### SPEC® CPU2017 Integer Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL580 Gen10
(2.70 GHz, Intel Xeon Platinum 8280)

<table>
<thead>
<tr>
<th>SPECspeed2017_int_base</th>
<th>SPECspeed2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.3</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 3  
**Test Sponsor:** HPE  
**Tested by:** HPE

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>Mar-2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Availability:</td>
<td>Apr-2019</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Feb-2019</td>
</tr>
</tbody>
</table>

#### Threads

<table>
<thead>
<tr>
<th>SPECspeed2017_int_base</th>
<th>Threads</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.3</td>
<td>56</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPECspeed2017_int_base</th>
<th>56</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>6.98</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>9.77</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>12.9</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>9.46</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>12.4</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>14.7</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>5.58</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>4.86</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>14.4</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>23.7</td>
</tr>
</tbody>
</table>

#### Hardware

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>Intel Xeon Platinum 8280</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz.:</td>
<td>4000</td>
</tr>
<tr>
<td>Nominal:</td>
<td>2700</td>
</tr>
<tr>
<td>Enabled:</td>
<td>56 cores, 2 chips</td>
</tr>
<tr>
<td>Orderable:</td>
<td>1, 2, 3, 4 chip(s)</td>
</tr>
<tr>
<td>Cache L1:</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2:</td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td>L3:</td>
<td>38.5 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R)</td>
</tr>
<tr>
<td>Storage:</td>
<td>1 x 600 GB SATA SSD, RAID 0</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
</tbody>
</table>

#### Software

<table>
<thead>
<tr>
<th>OS:</th>
<th>SUSE Linux Enterprise Server 15 (x86_64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler:</td>
<td>C/C++: Version 19.0.2.187 of Intel C/C++</td>
</tr>
<tr>
<td></td>
<td>Compiler Build 20190131 for Linux;</td>
</tr>
<tr>
<td></td>
<td>Fortran: Version 19.0.2.187 of Intel Fortran</td>
</tr>
<tr>
<td></td>
<td>Compiler Build 20190131 for Linux;</td>
</tr>
<tr>
<td>Parallel:</td>
<td>Yes</td>
</tr>
<tr>
<td>Firmware:</td>
<td>HPE BIOS Version U34 02/02/2019 released Apr-2019</td>
</tr>
<tr>
<td>File System:</td>
<td>btrfs</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Other:</td>
<td>jemalloc memory allocator V5.0.1</td>
</tr>
</tbody>
</table>
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(Test Sponsor: HPE)
ProLiant DL580 Gen10
(2.70 GHz, Intel Xeon Platinum 8280)

SPECspeed2017_int_base = 10.3
SPECspeed2017_int_peak = Not Run

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>56</td>
<td>254</td>
<td>6.98</td>
<td>253</td>
<td>7.00</td>
<td>256</td>
<td>6.95</td>
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<tr>
<td>602.gcc_s</td>
<td>56</td>
<td>408</td>
<td>9.77</td>
<td>406</td>
<td>9.82</td>
<td>410</td>
<td>9.70</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>56</td>
<td>366</td>
<td>12.9</td>
<td>370</td>
<td>12.8</td>
<td>363</td>
<td>13.0</td>
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<tr>
<td>620.omnetpp_s</td>
<td>56</td>
<td>176</td>
<td>9.25</td>
<td>171</td>
<td>9.54</td>
<td>172</td>
<td>9.46</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>56</td>
<td>115</td>
<td>12.4</td>
<td>114</td>
<td>12.5</td>
<td>114</td>
<td>12.4</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>56</td>
<td>120</td>
<td>14.7</td>
<td>120</td>
<td>14.7</td>
<td>120</td>
<td>14.7</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>56</td>
<td>257</td>
<td>5.57</td>
<td>256</td>
<td>5.59</td>
<td>257</td>
<td>5.58</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>56</td>
<td>351</td>
<td>4.86</td>
<td>352</td>
<td>4.85</td>
<td>351</td>
<td>4.86</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>56</td>
<td>204</td>
<td>14.4</td>
<td>203</td>
<td>14.5</td>
<td>206</td>
<td>14.3</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>56</td>
<td>261</td>
<td>23.7</td>
<td>260</td>
<td>23.8</td>
<td>260</td>
<td>23.7</td>
</tr>
</tbody>
</table>

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

Operating System Notes

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

General Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2017_u2/lib/ia32:/home/cpu2017_u2/lib/intel64"
LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/home/cpu2017_u2/je5.0.1-32:/home/cpu2017_u2/je5.0.1-64"
OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.5

Yes: 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.
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
Hewlett Packard Enterprise
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ProLiant DL580 Gen10
(2.70 GHz, Intel Xeon Platinum 8280)

SPECspeed2017_int_base = 10.3
SPECspeed2017_int_peak = Not Run

Platform Notes

BIOS Configuration:
Hyper-Threading set to Disabled
Thermal Configuration set to Maximum Cooling
Memory Patrol Scrubbing set to Disabled
LLC Prefetch set to Enabled
LLC Dead Line Allocation set to Disabled
Enhanced Processor Performance set to Enabled
Workload Profile set to General Peak Frequency Compute
Energy/Performance Bias set to Maximum Performance
Workload Profile set to Custom
Uncore Frequency Scaling set to Auto
Numa Group Size Optimization set to Flat
Advanced Memory Protection set to AdvancedECC

Sysinfo program /home/cpu2017_u2/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-lj2l Thu Mar 14 15:56:13 2019

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) Platinum 8280 CPU @ 2.70GHz
  2 "physical id"s (chips)
  56 "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 : 28
siblings : 28
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 56
On-line CPU(s) list: 0-55
Thread(s) per core: 1
Core(s) per socket: 28
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85

(Continued on next page)
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SPECspeed2017_int_base = 10.3
SPECspeed2017_int_peak = Not Run

CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

Platform Notes (Continued)

Model name: Intel(R) Xeon(R) Platinum 8280 CPU @ 2.70GHz
Stepping: 7
CPU MHz: 2700.000
BogoMIPS: 5400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 39424K
NUMA node0 CPU(s): 0-27
NUMA node1 CPU(s): 28-55
Flags: fpu vme de pse tsc msr pae mca cmov pat pse36 clflush dts acpi sep mtrr pge mca cmov

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 2 nodes (0-1)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
node 0 size: 193115 MB
node 0 free: 192584 MB
node 1 cpus: 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55
node 1 size: 193500 MB
node 1 free: 193215 MB
node distances:
node 0 1 0: 10 21 1: 21 10

From /proc/meminfo
MemTotal: 395895420 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
Hewlett Packard Enterprise
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Platform Notes (Continued)

os-release:
  NAME="SLES"
  VERSION="15"
  VERSION_ID="15"
  PRETTY_NAME="SUSE Linux Enterprise Server 15"
  ID="sles"
  ID_LIKE="suse"
  ANSI_COLOR="0;32"
  CPE_NAME="cpe:/o:suse:sles:15"

uname -a:
    Linux linux-lj2l 4.12.14-23-default #1 SMP Tue May 29 21:04:44 UTC 2018 (cd0437b)
      x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2017-5754 (Meltdown): Not affected
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted Speculation, IBPB, IBRS_FW

run-level 3 Mar 14 15:54

SPEC is set to: /home/cpu2017_u2
  Filesystem  Type  Size  Used Avail Use% Mounted on
  /dev/sdb3     xfs  141G  89G  53G  63% /home

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.

  BIOS HPE U34 02/02/2019
  Memory:
    36x UNKNOWN NOT AVAILABLE
    12x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2933

(End of data from sysinfo program)

Compiler Version Notes

===============================================
  CC  600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base) 625.x264_s(base)
      657.xz_s(base)
===============================================

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.2.187 Build 20190117

(Continued on next page)
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SPECspeed2017_int_peak = Not Run

CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

Test Date: Mar-2019
Hardware Availability: Apr-2019
Software Availability: Feb-2019

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

Base Portability Flags

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

Compiler Version Notes (Continued)

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==============================================================================
CXXC 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)
  641.leela_s(base)
==============================================================================
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.2.187 Build 20190117
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

==============================================================================
FC  648.exchange2_s(base)
==============================================================================
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.2.187 Build 20190117
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL580 Gen10
(2.70 GHz, Intel Xeon Platinum 8280)

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SPECSpeed2017_int_peak = Not Run

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Test Sponsor: HPE
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Test Date: Mar-2019
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Software Availability: Feb-2019

Base Optimization Flags

C benchmarks:
-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-L/home/cpu2017_u2/je5.0.1-64/ -ljemalloc

C++ benchmarks:
-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64
-lqkmalloc

Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/HPE-ic19.0u1-flags-linux64.html
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revA.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/HPE-ic19.0u1-flags-linux64.xml
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revA.xml

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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