### SPEC® CPU2017 Integer Speed Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant ML350 Gen10  
(2.10 GHz, Intel Xeon Gold 6230)

**SPECspeed2017_int_base** = 9.95  
**SPECspeed2017_int_peak** = Not Run

<table>
<thead>
<tr>
<th>Threads</th>
<th>Software Availability: Feb-2019</th>
<th>Test Date: Apr-2019</th>
<th>Hardware Availability: Apr-2019</th>
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<tbody>
<tr>
<td>600. perbench_s</td>
<td>40</td>
<td>602. gcc_s</td>
<td>40</td>
<td>605. mcf_s</td>
<td>40</td>
<td>620. omnetpp_s</td>
</tr>
<tr>
<td>0.00</td>
<td>3.00</td>
<td>6.00</td>
<td>9.00</td>
<td>12.00</td>
<td>15.00</td>
<td>18.00</td>
</tr>
<tr>
<td>6.81</td>
<td>9.35</td>
<td>12.3</td>
<td>14.5</td>
<td>5.40</td>
<td>4.75</td>
<td>14.0</td>
</tr>
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</table>

#### Hardware
- **CPU Name:** Intel Xeon Gold 6230
- **Max MHz.:** 3900
- **Nominal:** 2100
- **Enabled:** 40 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:** 27.5 MB I+D on chip per chip
- **Other:** None
- **Memory:** 384 GB (24 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 U41 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
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Benchmark | Threads | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio
--- | --- | --- | --- | --- | --- | --- | ---
600.perlbench_s | 40 | 261 | 6.79 | 260 | 6.81 | 261 | 6.81
602.gcc_s | 40 | 425 | 9.36 | 426 | 9.35 | 427 | 9.34
605.mcf_s | 40 | 378 | 12.5 | 384 | 12.3 | 381 | 12.4
620.omnetpp_s | 40 | 194 | 8.42 | 209 | 7.81 | 201 | 8.13
623.xalancbmk_s | 40 | 116 | 12.3 | 116 | 12.2 | 115 | 12.3
625.x264_s | 40 | 122 | 14.5 | 122 | 14.5 | 122 | 14.5
631.deepsjeng_s | 40 | 261 | 5.49 | 261 | 5.48 | 261 | 5.50
641.leela_s | 40 | 359 | 4.75 | 359 | 4.75 | 359 | 4.75
648.exchange2_s | 40 | 209 | 14.0 | 209 | 14.0 | 210 | 14.0
657.xz_s | 40 | 271 | 22.8 | 271 | 22.8 | 270 | 22.9

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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:
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.
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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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
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 9bcde8f2999c33d61f64985e45859ea9
running on ml350-sles15 Fri Apr 19 20:45:29 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 6230 CPU @ 2.10GHz
 2 "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 : 20
physical 0: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
physical 1: 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: 1
Core(s) per socket: 20
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6230 CPU @ 2.10GHz
Stepping: 7
CPU MHz: 2100.000

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**SPECspeed2017**

| SPECspeed2017_int_base = | 9.95 |
| SPECspeed2017_int_peak = | Not Run |

**Platform Notes (Continued)**

- BogoMIPS: 4200.00
- Virtualization: VT-x
- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 1024K
- L3 cache: 28160K
- NUMA node0 CPU(s): 0-19
- NUMA node1 CPU(s): 20-39
- Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
- pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb dts mmu lok
- 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 xptr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt
- tsc_deadline_timer aes xsave avx16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault
- epb cat_13 cdp_l3 invpcid single intel_pmin fbpr_shadow vtpr_priority ept
- valid fsdbase tsc_adjust bsm1 hle avx smmx smp bmi2 erms invpcid rtm cqm mpx rdt_a
- avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl
- xsaveopt xsave xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mb瓯_total cqm_mb瓯_local
- ibpb ibs dthrm ida arat pin pts pkup ospke avx512_vnni arch_capabilities ssbd

/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: 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 18 19
- node 0 size: 193118 MB
- node 0 free: 192689 MB
- node 1 cpus: 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39
- node 1 size: 193502 MB
- node 1 free: 193169 MB
- node distances:
  - node 0 1
  - 0: 10 21
  - 1: 21 10

From /proc/meminfo
- MemTotal: 395899440 KB
- HugePages_Total: 0
- Hugepagesize: 2048 KB

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

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

### Platform Notes (Continued)

```bash
PRETTY_NAME="SUSE Linux Enterprise Server 15"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15"
```

```bash
uname -a:
    Linux ml350-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 Apr 19 20:41

SPEC is set to: /home/cpu2017_u2

```
Filesystem   Type  Size  Used  Avail  Use% Mounted on
/dev/sdb2     btrfs 371G 206G  164G  56% /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 U41 02/02/2019
- Memory:
  - 24x 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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<td>软件: Feb-2019</td>
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Compiler Version Notes (Continued)

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.
-----------------------------------------------------------------------------------------------

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/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.