SPEC CPU®2017 Floating Point Speed Result

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Inspur Corporation

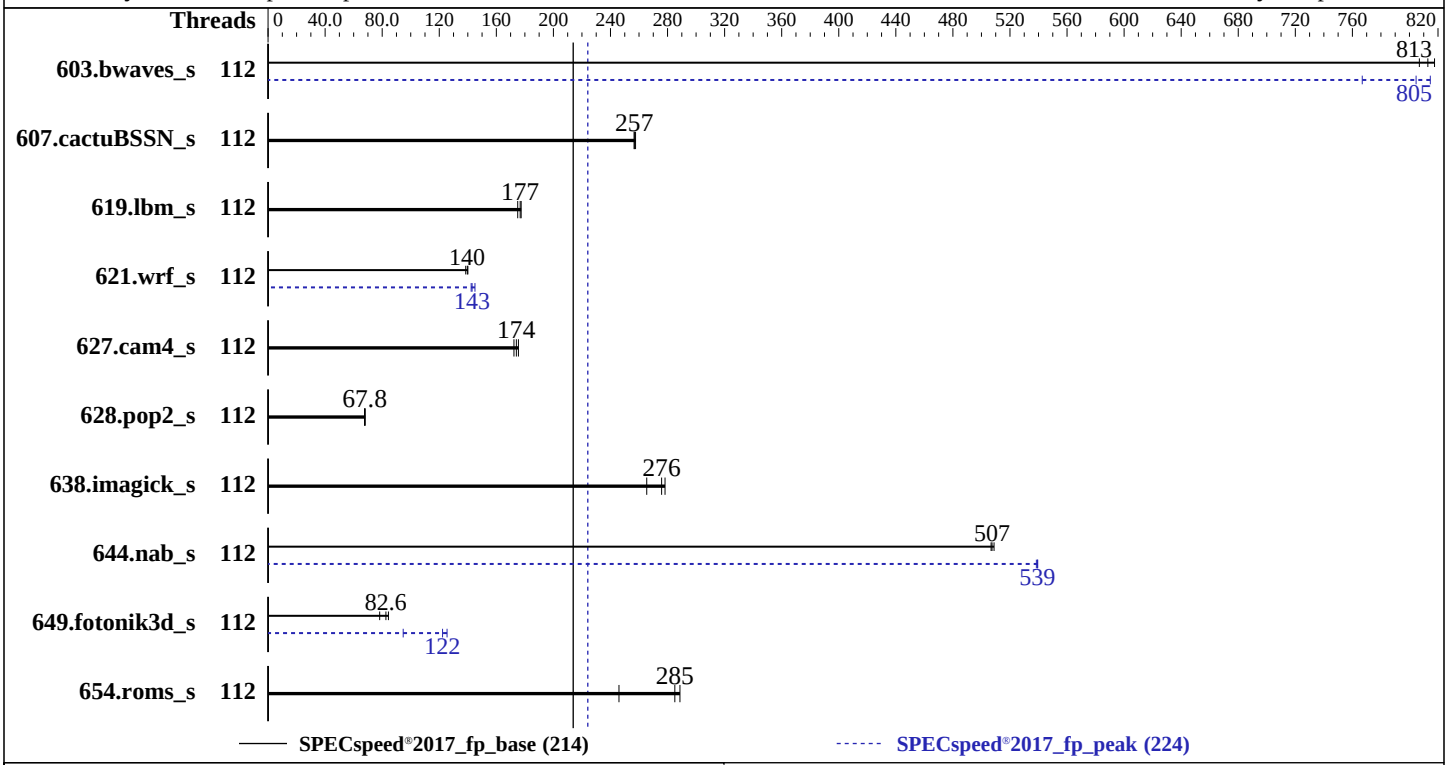
Inspur NF8480M5 (Intel Xeon Platinum 8280M)

SPECspeed®2017_fp_base = 214

SPECspeed®2017_fp_peak = 224

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

Test Date: Sep-2020
Hardware Availability: Feb-2020
Software Availability: Apr-2020



Hardware

CPU Name:	Intel Xeon Platinum 8280M
Max MHz:	4000
Nominal:	2700
Enabled:	112 cores, 4 chips
Orderable:	2,4 chips
Cache L1:	32 KB I + 32 KB D on chip per core
L2:	1 MB I+D on chip per core
L3:	38.5 MB I+D on chip per chip
Other:	None
Memory:	768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)
Storage:	1 x 1 TB SATA SSD
Other:	None

Software

OS:	Red Hat Enterprise Linux release 8.1 (Ootpa) 4.18.0-147.el8.x86_64
Compiler:	C/C++: Version 19.1.1.217 of Intel C/C++ Compiler Build 20200306 for Linux; Fortran: Version 19.1.1.217 of Intel Fortran Compiler Build 20200306 for Linux
Parallel:	Yes
Firmware:	Version 4.1.09 released Sep-2019
File System:	xfs
System State:	Run level 3 (multi-user)
Base Pointers:	64-bit
Peak Pointers:	64-bit
Other:	jemalloc memory allocator V5.0.1
Power Management:	BIOS and OS set to prefer performance at the cost of additional power usage.

Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	112	72.2	818	**72.6**	**813**	73.1	807	112	76.9	767	**73.3**	**805**	72.4	815
607.cactuBSSN_s	112	64.7	258	65.0	257	**64.9**	**257**	112	64.7	258	65.0	257	**64.9**	**257**
619.lbm_s	112	**29.6**	**177**	29.5	177	29.9	175	112	**29.6**	**177**	29.5	177	29.9	175
621.wrf_s	112	95.5	139	**94.7**	**140**	94.4	140	112	91.2	145	**92.5**	**143**	92.9	142
627.cam4_s	112	50.5	175	51.4	172	**50.9**	**174**	112	50.5	175	51.4	172	**50.9**	**174**
628.pop2_s	112	176	67.6	174	68.1	**175**	**67.8**	112	176	67.6	174	68.1	**175**	**67.8**
638.imagick_s	112	**52.3**	**276**	54.4	265	51.8	278	112	**52.3**	**276**	54.4	265	51.8	278
644.nab_s	112	34.3	509	34.5	507	**34.4**	**507**	112	**32.4**	**539**	32.4	539	32.4	539
649.fotonik3d_s	112	**110**	**82.6**	108	84.4	117	78.2	112	96.2	94.7	72.7	125	**74.5**	**122**
654.roms_s	112	64.0	246	54.5	289	**55.2**	**285**	112	64.0	246	54.5	289	**55.2**	**285**

SPECspeed®2017_fp_base = 214

SPECspeed®2017_fp_peak = 224

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"
SCALING_GOVERNOR set to Performance
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/CPU2017/lib/intel64:/home/CPU2017/je5.0.1-64"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"
```

General Notes

```
Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
memory using Redhat Enterprise Linux 8.0
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
```

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General Notes (Continued)

```
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>

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.

jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5,
and the system compiler gcc 4.8.5;
sources available from jemalloc.net or
https://github.com/jemalloc/jemalloc/releases
```

Platform Notes

```
BIOS configuration:
ENERGY_PERF_BIAS_CFG mode 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
Intel Hyper Threading Technology set to Disable

Sysinfo program /home/CPU2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011
running on localhost.localdomain Mon Sep 21 14:05:54 2020

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) Platinum 8280M CPU @ 2.70GHz
      4  "physical id"s (chips)
      112 "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 : 28
      siblings  : 28
      physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
      28 29 30
      physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
```

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Platform Notes (Continued)

```
       28 29 30
      physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
       28 29 30
      physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
       28 29 30

 From lscpu:
      Architecture:        x86_64
      CPU op-mode(s):      32-bit, 64-bit
      Byte Order:          Little Endian
      CPU(s):              112
      On-line CPU(s) list: 0-111
      Thread(s) per core:  1
      Core(s) per socket:  28
      Socket(s):           4
      NUMA node(s):        4
      Vendor ID:           GenuineIntel
      CPU family:          6
      Model:               85
      Model name:          Intel(R) Xeon(R) Platinum 8280M CPU @ 2.70GHz
      Stepping:            6
      CPU MHz:             3680.190
      CPU max MHz:         4000.0000
      CPU min MHz:         1000.0000
      BogoMIPS:            5400.00
      Virtualization:      VT-x
      L1d cache:           32K
      L1i cache:           32K
      L2 cache:            1024K
      L3 cache:            39424K
      NUMA node0 CPU(s):   0-27
      NUMA node1 CPU(s):   28-55
      NUMA node2 CPU(s):   56-83
      NUMA node3 CPU(s):   84-111
      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
      aperfmperf 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 cpuid_fault epb cat_l3 cdp_l3
      invpcid_single intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi
      flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm
      cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
      avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
      cqm_mbm_local dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req pku
      ospke avx512_vnni md_clear flush_l1d arch_capabilities
```

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Platform Notes (Continued)

```
 /proc/cpuinfo cache data
    cache size : 39424 KB

 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 24 25 26 27
   node 0 size: 192113 MB
   node 0 free: 184690 MB
   node 1 cpus: 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
   53 54 55
   node 1 size: 193530 MB
   node 1 free: 193294 MB
   node 2 cpus: 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
   81 82 83
   node 2 size: 193530 MB
   node 2 free: 193332 MB
   node 3 cpus: 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105
   106 107 108 109 110 111
   node 3 size: 193529 MB
   node 3 free: 193335 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

 From /proc/meminfo
    MemTotal:       791249496 kB
    HugePages_Total:       0
    Hugepagesize:       2048 kB

 From /etc/*release* /etc/*version*
    os-release:
       NAME="Red Hat Enterprise Linux"
       VERSION="8.1 (Ootpa)"
       ID="rhel"
       ID_LIKE="fedora"
       VERSION_ID="8.1"
       PLATFORM_ID="platform:el8"
       PRETTY_NAME="Red Hat Enterprise Linux 8.1 (Ootpa)"
       ANSI_COLOR="0;31"
    redhat-release: Red Hat Enterprise Linux release 8.1 (Ootpa)
    system-release: Red Hat Enterprise Linux release 8.1 (Ootpa)
    system-release-cpe: cpe:/o:redhat:enterprise_linux:8.1:ga
```

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Platform Notes (Continued)

```
 uname -a:
    Linux localhost.localdomain 4.18.0-147.el8.x86_64 #1 SMP Thu Sep 26 15:52:44 UTC 2019
    x86_64 x86_64 x86_64 GNU/Linux

 Kernel self-reported vulnerability status:

 CVE-2018-3620 (L1 Terminal Fault):        Not affected
 Microarchitectural Data Sampling:         Not affected
 CVE-2017-5754 (Meltdown):                 Not affected
 CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled
                                           via prctl and seccomp
 CVE-2017-5753 (Spectre variant 1):        Mitigation: usercopy/swapgs barriers and __user
                                           pointer sanitization
 CVE-2017-5715 (Spectre variant 2):        Mitigation: Enhanced IBRS, IBPB: conditional,
                                           RSB filling

 run-level 3 Sep 21 10:07

 SPEC is set to: /home/CPU2017
    Filesystem            Type  Size  Used Avail Use% Mounted on
    /dev/mapper/rhel-home xfs   839G  135G  705G  16% /home

 From /sys/devices/virtual/dmi/id
     BIOS:    Inspur 4.1.09 09/23/2019
     Vendor:  Inspur
     Product: NF8480M5
     Product Family: Type1Family
     Serial:  219598462

 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.
   Memory:
     24x NO DIMM NO DIMM
     24x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

 (End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================
C               | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
                | 644.nab_s(base, peak)
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
```


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Compiler Version Notes (Continued)

```
  Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C++, C, Fortran | 607.cactuBSSN_s(base, peak)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
Fortran         | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
                | 654.roms_s(base, peak)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
Fortran, C      | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
                | 628.pop2_s(base, peak)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
icc

Fortran benchmarks:
ifort

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Base Compiler Invocation (Continued)

Benchmarks using both Fortran and C:
ifort icc

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

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:
-m64 -std=c11 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-mbranches-within-32B-boundaries

Fortran benchmarks:
-m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-nostandard-realloc-lhs -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using both Fortran and C:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

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Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Peak Compiler Invocation

C benchmarks:
icc

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

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

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

619.lbm_s: basepeak = yes

638.imagick_s: basepeak = yes

644.nab_s: -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Fortran benchmarks:

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Peak Optimization Flags (Continued)

603.bwaves_s: `-m64 -Wl,-z,muldefs -prof-gen`(pass 1) `-prof-use`(pass 2)
`-DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -ipo -xCORE-AVX2`
`-O3 -no-prec-div -qopt-prefetch -ffinite-math-only`
`-qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs`
`-mbranches-within-32B-boundaries`
`-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

649.fotonik3d_s: `Same as 603.bwaves_s`

654.roms_s: `basepeak = yes`

Benchmarks using both Fortran and C:

621.wrf_s: `-m64 -std=c11 -Wl,-z,muldefs -prof-gen`(pass 1)
`-prof-use`(pass 2) `-ipo -xCORE-AVX2 -O3 -no-prec-div`
`-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4`
`-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP`
`-mbranches-within-32B-boundaries -nostandard-realloc-lhs`
`-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

627.cam4_s: `basepeak = yes`

628.pop2_s: `basepeak = yes`

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: `basepeak = yes`

The flags files that were used to format this result can be browsed at
`http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.html`
`http://www.spec.org/cpu2017/flags/Inspur-Platform-Settings-V1.9.html`

You can also download the XML flags sources by saving the following links:
`http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.xml`
`http://www.spec.org/cpu2017/flags/Inspur-Platform-Settings-V1.9.xml`

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Tested with SPEC CPU®2017 v1.1.0 on 2020-09-21 14:05:53-0400.
Report generated on 2020-10-14 09:20:48 by CPU2017 PS formatter v6255.
Originally published on 2020-10-13.