Hewlett Packard Enterprise
(Test Sponsor: HPE)
Synergy 480 Gen10
(2.20 GHz, Intel Xeon Silver 4210)

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

<table>
<thead>
<tr>
<th>Software</th>
<th>SPECspeed2017_fp_base = 82.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_fp_peak = Not Run</td>
<td></td>
</tr>
</tbody>
</table>

| Test Date: | Jul-2019 |
| Hardware Availability: | Apr-2019 |
| Software Availability: | Feb-2019 |

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_fp_base (82.2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>20</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>20</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>20</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>20</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>20</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>20</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>20</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>20</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>20</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name:</td>
<td>Intel Xeon Silver 4210</td>
</tr>
<tr>
<td>OS:</td>
<td>SUSE Linux Enterprise Server 15 (x86_64)</td>
</tr>
<tr>
<td>Max MHz.:</td>
<td>3200</td>
</tr>
<tr>
<td>Kernel 4.12.14-23-default</td>
<td></td>
</tr>
<tr>
<td>Nominal:</td>
<td>2200</td>
</tr>
<tr>
<td>Compiler:</td>
<td>C/C++: Version 19.0.2.187 of Intel C/C++ Compiler Build 20190117 for Linux;</td>
</tr>
<tr>
<td>Enabled:</td>
<td>20 cores, 2 chips</td>
</tr>
<tr>
<td>Fortran:</td>
<td>Version 19.0.2.187 of Intel Fortran Compiler Build 20190117 for Linux;</td>
</tr>
<tr>
<td>Orderable:</td>
<td>1, 2 chip(s)</td>
</tr>
<tr>
<td>Parallel:</td>
<td>Yes</td>
</tr>
<tr>
<td>Cache L1:</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>Firmware:</td>
<td>HPE BIOS Version I42 05/22/2019 released May-2019</td>
</tr>
<tr>
<td>L2:</td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td>File System:</td>
<td>btrfs</td>
</tr>
<tr>
<td>L3:</td>
<td>13.75 MB I+D on chip per chip</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>384 GB (24 x 16 GB 2Rx8 PC4-2933Y-R, running at 2400)</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Storage:</td>
<td>1 x 400 GB SAS SSD, RAID 0</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
</tbody>
</table>
## SPEC CPU2017 Floating Point Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
Synergy 480 Gen10
(2.20 GHz, Intel Xeon Silver 4210)

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

**SPECspeed2017_fp_base** = 82.2

**SPECspeed2017_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>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>20</td>
<td>176</td>
<td>336</td>
<td>175</td>
<td>337</td>
<td>176</td>
<td>336</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>20</td>
<td>192</td>
<td>87.0</td>
<td>187</td>
<td>89.3</td>
<td>187</td>
<td>89.2</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>20</td>
<td>74.4</td>
<td>70.4</td>
<td>74.4</td>
<td>68.9</td>
<td>74.7</td>
<td>70.2</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>20</td>
<td>177</td>
<td>74.7</td>
<td>174</td>
<td>75.9</td>
<td>177</td>
<td>74.8</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>20</td>
<td>167</td>
<td>53.0</td>
<td>167</td>
<td>53.0</td>
<td>167</td>
<td>53.0</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>20</td>
<td>213</td>
<td>55.7</td>
<td>215</td>
<td>55.3</td>
<td>212</td>
<td>56.0</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>20</td>
<td>243</td>
<td>59.3</td>
<td>243</td>
<td>59.3</td>
<td>243</td>
<td>59.3</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>20</td>
<td>159</td>
<td>110</td>
<td>159</td>
<td>110</td>
<td>159</td>
<td>110</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>20</td>
<td>143</td>
<td>63.6</td>
<td>143</td>
<td>63.6</td>
<td>142</td>
<td>64.2</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>20</td>
<td>215</td>
<td>73.1</td>
<td>215</td>
<td>73.3</td>
<td>215</td>
<td>73.2</td>
</tr>
</tbody>
</table>

**SPECspeed2017_fp_base** = 82.2

**SPECspeed2017_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=core,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)
SPEC CPU2017 Floating Point Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
Synergy 480 Gen10
(2.20 GHz, Intel Xeon Silver 4210)

SPECspeed2017_fp_base = 82.2
SPECspeed2017_fp_peak = Not Run

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

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
Intel UPI Link Power Management set to Enabled
Sysinfo program /home/cpu2017_u2/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcd8f2999c33d61f64985e45859ea9
running on sy480g10-2 Mon Jul 8 16:00:29 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) Silver 4210 CPU @ 2.20GHz
  2 "physical id"s (chips)
  20 "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 : 10
siblings : 10
physical 0: cores 0 1 2 3 4 8 9 10 11 12
physical 1: cores 0 1 2 3 4 8 9 10 11 12

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 20
On-line CPU(s) list: 0-19
Thread(s) per core: 1
Core(s) per socket: 10
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4210 CPU @ 2.20GHz
Stepping: 6
CPU MHz: 2200.000
BogoMIPS: 4400.00
Virtualization: VT-x
L1d cache: 32K
<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>82.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

**Platform Notes (Continued)**

- L1i cache: 32K
- L2 cache: 1024K
- L3 cache: 14080K
- NUMA node0 CPU(s): 0-9
- NUMA node1 CPU(s): 10-19
- Flags: fpu vme 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 rdtscp lm constant_tsc art 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 xtpr pdcm pcd pse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault epb cat_l3 cd813 invpcid_single intel_pinn mba tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ibrms invpcid rtm cqm mpx rdts a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local ibpb ibrs stibp dtherm ida arat pln pts pku ospke avx512_vnni arch_capabilities ssbd

From `/proc/cpuinfo`

- cache size: 14080 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 4 5 6 7 8 9
- node 0 size: 193048 MB
- node 0 free: 192478 MB
- node 1 cpus: 10 11 12 13 14 15 16 17 18 19
- node 1 size: 193307 MB
- node 1 free: 193107 MB
- node distances:
- node 0 1
  - 0: 10 21
  - 1: 21 10

From `/proc/meminfo`

- MemTotal: 395628828 KB
- HugePages_Total: 0
- Hugepagesize: 2048 KB

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

- os-release:
  - NAME="SLES"
  - VERSION="15"
  - VERSION_ID="15"
  - PRETTY_NAME="SUSE Linux Enterprise Server 15"
  - ID="sles"
  - ID_LIKE="suse"

(Continued on next page)
Hewlett Packard Enterprise

Synergy 480 Gen10

(2.20 GHz, Intel Xeon Silver 4210)

SPEC CPU2017 Floating Point Speed Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

SPECspeed2017_fp_base = 82.2
SPECspeed2017_fp_peak = Not Run

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

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

Platform Notes (Continued)

ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15"

uname -a:
Linux sy480g10-2 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

run-level 3 Jul 8 15:58

SPEC is set to: /home/cpu2017_u2

Filesystem Type Size Used Avail Use% Mounted on
/dev/sdb2 btrfs 371G 93G 277G 26% /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 142 05/22/2019
Memory: 24x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2933, configured at 2400

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
CC  619.lbm_s(base) 638.imagick_s(base) 644.nab_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.
==============================================================================

==============================================================================
FC  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.
(Continued on next page)
Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
Synergy 480 Gen10  
(2.20 GHz, Intel Xeon Silver 4210)  

SPECspeed2017_fp_base = 82.2  
SPECspeed2017_fp_peak = Not Run

Compiler Version Notes (Continued)

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.

---

Compiler Version Notes (Continued)

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.

---

Compiler Version Notes (Continued)

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.

---

Compiler Version Notes (Continued)

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

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
## SPEC CPU2017 Floating Point Speed Result

### Hewlett Packard Enterprise

- **(Test Sponsor: HPE)**
- **Synergy 480 Gen10**
  - **(2.20 GHz, Intel Xeon Silver 4210)**

<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>
<tr>
<td>SPECspeed2017_fp_base</td>
<td>82.2</td>
</tr>
<tr>
<td>SPECspeed2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

**Test Sponsor:** HPE  
**Hardware Availability:** Apr-2019  
**Software Availability:** Feb-2019

### Base Portability Flags

- `603.bwaves_s: -DSPEC_LP64`
- `607.cactuBSSN_s: -DSPEC_LP64`
- `619.hm9_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`

**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)
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Hewlett Packard Enterprise (Test Sponsor: HPE)</td>
<td>SPECspeed2017_fp_base = 82.2</td>
<td>SPECspeed2017_fp_peak = Not Run</td>
</tr>
<tr>
<td>Synergy 480 Gen10 (2.20 GHz, Intel Xeon Silver 4210)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

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-Platform-Flags-Intel-V1.2-CLX-revB.xml

SPEC is a registered trademark 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 CPU2017 v1.0.5 on 2019-07-08 17:00:29-0400.  
Report generated on 2019-08-06 17:59:41 by CPU2017 PDF formatter v6067.  
Originally published on 2019-08-06.