### SPEC® CPU2017 Floating Point Rate Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL360 Gen10  
(2.60 GHz, Intel Xeon Silver 4112)

<table>
<thead>
<tr>
<th>SPECrate2017_fp_base</th>
<th>51.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 3  
**Test Sponsor:** HPE  
**Tested by:** HPE  
**Test Date:** Oct-2017  
**Hardware Availability:** Oct-2017  
**Software Availability:** Sep-2017

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>503.bwaves_r</td>
<td>16</td>
<td>40.4</td>
</tr>
<tr>
<td>507.cactuBSSN_r</td>
<td>16</td>
<td>33.4</td>
</tr>
<tr>
<td>508.namd_r</td>
<td>16</td>
<td>40.8</td>
</tr>
<tr>
<td>510.parest_r</td>
<td>16</td>
<td>54.2</td>
</tr>
<tr>
<td>511.povray_r</td>
<td>16</td>
<td>38.4</td>
</tr>
<tr>
<td>519.lbm_r</td>
<td>16</td>
<td>51.6</td>
</tr>
<tr>
<td>521.wrf_r</td>
<td>16</td>
<td>46.0</td>
</tr>
<tr>
<td>526.blender_r</td>
<td>16</td>
<td>37.5</td>
</tr>
<tr>
<td>527.cam4_r</td>
<td>16</td>
<td>67.1</td>
</tr>
<tr>
<td>538.imagick_r</td>
<td>16</td>
<td>58.4</td>
</tr>
<tr>
<td>544.nab_r</td>
<td>16</td>
<td>59.1</td>
</tr>
<tr>
<td>549.fotonik3d_r</td>
<td>16</td>
<td>36.3</td>
</tr>
</tbody>
</table>

**Hardware**

- **CPU Name:** Intel Xeon Silver 4112  
- **Max MHz.:** 3000  
- **Nominal:** 2600  
- **Enabled:** 8 cores, 2 chips, 2 threads/core  
- **Orderable:** 1, 2 chip(s)  
- **Cache L1:** 32 KB I + 32 KB D on chip per core  
- **L2:** 1 MB I+D on chip per core  
- **L3:** 8.25 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 192 GB (24 x 8 GB 2Rx8 PC4-2666V-R, running at 2400)  
- **Storage:** 1 x 600 GB SATA SSD, RAID 0  
- **Other:** None

**Software**

- **OS:** SUSE Linux Enterprise Server 12 (x86_64) SP2  
- **Kernel:** 4.4.21-68-default  
- **Compiler:** C/C++: Version 18.0.0.128 of Intel C/C++  
- **Compiler for Linux:**  
- **Fortran:** Version 18.0.0.128 of Intel Fortran  
- **Compiler for Linux:**  
- **Parallel:** No  
- **Firmware:** HPE BIOS Version U32 released Oct-2017 (tested with U32 9/29/2017)  
- **File System:** xfs  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** Not Applicable  
- **Other:** None
SPEC CPU2017 Floating Point Rate Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL360 Gen10
(2.60 GHz, Intel Xeon Silver 4112)

SPECrate2017_fp_base = 51.8
SPECrate2017_fp_peak = Not Run

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>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>503.bwaves_r</td>
<td>16</td>
<td>714</td>
<td>225</td>
<td>714</td>
<td>225</td>
<td>717</td>
<td>224</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>507.cactuBSSN_r</td>
<td>16</td>
<td>502</td>
<td><strong>40.4</strong></td>
<td>501</td>
<td>40.5</td>
<td>502</td>
<td>40.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>508.namd_r</td>
<td>16</td>
<td>450</td>
<td>33.8</td>
<td><strong>455</strong></td>
<td><strong>33.4</strong></td>
<td>456</td>
<td>33.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>510.parest_r</td>
<td>16</td>
<td>1026</td>
<td><strong>40.8</strong></td>
<td>1024</td>
<td>40.9</td>
<td>1027</td>
<td>40.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>511.povray_r</td>
<td>16</td>
<td>689</td>
<td>54.2</td>
<td><strong>689</strong></td>
<td><strong>54.2</strong></td>
<td>688</td>
<td>54.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>519.lbm_r</td>
<td>16</td>
<td>439</td>
<td><strong>38.4</strong></td>
<td>437</td>
<td>38.6</td>
<td>439</td>
<td>38.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>521.wrf_r</td>
<td>16</td>
<td>695</td>
<td>51.6</td>
<td>693</td>
<td>51.7</td>
<td><strong>695</strong></td>
<td><strong>51.6</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>526.blender_r</td>
<td>16</td>
<td>528</td>
<td>46.1</td>
<td><strong>530</strong></td>
<td><strong>46.0</strong></td>
<td>531</td>
<td>45.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>527.cam4_r</td>
<td>16</td>
<td>747</td>
<td><strong>37.5</strong></td>
<td>750</td>
<td>37.3</td>
<td>743</td>
<td>37.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>538.imagick_r</td>
<td>16</td>
<td>593</td>
<td>67.1</td>
<td><strong>593</strong></td>
<td><strong>67.1</strong></td>
<td>592</td>
<td>67.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>544.nab_r</td>
<td>16</td>
<td>461</td>
<td><strong>58.4</strong></td>
<td>461</td>
<td>58.4</td>
<td>458</td>
<td>58.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>549.fotonik3d_r</td>
<td>16</td>
<td>1053</td>
<td>59.2</td>
<td>1055</td>
<td>59.1</td>
<td><strong>1055</strong></td>
<td><strong>59.1</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>554.roms_r</td>
<td>16</td>
<td>703</td>
<td>36.2</td>
<td><strong>700</strong></td>
<td><strong>36.3</strong></td>
<td>699</td>
<td>36.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl 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
Filesystem page cache synced and cleared with:
    sync; echo 3> /proc/sys/vm/drop_caches
runcpu command invoked through numactl i.e.:
    numactl --interleave=all runspec <etc>
irqbalance disabled with "service irqbalance stop"
tuned profile set with "tuned-adm profile throughput-performance"
VM Dirty ratio was set to 40 using "echo 40 > /proc/sys/vm/dirty_ratio"
Numa balancing was disabled using "echo 0 > /proc/sys/kernel/numa_balancing"

General Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32"
LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/home/cpu2017/je5.0.1-64"

(Continued on next page)
## SPEC CPU2017 Floating Point Rate Result

**Hewlett Packard Enterprise**

(Test Sponsor: HPE)

**ProLiant DL360 Gen10**

(2.60 GHz, Intel Xeon Silver 4112)

<table>
<thead>
<tr>
<th>SPECrate2017_fp_base</th>
<th>51.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>HPE</td>
</tr>
<tr>
<td>Tested by:</td>
<td>HPE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>Oct-2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Availability:</td>
<td>Oct-2017</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Sep-2017</td>
</tr>
</tbody>
</table>

### General Notes (Continued)

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM memory using Redhat Enterprise Linux 7.4

### Platform Notes

BIOS Configuration:
- Thermal Configuration set to Maximum Cooling
- LLC Prefetcher set to Enabled
- LLC Dead Line Allocation set to Disabled
- Stale A to S set to Disabled
- Memory patrol scrubbing set to disabled
- Workload Profile set to General Throughput Compute
- Minimum Processor Idle Power Core C-State set to C1E

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on linux-perm Mon Oct 23 20:49:09 2017

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) Silver 4112 CPU @ 2.60GHz
- 2 "physical id"s (chips)
- 16 "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 1 2 4 5
- physical 1: cores 0 2 3 4

From lscpu:
- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- CPU(s): 16
- On-line CPU(s) list: 0-15
- Thread(s) per core: 2
- Core(s) per socket: 4
- Socket(s): 2
- NUMA node(s): 2
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 85
- Model name: Intel(R) Xeon(R) Silver 4112 CPU @ 2.60GHz

(Continued on next page)
SPEC CPU2017 Floating Point Rate Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL360 Gen10
(2.60 GHz, Intel Xeon Silver 4112)

SPECrate2017_fp_base = 51.8
SPECrate2017_fp_peak = Not Run

<table>
<thead>
<tr>
<th>CPU2017 License: 3</th>
<th>Test Date: Oct-2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor: HPE</td>
<td>Hardware Availability: Oct-2017</td>
</tr>
<tr>
<td>Tested by: HPE</td>
<td>Software Availability: Sep-2017</td>
</tr>
</tbody>
</table>

Platform Notes (Continued)

Stepping: 4
CPU MHz: 2593.930
BogoMIPS: 5187.86
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 8448K
NUMA node0 CPU(s): 0-3, 8-11
NUMA node1 CPU(s): 4-7, 12-15
Flags: fpu vme de pse tsc msr pae mce 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 aperfmpref eagerfpu 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 ida arat epb pti msranched intel_pt tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2  kram invpcid rtm cqm mpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc

/proc/cpuinfo cache data
  cache size : 8448 KB

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 8 9 10 11
  node 0 size: 96350 MB
  node 0 free: 86261 MB
  node 1 cpus: 4 5 6 7 12 13 14 15
  node 1 size: 96766 MB
  node 1 free: 88454 MB
  node distances:
    node 0 1
    0: 10 21
    1: 21 10

From /proc/meminfo
  MemTotal: 197751660 KB
  HugePages_Total: 0
  Hugepagesize: 2048 KB

From /etc/*release* /etc/*version*
  SuSE-release:
    SUSE Linux Enterprise Server 12 (x86_64)
    VERSION = 12
    PATCHLEVEL = 2

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

# This file is deprecated and will be removed in a future service pack or release.
# Please check /etc/os-release for details about this release.

```bash
os-release:
  NAME="SLES"
  VERSION="12-SP2"
  VERSION_ID="12.2"
  PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
  ID="sles"
  ANSI_COLOR="0;32"
  CPE_NAME="cpe:/o:suse:sles:12:sp2"
```

```bash
uname -a:
Linux linux-perm 4.4.21-68-default #1 SMP Tue Oct 18 18:19:37 UTC 2016 (63cf368)
x86_64 x86_64 x86_64 GNU/Linux
```

run-level 3 Oct 23 04:43

SPEC is set to: /home/cpu2017

<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/sda4</td>
<td>xfs</td>
<td>517G</td>
<td>80G</td>
<td>438G</td>
<td>16%</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 U32 09/29/2017

Memory:
24x UNKNOWN NOT AVAILABLE 8 GB 2 rank 2666, configured at 2400

(End of data from sysinfo program)

## Compiler Version Notes

```
==============================================================================
CC 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
==============================================================================
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

```
==============================================================================
CXXC 508.namd_r(base) 510.parest_r(base)
==============================================================================
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL360 Gen10
(2.60 GHz, Intel Xeon Silver 4112)

<table>
<thead>
<tr>
<th>SPECrate2017_fp_base</th>
<th>SPECrate2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>51.8</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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

Test Date: Oct-2017
Hardware Availability: Oct-2017
Software Availability: Sep-2017

Compiler Version Notes (Continued)

```plaintext
CC  511.povray_r(base) 526.blender_r(base)

icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

```plaintext
FC  507.cactuBSSN_r(base)

icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

```plaintext
FC  503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)

ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

```plaintext
CC  521.wrf_r(base) 527.cam4_r(base)

ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

Base Compiler Invocation

C benchmarks:
iccc

C++ benchmarks:
icpc

(Continued on next page)
SPEC CPU2017 Floating Point Rate Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL360 Gen10
(2.60 GHz, Intel Xeon Silver 4112)

| SPECrate2017_fp_base = 51.8 |
| SPECrate2017_fp_peak = Not Run |

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

Test Date: Oct-2017
Hardware Availability: Oct-2017
Software Availability: Sep-2017

Base Compiler Invocation (Continued)

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using both C and C++:
icpc icc

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

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.ibm_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=3

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte

(Continued on next page)
## Base Optimization Flags (Continued)

Benchmarks using both Fortran and C:
- `-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only`
- `-qopt-mem-layout-trans=3 -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=3`

Benchmarks using Fortran, C, and C++:
- `-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only`
- `-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte`

### Base Other Flags

C benchmarks:
- `-m64 -std=c11`

C++ benchmarks:
- `-m64`

Fortran benchmarks:
- `-m64`

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

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

Benchmarks using Fortran, C, and C++:
- `-m64 -std=c11`

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-SXK-revD.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-SXK-revD.xml
<table>
<thead>
<tr>
<th>SPEC CPU2017 Floating Point Rate Result</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SPECrate2017 fp_base = 51.8</strong></td>
</tr>
<tr>
<td><strong>SPECrate2017 fp_peak = Not Run</strong></td>
</tr>
</tbody>
</table>

Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL360 Gen10  
(2.60 GHz, Intel Xeon Silver 4112)

<table>
<thead>
<tr>
<th>SPEC CPU2017 License: 3</th>
<th>Test Date: Oct-2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor: HPE</td>
<td>Hardware Availability: Oct-2017</td>
</tr>
<tr>
<td>Tested by: HPE</td>
<td>Software Availability: Sep-2017</td>
</tr>
</tbody>
</table>

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU2017 v1.0.2 on 2017-10-23 20:49:08-0400.  
Originally published on 2017-11-14.