SPEC® CPU2017 Floating Point Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL560 Gen10
(2.10 GHz, Intel Xeon Gold 6152)

SPECrate2017_fp_base =   380

SPECrate2017_fp_peak = Not Run
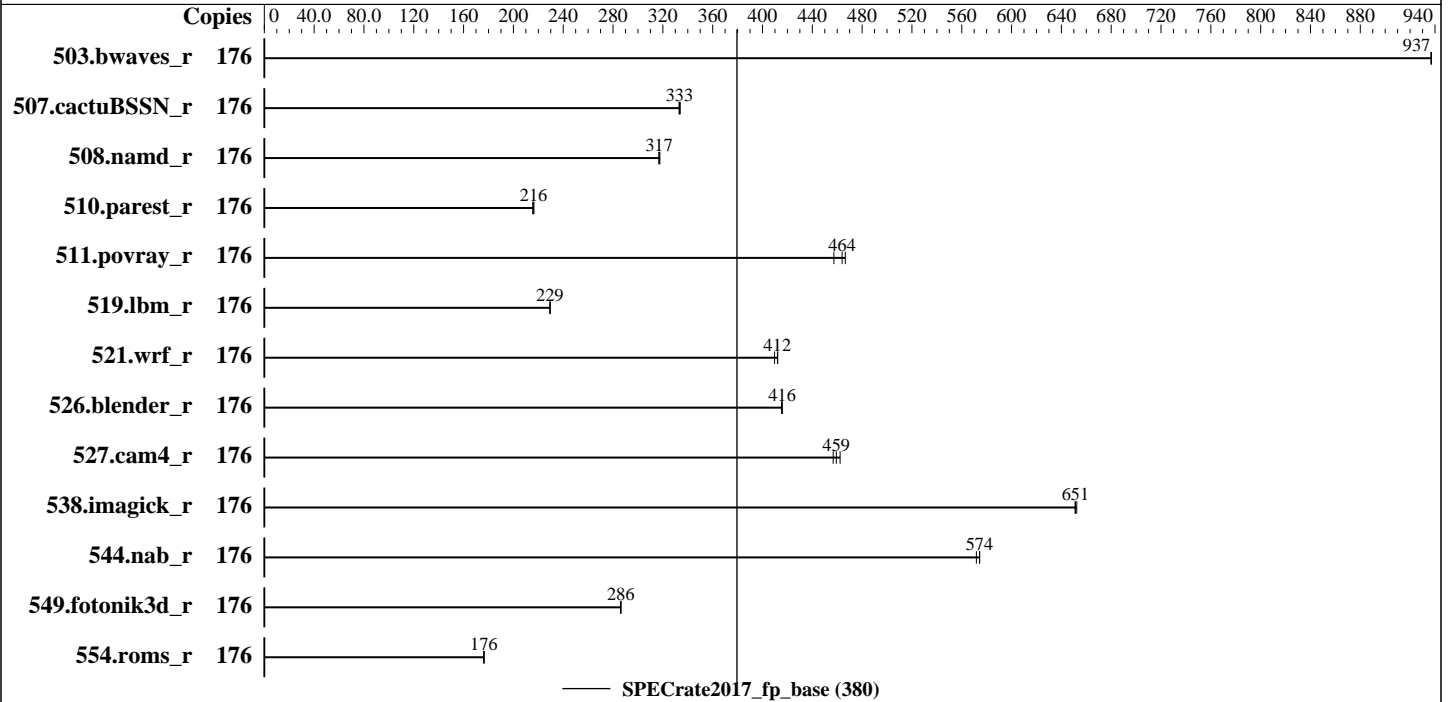
CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Nov-2017

Hardware Availability: Oct-2017

Software Availability: Sep-2017

Benchmark	Copies	Result
503.bwaves_r	176	937
507.cactuBSSN_r	176	333
508.namd_r	176	317
510.parest_r	176	216
511.povray_r	176	464
519.lbm_r	176	229
521.wrf_r	176	412
526.blender_r	176	416
527.cam4_r	176	459
538.imagick_r	176	651
544.nab_r	176	574
549.fotonik3d_r	176	286
554.roms_r	176	176

SPECrate2017_fp_base (380)

Hardware

CPU Name: Intel Xeon Gold 6152
 Max MHz.:   3700
 Nominal: 2100
Enabled: 88 cores, 4 chips, 2 threads/core
Orderable: 1, 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:   30.25 MB I+D on chip per chip
 Other: None
Memory: 768 GB (48 x 16 GB 2Rx8 PC4-2666V-R)
Storage: 2 x 480 GB SATA SSD, RAID 0
Other: None

Software

OS: SUSE Linux Enterprise Server 12 (x86_64) SP2
     Kernel 4.4.21-69-default
Compiler: C/C++: Version 18.0.0.128 of Intel C/C++
     Compiler for Linux;
     Fortran: Version 18.0.0.128 of Intel Fortran
     Compiler for Linux
Parallel: No
Firmware: HPE BIOS Version U34 released Oct-2017 (tested with U34 9/29/2017)
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: None

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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	176	1883	937	1884	937	**1884**	**937**							
507.cactuBSSN_r	176	669	333	**668**	**333**	667	334							
508.namd_r	176	528	317	526	318	**527**	**317**							
510.parest_r	176	2128	216	2136	216	**2129**	**216**							
511.povray_r	176	**886**	**464**	899	457	881	466							
519.lbm_r	176	809	229	808	229	**809**	**229**							
521.wrf_r	176	962	410	**957**	**412**	956	412							
526.blender_r	176	645	416	**645**	**416**	646	415							
527.cam4_r	176	674	457	666	462	**670**	**459**							
538.imagick_r	176	672	651	**672**	**651**	671	652							
544.nab_r	176	518	572	**516**	**574**	516	574							
549.fotonik3d_r	176	**2396**	**286**	2397	286	2395	286							
554.roms_r	176	1585	176	1588	176	**1585**	**176**							

SPECrate2017_fp_base = 380

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

Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

Operating System Notes

```
Stack size set to unlimited using "ulimit -s unlimited"
Prior to runcpu invocation
Filesystem page cache synced and cleared with:
 sync; echo 3>         /proc/sys/vm/drop_caches
runcpu command invoked through numactl i.e.:
 numactl --interleave=all runcpu <etc>
irqbalance disabled with "service irqbalance stop"
tuned profile set wtih "tuned-adm profile throughput-performance"
VM Dirty ratio was set to 40 using "echo 40 > /proc/sys/vm/dirty_ratio"
Numa balancing was disabled using "echo 0 > /proc/sys/kernel/numa_balancing"
```

General Notes

Environment variables set by runcpu before the start of the run:

LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32:/home/cpu2017/je5.0.1-64"

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General Notes (Continued)

```
Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.4
```

Platform Notes

```
BIOS Configuration:
 Thermal Configuration set to Maximum Cooling
 LLC Prefetch set to Enabled
 LLC Dead Line Allocation set to Disabled
 Stale A to S set to Enabled
 Memory Patrol Scrubbing set to Disabled
 Workload Profile set to General Throughput Compute
  Minimum Processor Idle Power Core C-State set to C1E
 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
 running on linux-e6az Thu Nov 16 20:11:54 2017

 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 6152 CPU @ 2.10GHz
       4  "physical id"s (chips)
       176 "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 : 22
       siblings  : 44
       physical 0: cores 0 1 2 3 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
       physical 1: cores 0 1 2 3 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
       physical 2: cores 0 1 2 3 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
       physical 3: cores 0 1 2 3 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28

 From lscpu:
       Architecture:          x86_64
       CPU op-mode(s):        32-bit, 64-bit
       Byte Order:            Little Endian
       CPU(s):                176
       On-line CPU(s) list:   0-175
       Thread(s) per core:    2
       Core(s) per socket:    22
       Socket(s):             4
       NUMA node(s):          8
       Vendor ID:             GenuineIntel
       CPU family:            6
```

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Test Sponsor:	HPE	**Hardware Availability:**	Oct-2017
Tested by:	HPE	**Software Availability:**	Sep-2017

Platform Notes (Continued)

```
       Model:                 85
       Model name:            Intel(R) Xeon(R) Gold 6152 CPU @ 2.10GHz
       Stepping:              4
       CPU MHz:               2095.100
       BogoMIPS:              4190.20
       Virtualization:        VT-x
       L1d cache:             32K
       L1i cache:             32K
       L2 cache:              1024K
       L3 cache:              30976K
       NUMA node0 CPU(s):     0-10,88-98
       NUMA node1 CPU(s):     11-21,99-109
       NUMA node2 CPU(s):     22-32,110-120
       NUMA node3 CPU(s):     33-43,121-131
       NUMA node4 CPU(s):     44-54,132-142
       NUMA node5 CPU(s):     55-65,143-153
       NUMA node6 CPU(s):     66-76,154-164
       NUMA node7 CPU(s):     77-87,165-175
       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
    aperfmperf eagerfpu 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 ida arat epb pln pts dtherm intel_pt
    tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2
    erms invpcid rtm cqm mpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd
    avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc

 /proc/cpuinfo cache data
    cache size : 30976 KB

 From numactl --hardware  WARNING: a numactl 'node' might or might not correspond to a
 physical chip.
    available: 8 nodes (0-7)
    node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 88 89 90 91 92 93 94 95 96 97 98
    node 0 size: 96346 MB
    node 0 free: 89847 MB
    node 1 cpus: 11 12 13 14 15 16 17 18 19 20 21 99 100 101 102 103 104 105 106 107 108
    109
    node 1 size: 96764 MB
    node 1 free: 91947 MB
    node 2 cpus: 22 23 24 25 26 27 28 29 30 31 32 110 111 112 113 114 115 116 117 118 119
    120
    node 2 size: 96764 MB
    node 2 free: 90714 MB
    node 3 cpus: 33 34 35 36 37 38 39 40 41 42 43 121 122 123 124 125 126 127 128 129 130
    131
```

(Continued on next page)

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Platform Notes (Continued)

```
   node 3 size: 96764 MB
   node 3 free: 91911 MB
   node 4 cpus: 44 45 46 47 48 49 50 51 52 53 54 132 133 134 135 136 137 138 139 140 141
   142
   node 4 size: 96764 MB
   node 4 free: 90500 MB
   node 5 cpus: 55 56 57 58 59 60 61 62 63 64 65 143 144 145 146 147 148 149 150 151 152
   153
   node 5 size: 96764 MB
   node 5 free: 83445 MB
   node 6 cpus: 66 67 68 69 70 71 72 73 74 75 76 154 155 156 157 158 159 160 161 162 163
   164
   node 6 size: 96764 MB
   node 6 free: 92129 MB
   node 7 cpus: 77 78 79 80 81 82 83 84 85 86 87 165 166 167 168 169 170 171 172 173 174
   175
   node 7 size: 96763 MB
   node 7 free: 92130 MB
   node distances:
   node   0   1   2   3   4   5   6   7
     0:  10  21  31  31  31  31  31  31
     1:  21  10  31  31  31  31  31  31
     2:  31  31  10  21  31  31  31  31
     3:  31  31  21  10  31  31  31  31
     4:  31  31  31  31  10  21  31  31
     5:  31  31  31  31  21  10  31  31
     6:  31  31  31  31  31  31  10  21
     7:  31  31  31  31  31  31  21  10

 From /proc/meminfo
    MemTotal:       792267868 kB
    HugePages_Total:        0
    Hugepagesize:        2048 kB

 /usr/bin/lsb_release -d
    SUSE Linux Enterprise Server 12 SP2

 From /etc/*release* /etc/*version*
    SuSE-release:
       SUSE Linux Enterprise Server 12 (x86_64)
       VERSION = 12
       PATCHLEVEL = 2
       # This file is deprecated and will be removed in a future service pack or release.
       # Please check /etc/os-release for details about this release.
    os-release:
       NAME="SLES"
       VERSION="12-SP2"
```

(Continued on next page)

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Platform Notes (Continued)

```
        VERSION_ID="12.2"
        PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
        ID="sles"
        ANSI_COLOR="0;32"
        CPE_NAME="cpe:/o:suse:sles:12:sp2"

 uname -a:
    Linux linux-e6az 4.4.21-69-default #1 SMP Tue Oct 25 10:58:20 UTC 2016 (9464f67)
    x86_64 x86_64 x86_64 GNU/Linux

 run-level 3 Nov 15 16:43

 SPEC is set to: /home/cpu2017
    Filesystem      Type  Size  Used Avail Use% Mounted on
    /dev/sdc4       xfs   852G   58G  795G   7% /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 U34 09/29/2017
    Memory:
     48x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666

 (End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================
 CC  519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
------------------------------------------------------------------------------
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------


==============================================================================
 CXXC 508.namd_r(base) 510.parest_r(base)
------------------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------


==============================================================================
 CC  511.povray_r(base) 526.blender_r(base)
------------------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
```

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Compiler Version Notes (Continued)

```
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------


==============================================================================
 FC  507.cactuBSSN_r(base)
------------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------


==============================================================================
 FC  503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)
------------------------------------------------------------------------
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------


==============================================================================
 CC  521.wrf_r(base) 527.cam4_r(base)
------------------------------------------------------------------------
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
```
icc
```

C++ benchmarks:
```
icpc
```

Fortran benchmarks:
```
ifort
```

Benchmarks using both Fortran and C:
```
ifort icc
```

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Base Compiler Invocation (Continued)

Benchmarks using both C and C++:
`icpc icc`

Benchmarks using Fortran, C, and C++:
`icpc icc ifort`

Base Portability Flags

503.bwaves_r: `-DSPEC_LP64`
507.cactuBSSN_r: `-DSPEC_LP64`
508.namd_r: `-DSPEC_LP64`
510.parest_r: `-DSPEC_LP64`
511.povray_r: `-DSPEC_LP64`
519.lbm_r: `-DSPEC_LP64`
521.wrf_r: `-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian`
526.blender_r: `-DSPEC_LP64 -DSPEC_LINUX -funsigned-char`
527.cam4_r: `-DSPEC_LP64 -DSPEC_CASE_FLAG`
538.imagick_r: `-DSPEC_LP64`
544.nab_r: `-DSPEC_LP64`
549.fotonik3d_r: `-DSPEC_LP64`
554.roms_r: `-DSPEC_LP64`

Base Optimization Flags

C benchmarks:
`-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch`
`-ffinite-math-only -qopt-mem-layout-trans=3`

C++ benchmarks:
`-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch`
`-ffinite-math-only -qopt-mem-layout-trans=3`

Fortran benchmarks:
`-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch`
`-ffinite-math-only -qopt-mem-layout-trans=3 -nostandard-realloc-lhs`
`-align array32byte`

Benchmarks using both Fortran and C:
`-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch`
`-ffinite-math-only -qopt-mem-layout-trans=3 -nostandard-realloc-lhs`
`-align array32byte`

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Base Optimization Flags (Continued)

Benchmarks using both C and C++:
```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3
```

Benchmarks using Fortran, C, and C++:
```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -nostandard-realloc-lhs
-align array32byte
```

Base Other Flags

C benchmarks:
```
-m64 -std=c11
```

C++ benchmarks:
```
-m64
```

Fortran benchmarks:
```
-m64
```

Benchmarks using both Fortran and C:
```
-m64 -std=c11
```

Benchmarks using both C and C++:
```
-m64 -std=c11
```

Benchmarks using Fortran, C, and C++:
```
-m64 -std=c11
```

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-10-19.html
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-SKX-revF.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-10-19.xml
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-SKX-revF.xml

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

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