## SPEC CPU®2017 Integer Speed Result

**Hewlett Packard Enterprise**  
*(Test Sponsor: HPE)*  
Synergy 480 Gen10  
*(3.60 GHz, Intel Xeon Gold 6244)*

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

### SPECspeed®2017 Int Base

- **SPECspeed®2017_int_base =** 10.7

### Hardware

- **Processor Name:** Intel Xeon Gold 6244  
- **Max MHz:** 4400  
- **Nominal:** 3600  
- **Enabled:** 16 cores, 2 chips  
- **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:** 24.75 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 I42 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:** --

---

### Benchmark Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_int_base (10.7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>16</td>
<td>7.58</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>16</td>
<td>10.0</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>16</td>
<td>8.44</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>16</td>
<td>13.6</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>16</td>
<td>15.8</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>16</td>
<td>15.3</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>16</td>
<td>6.01</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>16</td>
<td>5.36</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>16</td>
<td>15.8</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>16</td>
<td>22.4</td>
</tr>
</tbody>
</table>

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**SPECspeed®2017_int_base = 10.7**
**SPECspeed®2017_int_peak = Not Run**

CPUT2017 License: 3
Test Sponsor: HPE
Tested by: HPE

<table>
<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>
</tr>
</thead>
<tbody>
<tr>
<td>600:perlbench_s</td>
<td>16</td>
<td>234</td>
<td>7.60</td>
<td>234</td>
<td>7.58</td>
<td>235</td>
<td>7.56</td>
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<tr>
<td>602:gcc_s</td>
<td>16</td>
<td>398</td>
<td>10.0</td>
<td>396</td>
<td>10.0</td>
<td>401</td>
<td>9.93</td>
</tr>
<tr>
<td>605:mcf_s</td>
<td>16</td>
<td>354</td>
<td>13.4</td>
<td>354</td>
<td>13.3</td>
<td>348</td>
<td>13.6</td>
</tr>
<tr>
<td>620:omnetpp_s</td>
<td>16</td>
<td>197</td>
<td>8.30</td>
<td>193</td>
<td>8.44</td>
<td>190</td>
<td>8.59</td>
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<tr>
<td>623:xalancbmk_s</td>
<td>16</td>
<td>105</td>
<td>13.5</td>
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<td>13.6</td>
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<td>13.7</td>
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<tr>
<td>625:x264_s</td>
<td>16</td>
<td>115</td>
<td>15.3</td>
<td>115</td>
<td>15.3</td>
<td>115</td>
<td>15.3</td>
</tr>
<tr>
<td>631:deepsjeng_s</td>
<td>16</td>
<td>238</td>
<td>6.02</td>
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<td>6.01</td>
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<tr>
<td>641:leela_s</td>
<td>16</td>
<td>318</td>
<td>5.36</td>
<td>318</td>
<td>5.36</td>
<td>318</td>
<td>5.36</td>
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<tr>
<td>648:exchange2_s</td>
<td>16</td>
<td>186</td>
<td>15.8</td>
<td>186</td>
<td>15.8</td>
<td>186</td>
<td>15.8</td>
</tr>
<tr>
<td>657:xz_s</td>
<td>16</td>
<td>275</td>
<td>22.4</td>
<td>276</td>
<td>22.4</td>
<td>275</td>
<td>22.5</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
Filesystm 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
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesystm page cache synced and cleared with:
sync; echo 3> /proc/sys/vm/drop_caches

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

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SPECspeed®2017_int_base = 10.7
SPECspeed®2017_int_peak = Not Run

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

Test Date: May-2019
Hardware Availability: Apr-2019
Software Availability: Feb-2019

General Notes (Continued)

built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

Submitted by: "Bucek, James" <james.bucek@hpe.com>
Submitted: Tue Sep 17 00:02:18 EDT 2019
Submission: cpu2017-20190902-17377.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
Sysinfo program /home/cpu2017_u2/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcd8f2999c33d61f64f85e45859ea9
running on sy480g10-2 Wed May 22 00:05:32 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
  2 "physical id"s (chips)
  16 "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 4 8 17 18 19 24 25 27
physical 1: cores 2 8 9 18 19 20 25 26

From lscpu:
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                16
On-line CPU(s) list:   0-15

(Continued on next page)
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Test Sponsor: HPE
Tested by: HPE

SPECspeak®2017_int_base = 10.7
SPECspeak®2017_int_peak = Not Run

Test Date: May-2019
Hardware Availability: Apr-2019
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Platform Notes (Continued)

Thread(s) per core: 1
Core(s) per socket: 8
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
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
Flags: fpu vme de pse simd 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
aperfmpref tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3
sdauthorization fma cx16 xtpr pdcm pclid dca sse4_1 sse4_2 x2apic movbe popcnt
mca mmx cache data
tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault
epb cat_l3 cdp_l3 invpcid_single intel_ppin mba tpr_shadow vmx flexpriority ept
vdopt fsgsbase tsc_adjust bni hle avx2 smep bmi2 erms 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_mbms_total cqm_mbms_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: 2 nodes (0-1)
node 0 CPUs: 0 1 2 3 4 5 6 7
node 0 size: 193019 MB
node 0 free: 192477 MB
node 1 CPUs: 8 9 10 11 12 13 14 15
node 1 size: 193336 MB
node 1 free: 193144 MB
node distances:
node 0 1
0: 10 21
1: 21 10
**Platform Notes (Continued)**

From `/proc/meminfo`
- MemTotal: 395629068 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 sy480g10-2 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 May 22 00:03

SPEC is set to: /home/cpu2017_u2
- Filesystem Type Size Used Avail Use% Mounted on
  - /dev/sdb2 btrfs 371G 91G 280G 25% /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 I42 02/02/2019
- Memory:
  - 24x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2933

(End of data from sysinfo program)
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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

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.xalanckbmk_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-transform=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-transform=4
- -L/usr/local/IntelCompiler19/compilers_and Libraries_2019.1.144/linux/compiler/lib/intel64 -ljkmalloc

**Fortran benchmarks:**
- -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-mem-layout-transform=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-ic19.0u1-flags-linux64.html)
- [http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revB.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-ic19.0u1-flags-linux64.xml)
- [http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revB.xml](http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revB.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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