Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant BL460c Gen10
(3.80 GHz, Intel Xeon Gold 5222)

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

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Threads

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<td>607.cactuBSSN_s 8</td>
</tr>
<tr>
<td>619.lbm_s 8</td>
</tr>
<tr>
<td>621.wrf_s 8</td>
</tr>
<tr>
<td>627.cam4_s 8</td>
</tr>
<tr>
<td>628.pop2_s 8</td>
</tr>
<tr>
<td>638.imagick_s 8</td>
</tr>
<tr>
<td>644.nab_s 8</td>
</tr>
<tr>
<td>649.fotonik3d_s 8</td>
</tr>
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</table>

Hardware

- CPU Name: Intel Xeon Gold 5222
- Max MHz.: 3900
- Nominal: 3800
- Enabled: 8 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: 16.5 MB I+D on chip per chip
- Other: None
- Memory: 192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R, running at 2666)
- Storage: 1 x 400 GB SAS 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 I41 02/02/2019 released Apr-2019
- File System: xfs
- System State: Run level 3 (multi-user)
- Base Pointers: 64-bit
- Peak Pointers: Not Applicable
- Other: None
### 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=core,compact"
LD_LIBRARY_PATH = "/home/cpu2017_u2/lib/ia32:/home/cpu2017_u2/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)
SPEC CPU2017 Floating Point Speed Result

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

Platform Notes (Continued)

Memory Patrol Scrubbing set to Disabled
LLC Prefetch set to Enabled
LLC Dead Line Allocation set to Disabled
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_u2/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcd0ef2999c33d61f64985e45859ea9
running on bl460-sles15-6252 Wed Apr 17 16:05:12 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 5222 CPU @ 3.80GHz
    2 "physical id"s (chips)
    8 "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 : 4
    siblings : 4
    physical 0: cores 1 2 5 13
    physical 1: cores 2 5 9 13

From lscpu:
  Architecture: x86_64
  CPU op-mode(s): 32-bit, 64-bit
  Byte Order: Little Endian
  CPU(s): 8
  On-line CPU(s) list: 0-7
  Thread(s) per core: 1
  Core(s) per socket: 4
  Socket(s): 2
  NUMA node(s): 2
  Vendor ID: GenuineIntel
  CPU family: 6
  Model: 85
  Model name: Intel(R) Xeon(R) Gold 5222 CPU @ 3.80GHz
  Stepping: 7
  CPU MHz: 3800.000
  BogoMIPS: 7600.00
  Virtualization: VT-x
  L1d cache: 32K
  L1i cache: 32K
  L2 cache: 1024K

(Continued on next page)
SPEC CPU2017 Floating Point Speed Result

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Test Sponsor: HPE
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Platform Notes (Continued)

L3 cache: 16896K
NUMA node0 CPU(s): 0-3
NUMA node1 CPU(s): 4-7
Flags: fpu vme de pse tsc msr pae 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
aperfmpref perf_counter匮tis known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3
sdkg fma cx16 xtpm 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_pdata mbl tpr_shadow vmx flexpriority ept
vipid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 emms invpcid rtm cqm mpx rdtr_a
avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl
xsaveopt xsave xgetbv1 xsaves cqm_llc cqm_occumpack llc cqm_mbm_total cqm_mbm_local
ibpb ibrs stibp dtherm ida arat pln pts pkku ospke avx512_vnni arch_capabilities ssbd

/proc/cpuinfo cache data
  cache size : 16896 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
    node 0 size: 96354 MB
    node 0 free: 95981 MB
    node 1 cpus: 4 5 6 7
    node 1 size: 96737 MB
    node 1 free: 96411 MB
    node distances:
      node 0 1
        0: 10 21
        1: 21 10

From /proc/meminfo
  MemTotal: 197726152 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"
    CPE_NAME="cpe:/o:suse:sles:15"
### SPEC CPU2017 Floating Point Speed Result

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- **Test Sponsor:** HPE  
- **Tested by:** HPE  
- **Test Date:** Apr-2019  
- **Hardware Availability:** Apr-2019  
- **Software Availability:** Feb-2019

#### Platform Notes (Continued)

```plaintext
uname -a:
    Linux bl460c-sles15-6252 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 Apr 17 16:03

SPEC is set to: /home/cpu2017_u2

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sda5</td>
<td>xfs</td>
<td>72G</td>
<td>45G</td>
<td>28G</td>
<td>63%</td>
<td>/home</td>
</tr>
</tbody>
</table>

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 02/02/2019
- Memory:
  - 4x UNKNOWN NOT AVAILABLE
  - 12x UNKNOWN NOT AVAILABLE 16 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  
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Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Hewlett Packard Enterprise

Specspeed2017_fp_base = 59.7
Specspeed2017_fp_peak = Not Run

CPU2017 License: 3
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Hardware Availability: Apr-2019
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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)
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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
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### Base Portability Flags (Continued)

- 607.cactuBSSN_s: -DSPEC_LP64  
- 619.blm_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

**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

**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

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-1c19.0u1-flags-linux64.html

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-1c19.0u1-flags-linux64.xml
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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.