



# SPEC® CPU2017 Floating Point Speed Result

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**Hewlett Packard Enterprise**

(Test Sponsor: HPE)

**ProLiant DL560 Gen10**

(3.60 GHz, Intel Xeon Platinum 8156)

SPECspeed2017\_fp\_base = 86.7

SPECspeed2017\_fp\_peak = Not Run

CPU2017 License: 3

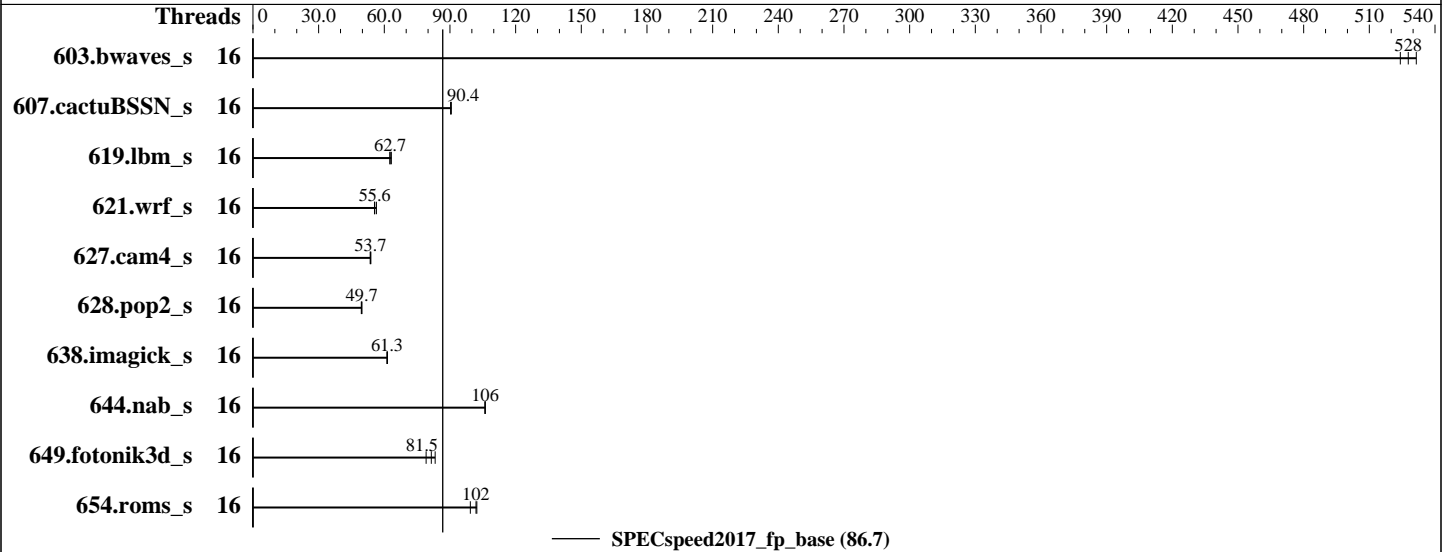
Test Sponsor: HPE

Tested by: HPE

Test Date: Oct-2017

Hardware Availability: Oct-2017

Software Availability: Sep-2017



## Hardware

CPU Name: Intel Xeon Platinum 8156  
 Max MHz.: 3700  
 Nominal: 3600  
 Enabled: 16 cores, 4 chips  
 Orderable: 1, 2, 4 chip(s)  
 Cache L1: 32 KB I + 32 KB D on chip per core  
 L2: 1 MB I+D on chip per core  
 L3: 16.5 MB I+D on chip per chip  
 Other: None  
 Memory: 768 GB (48 x 16 GB 2Rx8 PC4-2666V-R)  
 Storage: 1 x 480 GB SSD SATA, RAID 0  
 Other: None

## Software

OS: Red Hat Enterprise Linux Server release 7.3  
 Kernel 4.4.73-5-default  
 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 U34 released Oct-2017 (tested with U34 9/29/2017)  
 File System: xfs  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: Not Applicable  
 Other: None



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## Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	16	<b><u>112</u></b>	<b><u>528</u></b>	111	531	113	524							
607.cactuBSSN_s	16	<b><u>184</u></b>	<b><u>90.4</u></b>	185	90.3	184	90.6							
619.lbm_s	16	83.8	62.5	82.8	63.2	<b><u>83.5</u></b>	<b><u>62.7</u></b>							
621.wrf_s	16	234	56.4	<b><u>238</u></b>	<b><u>55.6</u></b>	238	55.5							
627.cam4_s	16	165	53.9	<b><u>165</u></b>	<b><u>53.7</u></b>	166	53.5							
628.pop2_s	16	240	49.5	239	49.7	<b><u>239</u></b>	<b><u>49.7</u></b>							
638.imagick_s	16	<b><u>235</u></b>	<b><u>61.3</u></b>	235	61.5	236	61.2							
644.nab_s	16	165	106	<b><u>165</u></b>	<b><u>106</u></b>	165	106							
649.fotonik3d_s	16	115	79.1	110	83.2	<b><u>112</u></b>	<b><u>81.5</u></b>							
654.roms_s	16	154	102	<b><u>155</u></b>	<b><u>102</u></b>	159	99.3							

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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,compact"  
LD\_LIBRARY\_PATH = "/cpu2017/lib/ia32:/cpu2017/lib/intel64:/cpu2017/je5.0.1-32"  
LD\_LIBRARY\_PATH = "\$LD\_LIBRARY\_PATH:/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  
Memory Patrol Scrubbing set to Disabled  
LLC Prefetcher set to Enabled  
LLC Dead Line Allocation set to Disabled  
Stale A to S set to Enabled

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## Platform Notes (Continued)

Workload Pofile set to General Peak Frequency Compute  
Energy/Performance Bias set to Maximum Performance  
Uncore Frequency Scaling set to Auto  
Workload Pofile set to General Peak Frequency Compute  
NUMA Group Size Optimization set to Flat

Sysinfo program /cpu2017/bin/sysinfo

Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f

running on DL560-Gen10 Thu Oct 19 18:12:00 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) Platinum 8156 CPU @ 3.60GHz

4 "physical id"s (chips)

16 "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

physical 2: cores 1 2 5 11

physical 3: cores 1 5 9 13

From lscpu:

Architecture: x86\_64

CPU op-mode(s): 32-bit, 64-bit

Byte Order: Little Endian

CPU(s): 16

On-line CPU(s) list: 0-15

Thread(s) per core: 1

Core(s) per socket: 4

Socket(s): 4

NUMA node(s): 4

Vendor ID: GenuineIntel

CPU family: 6

Model: 85

Model name: Intel(R) Xeon(R) Platinum 8156 CPU @ 3.60GHz

Stepping: 4

CPU MHz: 3600.000

BogoMIPS: 7207.41

Virtualization: VT-x

L1d cache: 32K

L1i cache: 32K

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## Platform Notes (Continued)

L2 cache: 1024K  
L3 cache: 16896K  
NUMA node0 CPU(s): 0-3  
NUMA node1 CPU(s): 4-7  
NUMA node2 CPU(s): 8-11  
NUMA node3 CPU(s): 12-15

```
/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 2 3
node 0 size: 196267 MB
node 0 free: 190893 MB
node 1 cpus: 4 5 6 7
node 1 size: 196608 MB
node 1 free: 192038 MB
node 2 cpus: 8 9 10 11
node 2 size: 196608 MB
node 2 free: 191681 MB
node 3 cpus: 12 13 14 15
node 3 size: 196607 MB
node 3 free: 189816 MB
node distances:
node  0  1  2  3
 0:  10  21  21  21
 1:  21  10  21  21
 2:  21  21  10  21
 3:  21  21  21  10
```

```
From /proc/meminfo
MemTotal: 792080148 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"
```

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## Platform Notes (Continued)

```
redhat-release: Red Hat Enterprise Linux Server release 7.3 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.3 (Maipo)
system-release-cpe: cpe:/o:redhat:enterprise_linux:7.3:ga:server
```

uname -a:

```
Linux DL560-Gen10 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 Oct 19 15:24

SPEC is set to: /cpu2017

```
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sdb1       xfs   447G   28G  419G   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 U34 09/29/2017

Memory:

48x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666

(End of data from sysinfo program)

## 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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## Compiler Version Notes (Continued)

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

```
=====
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

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
```



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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/Intel-ic18.0-official-linux64.2017-10-19.html>

<http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-SKX-revD.html>

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-10-19.xml>

<http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-SKX-revD.xml>



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For questions about this result, please contact the tester. For other inquiries, please contact [info@spec.org](mailto:info@spec.org).

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