## SPEC® CPU2017 Floating Point Rate Result

**Hewlett Packard Enterprise**
(2.10 GHz, Intel Xeon Silver 4110)  

**SPECrate2017_fp_base = 71.8**

**SPECrate2017_fp_peak = Not Run**

### Hardware

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name</td>
<td>Intel Xeon Silver 4110</td>
</tr>
<tr>
<td>Max MHz.</td>
<td>3000</td>
</tr>
<tr>
<td>Nominal</td>
<td>2100</td>
</tr>
<tr>
<td>Enabled</td>
<td>16 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td>Orderable</td>
<td>1, 2 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>11 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
<tr>
<td>Memory</td>
<td>192 GB (12 x 16 GB 2Rx8 PC4-2666V-R, running at 2400)</td>
</tr>
<tr>
<td>Storage</td>
<td>1 x 480 GB SATA SSD, RAID 0</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS</td>
<td>SUSE Linux Enterprise Server 12 (x86_64) SP3</td>
</tr>
<tr>
<td>Compiler</td>
<td>C/C++: Version 18.0.0.128 of Intel C/C++</td>
</tr>
<tr>
<td>Compiler for Linux</td>
<td></td>
</tr>
<tr>
<td>Fortran:</td>
<td>Version 18.0.0.128 of Intel Fortran</td>
</tr>
<tr>
<td>Parallel</td>
<td>No</td>
</tr>
<tr>
<td>Firmware</td>
<td>HPE BIOS Version I41 11/14/2017 released Nov-2017</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>None</td>
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</table>

---

**SPEC License:** 3  
**Test Sponsor:** HPE  
**Hardware Availability:** Sep-2017  
**Software Availability:** Sep-2017  
**Test Date:** Dec-2017  
**Tested by:** HPE  
**Software:** SUSE Linux Enterprise Server 12 (x86_64) SP3  
**Compiler:** C/C++: Version 18.0.0.128 of Intel C/C++  
**Parallel:** No  
**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 BL460c Gen10
(2.10 GHz, Intel Xeon Silver 4110)

SPECrate2017_fp_base = 71.8
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>32</td>
<td>1575</td>
<td>204</td>
<td>1574</td>
<td>204</td>
<td>1575</td>
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<tr>
<td>507.cactuBSSN_r</td>
<td>32</td>
<td>609</td>
<td>66.5</td>
<td>611</td>
<td>66.3</td>
<td>610</td>
<td>66.4</td>
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<tr>
<td>508.namd_r</td>
<td>32</td>
<td>548</td>
<td>55.4</td>
<td>548</td>
<td>55.5</td>
<td>548</td>
<td>55.5</td>
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<tr>
<td>510.parest_r</td>
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<td>47.5</td>
<td>1768</td>
<td>47.3</td>
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<tr>
<td>511.povray_r</td>
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<td>830</td>
<td>90.0</td>
<td>828</td>
<td>90.2</td>
<td>830</td>
<td>90.0</td>
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<td>519.lbm_r</td>
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<td>526.blender_r</td>
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<tr>
<td>527.cam4_r</td>
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<td>866</td>
<td>64.7</td>
<td>865</td>
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<td>544.nab_r</td>
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<td>549.fotonik3d_r</td>
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<tr>
<td>554.roms_r</td>
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<td>36.9</td>
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<td>36.9</td>
<td>1377</td>
<td>36.9</td>
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</tr>
</tbody>
</table>

SPECrate2017_fp_base = 71.8
SPECrate2017_fp_peak = Not Run

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 runcpu <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/jes5.0.1-32:/home/cpu2017/jes5.0.1-64"
Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM

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

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant BL460c Gen10
(2.10 GHz, Intel Xeon Silver 4110)

SPECrate2017_fp_base = 71.8
SPECrate2017_fp_peak = Not Run

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

General Notes (Continued)

memory using Redhat Enterprise Linux 7.4

No: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
No: 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.
No: 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.

This benchmark result is intended to provide perspective on past performance using the historical hardware and/or software described on this result page.

The system as described on this result page was formerly generally available. At the time of this publication, it may not be shipping, and/or may not be supported, and/or may fail to meet other tests of General Availability described in the SPEC OSG Policy document, http://wwww.spec.org/osg/policy.htm.

This measured result may not be representative of the result that would be measured were this benchmark run with hardware and software available as of the publication date.

Platform Notes

BIOS Configuration:
Thermal Configuration set to Maximum Cooling
Memory Patrol Scrubbing set to Disabled
LLC Prefetch set to Enabled
LLC Dead Line Allocation set to Disabled
Workload Profile set to General Throughput Compute
Minimum Processor Idle Power Core C-State set to C1E State
Workload Profile set to Custom
Sub-NUMA Clustering set to Disabled
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on bl460c107 Sat Dec 16 01:51:08 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 4110 CPU @ 2.10GHz
2 "physical id"s (chips)

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant BL460c Gen10
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| SPECrate2017_fp_base = | 71.8 |
| SPECrate2017_fp_peak = | Not Run |

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

32 "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 : 8
siblings : 16
physical 0: cores 0 1 2 3 4 5 6 7
physical 1: cores 0 1 2 3 4 5 6 7

From lscpu:
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                32
On-line CPU(s) list:   0-31
Thread(s) per core:    2
Core(s) per socket:    8
Socket(s):             2
NUMA node(s):          2
Vendor ID:             GenuineIntel
CPU family:            6
Model:                 85
Model name:            Intel(R) Xeon(R) Silver 4110 CPU @ 2.10GHz
Stepping:              4
CPU MHz:               2095.099
BogoMIPS:              4190.19
Virtualization:        VT-x
L1d cache:             32K
L1i cache:             32K
L2 cache:              1024K
L3 cache:              11264K
NUMA node0 CPU(s):     0-7,16-23
NUMA node1 CPU(s):     8-15,24-31
Flags:                 fp wakeup 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 rdscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc
aperfmperf 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 3nowprefetch ida arat epb pni dtc malleable intel_pt
tpr_shadow vmbwed flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2
erms invpcid ltd cmqm mpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd
avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc pku ospk

/platform/cpusinfo cache data
cache size : 11264 KB

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

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

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ProLiant BL460c Gen10
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Platform Notes (Continued)

available: 2 nodes (0-1)
node 0 cpus: 0 1 2 3 4 5 6 7 16 17 18 19 20 21 22 23
node 0 size: 96350 MB
node 0 free: 95954 MB
node 1 cpus: 8 9 10 11 12 13 14 15 24 25 26 27 28 29 30 31
node 1 size: 96765 MB
node 1 free: 96394 MB
node distances:
  node  0   1
 0:  10  21
 1:  21  10

From /proc/meminfo
  MemTotal:       197750024 kB
  HugePages_Total:       0
  Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
  SuSE-release:
    SUSE Linux Enterprise Server 12 (x86_64)
    VERSION = 12
    PATCHLEVEL = 3
    # 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.
  os-release:
    NAME="SLES"
    VERSION="12-SP3"
    VERSION_ID="12.3"
    PRETTY_NAME="SUSE Linux Enterprise Server 12 SP3"
    ID="sles"
    ANSI_COLOR="0;32"
    CPE_NAME="cpe:/o:suse:sles:12:sp3"

  uname -a:
    Linux bl460c107 4.4.73-5-default #1 SMP Tue Jul 4 15:33:39 UTC 2017 (b7ce4e4) x86_64
    x86_64 x86_64 GNU/Linux

  run-level 3 Dec 16 01:50

  SPEC is set to: /home/cpu2017
  Filesystem     Type Size Used Avail Use% Mounted on
  /dev/sda4      xfs  300G 140G 161G 47% /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.

(Continued on next page)
Hewlett Packard Enterprise  
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ProLiant BL460c Gen10  
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**SPEC CPU2017 Floating Point Rate Result**

**SPECrate2017_fp_base** = 71.8  
**SPECrate2017_fp_peak** = Not Run  

**Platform Notes (Continued)**

BIOS HPE I41 11/14/2017  
Memory:  
4x UNKNOWN NOT AVAILABLE  
12x UNKNOWN NOT AVAILABLE 16 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.

CC  511.povray_r(base) 526.blender_r(base)
      icc (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.

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.

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

(Continued on next page)
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<thead>
<tr>
<th>CPU2017 License: 3</th>
<th>Test Date: Dec-2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor: HPE</td>
<td>Hardware Availability: Nov-2017</td>
</tr>
<tr>
<td>Tested by: HPE</td>
<td>Software Availability: Sep-2017</td>
</tr>
</tbody>
</table>

Compiler Version Notes (Continued)

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

==============================================================================
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:
icc

C++ benchmarks:
icpc

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.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsinged-char

(Continued on next page)
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Base Portability Flags (Continued)

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

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

(Continued on next page)
Hewlett Packard Enterprise
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Test Sponsor: HPE
Test Date: Dec-2017

Tested by: HPE
Hardware Availability: Nov-2017
Software Availability: Sep-2017

Base Other Flags (Continued)

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-SKX-revG.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-revG.xml

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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 2017-12-16 01:51:07-0500.
Report generated on 2018-10-31 18:08:54 by CPU2017 PDF formatter v6067.