



# SPEC CPU®2017 Integer Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

## Inspur Corporation

SPECrate®2017\_int\_base = 428

### Inspur NF5280M6 (Intel Xeon Gold 6338)

SPECrate®2017\_int\_peak = 439

CPU2017 License: 3358

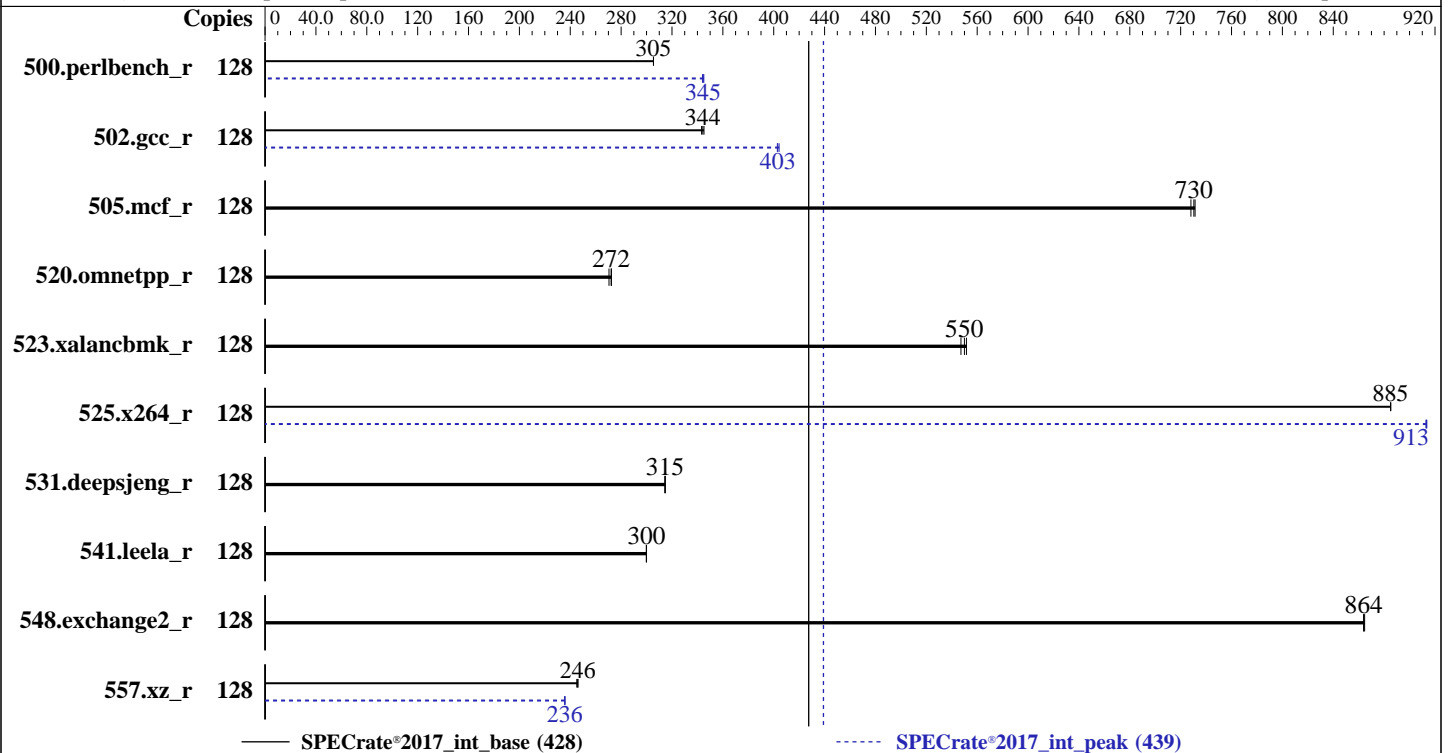
Test Sponsor: Inspur Corporation

Tested by: Inspur Corporation

Test Date: Jul-2022

Hardware Availability: Apr-2021

Software Availability: Sep-2021



### Hardware

CPU Name: Intel Xeon Gold 6338  
 Max MHz: 3200  
 Nominal: 2000  
 Enabled: 64 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: 48 MB I+D on chip per chip  
 Other: None  
 Memory: 1 TB (32 x 32 GB 2Rx8 PC4-3200AA-R)  
 Storage: 1 x 2 TB NVME SSD  
 Other: None

### Software

OS: Red Hat Enterprise Linux release 8.3 (Ootpa)  
 4.18.0-240.el8.x86\_64  
 Compiler: C/C++: Version 2021.4.0 of Intel oneAPI DPC++/C++  
 Compiler Build 20210924 for Linux;  
 Fortran: Version 2021.4.0 of Intel Fortran  
 Compiler Classic Build 20210910 for Linux;  
 C/C++: Version 2021.4.0 of Intel C/C++  
 Compiler Classic Build 20210910 for Linux;  
 Parallel: No  
 Firmware: Version 04.12.02 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	128	667	305	<b>667</b>	<b>305</b>	667	305	128	591	345	<b>591</b>	<b>345</b>	592	344
502.gcc_r	128	<b>527</b>	<b>344</b>	528	343	525	345	128	448	404	450	403	<b>450</b>	<b>403</b>
505.mcf_r	128	284	728	283	731	<b>283</b>	<b>730</b>	128	284	728	283	731	<b>283</b>	<b>730</b>
520.omnetpp_r	128	<b>617</b>	<b>272</b>	621	270	617	272	128	<b>617</b>	<b>272</b>	621	270	617	272
523.xalancbmk_r	128	247	547	<b>246</b>	<b>550</b>	245	552	128	247	547	<b>246</b>	<b>550</b>	245	552
525.x264_r	128	253	885	253	885	<b>253</b>	<b>885</b>	128	<b>245</b>	<b>913</b>	245	914	246	913
531.deepsjeng_r	128	466	315	466	314	<b>466</b>	<b>315</b>	128	466	315	466	314	<b>466</b>	<b>315</b>
541.leela_r	128	<b>707</b>	<b>300</b>	707	300	707	300	128	<b>707</b>	<b>300</b>	707	300	707	300
548.exchange2_r	128	388	864	<b>388</b>	<b>864</b>	388	865	128	388	864	<b>388</b>	<b>864</b>	388	865
557.xz_r	128	564	245	<b>562</b>	<b>246</b>	562	246	128	<b>587</b>	<b>236</b>	587	236	586	236

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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 2x Intel Xeon Platinum 8280M CPU + 384GB RAM memory using Red Hat Enterprise Linux 8.4  
Transparent Huge Pages enabled by default

(Continued on next page)



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## General Notes (Continued)

Prior to runcpu invocation  
Filesystem page cache synced and cleared with:  
sync; echo 3> /proc/sys/vm/drop\_caches

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  
Sub NUMA Cluster (SNC) set to Enable

Sysinfo program /home/cpu2017/bin/sysinfo  
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d  
running on localhost.localdomain Tue Jul 19 06:03:39 2022

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 6338 CPU @ 2.00GHz  
2 "physical id"s (chips)  
128 "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 : 32  
siblings : 64  
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 26 27 28 29 30 31  
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 26 27 28 29 30 31

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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):                128
On-line CPU(s) list:   0-127
Thread(s) per core:    2
Core(s) per socket:    32
Socket(s):             2
NUMA node(s):         8
Vendor ID:             GenuineIntel
CPU family:            6
Model:                106
Model name:            Intel(R) Xeon(R) Gold 6338 CPU @ 2.00GHz
Stepping:              6
CPU MHz:               2600.117
CPU max MHz:           3200.0000
CPU min MHz:           800.0000
BogoMIPS:              4000.00
Virtualization:        VT-x
L1d cache:             48K
L1i cache:             32K
L2 cache:              1280K
L3 cache:              49152K
NUMA node0 CPU(s):    0-7,64-71
NUMA node1 CPU(s):    8-15,72-79
NUMA node2 CPU(s):    16-23,80-87
NUMA node3 CPU(s):    24-31,88-95
NUMA node4 CPU(s):    32-39,96-103
NUMA node5 CPU(s):    40-47,104-111
NUMA node6 CPU(s):    48-55,112-119
NUMA node7 CPU(s):    56-63,120-127
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 cdp_l3 invpcid_single
intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced fsgsbase tsc_adjust bmi1 hle avx2
smep bmi2 erms invpcid 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_mbm_total cqm_mbm_local split_lock_detect 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

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## Platform Notes (Continued)

cache size : 49152 KB

From numactl --hardware

WARNING: a numactl 'node' might or might not correspond to a physical chip.

available: 8 nodes (0-7)

node 0 cpus: 0 1 2 3 4 5 6 7 64 65 66 67 68 69 70 71

node 0 size: 127539 MB

node 0 free: 128726 MB

node 1 cpus: 8 9 10 11 12 13 14 15 72 73 74 75 76 77 78 79

node 1 size: 127247 MB

node 1 free: 128390 MB

node 2 cpus: 16 17 18 19 20 21 22 23 80 81 82 83 84 85 86 87

node 2 size: 127544 MB

node 2 free: 128872 MB

node 3 cpus: 24 25 26 27 28 29 30 31 88 89 90 91 92 93 94 95

node 3 size: 127526 MB

node 3 free: 128885 MB

node 4 cpus: 32 33 34 35 36 37 38 39 96 97 98 99 100 101 102 103

node 4 size: 127414 MB

node 4 free: 128883 MB

node 5 cpus: 40 41 42 43 44 45 46 47 104 105 106 107 108 109 110 111

node 5 size: 127620 MB

node 5 free: 128839 MB

node 6 cpus: 48 49 50 51 52 53 54 55 112 113 114 115 116 117 118 119

node 6 size: 127598 MB

node 6 free: 128858 MB

node 7 cpus: 56 57 58 59 60 61 62 63 120 121 122 123 124 125 126 127

node 7 size: 127599 MB

node 7 free: 128835 MB

node distances:

node 0 1 2 3 4 5 6 7

0: 10 20 20 20 20 20 20 20

1: 20 10 20 20 20 20 20 20

2: 20 20 10 20 20 20 20 20

3: 20 20 20 10 20 20 20 20

4: 20 20 20 20 10 20 20 20

5: 20 20 20 20 20 10 20 20

6: 20 20 20 20 20 20 10 20

7: 20 20 20 20 20 20 20 10

From /proc/meminfo

MemTotal: 1056477640 kB

HugePages\_Total: 0

Hugepagesize: 2048 kB

/sbin/tuned-adm active

Current active profile: throughput-performance

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### Platform Notes (Continued)

/sys/devices/system/cpu/cpu\*/cpufreq/scaling\_governor has performance

From /etc/\*release\* /etc/\*version\*

os-release:

```
NAME="Red Hat Enterprise Linux"
VERSION="8.3 (Ootpa)"
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="8.3"
PLATFORM_ID="platform:el8"
PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
ANSI_COLOR="0;31"
```

redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)

system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)

system-release-cpe: cpe:/o:redhat:enterprise\_linux:8.3:ga

uname -a:

```
Linux localhost.localdomain 4.18.0-240.el8.x86_64 #1 SMP Wed Sep 23 05:13:10 EDT 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):	Not affected
CVE-2019-11135 (TSX Asynchronous Abort):	Not affected

run-level 3 Jul 19 05:57

SPEC is set to: /home/cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/mapper/rhel-home	xfs	1.4T	104G	1.3T	8%	/home

From /sys/devices/virtual/dmi/id  
Vendor: Inspur

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## Platform Notes (Continued)

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 18ASF4G72PDZ-3G2E1 32 GB 2 rank 3200

BIOS:  
BIOS Vendor: American Megatrends Inc.  
BIOS Version: 04.12.02  
BIOS Date: 04/02/2021  
BIOS Revision: 5.21

(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 2021.4.0 Build 20210910\_000000  
Copyright (C) 1985-2021 Intel Corporation. All rights reserved.

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

-----  
Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2021.4.0 Build 20210924  
Copyright (C) 1985-2021 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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## Compiler Version Notes (Continued)

=====  
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 2021.4.0 Build 20210910\_000000  
Copyright (C) 1985-2021 Intel Corporation. All rights reserved.  
-----

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

Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2021.4.0 Build 20210924  
Copyright (C) 1985-2021 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 2021.4.0 Build 20210924  
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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 2021.4.0 Build 20210910\_000000  
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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 2021.4.0 Build 20210924

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## Compiler Version Notes (Continued)

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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 2021.4.0 Build 20210924

Copyright (C) 1985-2021 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 2021.4.0 Build 20210910\_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



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## 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/usr/local/intel/compiler/2021.4.0/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/usr/local/intel/compiler/2021.4.0/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/usr/local/intel/compiler/2021.4.0/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

(Continued on next page)



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## Peak Portability Flags (Continued)

```

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
-L/usr/local/intel/compiler/2021.4.0/linux/compiler/lib/intel64_lin
-lqkmalloc

```

```

502.gcc_r: -m32
-L/usr/local/intel/compiler/2021.4.0/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 -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/usr/local/intel/compiler/2021.4.0/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/intel/compiler/2021.4.0/linux/compiler/lib/intel64_lin
-lqkmalloc

```

C++ benchmarks:

520.omnetpp\_r: basepeak = yes

(Continued on next page)



# SPEC CPU®2017 Integer Rate Result

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Inspur Corporation

SPECrate®2017\_int\_base = 428

Inspur NF5280M6 (Intel Xeon Gold 6338)

SPECrate®2017\_int\_peak = 439

CPU2017 License: 3358

Test Sponsor: Inspur Corporation

Tested by: Inspur Corporation

Test Date: Jul-2022

Hardware Availability: Apr-2021

Software Availability: Sep-2021

## Peak Optimization Flags (Continued)

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-V2.5.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-V2.5.xml>

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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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