# SPEC® CPU2017 Integer Speed Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant BL460c Gen10  
(3.80 GHz, Intel Xeon Gold 5222)

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

### Threads

<table>
<thead>
<tr>
<th>Thread Name</th>
<th>Threads</th>
<th>SPECspeed2017_int_base</th>
<th>SPECspeed2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perllbench_s</td>
<td>8</td>
<td>6.68</td>
<td>Not Run</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>8</td>
<td>8.97</td>
<td>12.4</td>
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<tr>
<td>605.mcf_s</td>
<td>8</td>
<td>6.48</td>
<td>12.3</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>625.x264_s</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>8</td>
<td>5.44</td>
<td></td>
</tr>
<tr>
<td>641.leela_s</td>
<td>8</td>
<td>4.76</td>
<td></td>
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<tr>
<td>648.exchange2_s</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>657.xz_s</td>
<td>8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SPECspeed2017_int_base (9.17)

**Hardware**

- **CPU Name:** Intel Xeon Gold 5222  
- **Max MHz.:** 3900  
- **Nominal:** 3800  
- **Enabled:** 8 cores, 2 chips  
- **Orderable:** 1, 2 chip(s)  
- **Cache L1:** 32 KB I + 32 KB D on chip per core  
- **Cache L2:** 1 MB I+D on chip per core  
- **Cache L3:** 16.5 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 192 GB (12 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 I41 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
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### SPECspeed2017_int_base = 9.17

### SPECspeed2017_int_peak = Not Run

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## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
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<tr>
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<td>251</td>
<td>6.49</td>
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<tr>
<td>623.xalancbmk_s</td>
<td>8</td>
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<td>12.2</td>
<td>115</td>
<td>12.3</td>
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<td>12.3</td>
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<tr>
<td>625.x264_s</td>
<td>8</td>
<td>124</td>
<td>14.2</td>
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<td>14.3</td>
<td>124</td>
<td>14.2</td>
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</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>8</td>
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<td>5.44</td>
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<tr>
<td>641.leela_s</td>
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<tr>
<td>648.exchange2_s</td>
<td>8</td>
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<td>14.0</td>
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<td>14.0</td>
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<tr>
<td>657.xz_s</td>
<td>8</td>
<td>447</td>
<td>13.8</td>
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<td>13.8</td>
<td>447</td>
<td>13.8</td>
<td></td>
<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:

```bash
class=cache

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.

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SPEC CPU2017 Integer Speed Result
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Specspeed2017_int_base = 9.17
Specspeed2017_int_peak = Not Run

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

Test Date: Apr-2019
Hardware Availability: Apr-2019
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 9bcde8f2999c33d61f64985e45859ea9
running on bl460-sles15-6252 Wed Apr 17 22:03:06 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 5222 CPU @ 3.80GHz
  2 "physical id"s (chips)
  8 "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 1 2 5 13
    physical 1: cores 2 5 9 13

From lscpu:
  Architecture: x86_64
  CPU op-mode(s): 32-bit, 64-bit
  Byte Order: Little Endian
  CPU(s): 8
  On-line CPU(s) list: 0-7
  Thread(s) per core: 1
  Core(s) per socket: 4
  Socket(s): 2
  NUMA node(s): 2
  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

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**SPECspeed2017_int_base =** 9.17  
**SPECspeed2017_int_peak =** Not Run  

<table>
<thead>
<tr>
<th>Platform Notes (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtualization: VT-x</td>
</tr>
<tr>
<td>L1d cache: 32K</td>
</tr>
<tr>
<td>L1i cache: 32K</td>
</tr>
<tr>
<td>L2 cache: 1024K</td>
</tr>
<tr>
<td>L3 cache: 16896K</td>
</tr>
<tr>
<td>NUMA node0 CPU(s): 0-3</td>
</tr>
<tr>
<td>NUMA node1 CPU(s): 4-7</td>
</tr>
<tr>
<td>Flags: fpu vme de pse tsc msr pae mce 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 pclid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdg_l3 invpcid_single intel_pinn mba tpr_shadow vmcs flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaenvopt xsavec xgetbv1 xsaves cqm_llc cqm_occupa(llc cqm_mbm_total cqm_mbm_local ibsp ibrs stibp dtherm ida arat pin pts ksu ospke avx512_vnni arch_capabilities ssebd</td>
</tr>
</tbody>
</table>

/cache info cache data  

cache size : 16896 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  
node 0 size: 96354 MB  
node 0 free: 95914 MB  
node 1 cpus: 4 5 6 7  
node 1 size: 96737 MB  
node 1 free: 96477 MB  
node distances:  

From /proc/meminfo  

MemTotal: 197726152 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"  

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Platform Notes (Continued)

ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15"

uname -a:
    Linux bl460-sles15-6252 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 17 22:01

SPEC is set to: /home/cpu2017_u2
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/sda5      xfs    72G   48G   25G  67% /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 I41 02/02/2019
    Memory:
        4x UNKNOWN NOT AVAILABLE
        12x 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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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.

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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**SPECspeed2017_int_base = 9.17**  
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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](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 2019-04-17 12:33:06-0400.  