Hewlett Packard Enterprise  
ProLiant DL560 Gen10  
(3.10 GHz, Intel Xeon Gold 6254)  

<table>
<thead>
<tr>
<th>Test Sponsor: HPE</th>
<th>SPECspeed(^{2017})_int_base = 10.0</th>
<th>SPECspeed(^{2017})_int_peak = Not Run</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Availability: Apr-2019</td>
<td>CPU2017 License: 3</td>
<td>Test Date: Apr-2019</td>
</tr>
<tr>
<td>Tested by: HPE</td>
<td>Test Sponsor: HPE</td>
<td>Hardware Availability: Feb-2019</td>
</tr>
<tr>
<td>Software Availability: Feb-2019</td>
<td>Tested by: HPE</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Threads</strong></th>
<th><strong>600.perlbench_s</strong></th>
<th><strong>602.gcc_s</strong></th>
<th><strong>605.mcf_s</strong></th>
<th><strong>620.omnetpp_s</strong></th>
<th><strong>623.xalancbmk_s</strong></th>
<th><strong>625.x264_s</strong></th>
<th><strong>631.deepsjeng_s</strong></th>
<th><strong>641.leela_s</strong></th>
<th><strong>648.exchange2_s</strong></th>
<th><strong>657.xz_s</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Hardware**

- **CPU Name:** Intel Xeon Gold 6254
- **Max MHz:** 4000
- **Nominal:** 3100
- **Enabled:** 72 cores, 4 chips
- **Orderable:** 1, 2, 4 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:** 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 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 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
- **Power Management:** --
## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Peak Seconds</th>
<th>Peak Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbasis</td>
<td>72</td>
<td>255</td>
<td>6.95</td>
<td>255</td>
<td>6.95</td>
</tr>
<tr>
<td>602.gccbasis</td>
<td>72</td>
<td>439</td>
<td>9.07</td>
<td>452</td>
<td>8.82</td>
</tr>
<tr>
<td>605.mcf</td>
<td>72</td>
<td>386</td>
<td>12.2</td>
<td>389</td>
<td>12.1</td>
</tr>
<tr>
<td>620.ommnetppbase</td>
<td>72</td>
<td>205</td>
<td>7.95</td>
<td>206</td>
<td>7.94</td>
</tr>
<tr>
<td>623.xalancbmkbase</td>
<td>72</td>
<td>113</td>
<td>12.6</td>
<td>112</td>
<td>12.6</td>
</tr>
<tr>
<td>625.x264base</td>
<td>72</td>
<td>122</td>
<td>14.4</td>
<td>122</td>
<td>14.4</td>
</tr>
<tr>
<td>631.deepsjengbase</td>
<td>72</td>
<td>260</td>
<td>5.50</td>
<td>260</td>
<td>5.50</td>
</tr>
<tr>
<td>641.leelabase</td>
<td>72</td>
<td>350</td>
<td>4.88</td>
<td>350</td>
<td>4.88</td>
</tr>
<tr>
<td>648.exchange2base</td>
<td>72</td>
<td>204</td>
<td>14.4</td>
<td>206</td>
<td>14.3</td>
</tr>
<tr>
<td>657.xzbase</td>
<td>72</td>
<td>260</td>
<td>23.8</td>
<td>257</td>
<td>24.1</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:
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"
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.


Submitted by: "Bucek, James" <james.bucek@hpe.com>
Submitted: Tue Sep 17 00:02:18 EDT 2019

(Continued on next page)
General Notes (Continued)

Submission: cpu2017-20190902-17383.sub

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
    Advanced Memory Protection set to Advanced ECC
Sysinfo program /home/cpu2017_u2/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcd8f2999c33d61f64985e45859ea9
running on linux-vqdi Wed Apr 10 13:42:35 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 6254 CPU @ 3.10GHz
    4 "physical id"s (chips)
        72 "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 : 18
        siblings : 18
        physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
        physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
        physical 2: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
        physical 3: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

From lscpu:
    Architecture:  x86_64
    CPU op-mode(s):  32-bit, 64-bit
    Byte Order:  Little Endian
    CPU(s):  72
    On-line CPU(s) list: 0-71
    Thread(s) per core: 1
    Core(s) per core:  18

(Continued on next page)
SPEC CPU® 2017 Integer Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL560 Gen10
(3.10 GHz, Intel Xeon Gold 6254)

SPECspeed®2017_int_base = 10.0
SPECspeed®2017_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 (Continued)

Socket(s): 4
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6254 CPU @ 3.10GHz
Stepping: 7
CPU MHz: 3100.000
BogoMIPS: 6200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 25344K
NUMA node0 CPU(s): 0-17
NUMA node1 CPU(s): 18-35
NUMA node2 CPU(s): 36-53
NUMA node3 CPU(s): 54-71
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
aperfmerf tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3
sdkg fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt
ۋئ tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault
eb cat_l3 cdp_l3 invpcid_single intel_pppin mba tpr_shadow vmx flexpriority ept
tvid fsnsbase tsc_adjust bmi1 hle avx2 smep bmi2 3m invpcid rtm cqm mpx rdt_a
avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl
xsaveopt xsaves xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local
lrbp ibpb stibp dtc tma at ar pln pts pkv osoku 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)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
node 0 size: 193117 MB
node 0 free: 192799 MB
node 1 cpus: 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
node 1 size: 193503 MB
node 1 free: 193160 MB
node 2 cpus: 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
node 2 size: 193532 MB
node 2 free: 193377 MB
node 3 cpus: 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71
node 3 size: 193530 MB

(Continued on next page)
## Platform Notes (Continued)

node 3 free: 193270 MB
node distances:
node  0  1  2  3
  0:  10  21  21  21
  1:  21  10  21  21
  2:  21  21  10  21
  3:  21  21  21  10

From /proc/meminfo
MemTotal:       792253024 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
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-vqdi 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 10 13:41

SPEC is set to: /home/cpu2017_u2
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 btrfs  371G  313G  58G  85% /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:
SPEC CPU®2017 Integer Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL560 Gen10
(3.10 GHz, Intel Xeon Gold 6254)

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

SPECspeed®2017_int_base = 10.0
SPECspeed®2017_int_peak = Not Run

Platform Notes (Continued)

24x UNKNOWN NOT AVAILABLE
24x UNKNOWN NOT AVAILABLE 32 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
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

==============================================================================
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,
Version 19.0.2.187 Build 20190117
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

==============================================================================
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
Hewlett Packard Enterprise
ProLiant DL560 Gen10
(3.10 GHz, Intel Xeon Gold 6254)

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

SPECspeed\textsuperscript{\textregistered}2017\textunderscore int\textsubscript{peak} = \textit{Not Run}
SPECspeed\textsuperscript{\textregistered}2017\textunderscore int\textsubscript{base} = 10.0

Base Portability Flags

- 600.perlbench\textunderscore s: -DSPEC\textunderscore LP64 -DSPEC\textunderscore LINUX\textunderscore X64
- 602.gcc\textunderscore s: -DSPEC\textunderscore LP64
- 605.mcf\textunderscore s: -DSPEC\textunderscore LP64
- 620.omnetpp\textunderscore s: -DSPEC\textunderscore LP64
- 623.xalancbmk\textunderscore s: -DSPEC\textunderscore LP64 -DSPEC\textunderscore LINUX
- 625.x264\textunderscore s: -DSPEC\textunderscore LP64
- 631.deepsjeng\textunderscore s: -DSPEC\textunderscore LP64
- 641.leela\textunderscore s: -DSPEC\textunderscore LP64
- 648.exchange2\textunderscore s: -DSPEC\textunderscore LP64
- 657.xz\textunderscore s: -DSPEC\textunderscore LP64

Base Optimization Flags

C benchmarks:
- \texttt{-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div}
- \texttt{-qopt-mem-layout-trans=4 -qopenmp -DSPEC\textunderscore OPENMP}
- \texttt{-L/home/cpu2017\textunderscore u2/je5.0.1-64/ -ljemalloc}

C++ benchmarks:
- \texttt{-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div}
- \texttt{-qopt-mem-layout-trans=4}
- \texttt{-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64}
- \texttt{-lqkmalloc}

Fortran benchmarks:
- \texttt{-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4}
- \texttt{-nostandard-realloc-lhs}

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/HPE\textunderscore ic19.0u1\textunderscore flags\textunderscore linux64.html
http://www.spec.org/cpu2017/flags/HPE\textunderscore Platform\textunderscore Flags\textunderscore Intel\textunderscore V1.2\textunderscore CLX\textunderscore revB.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/HPE\textunderscore ic19.0u1\textunderscore flags\textunderscore linux64.xml
http://www.spec.org/cpu2017/flags/HPE\textunderscore Platform\textunderscore Flags\textunderscore Intel\textunderscore V1.2\textunderscore CLX\textunderscore revB.xml

SPEC CPU and SPECspeed are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU\textsuperscript{\textregistered}2017 v1.0.5 on 2019-04-10 04:12:35-0400.
Originally published on 2019-09-17.