

Overall Best Practices for OpenManage Enterprise Power Manager

Abstract

This technical white paper provides information on the overall best practices for the usage of OpenManage Enterprise Power Manager plugin.

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Executive summary

This technical whitepaper provides recommendations on using Dell EMC OpenManage Enterprise Power Manager to effectively manage the power in a data center. The whitepaper provides insights into the usage of various features of Power Manager to conserve power and manage the data center in a more efficient way.

1 Introduction

Dell EMC OpenManage Enterprise Power Manager is an extension to Dell EMC OpenManage Enterprise (OME) console and uses fine-grained instrumentation to provide increased visibility over power consumption, anomalies, and utilization. Also, Power Manager alerts and reports on power and thermal events with servers, chassis, and groups consisting of servers and chassis. This enables increased control, faster response time, greater accuracy, and broader decision-making intelligence.

The power consumed in data centers are of such high magnitude that it is critical to monitor this consumption. There is a scope for managing this consumption effectively without compromising on the efficiency of the workload. Power Manager helps with identifying the areas where power can be conserved by using historical power consumption information of all the devices and groups that are monitored. Once such areas are identified, use static power policies to conserve power on these devices or groups.

This whitepaper provides details on using the various features of OpenManage Enterprise Power Manager to efficiently manage a data center.

2 Monitoring and Capping Power in Data Center

This section focuses on using the metric data obtained for devices and groups to effectively optimize the power consumption in a data center. Various metrics such as power, temperature, utilization are collected at regular time intervals for devices and groups. View this historical data about the devices and groups on their respective pages or on the **Reports** section. Use the built-in and custom reports to view this data. These reports help us identify the anomalies in power consumption of the devices. Use this information to determine the required cap value to be set on the devices or groups. From OpenManage Enterprise Power Manager version 1.1 onwards, there are two kinds of policies—static power policies and Temperature-Triggered policies. This document depicts how to use historical data to identify the appropriate cap values for both policies.

2.1 Monitoring Devices and Groups

Add the devices and groups that need to be analyzed to identify the Power anomalies to Power Manager. For more information about adding the devices and groups to Power Manager, refer to the Power Manager User's Guide on dell.com/support.

After adding these devices to Power Manager, monitor them for a minimum duration of 7 days.

2.1.1 Analyzing Historical Data

The historical data provides insight to the power consumption of the devices. This data is available in different forms such as historical graphs, reports, and REST APIs. The following section provides details on collecting the relevant data:

- **Historical Graphs:** Power Manager captures data at an interval of 15, 30 or 60 minutes based on your selection in Power Manager preferences section. View this data in a graphical form in OpenManage Enterprise. For devices, navigate to **Devices** page, click on a device that is being monitored by Power Manager plugin, and navigate to **Power Management and Monitoring** tab. This tab displays the historical monitoring data for that device for a duration of up to 1 year. There is a drop-down list available to select the duration for which you want to view the data. The available options are—6 hours, 12 hours, 1 day, 7 days, 1 month, 3 months, 6 months and 1 year. In this example, the time duration chosen to view the historical data is 7 days.
 - Similarly, the historical data for groups is found at the following location: Devices→Group_name→Group Details. Here, Group_name refers to any group that is being monitored by Power Manager plugin.

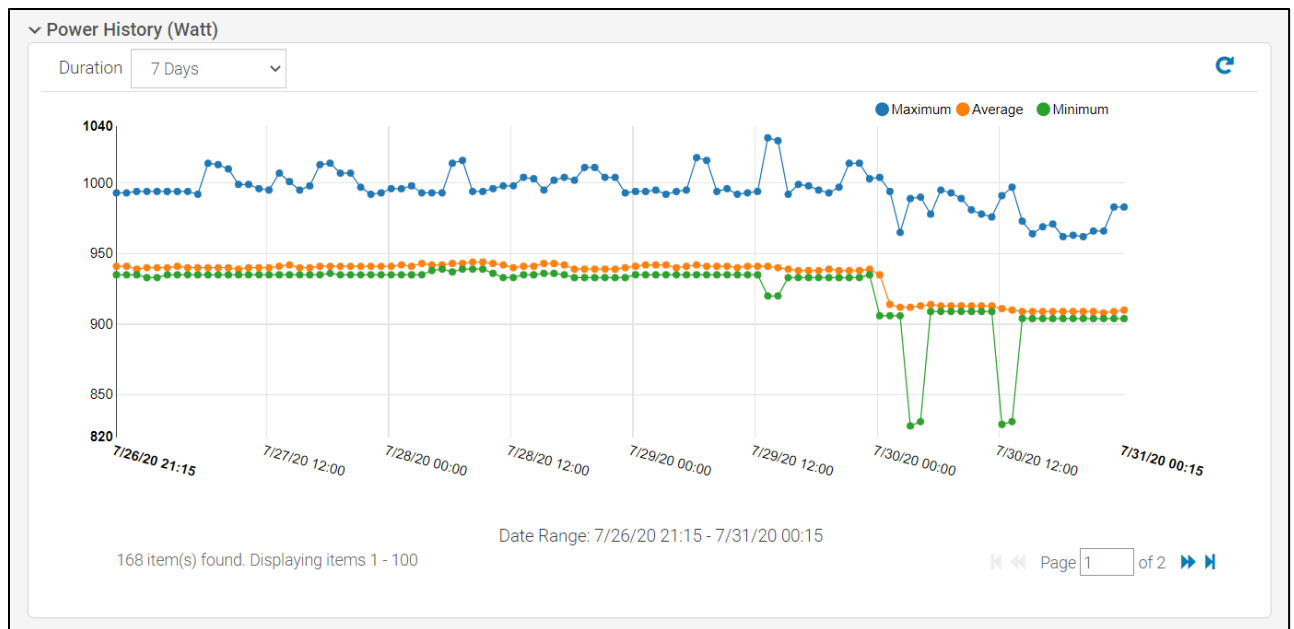


Figure 1 Historical Data for Group

- Reports: After a duration of 7 days, run the reports from **Monitor**→**Reports** section of OpenManage Enterprise. There are two types of reports available:
 - Built-in Reports—there are two built-in reports available that provide the historical monitoring data for the devices and the groups.
 - > Power Manager: Power and Thermal Reports for Devices
 - > Power Manager: Power and Thermal Reports for Groups
 - Custom Reports – These reports provide the flexibility to select the required Power Manager Devices or Power Manager Groups and their corresponding attributes.
 - > You can select built-in groups to view a report.
 - > Select the Report Duration as 7 days and Aggregation Period as Hourly.
 - > Select the following fields to identify the power anomalies—power metrics (Maximum Power, Minimum Power and Average Power and Collected At).

Select the required report (built-in or custom report) and run the report. After running the report, download the report in an Excel format and use this report as a baseline to compare the power consumption of the devices or groups. It is important to note that when a report is run for a duration of 7 days, monitoring data is available in a daily format having one aggregated value per day.

For more information about creating, running and downloading reports, refer the Power Manager User's Guide on the support site.

The REST API support that is available as part of Power Manager plugin also provides the historical data. Use the following API to view the historical data – <https://<IP>/api/MetricService/Metrics>. The result of this API is in json format. Convert this data to an excel sheet format and use the excel sheet to derive appropriate charts for further analysis of power consumption.

For more information about using REST APIs, refer to OpenManage Enterprise Power Manager REST API Guide.

2.1.2 Analyzing Historical data

This section describes how to use the historical graphs to identify the anomalies and identify the optimal power cap value for the devices and groups. After 7 days of monitoring, select a device for which you want to identify the anomalies.

1. Click the device and navigate to Power Management and Monitoring tab.
2. Select the duration as 7 days from the drop-down list.
3. Analyze the graph and identify the time frames where there is a spike in power consumption and where there is a dip in the consumption.
 - It is important to identify if the power consumption is periodically maximum at certain times.
 - If the increase in power consumption is periodic in nature, investigate whether a workload is causing this increase in consumption.
For example, the power consumption is at 150W from Monday to Friday between 2PM to 4PM. But at other durations, the power consumption stays at 130W. This would indicate an increase in system workload during this time duration.
 - If the increase in power consumption is not periodic in nature and is due to a workload, you can apply a power cap value in the range of 125-140 Watts so that there is no impact on the performance of the system. Consider this value as InitialCapValue.
 - If the high-power consumption is not associated with any system workload, then investigate further to identify the root cause.
 - Identify the timeframe where power consumption is minimum and note down this value.
 - You need to analyze this further to find the reason for the low power consumption.
For example, since it is a weekend, the servers are not in use or the workload running on them is minimal, but the devices cannot be powered off. In such cases, you can apply a power cap value corresponding to the lower bound value for the server.
4. Repeat the above steps for all the devices and groups.

2.2 Creating Static Power Policies

This section describes how to create Static Power Policies.

1. Navigate to Power Management → Policies section.
2. Select Create option. This launches the Create Policy wizard.
3. Provide an appropriate name for the policy.
4. After selecting the device, navigate to Policy Settings section.
 - Power consumption is maximum during a certain time
 - a. In this case, provide the power cap value as InitialCapValue that is identified in the [Analyzing Historical data](#) section.
 - b. The **Policy Settings** section lists the Lower Bound and Upper Bound values for the device.
 - c. Check whether InitialCapValue is in the range of the Lower and Upper Bound values. If yes, provide the cap value as the InitialCapValue (for example, 130Watts).

- d. Navigate to **Policy Schedule** and select the timeframe appropriately such that the capping is applied only for that duration. Identify this timeframe from the [Analyzing Historical data](#) section. For example, you can select **Time Span** as 2 PM to 4 PM. Also, you can select Days as **Daily** and as a recurrence from Monday to Friday.
 - e. If you want to provide this power cap only for two months, provide a range in **Active Span** section.
- Power consumption is minimum during a certain time
 - a. In this case, set the power cap value to the Lower Bound value for that server.
 - b. Schedule the policy appropriately in the Policy Schedule section such that this power capping occurs only for the duration when power consumption is at a minimum. For example, schedule this power cap value only for the weekends.
5. Click Finish and create the static policy.
 6. Repeat the steps to create policies for all the devices and groups you want to manage the power consumption. For more information about creating policies, refer to the Power Manager User's Guide on the support site.

You can perform this analysis once a month to ensure that there are no new power anomalies. In case there are any new power anomalies, analyze further to modify the power cap values. This helps in efficient power usage on the devices by ensuring that a device does not consume too much power unnecessarily. This in turn, helps in better Power Management in a data center.

3 Understanding Top Offenders and Top Energy Consumers

The following section provides information about the Top Offenders and Top Energy Consumers amongst all the devices and groups being monitored by Power Manager.

3.1 Top Offenders

Top Offenders is a feature of Power Manager that lists out the Top 10 power and thermal threshold offenders. Use the Top Offenders data to determine the devices and groups that have violated their Power and Temperature-Threshold values the greatest number of times. Use this data to determine which devices and groups require a power policy or a Temperature-Triggered policy. Use this feature as below:

1. Set Power and Temperature-Threshold values for all the devices and groups that are monitored in Power Manager.
 2. Navigate to Power Management → Overview tab to view the Top Power and Temperature Offenders.
 3. Select the required Entity Type, which is either Devices or Groups.
 4. The list of devices or groups that have violated the Threshold values most frequently are displayed.
 5. Investigate the cause of the Threshold violations.
- For devices or groups listed under Top Power Offenders, apply a static power policy to ensure that the power consumption is capped.
 - For groups listed under Top Temperature Offenders, apply a Temperature-Triggered policy to ensure that the threshold value is not violated.

This feature provides more insight into the devices or groups that have violated the threshold and aide in taking further action. Use policies to manage the power consumption of the devices and groups.

For more information about creating Policies, refer to the Power Manager User's Guide on the support site.

Top 10 Power Offenders			
Entity Type	Devices	State	All
ENTITY NAME	SERVICE TAG	TOTAL VIOLATIONS	THRESHOLD STATE
WIN2016CONFIG.BLR.net	4W6H3	2	Critical
WIN2016CONFIG.BLR.net	5S0V9	1	Critical
WIN2016CONFIG.BLR.net	1P7Z9	1	Warning
WIN2016CONFIG.BLR.net	2K8M7	1	Critical
WIN2016CONFIG.BLR.net	2T9F3	1	Critical
WIN2016CONFIG.BLR.net	2Q8G6	1	Warning
WIN2016CONFIG.BLR.net	8R0T8	1	Critical
WIN2016CONFIG.BLR.net	0H0X0	1	Critical
WIN2016CONFIG.BLR.net	8C5J5	1	Warning
WIN2016CONFIG.BLR.net	3S1R4	1	Warning

Figure 2 Top 10 Power Offenders (Devices)

3.2 Top Energy Consumers

Energy consumption is directly proportionate to power consumption. The higher the energy consumed, higher is the power consumed. In Power Manager, details about the top five energy consuming devices and groups are displayed. This data is available on Home page of OpenManage Enterprise, under the **Power Manager** widget. Use this list to identify the devices and groups that are consuming the highest power in a data center. You can then analyze these devices and groups to identify if there is a possibility of reducing the power consumption without compromising on the performance and functionality of the devices. Then, you can apply a power policy to cap the power being consumed by the devices.



Figure 3 Top Energy Consumers (Devices)

4 Using Physical Hierarchy

Power Manager version 1.2 has introduced a feature called Physical Hierarchy. This feature helps you to create physical groups in OpenManage Enterprise to resemble an actual data center. Four categories of physical groups are supported—Data Center, Room, Aisle and Rack. Use physical groups to logically group the devices based on their physical location in a data center and monitor them. Some important features of physical hierarchy are:

1. Physical hierarchy feature is available only when Power Manager is installed.
2. The Physical groups created are automatically added to Power Manager.
3. Place the devices based on the slot number in a rack of a physical group by referring to the actual slot in the data center that it is placed in.
4. The devices can be moved from one rack to another whenever the device is physically moved to.
5. Use the **Rack View** under **Power Management** section to view the devices placed in every rack.
6. You can monitor the overall consumption of a rack.
7. Ensure that you provide a power capacity value when creating a rack that helps to ensure the actual power consumption of the devices do not exceed the allotted power capacity.

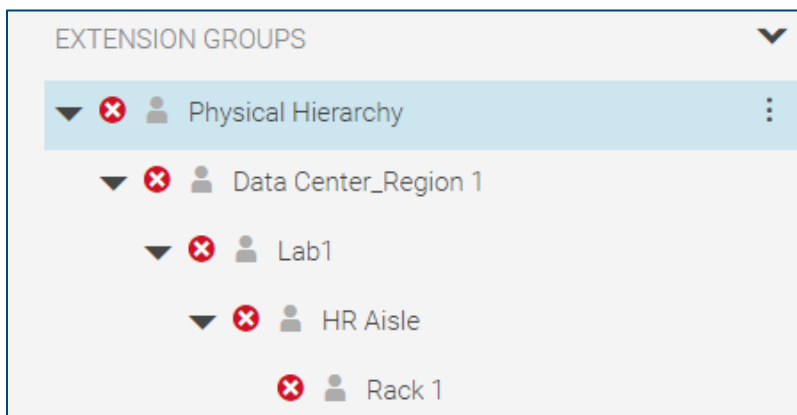


Figure 4 Structure of a Physical Hierarchy

View power and space utilization on physical groups using the Underutilized Racks dashlets available on the Overview tab under Power Management section.

4.1 Top 10 Underutilized Racks (Power)

This dashlet provides information about the racks that are consuming the least power among all the racks available in Power Manager. This information is useful to identify the racks that can add more devices. This information helps in moving devices across racks and thus reducing the load on the racks that have the highest power consumption.

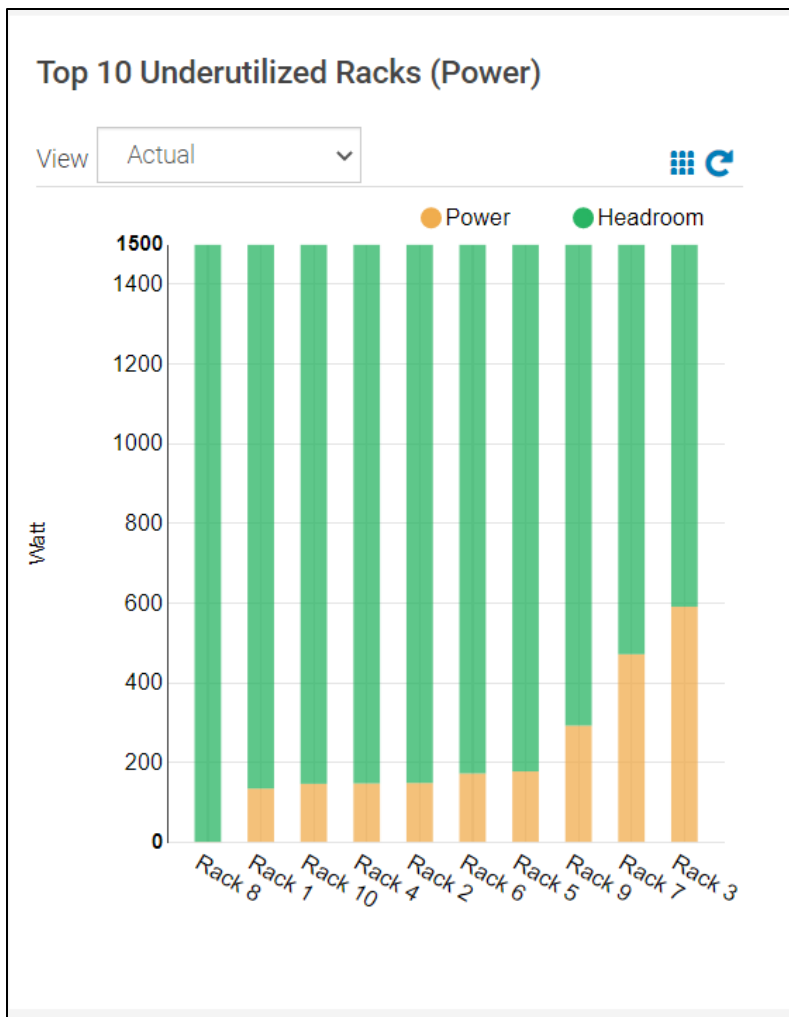


Figure 5 Top 10 Underutilized Racks (Power)

4.2 Top 10 Underutilized Racks (Space)

This dashlet provides information about the racks that are consuming the least space in the data center. This information allows you to perform capacity planning and identify the racks that have the capacity to accommodate more devices. This information is useful when you are planning to purchase more devices for your data center.

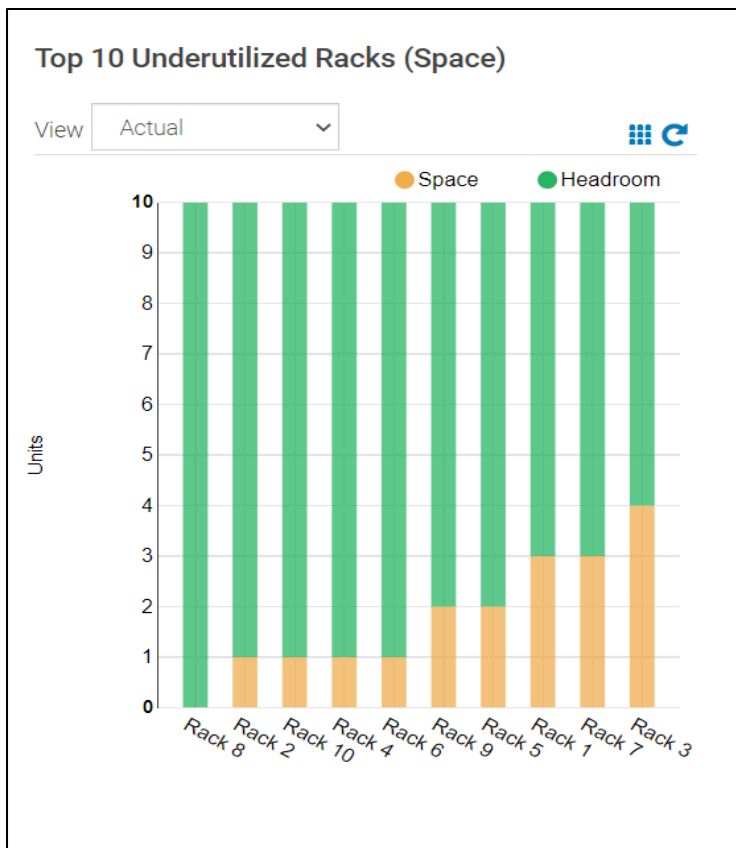


Figure 6 Top 10 Underutilized Racks (Space)

Additionally, there are built-in reports available to provide information about the space capacity and power capacity of all the racks being monitored in Power Manager. For more information about using built-in reports, see the [Usage of Reports in Data Center through Dell EMC OpenManage Enterprise Power Manager](#) whitepaper posted on the support site.

5 Using Dashboard

The Home page of OpenManage Enterprise hosts the Power Manager specific dashlets. Each dashlet provides quick access to Power Manager specific data. This section focuses on using these dashlets effectively.

5.1 Power History

Use this dashlet to select the most critical groups and get quick access to the power consumption of these groups. Using the edit icon, add a maximum of up to three critical groups to this dashlet. After adding the groups, select a group from the drop-down list to select and view the data.

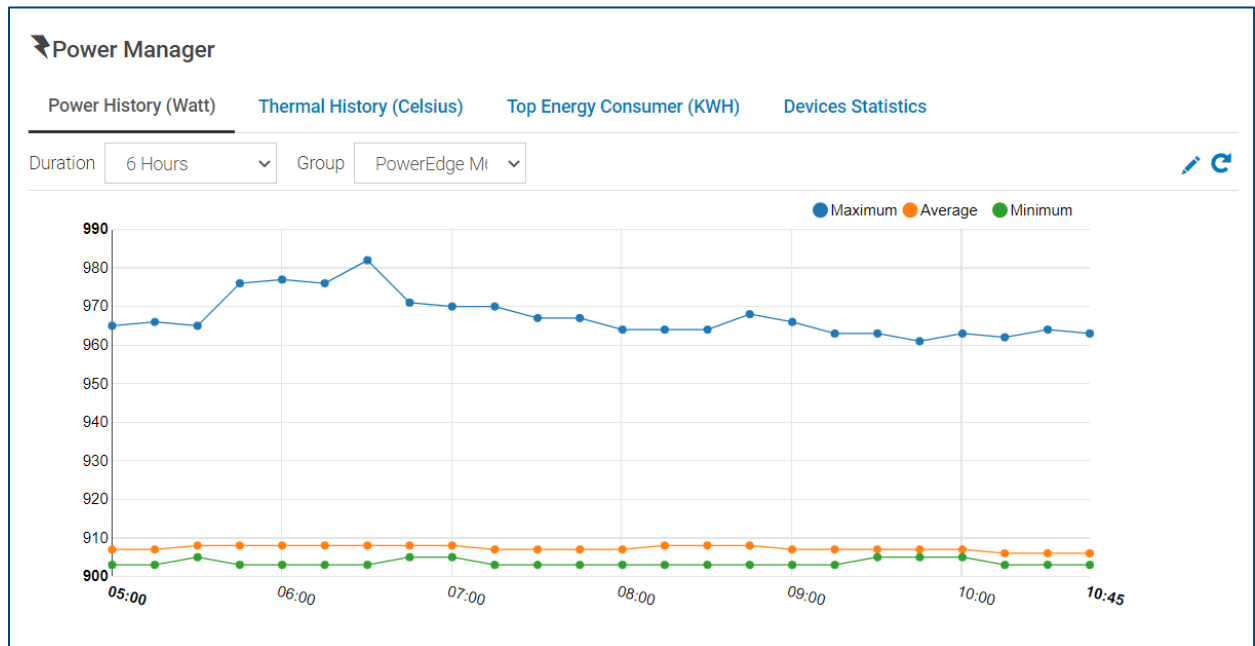


Figure 7 Power History Dashlet

5.2 Thermal History

This dashlet is like the Power History dashlet, and provides quick access to the Thermal History for the selected critical groups. Use the edit option to add a maximum of three groups to this dashlet. Once the groups are added to the dashlet, select the group from the drop-down list to view the thermal history data.

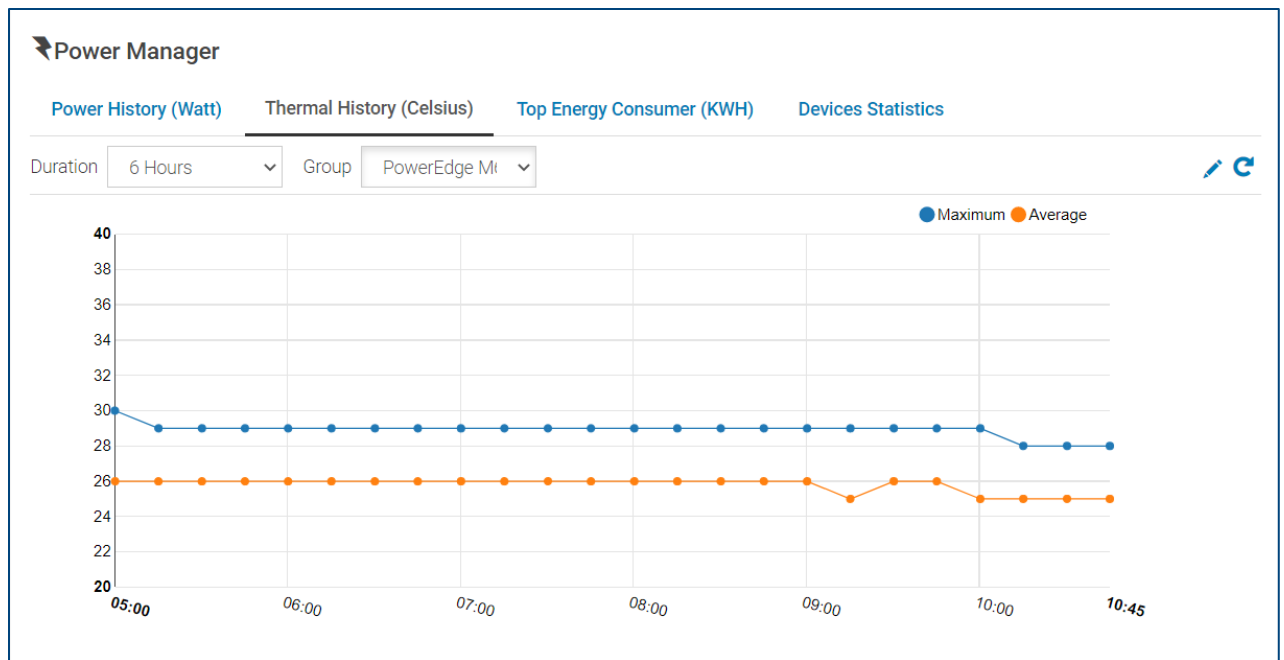


Figure 8 Thermal History Dashlet

5.3 Top Energy Consumers

This dashlet has been described in the previous [section](#).

5.4 Device Statistics

This dashlet displays two bars—Capable Devices and Monitored Devices. The Capable Devices bar represents the devices discovered in OpenManage Enterprise that are supported and can be added to Power Manager. The Monitored Devices bar displays the number of devices that are being Monitored by Power Manager. This information represents the correlation between the number of devices capable of being monitored by Power Manager and the actual number being monitored by Power Manager.



Figure 9 Device Statistics Dashlet

6 Disabling Power Manager

Power Manager provides an option to disable the plugin. In certain cases, such as during maintenance work, there is no requirement to monitor the devices in the data center. This feature is useful during such instances where the functionality of the plugin is temporarily disabled, allowing you to focus on the critical tasks. You need to keep the following in mind before disabling the plugin.

- Ensure that you disable any active policies and EPRs on any of the devices and groups monitored through Power Manager.
- Download the Power Manager Reports so that the old data is available.
- Ensure that you take a snapshot of the appliance.

It is possible to enable the plugin whenever you want to and Power Manager resumes its functionalities. It is important to note that you have to enable all the policies and EPRs that were previously disabled prior to disabling the plugin.

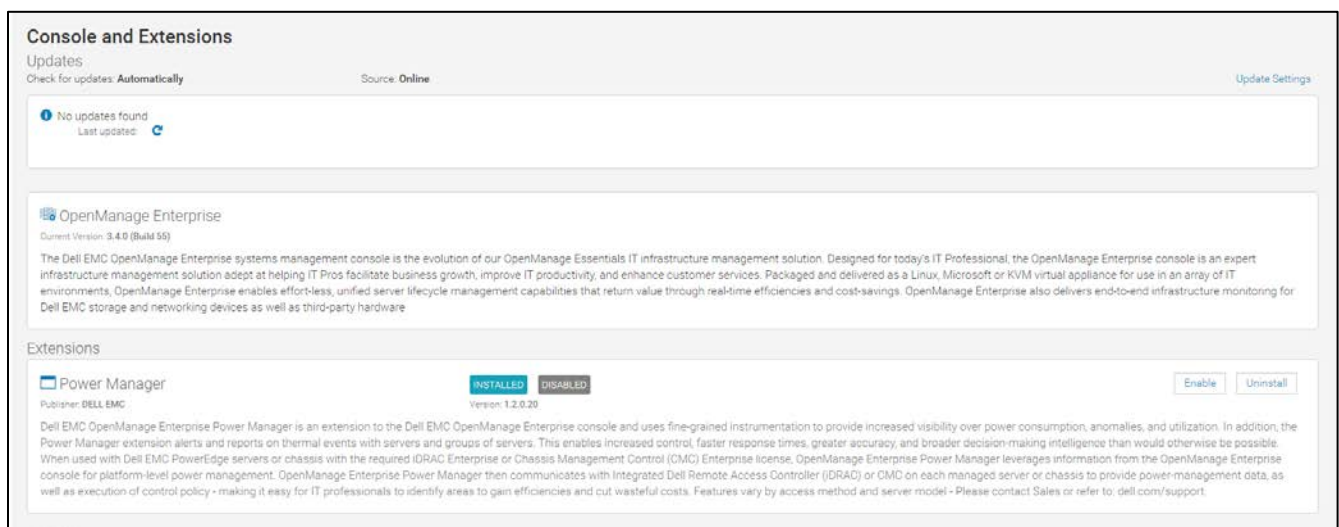


Figure 10 Console and Extensions page after disabling Power Manager

7 Understanding Power Manager Settings

There are various Settings available in Power Manager that serve various purposes. This section specifies the use of each of these features. View the Power Manager Settings by navigating to Power Management→Settings tab.

7.1 Monitoring Units

Use this section to select the measurement units for power and thermal data. Since different regions use different measuring units, this section allows you to select the scale of your choice.

7.2 Data Intervals

Use this section to select the time interval to collect power, thermal, and utilization data from the devices monitored through Power Manager. The following three options are available—15 minutes, 30 minutes, and 60 minutes. By default, the interval is set to 15 minutes. In cases there are more than 1000 devices to monitor in Power Manager, the interval automatically changes to 30 minutes. If the number of devices that are monitored is less than 1000, the recommendation is to select the 15 minutes interval. When the number of devices range between 1000 and 3000, the recommendation is to select the 30 minutes interval. When more than 3000 devices are monitored, it is recommended to select the 60 minutes interval.

7.3 Durations

Use this section to select the respective time durations. Power Manager provides options for three different durations:

- Duration of Top Energy Consumers—use this setting to select the duration for which you want to view the Top Energy consumers in the dashboard. This is helpful to determine the devices and groups that are consuming most of the energy during a specified duration.
- Report Duration—use this setting to select the duration for which the Power Manager built-in reports need to be displayed. This option helps the user by allowing to view reports for specific durations.
- Aggregation Period—use this setting to choose the aggregation period for the data displayed in Reports. For example, if you choose the Report Duration as 1 day and Aggregation Period as 1 hour, the data displayed on running a built-in report is for the past one day and the data is aggregated on hourly intervals.

7.4 Preferences

Use this section to manage Power Manager data. Power Manager provides the following two options:

- Delete Power Manager Data—use this option to choose whether the historical data and configured thresholds need to be deleted from Power Manager or not when a device or group is removed from Power Manager. If you select **No**, the data is not deleted when the devices or groups are removed from Power Manager. If you select **Yes**, the data is deleted when the devices or groups are removed from Power Manager. This is useful in situations where a device or group is taken down for maintenance, and you need not monitor the device or group for a short duration. This way, when the device is available for monitoring and it is added back to Power Manager, the previous data is still available. When the devices or groups are removed from Power Manager, you cannot view the historical data even if the Delete Power Manager Data is set to **No**.

Note: If the devices or groups are deleted from OpenManage Enterprise, then the data is deleted irrespective of whether this option is set to **No**.

- **Reset Metrics**—use this option to reset the current cumulative energy consumption and the peak power consumption on the iDRAC console. If this option is enabled, these two values are reset periodically based on the Data Gathering Interval. For example, if this option is enabled and Data Gathering interval is set to 15 minutes, then a reset of cumulative energy consumption and peak power consumption occurs every 15 minutes. This way, the energy consumption and peak power consumption data fetched is cumulative value for those 15 minutes.

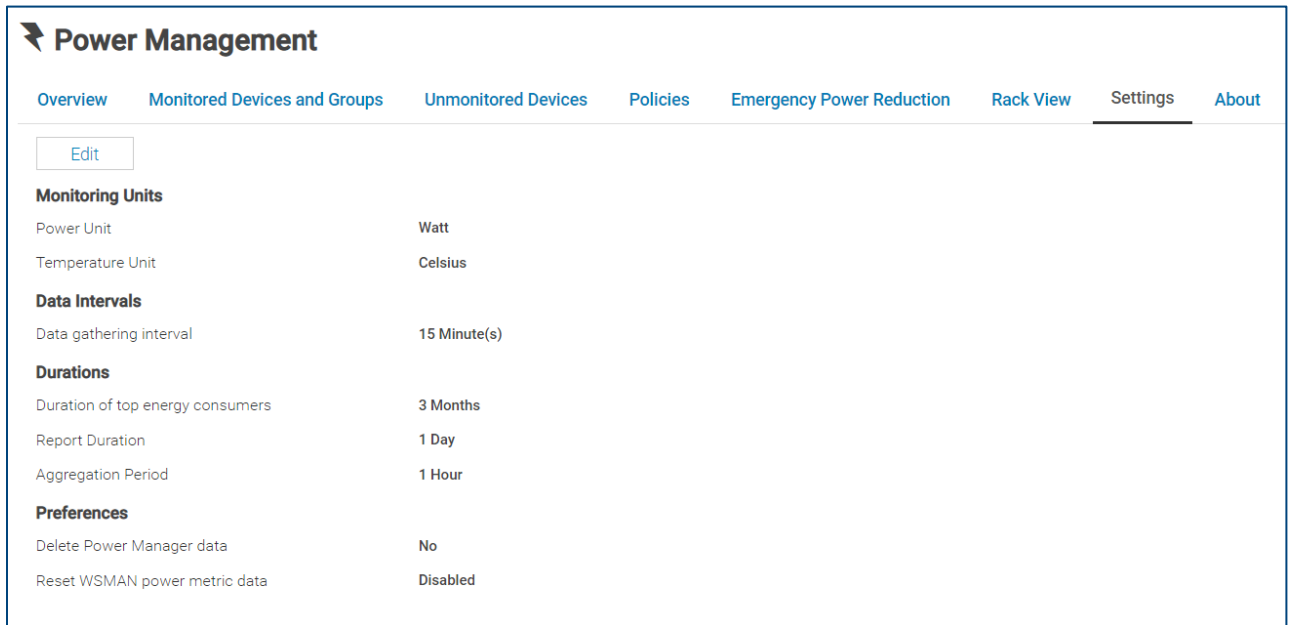


Figure 11 Power Manager Settings

- **Data Purge Interval**—this setting is available in **Application Settings**→**Console Preferences**→**Metric Collection Settings**. Use this setting to determine the frequency at which Power Manager data is deleted. You can set the interval to a value between 30 to 365 days range. For example, if the data purge interval is set to 6 months, data that is older than 6 months is not available. Hence, it is recommended that you take a backup of the data before the data is purged.

Note: This setting was previously available under Power Manager Settings in OpenManage Enterprise Power Manager version 1.0.

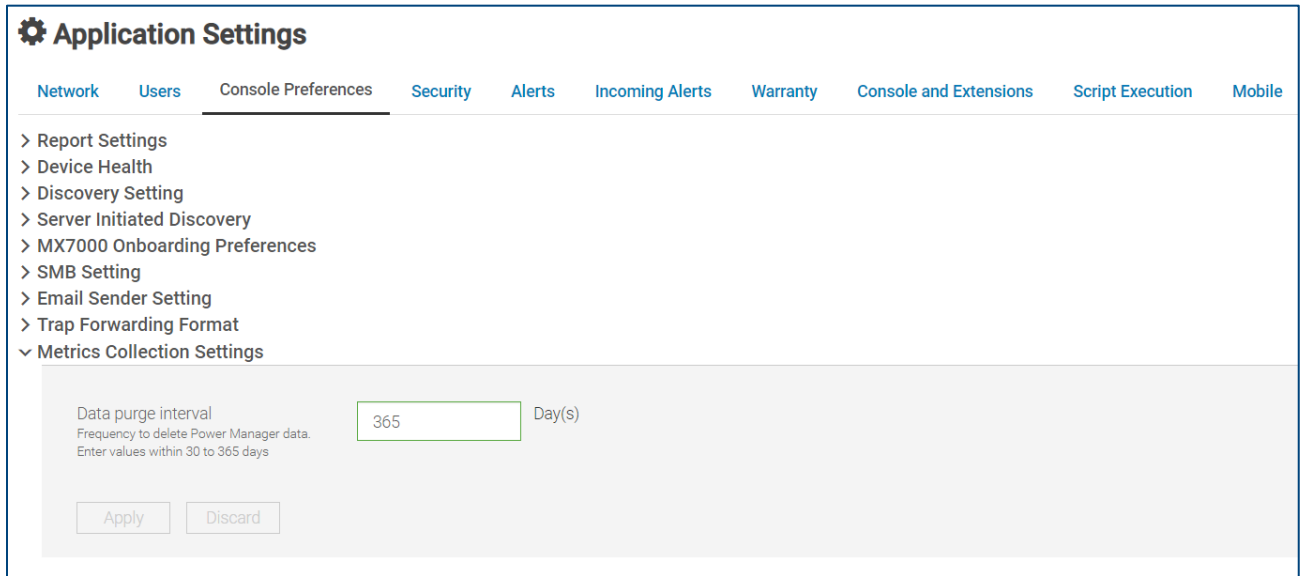


Figure 12 Data Purge Interval setting in OpenManage Enterprise

8 Conclusion

It is a known fact that power consumption of a data center results in huge cost to the companies. The monitoring and management of the power consumption is a critical task and Power Manager eases this task for you. Power Manager provides a great insight into the data center thus allowing the administrators to take necessary actions helping you to maximize energy efficiency. This helps in making the data center more efficient in terms of energy and cost, thus helping move towards a green data center.

9 Technical support and resources

[Dell.com/support](https://dell.com/support) is focused on meeting customer needs with proven services and support.

9.1 Related resources

- Knowledge Base for Dell EMC OpenManage Enterprise [HTML](#)
- Knowledge Base for Dell EMC OpenManage Enterprise Power Manager and Power Center [HTML](#)
- Dell EMC OpenManage Enterprise Power Manager Version 1.2 User's Guide [PDF](#) [HTML](#)
- Dell EMC OpenManage Enterprise Power Manager RESTful API Guide version 1.2 [PDF](#) [HTML](#)
- Dell EMC OpenManage Enterprise Power Manager 1.2 Release Notes [PDF](#)