Inspar Corporation

Inspur NE5260M5 (Intel Xeon Gold 5220)

SPEC CPU®2017 Integer Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

SPECrate®2017_int_base = 213
SPECrate®2017_int_peak = 221

Inspur Corporation

Inspur NE5260M5 (Intel Xeon Gold 5220)

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

Test Date: Oct-2020
Hardware Availability: Apr-2019

Tested by:

Inspur Corporation

Software

OS: Red Hat Enterprise Linux release 8.2 (Ootpa)
Compilers: 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

Compiler:

Firmware: Version 2.12.0 released Mar-2020
File System: xfs

Firmware:

System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 32/64-bit

Power Management:

Other: jemalloc memory allocator V5.0.1

Power Management:

Hardware

CPU Name: Intel Xeon Gold 5220
Max MHz: 3900
Nominal: 2200

Enabled: 36 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: 24.75 MB I+D on chip per chip

Other:
Memory: 192 GB (12 x 16 GB 2Rx4 PC4-2933Y-R, running at 2666)
Storage: 1 x 4 TB SATA, 7200 RPM

Other: None

500.perlbench_r 72
502.gcc_r 72
505.mcf_r 72
520.omnetpp_r 72
523.xalancbmk_r 72
525.x264_r 72
531.deepsjeng_r 72
541.leela_r 72
548.exchange2_r 72
557.xz_r 72

Copies

<table>
<thead>
<tr>
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<th>SPECrate®2017_int_base</th>
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SPECrates

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Firmware: Version 2.12.0 released Mar-2020

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.
## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
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<td>132</td>
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</table>

**Compiler Notes**

The inconsistent Compiler version information under Compiler Version section is due to a discrepancy in Intel Compiler. The correct version of C/C++ compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux. The correct version of Fortran compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux.

**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 Redhat Enterprise Linux 8.0
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesystem page cache synced and cleared with:
```bash
csync; echo 3>/proc/sys/vm/drop_caches
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
IMC (Integrated memory controller) Interleaving set to 1-way
Sub NUMA Cluster (SNC) set to Enable
Intel Hyper Threading Technology set to Enable

Sysinfo program /home/CPU2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edbb6e4e46a485a0011
running on localhost.localdomain Fri Oct 30 14:44:07 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
```bash
model name : Intel(R) Xeon(R) Gold 5220 CPU @ 2.20GHz
  2 "physical id"s (chips)
  72 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The following
(Continued on next page)
Platform Notes (Continued)

excerpts from /proc/cpuinfo might not be reliable. Use with caution.)
cpu cores : 18
siblings  : 36
physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 72
On-line CPU(s) list: 0-71
Thread(s) per core: 2
Core(s) per socket: 18
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5220 CPU @ 2.20GHz
Stepping: 7
CPU MHz: 2700.00
CPU max MHz: 3900.0000
CPU min MHz: 1000.0000
BogoMIPS: 4400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 25344K
NUMA node0 CPU(s): 0-2,5,6,9,10,11-15,18,19,22,24,26,27,30,31
NUMA node1 CPU(s): 3,4,7,8,11-13,16,17,19-21,23,25,28-32
NUMA node2 CPU(s): 18-20,23,24,27,28,32,33,34,35,37,38,40-42,45,46,47,49,50-52,53
NUMA node3 CPU(s): 54-56,59-61,63,64,65-67
NUMA node4 CPU(s): 68-69,70,71

Flags:

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

**Inspur Corporation**

Inspur NE5260M5 (Intel Xeon Gold 5220)

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>Test Date:</th>
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<tr>
<td>3358</td>
<td>Oct-2020</td>
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### SPECrate®2017_int_base = 213

### SPECrate®2017_int_peak = 221

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**Platform Notes (Continued)**

/proc/cpuinfo cache data

```
cache size : 25344 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 5 6 9 10 14 15 36 37 38 41 42 45 46 50 51
node 0 size: 46950 MB
node 0 free: 43979 MB
node 1 cpus: 3 4 7 8 11 12 13 16 17 39 40 43 44 47 48 49 52 53
node 1 size: 48352 MB
node 1 free: 40549 MB
node 2 cpus: 18 19 20 23 24 27 28 32 33 54 55 56 59 60 63 64 68 69
node 2 size: 48379 MB
node 2 free: 47944 MB
node 3 cpus: 21 22 25 26 29 30 31 34 35 57 58 61 62 65 66 67 70 71
node 3 size: 48379 MB
node 3 free: 48199 MB
node distances:

```
node   0   1   2   3
0:  10  11  21  21
1:  11  10  21  21
2:  21  21  10  11
3:  21  21  11  10
```

From /proc/meminfo

```
MemTotal:       196671632 kB
HugePages_Total:       0
Hugepagesize:       2048 kB
```

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)
SPEC CPU®2017 Integer Rate Result

Inspur Corporation

Inspur NE5260M5 (Intel Xeon Gold 5220)

- SPECrate®2017_int_base = 213
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CPU2017 License: 3358
Test Sponsor: Inspur Corporation
Tested by: Inspur Corporation

Platform Notes (Continued)

Kernel self-reported vulnerability status:

- itlb_multihit: KVM: Vulnerable
- 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
- tsx_async_abort: Mitigation: Clear CPU buffers; SMT vulnerable

run-level 3 Oct 30 14:39
SPEC is set to: /home/CPU2017

Filesystem            Type  Size  Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs   3.5T   32G  3.5T   1% /home

From /sys/devices/virtual/dmi/id
BIOS:    Inspur 2.12.0 03/02/2020
Vendor:  Inspur
Product: NE5260M5
Product Family: Not specified
Serial:  220658095

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:
- 12x Hynix HMA82GR7JJR8N-WM 16 GB 2 rank 2933
- 4x NO DIMM NO DIMM

(End of data from sysinfo program)

Compiler Version Notes

=======================================
C | 502.gcc_r(peak)
=======================================

Intel(R) C Compiler for applications running on IA-32, Version 2021.1 NextGen
Build 20200304
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Inspur Corporation

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CPU2017 License: 3358
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Test Date: Oct-2020
Hardware Availability: Apr-2019
Software Availability: Apr-2020

Compiler Version Notes (Continued)

------------------------------------------------------------------------------
| 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) C Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

| C       | 500.perlbench_r(peak) 557.xz_r(peak) |

Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

| C       | 502.gcc_r(peak) |

Intel(R) C Compiler for applications running on IA-32, Version 2021.1 NextGen
Build 20200304
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) C Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
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------------------------------------------------------------------------------

| C       | 500.perlbench_r(peak) 557.xz_r(peak) |

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NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

| C       | 502.gcc_r(peak) |

(Continued on next page)
Inspec Corporation

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SPEC CPU®2017 Integer Rate Result

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Compiler Version Notes (Continued)

Intel(R) C Compiler for applications running on IA-32, Version 2021.1 NextGen Build 20200304
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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) C Compiler for applications running on Intel(R) 64, Version 2021.1 NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

=================================================================================
| C       | 500.perlbench_r(peak) 557.xz_r(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.

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

Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1 NextGen Build 20200304
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=================================================================================
| Fortran | 548.exchange2_r(base, peak) |
=================================================================================

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.1.1.217 Build 20200306
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Base Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

(Continued on next page)
## Base Compiler Invocation (Continued)

Fortran benchmarks:

```
ifort
```

## Base Portability Flags

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<tr>
<th>Benchmark</th>
<th>Flags</th>
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<tbody>
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<td>500.perlbench_r</td>
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<tr>
<td>502.gcc_r</td>
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</tr>
<tr>
<td>557.xz_r</td>
<td>-DSPEC_LP64</td>
</tr>
</tbody>
</table>

## Base Optimization Flags

### C benchmarks:

```
-m64  -qnextgen  -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX512 -O3 -ffast-math -ftlo -mfpmath=sse -funroll-loops
-fuse-ld-gold -qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmalloc
```

### C++ benchmarks:

```
-m64  -qnextgen  -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -ftlo -mfpmath=sse
-funroll-loops -fuse-ld-gold -qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmalloc
```

### Fortran benchmarks:

```
-m64  -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -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/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin
-lqkmalloc
```
## SPEC CPU®2017 Integer Rate Result

**Insper Corporation**

**Insper NE5260M5 (Intel Xeon Gold 5220)**

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<th>3358</th>
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</table>

**SPECrate®2017_int_base = 213**

**SPECrate®2017_int_peak = 221**

---

### Peak Compiler Invocation

- **C benchmarks:**
  - icc

- **C++ benchmarks:**
  - icpc

- **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:**
  - `-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/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin`
  - `-lqkmalloc`

- **502.gcc_r:** `-m32`
  - `-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/ia32_lin`
  - `-std=gnu89`
  - `-Wl,-plugin-opt=-x86-branches-within-32B-boundaries`
  - `-Wl,-z,muldefs` `-fprofile-generate(pass 1)`
  - `-fprofile-use=default.profsdata(pass 2)` `-xCORE-AVX512` `-flto`
  - `-O2(pass 1)` `-O3` `-ffast-math` `-qnextgen`
  - `-fuse-ld=gold`
  - `-qopt-mem-layout-trans=4` `-L/usr/local/jemalloc32-5.0.1/lib`
  - `-ljemalloc`

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

505.mcf_r: basepeak = yes

525.x264_r: -m64 -qnextgen -std=c11
-WL,-plugin-opt=-x86-branches-within-32B-boundaries
-WL,-z,muldefs -xCORE-AVX512 -flto -O3 -ffast-math
-fuse-ld=gold -qopt-mem-layout-trans=4 -fno-alias
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/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/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/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

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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