SPEC® CPU2017 Floating Point Rate Result

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Inspur Corporation

Inspur NS5162M5 (Intel Xeon Silver 4109T)

SPECrate2017_fp_base =   77.4

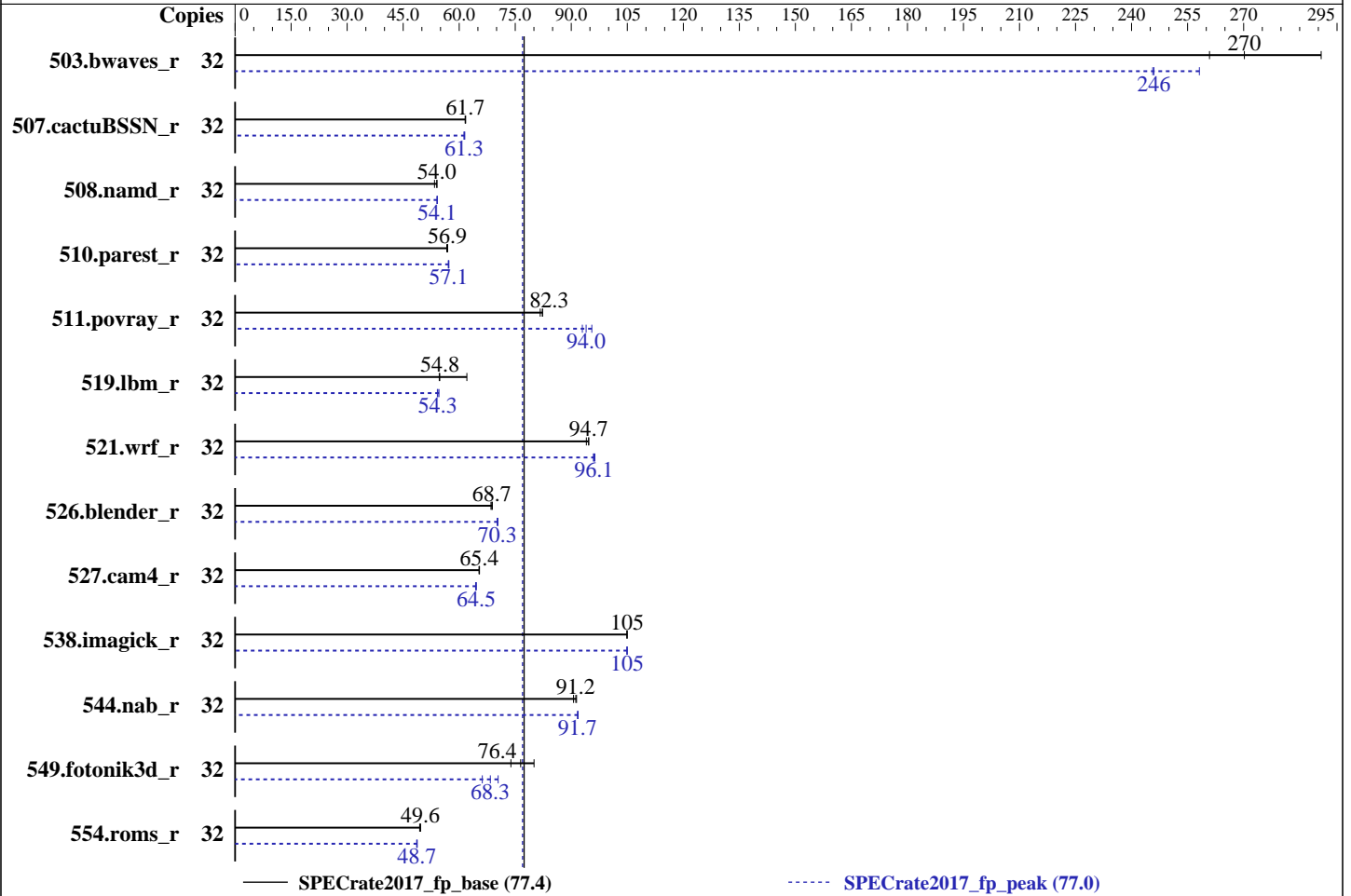SPECrate2017_fp_peak =   77.0

CPU2017 License: 3358

Test Sponsor: Inspur Corporation

Tested by: Inspur Corporation

Test Date: Jun-2019

Hardware Availability: Oct-2017

Software Availability: Mar-2018

Copies	base	peak
503.bwaves_r 32	270	246
507.cactuBSSN_r 32	61.7	61.3
508.namd_r 32	54.0	54.1
510.parest_r 32	56.9	57.1
511.povray_r 32	82.3	94.0
519.lbm_r 32	54.8	54.3
521.wrf_r 32	94.7	96.1
526.blender_r 32	68.7	70.3
527.cam4_r 32	65.4	64.5
538.imagick_r 32	105	105
544.nab_r 32	91.2	91.7
549.fotonik3d_r 32	76.4	68.3
554.roms_r 32	49.6	48.7

——— SPECrate2017_fp_base (77.4)

------ SPECrate2017_fp_peak (77.0)

Hardware

CPU Name: Intel Xeon Silver 4109T

 Max MHz.: 3000

 Nominal: 2000

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 (12 x 32 GB 2Rx4 PC4-2666V-R, running at 2400)

Storage: 1 x 480 GB SATA SSD

Other: None

Software

OS: SUSE Linux Enterprise Server 12 SP2

 4.4.120-92.70-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: Version 4.0.1 released Aug-2018

File System: xfs

System State: Run level 3 (multi-user)

Base Pointers: 64-bit

Peak Pointers: 64-bit

Other: None

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SPECrate2017_fp_peak =   77.0

Results Table

Benchmark	Base						Peak					
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	32	1104	291	**1188**	**270**	1230	261	32	1243	258	**1304**	**246**	1306	246
507.cactuBSSN_r	32	**657**	**61.7**	656	61.7	658	61.6	32	659	61.5	**661**	**61.3**	661	61.3
508.namd_r	32	**563**	**54.0**	569	53.4	562	54.0	32	561	54.2	**562**	**54.1**	563	54.0
510.parest_r	32	1477	56.7	**1472**	**56.9**	1471	56.9	32	1467	57.1	1462	57.2	**1465**	**57.1**
511.povray_r	32	**908**	**82.3**	908	82.3	915	81.7	32	782	95.5	804	93.0	**795**	**94.0**
519.lbm_r	32	544	62.0	**616**	**54.8**	617	54.7	32	618	54.6	623	54.2	**621**	**54.3**
521.wrf_r	32	757	94.7	762	94.0	**757**	**94.7**	32	744	96.3	747	95.9	**746**	**96.1**
526.blender_r	32	708	68.9	712	68.5	**709**	**68.7**	32	695	70.2	**693**	**70.3**	693	70.3
527.cam4_r	32	857	65.3	855	65.4	**856**	**65.4**	32	867	64.6	869	64.4	**867**	**64.5**
538.imagick_r	32	759	105	758	105	**758**	**105**	32	**758**	**105**	758	105	759	105
544.nab_r	32	594	90.6	589	91.4	**590**	**91.2**	32	587	91.7	**587**	**91.7**	586	91.8
549.fotonik3d_r	32	1558	80.0	**1631**	**76.4**	1689	73.8	32	1771	70.4	**1825**	**68.3**	1884	66.2
554.roms_r	32	1024	49.6	1029	49.4	**1025**	**49.6**	32	1043	48.8	**1044**	**48.7**	1046	48.6
SPECrate2017_fp_base =		**77.4**											
SPECrate2017_fp_peak =		**77.0**											

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"
```

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"


 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.
```

(Continued on next page)

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CPU2017 License: 3358
Test Sponsor: Inspur Corporation
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Test Date: Jun-2019
Hardware Availability: Oct-2017
Software Availability: Mar-2018

General Notes (Continued)

```
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 and OS configuration:
SCALING_GOVERNOR set to Performance
Hardware Prefetch set to Disable
VT Support set to Disable
C1E Support set to Disable
IMC (Integrated memory controller) Interleaving set to 1-way
Sub NUMA Cluster (SNC) set to Enable
Sysinfo program /home/CPU2017/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-q537 Wed Jun 19 22:59:56 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) Silver 4109T CPU @ 2.00GHz
      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

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
```

(Continued on next page)

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Platform Notes (Continued)

```
          Model name:             Intel(R) Xeon(R) Silver 4109T CPU @ 2.00GHz
          Stepping:               4
          CPU MHz:                2299.276
          CPU max MHz:            3000.0000
          CPU min MHz:            800.0000
          BogoMIPS:               3990.61
          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 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 stibp 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: 192963 MB
    node 0 free: 181771 MB
    node 1 cpus: 8 9 10 11 12 13 14 15 24 25 26 27 28 29 30 31
    node 1 size: 193384 MB
    node 1 free: 184003 MB
    node distances:
    node   0   1
      0:  10  21
      1:  21  10

 From /proc/meminfo
    MemTotal:       395620848 kB
    HugePages_Total:        0
    Hugepagesize:        2048 kB

 /usr/bin/lsb_release -d
```

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Platform Notes (Continued)

```
    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-q537 4.4.120-92.70-default #1 SMP Wed Mar 14 15:59:43 UTC 2018 (52a83de)
    x86_64 x86_64 x86_64 GNU/Linux

 Kernel self-reported vulnerability status:

 CVE-2017-5754 (Meltdown):         Mitigation: PTI
 CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
 CVE-2017-5715 (Spectre variant 2): Mitigation: IBRS+IBPB

 run-level 3 Jun 19 11:23 last=5

 SPEC is set to: /home/CPU2017
    Filesystem      Type  Size  Used Avail Use% Mounted on
    /dev/sdb3       xfs   407G   66G  342G  17% /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 Inspur 4.0.1 08/30/2018
   Memory:
    4x NO DIMM NO DIMM
    12x Samsung M393A4K40CB2-CTD 32 GB 2 rank 2666, configured at 2400

 (End of data from sysinfo program)
```

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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.
------------------------------------------------------------------------------


==============================================================================
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.
------------------------------------------------------------------------------


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

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Test Date: Jun-2019
Hardware Availability: Oct-2017
Software Availability: Mar-2018

Compiler Version Notes (Continued)

```
  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)
-------------------------------------------------------------------------------
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, 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)
-------------------------------------------------------------------------------
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)
-------------------------------------------------------------------------------
```

(Continued on next page)

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Tested by: Inspur Corporation

Test Date: Jun-2019
Hardware Availability: Oct-2017
Software Availability: Mar-2018

Compiler Version Notes (Continued)

```
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`
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`

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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
```

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
```

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Base Other Flags (Continued)

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:

519.lbm_r: `-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3`

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

544.nab_r: `Same as 519.lbm_r`

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Software Availability: Mar-2018

Peak Optimization Flags (Continued)

C++ benchmarks:
```
-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3
```

Fortran benchmarks:

```
503.bwaves_r: -xCORE-AVX512 -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-AVX512
-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-AVX512 -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-AVX512 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3
```

Benchmarks using Fortran, C, and C++:
```
-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte
```

Peak Other Flags

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

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

Fortran benchmarks:
```
-m64
```

(Continued on next page)

Standard Performance Evaluation Corporation (info@spec.org)   https://www.spec.org/

Inspur Corporation

Inspur NS5162M5 (Intel Xeon Silver 4109T)

SPECrate2017_fp_base =   77.4

SPECrate2017_fp_peak =   77.0

CPU2017 License: 3358
Test Sponsor: Inspur Corporation
Tested by: Inspur Corporation

Test Date: Jun-2019
Hardware Availability: Oct-2017
Software Availability: Mar-2018

Peak Other Flags (Continued)

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.html
http://www.spec.org/cpu2017/flags/Inspur-Platform-Settings-V1.3-SKL.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.xml
http://www.spec.org/cpu2017/flags/Inspur-Platform-Settings-V1.3-SKL.xml
```

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

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