SPEC® CPU2017 Floating Point Speed Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)
Synergy 660 Gen10
(2.10 GHz, Intel Xeon Gold 6252)

SPECspeed2017_fp_base = 195
SPECspeed2017_fp_peak = Not Run

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

<table>
<thead>
<tr>
<th>Thread</th>
<th>SPECspeed2017_fp_base</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>96</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>96</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>96</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>96</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>96</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>96</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>96</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>96</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>96</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>96</td>
</tr>
</tbody>
</table>

SPECspeed2017_fp_base (195)

Hardware
CPU Name: Intel Xeon Gold 6252
Max MHz.: 3700
Nominal: 2100
Enabled: 96 cores, 4 chips
Orderable: 2, 4 chip(s)
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 1 MB I+D on chip per core
L3: 35.75 MB I+D on chip per chip
Other: None
Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)
Storage: 1 x 480 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 I43 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
SPEC CPU2017 Floating Point Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
Synergy 660 Gen10
(2.10 GHz, Intel Xeon Gold 6252)

SPECspeed2017_fp_base = 195
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>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Base</td>
<td></td>
<td>Peak</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>603.bwaves_s</td>
<td>96</td>
<td>69.9</td>
<td>71.5</td>
<td>825</td>
<td>72.0</td>
<td>819</td>
<td></td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>96</td>
<td>79.1</td>
<td>79.4</td>
<td>210</td>
<td>79.7</td>
<td>209</td>
<td></td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>96</td>
<td>33.3</td>
<td>33.5</td>
<td>156</td>
<td>33.7</td>
<td>156</td>
<td></td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>96</td>
<td>99.7</td>
<td>99.6</td>
<td>133</td>
<td>99.8</td>
<td>133</td>
<td></td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>96</td>
<td>53.6</td>
<td>53.5</td>
<td>166</td>
<td>53.2</td>
<td>167</td>
<td></td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>96</td>
<td>227</td>
<td>52.2</td>
<td>229</td>
<td>52.0</td>
<td>226</td>
<td></td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>96</td>
<td>68.1</td>
<td>66.5</td>
<td>217</td>
<td>66.6</td>
<td>217</td>
<td></td>
</tr>
<tr>
<td>644.nab_s</td>
<td>96</td>
<td>43.5</td>
<td>43.5</td>
<td>402</td>
<td>43.5</td>
<td>402</td>
<td></td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>96</td>
<td>82.2</td>
<td>81.8</td>
<td>111</td>
<td>82.3</td>
<td>111</td>
<td></td>
</tr>
<tr>
<td>654.roms_s</td>
<td>96</td>
<td>57.9</td>
<td>57.0</td>
<td>276</td>
<td>59.7</td>
<td>264</td>
<td></td>
</tr>
</tbody>
</table>

Operating System Notes

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Stack size set to unlimited using "ulimit -s unlimited"
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesyststem 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

Hewlett Packard Enterprise
(Test Sponsor: HPE)
Synergy 660 Gen10
(2.10 GHz, Intel Xeon Gold 6252)

SPECSpeed2017_fp_base = 195
SPECSpeed2017_fp_peak = Not Run

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

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
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
   Intel UIPI Link Power Management set to Enabled
   Advanced Memory Protection set to Advanced ECC
Sysinfo program /home/cpu2017_u2/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on sy660-gen10 Thu Apr 18 06:40:33 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 6252 CPU @ 2.10GHz
   4 "physical id"s (chips)
   96 "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 : 24
   siblings : 24
   physical 0: cores 0 1 2 3 4 5 6 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
   physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29
   physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29
   physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29

From lscpu:
   Architecture: x86_64
   CPU op-mode(s): 32-bit, 64-bit
   Byte Order: Little Endian
   CPU(s): 96
   On-line CPU(s) list: 0-95
   Thread(s) per core: 1
   Core(s) per socket: 24
   Socket(s): 4
   NUMA node(s): 4
   Vendor ID: GenuineIntel
   CPU family: 6
   Model: 85
   Model name: Intel(R) Xeon(R) Gold 6252 CPU @ 2.10GHz
   Stepping: 7
   CPU MHz: 2100.000

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

Hewlett Packard Enterprise
(Test Sponsor: HPE)
Synergy 660 Gen10
(2.10 GHz, Intel Xeon Gold 6252)

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>195</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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

Platform Notes (Continued)

BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 36608K
NUMA node0 CPU(s): 0-23
NUMA node1 CPU(s): 24-47
NUMA node2 CPU(s): 48-71
NUMA node3 CPU(s): 72-95

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
aperfmpref tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3
sdbg fma cx16 xtpre 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_pinn mbx tpr_shadow vmmi flexpriority ept
vpid fsgsbase tsc_adjust bmml hle avx2 smee bni2 erms invpcid rtm cqm mpz rdt_a
avx512f avx512dq rseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl
xsaveopt xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
ibpb ibrs stibp dtherm ida arat pin ptsoku ospke avx512_vnni arch_capabilities ssbd

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
available: 4 nodes (0-3)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
node 0 size: 193044 MB
node 0 free: 192490 MB
node 1 cpus: 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
node 1 size: 193531 MB
node 1 free: 193359 MB
node 2 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71
node 2 size: 193502 MB
node 2 free: 193191 MB
node 3 cpus: 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95
node 3 size: 193321 MB
node 3 free: 193141 MB
node distances:
node 0 1 2 3
0: 10 21 21 21
1: 21 10 21 21
2: 21 21 10 21
3: 21 21 21 10

(Continued on next page)
Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
Synergy 660 Gen10  
(2.10 GHz, Intel Xeon Gold 6252)

SPECspeed2017_fp_base = 195
SPECspeed2017_fp_peak = Not Run

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

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

Platform Notes (Continued)

From /proc/meminfo
  MemTotal:       791961780 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"

uname -a:
  Linux sy660-gen10 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 18 06:40

SPEC is set to: /home/cpu2017_u2
  Filesystem Type Size Used Avail Use% Mounted on
  /dev/sdb2 btrfs 445G 110G 335G 25% /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 I43 02/02/2019
  Memory:
    24x UNKNOWN NOT AVAILABLE
    24x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2933

(End of data from sysinfo program)
Standard Performance Evaluation Corporation
(Info@spec.org)
https://www.spec.org/

SPEC CPU2017 Floating Point Speed Result
Copyright 2017-2019 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)
Synergy 660 Gen10
(2.10 GHz, Intel Xeon Gold 6252)

SPECspeed2017_fp_base = 195
SPECspeed2017_fp_peak = Not Run

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

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,
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
(Continued on next page)
Base Compiler Invocation (Continued)

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.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

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

Hewlett Packard Enterprise
(Test Sponsor: HPE)
Synergy 660 Gen10
(2.10 GHz, Intel Xeon Gold 6252)

SPECspeed2017_fp_base = 195
SPECspeed2017_fp_peak = Not Run

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

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

Base Optimization Flags (Continued)

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

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

SPEC is a registered trademark of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

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 2019-04-18 07:40:32-0400.