



# SPEC® CPU2017 Floating Point Speed Result

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## Hewlett Packard Enterprise

(Test Sponsor: HPE)

### ProLiant BL460c Gen10

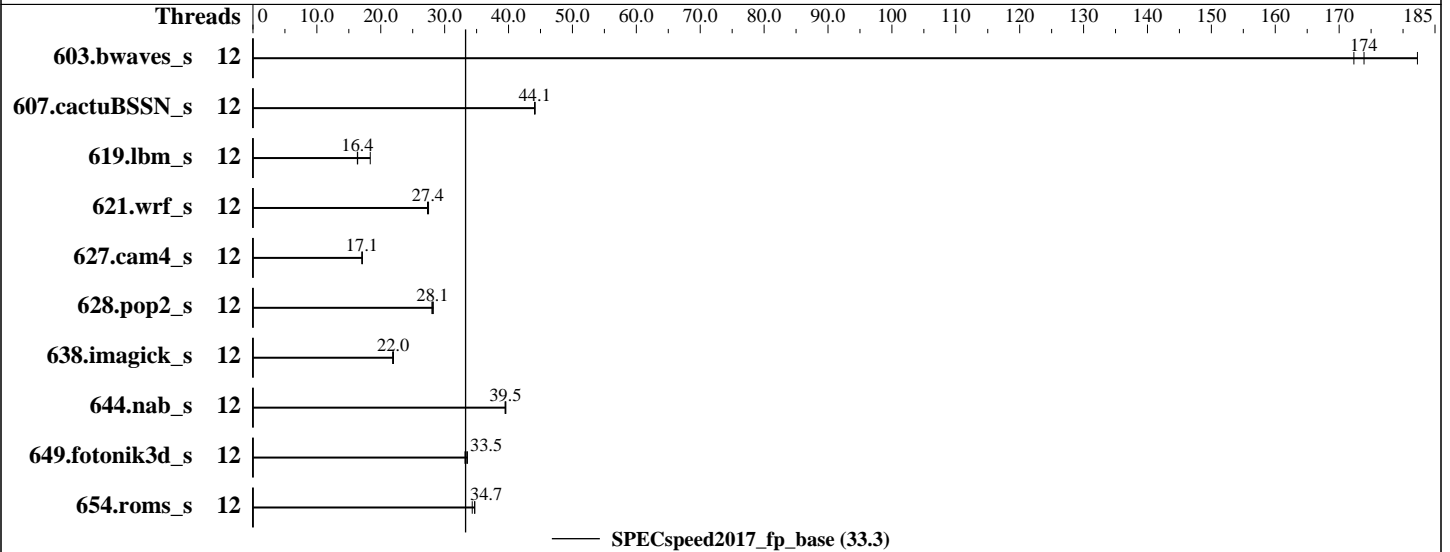
(1.70 GHz, Intel Xeon Bronze 3104)

SPECspeed2017\_fp\_base = 33.3

SPECspeed2017\_fp\_peak = Not Run

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

**Test Date:** Dec-2017  
**Hardware Availability:** Oct-2017  
**Software Availability:** Sep-2017



### Hardware

CPU Name: Intel Xeon Bronze 3104  
Max MHz.: 1700  
Nominal: 1700  
Enabled: 12 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: 8.25 MB I+D on chip per chip  
Other: None  
Memory: 192 GB (12 x 16 GB 2Rx8 PC4-2666V-R, running at 2133)  
Storage: 1 x 480 GB SATA SSD, RAID 0  
Other: None

### Software

OS: Red Hat Enterprise Linux Server release 7.3 (Maipo), Kernel 3.10.0-514.e17.x86\_64  
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 I41 09/29/2017 released Oct-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    | 12      | 324               | 182                | <b><u>339</u></b> | <b><u>174</u></b>  | 342               | 172                |         |         |       |         |       |         |       |
| 607.cactuBSSN_s | 12      | 378               | 44.2               | 378               | 44.1               | <b><u>378</u></b> | <b><u>44.1</u></b> |         |         |       |         |       |         |       |
| 619.lbm_s       | 12      | 285               | 18.4               | 321               | 16.3               | <b><u>320</u></b> | <b><u>16.4</u></b> |         |         |       |         |       |         |       |
| 621.wrf_s       | 12      | <b><u>483</u></b> | <b><u>27.4</u></b> | 481               | 27.5               | 484               | 27.3               |         |         |       |         |       |         |       |
| 627.cam4_s      | 12      | 518               | 17.1               | <b><u>519</u></b> | <b><u>17.1</u></b> | 520               | 17.1               |         |         |       |         |       |         |       |
| 628.pop2_s      | 12      | 421               | 28.2               | <b><u>422</u></b> | <b><u>28.1</u></b> | 424               | 28.0               |         |         |       |         |       |         |       |
| 638.imagick_s   | 12      | 656               | 22.0               | <b><u>657</u></b> | <b><u>22.0</u></b> | 660               | 21.9               |         |         |       |         |       |         |       |
| 644.nab_s       | 12      | 443               | 39.5               | <b><u>442</u></b> | <b><u>39.5</u></b> | 441               | 39.6               |         |         |       |         |       |         |       |
| 649.fotonik3d_s | 12      | 272               | 33.6               | <b><u>272</u></b> | <b><u>33.5</u></b> | 275               | 33.2               |         |         |       |         |       |         |       |
| 654.roms_s      | 12      | 454               | 34.7               | <b><u>454</u></b> | <b><u>34.7</u></b> | 459               | 34.3               |         |         |       |         |       |         |       |

SPECspeed2017\_fp\_base = 33.3

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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 service stopped using "systemctl stop irqbalance.service"  
Used throughput-performance profile for tuned-adm: "tuned-adm profile throughput-performance profile"

## General Notes

Environment variables set by runcpu before the start of the run:  
KMP\_AFFINITY = "granularity=fine,compact"  
LD\_LIBRARY\_PATH = "/root/cpu2017/lib/ia32:/root/cpu2017/lib/intel64:/root/cpu2017/je5.0.1-32:/root/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  
No: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.  
No: 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.  
No: 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.

This benchmark result is intended to provide perspective on past performance using the historical hardware and/or software described on this result page.

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## General Notes (Continued)

The system as described on this result page was formerly generally available. At the time of this publication, it may not be shipping, and/or may not be supported, and/or may fail to meet other tests of General Availability described in the SPEC OSG Policy document, <http://www.spec.org/osg/policy.htm>.

This measured result may not be representative of the result that would be measured were this benchmark run with hardware and software available as of the publication date.

## Platform Notes

BIOS Configuration:

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  
Workload Profile set to Custom  
NUMA Group Size Optimization set to Flat  
Sysinfo program /root/cpu2017/bin/sysinfo  
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f  
running on localhost.localdomain Fri Dec 15 16:04:30 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) Bronze 3104 CPU @ 1.70GHz
 2 "physical id"s (chips)
12 "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 : 6
siblings : 6
physical 0: cores 0 1 2 3 4 5
physical 1: cores 0 1 2 3 4 5
```

From lscpu:

```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
```

(Continued on next page)



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## Platform Notes (Continued)

```

CPU(s): 12
On-line CPU(s) list: 0-11
Thread(s) per core: 1
Core(s) per socket: 6
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Bronze 3104 CPU @ 1.70GHz
Stepping: 4
CPU MHz: 1700.000
BogoMIPS: 3405.17
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 8448K
NUMA node0 CPU(s): 0-5
NUMA node1 CPU(s): 6-11

```

```

/proc/cpuinfo cache data
cache size : 8448 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
node 0 size: 97964 MB
node 0 free: 94347 MB
node 1 cpus: 6 7 8 9 10 11
node 1 size: 98303 MB
node 1 free: 93263 MB
node distances:
node  0  1
 0:  10  21
 1:  21  10

```

```

From /proc/meminfo
MemTotal: 197575964 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

```

```

From /etc/*release* /etc/*version*
os-release:
NAME="Red Hat Enterprise Linux Server"
VERSION="7.3 (Maipo)"

```

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## Platform Notes (Continued)

```
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)
system-release-cpe: cpe:/o:redhat:enterprise_linux:7.3:ga:server
```

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 Dec 15 10:22

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, configured at 2133

(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

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icc (ICC) 18.0.0 20170811

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## Compiler Version Notes (Continued)

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)  
=====

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

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## Base Portability Flags (Continued)

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  
-nonstandard-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  
-nonstandard-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  
-nonstandard-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



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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-revH.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-revH.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).

Tested with SPEC CPU2017 v1.0.2 on 2017-12-15 17:04:29-0500.

Report generated on 2018-10-31 18:05:41 by CPU2017 PDF formatter v6067.

Originally published on 2018-06-13.