# SPEC CPU® 2017 Integer Rate Result

## Inspur Corporation

### Inspur NF5280M6 (Intel Xeon Silver 4310T)

<table>
<thead>
<tr>
<th>SPECrate® 2017_int_base</th>
<th>149</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate® 2017_int_peak</td>
<td>154</td>
</tr>
</tbody>
</table>

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

### Hardware

- **CPU Name:** Intel Xeon Silver 4310T  
- **Max MHz:** 3400  
- **Nominal:** 2300  
- **Enabled:** 20 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:** 15 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 1 TB (32 x 32 GB 2Rx8 PC4-3200AA-R, running at 2666)  
- **Storage:** 1 x 1.6 TB NVME SSD

### Software

- **OS:** Red Hat Enterprise Linux release 8.2 (Ootpa)  
- **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 05.00.02 released May-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.

---

### Graph

- **SPECrate® 2017_int_base (149)**  
- **SPECrate® 2017_int_peak (154)**

### Table

<table>
<thead>
<tr>
<th>Specbench</th>
<th>Result (base)</th>
<th>Result (peak)</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench</td>
<td>0.16</td>
<td>0.29</td>
</tr>
<tr>
<td>gcc</td>
<td>0.12</td>
<td>0.26</td>
</tr>
<tr>
<td>mcf</td>
<td>0.18</td>
<td>0.31</td>
</tr>
<tr>
<td>omnetpp</td>
<td>0.10</td>
<td>0.21</td>
</tr>
<tr>
<td>xalancbmk</td>
<td>0.18</td>
<td>0.32</td>
</tr>
<tr>
<td>x264</td>
<td>0.18</td>
<td>0.31</td>
</tr>
<tr>
<td>deepsjeng</td>
<td>0.11</td>
<td>0.23</td>
</tr>
<tr>
<td>leela</td>
<td>0.11</td>
<td>0.23</td>
</tr>
<tr>
<td>exchange2</td>
<td>0.11</td>
<td>0.23</td>
</tr>
<tr>
<td>xz</td>
<td>0.15</td>
<td>0.29</td>
</tr>
</tbody>
</table>

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*Copyright 2017-2021 Standard Performance Evaluation Corporation*
## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>40</td>
<td>648</td>
<td><strong>98.3</strong></td>
<td>647</td>
<td>98.3</td>
<td>649</td>
<td>98.2</td>
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<tr>
<td>502.gcc_r</td>
<td>40</td>
<td>438</td>
<td>129</td>
<td>437</td>
<td>130</td>
<td><strong>438</strong></td>
<td><strong>129</strong></td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>40</td>
<td>246</td>
<td>263</td>
<td>247</td>
<td><strong>261</strong></td>
<td>247</td>
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<tr>
<td>520.omnetpp_r</td>
<td>40</td>
<td><strong>503</strong></td>
<td><strong>104</strong></td>
<td>501</td>
<td>105</td>
<td>506</td>
<td>104</td>
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<tr>
<td>523.xalancbmk_r</td>
<td>40</td>
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<tr>
<td>525.x264_r</td>
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<td>299</td>
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<tr>
<td>531.deepsjeng_r</td>
<td>40</td>
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<td>541.leela_r</td>
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<td>106</td>
</tr>
<tr>
<td>548.exchange2_r</td>
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<td>294</td>
<td>360</td>
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<td><strong>358</strong></td>
<td><strong>292</strong></td>
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<tr>
<td>557.xz_r</td>
<td>40</td>
<td>523</td>
<td>82.6</td>
<td>523</td>
<td>82.7</td>
<td><strong>523</strong></td>
<td><strong>82.6</strong></td>
</tr>
</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"

### 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
```

runcpu command invoked through numactl i.e.:
Insapur Corporation

Inspur NF5280M6 (Intel Xeon Silver 4310T)

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

Test Date: Oct-2021
Hardware Availability: May-2021
Software Availability: Dec-2020

General Notes (Continued)

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

Sysinfo program /home/CPU2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca64d
running on localhost.localdomain Fri Oct 22 15:05:46 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 4310T CPU @ 2.30GHz
  2  "physical id"s (chips)
  40 "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 : 10
  siblings : 20
  physical 0: cores 0 1 2 3 4 5 6 7 8 9
  physical 1: cores 0 1 2 3 4 5 6 7 8 9

From lscpu from util-linux 2.32.1:
  Architecture: x86_64
  CPU op-mode(s): 32-bit, 64-bit
  Byte Order: Little Endian

(Continued on next page)
Platform Notes (Continued)

```plaintext
CPU(s):              40
On-line CPU(s) list: 0-39
Thread(s) per core:  2
Core(s) per socket:  10
Socket(s):           2
NUMA node(s):        2
Vendor ID:           GenuineIntel
CPU family:          6
Model:               106
Model name:          Intel(R) Xeon(R) Silver 4310T CPU @ 2.30GHz
Stepping:            6
CPU MHz:             2899.738
CPU max MHz:         3400.0000
CPU min MHz:         800.0000
BogoMIPS:            4600.00
Virtualization:      VT-x
L1d cache:           48K
L1i cache:           32K
L2 cache:            1280K
L3 cache:            15360K
NUMA node0 CPU(s):   0-9,20-29
NUMA node1 CPU(s):   10-19,30-39
Flags:               fpu vme de pse tsc msr pae 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 aperfmpref pni pclmulqdq
                      dtsgs eax67 ftrt pdcm dca lahf_lm abm 3dnowprefetch cpuid_fault
                      epb cat_l3 invpcid_single ssbd mba ibrs
                      ibpb stibp ibrs enhanced tpr_shadow vmm emt64xs opt vpr
                      intel_pstate vsx8dms8 xtrunc bmi1 hle avx2 smep bmi2 erms
                      invpcid rtm cqm rdt_a avx512f avx512fd avx512dq rdseed adx
                      smap avx512ifma clflushopt clwb intel_pt avx512cd sha_ni
                      avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc
                      cqm_occupp_llc cqm_mbmp_total cqm_mbmp_local wbnoinvd
                      dtherm ida arat pln pts avx512vbmi umip pku ospke avx512_vbmi2
                      gfnl vae vpclmulqdq avx512_vnmi avx512_bitalg tme
                      avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d
                      arch_capabilities

/proc/cpuinfo cache data
  cache size : 15360 KB
```

From numactl --hardware
WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 2 nodes (0-1)
  node 0 cpus: 0 1 2 3 4 5 6 7 8 9 20 21 22 23 24 25 26 27 28 29
  node 0 size: 515684 MB
  node 0 free: 515211 MB
  node 1 cpus: 10 11 12 13 14 15 16 17 18 19 30 31 32 33 34 35 36 37 38 39
  node 1 size: 516061 MB
Inspur Corporation

Inspur NF5280M6 (Intel Xeon Silver 4310T)

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SPECrate® 2017 int_base = 149
SPECrate® 2017 int_peak = 154

Platform Notes (Continued)

node 1 free: 515434 MB
node distances:
  node  0  1
  0: 10  20
  1: 20  10

From /proc/meminfo
  MemTotal: 1056507192 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

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):
Inspur Corporation

Inspur NF5280M6 (Intel Xeon Silver 4310T)

SPECrates

- SPECrate\textsuperscript{2017\_}int\_base = 149
- SPECrate\textsuperscript{2017\_}int\_peak = 154

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Platform Notes (Continued)

- 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 Oct 22 14:58

SPEC is set to: /home/CPU2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs 1.5T 113G 1.3T 8% /home

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 18ASF4G72PDZ-3G2E1 32 GB 2 rank 3200, configured at 2666

BIOS:
- BIOS Vendor: American Megatrends Inc.
- BIOS Version: 05.00.02
- BIOS Date: 05/22/2021
- BIOS Revision: 5.22

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
## Compiler Version Notes (Continued)

<table>
<thead>
<tr>
<th>C</th>
<th>500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak) 557.xz_r(base)</th>
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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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Intel(R) C Intel(R) 64 Compiler Classic for applications running on IA-32, Version 2021.1 Build 20201113
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<table>
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==============================================================================

(Continued on next page)
Compiler Version Notes (Continued)

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       | 502.gcc_r(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.

==============================================================================
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.

Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifort
**Insper Corporation**

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

**SPECrate®2017_int_base = 149**

**SPECrate®2017_int_peak = 154**

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

### 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:**


**C++ benchmarks:**


**Fortran benchmarks:**


### Peak Compiler Invocation

**C benchmarks (except as noted below):**

```bash
icc
```

500.perlbench_r: icc

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

557.xz_r: icc

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

## Peak Portability Flags

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
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<tbody>
<tr>
<td>500.perlbench_r</td>
<td>-DSPEC_LP64 -DSPEC_LINUX_X64</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>-D_FILE_OFFSET_BITS=64</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
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<td>557.xz_r</td>
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</tr>
</tbody>
</table>

## 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-bounds 
- /opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin 
  -ljmalloc

502.gcc_r: -m32 
- /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 
- fast(pass 1) -O3 -ffast-math -qopt-mem-layout-trans=4 
- mbranches-within-32B-bounds 
- /usr/local/jemalloc32-5.0.1/lib -ljmalloc

505.mcf_r: basepeak = yes
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---

### Peak Optimization Flags (Continued)

```
525.x264_r: -w -std=c11 -m64 -W1,-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: -W1,-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:


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


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