer questions similar to the following using this data model:

- What is the projected date for reaching the capacity threshold of 80% of my physical storage?
- What is the physical storage capacity on an array for a given tier?
- What is my storage capacity by manufacturer and family as well as by data center?
- What is the storage utilization trend on an array for all of the tiers?

- What are my top 10 storage systems with the highest utilization?
- What is the storage utilization trend of the storage pools?
- How much capacity is already allocated?
- What capacity is available for allocation?

◦ **File System Utilization data model**

Enables you to answer questions about file system utilization. This data model provides visibility about capacity utilization by hosts at the file system level. Administrators can determine allocated and used capacity per file system, determine the type of file system, and identify trending statistics by file system type. You can answer the following questions using this data model:

- What is the size of the file system?
- Where is the data kept and how is it accessed, for example, local or SAN?
- What are the historical trends for the file system capacity? Then, based on this, what can we anticipate for future needs?

◦ **Internal Volume Capacity data model**

Enables you to answer questions about internal volume used capacity, allocated capacity, and capacity usage over time:

- Which internal volumes have a utilization higher than a predefined threshold?
- Which internal volumes are in danger of running out of capacity based on a trend?
- What is the used capacity versus the allocated capacity on our internal volumes?

◦ **Port Capacity data model**

Enables you to answer questions about switch port connectivity, port status, and port speed over time. You can answer questions similar the following to help you plan for purchases of new switches:

- How can I create a port consumption forecast that predicts resource (port) availability (according to data center, switch vendor and port speed)?
- Which ports are likely to run out of capacity, providing data speed, data center, vendor and number of Host and storage ports?
- What are the switch port capacity trends over time?
- What are the port speeds?
- What type of port capacity is needed and which organization is about to run out of a certain port type or vendor?
- What is the optimal time to purchase that capacity and make it available?

◦ **Qtree Capacity data model**

Enables you to trend qtree utilization (with data such as used versus allocated capacity) over time. You can view the information by different dimensions—for example, by business entity, application, tier, and service level. You can answer the following questions using this data model:

- What is the used capacity for qtrees versus the limits set per application or business entity?
- What are the trends of our used and free capacity so that we can do capacity planning?
- Which business entities are using the most capacity?

- Which applications consume the most capacity?

- **VM Capacity data model**

Enables you to report your virtual environment and its capacity usage. This data model lets you report on changes in capacity usage over time for VMs and data stores. The data model also provides thin provisioning and virtual machine chargeback data.

- How can I determine capacity chargeback based on capacity provisioned to VMs and data stores?
- What capacity is not used by VMs and which portion of unused is free, orphaned, or other?
- What do we need to purchase based on consumption trends?
- What are my storage efficiency savings achieved by using storage thin provisioning and deduplication technologies? Capacities in the VM Capacity data model are taken from virtual disks (VMDKs). This means that the provisioned size of a VM using the VM Capacity data model is the size of its virtual disks. This is different from the provisioned capacity in the Virtual Machines view in OnCommand Insight, which shows the provisioned size for the VM itself.

- **Volume Capacity data model**

Enables you to analyze all aspects of the volumes in your environment and organize data by vendor, model, tier, service level, and data center. You can view the capacity related to orphaned volumes, unused volumes, and protection volumes (used for replication). You can also see different volume technologies (iSCSI or FC), and compare virtual volumes to non-virtual volumes for array virtualization issues. You can answer questions similar to the following with this data model:

- Which volumes have a utilization higher than a predefined threshold?
- What is the trend in my data center for orphan volume capacity?
- How much of my data center capacity is virtualized or thin provisioned?
- How much of my data center capacity must be reserved for replication?

- **Chargeback data model**

Enables you to answer questions about used capacity and allocated capacity on storage resources (volumes, internal volumes, and qtrees). This data model provides storage capacity chargeback and accountability information by hosts, application, and business entities, and includes both current and historical data. Report data can be categorized by service level and storage tier.

You can use this data model to generate chargeback reports by finding the amount of capacity that is used by a business entity. This data model enables you to create unified reporting of multiple protocols (including NAS, SAN, FC, and iSCSI).

- For storage without internal volumes, chargeback reports show chargeback by volumes.
- For storage with internal volumes:
 - If business entities are assigned to volumes, chargeback reports show chargeback by volumes.
 - If business entities are not assigned to volumes but assigned to qtrees, chargeback reports show chargeback by qtrees.
 - If business entities are not assigned to volumes and not assigned to qtrees, chargeback reports show the internal volume.
 - The decision whether to show chargeback by volume, qtree or internal volume is made per each internal volume, so it is possible for different internal volumes in the same storage pool to show chargeback at different levels. Capacity facts are purged after a default time interval. For details,

see Data Warehouse processes.

Reports using the Chargeback data model might display different values than those reports using the Storage Capacity data model.

- For storage arrays that are not NetApp storage systems, the data from both data models is the same.
- For NetApp and Celerra storage systems, the Chargeback data model uses a single layer (of volumes, internal volumes, or qtrees) to base its charges, while the Storage Capacity data model uses multiple layers (of volumes and internal volumes) to base its charges.

• **Inventory data model**

Enables you to answer questions about inventory resources including hosts, storage systems, switches, disks, tapes, qtrees, quotas, virtual machines and servers, and generic devices. The Inventory data model includes several submarts that enable you to view information about replications, FC paths, iSCSI paths, NFS paths, and violations. The Inventory data model does not include historical data. Questions you can answer with this data mart could include the following:

- What assets do I have and where are they?
- Who is using the assets?
- What types of devices do I have and what are components of those devices?
- How many hosts per OS do I have and how many ports exist on those hosts?
- What storage arrays per vendor exist in each data center?
- How many switches per vendor do I have in each data center?
- How many ports are not licensed?
- What vendor tapes are we using and how many ports exist on each tape?
- Are all the generic devices identified before we begin working on reports?
- What are the paths between hosts and storage volumes or tapes?
- What are the paths between generic devices and storage volumes or tapes?
- How many violations of each type do I have per data center?
- For each replicated volume, what are the source and target volumes?
- Do I have any firmware incompatibilities or port speed mismatches between Fibre Channel host HBAs and switches?

• **Performance data model**

Enables you to answer questions about performance for volumes, application volumes, internal volumes, switches, applications, VMs, VMDKs, ESX versus VM, hosts, and application nodes. Using this data model, you can create reports that answer several types of performance management questions:

- What volumes or internal volumes have not been used or accessed during a specific period?
- Can we pinpoint any potential misconfiguration for storage for an application (unused)?
- What was the overall access behavior pattern for an application?
- Are tiered volumes assigned appropriately for a given application?
- Could we use cheaper storage for an application currently running without impact to application performance?
- What are the applications that are producing more accesses to currently configured storage? When you use the switch performance tables, you can obtain the following information:

- Is my host traffic through connected ports balanced?
- Which switches or ports are exhibiting a high number of errors?
- What are the most used switches based on port performance?
- What are the underutilized switches based on port performance?
- What is the host trending throughput based on port performance?
- What is the performance utilization for last X days for one specified host, storage system, tape, or switch?
- Which devices are producing traffic on a specific switch (for example, which devices are responsible for use of a highly utilized switch)?
- What is the throughput for a specific business unit in our environment? When you use the disk performance tables, you can obtain the following information:
- What is the throughput for a specified storage pool based on disk performance data?
- What is the highest used storage pool?
- What is the average disk utilization for a specific storage?
- What is the trend of usage for a storage system or storage pool based on disk performance data?
- What is the disk usage trending for a specific storage pool? When you use VM and VMDK performance tables, you can obtain the following information:
- Is my virtual environment performing optimally?
- Which VMDKs are reporting the highest workloads?
- How can I use the performance reported from VMDs mapped to different datastores to make decisions about re-tiering. The Performance data model includes information that helps you determine the appropriateness of tiers, storage misconfigurations for applications, and last access times of volumes and internal volumes. This data model provides data such as response times, IOPs, throughput, number of writes pending, and accessed status.

• **Storage Efficiency data model**

Enables you to track the storage efficiency score and potential over time. This data model stores measurements of not only the provisioned capacity, but also the amount that is used or consumed (the physical measurement). For example, when thin provisioning is enabled, OnCommand Insight indicates how much capacity is taken from the device. You can also use this model to determine efficiency when deduplication is enabled. You can answer various questions using the Storage Efficiency data mart:

- What is our storage efficiency savings as a result of implementing thin provisioning and deduplication technologies?
- What are the storage savings across data centers?
- Based on historical capacity trends, when do we need to purchase additional storage?
- What would be the capacity gain if we enabled technologies such as thin provisioning and deduplication?
- Regarding storage capacity, am I at risk now?

Data model fact and dimension tables

Each data model includes both fact and dimension tables.

- **Fact tables:** Contain data that is measured, for example, quantity, raw and usable capacity. Contain foreign

keys to dimension tables.

- Dimension tables: Contain descriptive information about facts, for example, data center and business units. A dimension is a structure, often composed of hierarchies, that categorizes data. Dimensional attributes help describe the dimensional values.

Using different or multiple dimension attributes (seen as columns in the reports), you construct reports that access data for each dimension described in the data model.

For explanations of all data elements used in creating reports, see the Data Glossary.

Colors used in data model elements

Colors on data model elements have different indications.

- Yellow assets: Represent measurements.
- Non-yellow assets: Represent attributes. These values do not aggregate.

Using multiple data models in one report

Typically, you use one data model per report. However, you can write a report that combines data from multiple data models.

To write a report that combines data from multiple data models, choose one of the data models to use as the base, then write SQL queries to access the data from the additional data marts. You can use the SQL Join feature to combine the data from the different queries into a single query that you can use to write the report.

For example, say you want the current capacity for each storage array and you want to capture custom annotations on the arrays. You could create the report using the Storage Capacity data model. You could use the elements from the Current Capacity and dimension tables and add a separate SQL query to access the annotations information in the Inventory data model. Finally, you could combine the data by linking the Inventory storage data to the Storage Dimension table using the storage name and the join criteria.

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