## SPEC CPU®2017 Floating Point Speed Result

### Hewlett Packard Enterprise

*Test Sponsor: HPE*

**ProLiant DL360 Gen10 Plus**

*(2.00 GHz, Intel Xeon Gold 6330)*

---

**SPECspeed®2017_fp_base = 178**

**SPECspeed®2017_fp_peak = 181**

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<table>
<thead>
<tr>
<th>Application</th>
<th>SPECspeed 2017_fp_peak</th>
<th>SPECspeed 2017_fp_base</th>
</tr>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>233</td>
<td>132</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>132</td>
<td>146</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>134</td>
<td>69.9</td>
</tr>
<tr>
<td>621.wrf_s</td>
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</tr>
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<tr>
<td>628.pop2_s</td>
<td>134</td>
<td>69.9</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>134</td>
<td>69.9</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>134</td>
<td>69.9</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
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</tr>
<tr>
<td>654.roms_s</td>
<td>134</td>
<td>69.9</td>
</tr>
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</table>

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### Hardware

**CPU Name:** Intel Xeon Gold 6330  
**Max MHz:** 3100  
**Nominal:** 2000  
**Enabled:** 56 cores, 2 chips  
**Orderable:** 1, 2 chip(s)  
**Cache L1:** 32 KB I + 48 KB D on chip per core  
**L2:** 1.25 MB I+D on chip per core  
**L3:** 42 MB I+D on chip per chip  
**Other:** None  
**Memory:** 2 TB (32 x 64 GB 2Rx4 PC4-3200AA-R, running at 2933)  
**Storage:** 1 x 400 GB SAS SSD, RAID 0  
**Other:** None

---

### Software

**OS:** Red Hat Enterprise Linux 8.3 (Ootpa)  
**Kernel:** 4.18.0-240.el8.x86_64  
**Compiler:** C/C++: Version 2021.1 of Intel oneAPI DPC++/C++  
**Classic Build 20201113 for Linux; Fortran: Version 2021.1 of Intel Fortran Compiler Classic Build 20201112 for Linux; C/C++: Version 2021.1 of Intel C/C++ Compiler Classic Build 20201112 for Linux  
**Parallel:** Yes  
**Firmware:** HPE BIOS Version U46 v1.42 05/16/2021 released May-2021  
**File System:** xfs  
**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
Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base</th>
<th>Base</th>
<th>Base</th>
<th>Peak</th>
<th>Peak</th>
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<td>628.pop2_s</td>
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<td>70.6</td>
<td>170</td>
<td>69.9</td>
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<td>638.imagick_s</td>
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<td>166</td>
<td>87.1</td>
<td>166</td>
<td>87.1</td>
<td>166</td>
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<td>644.nab_s</td>
<td>56</td>
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<td>54.4</td>
<td>321</td>
<td>54.1</td>
<td>323</td>
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<tr>
<td>649.fotonik3d_s</td>
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<td>105</td>
<td>87.3</td>
<td>104</td>
<td>88.5</td>
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<td>654.roms_s</td>
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<td>74.5</td>
<td>211</td>
<td>72.7</td>
<td>216</td>
</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 178
SPECspeed®2017_fp_peak = 181

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 = "/home/cpu2017_1.1.8/lib/intel64:/home/cpu2017_1.1.8/je5.0.1-64"
MALLOCONF = "retain:true"
OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Redhat Enterprise Linux 8.0
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

(joined on next page)
SPEC CPU®2017 Floating Point Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL360 Gen10 Plus
(2.00 GHz, Intel Xeon Gold 6330)

SPECspeed®2017_fp_base = 178
SPECspeed®2017_fp_peak = 181

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

General Notes (Continued)

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

Submitted by: "Bhatnagar, Prateek" <prateek.bhatnagar@hpe.com>
Submitted: Mon Jun 21 10:22:03 EDT 2021
Submission: cpu2017-20210621-27547.sub

Platform Notes

The system ROM used for this result contains Intel microcode version 0xd0002a0 for
the Intel Xeon Gold 6330 processor
BIOS Configuration:
Workload Profile set to General Peak Frequency Compute
Intel Hyper-Threading set to Disabled
Thermal Configuration set to Maximum Cooling
Memory Patrol Scrubbing set to Disabled
Advanced Memory Protection set to Advanced ECC
Last Level Cache (LLC) Prefetch set to Enabled
Last Level Cache (LLC) Dead Line Allocation set to Disabled
Enhanced Processor Performance set to Enabled
Workload Profile set to Custom
Energy/Performance Bias set to Balanced Power
DCU Stream Prefetcher set to Disabled
Adjacent Sector Prefetch set to Disabled
Minimum Processor Idle Power Package C-State set to No Package State
Numa Group Size Optimization set to Flat

Sysinfo program /home/cpu2017_1.1.8/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on localhost.localdomain Tue Jun 15 14:01:17 2021

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 6330 CPU @ 2.00GHz
  2 "physical id"s (chips)
  56 "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 : 28
siblings : 28
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
25 26 27
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

(Continued on next page)
Platform Notes (Continued)

From lscpu from util-linux 2.32.1:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 56
On-line CPU(s) list: 0-55
Thread(s) per core: 1
Core(s) per socket: 28
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Gold 6330 CPU @ 2.00GHz
Stepping: 6
CPU MHz: 2397.059
BogoMIPS: 4000.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 43008K
NUMA node0 CPU(s): 0-27
NUMA node1 CPU(s): 28-55
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
aperfmpref pni pclmulqdq dtes64 monitor ds cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtpr pdcm pcid 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 invpcid_single ssbd
mba ibrs ibp bb ibrs_enhanced tpr_shadow vmi flexpriority ept vpid ept_ad
fsalbase tsc_adjust bmi1 hle avx2 smep bmi2 ews invpcid cmq rdt_a avx512f avx512dq
rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw
avx512vl xsaveopt xsavec xgetbv1 xsaveas cmq_lsc qcur_occup_lsc qcm_mbm_total
qcm_mbm_local split_lock detect wboinvd dtherm ida arat pin pts avx512vbmi umip pku
ospke avx512_vbmi2 gfini vaes vpcmrlqdq avx512_vnni avx512_bitalg tme
avx512_vfpopcntdq la57 rdrpid md_clear pconfig flush_l1d arch_capabilities

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 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27

(Continued on next page)
Platform Notes (Continued)

node 0 size: 983659 MB
node 0 free: 1030769 MB
node 1 cpus: 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55
node 1 size: 975956 MB
node 1 free: 1025237 MB
node distances:
node 0 1
  0: 10 20
  1: 20 10

From /proc/meminfo

MemTotal: 2113490568 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

/sbin/tuned-adm active
  Current active profile: throughput-performance

From /etc/*release*/etc/*version*

os-release:
  NAME="Red Hat Enterprise Linux"
  VERSION="8.3 (Ootpa)"
  ID="rhel"
  ID_LIKE="fedora"
  VERSION_ID="8.3"
  PLATFORM_ID="platform:el8"
  PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
  ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga
uname -a:
  Linux localhost.localdomain 4.18.0-240.el8.x86_64 #1 SMP Wed Sep 23 05:13:10 EDT 2020
  x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (ITLB Multihit): Not affected
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: usercopy/swapgs

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<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<td>178</td>
</tr>
<tr>
<td>SPECspeed(^ {2017})_fp_peak</td>
<td>181</td>
</tr>
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</table>

### Platform Notes (Continued)

- **CVE-2017-5715** (Spectre variant 2):
  - Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
- **CVE-2020-0543** (Special Register Buffer Data Sampling):
  - Not affected
- **CVE-2019-11135** (TSX Asynchronous Abort):
  - Not affected

---

**run-level 3 Jun 15 09:39**

**SPEC is set to:** /home/cpu2017_1.1.8

**Filesystem**

<table>
<thead>
<tr>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>xfs</td>
<td>372G</td>
<td>188G</td>
<td>185G</td>
<td>51%</td>
<td>/home</td>
</tr>
</tbody>
</table>

**From /sys/devices/virtual/dmi/id**

- **Vendor:** HPE
- **Product:** ProLiant DL360 Gen10 Plus
- **Product Family:** ProLiant
- **Serial:** CN701108CQ

**Additional information from dmidecode 3.2 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:**

- 32x Micron 36ASF8G72PZ-3G2B2 64 GB 2 rank 3200, configured at 2933

**BIOS:**

- **BIOS Vendor:** HPE
- **BIOS Version:** U46
- **BIOS Date:** 05/16/2021
- **BIOS Revision:** 1.42
- **Firmware Revision:** 2.42

(End of data from sysinfo program)

### Compiler Version Notes

```
C                        | 619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base)
```

---

**Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000**

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(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)  
ProLiant DL360 Gen10 Plus
(2.00 GHz, Intel Xeon Gold 6330)

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Copyright 2017-2021 Standard Performance Evaluation Corporation

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Compiler Version Notes (Continued)

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<td>C</td>
<td>644.nab_s(peak)</td>
</tr>
<tr>
<td></td>
<td>Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113</td>
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CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

Compiler Version Notes (Continued)

Fortran, C  621.wrf_s(base, peak) 627.cam4_s(base, peak)
           628.pop2_s(base, peak)

Base Compiler Invocation

C benchmarks:
  icc

Fortran benchmarks:
  ifort

Benchmarks using both Fortran and C:
  ifort icc

Benchmarks using Fortran, C, and C++:
  icpc icc ifort

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
   -assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL360 Gen10 Plus
(2.00 GHz, Intel Xeon Gold 6330)

SPECspeed®2017_fp_base = 178
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Base Optimization Flags

C benchmarks:
-m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-mbraches-within-32B-boundaries

Fortran benchmarks:
-m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs
-mbraches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib
-ljemalloc

Benchmarks using both Fortran and C:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -mbraches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using Fortran, C, and C++:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -mbraches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Peak Compiler Invocation

C benchmarks (except as noted below):
icc

644.nab_s: icx

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort
Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

619.lbm_s: basepeak = yes

638.imagick_s: basepeak = yes

644.nab_s: -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
flto -mfpmath=sse -funroll-loops -fiopenmp
-DSPEC_OPENMP -qopt-mem-layout-trans=4
-fimf-accuracy-bits=14:sqrt
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Fortran benchmarks:

603.bwaves_s: basepeak = yes

649.fotonik3d_s: -m64 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -ipo -xCORE-AVX512
-03 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

621.wrf_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)
-prof-use(pass 2) -ipo -xCORE-AVX512 -03 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
-mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

627.cam4_s: basepeak = yes

628.pop2_s: basepeak = yes

(Continued on next page)
Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL360 Gen10 Plus  
(2.00 GHz, Intel Xeon Gold 6330)  

SPECspeed®2017_fp_base = 178  
SPECspeed®2017_fp_peak = 181

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

Test Date: Jun-2021  
Hardware Availability: Jun-2021  
Software Availability: Jun-2021

Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: basepeak = yes

The flags files that were used to format this result can be browsed at

http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.0-ICX-revC.html

You can also download the XML flags sources by saving the following links:

http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.0-ICX-revC.xml
http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.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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