**SPEC CPU®2017 Integer Speed Result**

**Hewlett Packard Enterprise**

(Test Sponsor: HPE)

ProLiant DL20 Gen10

(3.60 GHz, Intel Xeon E-2246G)

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

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>Hardware Availability:</th>
<th>Software Availability:</th>
</tr>
</thead>
</table>

| SPECspeed®2017_int_base = 10.9 | SPECspeed®2017_int_peak = Not Run |

| Threads | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 |
| 600.perlbench_s | 6 | 12.4 | | | | | | | | | | | | | | | | | | | |
| 602.gcc_s | 6 | | | | | | | | | | | | | | | | | | | |
| 605.mcf_s | 6 | 6.80 | | | | | | | | | | | | | | | | | | | |
| 620.omnetpp_s | 6 | | | | | | | | | | | | | | | | | | | |
| 623.xalancbmk_s | 6 | 15.7 | | | | | | | | | | | | | | | | | | | |
| 625.x264_s | 6 | | | | | | | | | | | | | | | | | | | |
| 631.deepsjeng_s | 6 | 6.87 | | | | | | | | | | | | | | | | | | | |
| 641.leela_s | 6 | 5.77 | | | | | | | | | | | | | | | | | | | |
| 648.exchange2_s | 6 | | | | | | | | | | | | | | | | | | | |
| 657.xz_s | 6 | | | | | | | | | | | | | | | | | | | |

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base (10.9)</th>
</tr>
</thead>
</table>

**Hardware**

- **CPU Name:** Intel Xeon E-2246G
- **Max MHz:** 4800
- **Nominal:** 3600
- **Enabled:** 6 cores, 1 chip
- **Orderable:** 1 chip
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **Cache L2:** 256 KB I+D on chip per core
- **Cache L3:** 12 MB I+D on chip per chip
- **Other:** None
- **Memory:** 64 GB (4 x 16 GB 2Rx8 PC4-2666V-U)
- **Storage:** 1 x 400 GB SATA SSD, RAID 0
- **Other:** None

<table>
<thead>
<tr>
<th>Software</th>
</tr>
</thead>
</table>
- **OS:** SUSE Linux Enterprise Server 15 (x86_64) SP1
- **Kernel:** 4.12.14-195-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 U43 09/05/2019 released Sep-2019
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** Not Applicable
- **Other:** jemalloc memory allocator V5.0.1
- **Power Management:** --
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ProLiant DL20 Gen10
(3.60 GHz, Intel Xeon E-2246G)

SPECspeed®2017_int_base = 10.9
SPECspeed®2017_int_peak = Not Run

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
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</tbody>
</table>

SPECspeed®2017_int_base = 10.9
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,scatter"
LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:
/home/cpu2017/je5.0.1-32:/home/cpu2017/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
Platform Notes

BIOS Configuration:
Hyper Threading set to Disabled
Thermal Configuration set to Maximum Cooling
LLC Prefetch set to Enabled
Workload Profile set to General Peak Frequency Compute
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-vb4y Mon Oct 7 19:21:02 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) E-2246G CPU @ 3.60GHz
    1 "physical id"s (chips)
    6 "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 : 6
siblings : 6
physical 0: cores 0 1 2 3 4 5

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
Address sizes: 39 bits physical, 48 bits virtual
CPU(s): 6
On-line CPU(s) list: 0-5
Thread(s) per core: 1
Core(s) per socket: 6
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 158
Model name: Intel(R) Xeon(R) E-2246G CPU @ 3.60GHz
Stepping: 10
CPU MHz: 3600.000
BogoMIPS: 7200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 256K
L3 cache: 12288K
NUMA node0 CPU(s): 0-5

(Continued on next page)
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**SPECspeed®2017_int_peak** = Not Run

---

**Platform Notes (Continued)**

Flags:
- fpu
- vme
- de
- pse
- tsc
- msr
- pae
- mce
- cmov
- pat
- pse36
- clflush
- dts
- acpi
- mmx
- fxsr
- sse
- sse2
- ss
- ht
- tm
- pbe
- syscall
- nx
- pdpe1gb
- rdscp
- lm
- constant_tsc
- art
- arch_perfmon
- pebs
- bts
- rep_good
- nopl
- xtopology
- nonstop_tsc
- cpuid
- aperf
- mperf
- tsc_known_freq
- pni
- pclmulqdq
- dtes64
- monitor
- ds_cpl
- vmx
- smx
- est
- tm2
- ssse3
- sdbg
- fma
- cx16
- xtrunc
- pdcm
- pcid
- sse4_1
- sse4_2
- x2apic
- movbe
- popcnt
- tsc_deadline_timer
- aes
- xsave
- avx
- f16c
- rdrand
- lahf_lm
- abm
- 3dnowprefetch
- cpuid_fault
- epb
- invpcid_single
- pt
- ssbd
- ibrs
- ibpb
- stibp
- tpr_shadow
- vmni
- flexpriority
- ept
- vpid
- tsc_adjust
- bmi1
- hle
- avx2
- smep
- bmi2
- erms
- invpcid
- rtm
- mpx
- rdseed
- adx
- smap
- clflushopt
- intel_pt
- xsaveopt
- xsavec
- xgetbv1
- xsave
- dtherm
- ida
- arat
- pln
- pts
- md_clear
- flush_l1d

/proc/cpuinfo cache data
- cache size : 12288 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.
- available: 1 nodes (0)
- node 0 cpus: 0 1 2 3 4 5
- node 0 size: 64022 MB
- node 0 free: 63480 MB
- node distances:
- node 0: 10

From /proc/meminfo
- MemTotal: 65558680 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
- os-release:
  - NAME="SLES"
  - VERSION="15-SP1"
  - VERSION_ID="15.1"
  - PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"
  - ID="sles"
  - ID_LIKE="suse"
  - ANSI_COLOR="0;32"
  - CPE_NAME="cpe:/o:suse:sles:15:sp1"

uname -a:
  - x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:
- CVE-2017-5754 (Meltdown):
  - Mitigation: PTI
- CVE-2017-5753 (Spectre variant 1):
  - Mitigation: __user pointer sanitization

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

CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted Speculation, IBPB: conditional, IBRS_FW, RSB filling

run-level 3 Oct 7 19:19

SPEC is set to: /home/cpu2017

Filesystem      Type Size Used Avail Use% Mounted on  
/dev/sda3     xfs   270G   62G  209G  23% /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 U43 09/05/2019

Memory:
4x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666

(End of data from sysinfo program)

---

**Compiler Version Notes**

<table>
<thead>
<tr>
<th>Compiler</th>
<th>Benchmark(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base) 625.x264_s(base) 657.xz_s(base)</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Intel(R)</td>
<td>C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.1.144 Build 20181018</td>
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<tr>
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<td>Copyright (C) 1985-2018 Intel Corporation. All rights reserved.</td>
</tr>
<tr>
<td>C++</td>
<td>620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base) 641.leela_s(base)</td>
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</tr>
<tr>
<td>Fortran</td>
<td>648.exchange2_s(base)</td>
</tr>
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<td>Software Availability: Oct-2019</td>
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</table>

## 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
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-AVX2 -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-AVX2 -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-AVX2 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs
```
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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-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-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.

Tested with SPEC CPU®2017 v1.0.5 on 2019-10-07 19:21:02-0400.
Report generated on 2019-12-10 14:53:12 by CPU2017 PDF formatter v6255.
Originally published on 2019-12-10.