<table>
<thead>
<tr>
<th>Copy</th>
<th>SPECrate®2017_fp_base</th>
<th>SPECrate®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>503.bwaves_r</td>
<td>8</td>
<td>Not Run</td>
</tr>
<tr>
<td>507.cactuBSSN_r</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>508.namd_r</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>510.parest_r</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>511.povray_r</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>519.lbm_r</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>521.wrf_r</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>526.blender_r</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>527.cam4_r</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>538.imagick_r</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>544.nab_r</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>549.fotonik3d_r</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>554.roms_r</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

**Hardware**

- **CPU Name:** Intel Xeon E-2234
- **Max MHz:** 4800
- **Nominal:** 3600
- **Enabled:** 4 cores, 1 chip, 2 threads/core
- **Orderable:** 1 chip(s)
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **L2:** 256 KB I+D on chip per core
- **L3:** 8 MB I+D on chip per chip
- **Memory:** 64 GB (4 x 16 GB 2Rx8 PC4-2666V-U)
- **Storage:** 1 x 400 GB SATA SSD, RAID 0
- **Other:** None

**Software**

- **OS:** SUSE Linux Enterprise Server 15 (x86_64) SP1 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:** No
- **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:** None
- **Power Management:** --
### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>503.bwaves_r</td>
<td>8</td>
<td>1073</td>
<td>74.8</td>
<td>1073</td>
<td>74.8</td>
<td>1073</td>
<td>74.8</td>
</tr>
<tr>
<td>507.cactuBSSN_r</td>
<td>8</td>
<td>343</td>
<td>29.5</td>
<td>351</td>
<td>28.8</td>
<td>349</td>
<td>29.0</td>
</tr>
<tr>
<td>508.namd_r</td>
<td>8</td>
<td>294</td>
<td>25.8</td>
<td>296</td>
<td>25.7</td>
<td>295</td>
<td>25.8</td>
</tr>
<tr>
<td>510.parest_r</td>
<td>8</td>
<td>1205</td>
<td>17.4</td>
<td>1206</td>
<td>17.4</td>
<td>1196</td>
<td>17.5</td>
</tr>
<tr>
<td>511.povray_r</td>
<td>8</td>
<td>484</td>
<td>38.6</td>
<td>482</td>
<td>38.7</td>
<td>485</td>
<td>38.5</td>
</tr>
<tr>
<td>519.lbm_r</td>
<td>8</td>
<td>467</td>
<td>18.1</td>
<td>467</td>
<td>18.1</td>
<td>467</td>
<td>18.1</td>
</tr>
<tr>
<td>521.wrf_r</td>
<td>8</td>
<td>545</td>
<td>32.9</td>
<td>542</td>
<td>33.0</td>
<td>539</td>
<td>33.2</td>
</tr>
<tr>
<td>526.blender_r</td>
<td>8</td>
<td>329</td>
<td>37.0</td>
<td>329</td>
<td>37.0</td>
<td>330</td>
<td>36.9</td>
</tr>
<tr>
<td>527.cam4_r</td>
<td>8</td>
<td>375</td>
<td>37.3</td>
<td>377</td>
<td>37.1</td>
<td>374</td>
<td>37.4</td>
</tr>
<tr>
<td>538.imagick_r</td>
<td>8</td>
<td>227</td>
<td>87.5</td>
<td>227</td>
<td>87.6</td>
<td>227</td>
<td>87.5</td>
</tr>
<tr>
<td>544.nab_r</td>
<td>8</td>
<td>228</td>
<td>59.1</td>
<td>231</td>
<td>58.3</td>
<td>228</td>
<td>59.1</td>
</tr>
<tr>
<td>549.fotonik3d_r</td>
<td>8</td>
<td>1367</td>
<td>22.8</td>
<td>1367</td>
<td>22.8</td>
<td>1368</td>
<td>22.8</td>
</tr>
<tr>
<td>554.roms_r</td>
<td>8</td>
<td>1012</td>
<td>12.6</td>
<td>1007</td>
<td>12.6</td>
<td>1012</td>
<td>12.6</td>
</tr>
</tbody>
</table>

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

### Submit Notes

The taskset mechanism was used to bind copies to processors. The config file option 'submit' was used to generate taskset commands to bind each copy to a specific processor. For details, please see the config file.

### Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"
Prior to runcpu invocation
Files system 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:
LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64"

Binaries compiled on a system with 1x Intel Core i7-4790 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)
General Notes (Continued)
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:
Thermal Configuration set to Maximum Cooling
LLC prefetch set to Enabled
Workload Profile set to General Throughput Compute
Minimum Processor Idle Power Core C-State set to C1E
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-vb4y Tue Sep 24 20:56:30 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-2234 CPU @ 3.60GHz
  1 "physical id"s (chips)
  8 "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 : 4
siblings : 8
physical 0: cores 0 1 2 3

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): 8
On-line CPU(s) list: 0-7
Thread(s) per core: 2
Core(s) per socket: 4
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 158
Model name: Intel(R) Xeon(R) E-2234 CPU @ 3.60GHz
Stepping: 10
CPU MHz: 3600.000

(Continued on next page)
SPEC CPU®2017 Floating Point Rate Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL20 Gen10
(3.60 GHz, Intel Xeon E-2234)

<table>
<thead>
<tr>
<th>CPU2017 License: 3</th>
<th>Test Date: Oct-2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor: HPE</td>
<td>Hardware Availability: Nov-2019</td>
</tr>
<tr>
<td>Tested by: HPE</td>
<td>Software Availability: Oct-2019</td>
</tr>
</tbody>
</table>

SPECratenot run = 32.5
SPECratenot run = Not Run

Platform Notes (Continued)

BogoMIPS: 7200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 256K
L3 cache: 8192K
NUMA node0 CPU(s): 0-7
Flags: fpu vme de pse tsc msr pae mce cmov pat pse36 clflush dt sse2 sse3 ss ht tm pe syscall nx pdpe1gb rdtscp lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtext 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 pti ssbd ibrs ibpb stibp tpr_shadow vmprepare vmswi intel_pt xsaveopt xsaves xsaveopt xsavec xgetbv1 xsaves dtherm ida arat pln pts md_clear flush_lid

From /proc/cpuinfo

cache size : 8192 KB

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

available: 1 nodes (0)
nodes 0 cpus: 0 1 2 3 4 5 6 7
node 0 size: 64022 MB
node 0 free: 56955 MB
node distances:
node 0
0: 10

From /proc/meminfo

MemTotal: 65559328 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:
**Platform Notes (Continued)**

Linux linux-vb4y 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-2017-5754 (Meltdown): Mitigation: PTI
- CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
- CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted Speculation,
  IBPB: conditional, IBRS_FW, STIBP: conditional, RSB filling

run-level 3 Sep 24 17:47

SPEC is set to: `/home/cpu2017`

```
Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda3      xfs   270G   63G  208G  24% /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**

```markdown
---
C       | 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
---
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
---
C++     | 508.namd_r(base) 510.parest_r(base)
---
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
---
C++, C   | 511.povray_r(base) 526.blender_r(base)
---
```

(Continued on next page)
SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL20 Gen10
(3.60 GHz, Intel Xeon E-2234)

SPECrate®2017_fp_base = 32.5
SPECrate®2017_fp_peak = Not Run

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

Test Date: Oct-2019
Hardware Availability: Nov-2019
Software Availability: Oct-2019

Compiler Version Notes (Continued)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

Compiler Version Notes (Continued)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

Compiler Version Notes (Continued)

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

Compiler Version Notes (Continued)

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

(Continued on next page)
SPEC CPU®2017 Floating Point Rate Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL20 Gen10
(3.60 GHz, Intel Xeon E-2234)

Copyright 2017-2019 Standard Performance Evaluation Corporation

SPECrate®2017_fp_base = 32.5
SPECrate®2017_fp_peak = Not Run

CPU2017 License: 3
Test Sponsor: HPE
Test Date: Oct-2019
Tested by: HPE
Hardware Availability: Nov-2019
Software Availability: Oct-2019

Base Compiler Invocation (Continued)

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

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

Benchmarks using both C and C++:
icpc -m64 icc -m64 -std=c11

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

Base Portability Flags

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.gbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL20 Gen10
(3.60 GHz, Intel Xeon E-2234)

SPECrate®2017_fp_base = 32.5
SPECrate®2017_fp_peak = Not Run

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

Test Date: Oct-2019
Hardware Availability: Nov-2019
Software Availability: Oct-2019

Base Optimization Flags (Continued)

Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

Benchmarks using both C and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

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

SPEC CPU and SPECrate are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

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 2019-09-24 20:56:29-0400.
Originally published on 2019-11-12.