CASE STUDY

Cloud Data Center
Intel® Data Center Manager

Intel® Data Center Manager Reduces Energy Consumption

Intel® DCM delivers significant annual savings combining server group level automatic switching capability with enhanced utilization

Business:

One of the leading APAC based multinational networking and telecommunications equipment and services company

Challenges

- Real-time monitoring of cross-platform server energy consumption and temperature
- Centralized policy management of server energy consumption
- Enclosure-level energy consumption policies and security assurance
- Automatic discovery and energy optimization techniques for idle servers
- Server-level centralized remote access capability

Solutions

- Intel® Data Center Manager
- Intel® Node Manager

Executive Summary

The development lab of a multinational networking and telecommunications equipment and services company installed Intel® Data Center Manager (Intel® DCM) in its data center. Currently, the total number of servers in the R&D lab's data center exceed 30,000. The pilot deployment included a total of 500 managed servers.

The R&D laboratory IT staff deployed Intel® DCM to assess its value in reducing and optimizing the overall energy consumption of its servers during operations. The IT administrators were able to identify servers that were underutilized, finding utilization low across 16% of its servers. Additionally, it was determined that Intel® DCM's server group level automatic switching capability would significantly reduce energy costs, with the energy-saving rate reaching 23.3%. Moreover, Intel® DCM's ability to deliver device level power and thermal data eliminated the need of intelligent PDUs, another significant source of cost-savings. The Intel® DCM deployment results indicated an annual savings of $2,509,680 USD when deploying the solution across the data center's 30,000 servers.

Background

A multinational networking and telecommunications equipment and services company sought to optimize the data center environment of its development laboratory. The development lab is the innovation engine of the company where they manage servers for various business units.

As the R&D and testing workloads of the development lab continues to increase, the number and types of IT assets, especially server devices in its data center rooms, are also rapidly increasing. Currently, the total number of servers in the R&D lab's data center exceed 30,000. The large number of servers in the data

center bring huge energy costs and hardware maintenance pressures. Moreover, data center KPI indicators such as green energy efficiency and server performance are highly valued by R&D management.

In order to reduce and optimize the overall energy consumption of the R&D laboratory servers during operations, while effectively decreasing the performance risks of information systems and ensuring the smooth development of related R&D services, the R&D lab IT staff deployed the Intel® Data Center Manager (Intel® DCM) in its data center to assess its value in a wider deployment. Intel® DCM is a software and technology product that monitors, manages and optimizes the energy consumption and temperature of data center servers. The test deployment included a total of 500 managed servers.

Intel® Data Center Manager Provides Real-Time Energy & Thermal Monitoring

The R&D lab IT administrators installed Intel® DCM in its facility for server energy-saving analysis. Intel® DCM connects to the server through the server's Baseboard Management Controller (BMC) and Intelligent Platform Management Interface (IPMI) protocols to collect critical performance data in a centralized, active and real-time manner, while monitoring the health status of all parts of the server. The server's built-in Intel® Node Manager chip can be used to intelligently control the overall power consumption of the server, and achieve remote control of the server power supply while the BMC enables software keyboard, video, and mouse (KVM) sessions.

Intel® DCM provides an intuitive IT asset management interface and displays key KPI information for the data center. This enables integrated viewing of server asset information as a basis for optimization. Additionally, Intel® DCM's functionality in a heterogeneous server environment allows servers to be discovered and managed easily. Because server location can be easily located, the R&D lab IT staff was able to search for server assets with any valid field. Server asset information included real-time temperature, real-time power consumption, server name, model number, serial number, and management address among other data.

Based on the information and data obtained from the deployment of Intel® DCM, the energy consumption of the data center was reduced, and the efficiency optimization was improved from multiple perspectives.

Reducing Power Consumption & Optimizing Server Utilization

Intel® DCM enabled the R&D lab IT administrators to collect and visualize server performance data. They were also able to obtain IT equipment temperature and energy consumption data from the server, rack, row and room of the entire data center, and analyze the power consumption data effectively.

Intel® DCM also analyzed server utilization by collecting data collected over a period of time. The R&D lab IT team was able to view the relationship between server power consumption data and utilization and energy optimization potential. Additionally, Intel® DCM allowed IT staff to configure the server group and assign on-off task configurations according to a set policy. The server automatically switched on and off according to the policy to achieve automatic energy savings without affecting the service.

Intel® DCM cooling analysis monitored air inlet temperature, including analysis of server hot spots, computer room cooling environment and energy-saving potential. It also checked the server power consumption and analyzed the differences between varying servers' power consumption characteristics.

Energy Consumption Monitoring and Optimization

In any data center that has been operating for an extended length of time, there will always be some servers that are always on. However, for an extended period there will be no business load and they will remain idle. According to statistics, these so-called "ghost servers" can comprise approximately 15% of the equipment in the data center. Using Intel® DCM's low-performance server analysis, the R&D lab IT staff can easily locate the existence of these ghost servers to make reasonable use of these servers, or to eliminate or deactivate old servers. Alternatively, this analysis can be used to upgrade servers effectively, starting with the use of server devices, to achieve practical and optimized utilization.

Based on more than three weeks of monitoring data, Intel® DCM automatically analyzed and determined low-utility servers and calculated the weekly energy-saving potential. Using Intel® DCM, the R&D lab IT team was able to identify several servers that were underutilized, finding utilization low across 16% of its servers. The deployment results showed that the average utilization of 7 of the 42 servers in one data center room was lower than 10%.

Based on these figures, the Intel® DCM deployment determined that the projected annual savings from identifying and optimizing underutilized or zombie servers in an environment of 30,000 servers is $946,080.00 USD.

Strategically Powering Servers Off/On to Save Power

Using Intel® DCM's server group level automatic switching function, a server is set to automatically switch on and off according to the strategy to achieve effective server energy optimization. This capability allowed the R&D lab IT staff to set the server in the test group to switch on and off automatically within the specified time. The IT staff set the system to perform an automatic shutdown at 6 p.m. on Friday, and perform an automatic start at 8:30 a.m. on Monday, thus saving power. After three weeks, the selected server group can then correctly perform group shutdown and startup tasks automatically.

After data analysis, it was determined that Intel® DCM's server group level automatic switching capability would significantly reduce energy costs, with the energy-saving rate reaching 23.3%. If the energy-saving rate is prorated to a 30,000 server environment, the annual energy-saving cost is projected to be $1,263,600 USD, bringing a rapid ROI of three years.

Thermal Monitoring & Cooling Analysis

Using Intel® DCM's intuitive dashboard, the R&D lab IT staff was able to identify server hotspots that appeared in the data center and analyze the temperature profile of these servers to see how often high temperatures occur. They were also able to monitor the overall cooling environment

TEST DEPLOYMENT MANAGED SERVERS 500

PROJECTED ANNUAL SAVINGS >$2.5M

UNDERUTILIZED SERVERS 16%

AVERAGE UTILIZATION IN DATA CENTER ROOM <10%

ENERGY-SAVING RATE 23.3%

ELIMINATED NEED FOR INTELLIGENT PDUS

of the equipment room in the data center while identifying the cause of any problems, which would lead to possible solutions for improvement.

Intel® DCM's cooling analysis identified excessive ambient temperature and pinpointed hot spots that existed in the data center. Combined with the air intake temperature and cooling analysis view of the rack-level server, it was found that some servers exceeded 27 degrees and there were multiple, local hot spots.

Through the use of Intel® DCM's Intel® cooling analysis, the R&D lab IT administrators were able to optimize heat dissipation for servers that were overheated, such as by moving server locations and adding cold air. Additionally, Intel® DCM will alert IT staff of any thermal events that could have an effect on continuous server operations. This ultimately will assist in avoiding downtime and server failure due to excessive temperatures. The cooling analysis also led them to continue to set up a strategy switch to ensure the safe operating temperature of most servers when the cooling environment is limited.

Lastly, Intel® DCM's ability to provide precise analysis of insufficient or excessive cooling capacity prompted the R&D lab IT staff to gradually adjust the cooling system and make a statistical comparison with the total energy consumption of the equipment room. This allowed them to find the best advantage of reducing the energy consumption of the cooling system, while increasing the energy consumption of the servers.

Additional Key Benefits

From the outset of the test deployment, the R&D lab IT staff benefitted from Intel® DCM's short learning curve, ease of use, and simplicity of deployment. The use of Intel DCM eliminates the need for complex, device-specific configuration, setup or customization.

Additionally, Intel® DCM's ability to deliver device level power and thermal data eliminates the need of intelligent PDUs, which will result in an annual savings of $300,000 USD when the solution is installed in a wider deployment of 30,000 servers.

Lastly, Intel® DCM enabled the R&D lab IT staff to view abnormal events of the hardware components of the servers in real-time and identify hardware errors on some servers. Intel® DCM also allowed IT administrators to set thresholds of key parameters on the servers to ensure normal operation and timely response to failures.

Intel® Data Center Manager Deployment Results

The R&D laboratory IT staff deployed Intel® DCM to assess its value in reducing and optimizing the overall energy consumption of its servers during operations. Using Intel® DCM, the IT administrators were able to identify several servers that were underutilized, finding utilization low across 16% of its servers. The test deployment results showed that the average utilization in one data center room was lower than 10%.

- Based on these figures, the Intel® DCM deployment determined that the projected annual savings from identifying and optimizing underutilized or zombie servers in a wider deployment of 30,000 servers is $946,080.00 USD.

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- If the energy-saving rate is prorated to an environment of 30,000 servers, the annual energy-saving income is projected to be $1,263,600 USD, bringing a rapid ROI of three years.

Intel® DCM's ability to deliver device level power and thermal data eliminates the need of intelligent PDUs, which will result in an annual savings of $300,000 USD when the solution is installed in a wider deployment of 30,000 servers.

- Based on Intel® DCM deployment results, the anticipated annual savings of deploying the Intel® DCM solution across the R&D laboratory of 30,000 servers is $2,509,680 USD.

Where to Get More Information

For more information on Intel® Data Center Manager, visit **intel.com/dcm** or contact **dcmsales@intel.com**

About Intel® Data Center Manager

Intel® Data Center Manager (Intel® DCM) provides accurate, real-time power, thermal and health monitoring and management for individual servers, group of servers, racks and IT equipment in the data center. It's a capability that is useful for both IT and facility administrators, which allows them to work jointly to increase data center efficiency and uptime.

PUE is an indicator defined by Green Grid, a global consortium working to improve power efficiency in the data center system. PUE is a metric for the efficiency of electricity use, defined as:

$$\text{PUE} = \frac{\text{Total power dissipation in a target facility}}{\text{Total power consumption for the IT equipment}}$$