



# SPEC CPU®2017 Integer Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

## Inspur Corporation

SPECrate®2017\_int\_base = 169

### Inspur NF5280M6 (Intel Xeon Silver 4310)

SPECrate®2017\_int\_peak = 174

CPU2017 License: 3358

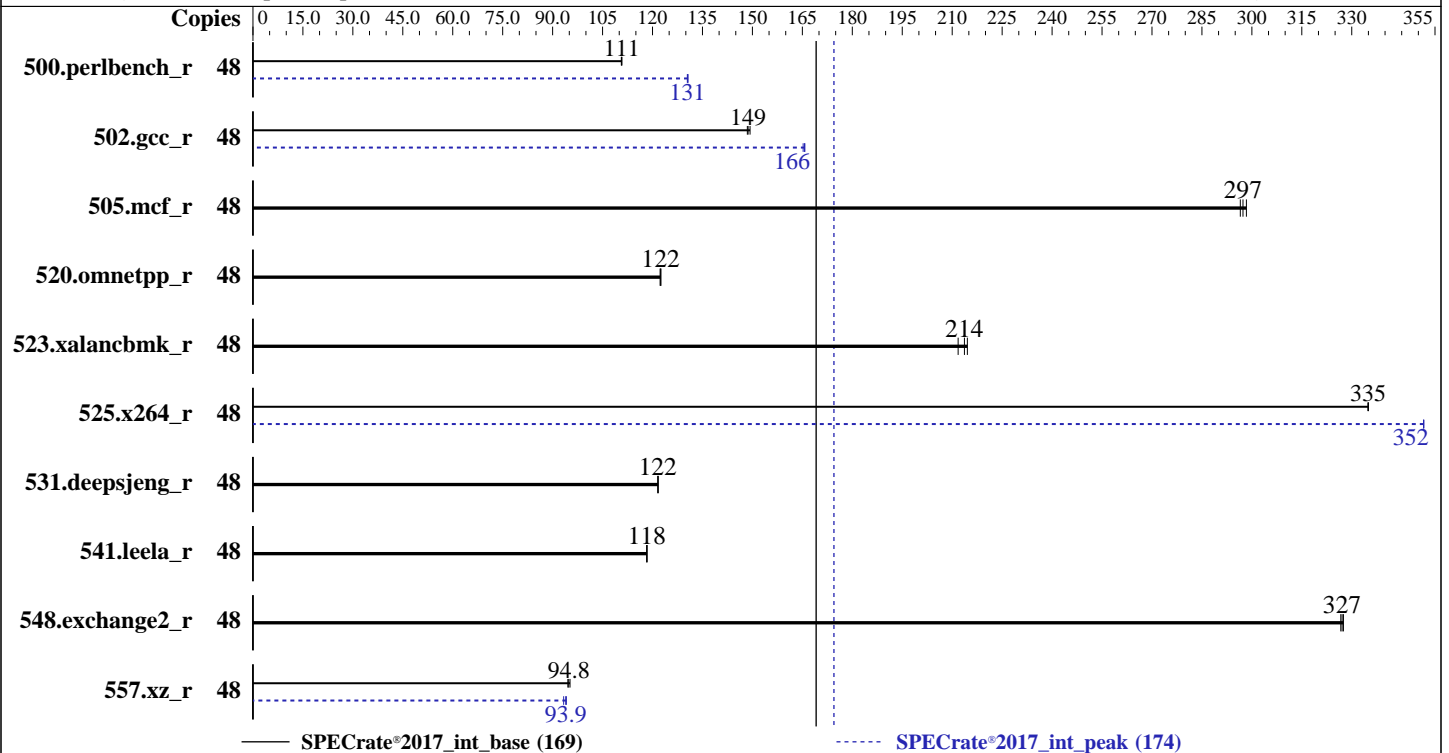
Test Sponsor: Inspur Corporation

Tested by: Inspur Corporation

Test Date: Jul-2021

Hardware Availability: May-2021

Software Availability: Dec-2020



### 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: BIOS and OS set to prefer performance at the cost of additional power usage.



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### Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	48	691	111	690	111	<b>690</b>	<b>111</b>	48	<b>585</b>	<b>131</b>	585	131	586	130
502.gcc_r	48	<b>457</b>	<b>149</b>	455	149	458	148	48	<b>410</b>	<b>166</b>	411	165	410	166
505.mcf_r	48	260	298	262	297	<b>261</b>	<b>297</b>	48	260	298	262	297	<b>261</b>	<b>297</b>
520.omnetpp_r	48	<b>514</b>	<b>122</b>	514	122	515	122	48	<b>514</b>	<b>122</b>	514	122	515	122
523.xalancbmk_r	48	239	212	<b>237</b>	<b>214</b>	236	215	48	239	212	<b>237</b>	<b>214</b>	236	215
525.x264_r	48	251	335	251	335	<b>251</b>	<b>335</b>	48	239	352	239	352	<b>239</b>	<b>352</b>
531.deepsjeng_r	48	452	122	<b>452</b>	<b>122</b>	452	122	48	452	122	<b>452</b>	<b>122</b>	452	122
541.leela_r	48	672	118	672	118	<b>672</b>	<b>118</b>	48	672	118	672	118	<b>672</b>	<b>118</b>
548.exchange2_r	48	385	327	384	328	<b>384</b>	<b>327</b>	48	385	327	384	328	<b>384</b>	<b>327</b>
557.xz_r	48	<b>547</b>	<b>94.8</b>	548	94.6	544	95.2	48	<b>552</b>	<b>93.9</b>	556	93.3	551	94.1

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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

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### 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  
<https://github.com/jemalloc/jemalloc/releases>

### 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 982a61ec0915b55891ef0e16acafc64d

running 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)



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### 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 art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfmpperf 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 3dnowprefetch cpuid_fault epb cat_l3 invpcid_single ssbd mba ibrs
ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust
bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm rdt_a avx512f avx512dq rdseed adx smap
avx512ifma clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl xsaveopt
xsaves xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local wbnoinvd
dtherm ida arat pln pts avx512vbmi umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq
avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 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)
```

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### Platform Notes (Continued)

```

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

```

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## 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):	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 13 09:11

SPEC is set to: /home/CPU2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/mapper/rhel-home	xfs	3.6T	100G	3.5T	3%	/home

From /sys/devices/virtual/dmi/id

```
Vendor:      Inspur
Product:     NF5280M6
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 2666

BIOS:

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

(End of data from sysinfo program)



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## 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)

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-----

=====  
C | 500.perlbench\_r(peak) 557.xz\_r(peak)  
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-----

=====  
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, 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

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=====  
C | 502.gcc\_r(peak)  
=====

Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, 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

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

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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
-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
```

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## Base Optimization Flags (Continued)

Fortran benchmarks (continued):

```
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin  
-lqkmallo
```

## 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 -O3 -no-prec-div

-qopt-mem-layout-trans=4 -fno-strict-overflow

-mbranches-within-32B-boundaries

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## Peak Optimization Flags (Continued)

500.perlbench\_r (continued):

```
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin  
-lqkmallo
```

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.profddata(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 -ljemallo
```

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  
-lqkmallo
```

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  
-lqkmallo
```

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/Intel-ic2021-official-linux64\\_revA.html](http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.html)

<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/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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Inspur Corporation

SPECrate®2017\_int\_base = 169

Inspur NF5280M6 (Intel Xeon Silver 4310)

SPECrate®2017\_int\_peak = 174

**CPU2017 License:** 3358

**Test Sponsor:** Inspur Corporation

**Tested by:** Inspur Corporation

**Test Date:** Jul-2021

**Hardware Availability:** May-2021

**Software Availability:** Dec-2020

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For questions about this result, please contact the tester. For other inquiries, please contact [info@spec.org](mailto:info@spec.org).

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