## SPEC CPU®2017 Floating Point Speed Result

### Hewlett Packard Enterprise

*(Test Sponsor: HPE)*

**ProLiant DL580 Gen10**

*(2.30 GHz, Intel Xeon Gold 6252N)*

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**CPU2017 License:** 3  
**Test Sponsor:** HPE  
**Tested by:** HPE  
**Test Date:** Jul-2019  
**Hardware Availability:** Jun-2019  
**Test Sponsor:** HPE  
**Hardware Availability:** Jun-2019  

<table>
<thead>
<tr>
<th>Thread Name</th>
<th>Threads</th>
<th>SPECspeed®2017_fp_base = 201</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>96</td>
<td>214</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>96</td>
<td>155</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>96</td>
<td>140</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>96</td>
<td>174</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>96</td>
<td>51.8</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>96</td>
<td>241</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>96</td>
<td>426</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>96</td>
<td>109</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>96</td>
<td>226</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>96</td>
<td>480</td>
</tr>
</tbody>
</table>

### Hardware

**CPU Name:** Intel Xeon Gold 6252N  
**Max MHz:** 3600  
**Nominal:** 2300  
**Enabled:** 96 cores, 4 chips  
**Orderable:** 1, 2, 3, 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:** 35.75 MB I+D on chip per chip  
**Other:** None  
**Memory:** 768 GB (24 x 32 GB 2Rx4 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 U34 05/21/2019 released Jun-2019  
**File System:** btrfs  
**System State:** Run level 3 (multi-user)  
**Base Pointers:** 64-bit  
**Peak Pointers:** Not Applicable  
**Other:** None  
**Power Management:** --
SPEC CPU®2017 Floating Point Speed Result

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(Test Sponsor: HPE)
ProLiant DL580 Gen10
(2.30 GHz, Intel Xeon Gold 6252N)

SPECspeed®2017_fp_base = 201
SPECspeed®2017_fp_peak = Not Run

Results Table

<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>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>96</td>
<td>69.4</td>
<td>851</td>
<td>69.2</td>
<td>853</td>
<td>69.7</td>
<td>846</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>96</td>
<td>78.3</td>
<td>213</td>
<td>77.9</td>
<td>214</td>
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<td>215</td>
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<td>619.lbm_s</td>
<td>96</td>
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<td>173</td>
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<tr>
<td>628.pop2_s</td>
<td>96</td>
<td>231</td>
<td>51.4</td>
<td>223</td>
<td>53.2</td>
<td>229</td>
<td>51.8</td>
</tr>
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<td>638.imagick_s</td>
<td>96</td>
<td>60.0</td>
<td>240</td>
<td>59.5</td>
<td>243</td>
<td>59.9</td>
<td>241</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>96</td>
<td>41.0</td>
<td>426</td>
<td>41.0</td>
<td>426</td>
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<td>428</td>
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<tr>
<td>649.fotonik3d_s</td>
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<td>109</td>
<td>83.9</td>
<td>109</td>
</tr>
<tr>
<td>654.roms_s</td>
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<td>273</td>
<td>55.9</td>
<td>282</td>
<td>57.0</td>
<td>276</td>
</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 201
SPECspeed®2017_fp_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"
    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.

Platform Notes

BIOS Configuration:
    Hyper-Threading set to Disabled
    Thermal Configuration set to Maximum Cooling

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL580 Gen10
(2.30 GHz, Intel Xeon Gold 6252N)

SPECspeed®2017_fp_base = 201
SPECspeed®2017_fp_peak = Not Run

Platform Notes (Continued)

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
   Advanced Memory Protection set to Advanced ECC
Sysinfo program /home/cpu2017_u2/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcd8f2999c33d61f64985e45859ea9
running on dl580-sles15 Fri Jul 19 16:13:12 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 6252N CPU @ 2.30GHz
    4 "physical id"s (chips)
    96 "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 : 24
siblings : 24
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 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 25 26 27 28 29
physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29
physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 96
On-line CPU(s) list: 0-95
Thread(s) per core: 1
Core(s) per socket: 24
Socket(s): 4
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6252N CPU @ 2.30GHz
Stepping: 7
CPU MHz: 2300.000
BogoMIPS: 4600.00

(Continued on next page)
Hewlett Packard Enterprise
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SPECspeed®2017_fp_base = 201
SPECspeed®2017_fp_peak = Not Run

Platform Notes (Continued)

Virtualization:   VT-x
L1d cache:        32K
L1i cache:        32K
L2 cache:         1024K
L3 cache:         36608K
NUMA node0 CPU(s): 0-23
NUMA node1 CPU(s): 24-47
NUMA node2 CPU(s): 48-71
NUMA node3 CPU(s): 72-95
Flags:           fpu vme de pse tsc msr pae 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
                  aperf tmpervf tsc_known_freq 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 cdp_13 invpcid_single intel_pinn mba tpr_shadow vmx flexpriority ept
                  pid fspecbase tsc_adjust bts hle avx2 smep bmi2 3dnow invpcid rtm cqm mpx rdt_a
                  avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl
                  xsaveopt xsave xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
                  ibpb ibrs dtherm ida arat pin pts ksu ospke avx512_vnni arch_capabilities ssbd

/proc/cpuinfo cache data
  cache size : 36608 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 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
    node 0 size: 193117 MB
    node 0 free: 192563 MB
    node 1 cpus: 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
    node 1 size: 193531 MB
    node 1 free: 193341 MB
    node 2 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71
    node 2 size: 193502 MB
    node 2 free: 193318 MB
    node 3 cpus: 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95
    node 3 size: 193529 MB
    node 3 free: 193230 MB
  node distances:
    node 0 1 2 3
      0: 10 21 21 21
      1: 21 10 21 21
      2: 21 10 21 21
      3: 21 21 21 10

From /proc/meminfo

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

<table>
<thead>
<tr>
<th>MemTotal:</th>
<th>792248876 kB</th>
</tr>
</thead>
<tbody>
<tr>
<td>HugePages_Total:</td>
<td>0</td>
</tr>
<tr>
<td>Hugepagesize:</td>
<td>2048 kB</td>
</tr>
</tbody>
</table>

From `/etc/*release*` /etc/*version*:

```plaintext
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"
```

```plaintext
uname -a:
  Linux dl580-sles15 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

```plaintext
run-level 3 Jul 19 16:12
```

**SPEC is set to**: /home/cpu2017_u2

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sda2</td>
<td>btrfs</td>
<td>371G</td>
<td>92G</td>
<td>278G</td>
<td>25%</td>
<td>/home</td>
</tr>
</tbody>
</table>

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 U34 05/21/2019
- Memory:
  - 24x UNKNOWN NOT AVAILABLE
  - 24x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2933

(End of data from sysinfo program)
Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
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<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
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<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

CPU2017 License: 3  
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Tested by: HPE  

Test Date: Jul-2019  
Hardware Availability: Jun-2019  
Software Availability: Feb-2019

---

**Compiler Version Notes**

<table>
<thead>
<tr>
<th>Compiler</th>
<th>Benchmarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)</td>
</tr>
</tbody>
</table>
|          | 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++, C, Fortran | 607.cactuBSSN_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.  
          | 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.  
          | 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. |
| Fortran   | 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_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. |
| Fortran, C| 621.wrf_s(base) 627.cam4_s(base) 628.pop2_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.  
          | 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. |

---

**Base Compiler Invocation**

C benchmarks:  
```
icc -m64 -std=c11
```
Hewlett Packard Enterprise
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Tested by: HPE

Base Compiler Invocation (Continued)

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
ifort -m64 icc -m64 -std=c11

Benchmarks using Fortran, C, and C++:
icpc -m64 icc -m64 -std=c11 ifort -m64

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

Base Optimization Flags

C benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-qopt-prefetch-issue-excl-hint -ansi-alias -complex-limited-range

Fortran benchmarks:
-DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-qopt-prefetch-issue-excl-hint -ansi-alias -complex-limited-range
-nostandard-realloc-lhs

Benchmarks using both Fortran and C:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-qopt-prefetch-issue-excl-hint -ansi-alias -complex-limited-range
-nostandard-realloc-lhs

(Continued on next page)
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**Software Availability:** Feb-2019

### Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++:
- `-xCORE-AVX512`  
- `-ipo`  
- `-O3`  
- `-no-prec-div`  
- `-qopt-prefetch`  
- `-ffinite-math-only`  
- `-qopt-mem-layout-trans=4`  
- `-qopenmp`  
- `-DSPEC_OPENMP`  
- `-qopt-prefetch-issue-excl-hint`  
- `-ansi-alias`  
- `-complex-limited-range`  
- `-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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