## SPEC® CPU2017 Floating Point Speed Result

### Hewlett Packard Enterprise

(Test Sponsor: HPE)  
ProLiant DL560 Gen10  
(2.50 GHz, Intel Xeon Platinum 8180)

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>193</th>
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</thead>
<tbody>
<tr>
<td>SPECspeed2017_fp_peak</td>
<td>Not Run</td>
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<tr>
<th>Test Sponsor:</th>
<th>HPE</th>
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<tr>
<td>Hardware Availability:</td>
<td>Jun-2018</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Mar-2018</td>
</tr>
</tbody>
</table>

| CPU2017 License: | 3 |
| Test Date: | Aug-2018 |
| Tested by: | HPE |

<table>
<thead>
<tr>
<th>Software</th>
<th>OS: Red Hat Enterprise Linux Server release 7.4 (x86_64) (Maipo)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler:</td>
<td>C/C++: Version 18.0.2.199 of Intel C/C++ Compiler for Linux; Fortran: Version 18.0.2.199 of Intel Fortran Compiler for Linux</td>
</tr>
<tr>
<td>Parallel:</td>
<td>Yes</td>
</tr>
<tr>
<td>Firmware:</td>
<td>HPE BIOS Version U34 06/20/2018 released Jun-2018</td>
</tr>
<tr>
<td>File System:</td>
<td>xfs</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Other:</td>
<td>jemalloc: jemalloc memory allocator library V5.0.1</td>
</tr>
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<table>
<thead>
<tr>
<th>Hardware</th>
<th>CPU Name: Intel Xeon Platinum 8180</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz.:</td>
<td>3800</td>
</tr>
<tr>
<td>Nominal:</td>
<td>2500</td>
</tr>
<tr>
<td>Enabled:</td>
<td>112 cores, 4 chips</td>
</tr>
<tr>
<td>Orderable:</td>
<td>1, 2, 4 chip(s)</td>
</tr>
<tr>
<td>Cache L1:</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2:</td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td>L3:</td>
<td>38.5 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>768 GB (48 x 16 GB 2Rx8 PC4-2666V-R)</td>
</tr>
<tr>
<td>Storage:</td>
<td>1 x 600 GB SAS HDD, RAID 0</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
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<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_fp_base (193)</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>112</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>112</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>112</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>112</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>112</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>112</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>112</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>112</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>112</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>112</td>
</tr>
</tbody>
</table>

| SPECspeed2017_fp_peak | Not Run |

| SPECspeed2017_fp_base | 193 |

| SPECspeed2017_fp_peak | Not Run |

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Page 1 Standard Performance Evaluation Corporation (info@spec.org) https://www.spec.org/
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(2.50 GHz, Intel Xeon Platinum 8180)

---

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

---

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>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>112</td>
<td>76.9</td>
<td>768</td>
<td>75.6</td>
<td>780</td>
<td>78.4</td>
<td>753</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>112</td>
<td>63.0</td>
<td>265</td>
<td>63.6</td>
<td>262</td>
<td>63.8</td>
<td>261</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>112</td>
<td>66.3</td>
<td>79.0</td>
<td>62.4</td>
<td>83.9</td>
<td>63.1</td>
<td>83.0</td>
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<tr>
<td>621.wrf_s</td>
<td>112</td>
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<td>84.6</td>
<td>158</td>
<td>83.7</td>
<td>159</td>
<td>83.0</td>
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<tr>
<td>627.cam4_s</td>
<td>112</td>
<td>54.4</td>
<td>163</td>
<td>54.4</td>
<td>163</td>
<td>54.4</td>
<td>163</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>112</td>
<td>193</td>
<td>61.5</td>
<td>197</td>
<td>60.2</td>
<td>192</td>
<td>62.0</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>112</td>
<td>56.1</td>
<td>257</td>
<td>54.5</td>
<td>265</td>
<td>55.8</td>
<td>259</td>
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<tr>
<td>644.nab_s</td>
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<td>33.5</td>
<td>522</td>
<td>33.6</td>
<td>519</td>
<td>33.6</td>
<td>519</td>
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<tr>
<td>649.fotonik3d_s</td>
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<td>76.2</td>
<td>120</td>
<td>76.1</td>
<td>120</td>
<td>77.5</td>
<td>118</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>112</td>
<td>49.9</td>
<td>315</td>
<td>50.7</td>
<td>310</td>
<td>50.7</td>
<td>310</td>
</tr>
</tbody>
</table>

SPECspeed2017_fp_base = 193
SPECspeed2017_fp_peak = Not Run

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"
irqbalance disabled with "service irqbalance stop"
tuned profile set with "tuned-adm profile throughput-performance"
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 = "/cpu2017/lib/ia32:/cpu2017/lib/intel64:/cpu2017/je5.0.1-32:/cpu2017/je5.0.1-64"
OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i7-6700K 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.
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| Test Sponsor: | HPE |
| Tested by: | HPE |
| Test Date: | Aug-2018 |
| Hardware Availability: | Jun-2018 |
| Software Availability: | Mar-2018 |

Platform Notes

BIOS Configuration:
- Intel Hyperthreading set to Disabled
- Thermal Configuration set to Maximum Cooling
- Memory Patrol Scrubbing set to Disabled
- LLC Dead Line Allocation set to Disabled
- Stale A to S set to Enabled
- LLC Dead Line Allocation set to Disabled
- Workload Profile set to General Peak Frequency Compute
- Minimum Processor Idle Power Core C-state set to C6
- Energy/Performance Bias set to Maximum Performance
- Workload Profile set to Custom
- Uncore Frequency Scaling set to Auto
- NUMA Group Size Optimization set to Flat

Sysinfo program /cpu2017/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on localhost.localdomain Thu Aug 16 15:15:09 2018

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) Platinum 8180 CPU @ 2.50GHz
- 4 "physical id"s (chips)
- 112 "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 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30
  - physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30
  - physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30
  - physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30

From lscpu:
- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- CPU(s): 112
- On-line CPU(s) list: 0-111
- Thread(s) per core: 1
- Core(s) per socket: 28
- Socket(s): 4

(Continued on next page)
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**Test Date:** Aug-2018  
**Hardware Availability:** Jun-2018  
**Software Availability:** Mar-2018

**Platform Notes (Continued)**

- **NUMA node(s):** 4
- **Vendor ID:** GenuineIntel
- **CPU family:** 6
- **Model:** 85
- **Model name:** Intel(R) Xeon(R) Platinum 8180 CPU @ 2.50GHz
- **Stepping:** 4
- **CPU MHz:** 2500.000
- **BogoMIPS:** 5000.00
- **Virtualization:** VT-x
- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 1024K
- **L3 cache:** 39424K
- **NUMA node0 CPU(s):** 0-27
- **NUMA node1 CPU(s):** 28-55
- **NUMA node2 CPU(s):** 56-83
- **NUMA node3 CPU(s):** 84-111

**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 arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc aperfmperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 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 msr hwcall rdtscp rdseed adx smap clflushopt clwb avx512f avx512dq rdseed adx smap clflushopt clwb avx512f avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pfn pts

```bash
/proc/cpuinfo cache data
cache size : 39424 KB
```

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

From `/proc/meminfo`

```bash
MemTotal: 792053220 kB
HugePages_Total: 0
Hugepagesize: 2048 KB
```

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

```bash
os-release:
NAME="Red Hat Enterprise Linux Server"
VERSION="7.4 (Maipo)"
ID="rhel"
ID_LIKE="fedora"
VARIANT="Server"
VARIANT_ID="server"
```

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

**Platform Notes (Continued)**

```
VERSION_ID="7.4"
PRETTY_NAME="Red Hat Enterprise Linux Server 7.4 (Maipo)"
redhat-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
system-release-cpe: cpe:/o:redhat:enterprise_linux:7.4:ga:server
```

uname -a:
```
Linux localhost.localdomain 3.10.0-693.20.1.el7.x86_64 #1 SMP Wed Feb 7 16:53:38 EST 2018 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: Load fences
- CVE-2017-5715 (Spectre variant 2): Mitigation: IBRS (kernel)

run-level 3 Aug 16 12:46

```
SPEC is set to: /cpu2017
/filemapper/rhel-root xfs 50G 11G 40G 22% /
```

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 06/20/2018
- Memory:
  - 48x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666

(End of data from sysinfo program)

**Compiler Version Notes**

```
== C C == 619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)
-- icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
--
== F F == 607.cactuBSSN_s(base)
-- icpc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

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CPU2017 License: 3
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Tested by: HPE

Test Date: Aug-2018
Hardware Availability: Jun-2018
Software Availability: Mar-2018

---

Compiler Version Notes (Continued)

icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

==============================================================================
FC  603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)

==============================================================================
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

==============================================================================
CC  621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)

==============================================================================
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

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

(Continued on next page)
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</table>

**SPECspeed2017_fp_base** = 193  
**SPECspeed2017_fp_peak** = Not Run

**Base Portability Flags (Continued)**

628.pop2_s:  -DSPEC_LP64  -DSPEC_CASE_FLAG  -convert big_endian
-assume byte recl
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:
-`-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch`
-`-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP`
-`-L/usr/local/je5.0.1-64/lib -ljemalloc`

Fortran benchmarks:
-`-Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div`
-`-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp`
-`-nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc`

Benchmarks using both Fortran and C:
-`-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch`
-`-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP`
-`-nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc`

Benchmarks using Fortran, C, and C++:
-`-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch`
-`-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP`
-`-nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc`

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-SKX-revI.html](http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-SKX-revI.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-SKX-revI.xml](http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-SKX-revI.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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