### SPEC® CPU2017 Floating Point Speed Result

**Hewlett Packard Enterprise**
(Test Sponsor: HPE)
ProLiant DL380 Gen10
(1.80 GHz, Intel Xeon Gold 6222V)

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

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>101</td>
<td>Not Run</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>40</td>
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<tr>
<td>619.lbm_s</td>
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<tr>
<td>621.wrf_s</td>
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<tr>
<td>627.cam4_s</td>
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<tr>
<td>628.pop2_s</td>
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<td>638.imagick_s</td>
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<td>644.nab_s</td>
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<tr>
<td>649.fotonik3d_s</td>
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<tr>
<td>654.roms_s</td>
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</tbody>
</table>

**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 04/18/2019 released Apr-2019
- **File System:** btrfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** Not Applicable
- **Other:** None

**Hardware**

- **CPU Name:** Intel Xeon Gold 6222V
- **Max MHz.:** 3600
- **Nominal:** 1800
- **Enabled:** 40 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:** 27.5 MB I+D on chip per chip
- **Other:** None
- **Memory:** 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R, running at 2400)
- **Storage:** 1 x 960 GB SATA SSD, RAID 0
- **Other:** None

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### SPEC CPU2017 License: 3  
**Test Sponsor:** HPE  
**Tested by:** HPE  
**Test Date:** Jul-2019  
**Hardware Availability:** Apr-2019  
**Software Availability:** Feb-2019

---

### Results Table

<table>
<thead>
<tr>
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</tbody>
</table>

**SPECspeed2017_fp_base = 101**  
**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,scatter"`
- `LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/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.

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### Platform Notes

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

(Continued on next page)
**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/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on dl380-clx-sles15hs Mon Jul 22 17:36:30 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 6222V CPU @ 1.80GHz
- 2 "physical id"s (chips)
- 40 "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 : 20
  - siblings : 20
  - physical 0: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
  - physical 1: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28

From lscpu:
- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- CPU(s): 40
- On-line CPU(s) list: 0-39
- Thread(s) per core: 1
- Core(s) per socket: 20
- Socket(s): 2
- NUMA node(s): 2
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 85
- Model name: Intel(R) Xeon(R) Gold 6222V CPU @ 1.80GHz
- Stepping: 7
- CPU MHz: 1800.000
- BogoMIPS: 3600.00
- Virtualization: VT-x
- L1d cache: 32K
- L1i cache: 32K

(Continued on next page)
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SPECspeed2017_fp_base = 101
SPECspeed2017_fp_peak = Not Run

CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE
Test Date: Jul-2019
Hardware Availability: Apr-2019
Software Availability: Feb-2019

Platform Notes (Continued)

L2 cache: 1024K
L3 cache: 28160K
NUMA node0 CPU(s): 0-19
NUMA node1 CPU(s): 20-39
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 arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
apeperf perf tsc_know_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3
sdmb fma cx16 xtpmr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt
tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault
ebf cat_13 cdpe_l3 invpcid_single intel_pmm mba tpr_shadow vmni flexpriority ept
vpid fsgsb tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdtd_a
avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl
xsaves xsaveopt xsave xgetbv1 xsavec qmm_mmc qmm_occup_llc qm_mbm_total qm_mbm_local
ibpb ibrs stibp dtherm ida arat pln pts pku oske avx512_vnni arch_capabilities ssbd

From /proc/cpuinfo cache data
  cache size : 28160 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 8 9 10 11 12 13 14 15 16 17 18 19
  node 0 size: 386582 MB
  node 0 free: 386152 MB
  node 1 cpus: 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39
  node 1 size: 386841 MB
  node 1 free: 386255 MB
  node distances:
    node 0 1
    0: 10 21
    1: 21 10

From /proc/meminfo
  MemTotal:       791985536 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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SPECspeed2017_fp_base = 101
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Platform Notes (Continued)

uname -a:
   Linux dl380-clx-sles15hs 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 Jul 22 17:34

SPEC is set to: /home/cpu2017
   Filesystem Type Size Used Avail Use% Mounted on
   /dev/sda3   xfs   476G  98G  379G  21% /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 04/18/2019
   Memory:
      24x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2933, configured at 2400

(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.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,

(Continued on next page)
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Test Sponsor: HPE
Tested by: HPE

Test Date: Jul-2019
Hardware Availability: Apr-2019
Software Availability: Feb-2019

Compiler Version Notes (Continued)

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)

Intel (R) Fortran Intel (R) 64 Compiler for applications running on Intel (R)
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= = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =

CC 621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)

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= = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = = =

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

Base Portability Flags

603.bwaves_s: -DSPEC_LP64

(Continued on next page)
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Base Portability Flags (Continued)

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 -DSPEC_OPENMP
-qopt-prefetch-issue-excl-hint -ansi-alias -complex-limited-range
-nostandard-realloc-lhs

Benchmarks using both Fortran and C:
-DSPEC_OPENMP -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++:
-DSPEC_OPENMP -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-ic19.0u1-flags-linux64.html
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revB.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/HPE-ic19.0u1-flags-linux64.xml
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-CLX-revB.xml
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| ProLiant DL380 Gen10 (1.80 GHz, Intel Xeon Gold 6222V) | SPECspeed2017_fp_peak = Not Run |

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