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

### ProLiant DL360 Gen10
**(2.10 GHz, Intel Xeon Gold 6230R)**

### SPEC CPU®2017 Integer Speed Result

<table>
<thead>
<tr>
<th>Benchmark</th>
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<th>SPECspeed²017_int_peak</th>
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<tr>
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<td>10.1</td>
<td>10.3</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>10.1</td>
<td>10.3</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Gold 6230R
- **Max MHz:** 4000
- **Nominal:** 2100
- **Enabled:** 52 cores, 2 chips
- **Orderable:** 1, 2 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:** 35.75 MB I+D on chip per chip
- **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 SP1 (x86_64)
- **Kernel:** 4.12.14-195-default
- **Compiler:** C/C++: Version 19.0.4.227 of Intel C/C++ Compiler Build 20190416 for Linux;
  Fortran: Version 19.0.4.227 of Intel Fortran Compiler Build 20190416 for Linux
- **Parallel:** Yes
- **Firmware:** HPE BIOS Version U32 2.22 (11/13/2019) released Feb-2020
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Other:** jemalloc memory allocator V5.0.1
- **Power Management:** BIOS set to prefer performance at the cost of additional power usage
SPEC CPU®2017 Integer Speed Result

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(Test Sponsor: HPE)
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SPECspeed®2017_int_base = 10.1
SPECspeed®2017_int_peak = 10.3

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>266</td>
<td>23.2</td>
<td>266</td>
<td>23.2</td>
</tr>
</tbody>
</table>

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

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
  KMP_AFFINITY = "granularity=fine,compact"
  LD_LIBRARY_PATH = "/cpu2017/lib/intel64:/cpu2017/je5.0.1-64"
  OMP_STACKSIZE = "192M"

General Notes

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.
Hewlett Packard Enterprise

ProLiant DL360 Gen10
(2.10 GHz, Intel Xeon Gold 6230R)

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

SPEC CPU®2017 Integer Speed Result

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02020 SPECspeed®2017_int_base = 10.1
SPECspeed®2017_int_peak = 10.3

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
- Energy/Performance Bias set to Balanced Power
- Workload Profile set to Custom
- Numa Group Size Optimization set to Flat
- Intel UPI Link Power Management set to Enabled

Sysinfo program /cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edbble6e46a485a001
running on linux-9e6o Sun Feb 23 10:42:09 2020

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 6230R CPU @ 2.10GHz
- 2 "physical id"s (chips)
- 52 "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 : 26
- siblings : 26
- physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25 26 27 28 29
- physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25 26 27 28 29

From lscpu:
- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- Address sizes: 46 bits physical, 48 bits virtual
- CPU(s): 52
- On-line CPU(s) list: 0-51
- Thread(s) per core: 1
- Core(s) per socket: 26
- Socket(s): 2
- NUMA node(s): 2
- Vendor ID: GenuineIntel
- CPU ID: 6

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

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SPECspeed®2017_int_base = 10.1
SPECspeed®2017_int_peak = 10.3

CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE
Hardware Availability: Feb-2020
Software Availability: Jun-2019

Platform Notes (Continued)

Model: 85
Model name: Intel(R) Xeon(R) Gold 6230R CPU @ 2.10GHz
Stepping: 7
CPU MHz: 2100.000
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 36608K
NUMA node0 CPU(s): 0-25
NUMA node1 CPU(s): 26-51

Flags: fpu vm x86guard mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp

From /proc/cpuinfo cache data

/node distances:

/proc/meminfo

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

MemTotal: 395904952 kB

(Continued on next page)
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SPECspeed®2017_int_base = 10.1
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Platform Notes (Continued)

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:
  Linux linux-9e6o 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Not affected
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

runtime-level 3 Feb 23 10:40

SPEC is set to: /cpu2017
  Filesystem Type Size Used Avail Use% Mounted on
  /dev/sda2 btrfs 369G 133G 237G 36% /

From /sys/devices/virtual/dmi/id
  BIOS: HPE U32 11/13/2019
  Vendor: HPE
  Product: ProLiant DL360 Gen10
  Product Family: ProLiant
  Serial: MXQ94204PS

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.
Memory:
  24x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2933

(Continued on next page)
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CPU2017 License: 3  
Test Sponsor: HPE  
Tested by: HPE

Platform Notes (Continued)

(End of data from sysinfo program)

Compiler Version Notes

C
600.perlbench_s(base, peak)
602.gcc_s(base, peak)
605.mcf_s(base, peak)
625.x264_s(base, peak)
657.xz_s(base, peak)

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.4.227 Build 20190416  
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C++
620.omnetpp_s(base, peak)
623.xalancbmk_s(base, peak)
631.deepsjeng_s(base, peak)
641.leela_s(base, peak)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.4.227 Build 20190416  
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Fortran
648.exchange2_s(base, peak)

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.4.227 Build 20190416  
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Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64
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<td>Hardware Availability: Feb-2020</td>
</tr>
<tr>
<td>Tested by: HPE</td>
<td>Software Availability: Jun-2019</td>
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### 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-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
- -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64 -lqkmalloc

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

### Peak Compiler Invocation

**C benchmarks:**
- icc -m64 -std=c11

**C++ benchmarks:**
- icpc -m64

**Fortran benchmarks:**
- ifort -m64
### SPEC CPU®2017 Integer Speed Result

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

**Test Date:** Feb-2020  
**Hardware Availability:** Feb-2020  
**Software Availability:** Jun-2019

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### Peak Portability Flags

Same as Base Portability Flags

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### Peak Optimization Flags

**C benchmarks:**

600.perlbench_s:  
-`-Wl,-z,muldefs`  
-`-prof-gen(pass 1)`  
-`-prof-use(pass 2)`  
-`-O2`  
-`-xCORE-AVX512`  
-`-qopt-mem-layout-trans=4`  
-`-ipo -O3`  
-`-no-prec-div`  
-`-DSPEC_SUPPRESS_OPENMP -qopenmp`  
-`-DSPEC_OPENMP -fno-strict-overflow`  
-`-L/usr/local/je5.0.1-64/lib -ljemalloc`

602gcc_s:  
-`-Wl,-z,muldefs`  
-`-prof-gen(pass 1)`  
-`-prof-use(pass 2)`  
-`-O2`  
-`-xCORE-AVX512`  
-`-qopt-mem-layout-trans=4`  
-`-ipo -O3`  
-`-no-prec-div`  
-`-DSPEC_SUPPRESS_OPENMP`  
-`-L/usr/local/je5.0.1-64/lib -ljemalloc`

605.mcf_s:  
-`-Wl,-z,muldefs`  
-`-prof-gen(pass 1)`  
-`-prof-use(pass 2)`  
-`-ipo`  
-`-xCORE-AVX512`  
-`-O3`  
-`-no-prec-div`  
-`-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP`  
-`-L/usr/local/je5.0.1-64/lib -ljemalloc`

625.x264_s:  
-`-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`

657.xz_s:  
-`-Wl,-z,muldefs`  
-`-prof-gen(pass 1)`  
-`-prof-use(pass 2)`  
-`-O2`  
-`-xCORE-AVX512`  
-`-qopt-mem-layout-trans=4`  
-`-ipo -O3`  
-`-no-prec-div`  
-`-DSPEC_SUPPRESS_OPENMP -qopenmp`  
-`-DSPEC_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc`

**C++ benchmarks:**

620.omnetpp_s:  
-`-Wl,-z,muldefs`  
-`-prof-gen(pass 1)`  
-`-prof-use(pass 2)`  
-`-ipo`  
-`-xCORE-AVX512`  
-`-O3`  
-`-no-prec-div`  
-`-qopt-mem-layout-trans=4`  
-`-DSPEC_SUPPRESS_OPENMP`  
-`-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64 -lqkmalloc`

623.xalancbmk_s:  
-`-Wl,-z,muldefs`  
-`-xCORE-AVX512`  
-`-ipo -O3`  
-`-no-prec-div`  
-`-qopt-mem-layout-trans=4`  
-`-lqkmalloc`

*(Continued on next page)*
### Peak Optimization Flags (Continued)

631.deepsjeng\_s: Same as 623.xalancbmk\_s

641.leela\_s: Same as 623.xalancbmk\_s

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-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