CASE STUDY

Cloud Data Center
Monterrey Institute of Technology and Higher Education

Improving Cooling, Energy Consumption and Server Visibility

Intel® DCM delivers significant annual savings by providing automated data collection and thermal control, while enabling visibility and optimization

Business:

Monterrey Institute of Technology and Higher Education

Challenges

- Real-time server power and thermal data collection
- Real-time health monitoring
- Cooling analysis
- Cross-platform support
- Alerting and aggregated control to gain impact visibility into Computer Room Air Conditioning (CRAC) hotspots

Solution

- Intel® Data Center Manager

Executive Summary

The Monterrey Institute of Technology and Higher Education installed Intel® Data Center Manager (Intel® DCM) and began to implement the solution in its two on-campus server rooms as well as an off-campus colocation operation. The ultimate goal of the educational institution is to leverage Intel® DCM to effectively consolidate its data centers as it moves appropriate workloads into the cloud.

With its intuitive format and ease of use, Intel® DCM was quickly deployed across multiple platforms to gain insight into the capacity planning and cooling efficiency of their data centers. Intel® DCM was deployed across 500 servers — 350 servers within the data centers and an additional 150 servers the educational institution migrated to the cloud during this DCM deployment.

Through the use of Intel® DCM features such as real-time power and thermal data collection, server health monitoring, cooling analysis, and remote access control, IT administrators began to assess the capacity efficiency of their operations and compile reports on their findings. They used this data to begin consolidating their on-campus servers and cooling equipment into one room. The added visibility provided by Intel® DCM allowed them to safely and efficiently perform the data center consolidation and cloud migration, as well as delivered environmental data and insights that IT administrators previously did not have access to.

Upon installation, Intel® DCM analyzed and controlled power and thermal consumption in real time through data aggregation as well as optimized server temperature levels across multiple platforms. Its remote access and control capabilities allowed greater visibility into the remote servers from the institution's on-campus location, reducing the need for visits to their third-party colocation facility.

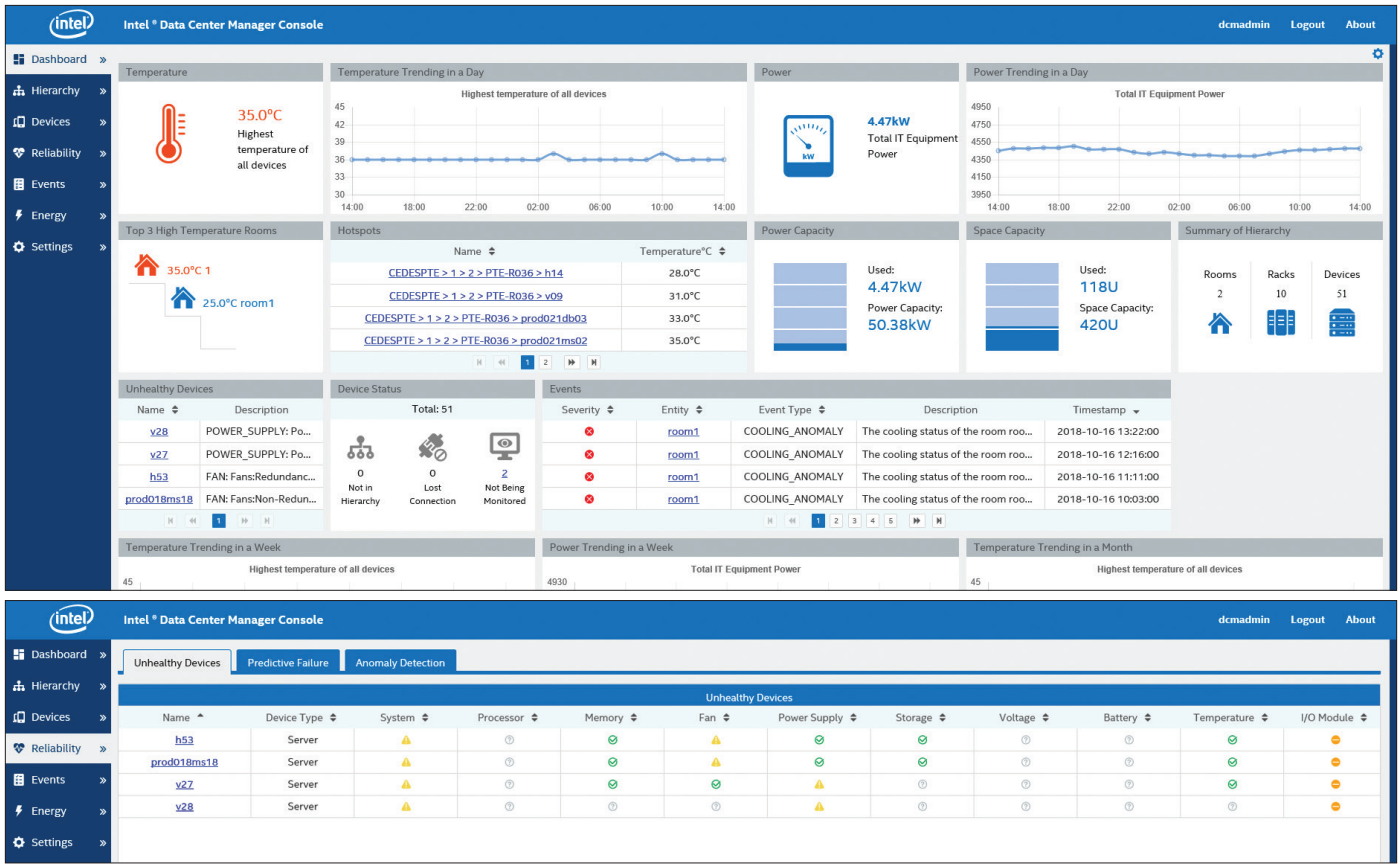

Figure 1. Intel® Data Center Manager Console

Intel® DCM's cooling analysis also enabled data center staff to raise air temperatures and drive redundancy, while simultaneously eliminating the risk of downtime or performance complications, as well as continuously monitoring servers to correct issues in real-time. The reduction in Computer Room Air Conditioning (CRAC) unit operation and space allocation costs would save the institution $2,500,000 USD.

Background

The Monterrey Institute of Technology and Higher Education installed Intel® DCM and began collecting data from its two primary campus server rooms as well as off-campus colocation operation. Prior to Intel® DCM, the data center relied upon manual data collection and lacked clarity as to workload balance. With its intuitive format, the Intel® DCM solution allowed the institution's IT staff immediate visibility into the server-to-rack-density ratio and thermal health of their on-campus operation. They plan to consolidate on-campus servers and cooling equipment into one room and perform a partial migration of applications and data into the cloud.

Intel® DCM is a middleware, web-service API that integrates easily into existing management systems to monitor, manage and optimize the energy consumption and temperature of data center servers. Once the server data was collected, IT administrators used it to assess cooling efficiency.

Through its ease of use and cross-platform support, Intel® DCM enabled IT staff to visualize trend data with features like 2D front of rack visibility and overhead mapping. Intel® DCM power, thermal and health monitoring features also aggregated to the precise server rack, row, and room to allow efficient management and quick response times.

While in the data center consolidation process, the team began to deploy workloads for applications that fit specific profiles into the cloud. Intel® DCM subcomponent monitoring capabilities provided this deep profile awareness. Once the consolidation is complete, the IT staff will return the extra space to the educational institution for reallocation.

Intel® DCM Provides Real-Time Power and Thermal Data Collection

Data center thermal design and energy policy execution may cause temperatures to reach upper limits, maxing-out power consumption and leading to hot spots and inefficient use of energy. Moreover, a lack of visibility into actual power consumption leads to energy usage well beyond the levels needed to maintain reserve margins.

Using Intel® DCM real-time power and thermal data, the institution's data center team was able to perform an initial power and thermal data analysis, and define a starting point to begin the new layout for data center consolidation.

With Intel® DCM, data collection requires no additional operating system rights or privileges, simplifying the hardware tracking process across multiple platforms. The data points and cooling analysis Intel® DCM provides allowed the IT team to safely move and redeploy hardware at a greater density and efficiency.

Intel® DCM Provides Real-Time Health Monitoring, Allowing Granular Visibility

Traditionally, IT teams rely on estimates and resort to overprovisioning to maintain reserve cooling margins. Intel® DCM provides cross-platform visibility into actual power and inlet temperatures in data center spaces by rack, row, and room. The IT administrators utilized Intel® DCM health monitoring to obtain granular sub-component power usage data, and analyze it to determine where racks could be loaded more efficiently.

Intel® DCM provides power and thermal control and management for servers, racks, and groups of servers. IT administrators were not only able to aggregate real-time accurate power and thermal consumption data for their servers, but also manage data center power consumption more efficiently in the new configuration. This approach enables uniform and sufficiently granular temperature distribution between hot and cold aisles. It also builds cooling redundancy by allowing IT managers to switch idle servers on and off.

In addition, Intel® DCM offers a single solution for power management across all devices in the data center, supporting the multiple proprietary power measurement and control protocols required by different Original Equipment Manufacturers (OEMs).

Improve Capacity Planning and Increase Rack Density

Monitoring server health levels, while eliminating the risk of downtime and performance complications, had been difficult for the educational institution due to lack of visibility. Intel® DCM automates the collection, management, and analysis of power and temperature readings at the individual device level. Leveraging this granularity, data center managers can improve capacity planning, identify and decommission energy-wasting assets, and strategize new equipment outlays using predictions based on actual energy usage.

Intel® DCM's cross-platform visibility allows real-time aggregated control for remote server deployments. IT staff were able to automate trend reporting and monitor remote server nodes from their on-site operation. Before this, they were only able to visit the third-party colocation facility once a week and collect data manually.

Intel® DCM sends alerts in real time and provides insight into the subcomponent health of individual servers, allowing administrators the capability to power devices on and off from remote locations.

Intel® DCM stores server-related measurement data such as current power consumption, and its historical trending feature maintains this data for a year. This data provides the foundation for high-precision capacity analysis, reliable capacity planning, and accurate threshold monitoring.

Intel® DCM Provides Cooling Analysis

The lack of visibility into actual power consumption leads to energy usage well beyond the levels needed to maintain reserve margins, making energy policy execution inefficient.

Using the Intel® DCM cooling analysis feature, IT staff were able to assess the efficiency of their facility cooling and move their devices in the data center, while continually monitoring devices to anticipate and correct issues as they happened. Their efforts reduced cooling costs and improved PUE, thus increasing energy efficiency.

This management capability included real-time monitoring of actual power and venting temperature data aggregated to servers, racks, and groups of servers, as well as specific server health component monitoring.

DEPLOYMENT DEVICES
500
Total servers: 350 in data center, 150 to cloud

CONSOLIDATION INTO ONE DATA CENTER
Two on-campus + one third-party data center

REDUCTION IN AC UNIT REQUIREMENTS
Increased energy efficiency

REMOTE ACCESS TO OFFSITE COLOCATION
Greater visibility and reduced need for visits

INTEL® DATA CENTER MANAGER SAVINGS
$2.5M
Projected savings

REPURPOSING OF EXPENSIVE SPACE
Educational institution space reallocation

Figure 2. Key Benefits of Intel® DCM

Intel® Data Center Manager Deployment Results

Using Intel® DCM, the Monterrey Institute of Technology and Higher Education established a power monitoring strategy and safely consolidated their data centers, while achieving optimal capacity deployment across 350 servers. IT staff also successfully migrated 150 servers to a cloud solution. Intel® DCM also simplified the thermal management functionality within a heterogeneous server environment, which unified the data center's thermal management and energy efficiency.

- Using Intel® DCM, IT administrators collected thermal and health data from their servers in real time, gaining insight that helped them better plan and prepare for their cloud migration and data center consolidation.
- Based on this enhanced visibility into the health of their servers, IT staff was able to combine their on-site server rooms and build redundancy into their cooling system with remote powering off/on capability, while enjoying granular server visibility and cooling efficiency.
- Intel® DCM data collection and reporting capability allowed IT staff the necessary insight into their operation to be able to consolidate the institution's two on-campus data centers into one, optimize cooling redundancy and decommission the space they no longer needed.

Based on Intel® DCM deployment results, the anticipated savings of deploying the solution across the educational institution's servers is $2,500,000 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:

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