### SPEC® CPU2017 Integer Rate Result

Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL380 Gen10  
(2.70 GHz, Intel Xeon Platinum 8280)

<table>
<thead>
<tr>
<th>SPECrate2017_int_base</th>
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<tr>
<td>SPECrate2017_int_peak</td>
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CPU2017 License: 3  
Test Sponsor: HPE  
Tested by: HPE

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<td>Apr-2019</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Nov-2018</td>
</tr>
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**Hardware**

- **CPU Name:** Intel Xeon Platinum 8280  
- **Max MHz.:** 4000
- **Nominal:** 2700
- **Enabled:** 28 cores, 1 chip, 2 threads/core
- **Orderable:** 1,2 chip(s)
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **L2:** 1 MB I+D on chip per core
- **L3:** 38.5 MB I+D on chip per chip
- **Other:** None
- **Memory:** 192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R)
- **Storage:** 1 x 960 GB SATA SSD, RAID 0
- **Other:** None

**Software**

- **OS:** SUSE Linux Enterprise Server 15 (x86_64)
- **Kernel:** 4.12.14-23-default
- **Compiler:** C/C++: Version 19.0.1.144 of Intel C/C++
- **Compiler Build:** 20181018 for Linux
- **Fortran:** Version 19.0.1.144 of Intel Fortran
- **Compiler Build:** 20181018 for Linux
- **Parallel:** No
- **Firmware:** HPE BIOS Version U30 02/02/2019 released Apr-2019
- **File System:** btrfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** Not Applicable
- **Other:** None

| Copies | 0 | 15.0 | 30.0 | 45.0 | 60.0 | 75.0 | 90.0 | 105.0 | 120.0 | 135.0 | 150.0 | 165.0 | 180.0 | 195.0 | 210.0 | 225.0 | 240.0 | 255.0 | 270.0 | 285.0 | 300.0 | 315.0 | 330.0 | 345.0 | 360.0 | 375.0 | 390.0 | 405.0 | 420.0 | 435.0 | 450.0 | 465.0 | 480.0 | 495.0 | 510.0 | 525.0 | 540.0 | 555.0 | 570.0 |
|--------|---|------|------|------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| 500.perlbench_r | 56 | 140 |
| 502.gcc_r | 56 | 131 |
| 505.mcf_r | 56 | 219 |
| 520.omnetpp_r | 56 | 102 |
| 523.xalancbmk_r | 56 | 177 |
| 525.x264_r | 56 | 368 |
| 531.deepsjeng_r | 56 | 152 |
| 541.leela_r | 56 | 143 |
| 548.exchange2_r | 56 | 327 |
| 557.xz_r | 56 | 117 |
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SPECrate2017_int_base = 172
SPECrate2017_int_peak = Not Run

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
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<th>Seconds</th>
<th>Ratio</th>
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<tr>
<td>500.perlbench_r</td>
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<td>635</td>
<td>140</td>
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<td>130</td>
<td>601</td>
<td>132</td>
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<td>131</td>
</tr>
<tr>
<td>505.mcf_r</td>
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<td>412</td>
<td>220</td>
<td>414</td>
<td>219</td>
<td>414</td>
<td>219</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>56</td>
<td>724</td>
<td>101</td>
<td>722</td>
<td>102</td>
<td>722</td>
<td>102</td>
</tr>
<tr>
<td>523.xalanbmk_r</td>
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<td>333</td>
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<td>333</td>
<td>178</td>
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<tr>
<td>525.x264_r</td>
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</tr>
<tr>
<td>531.deepsjeng_r</td>
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<td>421</td>
<td>152</td>
<td>421</td>
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<tr>
<td>541.leela_r</td>
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<td>143</td>
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<td>143</td>
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<td>449</td>
<td>326</td>
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<td>117</td>
<td>515</td>
<td>117</td>
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<td>117</td>
</tr>
</tbody>
</table>

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"
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.:
  numactl --interleave=all runcpu <etc>

General Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017_B0/lib/ia32:/home/cpu2017_B0/lib/intel64"
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)
Hewlett Packard Enterprise

Spec CPU2017 Integer Rate Result

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ProLiant DL380 Gen10
(2.70 GHz, Intel Xeon Platinum 8280)

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SPECrate2017_int_peak = Not Run

CPU2017 License: 3
Test Date: Mar-2019
Test Sponsor: HPE
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Tested by: HPE
Software Availability: Nov-2018

General Notes (Continued)

is mitigated in the system as tested and documented.

Platform Notes

BIOS Configuration:
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 Throughput Compute
Workload Profile set to Custom
Minimum Processor Idle Power Core C-State set to C1E State
Sysinfo program /home/cpu2017_B0/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-9mbf Fri Mar 8 04:02:00 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
      1 "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 : 56
  physical 0: cores 0 1 2 3 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:    2
    Core(s) per socket:    28
    Socket(s):             1
    NUMA node(s):          2
    Vendor ID:             GenuineIntel
    CPU family:            6
    Model:                 85
    Model name:            Intel(R) Xeon(R) Platinum 8280 CPU @ 2.70GHz

(Continued on next page)
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Platform Notes (Continued)

Stepping: 6
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): 0-13,28-41
NUMA node1 CPU(s): 14-27,42-55
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
aperfmperf tsc_known_freq 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
_clflushopt clwb intel_pt avx512cd avx512bw avx512vl

/cache data

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 28 29 30 31 32 33 34 35 36 37 38 39 40 41
node 0 size: 96277 MB
node 0 free: 95724 MB
node 1 cpus: 14 15 16 17 18 19 20 21 22 23 24 25 26 27 42 43 44 45 46 47 48 49 50 51 52
53 54 55
node 1 size: 96535 MB
node 1 free: 96243 MB
node distances:
node 0: 10 21
0: 10 21
1: 21 10

From /proc/meminfo
MemTotal: 197440260 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
os-release:

(Continued on next page)
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**SPECrate2017_int Base = 172**

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**Platform Notes (Continued)**

```plaintext
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-9mbf 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 8 03:59
```

**SPEC is set to: /home/cpu2017_B0**

```
Filesystem  Type  Size  Used Avail Use% Mounted on
/dev/sdb4    xfs   436G  204G  233G  47%  /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 U30 02/02/2019
- Memory:
  - 12x UNKNOWN NOT AVAILABLE
  - 12x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2933

(End of data from sysinfo program)

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**Compiler Version Notes**

```
CC 500.perlibench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base)
    557.xz_r(base)
```

```
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

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Compiler Version Notes (Continued)

==============================================================================
CXXC 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)
541.leela_r(base)
-----------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
-----------------------------------------------------------------------------

FC  548.exchange2_r(base)
-----------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
-----------------------------------------------------------------------------

Base Compiler Invocation

C benchmarks:  
icc -m64 -std=c11

C++ benchmarks:  
icpc -m64

Fortran benchmarks:  
ifort -m64

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
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### Base Optimization Flags

**C benchmarks:**  
-WL,-z,muldefs -xCORE-AVX512 -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

**C++ benchmarks:**  
-WL,-z,muldefs -xCORE-AVX512 -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:**  
-WL,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte  
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64/lqkmalloc

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