# SPEC® CPU2017 Floating Point Speed Result

**Hewlett Packard Enterprise**

**Test Sponsor:** HPE  
**ProLiant BL460c Gen10**  
**CPU2017 License:** 3  
**Test Date:** Dec-2017  
**Hardware Availability:** Oct-2017  
**Tested by:** HPE  
**Software Availability:** Sep-2017

| SPECspeed2017_fp_base = | 53.8 |
| SPECspeed2017_fp_peak = | Not Run |

## Hardware

<table>
<thead>
<tr>
<th>Task</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name</td>
<td>Intel Xeon Gold 5122</td>
</tr>
<tr>
<td>Max MHz.</td>
<td>3700</td>
</tr>
<tr>
<td>Nominal</td>
<td>3600</td>
</tr>
<tr>
<td>Enabled</td>
<td>8 cores, 2 chips</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>16.5 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)</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>
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</thead>
<tbody>
<tr>
<td>OS:</td>
<td>Red Hat Enterprise Linux Server release 7.3 (Maipo)</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>Compiler for Linux:</td>
<td>Fortran: Version 18.0.0.128 of Intel Fortran</td>
</tr>
<tr>
<td>Firmware:</td>
<td>HPE BIOS Version I41 released Oct-2017 (tested with I41 09/29/2017)</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>
</tr>
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SPEC CPU2017 Floating Point Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant BL460c Gen10
(3.60 GHz, Intel Xeon Gold 5122)

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

SPECspeed2017_fp_base = 53.8
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>8</td>
<td>201</td>
<td>294</td>
<td>201</td>
<td>294</td>
<td>201</td>
<td>294</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>8</td>
<td>307</td>
<td>54.3</td>
<td>308</td>
<td>54.2</td>
<td>308</td>
<td>54.2</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>8</td>
<td>163</td>
<td>32.1</td>
<td>163</td>
<td>32.2</td>
<td>162</td>
<td>32.3</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>8</td>
<td>275</td>
<td>48.0</td>
<td>277</td>
<td>47.7</td>
<td>279</td>
<td>47.4</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>8</td>
<td>293</td>
<td>30.3</td>
<td>291</td>
<td>30.4</td>
<td>292</td>
<td>30.3</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>8</td>
<td>268</td>
<td>44.3</td>
<td>268</td>
<td>44.4</td>
<td>267</td>
<td>44.5</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>8</td>
<td>437</td>
<td>33.0</td>
<td>437</td>
<td>33.0</td>
<td>438</td>
<td>32.9</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>8</td>
<td>306</td>
<td>57.1</td>
<td>308</td>
<td>56.6</td>
<td>307</td>
<td>57.0</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>8</td>
<td>151</td>
<td>60.5</td>
<td>152</td>
<td>59.9</td>
<td>151</td>
<td>60.2</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>8</td>
<td>286</td>
<td>55.0</td>
<td>287</td>
<td>54.8</td>
<td>288</td>
<td>54.6</td>
</tr>
</tbody>
</table>

SPECspeed2017_fp_base = 53.8
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 with "tuned-adm profile throughput-performance"

General Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,scatter"
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)
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Platform Notes (Continued)

Workload Profile set to Custom
NUMA Group Size Optimization set to Flat
Sysinfo program /root/cpu2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bce091c0f
running on localhost.localdomain Fri Dec 8 18:48:36 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 5122 CPU @ 3.60GHz
2  "physical id"s (chips)
8 "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 : 4
physical 0: cores 1 5 9 13
physical 1: cores 1 2 5 11

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 8
On-line CPU(s) list: 0-7
Thread(s) per core: 1
Core(s) per socket: 4
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5122 CPU @ 3.60GHz
Stepping: 4
CPU MHz: 3600.000
BogoMIPS: 7207.44
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 16896K
NUMA node0 CPU(s): 0,1
NUMA node1 CPU(s): 2,3
NUMA node2 CPU(s): 4,5
NUMA node3 CPU(s): 6,7

(Continued on next page)
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Platform Notes (Continued)

/proc/cpuinfo cache data
  cache size : 16896 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
  physical chip.
  available: 4 nodes (0-3)
  node 0 cpus: 0 1
  node 0 size: 48684 MB
  node 0 free: 47020 MB
  node 1 cpus: 2 3
  node 1 size: 49152 MB
  node 1 free: 47744 MB
  node 2 cpus: 4 5
  node 2 size: 49152 MB
  node 2 free: 45504 MB
  node 3 cpus: 6 7
  node 3 size: 49152 MB
  node 3 free: 47159 MB
  node distances:
    node 0 1 2 3
      0:  10  21  31  31
      1:  21  10  31  31
      2:  31  31  10  21
      3:  31  31  21  10

From /proc/meminfo
  MemTotal:       197446368 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

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Platform Notes (Continued)

x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Dec 8 15:47

SPEC is set to: /root/cpu2017

Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda4      xfs   442G   30G  413G   7% /

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 I41 09/29/2017
Memory:
  4x UNKNOWN NOT AVAILABLE
  12x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666

(End of data from sysinfo program)

Regarding the sysinfo display about the memory installed, the correct amount of memory is 192 GB and the dmidecode description should have one line reading as:

  12x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666 MHz, configured at 2400 MHz

---

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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### Compiler Version Notes (Continued)

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```plaintext
-- 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 -assume byterecl
- 627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
- 628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
- 638.imagick_s: -DSPEC_LP64
- 644.nab_s: -DSPEC_LP64
- 649.fotonik3d_s: -DSPEC_LP64
- 654.roms_s: -DSPEC_LP64
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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

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-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-SKX-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 2017-12-08 19:48:36-0500.  