SPEC® CPU2017 Integer Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL580 Gen10
(3.60 GHz, Intel Xeon Gold 6244)

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

Test Date: Feb-2019
Hardware Availability: Apr-2019
Software Availability: Nov-2018

SPECspeed2017_int_base = 10.9
SPECspeed2017_int_peak = Not Run

<table>
<thead>
<tr>
<th>Program</th>
<th>Threads</th>
<th>SPECspeed2017_int_base</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench_s</td>
<td>32</td>
<td>10.1</td>
</tr>
<tr>
<td>gcc_s</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>mcf_s</td>
<td>32</td>
<td>13.6</td>
</tr>
<tr>
<td>omnetpp_s</td>
<td>32</td>
<td>8.47</td>
</tr>
<tr>
<td>xalancbmk_s</td>
<td>32</td>
<td>13.7</td>
</tr>
<tr>
<td>xalnppp_s</td>
<td>32</td>
<td>15.2</td>
</tr>
<tr>
<td>xalancbmk_s</td>
<td>32</td>
<td>15.9</td>
</tr>
<tr>
<td>xz_s</td>
<td>32</td>
<td>25.0</td>
</tr>
</tbody>
</table>

--- SPECspeed2017_int_base (10.9) ---

**Hardware**

CPU Name: Intel Xeon Gold 6244
Max MHz.: 4400
Nominal: 3600
Enabled: 32 cores, 4 chips
Orderable: 1, 2, 3, 4 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: 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)
Storage: 1 x 600 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 U34 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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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>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>32</td>
<td>236</td>
<td>7.51</td>
<td>235</td>
<td>7.54</td>
<td>234</td>
<td>7.58</td>
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<tr>
<td>602 gcc_s</td>
<td>32</td>
<td>392</td>
<td>10.2</td>
<td>397</td>
<td>10.0</td>
<td>393</td>
<td>10.1</td>
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<tr>
<td>605 mcf_s</td>
<td>32</td>
<td>343</td>
<td>13.8</td>
<td>349</td>
<td>13.5</td>
<td>346</td>
<td>13.6</td>
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<tr>
<td>620 omnetpp_s</td>
<td>32</td>
<td>190</td>
<td>8.57</td>
<td>193</td>
<td>8.47</td>
<td>199</td>
<td>8.21</td>
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<tr>
<td>623 xalancbmk_s</td>
<td>32</td>
<td>104</td>
<td>13.7</td>
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<td>13.7</td>
<td>103</td>
<td>13.7</td>
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<tr>
<td>625 x264_s</td>
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<td>116</td>
<td>15.3</td>
<td>116</td>
<td>15.2</td>
<td>116</td>
<td>15.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>631 deepsjeng_s</td>
<td>32</td>
<td>238</td>
<td>6.02</td>
<td>239</td>
<td>6.00</td>
<td>238</td>
<td>6.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>641 leela_s</td>
<td>32</td>
<td>317</td>
<td>5.39</td>
<td>317</td>
<td>5.39</td>
<td>317</td>
<td>5.39</td>
<td></td>
<td></td>
</tr>
<tr>
<td>648 exchange2_s</td>
<td>32</td>
<td>185</td>
<td>15.9</td>
<td>185</td>
<td>15.9</td>
<td>185</td>
<td>15.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>657 xz_s</td>
<td>32</td>
<td>251</td>
<td>24.7</td>
<td>248</td>
<td>25.0</td>
<td>247</td>
<td>25.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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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,compact"
LD_LIBRARY_PATH = "/home/cpu2017_ic19_update1/lib/ia32:/home/cpu2017_ic19_update1/lib/intel64"
LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/home/cpu2017_ic19_update1/je5.0.1-32:/home/cpu2017_ic19_update1/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

Yes: 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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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  
- Workload Profile set to Custom  
- Energy/Performance Bias set to Maximum Performance  
- Advanced Memory Protection set to AdvancedECC  

Sysinfo program /home/cpu2017/bin/sysinfo  
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9  
running on linux-lj2l Sat Feb 23 23:07:25 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 6244 CPU @ 3.60GHz  
4 "physical id"s (chips)  
32 "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 : 8  
siblings : 8  
physical 0: cores 1 2 3 4 8 9 18 27  
physical 1: cores 2 8 9 18 19 20 25 26  
physical 2: cores 4 8 17 18 19 24 25 27  
physical 3: cores 2 3 4 11 16 24 25 26  

From lscpu:  
Architecture: x86_64  
CPU op-mode(s): 32-bit, 64-bit  
Byte Order: Little Endian  
CPU(s): 32  
On-line CPU(s) list: 0-31  
Thread(s) per core: 1  
Core(s) per socket: 8  
Socket(s): 4  
NUMA node(s): 4  
Vendor ID: GenuineIntel  
CPU family: 6  
Model: 85  

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Platform Notes (Continued)

Model name:           Intel(R) Xeon(R) Gold 6244 CPU @ 3.60GHz
Stepping:             6
CPU MHz:              3600.000
BogoMIPS:             7200.00
Virtualization:       VT-x
L1d cache:            32K
L1i cache:            32K
L2 cache:             1024K
L3 cache:             25344K
NUMA node0 CPU(s):    0-7
NUMA node1 CPU(s):    8-15
NUMA node2 CPU(s):    16-23
NUMA node3 CPU(s):    24-31

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 rdtscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperf perfctr tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3
sdqm fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt
	nsc_deadline_timer aes xsave avx f16c rdrand lahf_lm lm 3dnowprefetch cpuid_fault
epb cat_13 cdp l3 invpcid_single intel_pni mba tpr_shadow vmx flexpriority ept

vpid fsbgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ets invpcid rtm cqm mpz
rdt_a avx512f avx512dq rsrseed adx smap clflushopt clwb intel_ptu avx512cd avx512bw
avx512vl xsaving xsaves cmq_llc cmq_occumpc cmq_mbm_total cmq_mbm_local
ibpb ibrs stibp dtherm ida arat pln pts pku ospke avx512_vnni arch_capabilities ssbd

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.

available: 4 nodes (0-3)
nodes 0: cpus 0 1 2 3 4 5 6 7
node 0 size: 193119 MB
node 0 free: 192579 MB
node 1: cpus 8 9 10 11 12 13 14 15
node 1 size: 193534 MB
node 1 free: 193177 MB
node 2: cpus 16 17 18 19 20 21 22 23
node 2 size: 193505 MB
node 2 free: 188344 MB
node 3: cpus 24 25 26 27 28 29 30 31
node 3 size: 193533 MB
node 3 free: 192811 MB

node distances:
node 0 1 2 3
0: 10 21 21 21
1: 21 10 21 21

(Continued on next page)
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Platform Notes (Continued)

2:  21  21  10  21
3:  21  21  21  10

From /proc/meminfo
MemTotal:       792261576 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"

uname -a:
    Linux linux-lj2l 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 Feb 22 13:55

SPEC is set to: /home/cpu2017
    Filesystem     Type Size  Used Avail Use% Mounted on
    /dev/sdb3      xfs  141G  34G  108G  24% /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 U34 02/02/2019
    Memory:
        24x UNKNOWN NOT AVAILABLE
        24x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2933

(End of data from sysinfo program)
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**Compiler Version Notes**

```
==============================================================================
CC  600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base) 625.x264_s(base)
  657.xz_s(base)
==============================================================================
```

**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
```

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Base Portability Flags (Continued)

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:
-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-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

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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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