SPEC® CPU2017 Floating Point Rate Result

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Fujitsu

PRIMERGY RX2540 M4, Intel Xeon Silver 4110, 2.10GHz

$SPECrate2017\_fp\_base =$ **85.7**

$SPECrate2017\_fp\_peak =$ **88.1**

CPU2017 License: 19	**Test Date:** Mar-2018
Test Sponsor: Fujitsu	**Hardware Availability:** Jul-2017
Tested by: Fujitsu	**Software Availability:** Feb-2018

Copies

Benchmark	Copies	base	peak
503.bwaves_r	32	324	324
507.cactuBSSN_r	32	69.8	
508.namd_r	32	55.6	55.8
510.parest_r	32	61.3	61.6
511.povray_r	32	90.4	104
519.lbm_r	32	68.6	77.8
521.wrf_r	32	96.7	99.4
526.blender_r	32	76.4	76.7
527.cam4_r	32	70.3	70.7
538.imagick_r	32	110	110
544.nab_r	32	96.7	98.2
549.fotonik3d_r	32	95.1	95.1
554.roms_r	32	53.3	55.4

——— SPECrate2017_fp_base (85.7)   - - - - - SPECrate2017_fp_peak (88.1)

Hardware

CPU Name: Intel Xeon Silver 4110
Max MHz.: 3000
Nominal: 2100
Enabled: 16 cores, 2 chips, 2 threads/core
Orderable: 1,2 chips
Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 11 MB I+D on chip per chip
 Other: None
Memory: 384 GB (24 x 16 GB 2Rx4 PC4-2666V-R, running at 2400)
Storage: 384 GB tmpfs
Other: 1 x SATA HDD, 1000 GB, 7200 RPM, used for swap

Software

OS: SUSE Linux Enterprise Server 12 SP2
 4.4.114-92.64-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: Fujitsu BIOS Version V5.0.0.12 R1.17.0 for D3384-A1x. Released Feb-2018
File System: tmpfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None

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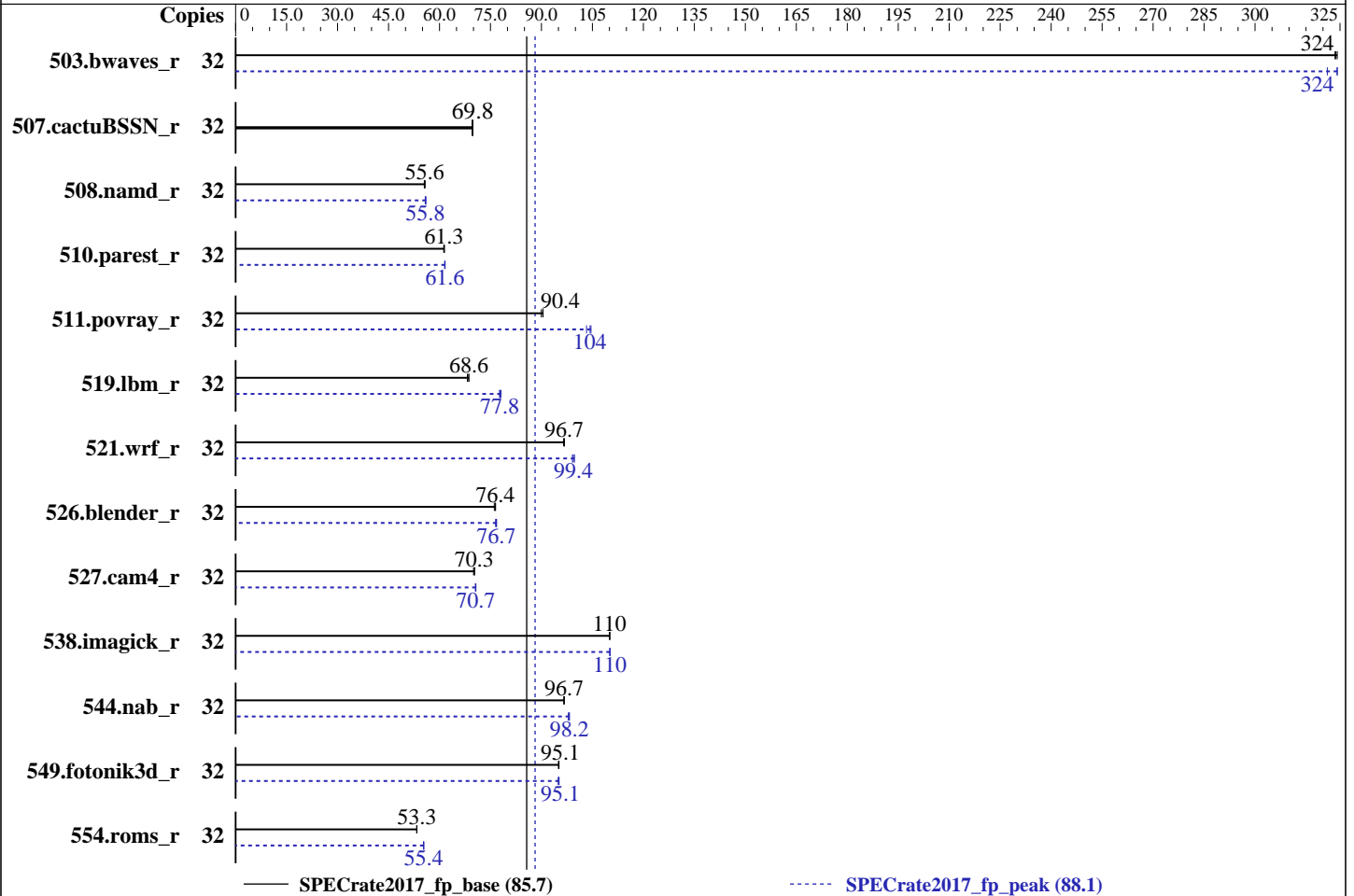SPECrate2017_fp_peak = 88.1

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Test Date: Mar-2018
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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	32	990	324	992	324	**991**	**324**	32	999	321	990	324	**990**	**324**
507.cactuBSSN_r	32	580	69.8	**581**	**69.8**	582	69.6	32	580	69.8	**581**	**69.8**	582	69.6
508.namd_r	32	545	55.8	**547**	**55.6**	547	55.5	32	**544**	**55.8**	543	56.0	545	55.8
510.parest_r	32	1362	61.5	1366	61.3	**1366**	**61.3**	32	**1358**	**61.6**	1358	61.6	1361	61.5
511.povray_r	32	**827**	**90.4**	831	90.0	826	90.5	32	724	103	**716**	**104**	714	105
519.lbm_r	32	491	68.6	495	68.2	**492**	**68.6**	32	434	77.7	432	78.1	**434**	**77.8**
521.wrf_r	32	741	96.8	743	96.5	**742**	**96.7**	32	**721**	**99.4**	723	99.1	719	99.7
526.blender_r	32	640	76.1	637	76.5	**638**	**76.4**	32	**635**	**76.7**	635	76.8	637	76.5
527.cam4_r	32	799	70.0	796	70.3	**797**	**70.3**	32	**792**	**70.7**	792	70.7	793	70.5
538.imagick_r	32	723	110	723	110	**723**	**110**	32	723	110	**723**	**110**	722	110
544.nab_r	32	558	96.6	557	96.7	**557**	**96.7**	32	550	97.9	**548**	**98.2**	548	98.2
549.fotonik3d_r	32	1312	95.0	1310	95.2	**1312**	**95.1**	32	**1311**	**95.1**	1314	94.9	1310	95.2
554.roms_r	32	954	53.3	953	53.4	**953**	**53.3**	32	**918**	**55.4**	920	55.3	918	55.4
SPECrate2017_fp_base =		**85.7**												
SPECrate2017_fp_peak =		**88.1**												

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"
Set Kernel Boot Parameter: nohz_full=1-31
Set CPU frequency governor to maximum performance with:
cpupower -c all frequency-set -g performance
Set tmpfs filesystem with:
mkdir /home/memory
mount -t tmpfs -o size=384g,rw tmpfs /home/memory
Process tuning settings:
cpu idle state set with:
cpupower idle-set -d 1

General Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/memory/speccpu/lib/ia32:/home/memory/speccpu/lib/intel64"
LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/home/memory/speccpu/je5.0.1-32:/home/memory/speccpu/je5.0.1-64"

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Test Sponsor: Fujitsu		**Hardware Availability:**	Jul-2017
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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
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
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>
```

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:
DCU Streamer Prefetcher = Disabled
Override OS Energy Performance = Enabled
Energy Performance = Performance
Package C State limit = C0
LLC Dead Line Alloc = Disabled
Stale AtoS = Enabled
Sub NUMA Clustering = Disabled
IMC Interleaving = 2-way
Fan Control = Full
Sysinfo program /home/memory/speccpu/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on linux-RX2540M4 Thu Mar 29 03:45:12 2018

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) Silver 4110 CPU @ 2.10GHz
      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 : 8
      siblings  : 16
      physical 0: cores 0 1 2 3 4 5 6 7
      physical 1: cores 0 1 2 3 4 5 6 7
```

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Tested by:	Fujitsu	**Software Availability:**	Feb-2018

Platform Notes (Continued)

```
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:    2
     Core(s) per socket:    8
     Socket(s):             2
     NUMA node(s):          2
     Vendor ID:             GenuineIntel
     CPU family:            6
     Model:                 85
     Model name:            Intel(R) Xeon(R) Silver 4110 CPU @ 2.10GHz
     Stepping:              4
     CPU MHz:               2642.355
     CPU max MHz:           3000.0000
     CPU min MHz:           800.0000
     BogoMIPS:              4190.15
     Virtualization:        VT-x
     L1d cache:             32K
     L1i cache:             32K
     L2 cache:              1024K
     L3 cache:              11264K
     NUMA node0 CPU(s):     0-7,16-23
     NUMA node1 CPU(s):     8-15,24-31
     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 invpcid_single pln pts
   dtherm hwp hwp_act_window hwp_epp hwp_pkg_req intel_pt rsb_ctxsw spec_ctrl retpoline
   kaiser 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 : 11264 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 16 17 18 19 20 21 22 23
   node 0 size: 191643 MB
   node 0 free: 182154 MB
```

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Platform Notes (Continued)

```
   node 1 cpus: 8 9 10 11 12 13 14 15 24 25 26 27 28 29 30 31
   node 1 size: 193383 MB
   node 1 free: 192957 MB
   node distances:
   node   0   1
     0:  10  21
     1:  21  10

From /proc/meminfo
   MemTotal:       394267428 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"
      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-RX2540M4 4.4.114-92.64-default #1 SMP Thu Feb 1 19:18:19 UTC 2018
   (c6ce5db) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Mar 28 16:26

SPEC is set to: /home/memory/speccpu
   Filesystem      Type   Size  Used Avail Use% Mounted on
   tmpfs           tmpfs  384G  8.9G  376G   3% /home/memory

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 FUJITSU // American Megatrends Inc. V5.0.0.12 R1.17.0 for D3384-A1x
```

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Platform Notes (Continued)

```
        02/08/2018
      Memory:
        24x Samsung M393A2G40EB2-CTD 16 GB 2 rank 2666, configured at 2400

     (End of data from sysinfo program)
```

Compiler Version Notes

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


==============================================================================
  CC   519.lbm_r(peak) 544.nab_r(peak)
------------------------------------------------------------------------------
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.
------------------------------------------------------------------------------


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


==============================================================================
```

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Compiler Version Notes (Continued)

```
CC    511.povray_r(peak) 526.blender_r(peak)
--------------------------------------------------------------------------
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.
--------------------------------------------------------------------------


==========================================================================
 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   507.cactuBSSN_r(peak)
--------------------------------------------------------------------------
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Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
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ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
--------------------------------------------------------------------------


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


==========================================================================
 FC   554.roms_r(peak)
--------------------------------------------------------------------------
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
--------------------------------------------------------------------------


==========================================================================
 CC   521.wrf_r(base) 527.cam4_r(base)
--------------------------------------------------------------------------
```

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```
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.
------------------------------------------------------------------------


==============================================================================
CC   521.wrf_r(peak) 527.cam4_r(peak)
------------------------------------------------------------------------
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
```

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
```

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Base Portability Flags (Continued)

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-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3`

C++ benchmarks:
`-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3`

Fortran benchmarks:
`-xCORE-AVX2 -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-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte`

Benchmarks using both C and C++:
`-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3`

Benchmarks using Fortran, C, and C++:
`-xCORE-AVX2 -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`

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Base Other Flags (Continued)

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
```

Peak Compiler Invocation

C benchmarks:
```
icc
```

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

Fortran benchmarks:
```
ifort
```

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

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

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

Peak Portability Flags

```
Same as Base Portability Flags
```

Peak Optimization Flags

C benchmarks:

(Continued on next page)

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Peak Optimization Flags (Continued)

519.lbm_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

538.imagick_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3

544.nab_r: Same as 519.lbm_r

C++ benchmarks:
-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

Fortran benchmarks:

503.bwaves_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3
-nostandard-realloc-lhs -align array32byte

549.fotonik3d_r: Same as 503.bwaves_r

554.roms_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -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:
-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte

Benchmarks using both C and C++:
-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: basepeak = yes

SPEC CPU2017 Floating Point Rate Result

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Fujitsu

PRIMERGY RX2540 M4, Intel Xeon Silver 4110, 2.10GHz

SPECrate2017_fp_base = 85.7

SPECrate2017_fp_peak = 88.1

CPU2017 License: 19
Test Sponsor: Fujitsu
Tested by: Fujitsu

Test Date: Mar-2018
Hardware Availability: Jul-2017
Software Availability: Feb-2018

Peak 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/Fujitsu-Platform-Settings-V1.2-SKL-RevE.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/Fujitsu-Platform-Settings-V1.2-SKL-RevE.xml`

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

Tested with SPEC CPU2017 v1.0.2 on 2018-03-29 03:45:11-0400.
Report generated on 2018-10-31 17:48:03 by CPU2017 PDF formatter v6067.
Originally published on 2018-04-17.