## SPEC® CPU2017 Integer Speed Result

### Hewlett Packard Enterprise

**Test Sponsor:** HPE  
**Tested by:** HPE

### SPECspeed2017_int_base = 9.79  
**SPECspeed2017_int_peak = Not Run**

| Test Date: | Jun-2019  
| Test Sponsor: | HPE  
| Hardware Availability: | Apr-2019  
| Software Availability: | Nov-2018 |

| Threads | 0 | 1.00 | 2.00 | 3.00 | 4.00 | 5.00 | 6.00 | 7.00 | 8.00 | 9.00 | 10.0 | 11.0 | 12.0 | 13.0 | 14.0 | 15.0 | 16.0 | 17.0 | 18.0 | 19.0 | 20.0 | 21.0 | 22.0 |
|---------|----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 600.perlbench_s | 72 | 6.75 | 9.24 | 12.4 | 15.0 |
| 602.gcc_s | 72 | 7.80 | 12.2 | 14.3 |
| 605.mcf_s | 72 | 5.38 | 14.0 |
| 620.omnetpp_s | 72 | 4.75 |
| 623.xalancbmk_s | 72 | 21.5 |

### Hardware

- **CPU Name:** Intel Xeon Gold 5220S  
- **Max MHz.:** 3900  
- **Nominal:** 2700  
- **Enabled:** 36 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:** 24.75 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 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:** Yes  
- **Firmware:** HPE BIOS Version U30 04/18/2019 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
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ProLiant DL380 Gen10  
(2.70 GHz, Intel Xeon Gold 5220S)

### SPECspeed2017_int_base = 9.79

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**Results Table**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Peak Seconds</th>
<th>Peak Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>600:perlbench_s</td>
<td>72</td>
<td>263</td>
<td>6.75</td>
<td>262</td>
<td>6.77</td>
</tr>
<tr>
<td>602:gcc_s</td>
<td>72</td>
<td>420</td>
<td>9.47</td>
<td>431</td>
<td>9.24</td>
</tr>
<tr>
<td>605:mcf_s</td>
<td>72</td>
<td>380</td>
<td>12.4</td>
<td>384</td>
<td>12.3</td>
</tr>
<tr>
<td>620:omnetpp_s</td>
<td>72</td>
<td>209</td>
<td>7.80</td>
<td>213</td>
<td>7.67</td>
</tr>
<tr>
<td>623:xalancbmk_s</td>
<td>72</td>
<td>115</td>
<td>12.3</td>
<td>116</td>
<td>12.2</td>
</tr>
<tr>
<td>625:x264_s</td>
<td>72</td>
<td>124</td>
<td>14.3</td>
<td>124</td>
<td>14.3</td>
</tr>
<tr>
<td>631:deepsjeng_s</td>
<td>72</td>
<td>271</td>
<td>5.28</td>
<td>266</td>
<td>5.38</td>
</tr>
<tr>
<td>641:leela_s</td>
<td>72</td>
<td>359</td>
<td>4.75</td>
<td>358</td>
<td>4.77</td>
</tr>
<tr>
<td>648:exchange2_s</td>
<td>72</td>
<td>210</td>
<td>14.0</td>
<td>209</td>
<td>14.0</td>
</tr>
<tr>
<td>657:xz_s</td>
<td>72</td>
<td>288</td>
<td>21.5</td>
<td>288</td>
<td>21.5</td>
</tr>
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</table>

**SPECspeed2017_int_base = 9.79**

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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:
  ```bash
  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/lib/ia32:/home/cpu2017/lib/intel64:
    /home/cpu2017/je5.0.1-32:/home/cpu2017/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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<td>Software Availability: Nov-2018</td>
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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 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_B0/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcede8f2999c33d61f64985e45859ea9
running on linux-9mbf Fri Jun 21 19:37:57 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) Gold 5220S CPU @ 2.70GHz
  2 "physical id"s (chips)
  72 "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 : 18
siblings : 36
physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 72
On-line CPU(s) list: 0-71
Thread(s) per core: 2
Core(s) per socket: 18
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5220S CPU @ 2.70GHz
Stepping: 7
CPU MHz: 2700.000
BogoMIPS: 5400.00

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### Platform Notes (Continued)

- **Virtualization:** VT-x
- **L1d cache:** 32K  
- **L1i cache:** 32K  
- **L2 cache:** 1024K  
- **L3 cache:** 25344K  
- **NUMA node0 CPU(s):** 0-17, 18-35
- **NUMA node1 CPU(s):** 36-53  

**OS:** SLES 15  
**From /proc/cpuinfo cache data**  
- **cache size:** 25344 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 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
  - **node 0 size:** 193043 MB
  - **node 0 free:** 192353 MB
  - **node 1 cpus:** 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 61 62 63 64 65 66 67 68 69 70 71
  - **node 1 size:** 193301 MB
  - **node 1 free:** 193089 MB
  - **node distances:**
    - **node 0 1**
    - **node 0:** 10 21
    - **node 1:** 21 10

**From /proc/meminfo**
- **MemTotal:** 395617492 kB
- **HugePages_Total:** 0
- **Hugepagesize:** 2048 kB

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

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Platform Notes (Continued)

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 Jun 21 19:35

SPEC is set to: /home/cpu2017_B0

Filesystem Type Size Used Avail Use% Mounted on
/dev/sdb4 xfs 436G 340G 97G 78% /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 04/18/2019
Memory:
24x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2933, configured at 2666

(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 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

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Compiler Version Notes (Continued)

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 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

------------------------------------------------------------------------------
FC 648.exchange2_s(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

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64  
602.gcc_s: -DSPEC_LP64  
605.mcf_s: -DSPEC_LP64  
620.omnetpp_s: -DSPEC_LP64  
623.xalancbmk_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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## Base Optimization Flags

**C benchmarks:**  
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
-qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP  
-L/usr/local/je5.0.1-64/lib -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-revB.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-revB.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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