## SPEC® CPU2017 Floating Point Speed Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL380 Gen10  
(2.70 GHz, Intel Xeon Gold 6226)

### SPECspeed2017_fp_base = 102

### SPECspeed2017_fp_peak = Not Run

<table>
<thead>
<tr>
<th>Software</th>
<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS: SUSE Linux Enterprise Server 15 (x86_64)</td>
<td>CPU Name: Intel Xeon Gold 6226</td>
</tr>
<tr>
<td>Kernel 4.12.14-23-default</td>
<td>Max MHz.: 3700</td>
</tr>
<tr>
<td>Compiler: C/C++: Version 19.0.2.187 of Intel C/C++</td>
<td>Nominal: 2700</td>
</tr>
<tr>
<td>Compiler Build 20190117 for Linux; Fortran: Version 19.0.2.187 of Intel Fortran</td>
<td>Enabled: 24 cores, 2 chips</td>
</tr>
<tr>
<td>Compiler Build 20190117 for Linux</td>
<td>Orderable: 1, 2 chip(s)</td>
</tr>
<tr>
<td>Parallel: Yes</td>
<td>Cache L1: 32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>Firmware: HPE BIOS Version U30 04/18/2019 released Apr-2019</td>
<td>L2: 1 MB I+D on chip per core</td>
</tr>
<tr>
<td>System State: Run level 3 (multi-user)</td>
<td>L3: 19.25 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Base Pointers: 64-bit</td>
<td>Other: None</td>
</tr>
<tr>
<td>Peak Pointers: Not Applicable</td>
<td>Storage: 1 x 960 GB SATA SSD, RAID 0</td>
</tr>
<tr>
<td>Other: None</td>
<td>Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)</td>
</tr>
</tbody>
</table>

### Test Details

<table>
<thead>
<tr>
<th>CPU2017 License: 3</th>
<th>Test Date: Jun-2019</th>
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<tr>
<td>Test Sponsor: HPE</td>
<td>Hardware Availability: Apr-2019</td>
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<td>Software Availability: Feb-2019</td>
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### Test Date: Jun-2019

### Test Sponsor: HPE

### Hardware Availability: Apr-2019

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### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>110</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>76.1</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>82.3</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>75.6</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>60.8</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>87.9</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>167</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>70.5</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>91.4</td>
</tr>
</tbody>
</table>

### SPECspeed2017_fp_base (102)

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**Note:** The results in the table are derived from the SPEC CPU2017 benchmark suite, which measures the floating point performance of a CPU. The benchmarks included are bwaves, cactuBSSN, lbm, wrf, cam4, pop2, imagick, nab, fotonik3d, and roms. The results are presented in a table format, showing the SPECspeed2017_fp_base and SPECspeed2017_fp_peak values, along with other test details such as the CPU name, memory, and storage configurations.
Hewlett Packard Enterprise
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Results Table

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<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Peak Seconds</th>
<th>Peak Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>24</td>
<td>138</td>
<td>427</td>
<td>138</td>
<td>426</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>24</td>
<td>152</td>
<td>110</td>
<td>151</td>
<td>110</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>24</td>
<td>67.5</td>
<td>77.6</td>
<td>73.9</td>
<td>70.9</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>24</td>
<td>161</td>
<td>82.4</td>
<td>162</td>
<td>81.6</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>24</td>
<td>117</td>
<td>75.6</td>
<td>118</td>
<td>75.3</td>
</tr>
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<td>628.pop2_s</td>
<td>24</td>
<td>195</td>
<td>60.8</td>
<td>193</td>
<td>61.6</td>
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<td>24</td>
<td>164</td>
<td>87.8</td>
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<td>87.9</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>24</td>
<td>104</td>
<td>167</td>
<td>105</td>
<td>167</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>24</td>
<td>129</td>
<td>70.5</td>
<td>131</td>
<td>69.8</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>24</td>
<td>172</td>
<td>91.4</td>
<td>172</td>
<td>91.4</td>
</tr>
</tbody>
</table>

SPECspeed2017_fp_base = 102
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.

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

(Continued on next page)
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Tested by: HPE

内存保护擦洗设置为Disabled
LLC Prefetch设置为Enabled
LLC Dead Line Allocation设置为Disabled
Enhanced Processor Performance设置为Enabled
Workload Profile设置为General Peak Frequency Compute
Energy/Performance Bias设置为Balanced Power
Workload Profile设置为Custom
Numa Group Size Optimization设置为Flat
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on dl380-clx-sles15hs Mon Jun 10 16:16:59 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 6226 CPU @ 2.70GHz
   2 "physical id"s (chips)
   24 "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 : 12
siblings : 12
physical 0: cores 0 2 3 4 5 6 8 9 10 11 12 13
physical 1: cores 0 2 3 4 5 6 8 9 10 11 13 14

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 24
On-line CPU(s) list: 0-23
Thread(s) per core: 1
Core(s) per socket: 12
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6226 CPU @ 2.70GHz
Stepping: 7
CPU MHz: 2700.000
BogoMIPS: 5400.00
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: 19712K  
NUMA node0 CPU(s): 0-11  
NUMA node 1 CPU(s): 12-23  
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_13 cdp_13 invpcid_single intel_ppin mba tpr_shadow vni 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 xsave xgetbv1 xsavec cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local ibpb ibrs stibp dtherm ida arat pln pts pkup ospke avx512_vnni arch_capabilities ssbd

/proc/cpuinfo cache data  
  cache size: 19712 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  
  node 0 size: 386584 MB  
  node 0 free: 385932 MB  
  node 1 cpus: 12 13 14 15 16 17 18 19 20 21 22 23  
  node 1 size: 386843 MB  
  node 1 free: 386279 MB  
  node distances:  
    node 0 1  
    0: 10 21  
    1: 21 10

From /proc/meminfo  
  MemTotal: 791989576 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"

*(Continued on next page)*
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<th>Jun-2019</th>
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<td>Apr-2019</td>
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<th>Tested by:</th>
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<td>Apr-2019</td>
<td></td>
</tr>
<tr>
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<td>Feb-2019</td>
<td></td>
</tr>
</tbody>
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**Platform Notes (Continued)**

```bash
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 Jun 10 16:14

SPEC is set to: /home/cpu2017

```
Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda3      xfs   476G  101G  376G  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 04/18/2019

Memory:
24x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2933

(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,
```

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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)
64, Version 19.0.2.187 Build 20190117
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

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

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.
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

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

Tested with SPEC CPU2017 v1.0.5 on 2019-06-10 16:16:58-0400.