### SPEC® CPU2017 Integer Rate Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant ML350 Gen10  
(2.70 GHz, Intel Xeon Platinum 8280)

| SPECrate2017_int_base = 334 |
| SPECrate2017_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

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>HPE</td>
<td></td>
</tr>
<tr>
<td>Tested by:</td>
<td>HPE</td>
<td></td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Apr-2019</td>
<td></td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Feb-2019</td>
<td></td>
</tr>
</tbody>
</table>

#### Hardware

- **CPU Name:** Intel Xeon Platinum 8280  
- **Max MHz.:** 4000  
- **Nominal:** 2700  
- **Enabled:** 56 cores, 2 chips, 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:** 384 GB (24 x 16 GB 2Rx8 PC4-2933Y-R)  
- **Storage:** 1 x 400 GB SAS SSD, RAID 0  
- **Other:** None

#### Software

- **OS:** SUSE Linux Enterprise Server 15 (x86_64)  
- **Kernel:** 4.12.14-23-default  
- **Compiler:** C/C++: Version 19.0.2.187 of Intel C/C++  
- **Compiler Build:** 20190131 for Linux; Fortran: Version 19.0.2.187 of Intel Fortran  
- **Compiler Build:** 20190131 for Linux  
- **Parallel:** No  
- **Firmware:** HPE BIOS Version U41 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

#### Results

<table>
<thead>
<tr>
<th>SPECrate2017_int_base</th>
<th>334</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_int_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>
### SPEC CPU2017 Integer Rate Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant ML350 Gen10  
(2.70 GHz, Intel Xeon Platinum 8280)  

**SPECrate2017_int_base** = 334  
**SPECrate2017_int_peak** = Not Run

- **CPU2017 License:** 3  
- **Test Date:** Mar-2019  
- **Test Sponsor:** HPE  
- **Hardware Availability:** Apr-2019  
- **Tested by:** HPE  
- **Software Availability:** Feb-2019

---

## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>112</td>
<td>665</td>
<td>268</td>
<td>663</td>
<td>269</td>
<td>663</td>
<td>269</td>
<td>112</td>
<td>663</td>
<td>269</td>
<td>663</td>
<td>269</td>
<td>112</td>
<td>663</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>112</td>
<td>634</td>
<td>250</td>
<td>625</td>
<td>254</td>
<td>627</td>
<td>253</td>
<td>112</td>
<td>627</td>
<td>253</td>
<td>627</td>
<td>253</td>
<td>112</td>
<td>627</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>112</td>
<td>428</td>
<td>423</td>
<td>428</td>
<td>423</td>
<td>429</td>
<td>422</td>
<td>112</td>
<td>429</td>
<td>422</td>
<td>429</td>
<td>422</td>
<td>112</td>
<td>429</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>112</td>
<td>732</td>
<td>201</td>
<td>733</td>
<td>200</td>
<td>731</td>
<td>201</td>
<td>112</td>
<td>731</td>
<td>201</td>
<td>731</td>
<td>201</td>
<td>112</td>
<td>731</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>112</td>
<td>349</td>
<td>339</td>
<td>348</td>
<td>340</td>
<td>349</td>
<td>339</td>
<td>112</td>
<td>349</td>
<td>339</td>
<td>349</td>
<td>339</td>
<td>112</td>
<td>349</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>112</td>
<td>269</td>
<td>728</td>
<td>269</td>
<td>730</td>
<td>269</td>
<td>729</td>
<td>112</td>
<td>269</td>
<td>729</td>
<td>269</td>
<td>729</td>
<td>112</td>
<td>269</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>112</td>
<td>434</td>
<td>296</td>
<td>434</td>
<td>296</td>
<td>435</td>
<td>295</td>
<td>112</td>
<td>435</td>
<td>295</td>
<td>435</td>
<td>295</td>
<td>112</td>
<td>435</td>
</tr>
<tr>
<td>541.leela_r</td>
<td>112</td>
<td>655</td>
<td>283</td>
<td>664</td>
<td>279</td>
<td>661</td>
<td>280</td>
<td>112</td>
<td>661</td>
<td>280</td>
<td>661</td>
<td>280</td>
<td>112</td>
<td>661</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>112</td>
<td>466</td>
<td>630</td>
<td>466</td>
<td>629</td>
<td>467</td>
<td>629</td>
<td>112</td>
<td>467</td>
<td>629</td>
<td>467</td>
<td>629</td>
<td>112</td>
<td>467</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>112</td>
<td>528</td>
<td>229</td>
<td>529</td>
<td>229</td>
<td>529</td>
<td>229</td>
<td>112</td>
<td>529</td>
<td>229</td>
<td>529</td>
<td>229</td>
<td>112</td>
<td>529</td>
</tr>
</tbody>
</table>

**SPECrate2017_int_base** = 334  
**SPECrate2017_int_peak** = Not Run

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_u2/lib/ia32:/home/cpu2017_u2/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)

(Continued on next page)
### SPEC CPU2017 Integer Rate Result

**Hewlett Packard Enterprise**

#### ProLiant ML350 Gen10

(2.70 GHz, Intel Xeon Platinum 8280)

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

**SPECrate2017_int_base** = 334

**SPECrate2017_int_peak** = Not Run

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

### 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
- Energy/Performance Bias set to Balanced Performance

**Sysinfo program** /home/cpu2017_u2/bin/sysinfo  
**Rev:** r5974 of 2018-05-19 9bcd0f2999c33d61f64f985e45859ea9  
running on ml350-sles15 Tue Mar 12 03:34:55 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)
- 112 "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**

**physical 1: 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):** 112
- **On-line CPU(s) list:** 0-111
- **Thread(s) per core:** 2
- **Core(s) per socket:** 28
- **Socket(s):** 2
- **NUMA node(s):** 4
- **Vendor ID:** GenuineIntel
- **CPU family:** 6

(Continued on next page)
SPEC CPU2017 Integer Rate Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant ML350 Gen10
(2.70 GHz, Intel Xeon Platinum 8280)

SPECrate2017_int_base = 334
SPECrate2017_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

Platform Notes (Continued)

Model: 85
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): 0-13,56-69
NUMA node1 CPU(s): 14-27,70-83
NUMA node2 CPU(s): 28-41,84-97
NUMA node3 CPU(s): 42-55,98-111
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 pdelgb rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperf perfctr tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtrac PCM dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault ebp cat13 cdp13 invpcid_single intel_pipin mba tpr_shadow vmx flexpriority ept vpid fsgsbase tsc_adjust bni hle avx2 smep bmi2 ems invpcid rtm cmq mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsavesopt xsaveopt xsavec xgetbv1 xsaves cmq_llc cmq_occup_llc cmq_mbm_total cmq_mbm_local ibpb ibrs stib dtherm ida arat pln pts pku ospke avx512_vnni arch_capabilities ssbd

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.

available: 4 nodes (0-3)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 56 57 58 59 60 61 62 63 64 65 66 67 68 69
node 0 size: 96348 MB
node 0 free: 96023 MB
node 1 cpus: 14 15 16 17 18 19 20 21 22 23 24 25 26 27 70 71 72 73 74 75 76 77 78 79 80
node 1 size: 96762 MB
node 1 free: 96576 MB
node 2 cpus: 28 29 30 31 32 33 34 35 36 37 38 39 40 41 84 85 86 87 88 89 90 91 92 93 94
node 2 size: 97662 MB
node 2 free: 96569 MB
node 3 cpus: 42 43 44 45 46 47 48 49 50 51 52 53 54 55 98 99 100 101 102 103 104 105
node 3 size: 97632 MB
node 3 free: 96303 MB

(Continued on next page)
Platform Notes (Continued)

node distances:
node   0    1    2    3
 0:  10  21  31  31
 1:  21  10  31  31
 2:  31  31  10  21
 3:  31  31  21  10

From /proc/meminfo
  MemTotal:       395885028 kB
  HugePages_Total:       0
  Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
  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 ml350-sles15 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 12 03:30

SPEC is set to: /home/cpu2017_u2
  Filesystem  Type  Size  Used  Avail  Use%  Mounted on
  /dev/sdb2    btrfs  371G  112G  259G  31%  /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 U41 02/02/2019
  Memory:
    24x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2933

(Continued on next page)
SPEC CPU2017 Integer Rate Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant ML350 Gen10
(2.70 GHz, Intel Xeon Platinum 8280)

<table>
<thead>
<tr>
<th>SPECrate2017_int_base</th>
<th>334</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_int_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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

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

Platform Notes (Continued)

(End of data from sysinfo program)

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 19.0.2.187 Build 20190117
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

==============================================================================
| 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 19.0.2.187 Build 20190117
Copyright (C) 1985-2019 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 19.0.2.187 Build 20190117
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64
SPEC CPU2017 Integer Rate Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant ML350 Gen10
(2.70 GHz, Intel Xeon Platinum 8280)

<table>
<thead>
<tr>
<th>CPU2017 License: 3</th>
<th>Test Date:</th>
<th>Mar-2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor: HPE</td>
<td>Hardware Availability:</td>
<td>Apr-2019</td>
</tr>
<tr>
<td>Tested by: HPE</td>
<td>Software Availability:</td>
<td>Feb-2019</td>
</tr>
</tbody>
</table>

| SPECrate2017_int_base = 334          | SPECrate2017_int_peak = Not Run |

**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:  
- `-W1,-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:  
- `-W1,-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:  
- `-W1,-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
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2019-04-03.xml
<table>
<thead>
<tr>
<th>Hewlett Packard Enterprise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor: HPE</td>
</tr>
<tr>
<td>ProLiant ML350 Gen10</td>
</tr>
<tr>
<td>(2.70 GHz, Intel Xeon Platinum 8280)</td>
</tr>
<tr>
<td>SPECrate2017_int_base = 334</td>
</tr>
<tr>
<td>SPECrate2017_int_peak = Not Run</td>
</tr>
</tbody>
</table>

| CPU2017 License: 3          |
| Test Sponsor: HPE          |
| Tested by: HPE             |
| Test Date: Mar-2019        |
| Hardware Availability: Apr-2019 |
| Software Availability: Feb-2019 |

SPEC is a registered trademark 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.

Tested with SPEC CPU2017 v1.0.5 on 2019-03-11 18:04:55-0400.
Originally published on 2019-04-03.