**SPEC® CPU2017 Integer Speed Result**

**Hewlett Packard Enterprise**
(Test Sponsor: HPE)
ProLiant ML110 Gen10
(3.80 GHz, Intel Xeon Gold 5222)

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

**Threads**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed2017_int_base</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>4</td>
<td>6.71</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>4</td>
<td>9.06</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>4</td>
<td>12.5</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>4</td>
<td>6.50</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>4</td>
<td>12.2</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>4</td>
<td>14.4</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>4</td>
<td>5.67</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>4</td>
<td>4.76</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>4</td>
<td>14.0</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>4</td>
<td>8.47</td>
</tr>
</tbody>
</table>

**Hardware**

CPU Name: Intel Xeon Gold 5222
Max MHZ.: 3900
Nominal: 3800
Enabled: 4 cores, 1 chip
Orderable: 1 chip(s)
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 1 MB I+D on chip per core
L3: 16.5 MB I+D on chip per chip
Other: None
Memory: 192 GB (6 x 32 GB 2Rx4 PC4-2933Y-R)
Storage: 1 x 400 GB SAS SSD, RAID 0

**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 20190117 for Linux;
Fortran: Version 19.0.2.187 of Intel Fortran
Compiler Build 20190117 for Linux
Parallel: Yes
Firmware: HPE BIOS Version U33 02/02/2019 released Apr-2019
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: jemalloc memory allocator V5.0.1
SPEC CPU2017 Integer Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant ML110 Gen10
(3.80 GHz, Intel Xeon Gold 5222)

Copyright 2017-2019 Standard Performance Evaluation Corporation

SPECspeed2017_int_base = 8.80
SPECspeed2017_int_peak = Not Run

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>4</td>
<td>264</td>
<td>6.71</td>
<td>266</td>
<td>6.67</td>
<td>264</td>
<td>6.72</td>
<td></td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>4</td>
<td>440</td>
<td>9.06</td>
<td>445</td>
<td>8.94</td>
<td>439</td>
<td>9.07</td>
<td></td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>4</td>
<td>371</td>
<td>12.7</td>
<td>378</td>
<td>12.5</td>
<td>378</td>
<td>12.5</td>
<td></td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>4</td>
<td>250</td>
<td>6.52</td>
<td>251</td>
<td>6.50</td>
<td>252</td>
<td>6.47</td>
<td></td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>4</td>
<td>117</td>
<td>12.1</td>
<td>116</td>
<td>12.2</td>
<td>116</td>
<td>12.2</td>
<td></td>
</tr>
<tr>
<td>625.x264_s</td>
<td>4</td>
<td>122</td>
<td>14.4</td>
<td>123</td>
<td>14.4</td>
<td>123</td>
<td>14.4</td>
<td></td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>4</td>
<td>252</td>
<td>5.69</td>
<td>253</td>
<td>5.66</td>
<td>253</td>
<td>5.67</td>
<td></td>
</tr>
<tr>
<td>641.leela_s</td>
<td>4</td>
<td>359</td>
<td>4.76</td>
<td>359</td>
<td>4.76</td>
<td>359</td>
<td>4.76</td>
<td></td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>4</td>
<td>209</td>
<td>14.1</td>
<td>210</td>
<td>14.0</td>
<td>209</td>
<td>14.0</td>
<td></td>
</tr>
<tr>
<td>657.xz_s</td>
<td>4</td>
<td>730</td>
<td>8.47</td>
<td>729</td>
<td>8.48</td>
<td>730</td>
<td>8.47</td>
<td></td>
</tr>
</tbody>
</table>

SPECspeed2017_int_base = 8.80
SPECspeed2017_int_peak = Not Run

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,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.
**SPEC CPU2017 Integer Speed Result**

**Hewlett Packard Enterprise**
(Test Sponsor: HPE)  
ProLiant ML110 Gen10  
(3.80 GHz, Intel Xeon Gold 5222)

<table>
<thead>
<tr>
<th>SPECspeed2017_int_base</th>
<th>8.80</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_int_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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

**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
- 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 9bcede8f2999c33d61f64985e45859ea9
- running on ml110-sles15 Tue May 7 20:01:37 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](https://www.spec.org/cpu2017/Docs/config.html#sysinfo)

From /proc/cpuinfo
- model name: Intel(R) Xeon(R) Gold 5222 CPU @ 3.80GHz
  - 1 "physical id"s (chips)
  - 4 "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: 4
  - siblings: 4
  - physical 0: cores 5 8 9 13

From lscpu:
- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- CPU(s): 4
- On-line CPU(s) list: 0-3
- Thread(s) per core: 1
- Core(s) per socket: 4
- Socket(s): 1
- NUMA node(s): 1
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 85
- Model name: Intel(R) Xeon(R) Gold 5222 CPU @ 3.80GHz
- Stepping: 7
- CPU MHz: 3800.000
- BogoMIPS: 7600.00
- Virtualization: VT-x

(Continued on next page)
SPEC CPU2017 Integer Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant ML110 Gen10
(3.80 GHz, Intel Xeon Gold 5222)

SPECspeed2017_int_base = 8.80
SPECspeed2017_int_peak = Not Run

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

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

Platform Notes (Continued)

L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 16896K
NUMA node0 CPU(s): 0-3
Flags: fpu vme de pse tsc msr pae 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 tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_pinn mba tpr_shadow vnmi flexpriority ept vpid fs.gsbase tsc_adjust bml1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsave xgetbv1 xsavec cqm_llc cqm_occup_llc cqm_mbms total cqm_mbms local ibpb ibrs stibp dtherm ida arat pln pts pkup ospe avx512_vnni arch_capabilities ssbd

/cacheinfo: cache data
    cache size : 16896 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.
    available: 1 nodes (0)
    node 0 cpus: 0 1 2 3
    node 0 size: 193094 MB
    node 0 free: 192488 MB
    node distances:
    node 0
    0: 10

From /proc/meminfo
    MemTotal: 197728840 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:

(Continued on next page)
SPEC CPU2017 Integer Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant ML110 Gen10
(3.80 GHz, Intel Xeon Gold 5222)

SPECspeed2017_int_base = 8.80
SPECspeed2017_int_peak = Not Run

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

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

Platform Notes (Continued)

Linux ml110-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 7 19:58

SPEC is set to: /home/cpu2017_u2

Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda3      xfs   313G   43G  270G  14% /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 U33 02/02/2019
Memory:
6x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2933

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)
    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.

(Continued on next page)
Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant ML110 Gen10  
(3.80 GHz, Intel Xeon Gold 5222)

| SPECspeed2017_int_base = 8.80 |
| SPECspeed2017_int_peak = Not Run |

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

---

**Compiler Version Notes (Continued)**

```plaintext
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.
```

---

**Base Compiler Invocation**

- C benchmarks:
  ```
  icc -m64 -std=c11
  ```
- C++ benchmarks:
  ```
  icpc -m64
  ```
- Fortran benchmarks:
  ```
  ifort -m64
  ```

---

**Base Portability 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
  ```

---

**Base Optimization Flags**

(Continued on next page)
SPEC CPU2017 Integer Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant ML110 Gen10
(3.80 GHz, Intel Xeon Gold 5222)

SPECspeed2017_int_base = 8.80
SPECspeed2017_int_peak = Not Run

<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>

Base Optimization Flags (Continued)

C++ benchmarks (continued):
-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

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.

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