## SPEC® CPU2017 Floating Point Speed Result

**Test Sponsor:** HPE  
**Hardware Availability:** Oct-2017  
**Software Availability:** Sep-2017  
**Test Date:** Nov-2017

### Hardware

- **CPU Name:** Intel Xeon Gold 6146  
- **Max MHz.:** 4200  
- **Nominal:** 3200  
- **Enabled:** 24 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:** 24.75 MB I+D on chip per chip  
- **Memory:** 192 GB (24 x 8 GB 2Rx8 PC4-2666V-R)  
- **Storage:** 1 x 480 GB SATA SSD, RAID 0  
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux Server release 7.3 (Maipo)  
- **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:** Yes  
- **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

### Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>24</td>
<td>128</td>
<td>Not Run</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>24</td>
<td>43.6</td>
<td>Not Run</td>
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<tr>
<td>619.lbm_s</td>
<td>24</td>
<td>81.9</td>
<td>Not Run</td>
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<tr>
<td>621.wrf_s</td>
<td>24</td>
<td>72.6</td>
<td>Not Run</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>24</td>
<td>66.6</td>
<td>Not Run</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>24</td>
<td>91.2</td>
<td>Not Run</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>24</td>
<td>170</td>
<td>Not Run</td>
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<tr>
<td>644.nab_s</td>
<td>24</td>
<td>84.7</td>
<td>Not Run</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>24</td>
<td>114</td>
<td>Not Run</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>24</td>
<td></td>
<td>Not Run</td>
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</tbody>
</table>
SPEC CPU2017 Floating Point Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL360 Gen10
(3.20 GHz, Intel Xeon Gold 6146)

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

SPECspeed2017_fp_base = 105
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>
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<tbody>
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<td>72.5</td>
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<td>628.pop2_s</td>
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<td>179</td>
<td>66.4</td>
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<td>66.6</td>
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<td>67.1</td>
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<tr>
<td>638.imagick_s</td>
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<td>154</td>
<td>93.9</td>
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<td>91.2</td>
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<td>170</td>
<td>103</td>
<td>169</td>
<td>103</td>
<td>170</td>
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<tr>
<td>649.fotonik3d_s</td>
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<td>84.7</td>
<td>108</td>
<td>84.7</td>
<td>108</td>
<td>84.0</td>
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<td>24</td>
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<td>114</td>
</tr>
</tbody>
</table>

SPECspeed2017_fp_base = 105
SPECspeed2017_fp_peak = Not Run

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 with "tuned-adm profile throughput-performance"

General Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/specuser/cpu2017/lib/ia32:/home/specuser/cpu2017/lib/intel64"
LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/home/specuser/cpu2017/je5.0.1-32:/home/specuser/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

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SPEC CPU2017 Floating Point Speed Result
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Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL360 Gen10
(3.20 GHz, Intel Xeon Gold 6146)

| SPECspeed2017_fp_base | 105 |
| SPECspeed2017_fp_peak | Not Run |

CPU2017 License: 3
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**Platform Notes (Continued)**

Energy/Performance Bias set to Maximum Performance
Workload Profile set to Custom
NUMA Group Size Optimization set to Flat
Sysinfo program /home/specuser/cpu2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618b091c0f
running on dl360Gen10rhel73Unit2 Sun Nov 12 02:48:35 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) Gold 6146 CPU @ 3.20GHz
  2  "physical id"s (chips)
  24 "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 : 12
    siblings : 12
    physical 0: cores 0 1 2 3 4 8 9 11 17 18 19 20
    physical 1: cores 0 1 2 3 8 9 10 11 18 19 24 27

From lscpu:
- Architecture:          x86_64
- CPU op-mode(s):        32-bit, 64-bit
- Byte Order:            Little Endian
- CPU(s):                24
- On-line CPU(s) list:   0-23
- Thread(s) per core:    1
- Core(s) per socket:    12
- Socket(s):             2
- NUMA node(s):          2
- Vendor ID:             GenuineIntel
- CPU family:            6
- Model:                 85
- Model name:            Intel(R) Xeon(R) Gold 6146 CPU @ 3.20GHz
- Stepping:              4
- CPU MHz:               3200.000
- BogoMIPS:              6406.24
- Virtualization:       VT-x
- L1d cache:             32K
- L1i cache:             32K
- L2 cache:              1024K
- L3 cache:              25344K
- NUMA node0 CPU(s):    0-11
- NUMA node1 CPU(s):    12-23

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

Platform Notes (Continued)

> /proc/cpuinfo cache data
  > cache size : 25344 KB

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

From /proc/meminfo
  MemTotal: 197573264 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
  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 dl360Gen10rhel73Unit2 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 11 22:49

SPEC is set to: /home/specuser/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>36G</td>
<td>357G</td>
<td>10%</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

(End of data from sysinfo program)
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### Compiler Version Notes

```
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)
------------------------------------------------------------------------------
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  603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
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ifort (IFORT) 18.0.0 20170811
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CC  621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(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

Fortran benchmarks:
- ifort

Benchmarks using both Fortran and C:
- ifort icc

(Continued on next page)
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Base Compiler Invocation (Continued)

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

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
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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-SKX-revF.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-revF.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 2017-11-12 03:48:35-0500.
Originally published on 2017-11-29.