# SPEC CPU®2017 Integer Speed Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL360 Gen10  
(2.10 GHz, Intel Xeon Gold 6209U)  

<table>
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<tr>
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</table>

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

### Hardware

**CPU Name:** Intel Xeon Gold 6209U  
**Max MHz:** 3900  
**Nominal:** 2100  
**Enabled:** 20 cores, 1 chip, 2 threads/core  
**Orderable:** 1 chip  
**Cache L1:** 32 KB I + 32 KB D on chip per core  
**L2:** 1 MB I+D on chip per core  
**L3:** 27.5 MB I+D on chip per chip  
**Other:** None  
**Memory:** 192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R)  
**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 U32 05/21/2019 released Jun-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  
**Power Management:** --

### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_int_base (9.89)</th>
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<tbody>
<tr>
<td>600.perlbench_s</td>
<td>40</td>
<td>6.77</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>40</td>
<td>9.47</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>40</td>
<td>12.6</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>40</td>
<td>8.78</td>
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<tr>
<td>625.x264_s</td>
<td>40</td>
<td>14.5</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>40</td>
<td>5.58</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>40</td>
<td>4.73</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>40</td>
<td>13.9</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>40</td>
<td>20.6</td>
</tr>
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**Threads**
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**Results Table**

| Benchmark          | Threads | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | | Threads | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
|--------------------|---------|---------|------|---------|------|---------|------| | -------|---------|------|---------|------|---------|------|
| perlbench_s        | 40      | 262     | 6.77 | 261     | 6.80 | 263     | 6.74 |
| gcc_s              | 40      | 416     | 9.57 | 423     | 9.42 | 421     | 9.47 |
| mcf_s              | 40      | 374     | 12.6 | 377     | 12.5 | 371     | 12.7 |
| omnetpp_s          | 40      | 194     | 8.40 | 198     | 8.25 | 197     | 8.28 |
| xalancbmk_s        | 40      | 116     | 12.2 | 116     | 12.2 | 116     | 12.3 |
| x264_s             | 40      | 122     | 14.5 | 122     | 14.5 | 122     | 14.4 |
| deepsjeng_s        | 40      | 257     | 5.59 | 257     | 5.58 | 257     | 5.58 |
| leela_s            | 40      | 361     | 4.73 | 361     | 4.73 | 361     | 4.73 |
| exchange2_s        | 40      | 211     | 13.9 | 210     | 14.0 | 211     | 13.9 |
| xz_s               | 40      | 300     | 20.6 | 300     | 20.6 | 300     | 20.6 |

**Results**  
- **SPECspeed\textsuperscript{2017\_int\_base} =** 9.89  
- **SPECspeed\textsuperscript{2017\_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,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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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_u2/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcede8f2999c33d61f64985e45859ea9
running on linux-nub3 Tue Jul  9 15:51:23 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 6209U CPU @ 2.10GHz
  1 "physical id"s (chips)
  40 "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 : 20
siblings : 40
physical 0: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28

From lscpu:
Architecture:        x86_64
CPU op-mode(s):      32-bit, 64-bit
Byte Order:          Little Endian
CPU(s):              40
On-line CPU(s) list: 0-39
Thread(s) per core:  2
Core(s) per socket:  20
Socket(s):           1
NUMA node(s):        1
Vendor ID:           GenuineIntel
CPU family:          6
Model:               85
Model name:          Intel(R) Xeon(R) Gold 6209U CPU @ 2.10GHz
Stepping:            7
CPU MHz:             2100.000
BogoMIPS:            4200.00
Virtualization:      VT-x

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Platform Notes (Continued)

L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 28160K
NUMA node0 CPU(s): 0-39
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 pcd 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_pmm mba tpr_shadow vmi flexpriority ept vpid fsgsbase tsc_adjust bni hle avx2 smep bmi2 erms invpcid rtm cmx mpx cbp sdbi dpic bmm mti ds_cpl vmm xsaes xsaveopt xsave xgetbv1 xsaveas cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local ibpb ibrs stibp dtherm ida arar ptm pkpu ospke avx512_vnni arch_capabilities ssbd

From /proc/cpuinfo cache data
  cache size: 28160 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 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39
    node 0 size: 193084 MB
    node 0 free: 192386 MB
    node distances:
      node 0

From /proc/meminfo
  MemTotal: 197718940 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"

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Platform Notes (Continued)

uname -a:
    Linux linux-nub3 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 Jul 9 15:48

SPEC is set to: /home/cpu2017_u2
    Filesystem  Type  Size  Used Avail Use% Mounted on
    /dev/sda1      xfs   373G  134G  239G  36% /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 U32 05/21/2019
    Memory:
        12x UNKNOWN NOT AVAILABLE
        12x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2933

(End of data from sysinfo program)

Compiler Version Notes

C
| 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
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C++
| 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,
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**Compiler Version Notes (Continued)**

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Fortran | 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**

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

**Base Optimization Flags**

C benchmarks:  
-W1, -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

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Base Optimization Flags (Continued)

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
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.

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