



# SPEC® CPU2017 Floating Point Rate Result

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## Hewlett Packard Enterprise

(Test Sponsor: HPE)

### ProLiant DL360 Gen9

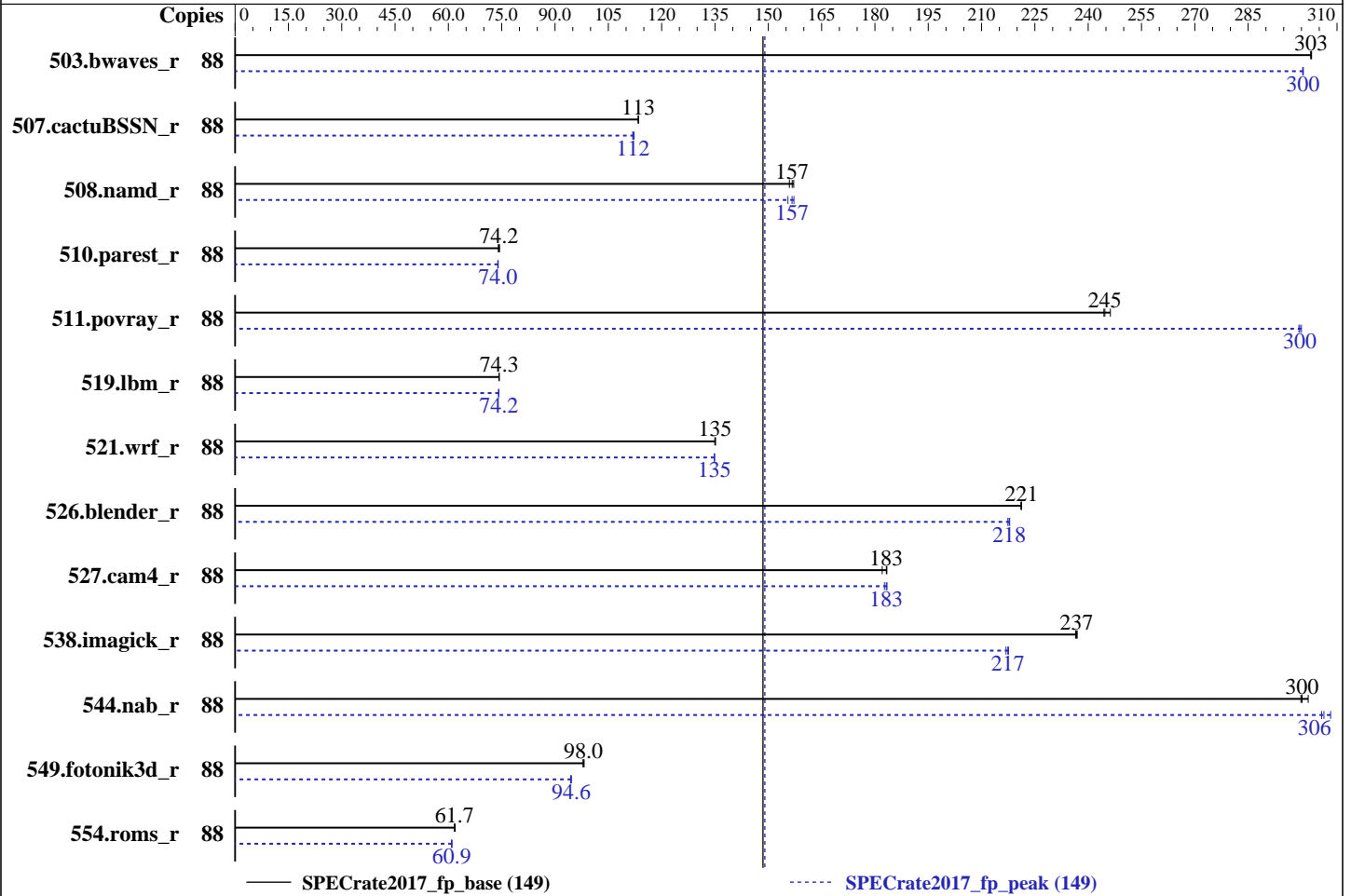
(2.40 GHz, Intel Xeon E5-2699A v4)

SPECrate2017\_fp\_base = 149

SPECrate2017\_fp\_peak = 149

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

Test Date: Dec-2016  
Hardware Availability: Oct-2016  
Software Availability: Sep-2016



### Hardware

CPU Name: Intel Xeon E5-2699A v4  
Max MHz.: 3600  
Nominal: 2400  
Enabled: 44 cores, 2 chips, 2 threads/core  
Orderable: 1,2 chips  
Cache L1: 32 KB I + 32 KB D on chip per core  
L2: 256 KB I+D on chip per core  
L3: 55 MB I+D on chip per chip  
Other: None  
Memory: 512 GB (16 x 32 GB 2Rx4 PC4-2400T-R)  
Storage: 1 x 400 GB SAS SSD, RAID 0  
Other: None

### Software

OS: SUSE Linux Enterprise Server 12 (x86\_64) SP1  
Kernel 3.12.49-11-default  
Compiler: C/C++: Version 17.0.0.098 of Intel C/C++  
Compiler for Linux;  
Fortran: Version 17.0.0.098 of Intel Fortran  
Compiler for Linux  
Parallel: No  
Firmware: P89 v2.30 9/12/16  
File System: btrfs  
System State: Run level 5 (multi-user, w/GUI)  
Base Pointers: 64-bit  
Peak Pointers: 32/64-bit  
Other: Microquill SmartHeap V10.2



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## Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	88	2916	303	2914	303	<b>2915</b>	<b>303</b>	88	2937	301	2938	300	<b>2937</b>	<b>300</b>
507.cactuBSSN_r	88	<b>982</b>	<b>113</b>	981	114	983	113	88	<b>995</b>	<b>112</b>	996	112	992	112
508.namd_r	88	<b>533</b>	<b>157</b>	536	156	532	157	88	532	157	<b>534</b>	<b>157</b>	538	156
510.parest_r	88	<b>3103</b>	<b>74.2</b>	3094	74.4	3109	74.0	88	3115	73.9	3111	74.0	<b>3111</b>	<b>74.0</b>
511.povray_r	88	834	246	<b>840</b>	<b>245</b>	841	244	88	685	300	687	299	<b>686</b>	<b>300</b>
519.lbm_r	88	1249	74.3	<b>1249</b>	<b>74.3</b>	1249	74.3	88	1250	74.2	1252	74.1	<b>1250</b>	<b>74.2</b>
521.wrf_r	88	1461	135	1458	135	<b>1460</b>	<b>135</b>	88	<b>1462</b>	<b>135</b>	1461	135	1462	135
526.blender_r	88	606	221	606	221	<b>606</b>	<b>221</b>	88	<b>615</b>	<b>218</b>	615	218	616	217
527.cam4_r	88	839	183	<b>840</b>	<b>183</b>	845	182	88	<b>840</b>	<b>183</b>	843	183	839	183
538.imagick_r	88	924	237	926	236	<b>924</b>	<b>237</b>	88	<b>1007</b>	<b>217</b>	1006	218	1009	217
544.nab_r	88	<b>493</b>	<b>300</b>	491	302	494	300	88	485	306	<b>483</b>	<b>306</b>	481	308
549.fotonik3d_r	88	<b>3500</b>	<b>98.0</b>	3492	98.2	3503	97.9	88	<b>3627</b>	<b>94.6</b>	3632	94.4	3627	94.6
554.roms_r	88	2267	61.7	<b>2265</b>	<b>61.7</b>	2259	61.9	88	2296	60.9	<b>2295</b>	<b>60.9</b>	2292	61.0

SPECrate2017\_fp\_base = 149

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Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

## Submit Notes

The config file option 'submit' was used.

## Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"  
Transparent Huge Pages enabled by default  
Filesystem page cache cleared with:  
echo 1 > /proc/sys/vm/drop\_caches  
runcpu command invoked through numactl i.e.:  
numactl --interleave=all runcpu <etc>

## General Notes

Environment variables set by runcpu before the start of the run:  
LD\_LIBRARY\_PATH = "/cpu2017/lib/ia32:/cpu2017/lib/intel64:/cpu2017/sh10.2"

Binaries compiled on a system with 1x Intel Core i7-4790K CPU + 32GB RAM  
memory using Redhat Enterprise Linux 7.2

## Platform Notes

BIOS Configuration:  
Power Profile set to Custom

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## Platform Notes (Continued)

Power Regulator set to Static High Performance Mode  
 Minimum Processor Idle Power Core C-State set to C6 State  
 Minimum Processor Idle Power Package C-State set to No Package State  
 Collaborative Power Control set to Disabled  
 QPI Snoop Configuration set to Cluster On Die  
 Thermal Configuration set to Maximum Cooling  
 Processor Power and Utilization Monitoring set to Disabled  
 Memory Double Refresh Rate set to 1x Refresh  
 Energy Performance Bias set to Maximum Performance  
 Sysinfo program /cpu2017/Docs/sysinfo  
 Rev: r5007 of 2016-11-15 fc8dc82f217779bedfed4d694d580ba9  
 running on linux-mzur Wed Dec 7 10:54:07 2016

This section contains SUT (System Under Test) info as seen by some common utilities.

For more information on this section, see

<http://www.spec.org/cpu2017/Docs/config.html#sysinfo>

From /proc/cpuinfo

```

model name : Intel(R) Xeon(R) CPU E5-2699A v4 @ 2.40GHz
 2 "physical id"s (chips)
 88 "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 : 22
  siblings  : 44
  physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27
 28
  physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27
 28
cache size : 28160 KB

```

The view from numactl --hardware follows. 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 4 5 6 7 8 9 10 44 45 46 47 48 49 50 51 52 53 54
node 0 size: 128920 MB
node 0 free: 114735 MB
node 1 cpus: 11 12 13 14 15 16 17 18 19 20 21 55 56 57 58 59 60 61 62 63 64 65
node 1 size: 129277 MB
node 1 free: 119637 MB
node 2 cpus: 22 23 24 25 26 27 28 29 30 31 32 66 67 68 69 70 71 72 73 74 75 76
node 2 size: 129277 MB
node 2 free: 119994 MB
node 3 cpus: 33 34 35 36 37 38 39 40 41 42 43 77 78 79 80 81 82 83 84 85 86 87
node 3 size: 129275 MB

```

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## Platform Notes (Continued)

```
node 3 free: 120071 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:          529153016 kB
HugePages_Total:       0
Hugepagesize:       2048 kB
```

```
/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 12 SP1
```

```
From /etc/*release* /etc/*version*
SuSE-release:
SUSE Linux Enterprise Server 12 (x86_64)
VERSION = 12
PATCHLEVEL = 1
# This file is deprecated and will be removed in a future service pack or
release.
# Please check /etc/os-release for details about this release.
os-release:
NAME="SLES"
VERSION="12-SP1"
VERSION_ID="12.1"
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP1"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp1"
```

```
uname -a:
Linux linux-mzur 3.12.49-11-default #1 SMP Wed Nov 11 20:52:43 UTC 2015
(8d714a0) x86_64 x86_64 x86_64 GNU/Linux
```

```
run-level 5 Dec 6 20:38
```

```
SPEC is set to: /cpu2017
Filesystem      Type      Size  Used Avail Use% Mounted on
/dev/sdb3       btrfs    369G  271G   97G  74% /
```

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

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## Platform Notes (Continued)

SMBIOS" standard.

BIOS HP P89 09/12/2016

Memory:

8x UNKNOWN NOT AVAILABLE

16x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2400 MHz

(End of data from sysinfo program)

Regarding the sysinfo display about the memory installed, the correct amount of memory is 512 GB and the dmidecode description should have one line reading as:

16x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2400 MHz

## Base Compiler Invocation

C benchmarks:

`icc -m64 -std=c11`

C++ benchmarks:

`icpc -m64`

Fortran benchmarks:

`ifort -m64`

Benchmarks using both Fortran and C:

`ifort -m64 icc -m64 -std=c11`

Benchmarks using both C and C++:

`icpc -m64 icc -m64 -std=c11`

Benchmarks using Fortran, C, and C++:

`icpc -m64 icc -m64 -std=c11 ifort -m64`

## Base Portability Flags

503.bwaves\_r: -DSPEC\_LP64

507.cactuBSSN\_r: -DSPEC\_LP64

508.namd\_r: -DSPEC\_LP64

510.parest\_r: -DSPEC\_LP64

511.povray\_r: -DSPEC\_LP64

519.lbm\_r: -DSPEC\_LP64

521.wrf\_r: -DSPEC\_LP64 -DSPEC\_CASE\_FLAG -convert big\_endian

526.blender\_r: -DSPEC\_LP64 -DSPEC\_LINUX -funsigned-char

527.cam4\_r: -DSPEC\_LP64 -DSPEC\_CASE\_FLAG

538.imagick\_r: -DSPEC\_LP64

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## Base Portability Flags (Continued)

544.nab\_r: -DSPEC\_LP64

549.fotonik3d\_r: -DSPEC\_LP64

554.roms\_r: -DSPEC\_LP64

## Base Optimization Flags

C benchmarks:

-xCORE-AVX2 -ipo -O3 -no-prec-div -auto-p32 -qopt-prefetch  
-qopt-mem-layout-trans=3

C++ benchmarks:

-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -auto-p32  
-qopt-prefetch -qopt-mem-layout-trans=3 -L/sh10.2 -lsmartheap64

Fortran benchmarks:

-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch  
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs

Benchmarks using both Fortran and C:

-xCORE-AVX2 -ipo -O3 -no-prec-div -auto-p32 -qopt-prefetch  
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs

Benchmarks using both C and C++:

-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -auto-p32  
-qopt-prefetch -qopt-mem-layout-trans=3 -L/sh10.2 -lsmartheap64

Benchmarks using Fortran, C, and C++:

-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -auto-p32  
-qopt-prefetch -qopt-mem-layout-trans=3 -nostandard-realloc-lhs  
-L/sh10.2 -lsmartheap64

## Peak Compiler Invocation

C benchmarks:

icc -m64 -std=c11

C++ benchmarks:

icpc -m64

Fortran benchmarks:

ifort -m64

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## Peak Compiler Invocation (Continued)

Benchmarks using both Fortran and C:

```
ifort -m64 icc -m64 -std=c11
```

Benchmarks using both C and C++:

```
icpc -m64 icc -m64 -std=c11
```

Benchmarks using Fortran, C, and C++:

```
icpc -m64 icc -m64 -std=c11 ifort -m64
```

## Peak Portability Flags

Same as Base Portability Flags

## Peak Optimization Flags

C benchmarks:

```
-prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2 -ipo -O3  
-no-prec-div -auto-p32 -qopt-prefetch -qopt-mem-layout-trans=3
```

C++ benchmarks:

```
-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2 -ipo  
-O3 -no-prec-div -auto-p32 -qopt-prefetch -qopt-mem-layout-trans=3  
-L/shl0.2 -lsmartheap64
```

Fortran benchmarks:

```
-prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2 -ipo -O3  
-no-prec-div -qopt-prefetch -qopt-mem-layout-trans=3  
-nostandard-realloc-lhs
```

Benchmarks using both Fortran and C:

```
-prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2 -ipo -O3  
-no-prec-div -auto-p32 -qopt-prefetch -qopt-mem-layout-trans=3  
-nostandard-realloc-lhs
```

Benchmarks using both C and C++:

```
-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2 -ipo  
-O3 -no-prec-div -auto-p32 -qopt-prefetch -qopt-mem-layout-trans=3  
-L/shl0.2 -lsmartheap64
```

Benchmarks using Fortran, C, and C++:

```
-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2 -ipo  
-O3 -no-prec-div -auto-p32 -qopt-prefetch -qopt-mem-layout-trans=3
```

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## Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):

`-nostandard-realloc-lhs -L/sh10.2 -lsmartheap64`

The flags files that were used to format this result can be browsed at

<http://www.spec.org/cpu2017/flags/Intel-ic17.0-official-linux64-revD.html>

<http://www.spec.org/cpu2017/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.html>

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

<http://www.spec.org/cpu2017/flags/Intel-ic17.0-official-linux64-revD.xml>

<http://www.spec.org/cpu2017/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.xml>

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