**SPEC® CPU2017 Integer Speed Result**

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL360 Gen10
(2.10 GHz, Intel Xeon Gold 6230)

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

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**Threads**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed2017_int_base =</th>
<th>SPECspeed2017_int_peak =</th>
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<tbody>
<tr>
<td>600.perlbench_s</td>
<td>80</td>
<td>9.68</td>
<td>Not Run</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>80</td>
<td>9.18</td>
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<tr>
<td>605.mcf_s</td>
<td>80</td>
<td>7.61</td>
<td></td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>80</td>
<td>12.0</td>
<td></td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>80</td>
<td>12.0</td>
<td></td>
</tr>
<tr>
<td>625.x264_s</td>
<td>80</td>
<td>5.35</td>
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</tr>
<tr>
<td>631.deepsjeng_s</td>
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<td>4.56</td>
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<tr>
<td>641.leela_s</td>
<td>80</td>
<td>13.5</td>
<td></td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>80</td>
<td>22.9</td>
<td></td>
</tr>
<tr>
<td>657.xz_s</td>
<td>80</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Hardware**

- **CPU Name:** Intel Xeon Gold 6230  
- **Max MHz.:** 3900  
- **Nominal:** 2100  
- **Enabled:** 40 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:** 27.5 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 128 GB (8 x 16 GB 1Rx8 PC4-2933Y-R)  
- **Storage:** 1 x 894 GB SAS SSD, RAID 0  
- **Other:** None

**Software**

- **OS:** CentOS Linux release 7.6.1810 (x86_64)  
- **Kernel:** 3.10.0-957.21.3.el7.x86_64  
- **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 05/03/2019 released May-2019  
- **System State:** Run level 5 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** Not Applicable  
- **Other:** jemalloc memory allocator V5.0.1
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<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>6.63</td>
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<td>117</td>
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<tr>
<td>625.x264_s</td>
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<td>130</td>
<td>13.6</td>
<td>124</td>
<td>14.2</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>80</td>
<td>267</td>
<td>5.36</td>
<td>268</td>
<td>5.35</td>
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<td>641.leela_s</td>
<td>80</td>
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<td>4.66</td>
<td>374</td>
<td>4.56</td>
<td>390</td>
<td>4.38</td>
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<tr>
<td>648.exchange2_s</td>
<td>80</td>
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<td>13.6</td>
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<td>13.5</td>
<td>226</td>
<td>13.0</td>
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<td>657.xz_s</td>
<td>80</td>
<td>267</td>
<td>23.2</td>
<td>270</td>
<td>22.9</td>
<td>271</td>
<td>22.9</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,scatter"  
LD_LIBRARY_PATH = "/home/cpu2017_u2/lib/ia32:/home/cpu2017_u2/lib/intel64"  
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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SPECspeed2017_int_base = 9.68
SPECspeed2017_int_peak = Not Run

BIOS Configuration:
- Workload Profile set to High Performance Compute
- Intel Virtualization Technology set to Enabled
- Sysinfo program /home/cpu2017_u2/bin/sysinfo

Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on localhost.localdomain Sat Jul 27 11:48:11 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)
- 80 "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
- 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): 80
- On-line CPU(s) list: 0-79
- Thread(s) per core: 2
- 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: 6
- CPU MHz: 2100.000
- BogoMIPS: 4200.00
- Virtualization: VT-x
- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 1024K
- L3 cache: 28160K
- NUMA node0 CPU(s): 0-19,40-59
- NUMA node1 CPU(s): 20-39,60-79
- Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov

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| SPECspeed2017_int_peak = | Not Run |

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| Tested by: | HPE |

#### Platform Notes (Continued)

```
pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc art architecture perfmonitor pebs bts rep_good nolock xtopology nonstop_tsc aperfperf eagerfpu 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 avx f16c rdrand lahf_lm abm 3nowprefetch epb cat_13 cdp_13 intel_pni intel_pt ssbd mbaf ibs ibps ibrs ibrs Enhanced tpr_shadow vmmi f lexpriority ept vpid fs gsb abase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cm mx rd t_a avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavevc xgetbv1 cmq llc cmq occup llc cmq mm b_total cmq mm b_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear spec_ctrl intel_stibp flush_lld arch_capabilities
```

/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 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 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79  
node 0 size: 65203 MB  
node 0 free: 50478 MB  
node 1 cpus: 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 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79  
node 1 size: 65535 MB  
node 1 free: 54931 MB  
node distances:  
node 0 1  
0: 10 21  
1: 21 10  

From /proc/meminfo  
MemTotal: 131517696 kB  
HugePages_Total: 0  
Hugepagesize: 2048 kB  

From /etc/*release*/etc/*version*  
centos-release: CentOS Linux release 7.6.1810 (Core)  
centos-release-upstream: Derived from Red Hat Enterprise Linux 7.6 (Source)  
os-release:  
NAME="CentOS Linux"  
VERSION="7 (Core)"  
ID="centos"  
ID_LIKE="rhel fedora"  
VERSION_ID="7"  
PRETTY_NAME="CentOS Linux 7 (Core)"  
ANSI_COLOR="0;31"  
CPE_NAME="cpe:/o:centos:centos:7"

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Platform Notes (Continued)

redhat-release: CentOS Linux release 7.6.1810 (Core)
system-release: CentOS Linux release 7.6.1810 (Core)
system-release-cpe: cpe:/o:centos:centos:7

uname -a:
    Linux localhost.localdomain 3.10.0-957.21.3.el7.x86_64 #1 SMP Tue Jun 18 16:35:19 UTC 2019 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: Load fences, __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB

run-level 5 Jul 25 02:29

SPEC is set to: /home/cpu2017_u2
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/centos-home xfs 839G 27G 813G 4% /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 05/03/2019
  Memory:
    16x UNKNOWN NOT AVAILABLE
    8x UNKNOWN NOT AVAILABLE 16 GB 1 rank 2933

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
CC  600.perlibench_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)
    641.leetcode_s(base)

(Continued on next page)
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**Tested by:** HPE  
**Test Date:** Jul-2019  
**Hardware Availability:** May-2019  
**Software Availability:** Jun-2019

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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.

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**Base Compiler Invocation**

C benchmarks:  
```
icc -m64 -std=c11```

C++ benchmarks:  
```
icpc -m64```

Fortran benchmarks:  
```
ifort -m64```

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**Base Portability Flags**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
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<tr>
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<td>657.xz_s</td>
<td>-DSPEC_LP64</td>
</tr>
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</table>

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**Base Optimization Flags**

C benchmarks:  
```
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div```

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(Continued on next page)
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Base Optimization Flags (Continued)

C benchmarks (continued):
- -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
- -ljqkmalloc

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-ic19.0u1-flags-linux64.html
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-ic19.0u1-flags-linux64.xml
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revB.xml

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Tested with SPEC CPU2017 v1.0.5 on 2019-07-27 12:48:10-0400.
Report generated on 2019-08-21 12:07:01 by CPU2017 PDF formatter v6067.
Originally published on 2019-08-20.