

# Broadcom BCM5719 Controller Technology

Product  
Brief



Connecting  
everything®

## X4 PCI EXPRESS® QUAD-PORT GIGABIT ETHERNET CONTROLLER



### Highlights

The Broadcom® BCM5719 is a thirteenth-generation 10/100/1000BASE-T Ethernet LAN controller solution suitable for high-performance server applications.

The BCM5719 combines quad triple-speed IEEE 802.3™-compliant Media Access Controllers (MACs) with quad 1000BASE-X/SGMII SerDes transceivers or quad 10/100/1000 Ethernet transceivers (PHYs), selectable individually per port, a Network Controller Sideband Interface (NC-SI), and on-chip memory buffer in a single device.

| BCM5719       |      |
|---------------|------|
| 1G            | ●    |
| 10G           |      |
| NetXtreme® I  | ●    |
| NetXtreme® II |      |
| Ports         | Quad |

● Supported ● Best Choice

### Overview

Built on proven architecture, the BCM5719 provides a PCI Express® v2.0-compliant host interface, which can operate at 5 GT/s or at 2.5 GT/s at x4 link width. The PCI Express supports MSI and MSI-X capabilities and Function Level Reset (FLR).

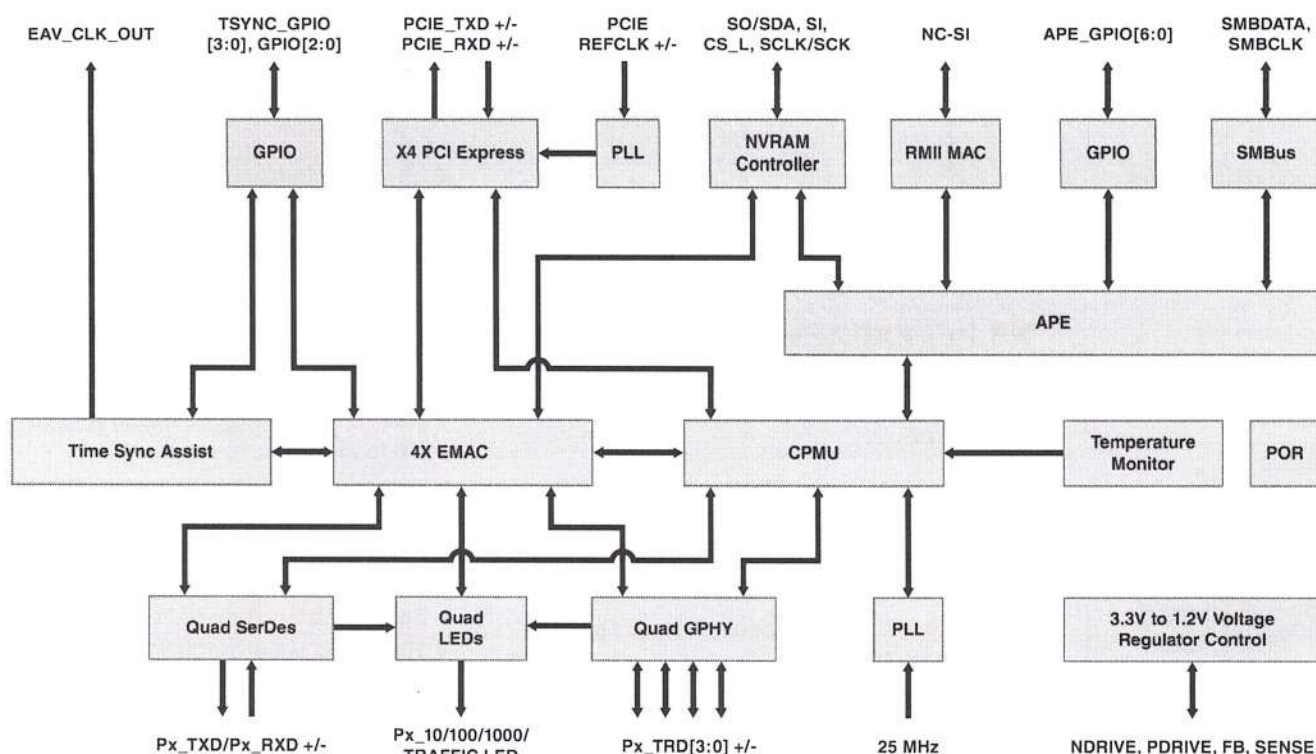
### Device Features

- Integrated quad 10/100/1000BASE-T and quad 1000BASE-X/SGMII 1.25 Gbaud SerDes transceivers.
- Energy Efficient Ethernet™ compliant with IEEE Std 802.3az-2010
- IEEE 802.3ap Clause 73 auto-negotiation
- Quad 10/100/1000BASE-T full-duplex/half-duplex MACs
- Quad 1000BASE-X/SGMII full-duplex/half-duplex MACs
- Automatic MDI crossover
- x4 PCI Express v2.0 at 5 GT/s or 2.5 GT/s
- MSI and MSI-X capabilities — up to 17 MSI-X vectors
- I/O Virtualization support for VMWare NetQueue and Microsoft VMQ
  - 17 receive queues and 16 transmit queues
  - 17 MSI-X vectors supporting per queue interrupt to host
- Flexible MSI-X vector to transmit/receive queue association
- TLP Processing Hint (TPH) ECN to the PCI Express Base Specification v2.0
- Function Level Reset
- Receive Side Scaling (RSS) with per queue MSI-X vector support and support for UDP RSS hash type
- Transmit Side Scaling (TSS) and multi-Tx queue with per queue MSI-X vector support

- Jumbo frame support for up to 9600-byte payload
- Virtual LAN (VLAN) support — IEEE 802.1q VLAN tagging
- TCP, IP, UDP checksum offload
- Large Send Offload (LSO), TCP Segmentation Offload (TSO)
- Hardware assist for IEEE 1588 and IEEE 802.1AS time synchronization implementations
- IEEE 802.3x flow control
- SMBus 2.0 Interface
- Statistics for SNMP MIB II, Ethernet-like MIB and Ethernet MIB (IEEE 802.3z, Clause 30)
- ACPI power management compliance
- Advanced power management by a Central Power Management Unit (CPMU)
- Efficient integrated switching regulator controller
- On-chip temperature monitor
- PCI Express CLKREQ support
- Power Management Offload (PM Offload)
- Serial flash and EEPROM NVRAM support; flash auto-configure
- ECC error detection and correction on internal SRAM
- JTAG boundary scan support
- 256-ball FBGA (1.0 mm pitch)

### Target Applications

- LAN on motherboard (LOM) for servers and workstations
- PCI Express Gigabit Ethernet Add-in NIC
- Blade servers with Ethernet over electrical backplane



BCM5719 Block Diagram

The host interface supports a separate PCI Express function for each LAN interface. The BCM5719 includes I/O Virtualization (IOV) features such as 17 receive and 16 transmit queues, 17 MSI-X vectors with flexible vector-to-queue association. These IOV features enable the BCM5719 to support the VMWare® NetQueue and Microsoft® VMQ technologies.

The BCM5719 includes a comprehensive set of hardware features that the system may use to

implement IEEE 1588- or IEEE 802.1AS-based time synchronization. These hardware features include a high-precision clock, timestamp registers for receive/transmit packets, and programmable trigger inputs and watchdog outputs.

The BCM5719 is fabricated in a low-voltage 65 nm CMOS process and integrates an efficient switching voltage regulator controller for core power supplies. Advanced power management features built into the BCM5719 enable minimizing the power

consumption of the network controller subsystem by lowering the controller's power consumption under lighter network traffic without compromising performance. The BCM5719 implements Energy Efficient Ethernet (EEE) compliance with the IEEE Std 802.3az-2010, which further reduces the power consumption with idle 100 Mbit or 1 Gbit GPHY links. These features provide a low system power consumption Ethernet network interface controller solution.

## Ordering Information

| Package                                  | Ambient Temperature | Part Number   |
|------------------------------------------|---------------------|---------------|
| 256-ball FBGA (17 mm x 17 mm, lead-free) | 0°C to 55°C         | BCM5719A0KFBG |

## About Broadcom

Broadcom Corporation is a major technology innovator and global leader in semiconductors for wired and wireless communications. Broadcom® products enable the delivery of voice, video, data, and multimedia to and throughout the home, the office, and the mobile environment. We provide the industry's broadest portfolio of state-of-the-art system-on-a-chip and software solutions to manufacturers of computing and networking equipment, digital entertainment and broadband access

products, and mobile devices. These solutions support our core mission: Connecting everything®.

Broadcom is one of the world's largest fabless semiconductor companies, with 2008 revenue of \$4.66 billion, and holds over 3,450 U.S. and over 1,350 foreign patents, more than 7,350 additional pending patent applications, and one of the broadest intellectual property portfolios addressing both wired and wireless transmission of voice, video, data, and multimedia.

A FORTUNE 500® company, Broadcom is headquartered in Irvine, Calif., and has offices and research facilities in North America, Asia, and Europe. Broadcom may be contacted at +1.949.926.5000 or at [www.broadcom.com](http://www.broadcom.com).



Broadcom, the pulse logo, Connecting everything, the Connecting everything logo, NetXtreme® I, and NetXtreme® II are among the trademarks of Broadcom Corporation and/or its affiliates in the United States, certain other countries and/or the EU. Any other trademarks or trade names mentioned are the property of their respective owners.

February 01, 2011 • 5719-PB01-R



# SPEC CPU®2017 Integer Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Dell Inc.

SPECrate®2017\_int\_base = 131

PowerEdge R750 (Intel Xeon Silver 4309Y, 2.80 GHz)

SPECrate®2017\_int\_peak = 136

CPU2017 License: 55

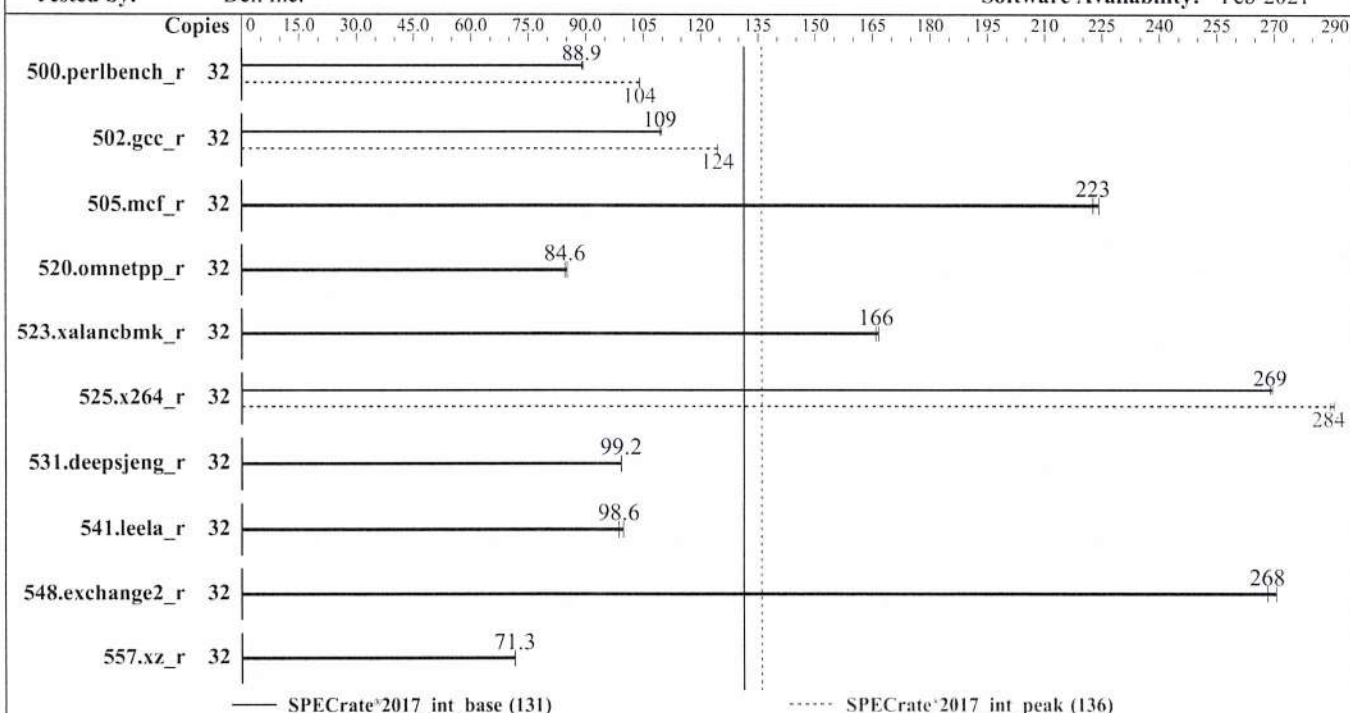
Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: May-2021

Hardware Availability: May-2021

Software Availability: Feb-2021



## Hardware

CPU Name: Intel Xeon Silver 4309Y  
Max MHz: 3600  
Nominal: 2800  
Enabled: 16 cores, 2 chips, 2 threads/core  
Orderable: 1,2 chips  
Cache L1: 32 KB I + 48 KB D on chip per core  
L2: 1.25 MB I+D on chip per core  
L3: 12 MB I+D on chip per chip  
Other: None  
Memory: 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R, running at 2666)  
Storage: 225 GB on tmpfs  
Other: None

## Software

OS: Red Hat Enterprise Linux 8.3 (Ootpa)  
4.18.0-240.15.1.el8\_3.x86\_64  
Compiler: C/C++: Version 2021.1 of Intel oneAPI DPC++/C++  
Compiler Build 20201113 for Linux;  
Fortran: Version 2021.1 of Intel Fortran Compiler  
Classic Build 20201112 for Linux;  
C/C++: Version 2021.1 of Intel C/C++ Compiler  
Classic Build 20201112 for Linux  
Parallel: No  
Firmware: Version 1.2.1 released May-2021  
File System: tmpfs  
System State: Run level 3 (multi-user)  
Base Pointers: 64-bit  
Peak Pointers: 32/64-bit  
Other: jemalloc memory allocator V5.0.1  
Power Management: BIOS and OS set to prefer performance  
at the cost of additional power usage.



# SPEC CPU®2017 Integer Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Dell Inc.

SPECrate®2017\_int\_base = 131

PowerEdge R750 (Intel Xeon Silver 4309Y, 2.80 GHz)

SPECrate®2017\_int\_peak = 136

CPU2017 License: 55

Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: May-2021

Hardware Availability: May-2021

Software Availability: Feb-2021

## Results Table

| Benchmark       | Base   |                   |                    |                   |                    |         |       |        | Peak              |                    |                   |                    |         |       |         |       |
|-----------------|--------|-------------------|--------------------|-------------------|--------------------|---------|-------|--------|-------------------|--------------------|-------------------|--------------------|---------|-------|---------|-------|
|                 | Copies | Seconds           | Ratio              | Seconds           | Ratio              | Seconds | Ratio | Copies | Seconds           | Ratio              | Seconds           | Ratio              | Seconds | Ratio | Seconds | Ratio |
| 500.perlbench_r | 32     | 571               | 89.2               | <b><u>573</u></b> | <b><u>88.9</u></b> |         |       | 32     | 490               | 104                | <b><u>490</u></b> | <b><u>104</u></b>  |         |       |         |       |
| 502.gcc_r       | 32     | 413               | 110                | <b><u>415</u></b> | <b><u>109</u></b>  |         |       | 32     | 364               | 125                | <b><u>364</u></b> | <b><u>124</u></b>  |         |       |         |       |
| 505.mcf_r       | 32     | <b><u>232</u></b> | <b><u>223</u></b>  | 231               | 224                |         |       | 32     | <b><u>232</u></b> | <b><u>223</u></b>  | 231               | 224                |         |       |         |       |
| 520.omnetpp_r   | 32     | 493               | 85.2               | <b><u>497</u></b> | <b><u>84.6</u></b> |         |       | 32     | 493               | 85.2               | <b><u>497</u></b> | <b><u>84.6</u></b> |         |       |         |       |
| 523.xalancbmk_r | 32     | <b><u>204</u></b> | <b><u>166</u></b>  | 203               | 167                |         |       | 32     | <b><u>204</u></b> | <b><u>166</u></b>  | 203               | 167                |         |       |         |       |
| 525.x264_r      | 32     | 208               | 269                | <b><u>208</u></b> | <b><u>269</u></b>  |         |       | 32     | <b><u>197</u></b> | <b><u>284</u></b>  | 196               | 286                |         |       |         |       |
| 531.deepsjeng_r | 32     | <b><u>370</u></b> | <b><u>99.2</u></b> | 369               | 99.3               |         |       | 32     | <b><u>370</u></b> | <b><u>99.2</u></b> | 369               | 99.3               |         |       |         |       |
| 541.leela_r     | 32     | 531               | 99.8               | <b><u>537</u></b> | <b><u>98.6</u></b> |         |       | 32     | 531               | 99.8               | <b><u>537</u></b> | <b><u>98.6</u></b> |         |       |         |       |
| 548.exchange2_r | 32     | <b><u>313</u></b> | <b><u>268</u></b>  | 310               | 271                |         |       | 32     | <b><u>313</u></b> | <b><u>268</u></b>  | 310               | 271                |         |       |         |       |
| 557.xz_r        | 32     | 484               | 71.4               | <b><u>484</u></b> | <b><u>71.3</u></b> |         |       | 32     | 484               | 71.4               | <b><u>484</u></b> | <b><u>71.3</u></b> |         |       |         |       |

SPECrate®2017\_int\_base = 131

SPECrate®2017\_int\_peak = 136

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

## Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

## Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

## Environment Variables Notes

Environment variables set by runcpu before the start of the run:

LD\_LIBRARY\_PATH =

"/mnt/ramdisk2/cpu2017-1.1.5-ic2021.1/lib/intel64:/mnt/ramdisk2/cpu2017-1.1.5-ic2021.1/lib/ia32:/mnt/ramdisk2/cpu2017-1.1.5-ic2021.1/je5.0.1-32"

MALLOC\_CONF = "retain:true"

## General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM  
memory using Red Hat Enterprise Linux 8.1  
Transparent Huge Pages enabled by default  
Prior to runcpu invocation  
Filesystem page cache synced and cleared with:  
sync; echo 3> /proc/sys/vm/drop\_caches  
runcpu command invoked through numactl i.e.:

(Continued on next page)



# SPEC CPU®2017 Integer Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

**Dell Inc.**

**SPECrate®2017\_int\_base = 131**

**PowerEdge R750 (Intel Xeon Silver 4309Y, 2.80 GHz)**

**SPECrate®2017\_int\_peak = 136**

**CPU2017 License:** 55

**Test Sponsor:** Dell Inc.

**Tested by:** Dell Inc.

**Test Date:** May-2021

**Hardware Availability:** May-2021

**Software Availability:** Feb-2021

## General Notes (Continued)

numactl --interleave=all runcpu <etc>  
jemalloc, a general purpose malloc implementation  
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5  
sources available from jemalloc.net or <https://github.com/jemalloc/jemalloc/releases>

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.  
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1) is mitigated in the system as tested and documented.  
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2) is mitigated in the system as tested and documented.

Benchmark run from a 225 GB ramdisk created with the cmd: "mount -t tmpfs -o size=225G tmpfs /mnt/ramdisk"

## Platform Notes

### BIOS Settings:

Sub NUMA Cluster : 2-Way Clustering

Virtualization Technology : Disabled

System Profile : Custom

CPU Power Management : Maximum Performance

C1E : Disabled

C States : Autonomous

Memory Patrol Scrub : Disabled

Energy Efficiency Policy : Performance

CPU Interconnect Bus Link

Power Management : Disabled

Sysinfo program /mnt/ramdisk2/cpu2017-1.1.5-ic2021.1/bin/sysinfo  
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c  
running on localhost.localdomain Fri May 28 00:36:20 2021

SUT (System Under Test) info as seen by some common utilities.  
For more information on this section, see

<https://www.spec.org/cpu2017/Docs/config.html#sysinfo>

From /proc/cpuinfo

model name : Intel(R) Xeon(R) Silver 4309Y CPU @ 2.80GHz

2 "physical id"s (chips)

32 "processors"

cores, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)

cpu cores : 8

siblings : 16

(Continued on next page)



# SPEC CPU®2017 Integer Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Dell Inc.

SPECrate®2017\_int\_base = 131

PowerEdge R750 (Intel Xeon Silver 4309Y, 2.80 GHz)

SPECrate®2017\_int\_peak = 136

CPU2017 License: 55

Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: May-2021

Hardware Availability: May-2021

Software Availability: Feb-2021

## Platform Notes (Continued)

physical 0: cores 0 1 2 3 4 5 6 7  
physical 1: cores 0 1 2 3 4 5 6 7

From lscpu:

Architecture: x86\_64  
CPU op-mode(s): 32-bit, 64-bit  
Byte Order: Little Endian  
CPU(s): 32  
On-line CPU(s) list: 0-31  
Thread(s) per core: 2  
Core(s) per socket: 8  
Socket(s): 2  
NUMA node(s): 2  
Vendor ID: GenuineIntel  
CPU family: 6  
Model: 106  
Model name: Intel(R) Xeon(R) Silver 4309Y CPU @ 2.80GHz  
Stepping: 6  
CPU MHz: 3400.000  
BogoMIPS: 5600.00  
Virtualization: VT-x  
L1d cache: 48K  
L1i cache: 32K  
L2 cache: 1280K  
L3 cache: 12288K  
NUMA node0 CPU(s): 0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30  
NUMA node1 CPU(s): 1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31  
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov  
pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp  
lm constant\_tsc art arch\_perfmon pebs bts rep\_good nopl xtopology nonstop\_tsc cpuid  
aperfperf pni pclmulqdq dtes64 monitor ds\_cpl vmx smx est tm2 ssse3 sdbg fma cx16  
xtpr pdcm pcid dca sse4\_1 sse4\_2 x2apic movbe popcnt tsc\_deadline\_timer aes xsave  
avx f16c rdrand lahf\_lm abm 3dnowprefetch cpuid\_fault epb cat\_l3 invpcid\_single  
intel\_ppin ssbd mba ibrs ibpb stibp ibrs\_enhanced fsgsbase tsc\_adjust bmi1 hle avx2  
smep bmi2 erms invpcid cqm rdt\_a avx512f avx512dq rdseed adx smap avx512ifma  
clflushopt clwb intel\_pt avx512cd sha\_ni avx512bw avx512vl xsaveopt xsavec xgetbv1  
xsaves cqm\_llc cqm\_occup\_llc cqm\_mbm\_total cqm\_mbm\_local split\_lock\_detect wbnoinvd  
dtherm ida arat pln pts avx512vbmi umip pku ospke avx512\_vbmi2 gfni vaes vpclmulqdq  
avx512\_vnni avx512\_bitalg tme avx512\_vpopcntdq la57 rdpid md\_clear pconfig flush\_l1d  
arch\_capabilities

/proc/cpuinfo cache data  
cache size : 12288 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a  
physical chip.  
available: 2 nodes (0-1)

(Continued on next page)



# SPEC CPU®2017 Integer Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Dell Inc.

SPECrate®2017\_int\_base = 131

PowerEdge R750 (Intel Xeon Silver 4309Y, 2.80 GHz)

SPECrate®2017\_int\_peak = 136

CPU2017 License: 55

Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: May-2021

Hardware Availability: May-2021

Software Availability: Feb-2021

## Platform Notes (Continued)

```
node 0 cpus: 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
node 0 size: 251651 MB
node 0 free: 242001 MB
node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31
node 1 size: 250913 MB
node 1 free: 256289 MB
node distances:
node 0 1
  0: 10 20
  1: 20 10
```

From /proc/meminfo

MemTotal: 527815568 kB

HugePages\_Total: 0

Hugepagesize: 2048 kB

/sbin/tuned-adm active

Current active profile: throughput-performance

From /etc/\*release\* /etc/\*version\*

os-release:

NAME="Red Hat Enterprise Linux"

VERSION="8.3 (Ootpa)"

ID="rhel"

ID\_LIKE="fedora"

VERSION\_ID="8.3"

PLATFORM\_ID="platform:el8"

PRETTY\_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"

ANSI\_COLOR="0;31"

redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)

system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)

system-release-cpe: cpe:/o:redhat:enterprise\_linux:8.3:ga

uname -a:

Linux localhost.localdomain 4.18.0-240.15.1.el8\_3.x86\_64 #1 SMP Wed Feb 3 03:12:15 EST 2021 x86\_64 x86\_64 x86\_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit):

Not affected

CVE-2018-3620 (L1 Terminal Fault):

Not affected

Microarchitectural Data Sampling:

Not affected

CVE-2017-5754 (Meltdown):

Not affected

CVE-2018-3639 (Speculative Store Bypass):

Mitigation: Speculative Store Bypass disabled via prctl and seccomp

CVE-2017-5753 (Spectre variant 1):

Mitigation: usercopy/swaps

(Continued on next page)



# SPEC CPU®2017 Integer Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Dell Inc.

SPECrate®2017\_int\_base = 131

PowerEdge R750 (Intel Xeon Silver 4309Y, 2.80 GHz)

SPECrate®2017\_int\_peak = 136

CPU2017 License: 55

Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: May-2021

Hardware Availability: May-2021

Software Availability: Feb-2021

## Platform Notes (Continued)

CVE-2017-5715 (Spectre variant 2):

CVE-2020-0543 (Special Register Buffer Data Sampling):

CVE-2019-11135 (TSX Asynchronous Abort):

barriers and \_\_user pointer sanitization

Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

Not affected

Not affected

SPEC is set to: /mnt/ramdisk2/cpu2017-1.1.5-ic2021.1

| Filesystem | Type  | Size | Used | Avail | Use% | Mounted on    |
|------------|-------|------|------|-------|------|---------------|
| tmpfs      | tmpfs | 225G | 6.9G | 219G  | 4%   | /mnt/ramdisk2 |

From /sys/devices/virtual/dmi/id

Vendor: Dell Inc.  
Product: PowerEdge R750  
Product Family: PowerEdge  
Serial: 1234567

Additional information from dmidecode follows. WARNING: Use caution when you interpret this section. The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

Memory:

12x 002C069D002C 18ASF4G72PDZ-3G2E1 32 GB 2 rank 3200, configured at 2666  
4x 00AD063200AD HMAA4GR7AJR8N-XN 32 GB 2 rank 3200, configured at 2666  
16x Not Specified Not Specified

BIOS:

BIOS Vendor: Dell Inc.  
BIOS Version: 1.2.1  
BIOS Date: 05/06/2021  
BIOS Revision: 1.2

(End of data from sysinfo program)

## Compiler Version Notes

=====  
C | 500.perlbench\_r(peak)  
=====

Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112\_000000  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
=====

(Continued on next page)



# SPEC CPU® 2017 Integer Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Dell Inc.

SPECrate®2017\_int\_base = 131

PowerEdge R750 (Intel Xeon Silver 4309Y, 2.80 GHz)

SPECrate®2017\_int\_peak = 136

CPU2017 License: 55

Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: May-2021

Hardware Availability: May-2021

Software Availability: Feb-2021

## Compiler Version Notes (Continued)

C | 502.gcc\_r(peak)

-----  
Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version  
2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
-----

=====

C | 500.perlbench\_r(base) 502.gcc\_r(base) 505.mcf\_r(base, peak)  
| 525.x264\_r(base, peak) 557.xz\_r(base, peak)

-----  
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
-----

=====

C | 500.perlbench\_r(peak)

-----  
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)  
64, Version 2021.1 Build 20201112\_000000  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
-----

=====

C | 502.gcc\_r(peak)

-----  
Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version  
2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
-----

=====

C | 500.perlbench\_r(base) 502.gcc\_r(base) 505.mcf\_r(base, peak)  
| 525.x264\_r(base, peak) 557.xz\_r(base, peak)

-----  
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
-----

=====

C | 500.perlbench\_r(peak)

-----  
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)  
64, Version 2021.1 Build 20201112\_000000  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
-----

(Continued on next page)



# SPEC CPU® 2017 Integer Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Dell Inc.

SPECrate®2017\_int\_base = 131

PowerEdge R750 (Intel Xeon Silver 4309Y, 2.80 GHz)

SPECrate®2017\_int\_peak = 136

CPU2017 License: 55

Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: May-2021

Hardware Availability: May-2021

Software Availability: Feb-2021

## Compiler Version Notes (Continued)

-----  
=====

```
C      | 502.gcc_r(peak)
```

-----

Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
-----

-----  
=====

```
C      | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)  
      | 525.x264_r(base, peak) 557.xz_r(base, peak)
```

-----

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
-----

-----  
=====

```
C++    | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak)  
      | 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)
```

-----

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
-----

-----  
=====

```
Fortran | 548.exchange2_r(base, peak)
```

-----

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112\_000000  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
-----

## Base Compiler Invocation

C benchmarks:

icx

C++ benchmarks:

icpx

Fortran benchmarks:

ifort



# SPEC CPU®2017 Integer Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

**Dell Inc.**

SPECrate®2017\_int\_base = 131

PowerEdge R750 (Intel Xeon Silver 4309Y, 2.80 GHz)

SPECrate®2017\_int\_peak = 136

CPU2017 License: 55

Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: May-2021

Hardware Availability: May-2021

Software Availability: Feb-2021

## Base Portability Flags

500.perlbench\_r: -DSPEC\_LP64 -DSPEC\_LINUX\_X64  
502.gcc\_r: -DSPEC\_LP64  
505.mcf\_r: -DSPEC\_LP64  
520.omnetpp\_r: -DSPEC\_LP64  
523.xalancbmk\_r: -DSPEC\_LP64 -DSPEC\_LINUX  
525.x264\_r: -DSPEC\_LP64  
531.deepsjeng\_r: -DSPEC\_LP64  
541.leela\_r: -DSPEC\_LP64  
548.exchange2\_r: -DSPEC\_LP64  
557.xz\_r: -DSPEC\_LP64

## Base Optimization Flags

C benchmarks:

-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math  
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
-mbranches-within-32B-boundaries  
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64\_lin  
-lqkmalloc

C++ benchmarks:

-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto  
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
-mbranches-within-32B-boundaries  
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64\_lin  
-lqkmalloc

Fortran benchmarks:

-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div  
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte  
-auto -mbranches-within-32B-boundaries  
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64\_lin  
-lqkmalloc

## Peak Compiler Invocation

C benchmarks (except as noted below):

icx

500.perlbench\_r: icc

(Continued on next page)



# SPEC CPU® 2017 Integer Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Dell Inc.

SPECrate®2017\_int\_base = 131

PowerEdge R750 (Intel Xeon Silver 4309Y, 2.80 GHz)

SPECrate®2017\_int\_peak = 136

CPU2017 License: 55

Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: May-2021

Hardware Availability: May-2021

Software Availability: Feb-2021

## Peak Compiler Invocation (Continued)

C++ benchmarks:

icpx

Fortran benchmarks:

ifort

## Peak Portability Flags

```
500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -D_FILE_OFFSET_BITS=64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64
```

## Peak Optimization Flags

C benchmarks:

```
500.perlbench_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -fno-strict-overflow
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmallocc

502.gcc_r: -m32
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/ia32_lin
-std=gnu89 -Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profddata(pass 2) -xCORE-AVX512 -flto
-Ofast(pass 1) -O3 -ffast-math -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc32-5.0.1/lib -ljemalloc

505.mcf_r: basepeak = yes

525.x264_r: -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -flto
-O3 -ffast-math -qopt-mem-layout-trans=4 -fno-alias
```

(Continued on next page)



# SPEC CPU®2017 Integer Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

**Dell Inc.**

**SPECrate®2017\_int\_base = 131**

**PowerEdge R750 (Intel Xeon Silver 4309Y, 2.80 GHz)**

**SPECrate®2017\_int\_peak = 136**

**CPU2017 License:** 55

**Test Sponsor:** Dell Inc.

**Tested by:** Dell Inc.

**Test Date:** May-2021

**Hardware Availability:** May-2021

**Software Availability:** Feb-2021

## Peak Optimization Flags (Continued)

525.x264\_r (continued):

-mbranches-within-32B-boundaries  
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64\_lin  
-lqkmallocc

557.xz\_r: basepeak = yes

C++ benchmarks:

520.omnetpp\_r: basepeak = yes

523.xalancbmk\_r: basepeak = yes

531.deepsjeng\_r: basepeak = yes

541.leela\_r: basepeak = yes

Fortran benchmarks:

548.exchange2\_r: basepeak = yes

The flags files that were used to format this result can be browsed at

[http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64\\_revA.html](http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.html)

<http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-ICX-rev1.1.html>

You can also download the XML flags sources by saving the following links:

[http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64\\_revA.xml](http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml)

<http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-ICX-rev1.1.xml>

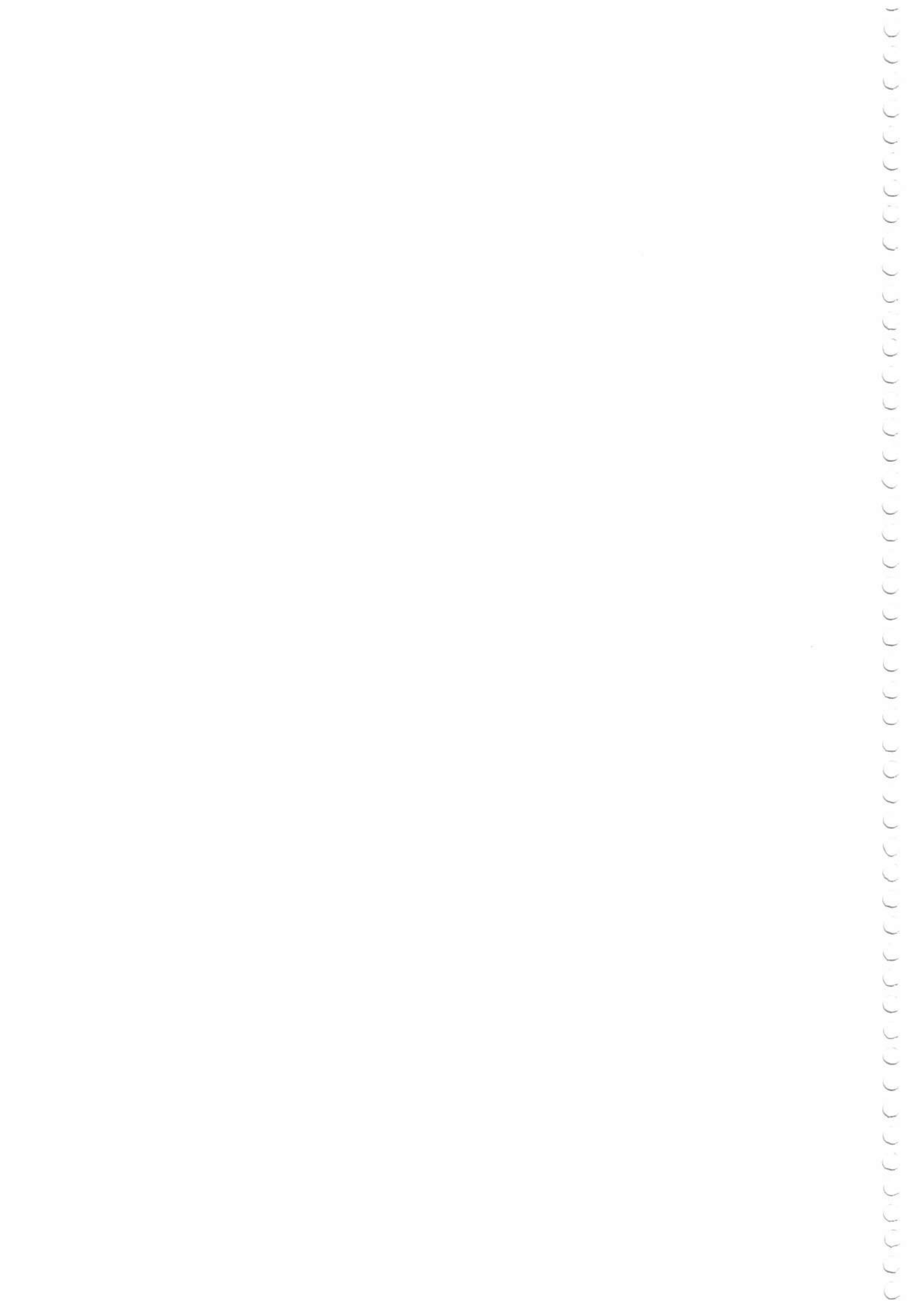
SPEC CPU and SPECrate are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

For questions about this result, please contact the tester. For other inquiries, please contact [info@spec.org](mailto:info@spec.org).

Tested with SPEC CPU®2017 v1.1.5 on 2021-05-28 01:36:19-0400.

Report generated on 2021-07-08 13:31:21 by CPU2017 PDF formatter v6442.

Originally published on 2021-07-06.





## Dell EMC PowerEdge RAID Controller H745

A sixteen-port 12Gb/s PCI Express RAID controller, the Dell EMC PowerEdge RAID Controller (PERC) H745 supports 6Gb/s and 12Gb/s SAS or SATA hard-disk drives and solid-state drives.

As storage demands expand and processing loads grow, it becomes increasingly more difficult for administrators to achieve maximum performance from their applications. The newest line of Dell EMC PowerEdge RAID Controller cards, built on the LSISA3516 dual-core ARM A15 RAID-on-Chip (ROC), offer unmatched I/O performance for database applications and streaming digital media environments.

The PowerEdge RAID Controller (PERC) H745, with sixteen internal ports, delivers two high-performance ARM A15 processor cores and integrates a 72-bit, DDR4-2133 DRAM interface that drives 4GB non-volatile cache memory<sup>1</sup>. If you are implementing hybrid server platforms based on solid-state storage, these next-generation PERC offerings exploit the potential of solid-state drives (SSDs) for unsurpassed performance and enterprise-class reliability.

### Enterprise data protection

Standard support for the most popular RAID levels including RAID 5, RAID 6, RAID 50, and RAID 60, further strengthen the data-protection capabilities of the PERC H745. The Dell EMC Flash Backed Cache or NVCache technology backs up the data to non-volatile memory in a power-loss event and can store it safely for a nearly unlimited period of time.

### Intuitive RAID management

Managing the PERC H745 is easy using the integrated Dell Remote Access Controller 9 (iDRAC9). Without having to deploy an agent, IT admins can configure, deploy, update, and monitor the PERC H745, either via the GUI or through the RACADM CLI. With the release of iDRAC9, customers can perform real-time storage operations through the GUI or RACADM interface. This includes the RAID controllers as well as the physical disks in the PowerEdge system and external JBOD enclosures.

iDRAC benefits include:

- Create VDs, Expand VDs, migrate RAID levels in real-time or stage it to do at a later time
- Support real-time RAID monitoring and inventory of hardware RAID connected to the server

Customers can also use Dell EMC OpenManage Server Administrator/Storage Services (OMSS), which provides the essential tools to efficiently manage PERC products, whether deployed in an enterprise or small business. Dell EMC offers a collection of applications and tools, including a pre-boot setup utility and a full spectrum of online RAID management utilities. This suite of applications allows administrators to adjust SAS or SATA topology views from the system host, controller and disk enclosure down to the logical and physical drive level. Extending to enterprise deployments, these tools can scale to easily configure, monitor and manage RAID and JBOD volumes locally or over the LAN network.

## PowerEdge RAID Controller H745

| Features                            | Technical Specification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Solution provided drives            | Sixteen-port internal SATA+SAS solution supporting 6Gb/s & 12Gb/s SAS/SATA hard disk drives (HDDs) and solid-state (SSDs)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Form Factor                         | PCIe Adapter Card (HHHL) and Custom (Front)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Connectors                          | Two SlimSAS x8 (SFF-8654 Series)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Device support                      | 32 SAS/SATA Devices (PowerEdge Server Largest Drive Configuration) <sup>2</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Host bus type                       | 8-lane, PCI Express 3.1 compliant                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Data transfer rates                 | Up to 12Gb/s per port                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| SAS controller                      | LSI SAS3516 Dual Core ARM A15 Processor - ROC (RAID-On-Chip)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Cache memory                        | 1MB Shared L2 Cache. 6MB On-Chip Memory                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Key RAID & data protection features | <div> RAID levels 0, 1, 5, 6<br/> RAID spans 10, 50, 60<br/> Online Capacity Expansion (OCE)<br/> Online RAID Level Migration (RLM)<br/> Auto resume after power loss during array rebuild or reconstruction/RLM<br/> Consistency Check for background data integrity<br/> Physical disk power management (Dimmer Switch™)<br/> 4K native sector support<br/> NVRAM "Wipe" feature- protects proprietary data once card is decommissioned<br/> SED drive support </div> <div> Load balancing<br/> Fast initialization for quick array setup<br/> Configurable stripe size up to 1MB<br/> Patrol read for media scanning and repair<br/> Up to 64 Virtual Drives<br/> DDF compliant Configuration on Disk (COD)<br/> S.M.A.R.T. support<br/> Global and dedicated hot spare with revertible hot-spare<br/> Support, automatic rebuild, enclosure affinity, emergency SATA<br/> TRIM/UNMAP support for SSDs in Pass-Thru Mode </div> |
| RAID management                     | Dell EMC OpenManage Server Administrator/Storage Services<br>iDRAC9<br>PERC CLI<br>Additional management:<br>UEFI (HII)<br>CEM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Operating temperature               | Maximum ambient temperature: 60°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Operating voltage                   | +3.3V, +12V and +3.3V_Aux                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Optional SSD optimization           | Dell FastPath™ firmware feature: delivers high IOPs performance on SSD arrays                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Operating systems                   | Citrix XenServer<br>Microsoft Windows Server with Hyper-V<br>Red Hat Enterprise Linux<br>Ubuntu Server<br>SUSE Linux Enterprise Server<br>VMware ESXi<br>For specifications and interoperability details, see Dell.com/OSsupport.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Warranty                            | 3-Year Standard Warranty. Up to five-year warranty available for controller & battery with extended platform warranty                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

<sup>1</sup>H745 will ship with matching 4GB DRAM & NV Cache.

<sup>2</sup>Silicon supports up to 255

### Global services and support

Dell EMC Services can help reduce IT complexity, lower costs and eliminate inefficiencies by making IT and business solutions work harder for you. The Dell EMC Services team takes a holistic view of your needs, and designs solutions for your environment and business objectives while leveraging proven delivery methods, local talent and in-depth domain knowledge for the lowest total cost of ownership.

Learn more at [Dell.com/PERC](http://Dell.com/PERC)

\* Copyright © 2019 Dell Inc. or subsidiaries. All Rights Reserved. Dell Technologies, Dell, EMC, Dell EMC and other trademarks are trademarks of Dell Inc. or its subsidiaries. Other trademarks may be trademarks of their respective owners. This document is for informational purposes only. Dell reserves the right to make changes without further notice to any products herein. The content provided is as is and without express or implied warranties of any kind.

Copyright © September 26, 2019 Dell Inc. or its subsidiaries. All Rights Reserved.

**DELLEMC**



THE INTEGRATED DELL REMOTE ACCESS CONTROLLER 9 (iDRAC9) WITH LIFECYCLE CONTROLLER

## COMPLETE AGENT-FREE MANAGEMENT OF POWEREDGE SERVERS

Dell iDRAC9 provides security  
and intelligent automation.



### Modernize with the Dell EMC PowerEdge portfolio

The integrated Dell Remote Access Controller 9 (iDRAC9) delivers advanced, agent-free local and remote server administration. Embedded in every PowerEdge server, iDRAC9 provides a secure means to automate a multitude of common management tasks. Because iDRAC9 is embedded in every PowerEdge server, there's no additional software to install; just plug in power and network cables, and iDRAC9 is ready to go. Even before installing an operating system or hypervisor, IT administrators have a complete set of server management features at their fingertips: Maximize storage performance with up to 12 NVMe drives and ensure application performance scales easily.

- Configuration
- OS deployment
- Firmware updates
- Health monitoring
- Automation of other routine management activities

### Scalable Architecture

With iDRAC9 in place across the PowerEdge portfolio, the same IT administration techniques and tools can be applied throughout. This consistent management platform allows easy scaling of PowerEdge servers as an organization's infrastructure needs grow. Customers will be able to use the iDRAC RESTful API for the latest in scalable administration methods of PowerEdge servers. With this API, iDRAC9 enables support for the Redfish standard and enhances it with Dell EMC extensions to optimize at-scale management of PowerEdge servers. Regardless of size though, the entire OpenManage portfolio of systems management tools allows every customer to tailor an effective, affordable solution for their environment. This portfolio includes tools, consoles and integrations.

Each component leverages iDRAC9 to make management easy. By extending the reach of administrators to larger numbers of servers, that staff becomes more productive and drives down costs.

### Intelligent Automation

Dell's agent-free management puts IT administrators in control. Once a PowerEdge server is connected to power and networking, that system can be monitored and fully managed, whether you're standing in front of the server or remotely over a network. In fact, with no need for software agents, an IT administrator can:

- Monitor
- Manage
- Update
- Troubleshoot and remediate Dell EMC servers

With features like zero-touch deployment and provisioning, iDRAC Group Manager, and System Lockdown, iDRAC9 is purpose-built to make server administration quick and easy. For those customers whose existing management platform utilizes in-band management, Dell EMC does provide iDRAC Service Module, a lightweight service that can interact with both iDRAC9 and the host operating system to support legacy management platforms.

### Secure Local and Remote Management

Whether iDRAC9 is used via the updated, HTML5-based web interface, command line interface, or via a set of robust APIs such as the iDRAC RESTful API, security is ensured with HTTPS, SSL, Smart Card authentication, LDAP, and Active Directory integration. The iDRAC9 web interface, remote RACADM utility, and WS-MAN interfaces all support TLS 1.2. Every web page served by the iDRAC9 is delivered with TLS encryption at 256-bit strength (unless configured otherwise). Dell also supports encryption on the virtual KVM (virtual console redirection) and virtual media over TLS. The iDRAC9 virtual console and media also benefit from SSL encryption. Additionally, the iDRAC9 firmware is equipped with a default security certificate, which can be replaced by one of a customer's choosing. By providing secure access remote servers, administrators can carry out critical management functions while maintaining the integrity and security of their data.

## The Heart of PowerEdge Manageability

The iDRAC9 provides common, embedded management across the PowerEdge family of servers, automation that lets your organization grow, and ensure security for peace of mind. This is why iDRAC is the core of managing Dell EMC servers. From the variety of tools and technologies in the OpenManage portfolio, a customer can build a management solution that matches their needs, and by leveraging iDRAC9, ensures optimal server management.

### Key iDRAC9 Features and Specifications

|                                        |                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BIOS Recovery                          | Detect an invalid, untrusted BIOS image when a boot is attempted and recover to an authenticated, trusted BIOS image.                                                                                                                                                                                                                 |
| Connection View                        | Quickly check if server LOMs/NDCs and iDRAC are connected to the correct switches and ports via the GUI or by command line interface. This helps prevent costly remote dispatch of technicians to remediate cabling errors.                                                                                                           |
| Full Power Cycle                       | By utilizing the iDRAC Service Module (iSM), DC power, including AUX power, can be temporarily removed via local or remote control to reset all power nodes in a server, saving time when troubleshooting.                                                                                                                            |
| iDRAC Direct                           | Secure front-panel USB connection to iDRAC web interface which eliminates the need for crash carts or a trip to the hot aisle of your data center. You can use the same port to insert a USB key to upload new system profile for secure, rapid system configuration.                                                                 |
| iDRAC Group Manager                    | Provides built-in, one-to-many monitoring and inventory of local iDRAC9s with no software to install. Ideal for customers who don't want to install and maintain a separate monitoring console. This feature does require iDRAC Enterprise licenses.                                                                                  |
| iDRAC RESTful API                      | With this API, iDRAC enables support for the Redfish standard and enhances it with Dell extensions.                                                                                                                                                                                                                                   |
| Multi Vector Cooling                   | Airflow for each PCIe slot can be fine-tuned to ensure proper cooling. This allows for greater power efficiency and more precise cooling within each server for accessory cards.                                                                                                                                                      |
| OpenManage Mobile and Quick Sync 2     | Use the OpenManage Mobile 2.0 (or higher) app on your handheld device to securely retrieve critical health data and easily perform bare-metal server configuration tasks via BLE/Wi-Fi connectivity. Compatible with various iOS and Android devices.                                                                                 |
| System Erase                           | With proper authentication, administrators can securely erase data from local storage (HDDs, SSDs, NVMs) and embedded flash devices.                                                                                                                                                                                                  |
| System Lockdown                        | Helps to prevent configuration or firmware changes to a server when using Dell tools. Requires iDRAC Enterprise License.                                                                                                                                                                                                              |
| Zero touch deployment and provisioning | When ordered with DHCP enabled from the factory, PowerEdge servers can be automatically configured when they are initially powered up and connected to your network. This process uses profile-based configurations that ensure each server is configured per your specifications. This feature requires an iDRAC Enterprise license. |

| iDRAC Licenses / Server Model | 200-500 Series Rack / Tower | 600+ Rack/Tower | Modular  |
|-------------------------------|-----------------------------|-----------------|----------|
| Basic                         | Standard                    | n/a             | n/a      |
| Express                       | Optional                    | Standard        | n/a      |
| Express for Blades            | n/a                         | n/a             | Standard |
| Enterprise                    | Upgrade                     | Upgrade         | Upgrade  |



Learn more at  
[dell.com/poweredge](http://dell.com/poweredge) and  
[delltechcenter.com/idrac](http://delltechcenter.com/idrac)

New features in yellow

## iDRAC 9 License Levels and Features

| License Type                                     | Basic | Express | Express for Blades | Enterprise     |
|--------------------------------------------------|-------|---------|--------------------|----------------|
| Interfaces / Standards                           |       |         |                    |                |
| Redfish                                          | ✓     | ✓       | ✓                  | ✓              |
| IPMI 2.0                                         | ✓     | ✓       | ✓                  | ✓              |
| DCMI 1.5                                         | ✓     | ✓       | ✓                  | ✓              |
| Web-based GUI                                    | ✓     | ✓       | ✓                  | ✓              |
| Racadm command line (local/remote)               | ✓     | ✓       | ✓                  | ✓              |
| SMASH-CLP (SSH-only)                             | ✓     | ✓       | ✓                  | ✓              |
| Telnet                                           | ✓     | ✓       | ✓                  | ✓              |
| SSH                                              | ✓     | ✓       | ✓                  | ✓              |
| Serial Redirection                               | ✓     | ✓       | ✓                  | ✓              |
| WSMAN                                            | ✓     | ✓       | ✓                  | ✓              |
| Network Time Protocol                            |       | ✓       | ✓                  | ✓              |
| Connectivity                                     |       |         |                    |                |
| Shared NIC                                       | ✓     | ✓       | N/A                | ✓ <sup>1</sup> |
| Dedicated NIC                                    | ✓     | ✓       | ✓                  | ✓ <sup>2</sup> |
| VLAN tagging                                     | ✓     | ✓       | ✓                  | ✓              |
| IPv4                                             | ✓     | ✓       | ✓                  | ✓              |
| IPv6                                             | ✓     | ✓       | ✓                  | ✓              |
| DHCP (new default; not static IP)                | ✓     | ✓       | ✓                  | ✓              |
| DHCP with Zero Touch                             |       |         |                    | ✓              |
| Dynamic DNS                                      | ✓     | ✓       | ✓                  | ✓              |
| OS pass-through                                  | ✓     | ✓       | ✓                  | ✓              |
| iDRAC Direct - Front panel USB                   | ✓     | ✓       | ✓                  | ✓              |
| Connection View                                  | ✓     | ✓       |                    | ✓              |
| NFS v4                                           | ✓     | ✓       | ✓                  | ✓              |
| SMB3.0 with NTLMv1 and NTLMv2                    | ✓     | ✓       | ✓                  | ✓              |
| Security                                         |       |         |                    |                |
| Role-based authority                             | ✓     | ✓       | ✓                  | ✓              |
| Local users                                      | ✓     | ✓       | ✓                  | ✓              |
| SSL encryption                                   | ✓     | ✓       | ✓                  | ✓              |
| IP blocking                                      |       | ✓       | ✓                  | ✓              |
| Directory services (AD, LDAP)                    |       |         |                    | ✓              |
| Two-factor authentication                        |       |         |                    | ✓              |
| Single sign-on                                   |       |         |                    | ✓              |
| PK authentication                                |       | ✓       | ✓                  | ✓              |
| Secure UEFI boot - certificate management        | ✓     | ✓       | ✓                  | ✓              |
| Lock down mode                                   |       |         |                    | ✓              |
| Unique iDRAC default password                    | ✓     | ✓       | ✓                  | ✓              |
| FIPS 140-2                                       | ✓     | ✓       | ✓                  | ✓              |
| Customizable Security Policy Banner - login page | ✓     | ✓       | ✓                  | ✓              |

## iDRAC 9 License Levels and Features

| License Type                                           | Basic | Express | Express for Blades | Enterprise |
|--------------------------------------------------------|-------|---------|--------------------|------------|
| Quick Sync 2.0 - optional auth for read operations     | ✓     | ✓       | ✓                  | ✓          |
| Quick Sync 2.0 - add mobile device number to LCL       | ✓     | ✓       | ✓                  | ✓          |
| System Erase of internal storage devices               | ✓     | ✓       | ✓                  | ✓          |
| Remote Presence                                        |       |         |                    |            |
| Power control                                          | ✓     | ✓       | ✓                  | ✓          |
| Boot control                                           | ✓     | ✓       | ✓                  | ✓          |
| Serial-over-LAN                                        | ✓     | ✓       | ✓                  | ✓          |
| Virtual Media                                          |       |         | ✓                  | ✓          |
| Virtual Folders                                        |       |         |                    | ✓          |
| Remote File Share                                      |       |         |                    | ✓          |
| Virtual Console                                        |       |         | ✓                  | ✓          |
| HTML5 access to Virtual Console                        |       |         | ✓                  | ✓          |
| VNC connection to OS                                   |       |         |                    | ✓          |
| Quality/bandwidth control                              |       |         |                    | ✓          |
| Virtual Console collaboration (6 users) <sup>2 3</sup> |       |         |                    | ✓          |
| Virtual Console chat                                   |       |         |                    | ✓          |
| Virtual Flash partitions                               |       |         |                    | ✓          |
| Group Manager                                          |       |         |                    | ✓          |
| HTTP / HTTPS support along with NFS/CIFS               | ✓     | ✓       | ✓                  | ✓          |
| Power & Thermal                                        |       |         |                    |            |
| Real-time power meter                                  | ✓     | ✓       | ✓                  | ✓          |
| Power thresholds & alerts                              |       | ✓       | ✓                  | ✓          |
| Real-time power graphing                               |       | ✓       | ✓                  | ✓          |
| Historical power counters                              |       | ✓       | ✓                  | ✓          |
| Power Capping                                          |       |         |                    | ✓          |
| OpenManage Power Center integration (view only)        |       | ✓       | ✓                  | ✓          |
| Temperature monitoring                                 | ✓     | ✓       | ✓                  | ✓          |
| Temperature graphing                                   |       | ✓       | ✓                  | ✓          |
| Health Monitoring                                      |       |         |                    |            |
| Full agent-free monitoring                             | ✓     | ✓       | ✓                  | ✓          |
| Predictive failure monitoring                          | ✓     | ✓       | ✓                  | ✓          |
| SNMPv1, v2, and v3 (traps and gets)                    | ✓     | ✓       | ✓                  | ✓          |
| Email Alerting                                         |       | ✓       | ✓                  | ✓          |
| Configurable thresholds                                | ✓     | ✓       | ✓                  | ✓          |
| Fan monitoring                                         | ✓     | ✓       | ✓                  | ✓          |
| Power Supply monitoring                                | ✓     | ✓       | ✓                  | ✓          |
| Memory monitoring                                      | ✓     | ✓       | ✓                  | ✓          |
| CPU monitoring                                         | ✓     | ✓       | ✓                  | ✓          |
| RAID monitoring                                        | ✓     | ✓       | ✓                  | ✓          |
| NIC monitoring                                         | ✓     | ✓       | ✓                  | ✓          |
| HD monitoring (enclosure)                              | ✓     | ✓       | ✓                  | ✓          |
| Out of Band Performance Monitoring                     |       |         |                    | ✓          |
| Alerts for excessive SSD wear                          | ✓     | ✓       | ✓                  | ✓          |

## IDRAC 9 License Levels and Features

| License Type                                            | Basic | Express | Express for Blades | Enterprise |
|---------------------------------------------------------|-------|---------|--------------------|------------|
| Customizable settings for Exhaust Temperature           | ✓     | ✓       | ✓                  | ✓          |
| Update                                                  |       |         |                    |            |
| Remote agent-free update                                | ✓     | ✓       | ✓                  | ✓          |
| Embedded update tools                                   | ✓     | ✓       | ✓                  | ✓          |
| Sync with repository (scheduled updates)                |       |         |                    | ✓          |
| Auto-update                                             |       |         |                    | ✓          |
| Improved PSU firmware updates                           | ✓     | ✓       | ✓                  | ✓          |
| Deployment & Configuration                              |       |         |                    |            |
| Local configuration via F10                             | ✓     | ✓       | ✓                  | ✓          |
| Embedded OS deployment tools                            | ✓     | ✓       | ✓                  | ✓          |
| Embedded configuration tools                            | ✓     | ✓       | ✓                  | ✓          |
| Auto-Discovery                                          |       | ✓       | ✓                  | ✓          |
| Remote OS deployment                                    |       | ✓       | ✓                  | ✓          |
| Embedded driver pack                                    | ✓     | ✓       | ✓                  | ✓          |
| Full configuration inventory                            | ✓     | ✓       | ✓                  | ✓          |
| Inventory export                                        | ✓     | ✓       | ✓                  | ✓          |
| Remote configuration                                    | ✓     | ✓       | ✓                  | ✓          |
| Zerotouch configuration                                 |       |         |                    | ✓          |
| System Retire/Repurpose                                 | ✓     | ✓       | ✓                  | ✓          |
| Server Configuration Profile in GUI                     | ✓     | ✓       | ✓                  | ✓          |
| Diagnostics, Service & Logging                          |       |         |                    |            |
| Embedded diagnostic tools                               | ✓     | ✓       | ✓                  | ✓          |
| Part Replacement                                        |       | ✓       | ✓                  | ✓          |
| Server Configuration Backup                             |       |         |                    | ✓          |
| Server Configuration Restore                            | ✓     | ✓       | ✓                  | ✓          |
| Easy Restore (system configuration)                     | ✓     | ✓       | ✓                  | ✓          |
| Easy Restore Auto Timeout                               | ✓     | ✓       | ✓                  | ✓          |
| Health LED / LCD (requires optional bezel) <sup>5</sup> | ✓     | ✓       | N/A                | ✓          |
| Quick Sync (require NFC bezel, 13G only)                |       |         |                    |            |
| Quick Sync 2.0 (requires optional BLE/WiFi hardware)    | ✓     | ✓       | ✓                  | ✓          |
| iDRAC Direct (front USB management port)                | ✓     | ✓       | ✓                  | ✓          |
| iDRAC Service Module (ISM) embedded                     | ✓     | ✓       | ✓                  | ✓          |
| Alert forwarding via iSM to inband monitoring consoles  | ✓     | ✓       | ✓                  | ✓          |
| Crash screen capture                                    |       | ✓       | ✓                  | ✓          |
| Crash video capture <sup>4</sup>                        |       |         |                    | ✓          |
| Boot capture                                            |       |         |                    | ✓          |
| Manual reset for iDRAC (LCD ID button)                  | ✓     | ✓       | ✓                  | ✓          |
| Remote reset for iDRAC (requires iSM)                   | ✓     | ✓       | ✓                  | ✓          |

## iDRAC 9 License Levels and Features

| License Type                                 | Basic | Express | Express for Blades | Enterprise |
|----------------------------------------------|-------|---------|--------------------|------------|
| Virtual NMI                                  | ✓     | ✓       | ✓                  | ✓          |
| OS watchdog <sup>1</sup>                     | ✓     | ✓       | ✓                  | ✓          |
| SupportAssist Report (embedded)              | ✓     | ✓       | ✓                  | ✓          |
| System Event Log                             | ✓     | ✓       | ✓                  | ✓          |
| Lifecycle Log                                | ✓     | ✓       | ✓                  | ✓          |
| Enhanced Logging in Lifecycle Controller Log | ✓     | ✓       | ✓                  | ✓          |
| Work notes                                   | ✓     | ✓       | ✓                  | ✓          |
| Remote Syslog                                |       |         |                    | ✓          |
| License management                           | ✓     | ✓       | ✓                  | ✓          |
| Improved Customer Experience                 |       |         |                    |            |
| iDRAC -Faster processor, more memory         | ✓     | ✓       | ✓                  | ✓          |
| GUI rendered in HTML5                        | ✓     | ✓       | ✓                  | ✓          |
| Add BIOS configuration to iDRAC GUI          | ✓     | ✓       | ✓                  | ✓          |
| iDRAC support for SW RAID licensing          | ✓     | ✓       | ✓                  | ✓          |

### footnotes:

- 1 Not available with blade servers.
- 2 500 series and lower rack and tower servers require a hardware card to enable this feature, this hardware offered at additional cost.
- 3 Requires vFlash SD card media.
- 4 Requires iDRAC Service Module (iSM) or OpenManage Server Administrator (OMSA).
- 5 Requires optional bezel.

Leasing and financing provided and serviced by Dell Financial Services L.L.C. or its affiliate or designee ("DFS") for qualified customers. Offers may not be available or may vary in certain countries. Where available, offers may be changed without notice and are subject to product availability, credit approval, execution of documentation provided by and acceptable to DFS, and may be subject to minimum transaction size. Offers not available for personal, family or household use.

**DELL**EMC

# **Dell EMC OpenManage Enterprise 3.8.3**

## **User's Guide**

## Notes, cautions, and warnings

 **NOTE:** A NOTE indicates important information that helps you make better use of your product.

 **CAUTION:** A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

 **WARNING:** A WARNING indicates a potential for property damage, personal injury, or death.

# Revision history

The following table shows the revision history of this document:

| Revision | Date          | Description                                                |
|----------|---------------|------------------------------------------------------------|
| 1        | February 2022 | Content updated for this release of OpenManage Enterprise. |

# Preface

As part of an effort to improve product lines, we periodically release revisions of software. Therefore, some functions described in this document might not be supported by all versions of the software currently in use. The product release notes provide the most up-to-date information on product features.

Contact your technical support professional if a product does not function properly or does not function as described in this document.

 **NOTE:** This document was accurate at publication time. Go to Online Support (<https://www.dell.com/support>) to ensure that you are using the latest version of this document.

## Purpose

This document includes conceptual information on managing OpenManage Enterprise.

## Audience

This document is intended for use by administrators, device managers, and viewers who use OpenManage Enterprise for systems management and monitoring.

## Related documentation

The following publications provide additional information:

- *OpenManage Enterprise Support Matrix*
- *OpenManage Enterprise Release Notes*
- *OpenManage Enterprise Security Configuration Guide*
- *OpenManage Enterprise User's Guide*
- *OpenManage Enterprise RESTful API Guide*
- *OpenManage Enterprise RESTful API* at <https://developer.dell.com/apis>.
- *OpenManage Enterprise Modular Edition Release Notes*
- *OpenManage Enterprise Modular Edition RESTful API Guide*

In addition to the core documents, we also provide white papers, plugin documentation and demos on YouTube.

## Typographical conventions

This document uses the following style conventions:

|                         |                                                                                                                                                                                                                         |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Bold</b>             | Used for names of interface elements, such as names of windows, dialog boxes, buttons, fields, tab names, key names, and menu paths (what the user specifically selects or clicks)                                      |
| <i>Italic</i>           | Used for full titles of publications referenced in text                                                                                                                                                                 |
| Monospace               | Used for: <ul style="list-style-type: none"><li>• System code</li><li>• System output, such as an error message or script</li><li>• Path names, filenames, prompts, and syntax</li><li>• Commands and options</li></ul> |
| <i>Monospace italic</i> | Used for variables                                                                                                                                                                                                      |
| <b>Monospace bold</b>   | Used for user input                                                                                                                                                                                                     |
| [ ]                     | Square brackets enclose optional values                                                                                                                                                                                 |

|     |                                                                        |
|-----|------------------------------------------------------------------------|
|     | Vertical bar indicates alternate selections - the bar means "or"       |
| { } | Braces enclose content that the user must specify, such as x or y or z |
| ... | Ellipses indicate nonessential information omitted from the example    |

## Product documentation

**NOTE:** For video demos and tutorials, search for the Dell EMC OpenManage Enterprise playlist on **YouTube**.

- For **OpenManage Enterprise**, go to <https://www.dell.com/openmanagemanuals>.  
To display the documentation of:
  - *Dell EMC OpenManage Enterprise*, click **Dell OpenManage Enterprise > Dell EMC OpenManage Enterprise > Documentation**.
  - *Dell EMC OpenManage Mobile*, click **OpenManage Mobile > Select the required version > Documentation**.
- For **OpenManage Enterprise plugins**, go to <https://www.dell.com/openmanagemanuals>.  
To display the documentation of:
  - *Dell EMC OpenManage Enterprise Services plugin*, click **OpenManage Enterprise Connected Services > OpenManage Enterprise Services > Documentation**.
  - *Dell EMC OpenManage Enterprise Power Manager plugin*, click **OpenManage Enterprise Power Manager > Dell EMC OpenManage Enterprise Power Manager > Documentation**.
  - *Dell EMC OpenManage Enterprise Update Manager plugin*, click **OpenManage Enterprise Update Manager > OpenManage Enterprise Update Manager > Documentation**.
  - *Dell EMC OpenManage Enterprise CloudIQ plugin*, click **OpenManage Enterprise Connected Services > OpenManage Enterprise CloudIQ > Documentation**.
- For **OpenManage Enterprise APIs**, go to <https://developer.dell.com/products>.  
To display the API documentation of:
  - *Dell EMC OpenManage Enterprise*, click **Servers > OpenManage Enterprise API**
  - *Dell EMC OpenManage Enterprise Modular Edition*, click **Servers > OpenManage Enterprise Modular API**
  - *Dell EMC OpenManage Enterprise Services plugin*, click **Servers > OpenManage Enterprise Services API**.
  - *Dell EMC OpenManage Enterprise Update Manager plugin*, click **Servers > OpenManage Enterprise Update Manager API**
  - *Dell EMC OpenManage Enterprise Power Manager plugin*, click **Servers > OpenManage Enterprise Power Manager API**
  - *Dell EMC OpenManage Enterprise CloudIQ plugin*, click **CloudIQ Public API**

## Product information

For documentation, release notes, software updates, or information about products, go to **Online Support** at <https://www.dell.com/support>.

## Where to get help

Go to **Online Support** at [www.dell.com/support](https://www.dell.com/support) and click **Contact Support**. To open a service request, you must have a valid support agreement. Contact your sales representative for details about obtaining a valid support agreement or with questions about your account.

## Where to find the support matrix

Consult the **Support Matrix** on **Dell OpenManage Enterprise** at <https://www.dell.com/openmanagemanuals> and click **Documentation**.

## Your comments

Your suggestions will help us continue to improve the accuracy, organization, and overall quality of the user publications. Send your opinions of this document to <https://contentfeedback.dell.com/s>.

# Contents

|                                                                                                  |           |
|--------------------------------------------------------------------------------------------------|-----------|
| Revision history.....                                                                            | 3         |
| Preface.....                                                                                     | 4         |
| <b>Tables.....</b>                                                                               | <b>13</b> |
| <b>Chapter 1: About Dell EMC OpenManage Enterprise.....</b>                                      | <b>14</b> |
| OpenManage Enterprise Advanced license.....                                                      | 15        |
| License-based features in OpenManage Enterprise.....                                             | 15        |
| <b>Chapter 2: Security features in OpenManage Enterprise.....</b>                                | <b>17</b> |
| OpenManage Enterprise user role types.....                                                       | 17        |
| Role and scope-based access control in OpenManage Enterprise .....                               | 18        |
| <b>Chapter 3: Install OpenManage Enterprise.....</b>                                             | <b>22</b> |
| Installation prerequisites and minimum requirements.....                                         | 22        |
| Hardware requirements.....                                                                       | 22        |
| Minimum system requirements for deploying OpenManage Enterprise.....                             | 23        |
| Deploy OpenManage Enterprise on VMware vSphere.....                                              | 23        |
| Deploy OpenManage Enterprise on Hyper-V 2012 R2 and earlier host.....                            | 24        |
| Deploy OpenManage Enterprise on Hyper-V 2016 host.....                                           | 25        |
| Deploy OpenManage Enterprise on Hyper-V 2019 or Windows 2022 host.....                           | 26        |
| Deploy OpenManage Enterprise by using Kernel-based Virtual Machine.....                          | 27        |
| Deploy OpenManage Enterprise programmatically.....                                               | 27        |
| <b>Chapter 4: Get started with OpenManage Enterprise.....</b>                                    | <b>29</b> |
| Log in to OpenManage Enterprise.....                                                             | 29        |
| Configure OpenManage Enterprise by using Text User Interface.....                                | 29        |
| Configure OpenManage Enterprise.....                                                             | 33        |
| Recommended scalability and performance settings for optimal usage of OpenManage Enterprise..... | 34        |
| Supported protocols and ports in OpenManage Enterprise.....                                      | 34        |
| Use case links for the supported protocols and ports in OpenManage Enterprise.....               | 37        |
| <b>Chapter 5: OpenManage Enterprise Graphical User Interface overview.....</b>                   | <b>38</b> |
| <b>Chapter 6: OpenManage Enterprise Home portal.....</b>                                         | <b>40</b> |
| Monitor devices by using the OpenManage Enterprise dashboard.....                                | 40        |
| Donut chart.....                                                                                 | 41        |
| Device health statuses.....                                                                      | 42        |
| <b>Chapter 7: Discovering devices for monitoring or management.....</b>                          | <b>43</b> |
| Discover servers automatically by using the server-initiated discovery feature .....             | 44        |
| .....                                                                                            | 45        |
| Create a device discovery job.....                                                               | 46        |
| Onboarding devices.....                                                                          | 47        |
| Protocol support matrix for discovering devices.....                                             | 48        |

|                                                                                                                         |           |
|-------------------------------------------------------------------------------------------------------------------------|-----------|
| View device discovery job details.....                                                                                  | 49        |
| Edit a device discovery job.....                                                                                        | 50        |
| Run a device discovery job.....                                                                                         | 50        |
| Stop a device discovery job.....                                                                                        | 50        |
| Specify multiple devices by importing data from the .csv file.....                                                      | 50        |
| Global exclusion of ranges.....                                                                                         | 51        |
| Specify discovery mode for creating a server discovery job.....                                                         | 52        |
| Create customized device discovery job protocol for servers –Additional settings for discovery protocols.....           | 52        |
| Specify discovery mode for creating a chassis discovery job.....                                                        | 53        |
| Create customized device discovery job protocol for Chassis – Additional settings for discovery protocols.....          | 54        |
| Specify discovery mode for creating a Dell storage discovery job.....                                                   | 55        |
| Specify discovery mode for creating a network switch discovery job.....                                                 | 55        |
| Create customized device discovery job protocol HTTPS storage devices –Additional settings for discovery protocols..... | 55        |
| Create customized device discovery job protocol for SNMP devices.....                                                   | 56        |
| Specify discovery mode for creating a MULTIPLE protocol discovery job.....                                              | 56        |
| Delete a device discovery job.....                                                                                      | 56        |
| <b>Chapter 8: Manage devices and device groups.....</b>                                                                 | <b>58</b> |
| Organize devices into groups.....                                                                                       | 58        |
| Create a custom group (Static or Query).....                                                                            | 60        |
| Create a Static device group.....                                                                                       | 60        |
| Create a Query device group.....                                                                                        | 61        |
| Edit a static group.....                                                                                                | 62        |
| Edit a query group.....                                                                                                 | 63        |
| Rename a static or query group.....                                                                                     | 63        |
| Delete a static or query device group.....                                                                              | 63        |
| Clone a static or query group.....                                                                                      | 64        |
| Add devices to a new group.....                                                                                         | 64        |
| Add devices to existing group.....                                                                                      | 64        |
| Refresh health on group.....                                                                                            | 65        |
| Devices list.....                                                                                                       | 65        |
| All Devices page — device list actions.....                                                                             | 66        |
| Delete devices from OpenManage Enterprise.....                                                                          | 67        |
| Exclude devices from OpenManage Enterprise.....                                                                         | 67        |
| Run inventory on devices.....                                                                                           | 68        |
| Update the device firmware and drivers by using baselines.....                                                          | 68        |
| Refresh the device health of a device group.....                                                                        | 69        |
| Refresh health on devices.....                                                                                          | 70        |
| Roll back an individual device's firmware version.....                                                                  | 70        |
| Export the single device inventory.....                                                                                 | 71        |
| Performing more actions on chassis and servers.....                                                                     | 71        |
| Hardware information displayed for MX7000 chassis .....                                                                 | 71        |
| Export all or selected data.....                                                                                        | 71        |
| View and configure individual devices.....                                                                              | 72        |
| Device Overview.....                                                                                                    | 72        |
| Device hardware information.....                                                                                        | 73        |
| Run and download Diagnostic reports.....                                                                                | 74        |

|                                                                                  |           |
|----------------------------------------------------------------------------------|-----------|
| Extract and download Services (SupportAssist) reports.....                       | 74        |
| Managing individual device hardware logs.....                                    | 75        |
| Run remote-RACADM and IPMI-commands on individual devices.....                   | 75        |
| Start Management application iDRAC of a device.....                              | 75        |
| Start the Virtual Console.....                                                   | 76        |
| Refresh device inventory of a single device.....                                 | 76        |
| <b>Chapter 9: Managing device inventory.....</b>                                 | <b>77</b> |
| Create an inventory job.....                                                     | 77        |
| Run an inventory job now.....                                                    | 78        |
| Stop an inventory job.....                                                       | 78        |
| Delete an inventory job.....                                                     | 79        |
| Edit an inventory schedule job.....                                              | 79        |
| <b>Chapter 10: Manage the device firmware and drivers.....</b>                   | <b>80</b> |
| Manage firmware and driver Catalogs.....                                         | 81        |
| Add a catalog by using Dell.com.....                                             | 81        |
| Add a catalog to the local network.....                                          | 82        |
| SSL Certificate Information.....                                                 | 83        |
| Update a catalog.....                                                            | 83        |
| Edit a catalog.....                                                              | 84        |
| Delete a catalog.....                                                            | 84        |
| Create a firmware/driver baseline.....                                           | 84        |
| Delete configuration compliance baselines.....                                   | 85        |
| Edit a baseline.....                                                             | 86        |
| Check the compliance of a device firmware and driver.....                        | 86        |
| View the baseline compliance report.....                                         | 86        |
| Update firmware and/or drivers using the baseline compliance report.....         | 87        |
| <b>Chapter 11: Manage device deployment templates.....</b>                       | <b>90</b> |
| Create a Deployment template from a reference device.....                        | 90        |
| Create a deployment template by importing a template file.....                   | 91        |
| View a deployment template information.....                                      | 92        |
| Edit a server deployment template.....                                           | 92        |
| Edit a chassis deployment template.....                                          | 93        |
| Edit IOA deployment template.....                                                | 94        |
| Edit network properties of a deployment template.....                            | 94        |
| Deploy device deployment templates.....                                          | 95        |
| Deploy IOA deployment templates.....                                             | 96        |
| Clone deployment templates.....                                                  | 97        |
| Auto deployment of configuration on yet-to-be-discovered servers or chassis..... | 97        |
| Create auto deployment targets .....                                             | 98        |
| Delete auto deployment targets .....                                             | 99        |
| Export auto deployment target details to different formats.....                  | 99        |
| Overview of stateless deployment.....                                            | 99        |
| Manage identity pools—Stateless deployment.....                                  | 100       |
| Create Identity Pool - Pool Information.....                                     | 100       |
| Define networks.....                                                             | 105       |
| Network types.....                                                               | 106       |

|                                                                         |            |
|-------------------------------------------------------------------------|------------|
| Edit or delete a configured network.....                                | 106        |
| Export VLAN definitions.....                                            | 107        |
| Import network definitions.....                                         | 107        |
| <b>Chapter 12: Manage Profiles.....</b>                                 | <b>109</b> |
| Create profiles.....                                                    | 110        |
| View Profile details.....                                               | 111        |
| Profiles — view network.....                                            | 111        |
| Edit a profile.....                                                     | 111        |
| Assign a Profile.....                                                   | 112        |
| Unassign profiles.....                                                  | 113        |
| Redeploy profiles.....                                                  | 113        |
| Migrate a Profile.....                                                  | 114        |
| Delete Profiles.....                                                    | 114        |
| Export Profile(s) data as HTML, CSV, or PDF.....                        | 115        |
| <b>Chapter 13: Managing the device configuration compliance.....</b>    | <b>116</b> |
| Manage compliance templates.....                                        | 117        |
| Create a compliance template from deployment template.....              | 117        |
| Create a compliance template from reference device.....                 | 118        |
| Create a compliance template by importing from a file.....              | 118        |
| Clone a compliance template.....                                        | 118        |
| Edit a compliance template.....                                         | 119        |
| Create a configuration compliance baseline.....                         | 119        |
| Edit a configuration compliance baseline.....                           | 120        |
| Delete configuration compliance baselines.....                          | 121        |
| Refresh compliance of the configuration compliance baselines .....      | 121        |
| Remediate noncompliant devices .....                                    | 122        |
| Export the Compliance Baseline report.....                              | 123        |
| Remove a configuration compliance baseline.....                         | 123        |
| <b>Chapter 14: Monitor and Manage device alerts.....</b>                | <b>124</b> |
| View alert logs.....                                                    | 124        |
| Manage alert logs.....                                                  | 125        |
| Alert policies.....                                                     | 126        |
| Configure and manage alert policies.....                                | 127        |
| Automatic refresh of MX7000 chassis on insertion and removal sleds..... | 131        |
| Alert definitions.....                                                  | 131        |
| <b>Chapter 15: Monitor audit logs.....</b>                              | <b>133</b> |
| Forward audit logs to remote Syslog servers.....                        | 134        |
| <b>Chapter 16: Using jobs for device control.....</b>                   | <b>136</b> |
| View job lists.....                                                     | 136        |
| Jobs status and Jobs type description.....                              | 137        |
| OpenManage Enterprise default jobs and schedule.....                    | 138        |
| View an individual job information.....                                 | 141        |
| Create a job to turn device LEDs.....                                   | 141        |
| Create a job for managing power devices.....                            | 142        |

|                                                                                                                 |            |
|-----------------------------------------------------------------------------------------------------------------|------------|
| Create a Remote command job for managing devices.....                                                           | 142        |
| Create a job to change the virtual console plugin type.....                                                     | 143        |
| Select target devices and device groups.....                                                                    | 143        |
| Manage jobs.....                                                                                                | 143        |
| <b>Chapter 17: Manage the device warranty.....</b>                                                              | <b>145</b> |
| View and renew device warranty.....                                                                             | 145        |
| <b>Chapter 18: Reports.....</b>                                                                                 | <b>147</b> |
| Run reports.....                                                                                                | 148        |
| Run and email reports.....                                                                                      | 148        |
| Edit reports.....                                                                                               | 149        |
| Copy reports.....                                                                                               | 149        |
| Delete reports.....                                                                                             | 149        |
| Creating reports.....                                                                                           | 150        |
| Select query criteria when creating reports.....                                                                | 151        |
| Export selected reports.....                                                                                    | 151        |
| <b>Chapter 19: Managing MIB files.....</b>                                                                      | <b>153</b> |
| Import MIB files.....                                                                                           | 153        |
| Edit MIB traps.....                                                                                             | 154        |
| Remove MIB files.....                                                                                           | 155        |
| Resolve MIB types.....                                                                                          | 155        |
| Download an OpenManage Enterprise MIB file.....                                                                 | 155        |
| <b>Chapter 20: Managing OpenManage Enterprise appliance settings.....</b>                                       | <b>156</b> |
| Configure OpenManage Enterprise network settings.....                                                           | 157        |
| Manage OpenManage Enterprise users.....                                                                         | 157        |
| Role and scope-based access control in OpenManage Enterprise .....                                              | 158        |
| Add and edit OpenManage Enterprise local users.....                                                             | 161        |
| Edit OpenManage Enterprise user properties.....                                                                 | 162        |
| Enable OpenManage Enterprise users.....                                                                         | 162        |
| Disable OpenManage Enterprise users.....                                                                        | 162        |
| Delete OpenManage Enterprise users.....                                                                         | 163        |
| Import AD and LDAP groups.....                                                                                  | 163        |
| Transfer of ownership of Device Manager entities.....                                                           | 164        |
| Ending user sessions.....                                                                                       | 165        |
| Directory services integration in OpenManage Enterprise.....                                                    | 165        |
| Add or edit Active Directory groups to be used with Directory Services.....                                     | 166        |
| Add or edit Lightweight Directory Access Protocol groups to be used with Directory Services.....                | 167        |
| Delete Directory services.....                                                                                  | 168        |
| OpenManage Enterprise login using OpenID Connect providers.....                                                 | 168        |
| Add an OpenID Connect provider to OpenManage Enterprise.....                                                    | 169        |
| Configure an OpenID Connect provider policy in PingFederate for role-based access to OpenManage Enterprise..... | 170        |
| Configure an OpenID Connect provider policy in Keycloak for role-based access to OpenManage Enterprise.....     | 170        |
| Test the registration status of OpenManage Enterprise with the OpenID Connect provider.....                     | 171        |
| Edit an OpenID Connect provider details in OpenManage Enterprise.....                                           | 171        |

|                                                                                                          |            |
|----------------------------------------------------------------------------------------------------------|------------|
| Enable OpenID Connect providers.....                                                                     | 172        |
| Delete OpenID Connect providers.....                                                                     | 172        |
| Disable OpenID Connect providers.....                                                                    | 172        |
| Security Certificates.....                                                                               | 172        |
| Generate and download the certificate signing request.....                                               | 173        |
| Assigning a webserver certificate to OpenManage Enterprise using the Microsoft Certificate Services..... | 173        |
| Manage Console preferences.....                                                                          | 173        |
| Set the login security properties.....                                                                   | 175        |
| Customize the alert display.....                                                                         | 176        |
| Configure SMTP, SNMP, and Syslog alerts.....                                                             | 176        |
| Manage incoming alerts.....                                                                              | 177        |
| Set SNMP Credentials.....                                                                                | 177        |
| Manage warranty settings.....                                                                            | 178        |
| Check and update the version of the OpenManage Enterprise and the available plugins.....                 | 178        |
| Upgrade Recommendations and Prerequisites.....                                                           | 179        |
| Configure and upgrade OpenManage Enterprise using online method.....                                     | 179        |
| Configure OpenManage Enterprise and perform offline upgrade using network share.....                     | 181        |
| Install a plugin.....                                                                                    | 182        |
| Disable a plugin.....                                                                                    | 183        |
| Uninstall a plugin.....                                                                                  | 184        |
| Enable plugin.....                                                                                       | 184        |
| Update a plugin.....                                                                                     | 184        |
| Execute remote commands and scripts.....                                                                 | 185        |
| OpenManage Mobile settings.....                                                                          | 185        |
| Enable or disable alert notifications for OpenManage Mobile.....                                         | 186        |
| Enable or disable OpenManage Mobile subscribers.....                                                     | 186        |
| Delete an OpenManage Mobile subscriber.....                                                              | 187        |
| View the alert notification service status.....                                                          | 187        |
| Notification service status.....                                                                         | 188        |
| View information about OpenManage Mobile subscribers.....                                                | 188        |
| OpenManage Mobile subscriber information.....                                                            | 188        |
| Troubleshooting OpenManage Mobile.....                                                                   | 189        |
| <b>Chapter 21: Other references and field descriptions.....</b>                                          | <b>191</b> |
| Firmware and DSU requirement for HTTPS.....                                                              | 191        |
| Schedule Reference.....                                                                                  | 191        |
| Firmware baseline field definitions.....                                                                 | 192        |
| Supported and unsupported actions on 'Proxied' sleds.....                                                | 192        |
| Schedule job field definitions.....                                                                      | 192        |
| Alert categories after EEMI relocation.....                                                              | 193        |
| Token substitution in remote scripts and alert policy.....                                               | 194        |
| Field service debug workflow.....                                                                        | 194        |
| Unblock the FSD capability.....                                                                          | 195        |
| Install or grant a signed FSD DAT.ini file.....                                                          | 195        |
| Invoke FSD.....                                                                                          | 196        |
| Disable FSD.....                                                                                         | 196        |
| Catalog Management field definitions.....                                                                | 196        |
| Firmware/driver compliance baseline reports— devices with 'Unknown' compliance status.....               | 197        |
| Generic naming convention for Dell EMC PowerEdge servers .....                                           | 197        |