## SPEC® CPU2017 Floating Point Speed Result

### Hewlett Packard Enterprise

**Test Sponsor:** HPE  
**ProLiant ML350 Gen10**  
**(2.30 GHz, Intel Xeon Gold 5218)**

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base =</th>
<th>117</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_fp_peak =</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

### CPU2017 License: 3  
**Test Date:** Apr-2019  
**Hardware Availability:** Apr-2019  
**Test Sponsor:** HPE  
**Tested by:** HPE  
**Software Availability:** Nov-2018

<table>
<thead>
<tr>
<th>Test Sponsor:</th>
<th>HPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name:</td>
<td>Intel Xeon Gold 5218</td>
</tr>
<tr>
<td>Max MHz.:</td>
<td>3900</td>
</tr>
<tr>
<td>Nominal:</td>
<td>2300</td>
</tr>
<tr>
<td>Enabled:</td>
<td>32 cores, 2 chips</td>
</tr>
<tr>
<td>Orderable:</td>
<td>1, 2 chip(s)</td>
</tr>
<tr>
<td>Cache L1:</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2:</td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td>L3:</td>
<td>22 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>384 GB (24 x 16 GB 2Rx8 PC4-2666V-R)</td>
</tr>
<tr>
<td>Storage:</td>
<td>1 x 400 GB SAS SSD, RAID 0</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
</tbody>
</table>

#### Hardware

<table>
<thead>
<tr>
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<th>Apr-2019</th>
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<td>Software Availability:</td>
<td>Nov-2018</td>
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</tbody>
</table>

#### Software

<table>
<thead>
<tr>
<th>OS:</th>
<th>SUSE Linux Enterprise Server 15 (x86_64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler:</td>
<td>C/C++: Version 19.0.1.144 of Intel C/C++</td>
</tr>
<tr>
<td>Firmware:</td>
<td>HPE BIOS Version U41 02/02/2019 released Apr-2019</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
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</table>

### Table of Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed2017_fp_base (117)</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>32</td>
<td>480</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>32</td>
<td>280</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>32</td>
<td>200</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>32</td>
<td>120</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>32</td>
<td>70</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>32</td>
<td>60</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>32</td>
<td>40</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>32</td>
<td>30</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>32</td>
<td>20</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>32</td>
<td>10</td>
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</tbody>
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**Note:**  
All tests were completed on Apr-2019.
**SPEC CPU2017 Floating Point Speed Result**

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant ML350 Gen10
(2.30 GHz, Intel Xeon Gold 5218)

**SPECspeed2017_fp_base = 117**

**SPECspeed2017_fp_peak = Not Run**

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Base</td>
<td></td>
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<tr>
<td>603.bwaves_s</td>
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<td>125</td>
<td>471</td>
<td>125</td>
<td>472</td>
<td>125</td>
<td>470</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>32</td>
<td>130</td>
<td>128</td>
<td>130</td>
<td>128</td>
<td>130</td>
<td>128</td>
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<tr>
<td>619.lbm_s</td>
<td>32</td>
<td>59.0</td>
<td>88.7</td>
<td>57.1</td>
<td>91.7</td>
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<td>91.8</td>
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<td>621.wrf_s</td>
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<td>121</td>
<td>109</td>
<td>121</td>
<td>110</td>
<td>122</td>
<td>108</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>32</td>
<td>124</td>
<td>71.7</td>
<td>123</td>
<td>71.9</td>
<td>124</td>
<td>71.7</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>32</td>
<td>190</td>
<td>62.4</td>
<td>193</td>
<td>61.7</td>
<td>191</td>
<td>62.2</td>
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<tr>
<td>638.imagick_s</td>
<td>32</td>
<td>161</td>
<td>89.5</td>
<td>169</td>
<td>85.2</td>
<td>154</td>
<td>93.7</td>
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<tr>
<td>644.nab_s</td>
<td>32</td>
<td>101</td>
<td>174</td>
<td>100</td>
<td>174</td>
<td>100</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>32</td>
<td>116</td>
<td>78.5</td>
<td>116</td>
<td>78.3</td>
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<td>654.roms_s</td>
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<td>109</td>
<td>145</td>
<td>109</td>
<td>145</td>
<td>110</td>
<td>143</td>
</tr>
</tbody>
</table>

**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=core,compact"
  LD_LIBRARY_PATH = "/home/cpu2017.ic19_update1/lib/ia32:/home/cpu2017.ic19_update1/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
Yes: 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
  Memory Patrol Scrubbing set to Disabled

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

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant ML350 Gen10
(2.30 GHz, Intel Xeon Gold 5218)

SPECspeed2017_fp_base = 117
SPECspeed2017_fp_peak = Not Run

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

Platform Notes (Continued)

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_ic19_update1/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on ml350-sles15 Mon Apr 1 07:33:49 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 5218 CPU @ 2.30GHz
    2 "physical id"s (chips)
    32 "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 : 16
        siblings : 16
        physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
        physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

From lscpu:
    Architecture: x86_64
    CPU op-mode(s): 32-bit, 64-bit
    Byte Order: Little Endian
    CPU(s): 32
    On-line CPU(s) list: 0-31
    Thread(s) per core: 1
    Core(s) per socket: 16
    Socket(s): 2
    NUMA node(s): 2
    Vendor ID: GenuineIntel
    CPU family: 6
    Model: 85
    Model name: Intel(R) Xeon(R) Gold 5218 CPU @ 2.30GHz
    Stepping: 6
    CPU MHz: 2300.000
    BogoMIPS: 4600.00
    Virtualization: VT-x
    L1d cache: 32K
    L1i cache: 32K
    L2 cache: 1024K

(Continued on next page)
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Test Date: Apr-2019
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Software Availability: Nov-2018

Platform Notes (Continued)

L3 cache: 22528K
NUMA node0 CPU(s): 0-15
NUMA node1 CPU(s): 16-31
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 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

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.

node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
node 0 size: 193119 MB
node 0 free: 192846 MB
node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
node 1 size: 193503 MB
node 1 free: 193046 MB
node distances:

node 0 1
0: 10 21
1: 21 10

From /proc/meminfo
MemTotal: 395901968 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"

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Test Date: Apr-2019
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Platform Notes (Continued)

```
uname -a:
  Linux ml350-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 Apr 1 07:29
SPEC is set to: /home/cpu2017_ic19_update1
  Filesystem     Type   Size  Used Avail Use% Mounted on
  /dev/sdb2      btrfs  371G  197G  173G  54% /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 U41 02/02/2019
Memory:
  24x 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 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 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 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.1.144 Build 20181018
```

(Continued on next page)
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Copyright 2017-2019 Standard Performance Evaluation Corporation

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Compiler Version Notes (Continued)

Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
Intel (R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

==============================================================================
FC  603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
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Intel (R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
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Copyright (C) 1985-2018 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 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
Intel (R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 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
607.cactusSNS_s: -DSPEC_LP64

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

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

Fortran benchmarks:
-DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-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
-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
-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

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

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