# SPEC® CPU2017 Floating Point Speed Result

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## Hewlett Packard Enterprise

(Test Sponsor: HPE)

$SPECspeed2017\_fp\_base =$ 83.4

ProLiant DL380 Gen10
(3.00 GHz, Intel Xeon Gold 5217)

$SPECspeed2017\_fp\_peak =$ Not Run

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

**Test Date:** May-2019
**Hardware Availability:** Apr-2019
**Software Availability:** Feb-2019

| Benchmark | Threads | Result |
|---|---|---|
| 603.bwaves_s | 16 | 329 |
| 607.cactuBSSN_s | 16 | 87.8 |
| 619.lbm_s | 16 | 71.1 |
| 621.wrf_s | 16 | 74.1 |
| 627.cam4_s | 16 | 52.8 |
| 628.pop2_s | 16 | 58.9 |
| 638.imagick_s | 16 | 60.3 |
| 644.nab_s | 16 | 112 |
| 649.fotonik3d_s | 16 | 64.9 |
| 654.roms_s | 16 | 78.3 |

SPECspeed2017_fp_base (83.4)

## Hardware

CPU Name: Intel Xeon Gold 5217
 Max MHz.: 3700
 Nominal: 3000
Enabled: 16 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: 11 MB I+D on chip per chip
 Other: None
Memory: 384 GB (24 x 16 GB 2Rx8 PC4-2666V-R)
Storage: 1 x 960 GB SATA SSD, RAID 0
Other: None

## Software

OS: SUSE Linux Enterprise Server 15 (x86_64)
 Kernel 4.12.14-23-default
Compiler: C/C++: Version 19.0.2.187 of Intel C/C++
 Compiler Build 20190117 for Linux;
 Fortran: Version 19.0.2.187 of Intel Fortran
 Compiler Build 20190117 for Linux
Parallel: Yes
Firmware: HPE BIOS Version U30 02/02/2019 released Apr-2019
File System: btrfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: None

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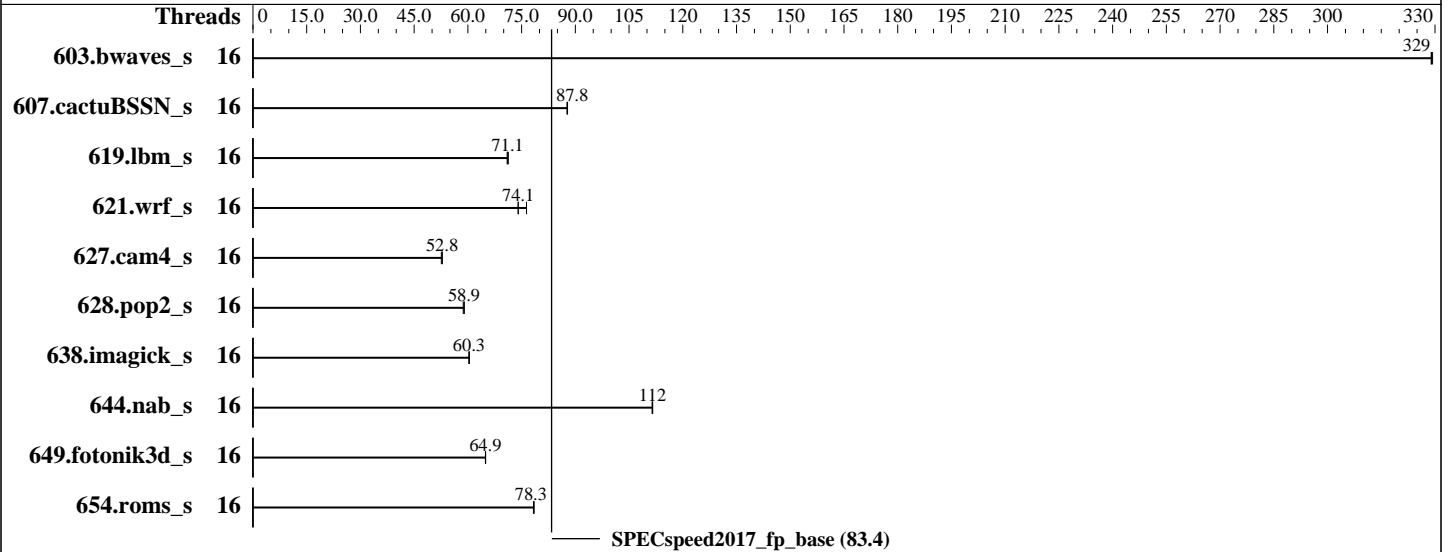$SPECspeed2017\_fp\_peak =$ Not Run

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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 | **179** | **329** | 179 | 329 | 179 | 329 | | | | | | | |
| 607.cactuBSSN_s | 16 | 190 | 87.7 | 190 | 87.8 | **190** | **87.8** | | | | | | | |
| 619.lbm_s | 16 | **73.6** | **71.1** | 73.8 | 71.0 | 73.5 | 71.3 | | | | | | | |
| 621.wrf_s | 16 | **179** | **74.1** | 179 | 74.0 | 173 | 76.4 | | | | | | | |
| 627.cam4_s | 16 | 169 | 52.6 | 168 | 52.8 | **168** | **52.8** | | | | | | | |
| 628.pop2_s | 16 | 202 | 58.7 | **201** | **58.9** | 201 | 59.0 | | | | | | | |
| 638.imagick_s | 16 | 239 | 60.4 | 239 | 60.3 | **239** | **60.3** | | | | | | | |
| 644.nab_s | 16 | 157 | 112 | 157 | 111 | **157** | **112** | | | | | | | |
| 649.fotonik3d_s | 16 | 140 | 64.9 | 140 | 65.0 | **140** | **64.9** | | | | | | | |
| 654.roms_s | 16 | 201 | 78.3 | 201 | 78.5 | **201** | **78.3** | | | | | | | |
| **SPECspeed2017_fp_base =** | | | **83.4** | | | | | | | | | | | |
| **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
Prior to runcpu invocation
Filesystem page cache synced and cleared with:
sync; echo 3>        /proc/sys/vm/drop_caches
```

## General Notes

```
Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2017_fpspeed/lib/ia32:/home/cpu2017_fpspeed/lib/intel64"
OMP_STACKSIZE = "192M"

 Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM
 memory using Redhat Enterprise Linux 7.5
NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
is mitigated in the system as tested and documented.
Yes: 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.
Yes: 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.
```

## Platform Notes

```
BIOS Configuration:
 Hyper-Threading set to Disabled
 Thermal Configuration set to Maximum Cooling
```

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**Tested by:**        HPE

**Test Date:**            May-2019

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## Platform Notes (Continued)

```
Memory Patrol Scrubbing set to Disabled
LLC Prefetch set to Enabled
LLC Dead Line Allocation set to Disabled
Enhanced Processor Performance set to Enabled
Workload Profile set to General Peak Frequency Compute
 Energy/Performance Bias set to Balanced Power
Workload Profile set to Custom
 Numa Group Size Optimization set to Flat
Sysinfo program /home/cpu2017_fpspeed/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on dl380-clx-sles15 Wed May 15 21:52:22 2019

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 5217 CPU @ 3.00GHz
      2  "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 : 8
      siblings  : 8
      physical 0: cores 0 1 2 3 4 5 6 7
      physical 1: cores 0 1 2 3 4 5 6 7

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:  8
    Socket(s):           2
    NUMA node(s):        2
    Vendor ID:           GenuineIntel
    CPU family:          6
    Model:               85
    Model name:          Intel(R) Xeon(R) Gold 5217 CPU @ 3.00GHz
    Stepping:            6
    CPU MHz:             3000.000
    BogoMIPS:            6000.00
    Virtualization:      VT-x
    L1d cache:           32K
    L1i cache:           32K
```

**(Continued on next page)**

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## Platform Notes (Continued)

```
       L2 cache:              1024K
       L3 cache:              11264K
       NUMA node0 CPU(s):     0-7
       NUMA node1 CPU(s):     8-15
       Flags:                 fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
    pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
    lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
    aperfmperf tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3
    sdbg fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt
    tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault
    epb cat_l3 cdp_l3 invpcid_single intel_ppin mba tpr_shadow vnmi flexpriority ept
    vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a
    avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl
    xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
    ibpb ibrs stibp dtherm ida arat pln pts pku ospke avx512_vnni arch_capabilities ssbd

  /proc/cpuinfo cache data
     cache size : 11264 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 6 7
    node 0 size: 193019 MB
    node 0 free: 192109 MB
    node 1 cpus: 8 9 10 11 12 13 14 15
    node 1 size: 193337 MB
    node 1 free: 189982 MB
    node distances:
    node   0   1
      0:  10  21
      1:  21  10

  From /proc/meminfo
    MemTotal:       395629892 kB
    HugePages_Total:        0
    Hugepagesize:        2048 kB

  From /etc/*release* /etc/*version*
     os-release:
       NAME="SLES"
       VERSION="15"
       VERSION_ID="15"
       PRETTY_NAME="SUSE Linux Enterprise Server 15"
       ID="sles"
       ID_LIKE="suse"
       ANSI_COLOR="0;32"
```

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**Test Date:**                May-2019
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## Platform Notes (Continued)

```
        CPE_NAME="cpe:/o:suse:sles:15"

uname -a:
    Linux dl380-clx-sles15 4.12.14-23-default #1 SMP Tue May 29 21:04:44 UTC 2018
    (cd0437b) x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2017-5754 (Meltdown):            Not affected
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted Speculation,
IBPB, IBRS_FW

run-level 3 May 15 19:16

SPEC is set to: /home/cpu2017_fpspeed
    Filesystem      Type    Size   Used Avail Use% Mounted on
    /dev/sda3       btrfs   407G    86G  321G  22% /home

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 U30 02/02/2019
  Memory:
   1x HPE 840756-091 16 GB 2 rank 2666
   23x 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)
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.2.187 Build 20190117
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------


==============================================================================
  FC  607.cactuBSSN_s(base)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.2.187 Build 20190117
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
```

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## Compiler Version Notes (Continued)

```
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.2.187 Build 20190117
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.2.187 Build 20190117
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------


==============================================================================
 FC  603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
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------------------------------------------------------------------------


==============================================================================
 CC  621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)
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  64, Version 19.0.2.187 Build 20190117
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.2.187 Build 20190117
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------
```

## Base Compiler Invocation

C benchmarks:
```
icc -m64 -std=c11
```

Fortran benchmarks:
```
ifort -m64
```

Benchmarks using both Fortran and C:
```
ifort -m64 icc -m64 -std=c11
```

Benchmarks using Fortran, C, and C++:
```
icpc -m64 icc -m64 -std=c11 ifort -m64
```

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# 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-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch`
`-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP`
`-qopt-prefetch-issue-excl-hint -ansi-alias -complex-limited-range`

Fortran benchmarks:
`-DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch`
`-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp`
`-qopt-prefetch-issue-excl-hint -ansi-alias -complex-limited-range`
`-nostandard-realloc-lhs`

Benchmarks using both Fortran and C:
`-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch`
`-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP`
`-qopt-prefetch-issue-excl-hint -ansi-alias -complex-limited-range`
`-nostandard-realloc-lhs`

Benchmarks using Fortran, C, and C++:
`-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch`
`-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP`
`-qopt-prefetch-issue-excl-hint -ansi-alias -complex-limited-range`
`-nostandard-realloc-lhs`

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-CLX-revA.html
http://www.spec.org/cpu2017/flags/HPE-ic19.0u1-flags-linux64.2019-04-03.00.html

Standard Performance Evaluation Corporation (info@spec.org)          https://www.spec.org/

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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-CLX-revA.xml
http://www.spec.org/cpu2017/flags/HPE-ic19.0u1-flags-linux64.2019-04-03.00.xml

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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