## SPEC® CPU2017 Integer Speed Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant ML350 Gen10  
(2.40 GHz, Intel Xeon Platinum 8260L)

<table>
<thead>
<tr>
<th>Test Sponsor</th>
<th>HPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tested by</td>
<td>HPE</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 3  
**Test Date:** May-2019  
**Hardware Availability:** Apr-2019  
**Software Availability:** Feb-2019

### Results

<table>
<thead>
<tr>
<th>Thread Count</th>
<th>SPECspeed2017_int_base</th>
<th>SPECspeed2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>48</td>
<td>10.1</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

### Hardware

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name</td>
<td>Intel Xeon Platinum 8260L</td>
</tr>
<tr>
<td>Max MHz.</td>
<td>3900</td>
</tr>
<tr>
<td>Nominal</td>
<td>2400</td>
</tr>
<tr>
<td>Enabled</td>
<td>48 cores, 2 chips</td>
</tr>
<tr>
<td>Orderable</td>
<td>1, 2 chip(s)</td>
</tr>
<tr>
<td>Cache L1</td>
<td>32 KB I+32 KB D on chip per core</td>
</tr>
<tr>
<td>Cache L2</td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td>Cache L3</td>
<td>35.75 MB I+D on chip per core</td>
</tr>
<tr>
<td>Memory</td>
<td>384 GB (24 x 16 GB 2Rx8 PC4-2933Y-R)</td>
</tr>
<tr>
<td>Storage</td>
<td>1 x 400 GB SAS SSD, RAID 0</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS</td>
<td>SUSE Linux Enterprise Server 15 (x86_64)</td>
</tr>
<tr>
<td>Kernel</td>
<td>4.12.14-23-default</td>
</tr>
<tr>
<td>Compiler</td>
<td>C/C++: Version 19.0.2.187 of Intel C/C++</td>
</tr>
<tr>
<td>Compiler Build</td>
<td>20190117 for Linux:</td>
</tr>
<tr>
<td>Fortran</td>
<td>Version 19.0.2.187 of Intel Fortran</td>
</tr>
<tr>
<td>Firmware</td>
<td>HPE BIOS Version U41 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>
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</table>
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**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>
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<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<tbody>
<tr>
<td>600.perlbench_s</td>
<td>48</td>
<td>261</td>
<td>6.80</td>
<td>260</td>
<td>6.84</td>
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<td>6.80</td>
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<td>602.gcc_s</td>
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<td>9.41</td>
<td>419</td>
<td>9.50</td>
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<td>605.mcf_s</td>
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<td>380</td>
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<td>377</td>
<td>12.5</td>
<td>378</td>
<td>12.5</td>
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<tr>
<td>620.omnetpp_s</td>
<td>48</td>
<td>179</td>
<td>9.12</td>
<td>181</td>
<td>9.02</td>
<td>178</td>
<td>9.15</td>
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<tr>
<td>623.xalancbmk_s</td>
<td>48</td>
<td>115</td>
<td>12.3</td>
<td>115</td>
<td>12.3</td>
<td>115</td>
<td>12.3</td>
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<tr>
<td>625.x264_s</td>
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<td>631.deepsjeng_s</td>
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<td>641.leela_s</td>
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<tr>
<td>648.exchange2_s</td>
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<td>210</td>
<td>14.0</td>
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<tr>
<td>657.xz_s</td>
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<td>23.7</td>
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<td>23.7</td>
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<td>23.7</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**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,scatter"
LD_LIBRARY_PATH = "/home/cpu2017_u2/lib/ia32:/home/cpu2017_u2/lib/intel64: /
/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
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.
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ProLiant ML350 Gen10
(2.40 GHz, Intel Xeon Platinum 8260L)

SPECspeed2017_int_base = 10.1
SPECspeed2017_int_peak = Not Run

Table:

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

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
- Minimum Processor Idle Power Core C-State set to C1E State
- Energy/Performance Bias set to Balanced Power
- Workload Profile set to Custom
- Numa Group Size Optimization set to Flat

Sysinfo program /home/cpu2017_u2/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcd8f2999c33d61f64985e45859ea9
running on ml350-sles15 Wed May 8 10:08:02 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 8260L CPU @ 2.40GHz
  2 "physical id"s (chips)
  48 "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 : 24
siblings : 24
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29
physical 1: cores 0 1 2 3 4 5 6 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
```

From lscpu:

```
Architecture:       x86_64
CPU op-mode(s):     32-bit, 64-bit
Byte Order:         Little Endian
CPU(s):             48
On-line CPU(s) list: 0-47
Thread(s) per core: 1
Core(s) per socket: 24
Socket(s):          2
NUMA node(s):       2
Vendor ID:          GenuineIntel
CPU family:         6
Model:              85
Model name:         Intel(R) Xeon(R) Platinum 8260L CPU @ 2.40GHz
Stepping:           6
CPU MHz:            2400.000
```
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant ML350 Gen10
(2.40 GHz, Intel Xeon Platinum 8260L)

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<td>Software Availability: Feb-2019</td>
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</table>

**Platform Notes (Continued)**

- **BogoMIPS:** 4800.00
- **Virtualization:** VT-x
- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 1024K
- **L3 cache:** 36608K
- **NUMA node0 CPU(s):** 0-23
- **NUMA node1 CPU(s):** 24-47
- **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 dtscs64 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 cdp_l3 invpcid_single intel_pni mba tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 irdt rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local ibpb stibp dtherm ida arat pin pts pku ospke avx512_vnni arch_capabilities ssbd

```
/proc/cpuinfo cache data
  cache size : 36608 KB
```

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
- **node 0 size:** 193088 MB
- **node 0 free:** 192647 MB
- **node 1 cpus:** 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
- **node 1 size:** 193530 MB
- **node 1 free:** 193174 MB
- **node distances:**
  - **node 0:** 0 1
  - **node 1:** 21 10

```
From /proc/meminfo
  MemTotal: 395897928 KB
  HugePages_Total: 0
  Hugepagesize: 4096 KB
```

```
From /etc/*release*/etc/*version*
  os-release:
    NAME="SLES"
    VERSION="15"
    VERSION_ID="15"
```

(Continued on next page)
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Platform Notes (Continued)

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 May 8 10:04
SPEC is set to: /home/cpu2017_u2
    Filesystem Type Size Used Avail Use% Mounted on
    /dev/sdb2 btrfs 371G 210G 160G 57% /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 SMIOS" standard.
   BIOS HPE U41 02/02/2019
   Memory: 24x UNKNOWN NOT AVAILABLE 16 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
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

==============================================================================
CXXC 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)
(Continued on next page)
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### Hewlett Packard Enterprise

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</table>

| **SPECspeed2017_int_base = 10.1** | **SPECspeed2017_int_peak = Not Run** |

### Compiler Version Notes (Continued)

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.

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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.

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### 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.xalancmk_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
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Test Sponsor: HPE
Tested by: HPE

Test Date: May-2019
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Base Optimization Flags

C benchmarks:
-Wl,-z,muldefs -xCORE-AVX512 -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-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:
-xCORE-AVX512 -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-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

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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 2019-05-08 00:38:02-0400.