## SPEC CPU®2017 Floating Point Rate Result

**Inspur Corporation**

**Inspur NF5280M6 (Intel Xeon Gold 6338N)**

**SPECrates:**
- `SPECrates®2017_fp_base = 378`
- `SPECrates®2017_fp_peak = 401`

### Hardware

- **CPU Name:** Intel Xeon Gold 6338N
- **Max MHz:** 3500
- **Nominal:** 2200
- **Enabled:** 64 cores, 2 chips, 2 threads/core
- **Orderable:** 1,2 chips
- **Cache L1:** 32 KB I + 48 KB D on chip per core
- **L2:** 1.25 MB I+D on chip per core
- **L3:** 48 MB I+D on chip per chip
- **Other:** None
- **Memory:** 1 TB (32 x 32 GB 2Rx4 PC4-3200AA-R, running at 2666)
- **Storage:** 1 x 1 TB SATA SSD
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux release 8.2 (Ootpa) 4.18-193.el8.x86_64
- **Compiler:**
  - C/C++: Version 2021.1 of Intel oneAPI DPC++/C++ Compiler Build 20201113 for Linux;
  - C/C++: Version 2021.1 of Intel C/C++ Compiler Classic Build 20201112 for Linux;
  - Fortran: Version 2021.1 of Intel Fortran Compiler Classic Build 20201112 for Linux
- **Parallel:** No
- **Firmware:** Version 5.00.00 released Apr-2021
- **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.

### Test Details

- **CPU2017 License:** 3358
- **Test Sponsor:** Inspur Corporation
- **Test Date:** May-2021
- **Hardware Availability:** May-2021
- **Tested by:** Inspur Corporation
- **Software Availability:** Jan-2021
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### Performance Results

<table>
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## Inspur Corporation

**Inspur NF5280M6 (Intel Xeon Gold 6338N)**

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## Results Table

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</tbody>
</table>

## 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:
LD_LIBRARY_PATH = "/home/CPU2017/lib/intel64:/home/CPU2017/je5.0.1-64"
MALLOC_CONF = "retain:true"

## General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Red Hat Enterprise Linux 8.1
Transparent Huge Pages enabled by default
Prior to runcpu invocation

(Continued on next page)
Inspur Corporation
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CPU2017 License: 3358
Test Sponsor: Inspur Corporation
Tested by: Inspur Corporation

Test Date: May-2021
Hardware Availability: May-2021
Software Availability: Jan-2021

General Notes (Continued)

Filesystem page cache synced and cleared with:
sync; echo 3> /proc/sys/vm/drop_caches
runcpu command invoked through numactl i.e.:
umactl --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

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
Sub NUMA Cluster (SNC) set to Enable
Intel Hyper Threading Technology set to Enable

Sysinfo program /home/CPU2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca.fc64d
running on localhost.localdomain Fri May 21 19:15:07 2021

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 6338N CPU @ 2.20GHz
  2 "physical id"s (chips)
 128 "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 : 32
siblings : 64
physical 0: cores 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 28 29 30 31

(Continued on next page)
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Platform Notes (Continued)

From lscpu from util-linux 2.32.1:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 128
On-line CPU(s) list: 0-127
Thread(s) per core: 2
Core(s) per socket: 32
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Gold 6338N CPU @ 2.20GHz
Stepping: 6
CPU MHz: 2800.000
CPU max MHz: 3500.0000
CPU min MHz: 800.0000
BogoMIPS: 4400.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 49152K
NUMA node0 CPU(s): 0-15,64-79
NUMA node1 CPU(s): 16-31,80-95
NUMA node2 CPU(s): 32-47,96-111
NUMA node3 CPU(s): 48-63,112-127
Flags: fpu vme de pse move mce cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pe syscall nx pdpe1gb rdtscp lm constant_tsc arch_perfmon pbe bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf 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 3nowprefetch cpuid_fault epb cat_l3 invpcid_single ssbd mbd ibrs ibpb stibp ibrs_enabled tpr_shadow vni f0pxor ept pdcnt tsc_adjust bmi1 hle avx2 smep bmi2 erts invpcid rtm cqm rdt_a avx512f avx512d avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaveopt xsaves xsavec xsaveopt cqm_llc cqm_occip_llc cqm_mbb_total cqm_mbb_local wbnoinvd dtherm ia arat pln pts avx512vmbmi umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdrpid md_clear pconfli flush_l1d arch_capabilities

/proc/cpuinfo cache data
cache size : 49152 KB

(Continued on next page)
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**Platform Notes (Continued)**

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 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 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79  
node 0 size: 257608 MB  
node 0 free: 242234 MB  
node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 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 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79  
node 1 size: 258040 MB  
node 1 free: 245233 MB  
node 2 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79  
node 2 size: 258040 MB  
node 2 free: 245276 MB  
node 3 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 72 73 74 75 76 77 78 79  
node 3 size: 258038 MB  
node 3 free: 245250 MB  
node distances:  
node  0 1 2 3  
0:  10 11 20 20  
1:  11 10 20 20  
2:  20 20 10 11  
3:  20 20 11 10

From `/proc/meminfo`  
MemTotal: 1056489916 kB  
HugePages_Total: 0  
Hugepagesize: 2048 kB

/sbin/tuned-adm active  
Current active profile: throughput-performance

/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has performance

From /etc/*release* /etc/*version*  
os-release:  
NAME="Red Hat Enterprise Linux"  
VERSION="8.2 (Ootpa)"  
ID="rhel"  
ID_LIKE="fedora"  
VERSION_ID="8.2"  
PLATFORM_ID="platform:el8"  
PRETTY_NAME="Red Hat Enterprise Linux 8.2 (Ootpa)"

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### Platform Notes (Continued)

```
ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.2:ga
```

```
uname -a:
Linux localhost.localdomain 4.18.0-193.el8.x86_64 #1 SMP Fri Mar 27 14:35:58 UTC 2020
x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

**CVE-2018-12207 (iTLB Multihit):** Not affected
**CVE-2018-3620 (L1 Terminal Fault):** Not affected
**Microarchitectural Data Sampling:** Not affected
**CVE-2017-5754 (Meltdown):** Mitigation: Speculative Store Bypass disabled via prctl and seccomp
**CVE-2018-3639 (Speculative Store Bypass):** Mitigation: usercopy/swapgs barriers and __user pointer sanitization
**CVE-2017-5753 (Spectre variant 1):** Not affected
**CVE-2017-5715 (Spectre variant 2):** Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
**CVE-2020-0543 (Special Register Buffer Data Sampling):** No status reported
**CVE-2019-11135 (TSX Asynchronous Abort):** Not affected

```
run-level 3 May 21 11:03
```

```
SPEC is set to: /home/CPU2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs 876G 132G 745G 15% /home
```

```
From /sys/devices/virtual/dmi/id
Vendor: MFR
Product: NF5280M6
Product Family: Family
Serial: 380321144
```

Additional information from dmidecode 3.2 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:
32x Samsung M393A4K40DB3-CWE 32 GB 2 rank 3200, configured at 2666
```

```
BIOS:
BIOS Vendor: American Megatrends Inc.
```

(Continued on next page)
### Platform Notes (Continued)

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(End of data from sysinfo program)

### Compiler Version Notes

**C**

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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113
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**C++**

| 508.namd_r(base, peak) | 510.parest_r(base, peak) |

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**C++, C**

| 511.povray_r(peak) |

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**C++, C**

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C++, C | 511.povray_r(peak)

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C++, C | 511.povray_r(base) 526.blender_r(base, peak)

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C++, C, Fortran | 507.cactuBSSN_r(base, peak)

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Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
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Fortran | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)

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(Continued on next page)
Inspur Corporation

Inspur NF5280M6 (Intel Xeon Gold 6338N)

SPECrater®2017_fp_base = 378
SPECrater®2017_fp_peak = 401

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

Test Date: May-2021
Hardware Availability: May-2021
Software Availability: Jan-2021

Compiler Version Notes (Continued)

Fortran, C | 521.wrf_r(peak)
---------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
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Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
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Fortran, C | 521.wrf_r(base) 527.cam4_r(base, peak)
---------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
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Fortran, C | 521.wrf_r(peak)
---------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
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Fortran, C | 521.wrf_r(base) 527.cam4_r(base, peak)
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Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113
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## Base Compiler Invocation

C benchmarks:
- icx

C++ benchmarks:
- icpx

Fortran benchmarks:
- ifort

Benchmarks using both Fortran and C:
- ifort icx

Benchmarks using both C and C++:
- icpx icx

Benchmarks using Fortran, C, and C++:
- icpx icx 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:
- -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
- -flto -mfpmath=sse -funroll-loops -gopt-mem-layout-trans=4
- -mbranches-within-32B-boundaries -ljemalloc
- -L/usr/local/jemalloc64-5.0.1/lib

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Inspur Corporation

Inspur NF5280M6 (Intel Xeon Gold 6338N)

SPECrate®2017_fp_base = 378
SPECrate®2017_fp_peak = 401

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

Test Date: May-2021
Hardware Availability: May-2021
Software Availability: Jan-2021

Base Optimization Flags (Continued)

C++ benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

Fortran benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div
-qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using both Fortran and C:
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-nostandard-realloc-lhs -align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using both C and C++:
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using Fortran, C, and C++:
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-nostandard-realloc-lhs -align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Peak Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx
Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
521.wrf_r: ifort icc
527.cam4_r: ifort icx

Benchmarks using both C and C++:
511.povray_r: icpc icc
526.blender_r: icpx icx

Benchmarks using Fortran, C, and C++:
icpx icx ifort

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
519.lbm_r: basepeak = yes
538.imagick_r: basepeak = yes
544.nab_r: -w -std=c11 -m64 -Wl,-z,mulefs -xCORE-AVX512 -flto
-Ofast -qopt-mem-layout-trans=4
-fimf-accuracy-bits=14:sqrt
-branches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

C++ benchmarks:
508.namd_r: basepeak = yes
510.parest_r: -w -m64 -Wl,-z,mulefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops

(Continued on next page)
**Peak Optimization Flags (Continued)**

510.parest_r (continued):
-qqopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Fortran benchmarks:

503.bwaves_r: -w -m64 -W1, -z, muldefs -xCORE-AVX512 -O3 -ipo
-no-prec-div -qqopt-prefetch -ffinite-math-only
-qqopt-multiple-gather-scatter-by-shuffles
-qqopt-mem-layout-trans=4 -nostandard-realloc-lhs
-align array32byte -auto -mbranches-within-32B-boundaries
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

549.fotonik3d_r: basepeak = yes

554.roms_r: Same as 503.bwaves_r

Benchmarks using both Fortran and C:

521.wrf_r: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512 -O3
-ipo -no-prec-div -qqopt-prefetch -ffinite-math-only
-qqopt-multiple-gather-scatter-by-shuffles
-qqopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

527.cam4_r: basepeak = yes

Benchmarks using both C and C++:

511.povray_r: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512 -O3
-ipo -no-prec-div -qqopt-prefetch -ffinite-math-only
-qqopt-multiple-gather-scatter-by-shuffles
-qqopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

526.blender_r: basepeak = yes

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: basepeak = yes

The flags files that were used to format this result can be browsed at
**Inspur Corporation**

**Inspur NF5280M6 (Intel Xeon Gold 6338N)**

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base = 378</th>
<th>SPECrate®2017_fp_peak = 401</th>
</tr>
</thead>
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<tr>
<td>CPU2017 License: 3358</td>
<td>Test Date: May-2021</td>
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<td>Hardware Availability: May-2021</td>
</tr>
<tr>
<td>Tested by: Inspur Corporation</td>
<td>Software Availability: Jan-2021</td>
</tr>
</tbody>
</table>

You can also download the XML flags sources by saving the following links:

SPEC CPU®2017 Floating Point Rate Result

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