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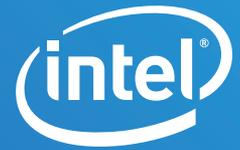
Intel® DCM Optimizes Cooling and Uptime with Virtual Console

Intel® DCM delivers significant savings and efficiency by providing virtual KVM access, thermal visibility and group policy controls for servers

Business:

A Japanese Managed Supercomputer as a Service startup supporting HPC (High Performance Computing) and HPDA (High Performance Data Analytics) for AI, Deep Learning for researchers and scientists.

Challenges

- Real-time server power and thermal data collection
- Real-time health monitoring
- Cooling analysis
- Automated server discovery
- Cross-platform group policy control
- KVM for device management

Solution

- Intel® Data Center Manager

Executive Summary

XTREME-D is a Japanese HPC-as-a-service startup based in Tokyo, Japan, providing high-performance computing (HPC) to support data-intensive research and scientific organizations running artificial intelligence (AI) and deep learning (DL) applications and large scale simulations. The company deployed Intel® Data Center Manager (Intel® DCM) to improve the thermal health of its Intel® Data Center Blocks (Intel® DCB) servers (Intel 1U, 2U, and 2U multi-node devices connected OmniPath) and data center environment. It further sought to reduce downtime by decreasing the Mean Time to Repair (MTTR) for server failures. Finally, it sought to leverage remote access controls and execute group management to reduce man-hours and improve efficiency in its data center operation. The Intel® DCM test deployment was on 100 servers.

The data center staff downloaded Intel® DCM and deployed the intuitive solution to gain insights into the cooling efficiency and health of their data center. Using Intel® DCM's capabilities including cooling analysis, automated server discovery, thermal health monitoring, and remote access control, data center operators began to assess the cooling efficiency of their operations and compile reports on their findings. The added visibility the solution provided allowed them to optimize their operation safely and efficiently.

Because Intel® DCM turns servers into sensors, EXTREME-D avoided purchasing expensive Power Distribution Unit (PDU) hardware. In the initial 100-server deployment, the cost savings would be $5,600 USD.

Intel® DCM's granular visibility allowed data center staff to safely raise temperatures in the server room a total of 3°C while continuously monitoring server health. Factoring in the 100-server subset, the calculated annual savings for driving temperatures higher would be $2,270 USD.
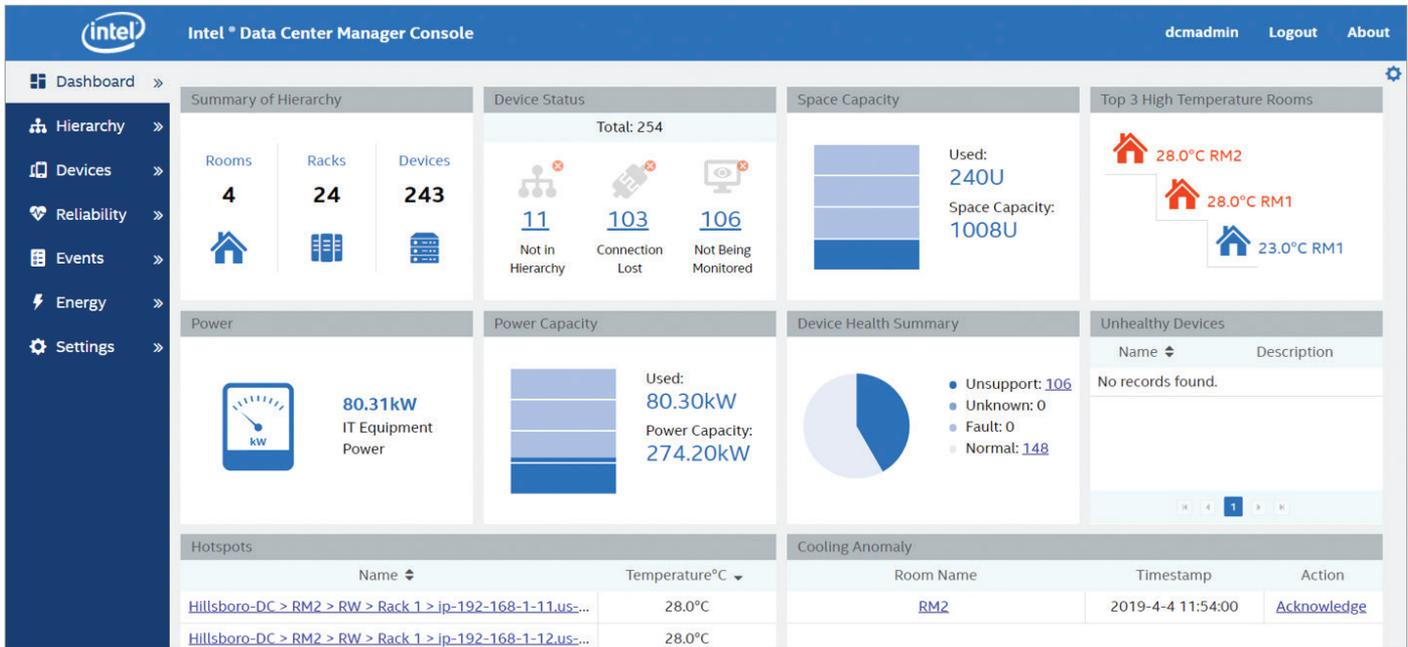
Figure 1. Intel® Data Center Manager Console

Intel® DCM allowed EXTREME-D to improve the Service Level Agreement (SLA) of their operation by providing automated alerts, server location mapping, and diagnostic features to reduce downtime an average of two hours per event ($40 per hour). By lowering the MTTR, Intel® DCM would save the company $960 USD annually for this deployment.

Intel® DCM offers a cross-platform KVM (virtual keyboard-video-mouse) solution to troubleshoot, diagnose server issues, and remote control them too. This eliminates the need for expensive hardware KVM devices, saving the company an additional $6,250 USD.

Finally, Intel® DCM's remote access and patented group policy control features allowed the company to perform a batch firmware update for their Intel® DCB servers, thus eliminating manual processes and yielding the company an annual savings of $125,000 USD.

Deploying Intel® DCM on the company's 100 Intel® DCB Proof of Concept (POC) would yield XTREME-D an annual savings of $140,080 USD.

Background

XTREME-D installed Intel® DCM in its high-performance server data center operation to monitor the power consumption and thermal levels of its devices. The data center staff wanted to reduce overhead margins and improve server health and operational efficiency. IT administrators downloaded Intel® DCM and immediately found its wide range of measurement capabilities and intuitive design easy to use. They quickly began to aggregate and analyze the thermal health data of their servers.

Intel® DCM is a middleware API that integrates with existing management systems providing access to optimize the energy consumption and temperature of servers. The solution enables data center operators remote access to power servers off and on as needed, eliminating the need

for manual processes. Intel® DCM's automated features aggregate data and optimize thermal levels of servers cross-platform.

Intel® DCM quickly gained visibility into the server deployment and began comparing data in real time as well as assessing workloads to determine the cause of inefficiencies across their environment. The thermal and power data collected clearly identified areas for improvement and simplified the diagnostics process for the data center network.

Reducing Cooling Costs by Increasing the Data Center Temperature Set-Point

Energy costs are the fastest-rising expense in data centers especially in environments where high-performance devices have an intensive thermal impact. Operators compensate by maxing out power beyond the requirements for optimum functionality. The lack of visibility into actual power consumption makes energy policy execution inefficient, leading to energy usage beyond the levels needed to maintain reserve margins.

Using the Intel® DCM cooling analysis, the IT staff identified that the set-point for the server room was too cool. The aggregated data and real-time thermal health monitoring features allowed them to raise server room temperatures by 3°C while monitoring data center devices for temperature issues. The solution improved the Power Usage Effectiveness (PUE) for the test deployment servers by a level of two, which would reduce annual cooling costs significantly if deployed across the network.

Improving Data Center SLA and Uptime by Identifying Component Failures without Additional Hardware

Service level agreements are hard to implement when server health data is limited. Intel® DCM uses the sensors in each server to capture thermal health data, allowing the servers

to act as wireless sensors to precisely track health and send alerts.

Intel® DCM allowed the IT team to capture real-time subcomponent health data of each of its servers providing the ability to diagnose and root cause issues while recommending fixes. This ability to monitor the health of each server according to power consumption, thermal health, and utilization levels made the expense of purchasing of hardware PDUs (two per rack) unnecessary while reducing downtime and maintaining peak efficiency.

Intel® DCM's alerting and diagnostic capabilities shortened the MTTR an average of two hours per event due to early detection and location mapping. If deployed across the larger operation the increased uptime would provide significant cost savings for XTREME-D.

Intel® DCM KVM Access Remote Server Visibility and Control from Anywhere

Intel® DCM allows data center operators to replace legacy KVM (keyboard-video-mouse) hardware with an easy to integrate API. The solution supports multiple Original Equipment Manufacturers (OEMs) server vendors with one easy-to-install console, reducing complexity and adding new capabilities beyond the limits of complicated, expensive KVM hardware. Intel® DCM's console controls and manages servers over a centralized dashboard for remote access, subsystem monitoring, automated health alerts, and remote on/off control.

Because Intel® DCM KVM for device management gave administrators remote access, the need for hardware based KVM devices was eliminated. The startup deployed this feature across servers to power servers off/on as required from the convenience of remote locations.

Intel® DCM Provides an Intelligent Group Policy Engine, Allowing Cross-platform Server Management

In a study sponsored by Intel in the summer of 2018, researchers found data centers in both the U.S. and U.K. use a combination of automated and manual processes. Though manual processes are inefficient, IT managers spend up to 40 percent of planning time finding ways to implement strategies to compensate.

Intel® DCM offers a single solution for different OEMs, providing cross-platform visi bility and control. This deep insight enabled the company IT administrators to track and update the firmware on its Intel® DCB servers as recommended across its server network. Additionally, the Intel® DCM intelligent group policy engine allowed IT operators to perform these updates in batches from a remote location. This consolidated, centralized access allows operators to reach any rack, blade or combination from one console controlling up to 50 concurrent KVM server sessions at a time.
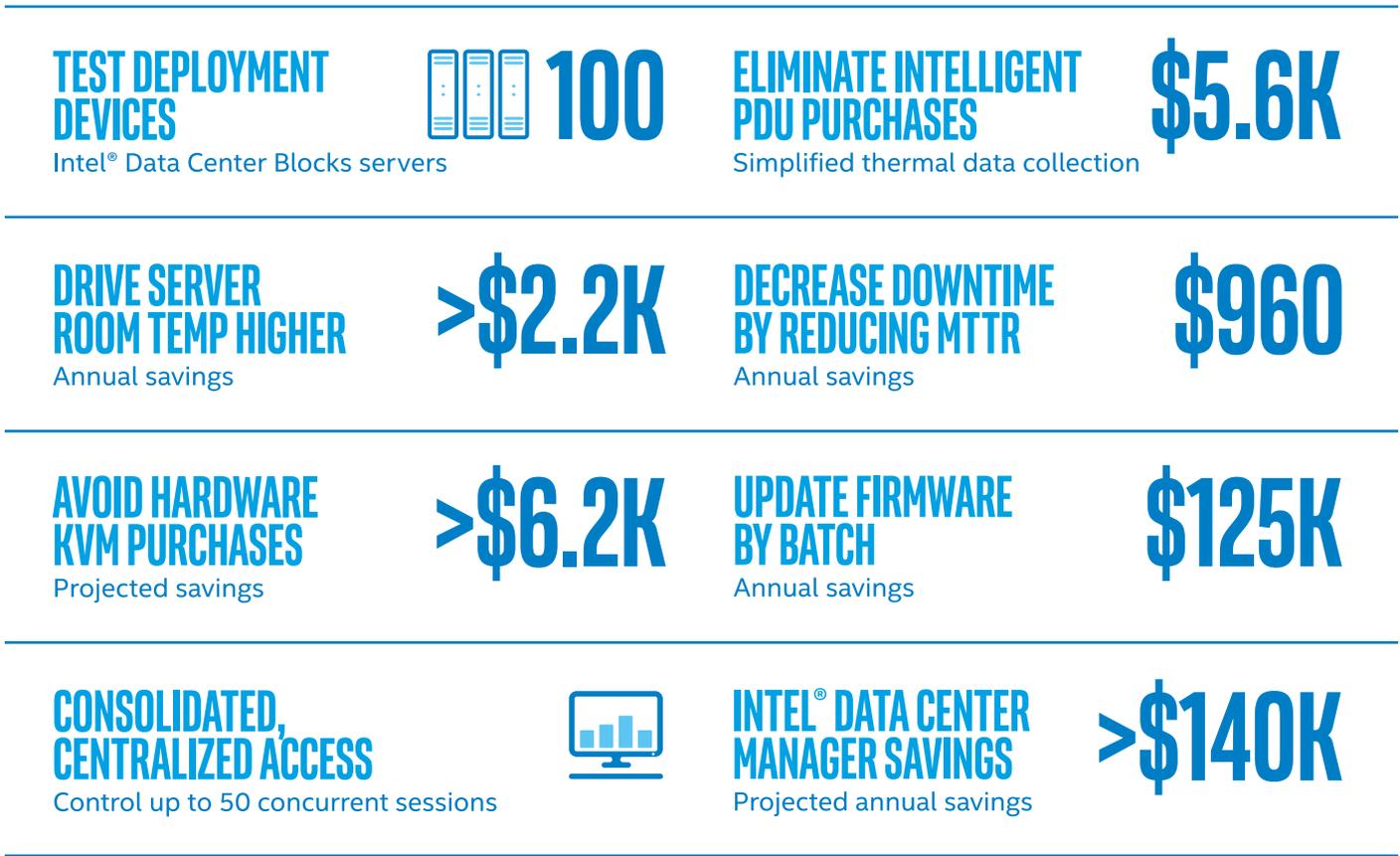
TEST DEPLOYMENT DEVICES Intel® Data Center Blocks servers	**100**	**ELIMINATE INTELLIGENT PDU PURCHASES** Simplified thermal data collection	**$5.6K**
DRIVE SERVER ROOM TEMP HIGHER Annual savings	**>$2.2K**	**DECREASE DOWNTIME BY REDUCING MTTR** Annual savings	**$960**
AVOID HARDWARE KVM PURCHASES Projected savings	**>$6.2K**	**UPDATE FIRMWARE BY BATCH** Annual savings	**$125K**
CONSOLIDATED, CENTRALIZED ACCESS Control up to 50 concurrent sessions		**INTEL® DATA CENTER MANAGER SAVINGS** Projected annual savings	**>$140K**

Figure 2. Key Benefits of Intel® DCM

Intel® Data Center Manager Deployment Results

XTREME-D established a power monitoring strategy in its supercomputing environment. The company was able to achieve optimal thermal health while managing operational costs successfully. Through the use of Intel® DCM, the company was able to improve the health and thermal management of its servers, allowing their customers better reliability and performance for their Artificial Intelligence and Deep Learning tasks. Based on this enhanced control and visibility into the thermal health of its servers and facility cooling, the company IT staff was able to lower power usage by nine percent, the industry standard three percent per degree and safely raise room temperatures in their server room. By deploying Intel® DCM, the company was able to capture a significant reduction in spending and maintain its Intel® DCB server network at peak efficiency.

- Intel® DCM simplified the thermal data collection process, eliminating the need for expensive hardware PDU purchases and saving the company $5,600 USD.

- Intel® DCM added visibility into the sub-component health of each of the servers and allowed IT staff to safely raise temperatures in their server room by 3°C, yielding an annual savings of $2,270 USD.

- Intel® DCM automated alerts, server location mapping, and diagnostic features reduced downtime an average of two hours per event ($40 per hour). By reducing the MTTR, Intel® DCM would yield an annual saving for 100 servers of $960 USD.

- The Intel® DCM virtual KVM feature needed to support complex hardware and software server environments allowed the data center operators the ability to manage the Intel® DCB servers without the expense of additional KVM hardware at a savings of $6,250 USD.

- Finally, the patented Intel® DCM intelligent group policy engine allowed IT managers the capability to batch update server firmware, saving the HPC startup a substantial $125,000 USD.

Based on these results, the anticipated annual savings of implementing the Intel® DCM solution across the HPC-as-a-service initial deployment is $140,080 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:

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