## SPEC CPU® 2017 Integer Speed Result

### Hewlett Packard Enterprise

**Hewlett Packard Enterprise**
(Test Sponsor: HPE)

**Synergy 660 Gen10**
(3.60 GHz, Intel Xeon Gold 6244)

**SPECspeed®2017_int_base** = 10.8

**SPECspeed®2017_int_peak** = Not Run

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<td>HPE</td>
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### Threads

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<td>625.x264_s</td>
<td>32</td>
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<tr>
<td>631.deepsjeng_s</td>
<td>32</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>32</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>32</td>
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<tr>
<td>657.xz_s</td>
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### SPECspeed®2017_int_base (10.8)

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<td>32</td>
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</table>

### Hardware

- **CPU Name**: Intel Xeon Gold 6244
- **Max MHz**: 4400
- **Nominal**: 3600
- **Enabled**: 32 cores, 4 chips
- **Orderable**: 2, 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 480 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 19.0.2.187 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 I43 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>Seconds</th>
<th>Ratio</th>
<th>Base Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak Threads</th>
<th>Seconds</th>
<th>Ratio</th>
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<tr>
<td>625.x264_s</td>
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<td>641.leela_s</td>
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<td>5.36</td>
<td>318</td>
<td>5.36</td>
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<td></td>
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<tr>
<td>648.exchange2_s</td>
<td>32</td>
<td>185</td>
<td>15.9</td>
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<td>15.8</td>
<td>186</td>
<td>15.8</td>
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<tr>
<td>657.xz_s</td>
<td>32</td>
<td>254</td>
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<td>24.3</td>
<td>251</td>
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<td></td>
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</table>

**SPECspeed®2017_int_base = 10.8**

**SPECspeed®2017_int_peak = Not Run**

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_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
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 9bcd8f2999c33d61f64985e45859ea9
running on sy660-gen10 Thu Apr 25 11:22:54 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 2 4 8 9 18 19 20 25
  physical 1: cores 4 9 16 18 19 24 25 27
  physical 2: cores 2 3 4 8 9 11 18 25
  physical 3: cores 2 4 17 18 19 24 25 27

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
  Model name: Intel(R) Xeon(R) Gold 6244 CPU @ 3.60GHz

(Continued on next page)
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**Test Date:** Apr-2019
**Hardware Availability:** Apr-2019
**Software Availability:** Feb-2019

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**Platform Notes (Continued)**

Stepping: 7
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 apa sep mtrr pge mca cmov
pat pse36 clflush dts acpich mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
lm constant_tsc 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
sdg fma cx16 xtr pdc pcd dca sse4_1 sse4_2 x2apic movbe popcnt
tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault
epb cat_13 cdp_13 invpcid_single intel_pinn mba tpr_shadow vnumi flexpriority ept
vpid fsbgbase tsc_adjust bmi1 hle avx2 smep bmi2 rome invpperf rtm cmq mpx rdt_a
avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl
xsaveopt xsaves xsavec xgetbv1 xsaves cmp_llc cmp_occup_llc cmp_mb_total cmp_mb_local
ibpb ibrs stibp dtmar ida arat pln pts pku ospke avx512_vnni arch_capabilities ssbd

```
/proc/cpuinfo cache data
cache size : 25344 KB
```

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
node 0 size: 193047 MB
node 0 free: 192772 MB
node 1 cpus: 8 9 10 11 12 13 14 15
node 1 size: 193534 MB
node 1 free: 193274 MB
node 2 cpus: 16 17 18 19 20 21 22 23
node 2 size: 193505 MB
node 2 free: 193201 MB
node 3 cpus: 24 25 26 27 28 29 30 31
node 3 size: 193325 MB
node 3 free: 193127 MB
node distances:
node 0 1 2 3
 0: 10 21 21 21
 1: 21 10 21 21
 2: 21 21 10 21
(Continued on next page)
Platform Notes (Continued)

3: 21 21 21 10

From /proc/meminfo
MemTotal: 791974860 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 sy660-gen10 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 25 11:22

SPEC is set to: /home/cpu2017_u2
Filesystem Type  Size Used Avail Use% Mounted on
/dev/sdb2  btrfs  445G 110G 335G 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 I43 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

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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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Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.2.187 Build 20190117
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<tr>
<th>Fortran</th>
<th>648.exchange2_s(base)</th>
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</table>

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.perlbenc_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/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.

Tested with SPEC CPU®2017 v1.0.5 on 2019-04-25 12:22:54-0400.  