Inspur Corporation

Inspur NF5280M6 (Intel Xeon Gold 5320)

**SPEC CPU®2017 Integer Rate Result**

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

### Results

- **SPECrate®2017_int_base = 360**
- **SPECrate®2017_int_peak = 373**

### Hardware

- **CPU Name:** Intel Xeon Gold 5320
- **Max MHz:** 3400
- **Nominal:** 2200
- **Enabled:** 52 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:** 39 MB I+D on chip per chip
- **Other:** None
- **Memory:** 1 TB (32 x 32 GB 2Rx4 PC4-3200AA-R, running at 2933)
- **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:** BIOS and OS set to prefer performance at the cost of additional power usage.
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Hardware Availability: May-2021
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Results Table

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</tbody>
</table>

SPECrater®2017_int_base = 360
SPECrater®2017_int_peak = 373

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"
MALLOCONF = "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:
General Notes (Continued)

sync; echo 3> /proc/sys/vm/drop_caches
runcpu command invoked through numacll 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.


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

Sysinfo program /home/CPU2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca6f64d
running on localhost.localdomain Mon Jul 26 09:05:48 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 5320 CPU @ 2.20GHz
  2 "physical id"s (chips)
  104 "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 : 26
siblings : 52
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
physical 1: 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

(Continued on next page)
Inspec Corporation

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Table: SPEC CPU®2017 Integer Rate Result
| SPEC CPU®2017 int_base = 360 |
| SPEC CPU®2017 int_peak = 373 |

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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): 104
On-line CPU(s) list: 0-103
Thread(s) per core: 2
Core(s) per socket: 26
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Gold 5320 CPU @ 2.20GHz
Stepping: 6
CPU MHz: 2800.000
CPU max MHz: 3400.0000
CPU min MHz: 800.0000
BogoMIPS: 4400.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 128K
L3 cache: 39936K
NUMA node0 CPU(s): 0-12, 52-64
NUMA node1 CPU(s): 13-25, 65-77
NUMA node2 CPU(s): 26-38, 78-90
NUMA node3 CPU(s): 39-51, 91-103
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 rdtsscp
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
rdimm lahf_lm abm 3nowprefetch cpuid_fault epb cat_l3 invpcid_single ssbd mba ibrs
ibpb stibp ibrs_enhanced tpr_shadow vni flexpriority ept fsgsbase tsc_adjust
bmi1 hle avx2 smep bmi2 erms invpcid rtm cgx rdta avx512f avx512dq rdseed adx smap
avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaveopt
xsaves xgetbv xsavec xsaveopt cqm_llc cqm_occup_llc cqm_mrbm_total cqm_mbb_local
wbnoinvd dtherm ida arat pln pts avx512vmbi umip pku ospke avx512_vmbi gfdi vaes
vpcmulaqavx avx512_vnni avx512_vbitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig
flush_lld arch_capabilities

/proc/cpuinfo cache data
cache size: 39936 KB

From numactl --hardware

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

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<table>
<thead>
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<th>3358</th>
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<tbody>
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</tr>
</tbody>
</table>

### Platform Notes (Continued)

**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 52 53 54 55 56 57 58 59 60 61 62 63 64
node 0 size: 257637 MB
node 0 free: 257267 MB
node 1 cpus: 13 14 15 16 17 18 19 20 21 22 23 24 25 66 67 68 69 70 71 72 73 74 75 76 77
node 1 size: 258042 MB
node 1 free: 257651 MB
node 2 cpus: 26 27 28 29 30 31 32 33 34 35 36 37 38 78 79 80 81 82 83 84 85 86 87 88 89 90
node 2 size: 258042 MB
node 2 free: 257818 MB
node 3 cpus: 39 40 41 42 43 44 45 46 47 48 49 50 51 91 92 93 94 95 96 97 98 99 100 101 102 103
node 3 size: 258012 MB
node 3 free: 257786 MB
node distances:

<table>
<thead>
<tr>
<th>node</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0:</td>
<td>10</td>
<td>11</td>
<td>20</td>
<td>20</td>
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<tr>
<td>1:</td>
<td>11</td>
<td>10</td>
<td>20</td>
<td>20</td>
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<tr>
<td>2:</td>
<td>20</td>
<td>20</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>3:</td>
<td>20</td>
<td>20</td>
<td>11</td>
<td>10</td>
</tr>
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</table>

From /proc/meminfo

<table>
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<tr>
<th>MemTotal:</th>
<th>1056495008 kB</th>
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<tbody>
<tr>
<td>HugePages_Total:</td>
<td>0</td>
</tr>
<tr>
<td>Hugepagesize:</td>
<td>2048 kB</td>
</tr>
</tbody>
</table>

/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)
Inspur Corporation

Inspec NF5280M6 (Intel Xeon Gold 5320)

**SPEC CPU® 2017 Integer Rate Result**

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### Platform Notes (Continued)

```text
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): 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
CVE-2020-0543 (Special Register Buffer Data Sampling): No status reported
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Jul 26 09:04

SPEC is set to: /home/CPU2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs 3.6T 94G 3.5T 3% /home

From /sys/devices/virtual/dmi/id
Vendor: Inspur
Product: NFS280M6
Product Family: Family
Serial: 380251214

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 2933

BIOS:
BIOS Vendor: American Megatrends Inc.
BIOS Version: 05.00.00
BIOS Date: 04/25/2021
BIOS Revision: 5.22

(Continued on next page)
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SPECrates 2017_int_base = 360
SPECrates 2017_int_peak = 373

Platform Notes (Continued)

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C       | 500.perlbench_r(peak) 557.xz_r(peak)
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.
==============================================================================
C       | 502.gcc_r(peak)
Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2021.1 Build 20201113
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
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| 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  
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| C       | 500.perlbench_r(peak) 557.xz_r(peak) |

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.

---

| C       | 502.gcc_r(peak) |

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| 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,  
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| 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.

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| Fortran | 548.exchange2_r(base, peak) |

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on

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Compiler Version Notes (Continued)

Intel(R) 64, Version 2021.1 Build 20201112_000000
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Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

Base Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -DSPEC_LP64
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

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

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<td>Hardware Availability: May-2021</td>
</tr>
<tr>
<td>Tested by: Inspur Corporation</td>
<td>Software Availability: Dec-2020</td>
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</table>

### Base Optimization Flags (Continued)

C++ benchmarks (continued):

- `-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`
- `-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`
**SPEC CPU®2017 Integer Rate Result**

**Inspur Corporation**

**Inspur NF5280M6 (Intel Xeon Gold 5320)**

**SPECrate®2017_int_base = 360**

**SPECrate®2017_int_peak = 373**

<table>
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**Peak Optimization Flags**

C benchmarks:

500.perlbench_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) 
-xCORE-AVX512 -ipo -O3 -no-prec-div 
-qopt-mem-layout-trans=4 -fno-strict-overflow 
-mbranches-within-32B-boundaries 
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin 
-1qkmalloc

502.gcc_r: -m32 
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/ia32_lin 
-std=gnu89 -Wl,-z,muldefs -fprofile-generate(pass 1) 
-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 -1jemalloc

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 
-1qkmalloc

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 
-1qkmalloc

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
## SPEC CPU®2017 Integer Rate Result

### Test Sponsor:
Inspur Corporation

### Hardware Availability:
May-2021

### Software Availability:
Dec-2020

### Hardware:
Inspur NF5280M6 (Intel Xeon Gold 5320)

### Results:
- **SPECrate®2017_int_base = 360**
- **SPECrate®2017_int_peak = 373**

### CPU2017 License:
3358

### Test Date:
Jul-2021

### Tested by:
Inspur Corporation

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The flags files that were used to format this result can be browsed at:


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


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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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