



INTEL® DATA CENTER MANAGER OVERVIEW

Get Your Data Center Under Control

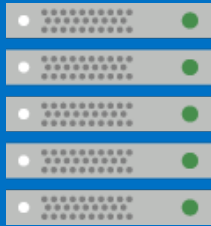
SUMMARY

- **THE NEED FOR ON-DEMAND VISIBILITY INTO DATA CENTER PERFORMANCE**
- **INTEL® DATA CENTER MANAGER (INTEL® DCM) OVERVIEW**
- **DCM FEATURES AND FUNCTIONALITIES**
- **USE CASES**
- **CASE STUDIES**
- **SUMMARY / CALL TO ACTION**

DATA CENTER COMPUTING PROGRESSION

Multiple computing models will persist for foreseeable future

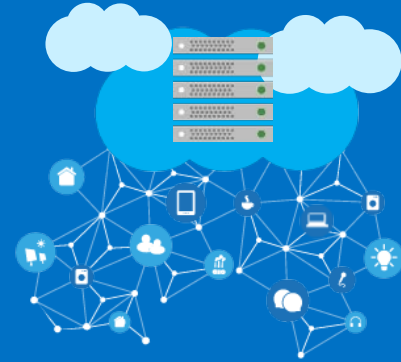
ON-PREMISE



PUBLIC



HYBRID



Data centers demand more visibility and operational control than ever

THE 6 PILLARS FOR A SUCCESSFUL DATACENTER MANAGER

REAL-TIME POWER, THERMAL, HEALTH

Monitoring & analytics
Identify systems with older firmware



HISTORICAL TRENDS AND PREDICTIONS

Improves uptime and helps identify
under-utilized devices



CROSS-PLATFORM SUPPORT

Easy to install, integrate and scale



AGGREGATED DATA

To physical groups
(e.g. room/row/rack) & logical groups



BROAD DEVICE COVERAGE

Better inventory and capacity planning
(PDUs, UPSs, SANs, NASs, etc.)



ACCURATE POWER CAPPING

Helps increase rack density,
Decreases costs and improves efficiency

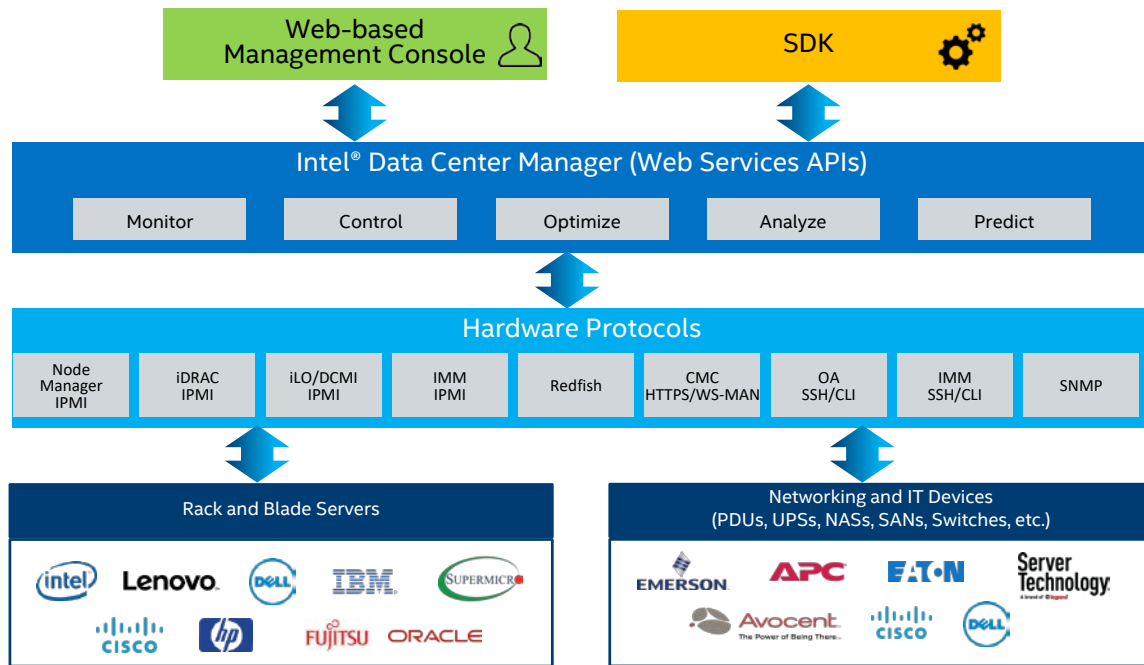


INTEL® DCM OVERVIEW

Intel DCM is a solution for monitoring and managing the health, power, and thermals of servers and a variety of other types of devices.

Intel DCM reduces data center total cost of ownership (TCO) by:

- Improving asset management
- Increasing data center reliability
- Simplifying maintenance
- Optimizing power & cooling efficiency
- Maximizing compute density
- Reducing downtime



Scales to 10Ks of nodes

IPMI = Intelligent Platform Management Interface
 IMM = Integrated Management Module
 SNMP = Simple Network Management Protocol
 WS-MAN = Web Services-Management

iDRAC = Integrated Dell Remote Access Controller
 CMC = Chassis Management Controller
 CLI = Command Line Interface
 DCMI = Data Center Manageability Interface

iLO = Integrated Lights-out
 OA = Onboard Administrator
 SSH = Secure Shell

INTEL® DCM ECOSYSTEM

OEM Partners



Lenovo



FUJITSU

ASUS
IN SEARCH OF INCREDIBLE



SUPERMICRO®

ISVs / Resellers

ABB

ACÃO

Datavision

AMAX

Datcent

Sugon

AJAO

ANIXER

Datacenter
Clarity LC

flex

HEZHONG
合众节能

IFU

JoySuccess
卓盈达科技

MAGUAY

Schneider
Electric

福富软件

GRAPHICAL
NETWORKS

NETZOOMDC
by Allwin Technologies, Inc.

ESIN

NARI
南瑞集团

IG2
GROUP

Bjumper

SIEMENS

TSO logic

OpSys

正睿

TKME
Transmission & Power Markets

RIT

ZTE

国家电网公司
STATE GRID

NEC

Hitachi Data Systems

Direct Customers

SAP



Baidu 百度

intel

UCloud

ebay inc

CERN

EMC

YAHOO!

QINGCLOUD

NIO



ICBC

JD 京东
.COM

中華電信
Chungwa Telecom

Tencent 腾讯

UKFAST

kt

KINGSOFT



CROWDSTRIKE

TURK TELEKOM

头条 TOUTIAO

NTT DATA

Bezeq

SAKURA Internet

京都大学
KYOTO UNIVERSITY

Alibaba.com

mandic
CLOUD SOLUTIONS



WHAT CAN YOU DO WITH INTEL[®] DCM?

VENDOR AGNOSTIC MONITORING / MANAGEMENT



INCREASE RACK DENSITIES



SET POWER POLICIES AND CAPS



IDENTIFY UNDERUTILIZED SERVERS



MEASURE ENERGY CONSUMED BY DEVICE



PINPOINT POWER/THERMAL ISSUES



PREDICT FAN FAILURES & ESTIMATE SSD LIFESPAN



CREATE POWER-AWARE JOBS AND TASKS



IDENTIFY SERVER FIRMWARE VERSION OUTLIERS



SIMPLIFY CAPACITY PLANNING



IMPROVE DATA CENTER THERMAL PROFILE



OPTIMIZE APPLICATION POWER CONSUMPTION



AVOID EXPENSIVE PDUS AND SMART POWER STRIPS



INTEGRATE INTO OTHER MANAGEMENT SOLUTIONS



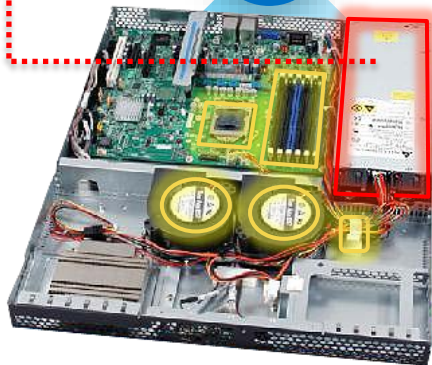
SYSTEM MANAGEABILITY

Monitor server and sub-component health in real time and get alerts

Health Status	Fault (warning)	Management Console
CPU	✓	
Memory	✓	
Fan	✓	
Power supply	⚠ [Power Supply 1] Failure detected, [Power Supplies] Redundancy	
Storage	✓	[Power Supply 1] Failure detected [Power Supplies] Redundancy Lost
Temperature	✓	
Voltage	✓	
Battery	✓	



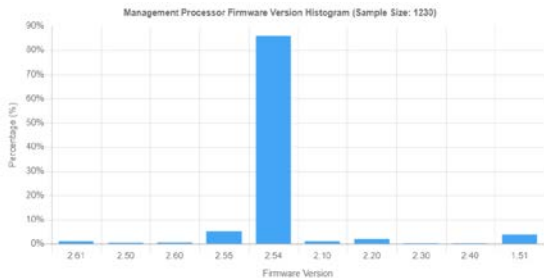
Intel
DCM



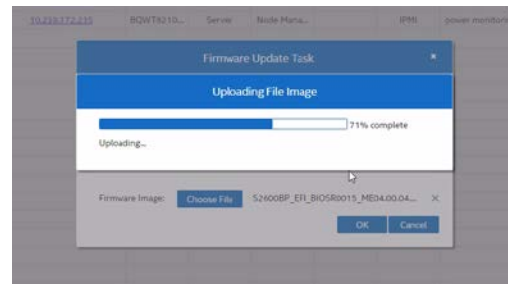
Remote connect to servers via the integrated BMC KVM



Check the FW version of servers and identify outliers



Perform FW updates on Intel Server Systems in batches remotely

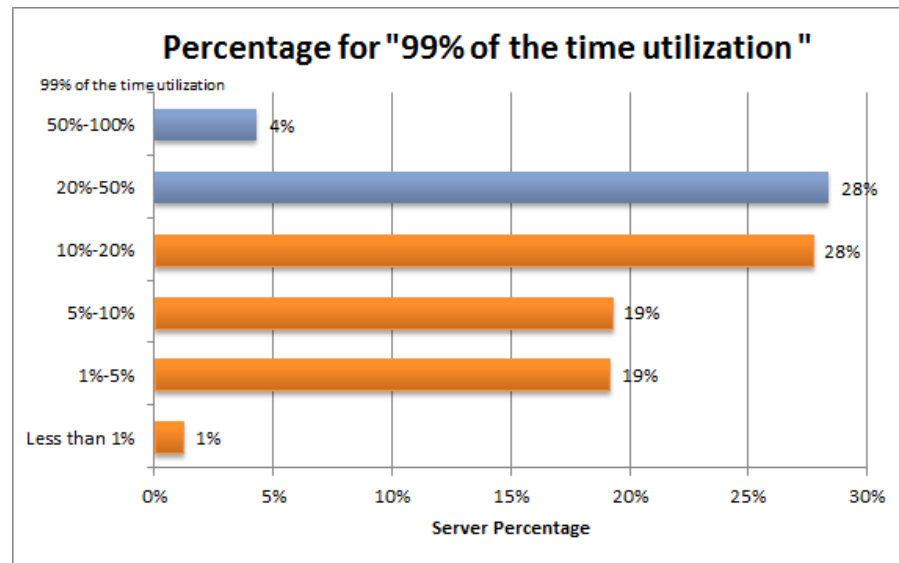


IDENTIFYING UNDERUTILIZED SERVERS

Identifying underutilized or “ghost” servers can be tricky, but can save significant costs

DCM uses historical utilization and power data to determine if servers have not been utilized for a long time

That way you can decide to decide to shut down remotely



PoC Report

POWER OFF LOW-UTILIZED SERVER SAVING \$25,200 PER YEAR

Note: $0.1\text{kw} \times 0.08/\text{kwh} \times 1.8 \times 24 \times 365 \times 1000 \times 20\% = 25,200$

RACK PROVISIONING AND CAPACITY PLANNING

Use case: Provision rack with 4 KW available power

Goal: Fit as many servers as possible within 4,000 W envelope

Traditional method: static provisioning

- 650 watt power supply rating
- Use 400 watts as safe bet from lab measurements for expected configuration
- Install 4,000 W/400 watt per server = 10 servers



Before



After

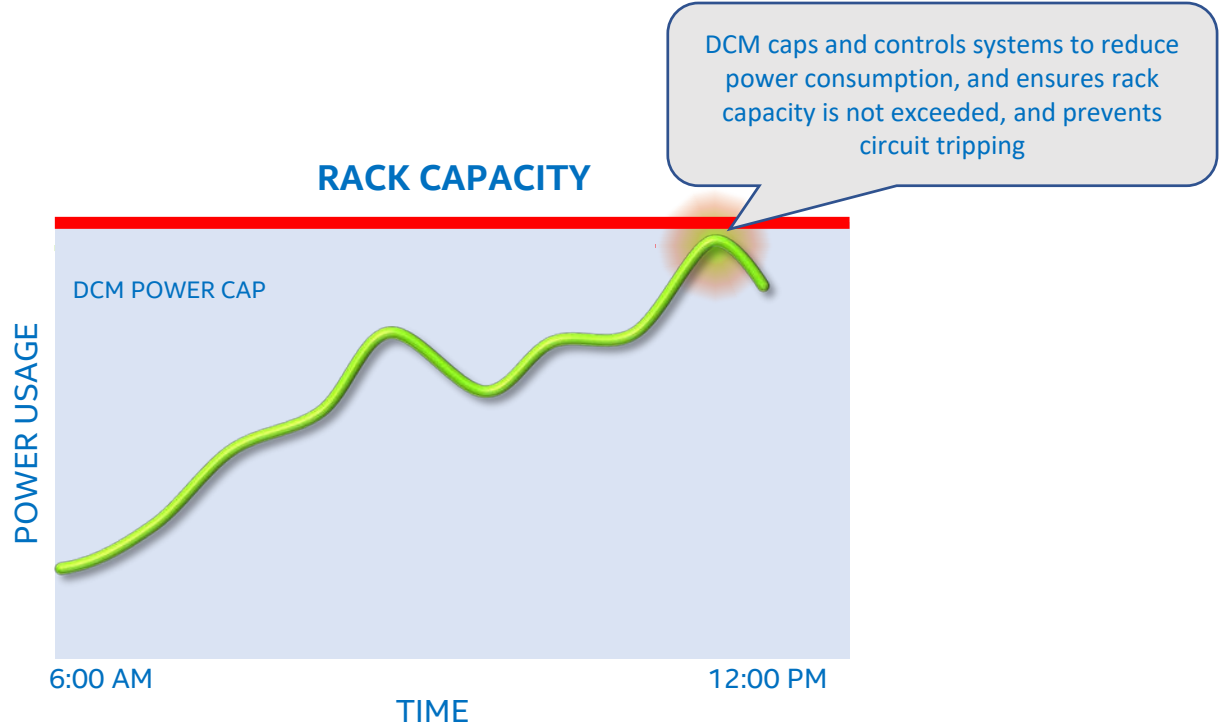
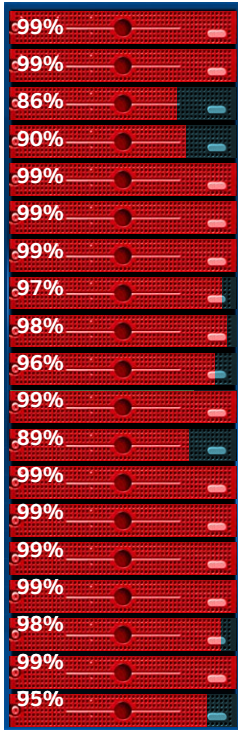
Real time monitoring with power budget enforcement*

- Actual measurements indicates power/server rarely exceeds 250 W
- Use 250 W as aggressive power/server budget
- Enforce 4,000 W global cap for rare cases
- Install 4,000 watt/250 watt per server = 16 servers

PAYOFF: INCREASING RACK DENSITY BY UP TO 60%

*Calculations are based on lab measurements and typical specifications of dual-socket servers provisioned with Intel® Xeon® 5500 or 5600-series processors. Results may vary depending on actual conditions.

POWER MONITORING AND CONTROL



PREDICTIVE DETECTION OF COOLING ANOMALIES

A patented algorithm builds
a model of the temperature patterns

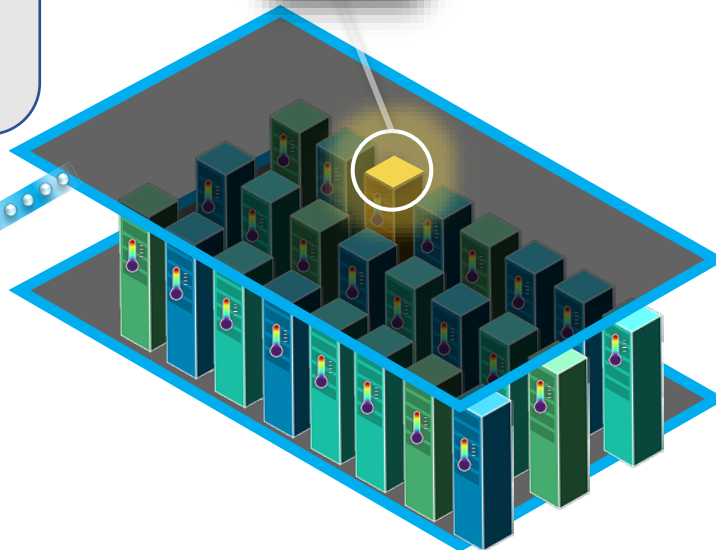
and detects anomalies in time...

... to be resolved before a thermal issue
occurs.

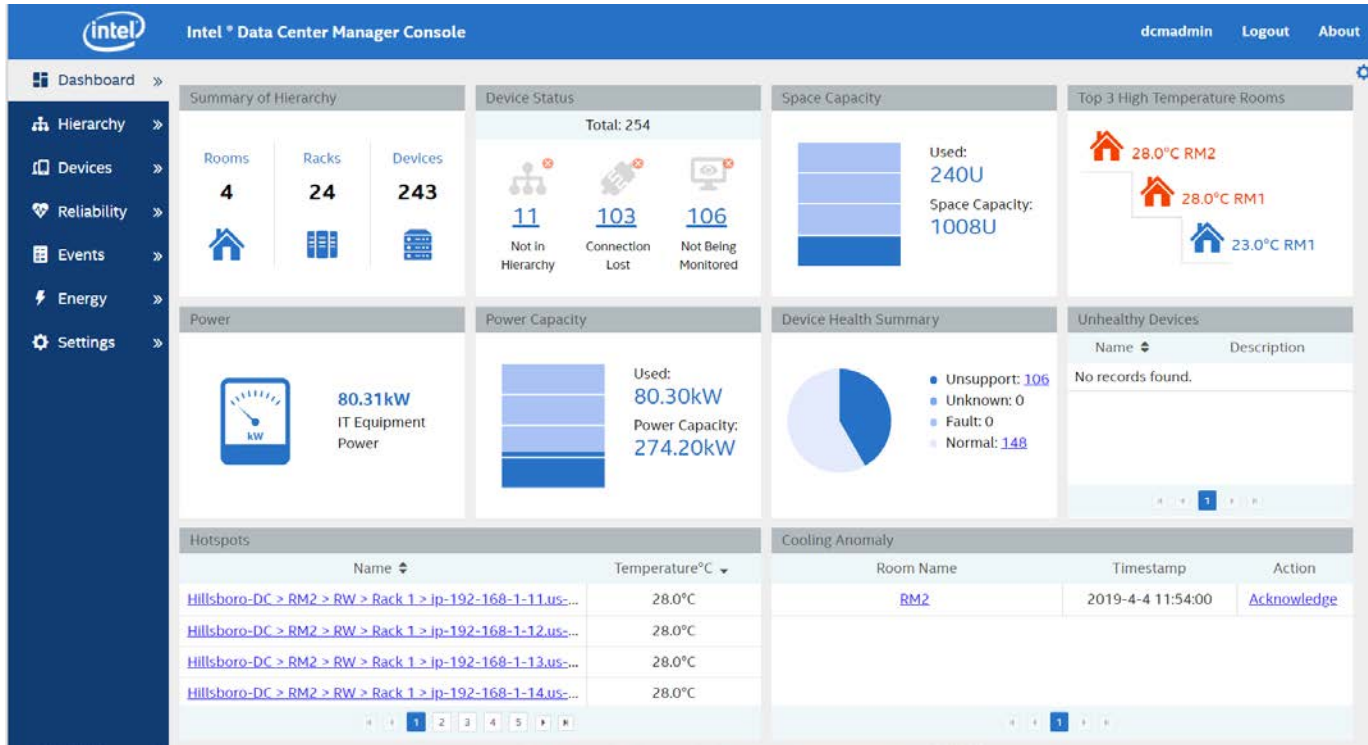


DCM Algorithm

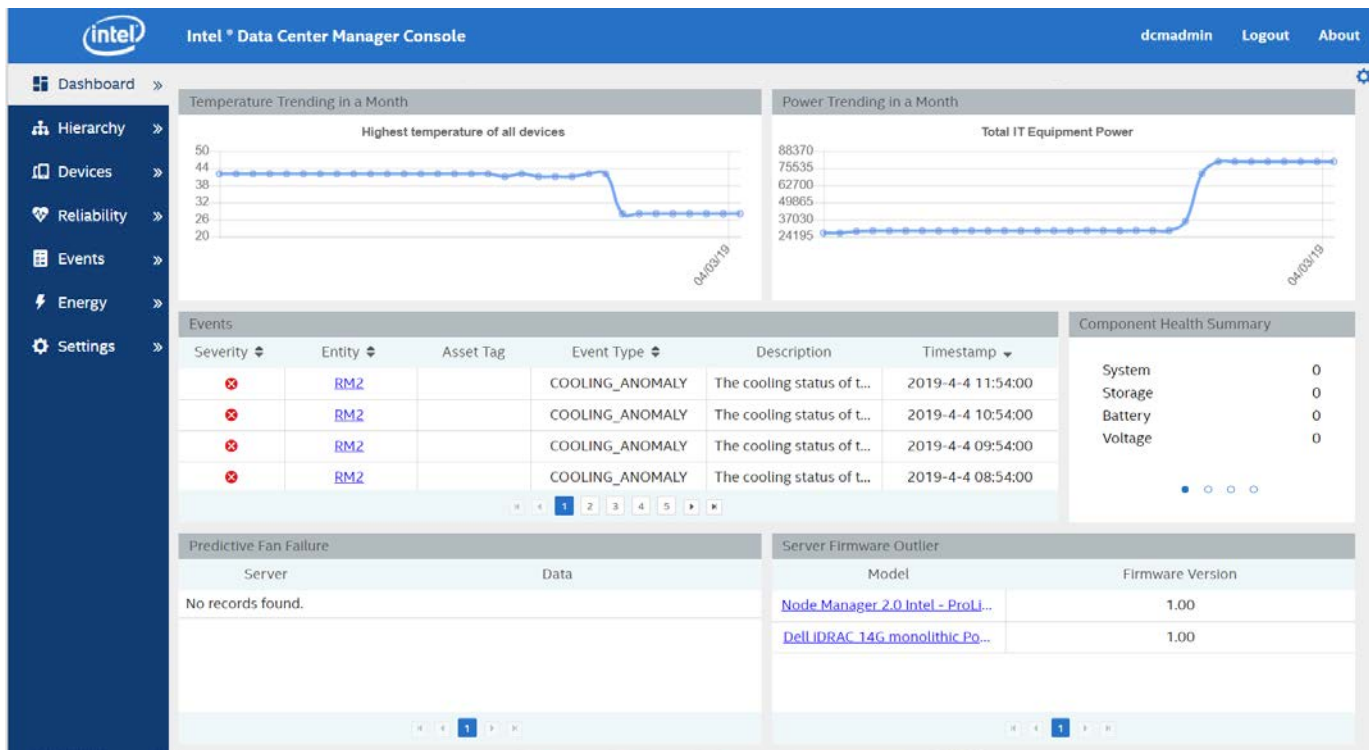
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111100100100100010  
001001001001010101  
100101010101010101  
010010101010111011
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INTEL[®] DCM CONSOLE DASHBOARD



DASHBOARD CONT'D

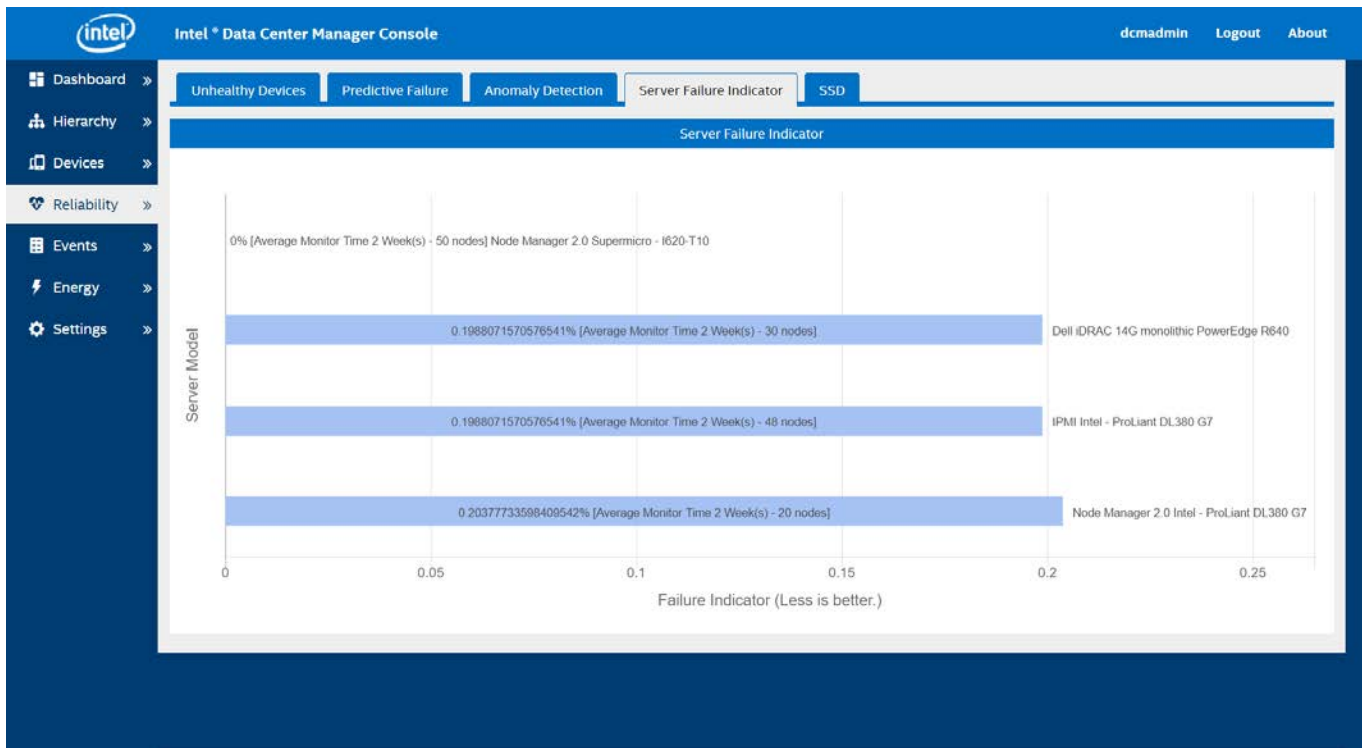


DEVICE HEALTH MONITORING

The screenshot displays the Intel Data Center Manager Console interface. The top navigation bar includes the Intel logo, the text "Intel Data Center Manager Console", and links for "dcmview", "Logout", and "About". A left-hand navigation menu lists "Dashboard", "Hierarchy", "Devices", "Reliability", "Events", "Energy", and "Settings". The main content area features a tabbed interface with "Unhealthy Devices", "Predictive Failure", "Anomaly Detection", and "Server Failure Indicator". The "Unhealthy Devices" tab is active, showing a table with 15 rows of server data. Each row includes a link to the device ID, the device type (all "Server"), and health status icons for System, Processor, Memory, Fan, Power Supply, Storage, and Voltage. The "System" column shows a yellow warning triangle for all devices, while other components show green checkmarks or grey warning icons. A pagination bar at the bottom indicates the current page is 15 out of 17.

Unhealthy Devices									
Name	Device Type	System	Processor	Memory	Fan	Power Supply	Storage	Voltage	
icsl5151	Server	⚠	⊕	✅	✅	⚠	✅	⊕	
icsl5152	Server	⚠	⊕	✅	✅	⚠	✅	⊕	
icsl5153	Server	⚠	⊕	✅	✅	⚠	✅	⊕	
icsl5154	Server	⚠	⊕	✅	✅	⚠	✅	⊕	
icsl5155	Server	⚠	⊕	✅	✅	⚠	✅	⊕	
icsl5156	Server	⚠	⊕	✅	✅	⚠	✅	⊕	
icsl5157	Server	⚠	⊕	✅	✅	⚠	✅	⊕	
icsl5158	Server	⚠	⊕	✅	✅	⚠	✅	⊕	
icsl5159	Server	⚠	⊕	✅	✅	⚠	✅	⊕	
icsl5160	Server	⚠	⊕	✅	✅	⚠	✅	⊕	
icsl5161	Server	⚠	⊕	✅	✅	⚠	✅	⊕	
icsl5162	Server	⚠	⊕	✅	✅	⚠	✅	⊕	
icsl5163	Server	⚠	⊕	✅	✅	⚠	✅	⊕	
icsl5164	Server	⚠	⊕	✅	✅	⚠	✅	⊕	
icsl5165	Server	⚠	⊕	✅	✅	⚠	✅	⊕	

SERVER RELIABILITY INDICATOR



LAYOUT MANAGEMENT

Intel Data Center Manager Console | dcmadmin | Logout | About

Navigation: Dashboard, Hierarchy, Devices, Reliability, Events, Energy, Settings

Layout Management Tabs: Hierarchy, Layout, Capacity

Hierarchy


Data Center	Room	Row	Rack
Hillsboro-DC	RM1	RW	CP-A1
SantaClara-DC	RM2		CP-A2
			CP-B1
			CP-B2
			Rack 1
			Rack 2
			Rack 3

Layout

Temperature Scale: 17°C to 32°C

IP Address	IP Address	IP Address
ip-192-168-1-62.us-west-2	ip-192-168-1-206.us-west-2	ip-192-168-1-19.us-west-2
ip-192-168-1-81.us-west-2	ip-192-168-1-205.us-west-2	ip-192-168-1-18.us-west-2
ip-192-168-1-80.us-west-2	ip-192-168-1-204.us-west-2	ip-192-168-1-17.us-west-2
ip-192-168-1-84.us-west-2	ip-192-168-1-203.us-west-2	
ip-192-168-1-83.us-west-2	ip-192-168-1-202.us-west-2	
ip-192-168-1-89.us-west-2	ip-192-168-1-201.us-west-2	
ip-192-168-1-66.us-west-2	ip-192-168-1-82.us-west-2	ip-192-168-1-16.us-west-2
ip-192-168-1-67.us-west-2	ip-192-168-1-81.us-west-2	ip-192-168-1-15.us-west-2
ip-192-168-1-86.us-west-2	ip-192-168-1-80.us-west-2	ip-192-168-1-14.us-west-2
ip-192-168-1-85.us-west-2	ip-192-168-1-209.us-west-2	ip-192-168-1-13.us-west-2
ip-192-168-1-64.us-west-2	ip-192-168-1-208.us-west-2	ip-192-168-1-12.us-west-2
ip-192-168-1-63.us-west-2	ip-192-168-1-207.us-west-2	ip-192-168-1-11.us-west-2

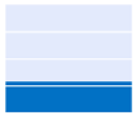
CAPACITY MANAGEMENT

 Intel® Data Center Manager Console
dcmadmin Logout About

Dashboard »
Hierarchy »
Layout »
Capacity »

Hierarchy »
Devices »
Reliability »
Events »
Energy »
Settings »

Power Capacity

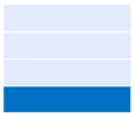


All: 274.20kW

Used: 80.35kW

Unused: 193.85kW

Space Capacity



All: 1008U

Used: 240U

Unused: 768U

Racks

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

Size (U)

Derated Power (W)

Consider Space Continuity

Search

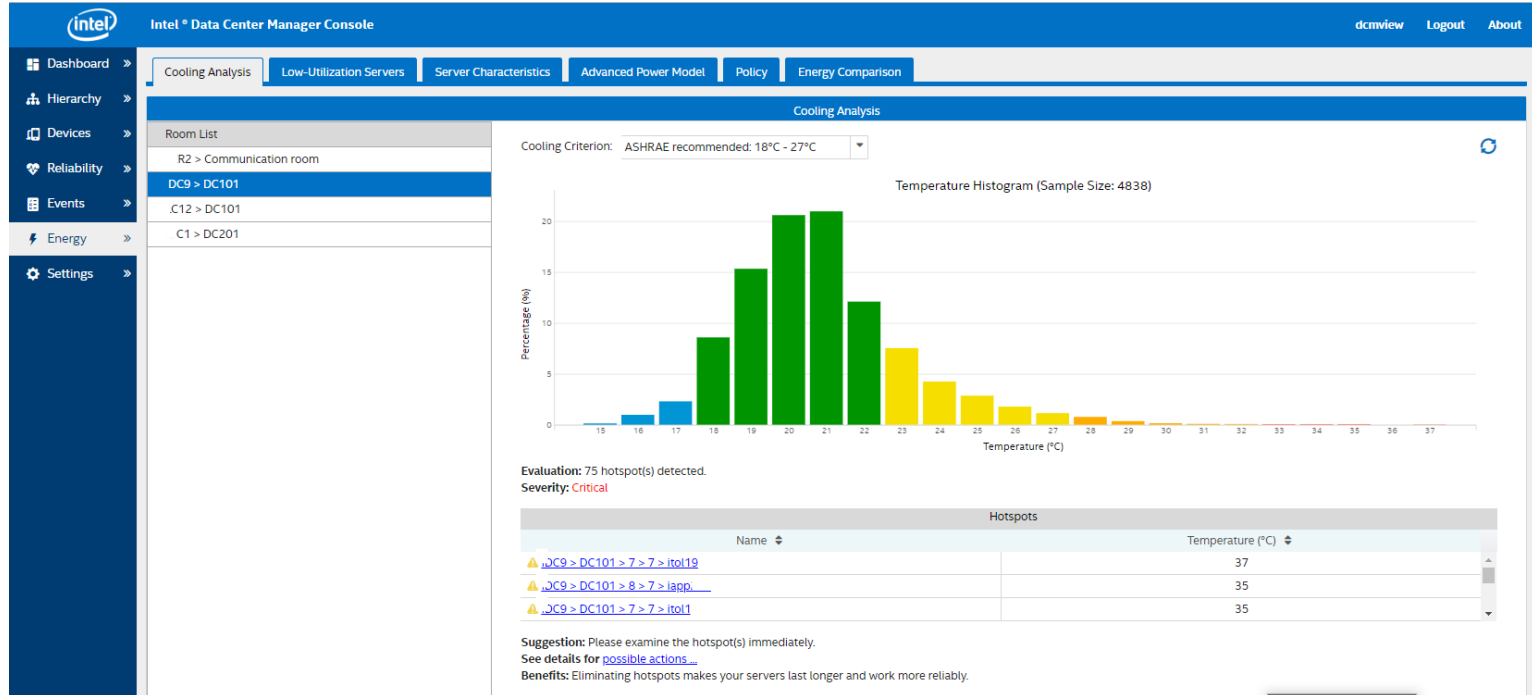
Clear

Planning




















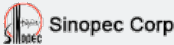



[Export rack capacity data](#)

Rack Name	Space			Utilization	Power		
	Total (U)	Available (U)	Continuous (U)		Total (W)	Available (W)	Utilization
Firmware update-r...	42	42	42	0%	4200	4200	0%
Rack 1 (/Hillsboro...	42	33	32	21.43%	10000	7717	22.83%
Rack 1 (/SantaClar...	42	35	19	16.67%	10000	7905	20.95%
Rack 1-1 (/Hillsbor...	42	27	26	35.71%	10000	5973	40.27%
Rack 1-2 (/Hillsbor...	42	16	N/A	61.9%	10000	1846	81.54%
Rack 1-3(cups) (/HI...	42	15	18	64.29%	10000	1932	80.68%

COOLING ANALYSIS



RECENT CUSTOMER WHITEPAPERS

	Power Monitoring	Increase Rack Density	Ghost Server Identification	Identify Power/Thermal Failure	Improve Thermal Profile	Power Management	Reducing Labor and HW Costs	Remote Access
Use Customers	 <p>Reduced monthly datacenter electricity bill while peak power demand kept increasing</p>	 <p>Allowed customers to increase rack density by 71% by implementing Intel DCM</p>	 <p>Identified 10 – 15% of underutilized servers and virtualized those systems</p>	 <p>UPS uptime can be extended up to 15% with limited performance impact during power outage</p>	 <p>Thermal data collection allows users to see 2D heat maps of the datacenter</p>	 <p>Decreased power by 18% of KWh with little/no impact on performance</p>	 <p>Reduced the costs of manually managing server health by \$200K per year</p>	 <p>Remotely turning off idle servers saved Sohu.com \$94K per year</p>
	 <p>Charge back system allows facilities to correctly charge colo and other service users</p>	 <p>Up to 83% rack density increase within same power envelope with power management policy users</p>	 <p>With 13% of servers underutilized, one compute geo improved usage or terminated devices</p>	 <p>Prolonging business continuity time by up to 25% during power outage</p>	 <p>Raised server room temp by 3°C, a potential 9% savings of annual energy</p>	 <p>Saved 15% power without performance degradation</p>	 <p>Eliminated the need to purchase 600 intelligent PDUs saving \$60K</p>	 <p>Remote diagnosis and remediation of 150K servers</p>
	 <p>Identifies peak electrical usage and reduces usage by 18% during peak hours</p>	 <p>Monitoring capabilities and power consumption ceilings allowed up to a 60% increase in rack density.</p>	 <p>\$630k can be saved in 3 years for a 10k datacenter by consolidating low utilization servers</p>	 <p>Existing alert infrastructure sped up market launch of new product</p>	 <p>4°C increase expected to save 32% in power consumption for cooling</p>	 <p>25% savings on power consumption with DCM ED and Node Manager</p>	 <p>Significantly improved PUE due to reliability of interoperable health monitoring</p>	 <p>Remotely switching servers on/off helped conserve power resulting in \$24K annually</p>

SUMMARY

Whatever your infrastructure is, make sure you are taking advantage of platform telemetry to optimize your datacenter and cloud operations

Make sure you have real-time insights into their power consumption, performance, thermals, utilization, and health

Learn more about Intel® DCM and download the unrestricted 30-day evaluation version of the DCM Console @ www.intel.com/dcm

Check all the latest Intel® DCM customer testimonials and whitepapers too

Reach out to us: dcmsales@intel.com

NOTICES AND DISCLAIMERS

Intel technologies' features and benefits depend on system configuration and may require enabled hardware, software or service activation. Performance varies depending on system configuration.

No computer system can be absolutely secure.

Tests document performance of components on a particular test, in specific systems. Differences in hardware, software, or configuration will affect actual performance. For more complete information about performance and benchmark results, visit <http://www.intel.com/benchmarks>.

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Benchmark results were obtained prior to implementation of recent software patches and firmware updates intended to address exploits referred to as "Spectre" and "Meltdown." Implementation of these updates may make these results inapplicable to your device or system.

Intel® Advanced Vector Extensions (Intel® AVX)* provides higher throughput to certain processor operations. Due to varying processor power characteristics, utilizing AVX instructions may cause a) some parts to operate at less than the rated frequency and b) some parts with Intel® Turbo Boost Technology 2.0 to not achieve any or maximum turbo frequencies. Performance varies depending on hardware, software, and system configuration and you can learn more at <http://www.intel.com/go/turbo>.

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Cost reduction scenarios described are intended as examples of how a given Intel-based product, in the specified circumstances and configurations, may affect future costs and provide cost savings. Circumstances will vary. Intel does not guarantee any costs or cost reduction.

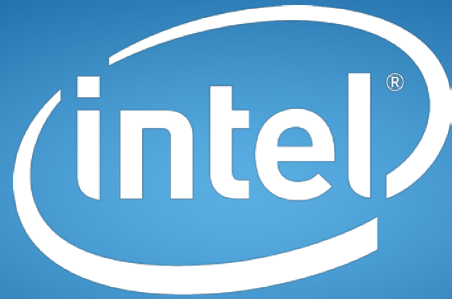
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experience
what's inside™