**Inspur Corporation**

**Inspur NF5280M6 (Intel Xeon Silver 4310)**

**SPECrate®2017_int_base = 169**

**SPECrate®2017_int_peak = 174**

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**Hardware**

- **CPU Name:** Intel Xeon Silver 4310
- **Max MHz:** 3300
- **Nominal:** 2100
- **Enabled:** 24 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:** 18 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 4 TB NVME SSD
- **Other:** None

---

**Software**

- **OS:** Red Hat Enterprise Linux release 8.2 (Ootpa) 4.18.0-193.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 05.00.00 released Apr-2021
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 32/64-bit
- **Other:** jemalloc memory allocator V5.0.1
- **Power Management:** B IOS and OS set to prefer performance at the cost of additional power usage.

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**Test Sponsor:** Inspur Corporation

**Test Date:** Jul-2021

**Hardware Availability:** May-2021

**Software Availability:** Dec-2020
## Results Table

<table>
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<td>556</td>
<td>93.3</td>
<td>551</td>
<td>94.1</td>
<td></td>
</tr>
</tbody>
</table>

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:
LD_LIBRARY_PATH =
"/home/CPU2017/lib/intel64:/home/CPU2017/lib/ia32:/home/CPU2017/je5.0.1-32"
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
Filesystem page cache synced and cleared with:
sync; echo 3>/proc/sys/vm/drop_caches

(Continued on next page)
Inspur Corporation

Inspur NF5280M6 (Intel Xeon Silver 4310)

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

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 982a61ec0915b55891ef0e16acaf6da
runtime on localhost.localdomain Tue Jul 13 09:21:08 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) Silver 4310 CPU @ 2.10GHz
  2 "physical id"s (chips)
  48 "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 : 12
  siblings : 24
  physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11
  physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11

From lscpu from util-linux 2.32.1:

(Continued on next page)
Platform Notes (Continued)

Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 48
On-line CPU(s) list: 0-47
Thread(s) per core: 2
Core(s) per socket: 12
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Silver 4310 CPU @ 2.10GHz
Stepping: 6
CPU MHz: 2700.174
CPU max MHz: 3300.0000
CPU min MHz: 800.0000
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 18432K
NUMA node0 CPU(s): 0-5,24-29
NUMA node1 CPU(s): 6-11,30-35
NUMA node2 CPU(s): 12-17,36-41
NUMA node3 CPU(s): 18-23,42-47
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 arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfperf 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
rd indexed lahf_lm abm 3nowprefetch cpuid_fault epb cat_l3 invpcid_single ssbd mba ibrs
ibpb stibp ibrs-enhanced tpr_shadow vmlinux flexpriority ept vpid fsgsbase tsc_adjust
bm1 hle avx2 smep bmi2 erts sse3 invpcid rtm cqm rdt_a avx512f avx512dq rdseed adx smap
avx512ifma clflushopt clwb intel-pt avx512cd sha ni avx512bw avx512vl xsaveopt
xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local wbnoinvd
dtherm ida arat pln pts avx512v bmi umip pku ospe avx512-vbmi2 gfn i vaes vpclmulqdq
avx512_vnni avx512_bitalg tme avx512_vpopcntdq ia57 rdpid md_clear pconfig flush_l1d
arch_capabilities

/proc/cpuinfo cache data
cache size : 18432 KB

From numactl --hardware
WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 4 nodes (0-3)
**SPEC CPU®2017 Integer Rate Result**

**Inspur Corporation**

**Inspur NF5280M6 (Intel Xeon Silver 4310)**

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
<th>= 169</th>
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</thead>
<tbody>
<tr>
<td>SPECrate®2017_int_peak</td>
<td>= 174</td>
</tr>
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</table>

**CPU2017 License:** 3358

**Test Sponsor:** Inspur Corporation

**Tested by:** Inspur Corporation

**Test Date:** Jul-2021

**Hardware Availability:** May-2021

**Software Availability:** Dec-2020

---

### Platform Notes (Continued)

```plaintext
node 0 cpus: 0 1 2 3 4 5 24 25 26 27 28 29
node 0 size: 257640 MB
node 0 free: 257413 MB
node 1 cpus: 6 7 8 9 10 11 30 31 32 33 34 35
node 1 size: 258017 MB
node 1 free: 257732 MB
node 2 cpus: 12 13 14 15 16 17 36 37 38 39 40 41
node 2 size: 258044 MB
node 2 free: 257822 MB
node 3 cpus: 18 19 20 21 22 23 42 43 44 45 46 47
node 3 size: 258042 MB
node 3 free: 257726 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:       1056506892 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)"
    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

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

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/swaps barriers and __user pointer sanitization
- CVE-2017-5753 (Spectre variant 1): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
- 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 Jul 13 09:11

SPEC is set to: /home/CPU2017

From /sys/devices/virtual/dmi/id

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Inspur</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product</td>
<td>NF5280M6</td>
</tr>
<tr>
<td>Product Family</td>
<td>Family</td>
</tr>
<tr>
<td>Serial</td>
<td>380251214</td>
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</tbody>
</table>

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 Micron 36ASF4G72PZ-3G2R1 32 GB 2 rank 3200, configured at 2666

BIOS:

<table>
<thead>
<tr>
<th>BIOS Vendor</th>
<th>American Megatrends Inc.</th>
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<tbody>
<tr>
<td>BIOS Version</td>
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<tr>
<td>BIOS Date</td>
<td>04/25/2021</td>
</tr>
<tr>
<td>BIOS Revision</td>
<td>5.22</td>
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(End of data from sysinfo program)
## SPEC CPU®2017 Integer Rate Result

**Inspur Corporation**  
**Inspur NF5280M6 (Intel Xeon Silver 4310)**  

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### SPECrate®2017_int_base = 169  
### SPECrate®2017_int_peak = 174

#### Compiler Version Notes

```plaintext
<table>
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<tr>
<th>C</th>
<th>500.perlbench_r(peak) 557.xz_r(peak)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000</td>
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**Compiler Version Notes (Continued)**

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```
C       | 500.perlbench_r(peak) 557.xz_r(peak)
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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  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

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C       | 502.gcc_r(peak)
```

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Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

---

```
C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
       | 525.x264_r(base, peak) 557.xz_r(base)
```

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

---

```
C++     | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak)
       | 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)
```

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

---

```
Fortran | 548.exchange2_r(base, 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.
## SPEC CPU®2017 Integer Rate Result

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### Base Compiler Invocation

**C benchmarks:**
- icx

**C++ benchmarks:**
- icpx

**Fortran benchmarks:**
- ifort

### Base Portability Flags

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
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<td>-DSPEC_LP64</td>
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<tr>
<td>mcf_r</td>
<td>-DSPEC_LP64</td>
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<tr>
<td>omnetpp_r</td>
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<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>deepsjeng_r</td>
<td>-DSPEC_LP64 -DSPEC_LINUX</td>
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</tr>
<tr>
<td>xz_r</td>
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</tr>
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</table>

### Base Optimization Flags

**C benchmarks:**
- **-w**
- **-std=c11**
- **-m64**
- **-Wl,-z,muldefs**
- **-xCORE-AVX512**
- **-O3**
- **-ffast-math**
- **-flto**
- **-mfpmath=sse**
- **-funroll-loops**
- **-qopt-mem-layout-trans=4**
- **-mbranches-within-32B-boundaries**
- **-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin**
- **-lqkmalloc**

**C++ benchmarks:**
- **-w**
- **-m64**
- **-Wl,-z,muldefs**
- **-xCORE-AVX512**
- **-O3**
- **-ffast-math**
- **-flto**
- **-mfpmath=sse**
- **-funroll-loops**
- **-qopt-mem-layout-trans=4**
- **-mbranches-within-32B-boundaries**
- **-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin**
- **-lqkmalloc**

**Fortran benchmarks:**
- **-w**
- **-m64**
- **-Wl,-z,muldefs**
- **-xCORE-AVX512**
- **-O3**
- **-ipo**
- **-no-prec-div**
- **-qopt-mem-layout-trans=4**
- **-nostandard-realloc-lhs**
- **-align array32byte**
- **-auto**
- **-mbranches-within-32B-boundaries**

( Continued on next page)
### SPEC CPU®2017 Integer Rate Result

**Inspur Corporation**

**Inspur NF5280M6 (Intel Xeon Silver 4310)**

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<tr>
<th>SPECrate®2017_int_base</th>
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<td>SPECrate®2017_int_peak</td>
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<td>Tested by</td>
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<td>Test Date</td>
<td>Jul-2021</td>
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<tr>
<td>Hardware Availability</td>
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</tbody>
</table>

### Base Optimization Flags (Continued)

Fortran benchmarks (continued):
- `-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin`
- `-lqkmalloc`

### Peak Compiler Invocation

C benchmarks (except as noted below):
- `icx`

500.perlbench_r: `icc`

557.xz_r: `icc`

C++ benchmarks:
- `icpx`

Fortran benchmarks:
- `ifort`

### Peak Portability Flags

500.perlbench_r: `-DSPEC_LP64 -DSPEC_LINUX_X64`
502.gcc_r: `-D_FILE_OFFSET_BITS=64`
505.mcf_r: `-DSPEC_LP64`
520.omnetpp_r: `-DSPEC_LP64`
523.xalancbmk_r: `-DSPEC_LP64 -DSPEC_LINUX`
525.x264_r: `-DSPEC_LP64`
531.deepsjeng_r: `-DSPEC_LP64`
541.leela_r: `-DSPEC_LP64`
548.exchange2_r: `-DSPEC_LP64`
557.xz_r: `-DSPEC_LP64`

### Peak Optimization Flags

C benchmarks:
- `500.perlbench_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512 -ipo -03 -no-prec-div -qopt-mem-layout-trans=4 -fno-strict-overflow -mbranches-within-32B-boundaries`

(Continued on next page)
Inspur Corporation
Inspur NF5280M6 (Intel Xeon Silver 4310)

SPEC CPU®2017 Integer Rate Result
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SPECrate®2017_int_base = 169
SPECrate®2017_int_peak = 174

CPU2017 License: 3358
Test Sponsor: Inspur Corporation
Tested by: Inspur Corporation
Test Date: Jul-2021
Hardware Availability: May-2021
Test Sponsor: Inspur Corporation
Software Availability: Dec-2020

Peak Optimization Flags (Continued)

500.perlbench_r (continued):
- L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
  - lqkmalloc

502.gcc_r: -m32
- L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/ia32_lin
- std=gnu89 -Wl,-z,muldefs -fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto
- Ofast(pass 1) -O3 -ffast-math -qopt-mem-layout-trans=4
  - mbranches-within-32B-boundaries
- L/usr/local/jemalloc32-5.0.1/lib -ljemalloc

505.mcf_r: basepeak = yes

525.x264_r: -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -flto
- O3 -ffast-math -qopt-mem-layout-trans=4 -fno-alias
  - mbranches-within-32B-boundaries
- L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
  - lqkmalloc

557.xz_r: -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
- qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
- L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
  - lqkmalloc

C++ benchmarks:

520.omnetpp_r: basepeak = yes

523.xalancbmk_r: basepeak = yes

531.deepsjeng_r: basepeak = yes

541.leela_r: basepeak = yes

Fortran benchmarks:

548.exchange2_r: basepeak = yes

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Inspur-Platform-Settings-V2.0.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml
http://www.spec.org/cpu2017/flags/Inspur-Platform-Settings-V2.0.xml
### SPEC CPU®2017 Integer Rate Result

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

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