



Intel® Data Center Manager Console User Guide

Revision 3.9

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Getting Started

Getting Started: Overview

Intel® DCM Console is an energy & reliability management solution for the data center. It enables you to monitor and manage power consumption, temperature and device health in your data center through the management console.

Software Requirements

Intel® DCM Console has been validated on the following operating systems:

- Microsoft Windows Server 2012
- Microsoft Windows Server 2012 R2
- Microsoft Windows Server 2016
- Microsoft Windows Server 2019
- Red Hat Enterprise Linux 7.9 Server x86_64
- Red Hat Enterprise Linux 8.3 Server x86_64
- Novell SUSE Linux Enterprise Server 11 SP4 x86_64
- Novell SUSE Linux Enterprise Server 12 SP5 x86_64
- Novell SUSE Linux Enterprise Server 15 SP2 x86_64
- Ubuntu Server 16.04 x86_64
- Ubuntu Server 18.04 x86_64
- Ubuntu Server 20.10 x86_64
- CentOS 7.9 x86_64
- CentOS 8.2 x86_64
- Debian 9.13 x86_64
- Debian 10.6 x86_64

Hardware Requirements

For best performance, install the Intel® DCM Console on a system with at least:

- A dual-core processor of 2.6GHz or higher

- 8GB RAM
- 80GB of hard drive space

Below is recommended configuration for a scaled environment (e.g. managing up to 20,000 IPMI based nodes):

- 2 * Intel® Xeon® CPU E5-2699 v3 @ 2.30GHz
- 64GB RAM
- 800GB SSD

Below is the default network requirement for the Console and device access. It may be changed when setting up DCM or managed devices.

Protocol/Purpose	DCM Console	Managed devices
DCM console web access	8643(TCP)	---
Collect SNMP trap from devices	162(UDP)	---
IPMI	---	623(UDP) Optional: 443 (TCP) for Redfish inventory/health 22 (TCP) for some device management processor info, such HP iLO2/3/4 627(TCP) for firmware provisioning feature
SSH	---	22(TCP)
SNMP	---	161(UDP)
HTTP/WSMAN	---	443(TCP)
WMI	---	135(TCP)

Installing Intel® DCM Console

There are two types of installers available, one is for Intel® DCM Console with web GUI (e.g. "Intel(R)_Data_Center_Manager.exe" as installer for Windows), the other is for API based integration only (e.g. "Intel(R)_Data_Center_Manager_API.exe" as installer for Windows). The only difference between these two installers is the availability of web GUI. The installation process is similar.

Before installing Intel® DCM Console, you can verify the signature of installation package.

For Intel® DCM Console Windows installer:

1. Right click on the installer and select "Properties".
2. View and verify its signature and the certificate chain in the "Digital Signatures" tab.

The same practice can be applied for installed executables / libraries as well.

For Intel® DCM Console Linux installer, run following commands in shell:

```
tar -xvzf Intel(R)_Data_Center_Manager64.tar.gz
cd dcm64_package
openssl pkcs7 -print_certs -inform der -in
Intel(R)_Data_Center_Manager64.sig > certs.pem
openssl verify -verbose -untrusted certs.pem certs.pem
```

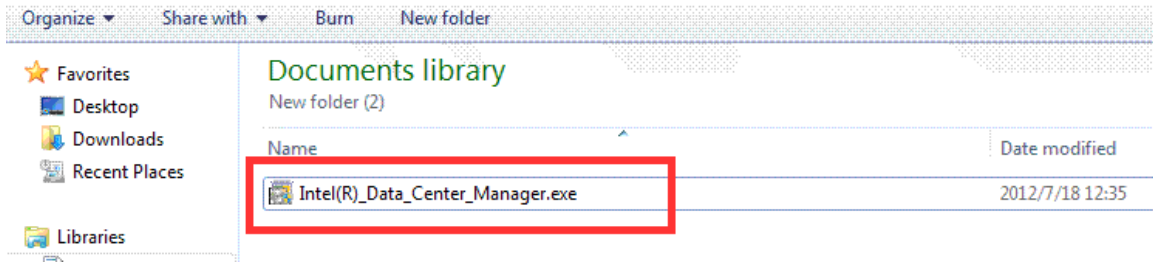
You should see "certs.pem: OK" if the certificate is OK.

```
openssl smime -verify -in Intel(R)_Data_Center_Manager64.sig -inform der -
content Intel(R)_Data_Center_Manager64.sh -noverify certs.pem > /dev/null
```

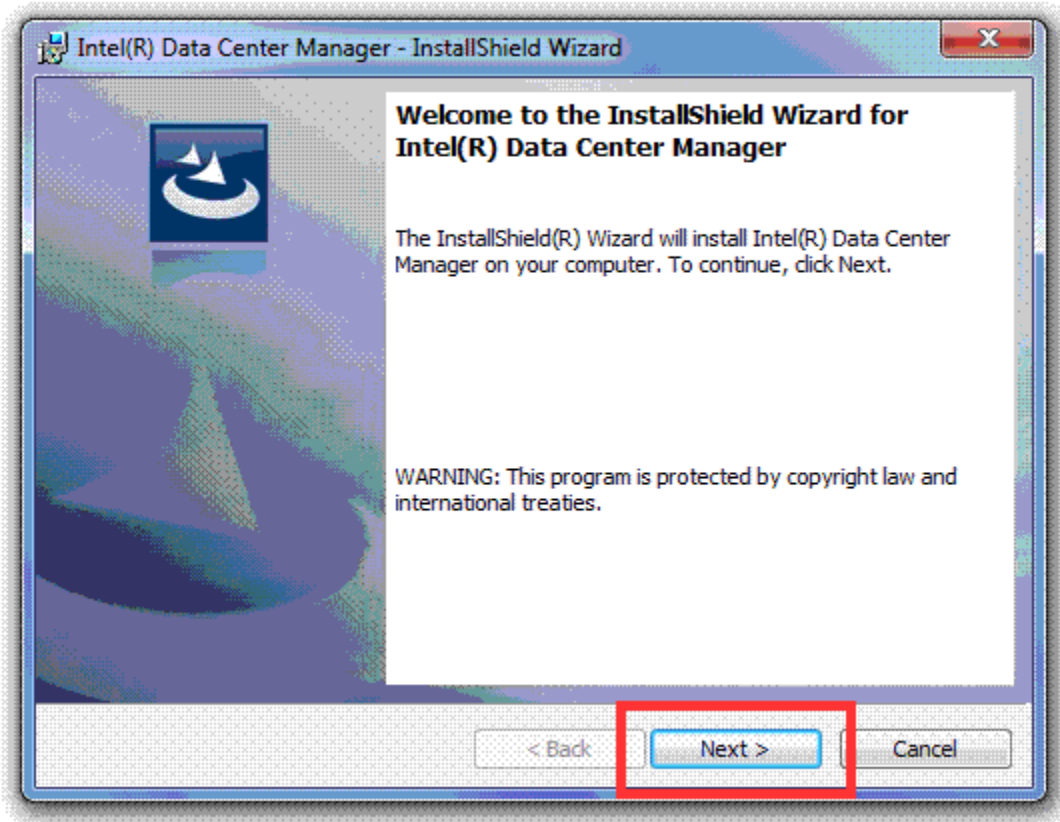
You should see "Verification successful" if the signature is ok.

Following content demonstrates the installation process in Windows. The installation process in Linux is based on command line user interface, but the steps are similar.

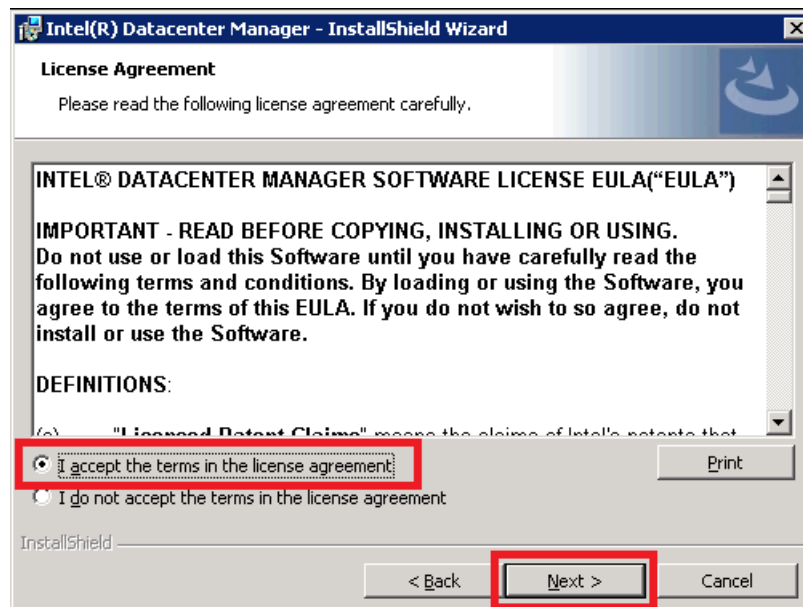
Navigate to the directory containing the installation package, and double-click the package to launch the installation program.



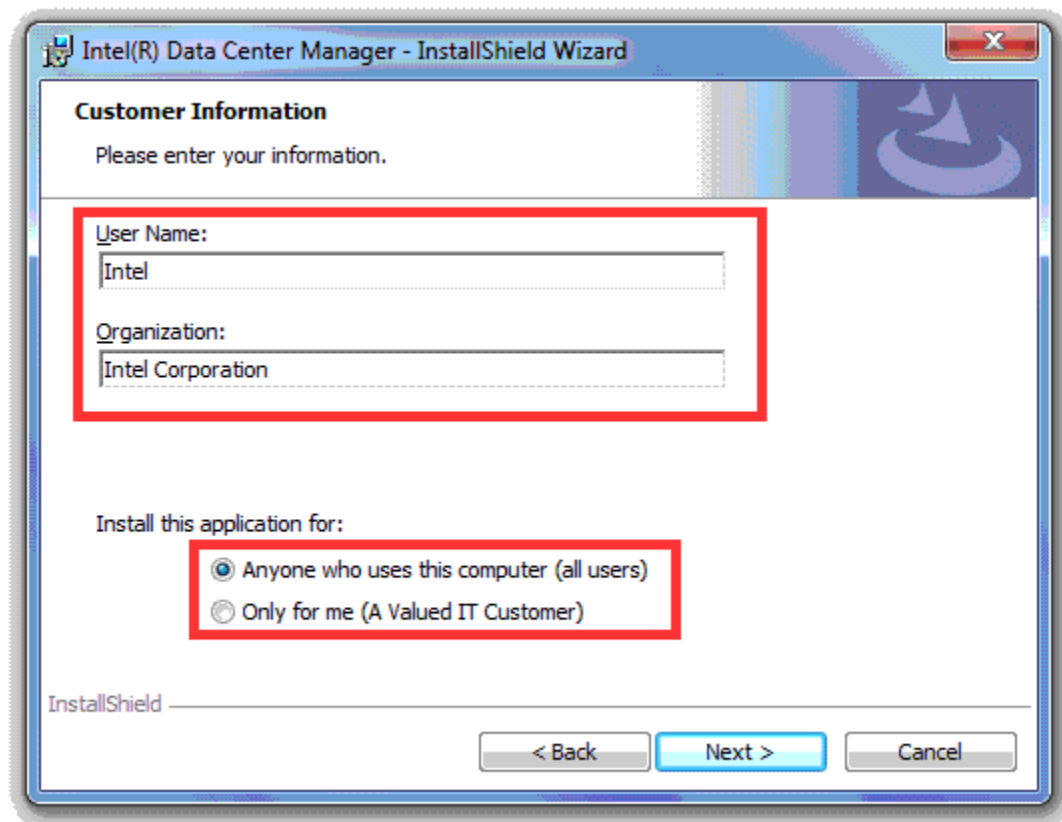
Click **Next**.



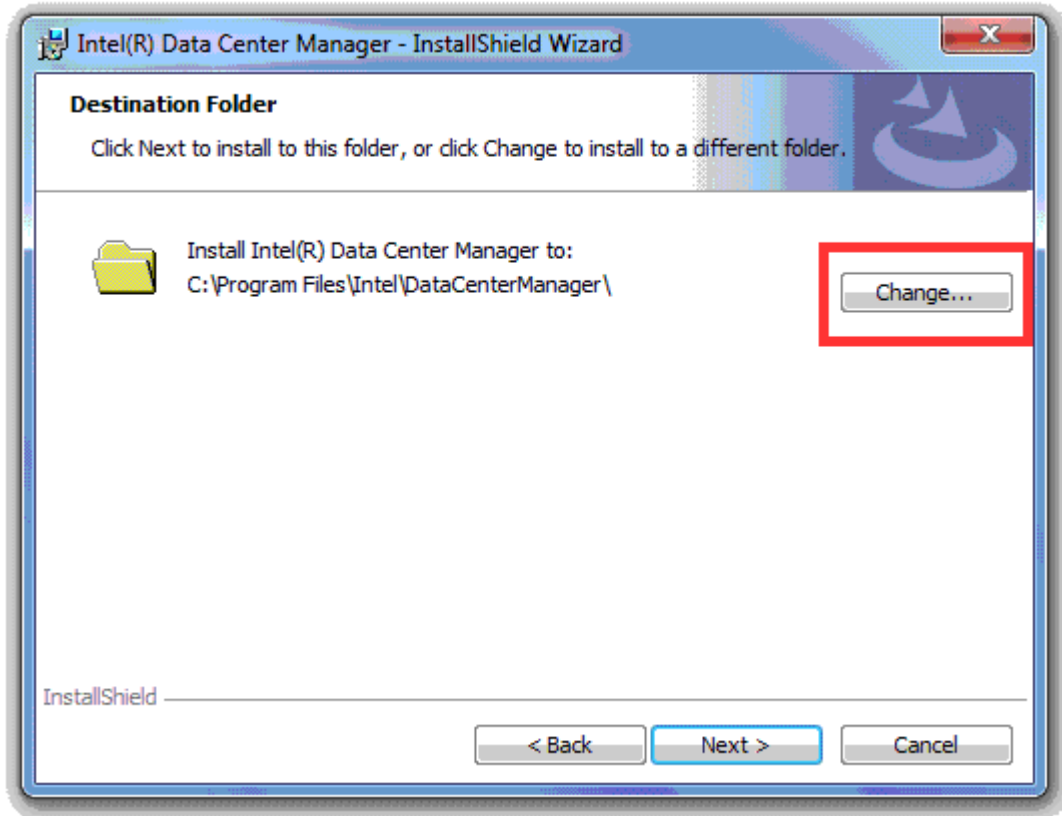
Choose **I accept the terms in the license agreement**, and then click **Next**.



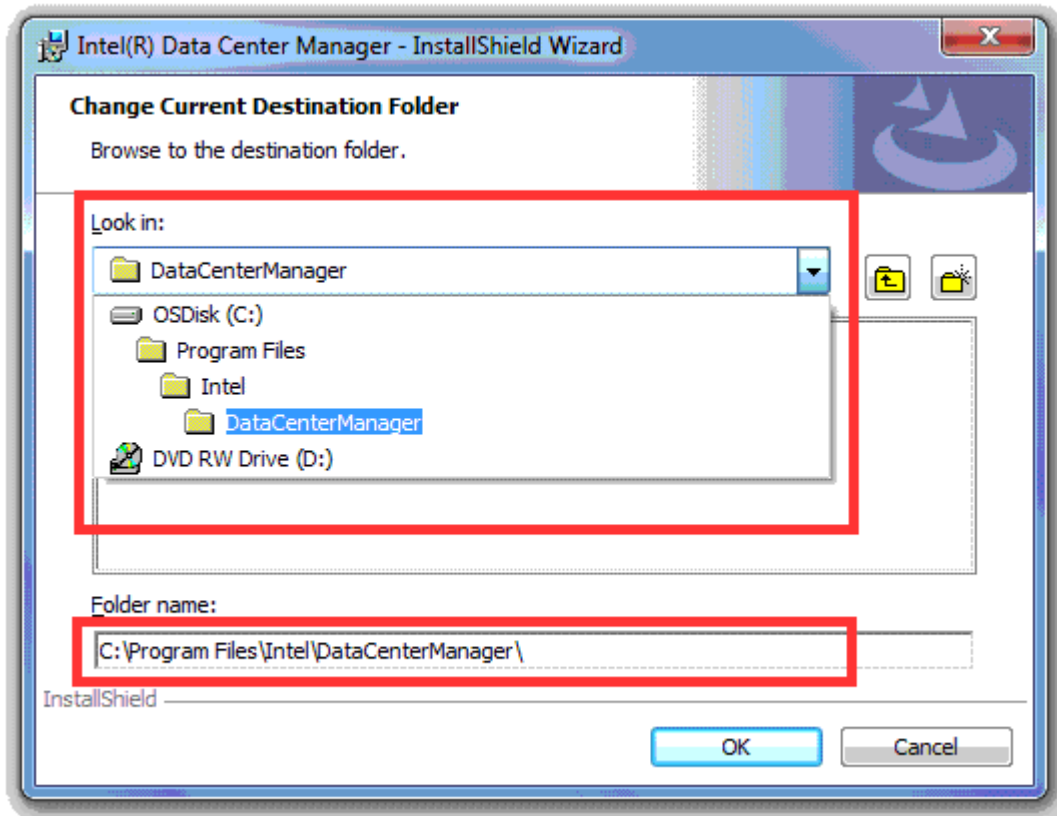
Fill in the **User Name** and **Organization** fields; choose whether to install for all users or only the current user, and then click **Next**.



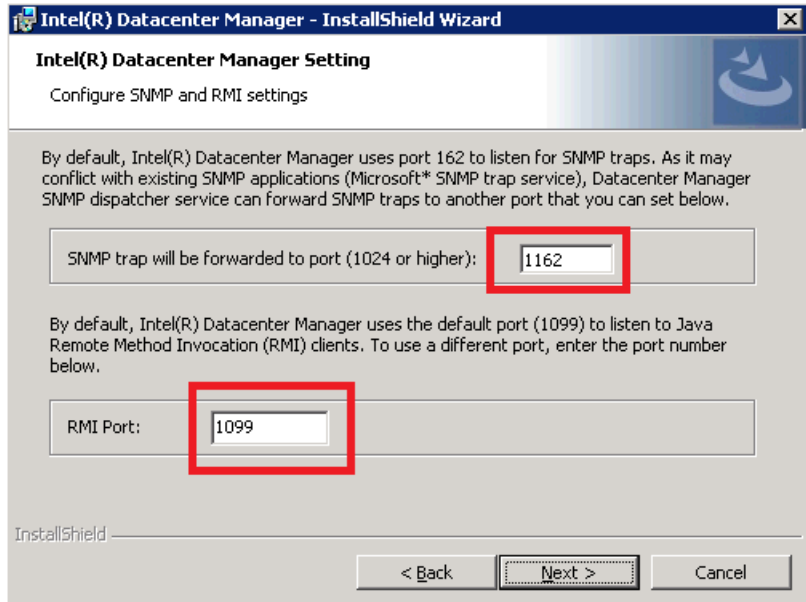
For ease of trouble-shooting while installing and running the product, we recommend that you use the default installation path and click **Next** directly. If you want to change the location to install, click **Change**.



If you clicked **Change** in the previous step, you can browse through the drop-down list or type the exact path in the text box. Click **OK** to return to the previous window, and then click **Next** to continue the installation.



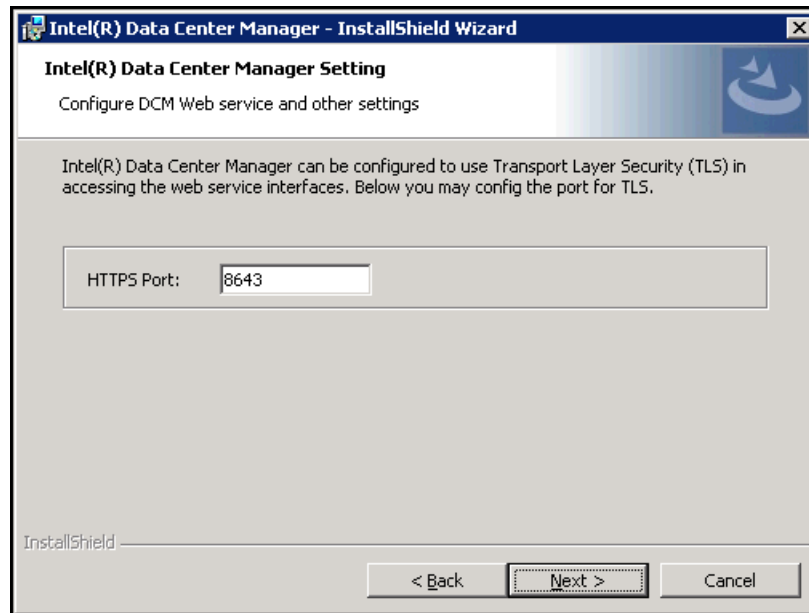
By default, Intel® DCM Console dispatches SNMP traps to port 1162, and uses port 1099 for RMI communication. If there is any conflict with other network application, please modify the default port numbers. Click **Next** to continue.



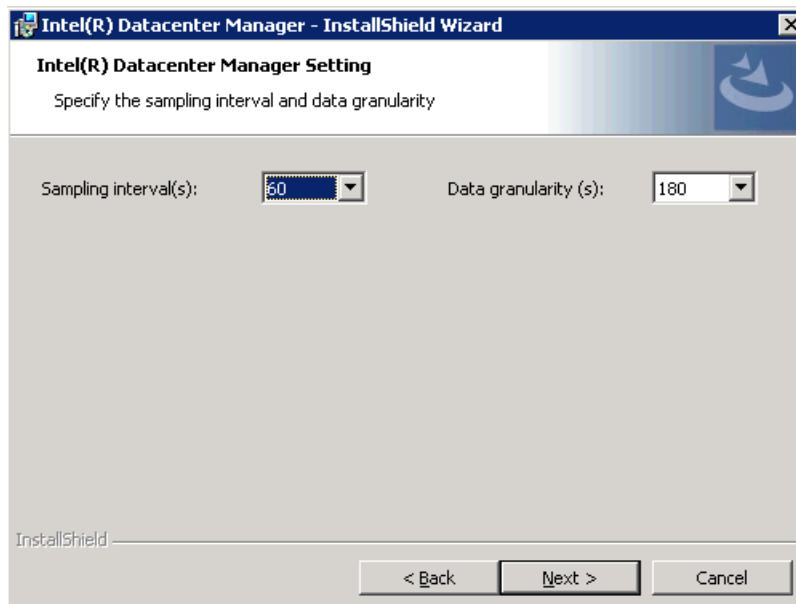
 **NOTE**

Generally, each port has a default value during installation and configuration. You need to make sure that other processes do not occupy the port you're setting before you change the value.

By default TLS is required. The port number is configurable.



Configure the **Sampling Interval** and **Data Granularity** settings, and then click **Next**.



NOTE

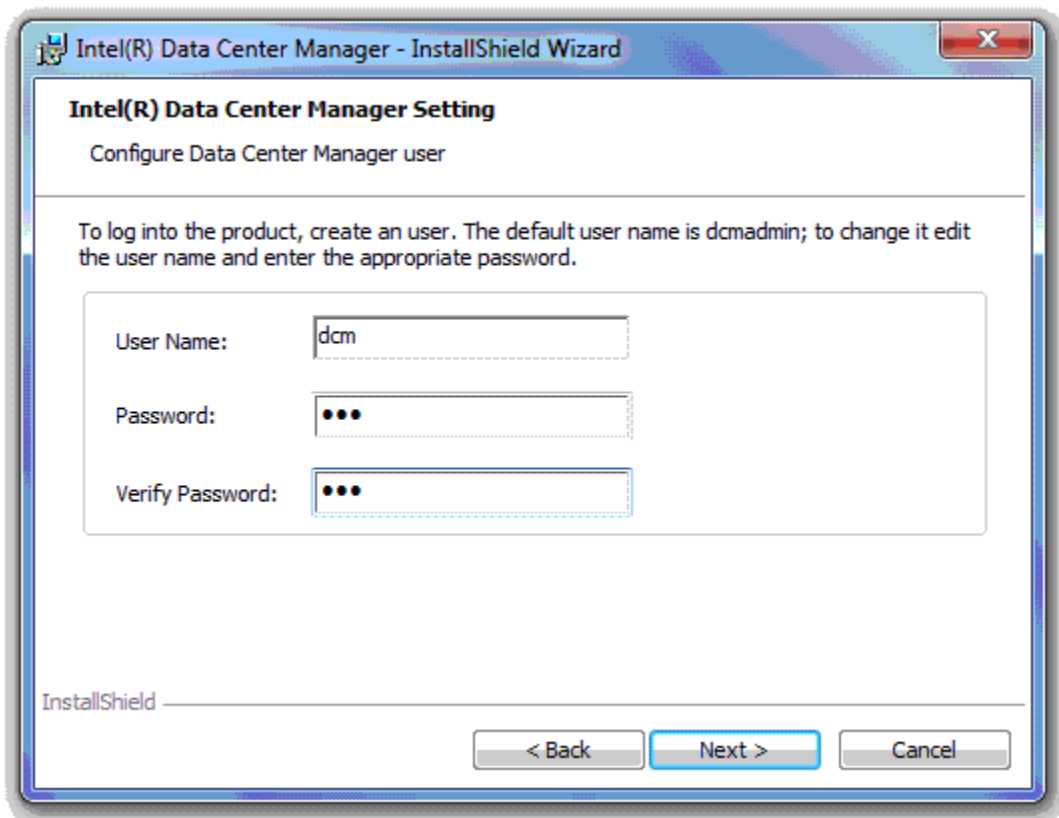
Sampling Interval is the time interval between two consecutive sampling of power / thermal measurements that DCM collects from the managed devices.

The default value is 60 seconds, and you need to make sure that the device supports the sampling interval you set.

Data Granularity is the resolution of power/thermal data measurements that are stored in DCM database for query/metric usages. Valid measurement data granularity includes 30, 60, 180, 360, 600, 1800, and 3600 seconds, and it must be a multiple of the **Sampling Interval**.

For a typical environment (e.g. managing 1~5000 IPMI based devices), the recommended Sampling Interval is 60 seconds, and Data Granularity is 180 seconds. For a scaled environment (e.g. managing 5000 ~ 20000 IPMI based devices), the recommended Sample Interval is 300 seconds, and Data Granularity is 300 seconds seconds.

Then configure **User Name** and **Password** for login, and click **Next**.

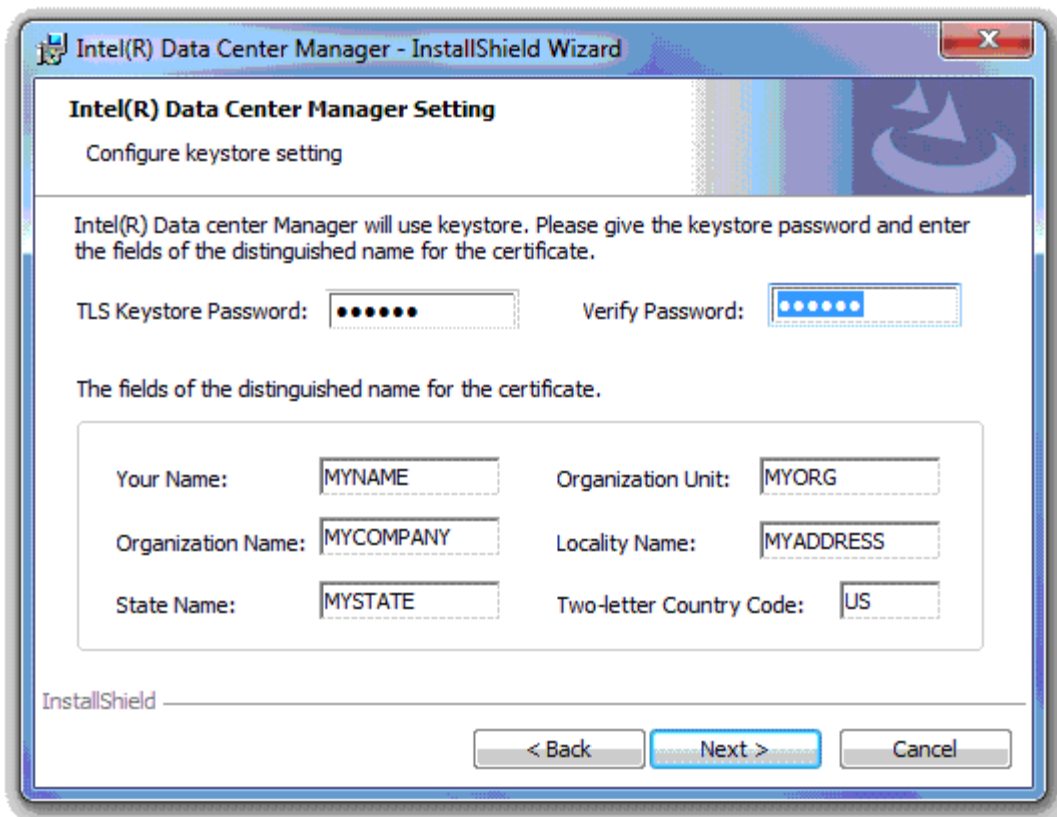


 **NOTE**

Password rule enforced in Intel® DCM Console is like below:

- Passwords must be a minimum of eight characters long.
- Passwords must not be a repeat or reverse of the associated user ID.
- Passwords must be no more than three of the same characters used consecutively.
- Passwords must contain at least three of the following combinations:
 - Alpha characters - at least one lower case alpha character.
 - Alpha characters - at least one upper case alpha character.
 - Numeric characters - at least one numeric character.
 - Special characters - at least one special character. The permitted characters include '!@#\$\$%^*()_+|.:?=-'

Enter **TLS Keystore Password**, which will be used to access the keystore file. Then enter the corresponding information for the certificate, and click **Next**.



Intel(R) Data Center Manager - InstallShield Wizard

Intel(R) Data Center Manager Setting
Configure keystore setting

Intel(R) Data center Manager will use keystore. Please give the keystore password and enter the fields of the distinguished name for the certificate.

TLS Keystore Password: Verify Password:

The fields of the distinguished name for the certificate.

Your Name:	<input type="text" value="MYNAME"/>	Organization Unit:	<input type="text" value="MYORG"/>
Organization Name:	<input type="text" value="MYCOMPANY"/>	Locality Name:	<input type="text" value="MYADDRESS"/>
State Name:	<input type="text" value="MYSTATE"/>	Two-letter Country Code:	<input type="text" value="US"/>

InstallShield

< Back Next > Cancel

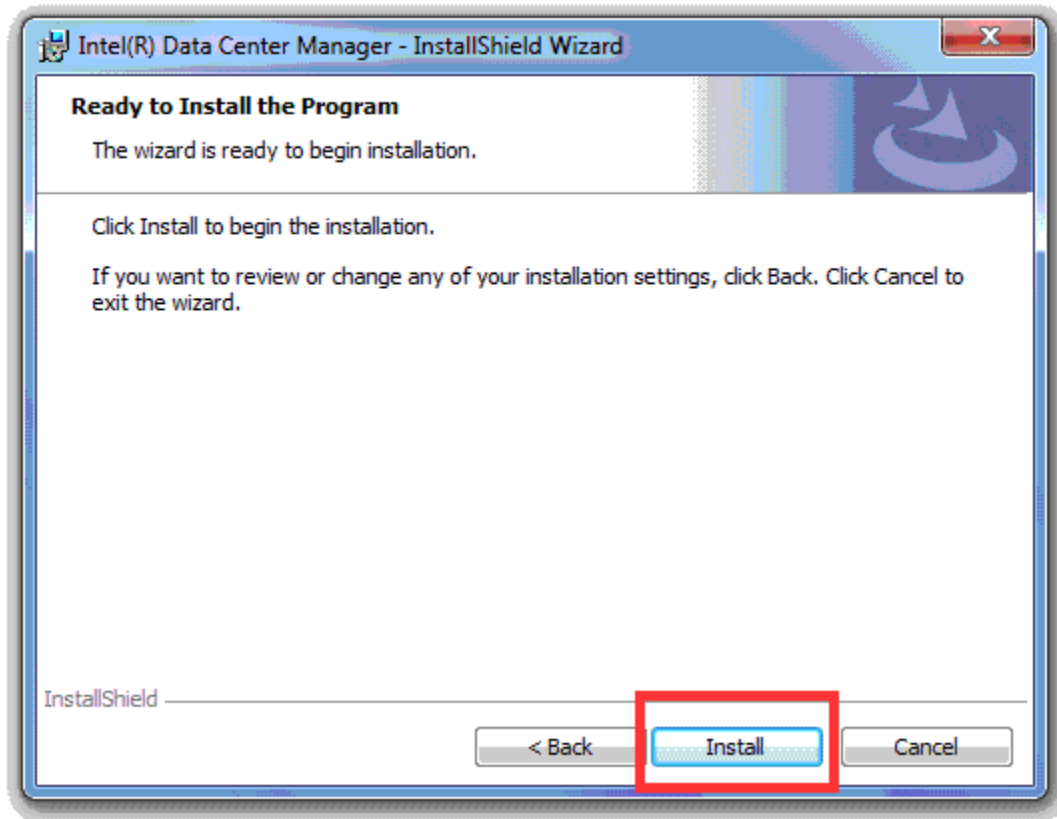
In the form, you need to complete the database settings, including **User Name**, **PostgreSQL Port**, **User Password**, and the directory of the database. The default value of **PostgreSQL Port** is 6443. If another process is already using that default port, enter a different one. Then click **Next**.

The screenshot shows a Windows-style dialog box titled "Intel(R) Data Center Manager - InstallShield Wizard". The main heading is "Intel(R) Data Center Manager Database Setting" with the subtitle "Configure PostgreSQL service". Below this, a message states: "Intel(R) Data Center Manager embeds an internal database server." A section titled "Please enter Database server Account information" contains the following fields:

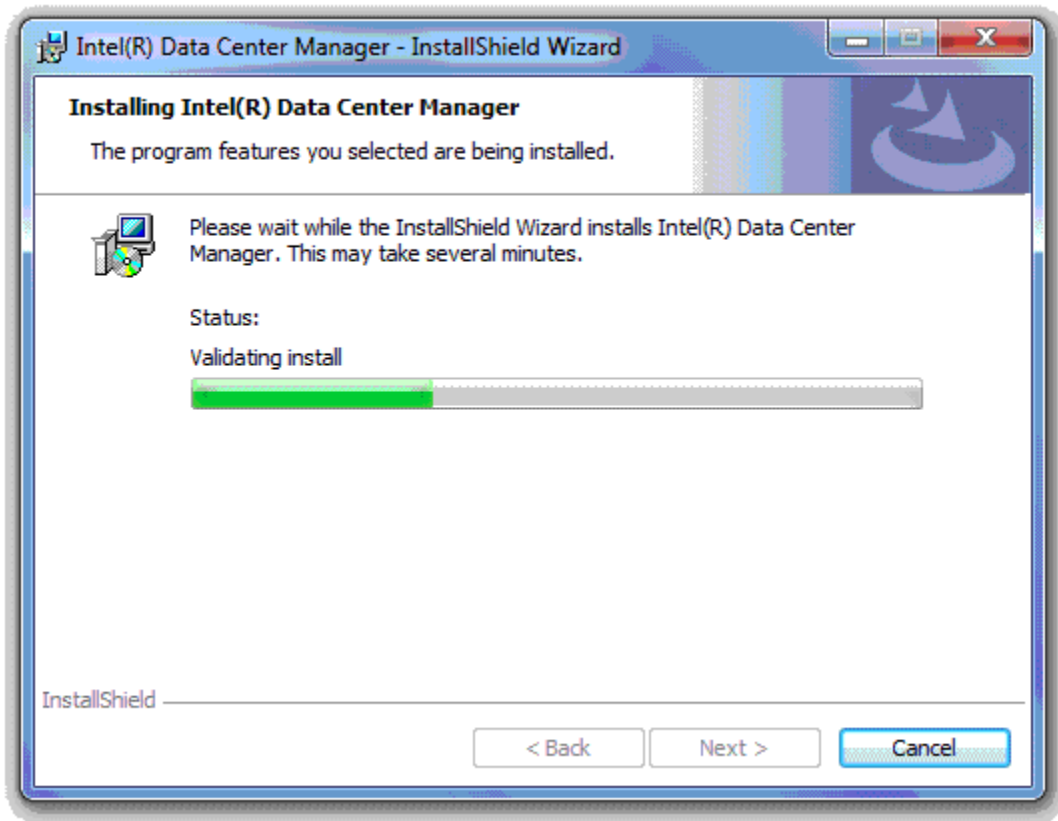
- User Name:
- PostgreSQL Port:
- User Password:
- Verify Password:
- PostgreSQL Data Directory:

At the bottom of the dialog, there are three buttons: "< Back", "Next >" (which is highlighted with a blue border), and "Cancel". The "InstallShield" logo is visible in the bottom left corner.

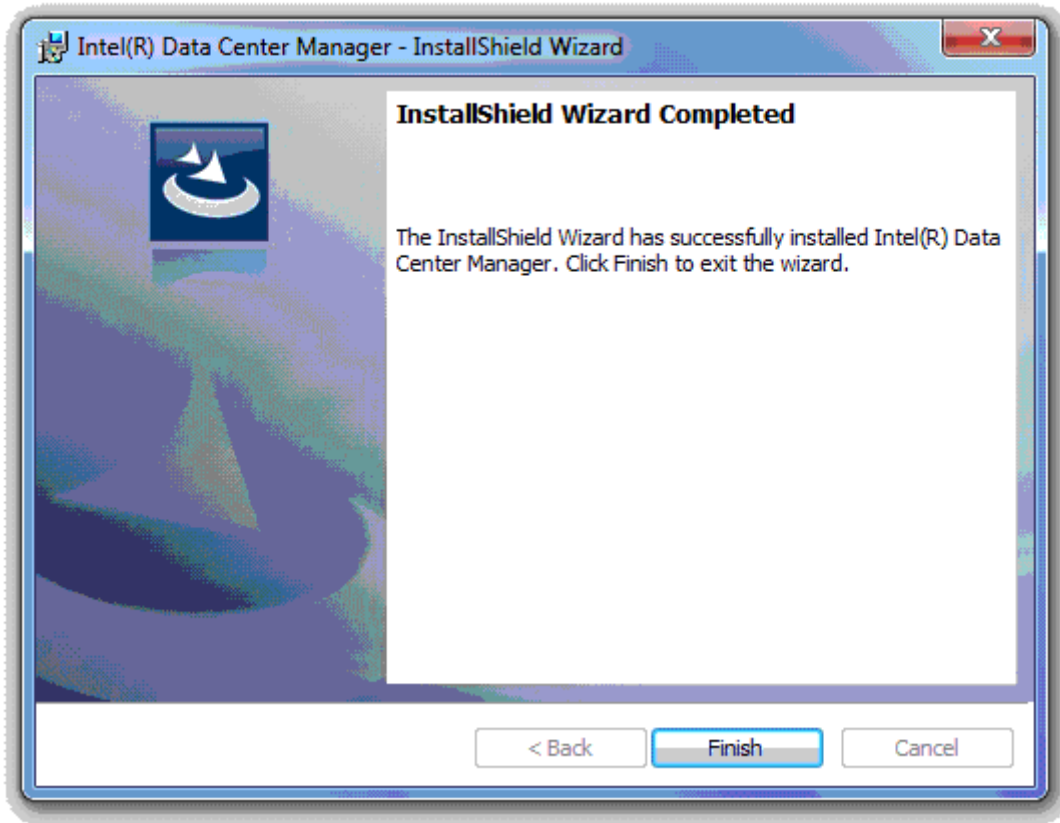
On the **Ready to Install the Program** page, click **Back** if you want to change the installation settings, or click **Install** to begin the installation process.



Once you click **Install**, you will see a status screen that notes the progress.



After clicking **Finish**, Intel® DCM Console has been installed successfully.



After installation, the signature of the installed *.jar files can be verified:

bin/plugins/.jar (Windows/Linux)*

bin/ConsoleDBUpgradeTool.jar (Windows/Linux)

bin/installTool.jar (Windows/Linux)

bin/infoverifier.jar (Windows/Linux)

bin/DcmCLI.jar (Windows/Linux)

bin/DcmDaemonImpl.jar (Linux only)

bin/DcmConsole.jar (Linux only)

The verification can be done through below commands:

```
cd [DCM_HOME]
```

```
external\jre\bin\keytool -genkeypair -alias dummykeypair -keyalg RSA -keystore  
keystore.ssl -storepass dummyspass -keypass dummyspass -validity 365 -  
storetype pkcs12 -keysize 2048
```

```
external\jre\bin\keytool -import -alias "dcmcodesign" -keystore keystore.ssl -file  
"Intel(R) Data Center Manager.pem"
```

```
external\jre\bin\jarsigner -verify -verbose -certs -keystore keystore.ssl -  
storepass dummyspass [DCM_HOME]\bin\plugins\Dcm.jar
```

The expected result is "jar verified" if the signature is ok.

Follow below steps to renew the self-signed certificate when necessary (e.g. after expiration).

1. Delete old certificate

```
keytool -delete -alias datacentermanager -keystore keystore.ssl  
You will be required to input keystore password.
```

Then verify the entry with "datacentermanager" alias is removed from keystore.ssl

```
keytool -list -v -keystore keystore.ssl
```

2. Create new certificate

```
keytool -genkeypair -alias datacentermanager -keyalg RSA -keystore  
keystore.ssl -dname  
"CN=MYDN,OU=MYORG,O=MYCMPY,L=MYADDRESS,S=MYCITY,C=CN" -  
validity 365 -storetype pkcs12 -keysize 3072
```

Also, verify the entry with "datacentermanager" alias is inserted into keystore.ssl

```
keytool -list -v -keystore keystore.ssl
```

You can also export CSR from keystore to sign it with CA. Refer to [this link](#) for more information.

Launching Intel® DCM Console

There are two ways to launch Intel® DCM Console.

1. By typing the URL directly in address bar of browsers.

Enter the following default URL in your web browser to launch Intel® DCM Console:

<https://localhost:8643/DcmConsole/>

Enter the **User Name** and **Password** you configured during installation to login.

[Dashboard](#) provides an overview of data center power and temperature status.

NOTE

The letters of 'D' and 'C' in the default address are in capitals.

2. By clicking the shortcut in the Start menu.

- Click Start --All Programs.
- Find the **Intel Datacenter Manager** folder.
- Click on **Datacenter Manager Console**.

Set Up Hierarchy

Intel® DCM Console provides several ways to set up data center hierarchy (data centers, rooms, rows, racks, and devices):

1. Hierarchy: To create a data center hierarchy manually from scratch, you may start from "Hierarchy" (left navigation menu). You may view power and temperature data by selecting items in hierarchy once devices are added.
2. Discovery: To discover devices in the network, you may start from "Devices" (left navigation menu). After discovery you may check devices in "All Devices" and add them to hierarchy in "Hierarchy".
3. Import devices or hierarchy: To import devices or hierarchy from an excel file, you may start from "Discovery and Import" tab in "Devices". Please refer [Importing Devices](#) to know how to create excel file.

To manage power and temperature of devices, you must add the devices into the hierarchy (in racks).

License

Intel® DCM Console can be used at no charge for 30 days. You can click **About** on the top right of the interface to check license **Status** and **Expire Date**.

If a new license is not imported after the expiration date, the **Status** changes from **Valid** to **Expired**. Intel® DCM Console stops working, and any operation in Intel® DCM Console will lead to an **Invalid license** notice.

If you want to continue using Intel® DCM Console after the expiration date, you can request a license from Intel Corporation to extend your use period.

To request a license:

- Click **About** on the top right of the interface.
- Copy your **Request ID** in the popup dialog and email it to dcmsales@intel.com.
- Contact Intel Corporation to sign an agreement and complete payment correctly.
- Obtain license from Intel.

To import new license:

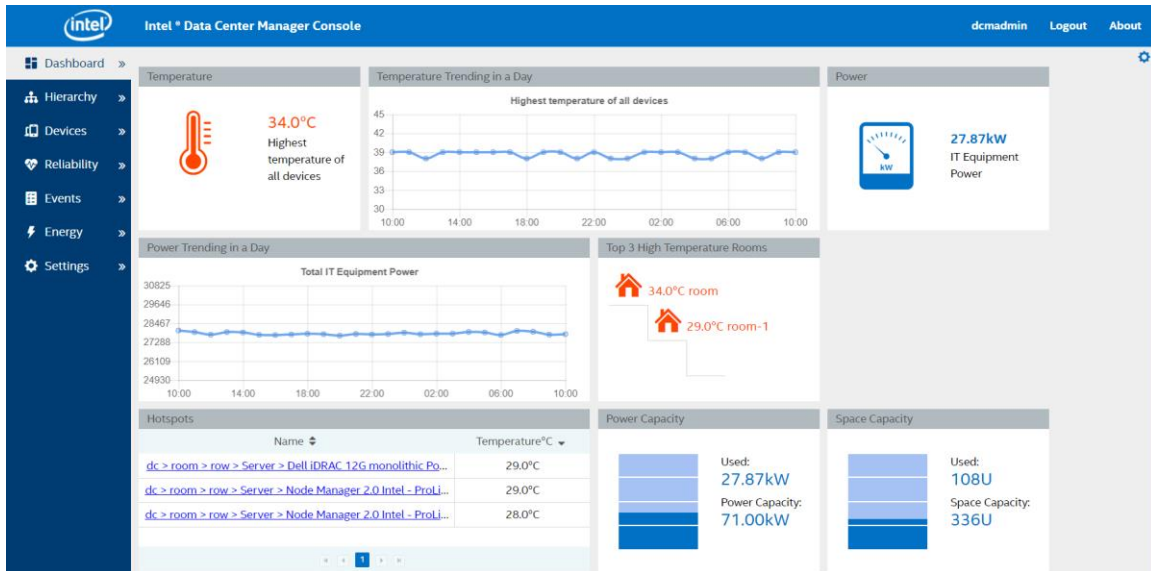
- Click **About**.
- Click **Import new license** in the popup dialog.
- Select license file and then click **Open**.

Then your **Status** changes to **Valid** and the **Expire Date** is extended automatically.

Using Intel® DCM Console

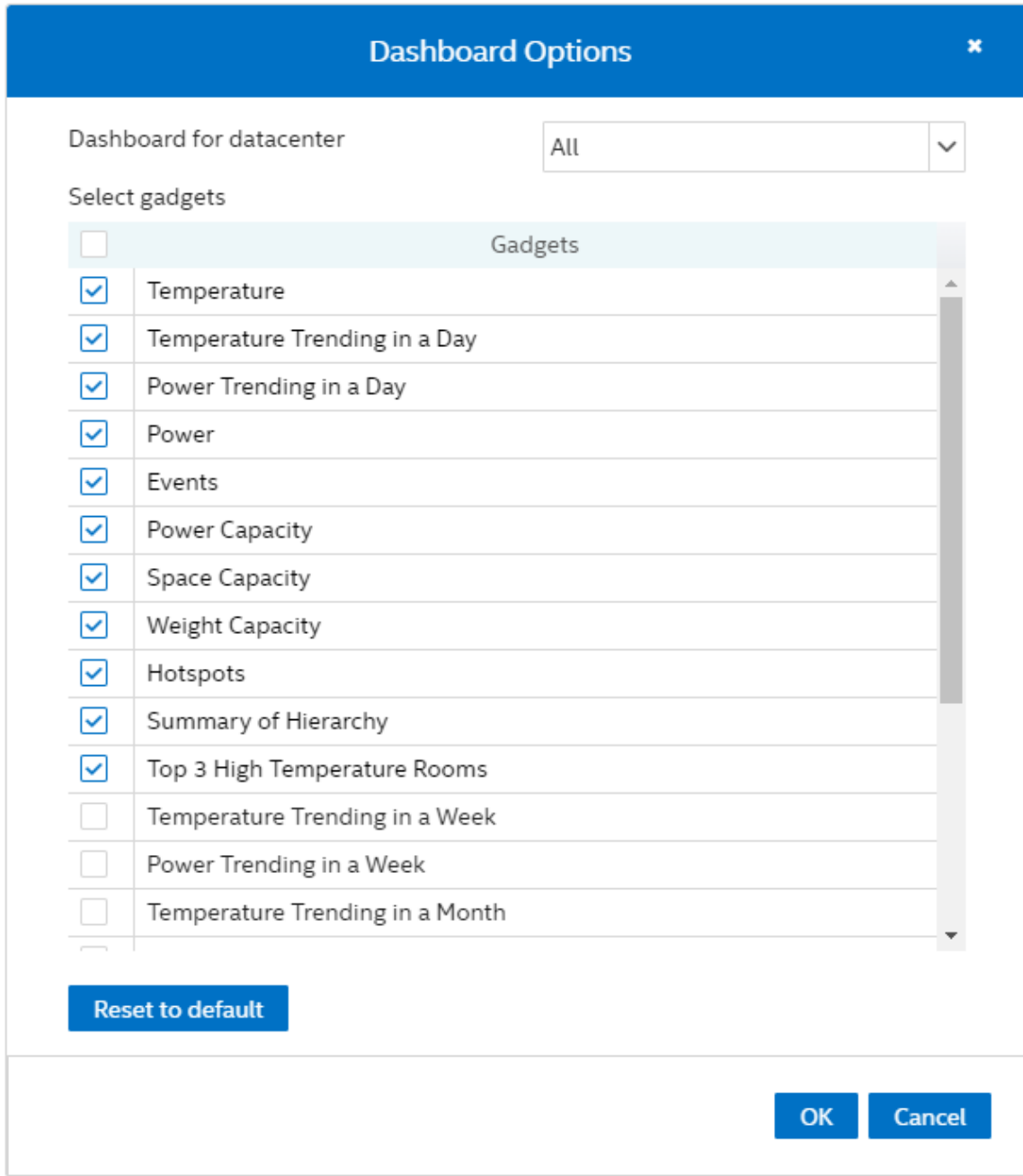
Dashboard

The Dashboard provides the overall health status of the data center. It shows the current power and cooling status, the historical power and temperature trend, the hot rooms and hotspots, the power and space capacity information, devices status, and the critical events.



You may customize the dashboard by adding, deleting, or moving gadgets in it.

To add a gadget to the dashboard, click the 'Gear' icon on the top right corner. In the popup dialog, check the gadget you need and then click the 'OK' button.



To delete a gadget, move your mouse over the gadget and click the button on its top corner.

To move a gadget, move your mouse to the title of the gadget. When the mouse pointer changes to the cursor of the moving icon, you may drag the gadget and drop it to the desire location.

To reset the dashboard to the default status, click the 'Gear' icon on the top right corner. In the popup dialog, click the 'Reset to default' link.

If you want to see the dashboard for only one datacenter, you may choose the datacenter from the dropdown list "Dashboard for datacenter" in the "Dashboard Options" dialog.

To specify gadget option, you may move your mouse to the gadget and click the button of the spanner icon (which will be shown if the gadget is configurable) on the top of the gadget. Then specify the gadget options in the popup dialog.

Most of the data in the dashboard are refreshed automatically each minute.

The dashboard snapshot can be exported by clicking "Export". It can be sent through email by configuring "Email Subscription" in **Settings** page.

Hierarchy

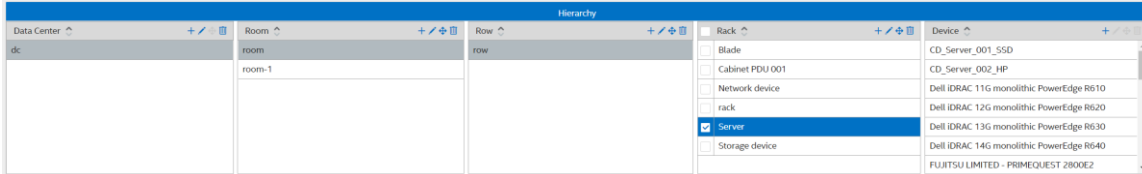
Hierarchy displays all managed entities in Intel® DCM Console.

Intel® DCM Console manages entities with the following hierarchy structure:

Data Center > Room > Row > Rack > Device > Blade

When you are creating a hierarchy:

- A room can only be added to a data center.
- A row can only be added to a room.
- A rack can only be added to a row.
- A device can only be added to a rack.
- A blade can be added to either a rack or a chassis (displayed in Device list).



Creating Hierarchy

On the **Hierarchy** page, click **+** in the **Data Center** list to add a DC. Specify the name in the popup dialog, and then click **OK**.

Select a DC and click **+** in the **Room** list to add a room to it. Specify the name of the room in the popup dialog, and then click **OK**.

Similarly, you may add rows to a room.

Select a row and click **+** in the **Rack** list to add a rack to it. Specify the name of the rack in the popup dialog, configure the space capacity and total power capacity, and check the box **"PDU Power as Rack Power"** if you want to use the power reading of PDU(s) in the rack as the IT equipment power of the rack, and click **OK** to add the rack.

NOTE

Name and **Total Power Capacity** are mandatory when you are adding a rack. If **Total Power Capacity** is specified at Data Center, Room, or Row level, Intel® DCM Console would use it to calculate the utilization percentage instead of the aggregated capacity from rack level.

PUE (Power Usage Effectiveness) is an optional property for data center and room to calculate “Non IT Facility Energy” and “Energy Consumed (Total)” metrics. If it is not specified, Intel® DCM Console would use PUE specified in the **Settings** page.

Adding Devices

Select a rack and click **+** in the **Device** tab.

The popup dialog shows “Devices not in Hierarchy”. Select the devices you want to add to the rack, and then click **OK**.

You may also add a new device to a rack by navigating to the **Add New Device** tab in the popup dialog, and specifying the information of the device as described in [Adding a Device Manually](#).

NOTE

If you do not specify **Size of Device** and **Derated Power**, default values (1 for **Size of Device** and 400 for **Derated Power**) are set for the server after you click **OK**. Default values for different device types are different.

Hierarchy Management

In the **Hierarchy** tab on the **Hierarchy** page, each entity can be edited or deleted (recursively with the sub-groups and devices) using the **Edit** icon or the **Delete** icon.

To edit an entity:

- Select the entity.
- Click the **Edit** icon in the list.
- Edit its information.
- Click **OK**.

To delete one or more entities:

- Select the entity/entities.
- Click the **Delete** icon in the list.

You may also click the **Move** icon to change the hierarchy:

- Select the entity/entities.
- Click the **Move** icon in the list.
- In the popup dialog, select the group as the destination.
- Click **OK**.

NOTE

You can refer to the **Hierarchy** tab by clicking the hyperlinks on entities. Almost all the entities are equipped with hyperlinks to the **Hierarchy** tab.

Summary

The **Summary** widget on the **Hierarchy** tab displays detailed information about each entity, including temperature, power, space and events, etc. You may export the selected hierarchy to an excel file at any level.

Summary of a DC

The **Summary** widget of the DC selected on the **Hierarchy** tab displays the following information:

- The highest inlet temperature
- The power capacity currently consumed against the power unused
- The space capacity currently consumed against the space unused
- The weight capacity currently consumed against the weight unused
- The total number of racks and devices in the DC
- The total number of processors, memory and local hard disk in the DC
- The device status in the DC

The **Events** tab lists all the events for the DC.

NOTE

The thermometer in the **Temperature** graph may turn red if the **Highest Inlet Temperature** becomes higher than 27 degrees.

The pie charts in the **Power** and **Space** graphs may turn red if the amount in use is greater than the capacity configured.

Summary of a Room

The **Summary** widget of the room selected on the **Hierarchy** tab displays the information below:

- The highest inlet temperature
- The power capacity currently consumed against the power unused
- The space capacity currently consumed against the space unused

- The weight capacity currently consumed against the weight unused
- The total number of racks and devices in the room
- The total number of processors, memory and local hard disk in the room
- The device status in the room

The **Summary** of a room is similar to the **Summary** of a DC.

The **Events** widget lists all the events for the room.

Summary of a Row

The **Summary** widget of the row selected on the **Hierarchy** page displays the information below:

- The highest inlet temperature
- The power capacity currently consumed against the power unused
- The space capacity currently consumed against the space unused
- The weight capacity currently consumed against the weight unused
- The total number of racks and devices in the row
- The total number of processors, memory and local hard disk in the row
- The device status in the row

The **Summary** of a row is similar to the **Summary** of a DC.

The **Events** widget lists all the events for the row.

Summary of a Rack

The **Summary** widget of the rack selected on the **Hierarchy** tab displays the information below:

- The highest inlet temperature
- The power capacity currently consumed against the power unused
- The space capacity currently consumed against the space unused
- The weight capacity currently consumed against the weight unused
- The total number of devices in the rack
- The total number of processors, memory and local hard disk in the rack

The **Summary** of a rack is similar to the **Summary** of a DC, except that the total number of the racks is not listed. You may click 'Rack View' to see a visualized rack figure.

In 'Rack View', the devices are color-coded by temperature, rectangles in white represent free space. When mouse over a device, the detailed information of that device is shown in tooltip.

You can select a device by clicking on the corresponding rectangle in the 'Rack View', then the device will be selected in the hierarchy, and it will be surrounded by blue dot line in the 'Rack View'.

The **Events** widget lists all the events for the rack.

Summary of a Device

The **Summary** widget of the device selected on the **Hierarchy** tab displays the information below:

- The highest inlet temperature
- Power
- Space
- Weight
- The details of the device

The **Summary** of a device is different from that of a group.

- The **Temperature** graph displays its highest inlet temperature.
- The **Power** graph shows its current power.
- The **Space** graph displays the space that it occupies.

The blue dashed line around a device in the visualized rack highlights the device selected. The empty rectangles with no color represent the free space.

The **Events** widget lists all the events for the device.

NOTE

To refresh the properties and status of the selected device, you can click **Reconnect** on the Device Table widget.

Power/Temperature

Select an entity on the **Hierarchy** page and then check the **Power/Temperature** widget to see its power and temperature details.

Power and temperature data is plotted in the figures with the corresponding data granularities. CPU utilization data is plotted if in-band OS information is specified for the given server.

In the temperature figure:

- The **Highest Inlet Temperature**.
- The **Lowest Inlet Temperature**.
- The **Average Inlet Temperature**.

In the power figure:

- The **Highest Power Consumption**.
- The **Lowest Power Consumption**
- The **IT Equipment Power**.

You can view the power/temperature values by hovering your mouse over the data points in the curves.

By default, the power and temperature figures display the trending data of the recent hour. You can click the arrow buttons "<" and ">" to view the data in the previous and next time window, or switch to display the data in different time windows by clicking the corresponding buttons.

You can save the measurement data in an excel file so that the managers can analyze the data more conveniently. Click the **Export Data** link on the top of the **Temperature/Power** widget.

Choose the start and end time for data exporting. Then click **OK**.

NOTE

The corresponding data granularity of a different time window size is different, and is explicitly shown in the figures.

The **Power/Temperature** widget also provides energy consumption metrics for the selected entity:

- **IT Equipment Energy** gives the total energy consumption of all the IT devices.
- **Non IT Facility Energy**, obtained by multiplying **IT Equipment Energy** with a multiplier, estimates the energy consumption for cooling.
- **Energy Consumed (Total)** gives the total energy consumption from the IT devices and the cooling system.

 **NOTE**

After a policy is enforced on the entity selected, **Requested Power Cap** is plotted in the power trending graph.

Layout

The layout tab demonstrates how the racks are distributed in the room. Each small check in the layout represents one corresponding rack in the room, red ones declaring the rack being hot. Detailed information about the rack, including **Name**, **Capacity**, **Total power capacity**, **Weight Capacity**, **Temperature**, **Power**, **Grid X** and **Y** and so on, will appear once you move your cursor onto it. Through right clicking the rack in the layout and choosing **Go to the rack**, you'll get detailed information about the rack.

To add rack into the layout, you can either click **Add** in **Rack**, **Row**, **Room**, **Data center** in **Hierarchy** and input information like **Grid X** and **Y**, or Right click the blank space in the Layout, and choose **Move rack to the grid**.

There are mainly two ways to change the rack location in the layout. You can choose the specific rack in **Rack**, **Row**, **Room**, **Data center** in **Hierarchy** and edit its **Grid X** and **Y**. And besides, you can also right click the rack in the layout and choose **Move the rack**, and then a location icon will appear, which indicates that you can drag or move the rack according to its current location in the room.

You may rotate the entire layout view of a room by editing the "Layout Original Position" of the room.

You may specify the "Rack Orientation" at the row level by editing a row in the hierarchy.

You may switch layer of data by clicking "Layer" icon. The temperature/ power/ capacity data is color coded for the entire layout view.

When you select a row in the hierarchy, you can switch angle of the layout view to Front (panel) view by clicking the "Eye" icon. In the "**Front view**" you may check all the devices front panel temperature distribution for the selected row. By switching the angle, you have the **2D orthogonal thermal map** for your datacenter.

You may check the **historical data in the layout view** by clicking the "Clock" icon. A new web browser window/ tab would be popped up after you select an available timestamp. You may compare the data (temperature/ power/ capacity) to get the hint to optimize your datacenter energy efficiency.

What's more, you can zoom in or out the layout by sliding the mouse up or down. Right clicking in the blank space and choosing **Toggle full screen** will help you get a full and clear layout picture. Whenever you go too far away around the layout, you can always get back to the original point by simply clicking **Go to the origin**.

You can set a background image for the layout by clicking **Select background image**.

Capacity

The current power capacity, space capacity and weight capacity status is shown in "**Capacity**" tab.

You may specify device information to search for racks to install the device.

Type in **Size, Derated Power, Weight**, and then click **Search**.

Then the racks matching your requirements will be listed below.

You may plan (a what-if analysis) how to install your new devices to racks by clicking the planning button.

Devices

All Devices

The **All Devices** tab contains all the devices discovered, imported, and manually added.

On this page, you can edit the device information to change the **Name**, **Description**, etc. You can also delete a device from the list or apply a filter to show only specific devices.

Adding a Device Manually

Click **Add** to add a new device to the Device List.

Choose device type in the drop-down list

Specify **Name** and **IP Address** or **Hostname** of the new device in the popup dialog. You may also need to provide some additional information based on the **Device Type** you selected. For servers managed through IPMI protocol, you may specify in-band OS information to retrieve CPU utilization data along with the power and temperature data.

For example, if you chose **Server** as the **Device Type**, you have to choose a protocol from IPMI, SSH, and WMI, then type in the related information.

Some additional attributes are available for asset management purpose (e.g. Owner, Business Unit, Contact, Warranty Expiration). Custom attributes can be inputted as well (need to be configured in **Settings** page first).

NOTE

- You need to enter either the **IP Address** or the **Hostname**, but not both.
- If you choose **Server** as the device type and **SSH** or **WMI** as the protocol, DCM will login the OS with the username and password. Then DCM gets workload information from the OS to estimate power consumption dynamically.
- For **Network Device**, DCM supports Cisco switches with Cisco EnergyWise technology enabled.

Redfish Supported Servers

If the server is Redfish enabled and you plan on monitoring the device with this protocol, select HTTPs and then provide the authentication credentials during discovery or in the Add New Device tab.

PDU Configuration

If you add a PDU with outlet level power monitoring capability, you can specify unmanaged devices as associate devices. By doing this, you can get the power information of the devices without power monitoring capability from the PDU outlet power.

Click the **Associate Device** link on the **Device** tab of the PDU summary page. Click the drop-down list and choose an unmanaged device for the corresponding outlet. Then click **OK**.

Adding an Unmanaged Device

If you choose **Unmanaged server**, **Unmanaged network device**, **Unmanaged storage device**, or **Unmanaged Chassis** as the device type, you may specify Power Estimator(s) for the device(s) because these unmanaged devices do not have power monitoring capabilities. You can assign parameters to the estimator by specifying typical power or looking up the power profile.

To look it up go to the **Hierarchy** page, select the **Hierarchy** tab, then add the unmanaged device to a rack and select the device.

Click the **Edit** link on the **Summary** widget and a popup dialog box appears. Then you can select the device from the list and DCM will fill in the **peak power** and **active idle power** automatically according to the device selected. Click **OK** to finish configuring **Power Estimator**.

If your device is not in the list, or you know the typical power of your device, you can:

- Fill in the **peak power** and **active idle power** blanks directly.
- Click **Add** in the popup dialog to add a power profile:

You can **Edit** or **Delete** a power profile by clicking the corresponding button.

You can also check, edit and delete all the power profiles on the **Power Profile** tab of the **Settings** page.

NOTE

- After adding an unmanaged device into a rack, an event will appear in the Events list to remind you to specify a power estimator for it.
- You can configure the Power Estimator for devices of the same type in batches.
- If you have specified an unmanaged device for a PDU, you can see the information for the PDU on the last line of the Device list. For example, the screenshot below shows that you can get its power information from Outlet1 of PDU with an IP address of 10.239.98.30. You can click the **Clear** link to disassociate this information.

Device

Name	
IP Address	10.239.43.32 Reconnect
Device Type	Server
Device Model	IPMI Super Micro - IPMI2.0
Capability	N/A
Protocol	IPMI
Derated Power	400W
PDU Outlet	10.239.98.30, 1 Clear

Filtering Devices

You can apply a filter to show only specific devices:

- Go to the **All Devices** tab on **Devices** page.
- Specify device name/address (partial or full).
- Click **Search**.

Advanced Search

You may search devices with combined condition in the “Advanced Search” dialog by clicking the “Advanced Search” button. The search result will satisfy all the conditions you specified.

Editing Devices

Click **Edit** to edit devices. Select the devices you want to edit, and then click **OK**.

You can change the name and optional information of the devices being edited. Only common property of devices could be edited if you need to edit multiple devices.

NOTE

IP Address/Hostname, Device Type, and Protocol information are based on device configuration, which cannot be changed arbitrarily.

Deleting Devices

To delete a single device or multiple devices:

- Go to the **All Devices** tab on the **Devices** page.
- Click **Delete**.
- Select the check boxes to specify which devices to delete.
- Click **OK**.

Discovery and Import

Discovering Devices

Click 'Add Discovery Task' in the 'Discovery and Import' tab.

Select the protocol type from the drop-down list, and input the IP range. The default 'Subnet Mask' is 255.255.255.0. You may provide some additional information based on the 'Protocol type' you choose.

Choose from 7 protocol types available in the drop-down list: IPMI, SNMPv1v2c, SNMPv3, WS-MAN, HTTPS, SSH, and INBAND.

Click OK to run the discovery task.

✕
Add Discovery Task

Please choose the protocol and type in the IP range, the subnet mask, and the credential.

Protocol	<input type="text" value="IPMI"/>	▼		
First Address	<input type="text" value="Required"/>	Last Address	<input type="text" value="Required"/>	Subnet Mask <input type="text" value="255.255.255.0"/>
IPMI User Name	<input type="text"/>	IPMI Password	<input type="text"/>	IPMI Key <input type="text"/>
Memo	<input type="text"/>			

You can also click "Schedule" to run the discovery task in a different time or in a recurrent pattern.

The screenshot shows a dialog box titled "Schedule Discovery Task" with a close button (x) in the top right corner. It features three radio button options: "Now", "Specific Time", and "Recurrent". The "Specific Time" option is selected. To the right of the "Specific Time" label, there is a text input field containing "2019-09-19" with a calendar icon to its right, and another text input field containing "00:00". At the bottom right, there are two buttons: "OK" and "Cancel".

The screenshot shows the same "Schedule Discovery Task" dialog box, but with the "Recurrent" radio button selected. Under the "Recurrent" option, there are four sub-options: "Hourly" (selected), "Daily", "weekly", and "Every". The "Every" option has a text input field next to it containing "1" and the text "day(s) on". Below these options is the label "Range of Recurrence:". Under this label, there are two rows of input fields. The first row is labeled "Start" and contains a date field with "2019-09-19" and a calendar icon, and a time field with "00:00". The second row is labeled "End" and contains a date field with "2019-09-19" and a calendar icon, and a time field with "00:00". At the bottom right, there are two buttons: "OK" and "Cancel".

Intel® DCM Console supports to run multiple discovery tasks at the same time. If you have too many discovery tasks running at the same time, the performance of Intel® DCM Console would be impact potentially.

After the discovery progress reaches 100%, you may restart or remove the task by clicking the 'Run Again' or 'Remove' button.

The devices discovered will be added to the 'Device List' automatically.

As part of the security consideration, Intel® DCM Console will verify device identity during discovery by default. It can be turned off through modifying below (both) configuration files:

conf\console.config.xml:

```
<entry key="VALIDATE_AUTH_IN_DISCOVERY">false</entry>
```

conf\user.config.xml:

```
<entry key="AUTHENTICATE_ENTITY_BY_DEFAULT">false</entry>
```

When it is turned on, device identity information should be provided to Intel® DCM Console.

1. For SSH based devices, a file named "know_hosts" should be put under installed folder. It will take effect after restarting Intel® DCM Console services. The host keys should be added in this file following below example:

```
192.168.10.10 ecdsa-sha2-nistp256
AAAAE2VjZHNhLXNoYTItbmlzdHAyNTYAAAAIbmlzdHAyNTYAAABBBLka4eoTCD
GzIAQAM+4tJf2JeWB/LhOgCa/pk/LXYGqiY/7oBFnJGmvdosPoe0CpFNDz6/ubLP
mNrp+xyWAoi+Y=
```

If a SSH based device has multiple host keys, Intel® DCM Console will choose one key according to below order (key types)

```
ecdsa-sha2-nistp256
ecdsa-sha2-nistp384
ecdsa-sha2-nistp521
ssh-rsa
ssh-dss
```

The detailed explanation for the format of this file can be found [here](#).

2. For HTTPS based devices, the device certificate can be imported to Intel® DCM Console keystore, using below command:

```
external\jre\bin\keytool -import -keystore <keystore file path> -alias
<devicealiasname> -file <device cert file path>
```

Example:

```
external\jre\bin\keytool -import -keystore "C:\Program Files\Intel\DatacenterManager\keystore.ssl" -alias server001 -file c:\temp\device_certs\server001.cer
```

You can verify the added device certificate by below command:

```
external\jre\bin\keytool -list -keystore <keystore file path>
```

3. For WMI based devices, when Intel® DCM Console is configured to verify device identity, they cannot be found through discovery process, and you need to manually add them in Intel® DCM Console with FQDN specified. Refer to [Adding a Device Manually](#) section for details.

NOTE

If some devices are in the network you specified and are not discovered or imported by Intel® DCM Console, check the following:

- Network connectivity
- Device status
- Device credential you specified

Importing Devices

You may import devices with or without hierarchy information to Intel® DCM Console. To import devices, you need to compile an Excel file which contains device and hierarchy information. Depending on device type, some columns are required. For example: Name, type, and address would be required for any IPMI based servers. Other columns would be optional.

	A	B	C	D	E	F	G
1	name	type	address	username	password	snmpcommunitystring	snmpencryptionpassword
2	node manager	IPMI	10.239.43.42				
3	serverB	IPMI	10.239.43.19				
4	serverC	IPMI	10.239.43.27				
5	serverD	IPMI	10.239.43.48				
6	serverA	IPMI	10.239.43.7				
7	ibm	SSH	10.239.45.1	USERID	PASSWORD		
8	apc	SNMPv1v2c	10.239.43.236			public	
9	dell_cmc	WS MAN	10.239.45.3	root	calvin		

	H	I	J	K	L	M	N	O	P
1	httpsport	sshport	distinguishedname	rack	row	room	dc	size	location
2				44444	3333	222	11		30
3				rack2	row1	room1	dc1		30
4				rack2	row1	room1	dc1		
5				rack2	row1	room1	dc1	1	
6				rack1	row1	room1	dc1	1	
7		22		rack2	row1	room1	dc1		
8				rack1	row1	room1	dc1		12
9				rack1	row1	room1	dc1	16	
10				rack1	row1	room1	dc1		

The following table lists the description of each item.

Item	Description
name	Entity display name
description	Description of a device or group.
type	Supported protocol types include IPMI, SNMPv1v2c, SNMPv3, WS_MAN, SSH, and INBAND_PROTOCOL. For unmanaged device, it should be "Unmanaged server", "Unmanaged network device", or "Unmanaged storage device".
address	IP address
username	Username to login
password	Password to login
snmpcommunitystring	Community string for accessing the SNMP-based platform via V1
snmpencryptionpassword	The SNMP-based platform user account password for encryption
snmpauthenticationprotocol	The authentication protocol for an SNMP v3 based device. It can be one of below options: <i>AuthMD5</i> <i>AuthSHA1</i> <i>AuthHMAC128SHA224</i> <i>AuthHMAC192SHA256</i>

	<i>AuthHMAC256SHA384</i> <i>AuthHMAC384-SHA512</i>
snmpencryptionprotocol	<p>The encryption protocol for an SNMP v3 based device. It can be one of below options:</p> <p><i>PrivDES</i></p> <p><i>Priv3DES</i></p> <p><i>PrivAES128</i></p> <p><i>PrivAES192</i></p> <p><i>PrivAES256</i></p>
httpsport	The HTTPS port for the entity
sshport	The SSH port for the entity
distinguishedname	The UCS DN of the entity (used for identifying and discriminating UCS devices in DCM)
key	The IPMI key for the node
nameplatepower	Rated power capacity from nameplate.
deratedpower	De-rated power for both managed and unmanaged nodes
size	Size of the entity
location	Location of the physical entity
authenticateentity	To decide whether to authenticate Dell CMC in WSMAN connection. Valid value: true, false
model	Device model for unmanaged devices
ostype	OS type for IPMI devices. Valid values: Windows, Linux, Xen, ESX
osaddress	OS IP address

osusername	OS user name
ospassword	OS password
typicalpower	Typical power used in power estimation
idlepower	Idle power used in power estimation
peakpower	Peak power used in power estimation
custom_mgmtconsoleurl	The customized management console URL for a device.
EPR	Action for Emergency Power Reduction. It can be one of below options: <i>Minimize Power Consumption</i> <i>Shutdown</i> <i>No Action</i>
owner	Owner of the device
contact	Contact information associated with the device
warranty expiration	The date after which the warranty for the device is expired.
business unit	Business unit that the device is associated to
reportinlettemp	Option to decide whether a ChatsWorth PDU should report temperature (True / False)
rackcapacity	Capacity of a rack (in U)
rackpowercapacity	Power capacity of a rack (in W)
roompowercapacity	Power capacity of a room (in W)
rowpowercapacity	Power capacity of a row (in W)
cabinetpdupowercapacity	Power capacity of a cabinet pdu (in W)
gridx	The x axis of a rack in the room layout coordinate

gridy	The y axis of a rack in the room layout coordinate
width	The width of a chassis / blade (number of grids)
height	The height of a chassis / blade (number of grids)
start_x	The start position (in x-axle) of a blade in a chassis (start from 1)
start_y	The start position (in y-axle) of a blade in a chassis (start from 1)
dc	Data center
room	A physical group that includes all the rows in a physical room in the data center
rack	A physical group that includes all the devices in a physical rack in the physical data center.
row	A physical group that includes all the racks in a physical row in the physical data center
enclosure	An enclosure containing blade servers
group	Group that an entity belongs to.
birthday	The date when the device is used for the first time.
creation_time	The time when the device is added into Intel® DCM Console (for export only, will be ignored during import).
weight_kg	device weight in kilograms
rowweightcapacity_kg	row weight capacity in kilograms
rackweightcapacity_kg	rack weight capacity in kilograms
rackweight_kg	rack weight in kilograms
rackmiscweight_kg	rack miscellaneous weight in kilograms

weight_lb	device weight in pounds
rowweightcapacity_lb	row weight capacity in pounds
rackweightcapacity_lb	rackweightcapacity_lb
rackweight_lb	rack weight in pounds
rackmiscweight_lb	rack miscellaneous weight in pounds

NOTE

If both weight value in kilograms and pounds are available in the import file, the one matching the current weight unit setting will be used.

Custom attributes can be imported as well. A '*' character should be appended to the custom attributes to indicate they are not built-in attributes. Before importing devices with custom attributes, the custom attributes should be configured in **Settings** page, otherwise the custom attributes will be ignored.

For a running import task, you may check the progress or stop the task. For a completed import task, you may check result or remove the task by click corresponding link and button.

Groups

On the **Groups** tab, the devices you are interested in can be sorted and put into one custom group. You can manage, monitor, and configure the devices in the groups the same way as in the **Hierarchy**.

Operations on Groups

1. Adding groups

On the **Groups** page, click **+** under **Group List** to add a group. Specify the name and an optional description in the popup dialog, and then click **OK**.

You'll see your group added to the **Group List**.

Select a group and click **+** at the right side of the "Devices" table to add a device to it.

 **NOTE**

If you want to add all the devices of a given Data Center/Room/Row/Rack to a group, you can check the box for that Data Center/Room/Row/Rack, and then click **OK**.

You can also click the search button to search devices and add to the selected group.

2. Editing/deleting groups

In the Group List, you may click corresponding button to edit or delete a group.

Summary/Power/Temperature/Events

These widgets are similar to that of **Hierarchy** page.

Power On/Off

You may schedule power on/ off tasks for a group of devices in this widget.

Provisioning

This feature was introduced in version 3.3 ~ 3.9 of Intel® DCM Console. It provides the capability to review and update firmware for Intel Grantley and Purley servers, provision system settings for them, and mount ISO image. So far, it supports Linux only.

As one step of installation, provisioning feature can be enabled, and Intel® DCM Console can detect the existence of Intel® SDP Tool and generate the required configuration automatically. Below are the steps to enable it if this feature is to be enabled after installation.

1. Install Intel® DCM Console
2. Download and Install [Intel® SDP Tool](#)
3. Update configuration file for Intel® SDP Tool
4. Copy the file FirmwareProvisioningConfig.xml into the Intel® DCM Console conf folder (/opt/intel/datacentermanager/conf) and change its owner to dcm.

5. Set the right value for SDPTool_SetupLocation and SDPTool_ConfigLocation in this configuration file.
6. Run GrantExternalTool.sh (as root, default location: `/opt/intel/datacentermanager/bin`) from Intel® DCM Console to configure the access right. Example below (location of cp, chmod might be different in different Linux distribution):


```
./GrantExternalTool.sh add dcm /usr/bin/SDPTool
./GrantExternalTool.sh add dcm /usr/bin/cp
./GrantExternalTool.sh add dcm /usr/bin/chmod
```
7. Append into the file `/opt/intel/datacentermanager/bin/allpermit.policy`:


```
permission java.io.FilePermission "<<ALL FILES>>", "execute";
```
8. To avoid exposing sensitive information, mount `/proc` with `hidepid` option (refer to [this link](#) for details)
9. Restart DCM services: `/opt/intel/datacentermanager/startdcm.sh restart`

NOTE

Please contact dcmsales@intel.com on how to generate FirmwareProvisioningConfig.xml file to enable this feature. Provisioning System Setting may not work if BIOS Administrator password is set. Above procedure is applicable for provisioning Intel servers only.

After you successfully enable the provisioning feature, you may get the BIOS version and BMC firmware version of the managed Intel Grantley and Purley servers in the "Firmware Version" column of the "All Devices" table.

You may select Intel servers in the "All Devices" table or one group of Intel servers in the "Groups" page, and then click "Provisioning" button to update their firmware, change their system settings or mount ISO file on them.

Firmware Update

In the "Firmware Update" tab of "Provisioning" dialog, you may add the "Firmware Update" task immediate or in a future time. You may just update the server basic components firmware, "BIOS/BMC/ME/SDR", or some "Custom" components firmware. You may use the 'Preconfigured' mode to update firmware. The target

firmware image files are pre-configured with the server model and image file mapping in the Intel SDP Tool configuration file.

You may also upload your local firmware image file and update to the selected servers. You should select the servers with the same model for this feature.

After the task is added, you may get the task status in 'Provisioning' page. After the task is finished, you may check if the firmware update succeeds or fails for each server in the result link.

System Settings

You may select one Intel server and get its system settings. After the task is finished, you may download its system settings file in the task card.

You may change some values of the system settings file and deploy to other servers. Then all servers will have the same settings. All these servers should be with the same model and have the same firmware version.

You may also 'Change Single System Setting' of all servers, such as enabling Intel Virtualization Technology. For this feature, the selected servers can be with the different models or have the different firmware version.

Mount ISO

You may select some servers and mount one ISO file on them. The ISO file should be copied to the server with DCM installed and the file path is specified in this dialog. DCM server should be able to access this folder. You may specify if the servers are automatically reset after the ISO file is mounted. After the task is finished, you may unmount the ISO file for all servers on the 'Mount ISO' task card. A new task will be started for unmounting the ISO file.

Reliability

Unhealthy Devices

All devices which has healthy issues are listed in the “Unhealthy Devices” table. When you move the mouse to the state icon, the detail info is shown in tooltip. You may also click the device hyperlink to go to Hierarchy to see the detailed device health info.

Predictive Failure

After changing some configuration and restarting DCM service, you may enable this feature to monitor the server fans predictive failure.

Anomaly Detection

Server Firmware Outlier

This table is used to show the firmware version outlier of the same server models.

Cooling Anomaly

This table is used to show the cooling anomaly info if any cooling anomaly happens in your room.

SNMP Alerts

This tab will appear only when “Receive SNMP alerts” is selected in **Settings** page.

SNMP alerts from managed devices can be viewed, acknowledged, and disabled in this table.

The SNMP alerts can be forwarded through email / SNMP trap, with below option set to true in console.config.xml file, when “Email Subscription” / “SNMP Trap” are well configured in **Settings** page.

```
<entry key=" RELAY_DEVICE_SNMP_ALERT">true</entry>
```

Failure Indicator

Failure Indicator is used for estimating the probability of being unhealthy for different server models or components (memory / disk / processor) based on the observation of failures during a relative long time (e.g. several months). It is calculated through counting the observed unhealthy status against the number of successful observation, and aggregated for each server model, or for certain location. This feature relies on the health monitor capability and model of devices / components, so it is only available / meaningful for devices / components that support inventory & health monitoring.

SSD

Devices with unhealthy SSDs are listed in the first table (Unhealthy SSDs) under SSD tab. Intel® DCM Console can monitor some key attributes for SSDs, if any of them goes below corresponding failure thresholds, the SSD is regarded as unhealthy, then the device with such SSD will be listed in this Unhealthy SSDs table.

The second table under SSD tab lists all the managed SSDs with Estimated Life Span provided.

NOTE

The SSD related features in Intel® DCM Console today only work with SATA SSDs on Linux based servers, through SSH. It relies on smartctl from the [smartmontools](#) package, which is typically included in mainstream Linux distributions (if not, please make sure it is installed). You can enable SSH root login for the server, and enter the root account credentials when adding the server to Intel® DCM Console, or, you can use non-root account but please make sure it is added in sudoer list.

The default sampling interval is 1 hour. It can be configured by adding the entry below in the console.config.xml file (30 minutes as an example).

```
<entry key="SMART_MONITOR_INTERVAL">1800</entry>
```

Energy

Cooling Analysis

In the **Cooling Analysis** tab, the **Temperature Histogram** figure for the room selected provides real-time monitoring data of the inlet temperatures. The X-axis shows the temperature values and the Y-axis gives the percentages of servers with the corresponding temperature values. **Sample Size** shows the number of the devices whose temperature can be monitored in the selected room.

The current cooling status is evaluated with suggestions given, along with **possible actions** and the **Benefits** of taking these actions.

For example, when servers with inlet temperatures higher than 27 degrees are detected, they will be displayed in the **Hotspots** list.

If you need to refresh the temperature data, click **Refresh** on the top right.

Low-Utilization Servers

On the **Low-Utilization Servers** tab, by clicking **Analyze**, low utilization servers will be identified and listed as potential targets for consolidation to optimize energy efficiency. The time that the analysis was done is shown in the bottom left of the screen.

If there are a large number of servers, utilization analysis may take a long time. You may leave this page and perform other operations while the analysis runs in the background.

The **Daily Utilization Pattern** shows the result of analyzing server utilization patterns based on the historical monitoring data. This can help with server consolidation. For example, if one server is busy at night and idle in the daytime, while another is busy in the daytime and idle at night, you may consider migrating workload and shutting down one of these 2 servers.

Server Power Characteristics

Click **Server Power Characteristics** tab on the **Energy** page. You will see the bar diagram. The X-axis shows the power values and the Y-axis shows the server model. The power values next to the bars present the power ranges measured for different server models.

For example, **128 – 139** means that, for all managed servers with given model, the lowest power observed was 128 watt and the highest power observed was 139 watt.

Advanced Power Model

The power model for a certain server takes its utilization data as the input to predict its power consumption. To add a power model, you need to select a server with both monitored power and utilization data. At least 100 monitored data points are required. Once a power model is added, you can predict its power consumption for given workload (a combination of utilization data).

Policies

You can view the policies in this tab.

You can use policies to limit the amount of power that an entity consumes. Each policy applies to one entity, either a group or a device.

Intel® DCM Console provides several policy types:

- **Custom Power Limit** limits the total power consumption of an entity. When the policy applies to a group, Intel® DCM Console actively reallocates the power budgets to the individual servers within the group in each monitoring cycle. It attempts to minimize the gap between the power demands of each entity and the overall power allocation for the group, in order to minimize the performance impact of the group power capping. Intel® DCM Console monitors the power consumption data of the servers, estimates the power demand of the servers, and reallocates the power budgets with a sophisticated approach by applying a heuristic discriminative approach to solve a probabilistic model. In general, Intel® DCM Console reacts quickly by allocating more power to servers to get new tasks running properly. If the total power demand of the group exceeds the group power constraint, Intel® DCM Console implements a balanced power allocation. The policies are commonly applied to increase the server density with respect to power or cooling capacity.
- **Minimum Power** throttles power consumption of an entity as much as possible. Use this policy to prolong business continuity in the case of an emergency.

Creating a Policy for Device

You may set a policy on a device. In the popup dialog, specify the policy name and select the policy type from the drop-down list:

- If you choose **Custom Power Limit**, DCM will generate an alert when the actual power consumption is higher than the threshold you configured.
- If you choose **Minimum Power**, DCM throttles the device power to the minimum (so you do not need to specify a threshold).

Navigate to the **Schedule** tab to schedule the policy, and then click **OK**.

You may check the policy in the **Policies** tab or on the **Policies** page.

NOTE

Reserve Budget is used for devices without power capping capability and is discounted from the total power limit.

Power Efficient policy type is supported for some old generation HP devices (e.g. iLO2/iLO3/iLO4), but by default it is not available due to these devices require insecure / outdated key exchange algorithm for SSH based communication. The insecure key exchange algorithms for SSH are not enabled in Intel® DCM Console by default. They can be enabled by appending missing algorithm (e.g. diffie-hellman-group14-sha1) to the line begin with "KexAlgorithms" in "ssh_config" file under "conf" folder (restarting Intel® DCM Console services is required).

Creating a Policy for a Group

When enforcing a **Custom Power Limit** at the group level, you may configure the priorities of its members. Excess power is distributed to the devices according to their priorities.

For each member, you can choose one of the priority levels:

- Low
- Medium (Default)
- High
- Critical: DCM reserves the de-rated power for this entity.

Priority lists are policy-specific and an entity may have different priorities in different policies. However, during policy calculation, a higher priority of an entity in one policy may override a lower priority set to the same entity in another policy.

You may view all the policies on the **Policies** page to disable, edit, or delete policies.

Enabling/Disabling Policy

To enable/disable a policy:

- Click the policy's **Enable/Disable** link.
- The **Status** of the policy turns green/red.

Editing Policies

To edit a policy:

- Click **Edit** for the selected policy.
- Update policy details in the popup dialog.
- Click **OK**.






Deleting Policies

To delete a policy:

- Choose the policies to delete by selecting the check boxes.
- Click **OK**.

Events

The **Events** and **Thresholds** tabs enables you to view the predefined events or custom events for DC management and all the thresholds of entities. Clicking **Events** on the left side of the interface will bring up the **Events** page. The **Events** list can be filtered by time, severity level (defined below), Entity, Event Type, Description, or Serial Number.

Severity Level	Icon	Description
Custom		Associated with all custom events.
Critical		For errors that may cause DCM to stop working properly.
Error		For errors on specific nodes, or non-critical errors in Intel® DCM.
Warning		For events that warn that an error may soon occur.
Informative		For events that do not report errors.

NOTE

There are different **Events** tabs in Intel® DCM Console:

- The **Events** page lists all the predefined events and custom events.
- The **Events** tab on the **Dashboard** page only lists the critical events and custom events.
- The **Events** tab in the **Hierarchy** page lists all the events applying to the specific group or device.

You can specify an e-mail address to receive messages when an event is triggered. Add an e-mail address on the **E-mail Subscription** tab of the **Settings** page.

Exporting Events

Event data can be exported.

- Click "Export raw data" to export the event data. The result is impacted by the filter applied.
- Click "Export health report" to export health report.

Acknowledging Events

Events can be acknowledged then the new events with same type, for the same device, and with same event description, will not appear in "Events" table again.

Select one or more events, click "Acknowledge" button, fill notes if needed, click "OK", then the selected events are acknowledged.

The acknowledged events are listed in "Acknowledged Events" table below "Events" table. The notes for acknowledged events can be modified by clicking "Edit Notes" button. The events in this table can be filtered in the same way as in "Events" table.

The acknowledged events can be unacknowledged as well. Select one or more events in "Acknowledged Events" table, click "Unacknowledge", the selected events will be removed from "Acknowledged Events" table.

Deleting Events

Intel® DCM Console automatically deletes old events if there are more than 20,000 events listed. You can also manually delete events.

To delete events:

- Go to the **Events** page.
- Click **Delete**.
- Choose the event to delete by selecting the check boxes.
- Click **OK**.

To delete all events:

- Go to the **Events** page.
- Click **Delete All**.

Thresholds

All thresholds are displayed in a table. You may manipulate these thresholds in the table. Intel® DCM Console would not validate input when you edit threshold in the table considering that these thresholds might be showed in multiple pages.

Custom events are triggered when a power or temperature threshold is configured on groups or devices, and when the 'Condition' is met.

Below is an example for setting power threshold:

- Got to Thresholds tab and click '+' button
- Select "To single entity in hierarchy"

- Select an entity in the hierarchy
- Select 'IT Equipment Power' as 'Threshold Type'.
- Select the right value for 'Condition'
- Enter the value of Threshold, and then click OK.

Once the power draw of the entity increases to above the threshold you configured, an event will be triggered and listed in 'Summary' tab. You can check the details by moving your mouse over its 'Description'.

You can also set threshold for multiple racks / rows / rooms at one time. Simply select "Selection" as "To racks", "To rows" or "To rooms", and then multiple racks / rows / rooms can be selected for setting threshold.

Settings

User Management

In the User Management tab, you can create, edit, or delete users. Below roles are available:

- “Administrator” has full access to the account with all permissions including device / hierarchy management, energy management, reliability, event management, settings, etc.
- “Power User” has similar permissions to an Administrator except changing (create / modify / remove) user account, power policy and power status of device.
- “Guest User” is a limited role that can only view information.
- “Tenant User” role is designed for multi-tenant scenario that each tenant user is separated from other users. They and can only view / manage the devices and groups belong to themselves. Only basic device / group management features are available for Tenant User.

Intel® DCM Console supports Microsoft Active Directory user and group. You may assign a role for a Microsoft Active Directory user or group, and then login to Intel® DCM Console with the Active Directory account. You need to specify domain name and credentials to access the Active Directory server.

Intel® DCM Console also supports LDAP authentication. You need to specify correct LDAP configuration in the Settings to enable LDAP authentication before adding an LDAP user.

Intel® DCM Console tracks user operations for audit purpose. The time, account, and action for user operations are logged in “action.log” file under “log” folder. Access to this file requires administrator / root privilege.

Password

On the **Password** tab, you can change your login password once you fill in the correct old password.

To change the login password:

- Go to the **Settings** page.
- Fill in the old password.
- Fill in the new password.

- Confirm the new password.
- Click **Save**.

CPU Telemetry

In the **CPU Telemetry** tab you can export CPU Telemetry data to a csv file. Simply click the "Export CPU Telemetry Data" link and select the time range, click "OK", a csv file containing CPU Telemetry Data will be downloaded through the browser.

NOTE

The sampling interval for CPU Telemetry can be configured by modifying user.config.xml file, with "NODE_CPU_TELEMETRY_SAMPLING_FREQUENCY" entry. The valid values are: 30, 60, 180, 300, 360, 600, 1800, 3600, 21600, 43200, 86400. The default value is 3600 (seconds). It will take effect after restarting Intel® DCM Console services.

SNMP Trap

In the **SNMP Trap** tab you can assign a recipient to receive the events triggered, making it easier to manage the events in 3rd-party event management systems. DCM events are defined in the Management Information Base (MIB) file. And the MIB file is installed at "<installation path>\Intel\DatacenterManager\conf\DCMConsole-MIB-V1.mib".

To add a trap receiver:

- Go to the **Settings** page.
- Click **Add Receiver**.
- Fill in the Destination IP/Host, Port, and Community Name.
- Click **OK**.

To edit/delete/test a trap receiver:

- Go to the **Settings** page.
- Click the links **Edit/Delete/Test** in the **Action** column.

Email Subscription

In "Email Subscription" tab you can subscribe event through email, making it easier to get DCM alert.

To subscribe event:

- Go to the **Settings** page.

- Click 'Add Subscription'.
- Fill in email server configuration.
- Check "Subscribe threshold-based events only" if you only care about threshold-based event
- Click OK.

To edit/delete/test a subscription:

- Go to the **Settings** page.
- Click the links Edit/Delete/Test in the Action column.

Emails can be grouped to avoid flooding:

- Go to the **Settings** page
- Go to **Email Subscription** section
- Click the configuration button
- Check "Enable" checkbox to enable email grouping. Parameters impacting email group are listed below:
 - Group By: The field(s) by which the events are grouped. It can be "All", "Event Type" (default), or "Entity", or "Entity" + "Event Type", or "Entity" + "Event Type" + "Description".
 - Group Wait: The time to wait before sending a notification for a group.
 - Repeat Interval: Time interval between sending consecutive email notifications.

Predefined Event

The **Predefined Event** tab integrates all the events predefined by DCM in a form. It includes the **Predefined Event Type** and **Severity** of events. You can select the predefined events you are interested in by checking the corresponding boxes and clicking **Save**.

Power Profile

All the power profiles are listed in **Power Profile** tab on the **Settings** page. You can manage the power profiles conveniently in this tab.

Click the **Add** or **Delete** button to add a new power profile or delete an existing power profile.

Click the **More** hyperlink to edit the corresponding power profile.

LDAP

Intel® DCM Console supports LDAP authentication. You need to specify correct LDAP configuration in the settings to enable LDAP authentication (before adding an LDAP user). You may need to consult your LDAP administrator to get the configuration information for the settings.

NOTE

Only LDAP over TLS is supported

Emergency Power Reduction

In the event of an emergency, such as a DC-level power failure forcing the DC to run on a backup power supply, you can enable **Emergency Power Reduction** to throttle the power of the devices down to an extremely low level to prolong the service time.

Also, you can specify the emergency power reduction (EPR) for a device when it is added. You can also modify this EPR action by editing the device if it has been added. So when a room is in emergency power reduction, different devices can be in different states.

There are three actions you can choose from the drop-down list: **Minimize power consumption** (default), **Shut down** and **No action**. You can choose **No action** for very critical devices, while choose **Minimize power consumption** or even **Shutdown** for others.

NOTE

Applying **Emergency Power Reduction** may throttle the power consumption of the devices down to an extremely low level, or even shut the devices down, which will impact performance. Use this function only in emergencies. Please check the EPR action carefully before applying EPR.

Enabling EPR

Choose a data center or a room, and then click **Save**.

Click **OK** to confirm the operation in the popup dialog.

All the devices with power capping capability in this group are throttled to the state specified by the manager. You can specify **EPR action** by editing the devices.

Then an icon for EPR appears on top right of the page.

You can check the device list in EPR by clicking the icon.

Disabling EPR

To disable emergency power reduction, uncheck the specified groups, and then click **Save**.

Click **OK** to confirm the operation in the popup dialog.

Custom Attribute

Intel® DCM Console supports custom attributes that can be associated with devices.

You can manage (add / edit / delete) the custom attributes in this section.

Miscellaneous

You may configure the following options for your preferences:

- Maximum Healthy Temperature: The color (blue or orange) in dashboard would be affected by this option. Recommended value is 27 °C. This setting option does not impact all the temperature-based thresholds.
- Specify 'Power Usage Effectiveness' of your datacenter. PUE=Total Facility Energy / IT Equipment Energy. It is used to estimate Metrics in Temperature / Power page.
- Specify "Show monitoring status of devices in visualized rack". If it is checked, the visualized rack in "Datacenter Manager" would show an orange dot to indicate the servers are not monitored.
- Specify "Temperature Unit"
- Specify "Weight Unit"
- Specify "Show advanced telemetry". The advanced telemetry is available for some NM enabled servers.
- Specify "Receive SNMP alerts". When checked, a tab named "SNMP Alerts" will be available in "Reliability" to show the SNMP alerts received from managed devices.
- Specify "Email health alert to device vendor". When checked (with SMTP server information provided), Intel® DCM Console will send health alert email to device vendor (if the vendor email, which can be configured when add / edit a device, is correctly filled for the devices with health issue).

 **NOTE**

The blink of the browser title may behave differently in different web browsers and operating system settings.

RESTful API

Starting from Intel® DCM Console version 3.6, RESTful API is provided to facilitate automation / integration with Intel® DCM Console. Please refer to DCM_RESTful_API.pdf file under doc folder for details.

Ansible Module

Starting from Intel® DCM Console version 3.8, Ansible Modules are provided for automation with Ansible. Refer to “ansible” folder for Ansible modules, document, and sample playbooks.

Command Line Tool

Intel® DCM Console provides a command line tool to manipulate hierarchy. The tool should be run on the same server as Intel® DCM Console installed. You may find the corresponding executable hman.bat (for Windows) and hman.sh (for Linux) in DCM bin folder. Please make sure that no EPR (Emergency Power Reduction) is enabled when you manipulate hierarchy with the command line tool.

Six commands are supported:

add, delete, update, list, move, and help.

For each command, there should be command options and command target.

help

command target: add, delete, update, list, and move. Help command shows the usage of the commands. The tool shows the usages of all the commands if the command target is not specified.

add

command options:

-hierarchylevel (data center, room, row, rack, device, blade)

-name

-description

-capacity (for rack only)

-powercapacity (for rack only)

-pdupowersackpower (for rack only)

-type (options below are the same as column items in import, please refer to [Importing Devices](#))

-address

-username

-password (password id string which cannot contain ":")

-snmpcommunitystring

-snmpencryptionpassword (password id string which cannot contain ":")

-snmpauthenticationprotocol

-snmpencryptionprotocol

-httpsport

-sshport

-distinguishedname

-key

-deratedpower

-size

-location

-authenticateentity

-model

- ostype
- osaddress
- osusername
- ospassword (password id string which cannot contain ":")
- typicalpower
- idlepower
- peakpower
- gridx
- gridy
- passwordfile (a file contains passwordid:password pair)

command target: full path name (Unix like full path name style, e.g., /dc1/room1/row1/rack1/) of the entity to which end user wants to add a new entity. If the command target is not specified for add command, root (/) would be used by default. It implies that you can only add a data center entity if the command target is not specified.

delete

command target: full path name of the entity to be deleted.

update

command options:

- name
- description
- capacity
- powercapacity
- pdupowerasrackpower
- address
- username
- password (password id string which cannot contain ":")
- snmpcommunitystring
- snmpencryptionpassword (password id string which cannot contain ":")

- snmpauthenticationprotocol
- snmpencryptionprotocol
- httpsport
- sshport
- distinguishedname
- key
- deratedpower
- size
- location
- authenticateentity
- model
- ostype
- osaddress
- osusername
- ospassword (password id string which cannot contain “:”)
- typicalpower
- idlepower
- peakpower
- gridx
- gridy
- passwordfile (a file contains passwordid:password pair)

command target: full path name of the entity to be updated.

Examples (with below sample content in password file “dcmpassfile”):

```
mypassword_id1:6VAsH3Fa  
mypassword_id2:iOLZh9yw  
mypassword_id3:E6D1bAZQ
```

1. Set up hierarchy, create hierarchy "/DC9 SHANGHAI/Real Lab/Row/TmpRack"

```
C:\Program Files\Intel\DataCenterManager\bin>hman.bat add -hierarchylevel dc -
name "DC 9 SHANGHAI"
```

```
C:\Program Files\Intel\DataCenterManager\bin>hman.bat add -hierarchylevel room
-name "Real Lab" "/DC 9 SHANGHAI"
```

```
C:\Program Files\Intel\DataCenterManager\bin>hman.bat add -hierarchylevel row -
name "Row" "/DC 9 SHANGHAI/Real Lab"
```

```
C:\Program Files\Intel\DataCenterManager\bin>hman.bat add -hierarchylevel rack -
name "TmpRack" "/DC 9 SHANGHAI/Real Lab/Row"
```

2. Add an HP iLO rack server to a rack

```
C:\Program Files\Intel\DataCenterManager\bin>hman.bat add -hierarchylevel device
-name "My iLO" -type IPMI -address 192.168.0.1 -username myname -passwordfile
"c:\dcmpassfile" -password mypassword_id1 "/DC9 SHANGHAI/Real
Lab/Row/TmpRack"
```

3. Add an HP enclosure to DCM to a rack

```
C:\Program Files\Intel\DataCenterManager\bin>hman.bat add -hierarchylevel device
-name "My Enclosure" -type SSH -address 192.168.0.2 -username myname -
passwordfile "c:\dcmpassfile" -password mypassword_id2 "/DC9 SHANGHAI/Real
Lab/Row/TmpRack"
```

4. Add an HP blade to an Enclosure ("My Enclosure")

```
C:\Program Files\Intel\DataCenterManager\bin>hman.bat add -hierarchylevel blade
-name "My iLO blade to enclosure" -type IPMI -address 192.168.0.1 -username
myusername -passwordfile "c:\dcmpassfile" -password mypassword_id3 "/DC9
SHANGHAI/Real Lab/Row/TmpRack/My Enclosure"
```

list

command target: full path name of the entity to be listed. The command lists all direct children of the command target. If the command target is not specified for

the "list" command, root (/) would be used by default. It implies that you can list all data centers if the command target is not specified.

move

command target: the command takes two arguments, source and destination. "Source" means the full path of an existing entity. "Destination" means the full path to specify where to move 'source'. The rule of the hierarchy needs to be followed when an entity is moved.

Working in scaled environment

When working in a scaled environment (e.g. up to 20000 devices), Intel® DCM Console demands more resources to accomplish the tasks. Below are the steps to enable those additional resources.

For Linux OS:

1. Increase the maximum number of open file descriptors, from default value (20000) to 60000 (`ulimit -n 60000`) in below files:

`/opt/intel/datacentermanager/dcm_service.sh`

`/etc/systemd/system/dcm.service` (SUSE version above 14)

`/etc/init.d/dcm-daemon` (other linux OS)

2. Change JVM heap size:

find string `"-Xms256m -Xmx8192m -Xss2000k -outfile logs/dcmService.out"` and change to `"-Xms32768m -Xmx16384m -Xss2000k -outfile logs/dcmService.out"` in below files:

`/opt/intel/datacentermanager/dcm_service.sh`

`/etc/systemd/system/dcm.service` (SUSE version above 14)

`/etc/init.d/dcm-daemon` (other linux OS)

find string `"-Xms256m -Xmx2048m -Xss2000k -outfile $CATALINA_HOME/logs/catalina.out"` and change to `"-Xms256m -Xmx8192m -Xss2000k -outfile $CATALINA_HOME/logs/catalina.out"` in below files:

`/opt/intel/datacentermanager/dcm_service.sh` (SUSE version above 14)

`/etc/init.d/dcm-tomcat-daemon` (other linux OS)

3. The default `nf_conntrack` table size is 65536 on host whose memory is larger than 4G. We recommend changing this value to 262144.

`###Verified on RH7/Ubuntu18###`

- `create file /etc/modprobe.d/conntrack.conf`
- `add line "options nf_conntrack hashsize=262144" into conntrack.conf`
- `reboot server`

- After startup, check `/proc/sys/net/netfilter/nf_conntrack_buckets` content equals 262144

Reference:

https://www.kernel.org/doc/Documentation/networking/nf_conntrack-sysctl.txt

4. Default ARP table size is typically 1024 which is too small if DCM console is in a large subnetwork. We recommend increasing this value.

#####Verified on RH7/Ubuntu18#####

- create file `/etc/sysctl.conf`
- add line `"net.ipv4.neigh.default.gc_thresh1 = 8192
net.ipv4.neigh.default.gc_thresh2 = 16384
net.ipv4.neigh.default.gc_thresh3 = 32768"` into `sysctl.conf`
- run command `"sysctl -p"`

For Windows:

1. Run regedit and locate:

`HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Tcpip\Parameters`

Set DWORD value `MaxUserPort` to 65534 (Base: decimal). Create it if it does not exist.

Set DWORD value `TCPTimedWaitDelay` to 30 (Base: decimal). Create it if it does not exist.

2. Locate:

`HKEY_LOCAL_MACHINE\SYSTEM\ControlSet001\services\DataCenterManager
Server`

Modify string value `JvmData`, replace `"-Xmx8192m"` with `"-Xmx32768m"`

3. Locate: `\HKEY_LOCAL_MACHINE\SOFTWARE\WOW6432Node\Apache
Software Foundation\Procrun 2.0\DatacenterManager\Parameters\Java`

Modify dword value `JvmMx`, replace value data `"2048"` with `"8192"`

4. Run "services.msc" and restart DCM services.

Renew Passwords

As a maintenance effort, password / key used in Intel® DCM Console may require update on a regular basis. Please make sure the installed services are stopped before updating them.

For Windows: Stop "DatacenterManagerServer" and "DatacenterManager" service

For Linux: Run command "./startdcm.sh stopjsvc" to stop service

Renew database password

Follow below steps to renew database password.

1. Renew database password

Follow the instruction [here](#).

The database user name is available as entry DB_USER_NAME in both `conf\user.config.xml` and `conf\console.config.xml`:

```
<entry key="DB_USER_NAME">dcmdba</entry>
```

2. Synchronize new password into Intel® DCM Console configuration file

```
For Windows: java -cp bin\plugins\DCM.jar;bin\InstallTool.jar;external\apache-  
tomcat\webapps\DcmConsole\WEB-INF\lib\postgresql-42.2.5.jar  
com.intel.dcm.install.Security -update dbpasswd yourpassword -file conf\user.config.xml  
For Linux: java -cp bin/plugins/Dcm.jar:bin/InstallTool.jar:external/apache-  
tomcat/webapps/DcmConsole/WEB-INF/lib/postgresql-42.2.5.jar  
com.intel.dcm.install.Security -update dbpasswd yourpassword -file conf/user.config.xml
```

This command will update both `conf\user.config.xml` and `conf\console.config.xml`.

```
Administrator: C:\Windows\System32\cmd.exe
C:\Program Files\Intel\DataCenterManager>java -cp bin\plugins\DCM.jar;bin\InstallTool.jar;external\apache-tomcat\webapps\DcmConsole\WEB-INF\lib\postgresql-42.1.4.jar com.intel.dcm.install.Security -update dbpasswd <password> -file conf\console.config.xml
Picked up _JAVA_OPTIONS: -Djava.net.preferIPv4Stack=true
Update DB password successfully.
Please remember to update password in DB.
Update console DB password successfully.
C:\Program Files\Intel\DataCenterManager>
```

Renew keystore password

Follow below steps to renew keystore password.

1. Renew keystore password

Follow the instruction [here](#).

Intel® DCM Console requires IDENTICAL passwords to protect both keystore and private key.

Refer to [this link](#) on how to renew keystore password (using “keytool –storepasswd” command) that is used for protecting keystore file. The private key password is also updated when keystore password is updated.

Alias associated to Intel® DCM Console private key is *datacentermanager*.

The keystore file used by Intel® DCM Console is *keystore.ssl* located under the installed folder.

Keytool is located under *\external\jre\bin*.

2. Synchronize new password into Intel® DCM Console configuration file

For Windows: java -cp bin\plugins\DCM.jar;bin\InstallTool.jar;external\apache-tomcat\webapps\DcmConsole\WEB-INF\lib\postgresql-42.2.5.jar com.intel.dcm.install.Security -update keystorepasswd yourpassword -file conf\user.config.xml

For Linux: java -cp bin/plugins/Dcm.jar:bin/InstallTool.jar:external/apache-tomcat/webapps/DcmConsole/WEB-INF/lib/postgresql-42.2.5.jar com.intel.dcm.install.Security -update keystorepasswd yourpassword -file conf/user.config.xml

This command will update both *conf\user.config.xml* and *conf\console.config.xml*.

3. Synchronize new password into Tomcat configuration file

Please refer to [Tomcat document](#).

The Tomcat configuration file used in Intel® DCM Console is `external\apache-tomcat\conf\server.xml`.

Renew keys

For windows:

Run below commands to renew keys used by Intel® DCM Console.

```
java -cp
bin\plugins\DCM.jar;bin\InstallTool.jar;external\apache-
tomcat\webapps\DcmConsole\WEB-INF\lib\postgresql-
42.2.5.jar com.intel.dcm.install.Security -update rootkey -file
conf\user.config.xml
```

```
java -cp
bin\plugins\DCM.jar;bin\InstallTool.jar;external\apache-
tomcat\webapps\DcmConsole\WEB-INF\lib\postgresql-
42.2.5.jar com.intel.dcm.install.Security -update dbpasswdkey -
file conf\user.config.xml
```

```
java -cp
bin\plugins\DCM.jar;bin\InstallTool.jar;external\apache-
tomcat\webapps\DcmConsole\WEB-INF\lib\postgresql-
42.2.5.jar com.intel.dcm.install.Security -update consolekeys -
file conf\console.config.xml
```

For Linux:

Run below commands to renew keys used by Intel® DCM Console.

```
java -cp
bin/plugins/Dcm.jar:bin/InstallTool.jar:external/apache-
```

```
tomcat/webapps/DcmConsole/WEB-INF/lib/postgresql-  
42.2.5.jar com.intel.dcm.install.Security -update rootkey -file  
conf/user.config.xml
```

```
java -cp  
bin/plugins/Dcm.jar:bin/InstallTool.jar:external/apache-  
tomcat/webapps/DcmConsole/WEB-INF/lib/postgresql-  
42.2.5.jar com.intel.dcm.install.Security -update dbpasswdkey -  
file conf/user.config.xml
```

```
java -cp  
bin/plugins/Dcm.jar:bin/InstallTool.jar:external/apache-  
tomcat/webapps/DcmConsole/WEB-INF/lib/postgresql-  
42.2.5.jar com.intel.dcm.install.Security -update consolekeys -  
file conf/console.config.xml
```

Glossary

BMC	Board Management Controller
DC	Data Center
DCM	Datacenter Manager
NM	Intelligent Power Node Manager
PDU	Power Distribution Unit
RMI	Remote Method Invocation
RAM	Random Access Memory
SNMP	Simple Network Management Protocol
SSH	Secure Shell
TLS	Transport Layer Security
UI	User Interface
UPS	Uninterruptible Power Supply
UCS	Universal Character Set