### SPEC® CPU2017 Integer Speed Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
Synergy 480 Gen10  
(2.30 GHz, Intel Xeon Gold 5218)

<table>
<thead>
<tr>
<th>CPU2017 License: 3</th>
<th>Test Date: Apr-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>

#### Hardware

- **CPU Name:** Intel Xeon Gold 5218  
- **Max MHz.:** 3900  
- **Nominal:** 2300  
- **Enabled:** 32 cores, 2 chips  
- **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:** 22 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 384 GB (24 x 16 GB 2Rx8 PC4-2933Y-R, running at 2666)  
- **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:** 20190117 for Linux; Fortran: Version 19.0.2.187 of Intel Fortran  
- **Compiler Build:** 20190117 for Linux  
- **Parallel:** Yes  
- **Firmware:** HPE BIOS Version I42 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:** jemalloc memory allocator V5.0.1

#### Performance Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed2017_int_base</th>
<th>SPECspeed2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>32</td>
<td>6.54</td>
<td>Not Run</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>32</td>
<td>9.25</td>
<td>Not Run</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>32</td>
<td>12.3</td>
<td>Not Run</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>32</td>
<td>7.44</td>
<td>Not Run</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>32</td>
<td>12.2</td>
<td>Not Run</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>32</td>
<td>11.6</td>
<td>Not Run</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>32</td>
<td>5.43</td>
<td>Not Run</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>32</td>
<td>4.75</td>
<td>Not Run</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>32</td>
<td>14.0</td>
<td>Not Run</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>32</td>
<td>20.9</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

---

**SPECspeed2017_int_base =** 9.52  
**SPECspeed2017_int_peak =** Not Run
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SPECspeed2017_int_base = 9.52
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Results Table

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<th>Seconds</th>
<th>Ratio</th>
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<td></td>
<td></td>
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<td></td>
<td>Peak</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>600.perlbench_s</td>
<td>32</td>
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<tr>
<td>602.gcc_s</td>
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<td>428</td>
<td>9.30</td>
<td>431</td>
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<td>605.mcf_s</td>
<td>32</td>
<td>380</td>
<td>12.4</td>
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<td>388</td>
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<td>620.omnetpp_s</td>
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<td>219</td>
<td>7.44</td>
<td>218</td>
<td>7.47</td>
<td>223</td>
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<tr>
<td>623.xalancbmk_s</td>
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<td>117</td>
<td>12.2</td>
<td>116</td>
<td>12.2</td>
<td>116</td>
<td>12.2</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>32</td>
<td>152</td>
<td>11.6</td>
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<td>5.42</td>
<td>264</td>
<td>5.43</td>
</tr>
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<td>641.leela_s</td>
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<td>359</td>
<td>4.75</td>
<td>359</td>
<td>4.75</td>
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<tr>
<td>648.exchange2_s</td>
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<td>210</td>
<td>14.0</td>
<td>210</td>
<td>14.0</td>
<td>210</td>
<td>14.0</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>32</td>
<td>296</td>
<td>20.9</td>
<td>296</td>
<td>20.9</td>
<td>297</td>
<td>20.8</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:
/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.
jemalloc, a general purpose malloc implementation built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
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</tbody>
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| CPU2017 License: | 3 |
| Test Sponsor:   | HPE |
| Tested by:      | HPE |

**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 9bcede8f2999c33d61f64985e45859ea9
running on sy480g10-2 Tue Apr 16 01:51:51 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

```plaintext
model name : Intel(R) Xeon(R) Gold 5218 CPU @ 2.30GHz
  2  "physical id"s (chips)
  32 "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 : 16
siblings : 16
  physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
  physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
```

From lscpu:

```plaintext
Architecture:       x86_64
CPU op-mode(s):   32-bit, 64-bit
Byte Order:        Little Endian
CPU(s):            32
On-line CPU(s) list: 0-31
Thread(s) per core: 1
Core(s) per socket: 16
Socket(s):         2
NUMA node(s):      2
Vendor ID:         GenuineIntel
CPU family:        6
Model:             85
Model name:        Intel(R) Xeon(R) Gold 5218 CPU @ 2.30GHz
Stepping:          6
CPU MHz:           2300.000
```

(Continued on next page)
### Platform Notes (Continued)

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BogoMIPS</td>
<td>4600.00</td>
</tr>
<tr>
<td>Virtualization</td>
<td>VT-x</td>
</tr>
<tr>
<td>L1d cache</td>
<td>32K</td>
</tr>
<tr>
<td>L1i cache</td>
<td>32K</td>
</tr>
<tr>
<td>L2 cache</td>
<td>1024K</td>
</tr>
<tr>
<td>L3 cache</td>
<td>22528K</td>
</tr>
<tr>
<td>NUMA node0 CPU(s)</td>
<td>0-15</td>
</tr>
<tr>
<td>NUMA node1 CPU(s)</td>
<td>16-31</td>
</tr>
<tr>
<td>Flags</td>
<td>fpu vme de pse tsc mrs 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 xtrr 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_13 cdp_13 invpcid_single intel_pmm mba tpr_shadow vnmi flexpriority ept vpid fsbgbase tsc_adjust bm1 hle avx2 smep bmi2 erms invpcid rtm cg mpx rdt_a avx512f avx512dq rdseed adx clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cgx_l1c cgx_occup_l1c cgx_mbm_total cgx_mbm_local ibpb ibrs stib dtherm ida arat pin pts pkc ospe avx512_vnni arch_capabilities ssbd</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Node</th>
<th>Available CPUs</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>2</td>
<td>193047 MB</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>192724 MB</td>
</tr>
<tr>
<td>0</td>
<td>16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31</td>
<td>193306 MB</td>
</tr>
<tr>
<td>1</td>
<td>192807 MB</td>
<td></td>
</tr>
</tbody>
</table>

From `/proc/meminfo`:
- MemTotal: 395626572 KB
- HugePages_Total: 0
- Hugepagesize: 4096 KB

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

(Continued on next page)
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 sy480g10-2 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 Apr 16 01:49

SPEC is set to: /home/cpu2017_u2
    Filesystem     Type Size  Used Avail Use% Mounted on
/dev/sdb2      btrfs  371G   89G  282G  24% /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 142 02/02/2019
Memory:
    24x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2933, configured at 2666

(End of data from sysinfo program)
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**Test Sponsor:** HPE  
**Tested by:** HPE

**Compiler Version Notes (Continued)**

```
-------------------
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.
-------------------
```

```
-------------------
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**

```
600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalanchmk_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 Date:** Apr-2019  
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**Software Availability:** Feb-2019

### 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](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/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.

Tested with SPEC CPU2017 v1.0.5 on 2019-04-16 02:51:50-0400.  