## SPEC® CPU2017 Floating Point Speed Result

**Hewlett Packard Enterprise**

*Test Sponsor: HPE*

**Synergy 480 Gen10 (2.20 GHz, Intel Xeon Silver 4114)*

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### Software

<table>
<thead>
<tr>
<th>OS:</th>
<th>Red Hat Enterprise Linux Server release 7.3 (Maipo)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler:</td>
<td>C/C++: Version 18.0.0.128 of Intel C/C++</td>
</tr>
<tr>
<td>Fortran:</td>
<td>Version 18.0.0.128 of Intel Fortran Compiler for Linux</td>
</tr>
<tr>
<td>Parallel:</td>
<td>Yes</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>
</tr>
</tbody>
</table>

### Hardware

| CPU Name: | Intel Xeon Silver 4114 |
| Max MHz.: | 3000 |
| Nominal: | 2200 |
| Enabled: | 20 cores, 2 chips |
| 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: | 13.75 MB I+D on chip per chip |
| Other: | None |
| Memory: | 384 GB (24 x 16 GB 2Rx8 PC4-2666V-R, running at 2400) |
| Storage: | 1 x 480 GB SATA SSD, RAID 0 |
| Other: | None |

### Performance Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>69.2</td>
<td>Not Run</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>85.5</td>
<td></td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>34.3</td>
<td></td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>51.9</td>
<td></td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>42.2</td>
<td></td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>52.2</td>
<td></td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>52.8</td>
<td></td>
</tr>
<tr>
<td>644.nab_s</td>
<td>93.8</td>
<td></td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>66.4</td>
<td></td>
</tr>
<tr>
<td>654.roms_s</td>
<td>68.3</td>
<td></td>
</tr>
</tbody>
</table>

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**SPECspeed2017_fp_base = 69.2**

**SPECspeed2017_fp_peak = Not Run**
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SPECspeed2017_fp_base = 69.2
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>177</td>
<td>333</td>
<td>178</td>
<td>332</td>
<td></td>
<td></td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>20</td>
<td>195</td>
<td>85.5</td>
<td>195</td>
<td>85.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>20</td>
<td>153</td>
<td>34.2</td>
<td>153</td>
<td>34.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>20</td>
<td>255</td>
<td>51.9</td>
<td>256</td>
<td>51.7</td>
<td>254</td>
<td>52.1</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>20</td>
<td>210</td>
<td>42.1</td>
<td>210</td>
<td>42.2</td>
<td>209</td>
<td>42.4</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>20</td>
<td>227</td>
<td>52.4</td>
<td>228</td>
<td>52.2</td>
<td>228</td>
<td>52.2</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>20</td>
<td>273</td>
<td>52.8</td>
<td>273</td>
<td>52.9</td>
<td>276</td>
<td>52.3</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>20</td>
<td>186</td>
<td>93.8</td>
<td>186</td>
<td>93.8</td>
<td>187</td>
<td>93.2</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>20</td>
<td>138</td>
<td>66.3</td>
<td>137</td>
<td>66.4</td>
<td>137</td>
<td>66.5</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>20</td>
<td>231</td>
<td>68.2</td>
<td>230</td>
<td>68.3</td>
<td>230</td>
<td>68.4</td>
</tr>
</tbody>
</table>

SPECspeed2017_fp_base = 69.2
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
Filesystem page cache cleared with:
  shell invocation of 'sync; echo 3 > /proc/sys/vm/drop_caches' prior to run
irqbalance disabled with "systemctl stop irqbalance"
tuned profile set wth "tuned-adm profile throughput-performance"

General Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=core,compact"
LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32:/home/cpu2017/je5.0.1-64"
OMP_STACKSIZE = "192M"

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:
Intel Hyperthreading set to Disabled
Thermal Configuration set to Maximum Cooling
LLC Prefetch set to Enabled
LLC Dead Line Allocation set to Disabled
Memory Patrol Scrubbing set to Disabled
Workload Profile set to General Peak Frequency Compute
Energy/Performance Bias set to Maximum Performance

(Continued on next page)
Platform Notes (Continued)

Workload Profile set to Custom
NUMA Group Size Optimization set to Flat
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618b0c091c0f
running on localhost.localdomain Wed Nov 22 18:19:00 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 4114 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 4114 CPU @ 2.20GHz
Stepping: 4
CPU MHz: 2200.000
BogoMIPS: 4405.33
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 14080K
NUMA node0 CPU(s): 0-9
NUMA node1 CPU(s): 10-19

/proc/cpuinfo cache data

(Continued on next page)
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SPECspeed2017_fp_base = 69.2
SPECspeed2017_fp_peak = Not Run

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

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

Platform Notes (Continued)

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: 196268 MB
node 0 free: 191540 MB
node 1 cpus: 10 11 12 13 14 15 16 17 18 19
node 1 size: 196607 MB
node 1 free: 192126 MB
node distances:
node 0 1
0: 10 21
1: 21 10

From /proc/meminfo
MemTotal: 395931984 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

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

os-release:
NAME="Red Hat Enterprise Linux Server"
VERSION="7.3 (Maipo)"
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="7.3"
PRETTY_NAME="Red Hat Enterprise Linux Server 7.3 (Maipo)"
ANSI_COLOR="0;31"
CPE_NAME="cpe:/o:redhat:enterprise_linux:7.3:GA:server"
redhat-release: Red Hat Enterprise Linux Server release 7.3 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.3 (Maipo)

uname -a:
Linux localhost.localdomain 3.10.0-514.el7.x86_64 #1 SMP Wed Oct 19 11:24:13 EDT 2016
x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Nov 22 18:15

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/mapper/rhel-home</td>
<td>xfs</td>
<td>392G</td>
<td>34G</td>
<td>359G</td>
<td>9%</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
Platform Notes (Continued)

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 I42 09/27/2017
  Memory:
  24x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666, 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)
 CC  619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)
 CC  619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)
==============================================================================
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

==============================================================================
 FC  607.cactuBSSN_s(base)
 FC  607.cactuBSSN_s(base)
 FC  607.cactuBSSN_s(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.

==============================================================================
 PC  603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
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- **CPU2017 License:** 3  
- **Test Sponsor:** HPE  
- **Tested by:** HPE

### Base Compiler Invocation

C benchmarks:  
**icc**

Fortran benchmarks:  
**ifort**

Benchmarks using both Fortran and C:  
**ifort icc**

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

### 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  
- **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-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP

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

(Continued on next page)
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Test Date: Nov-2017
Hardware Availability: Oct-2017
Software Availability: Sep-2017

Base Optimization Flags (Continued)

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

Base Other Flags

C benchmarks:
-m64 -std=c11

Fortran benchmarks:
-m64

Benchmarks using both Fortran 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-SKK-revH.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-SKK-revH.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 2017-11-22 07:48:59-0500.