# SPEC CPU®2017 Integer Rate Result

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## Inspur Corporation
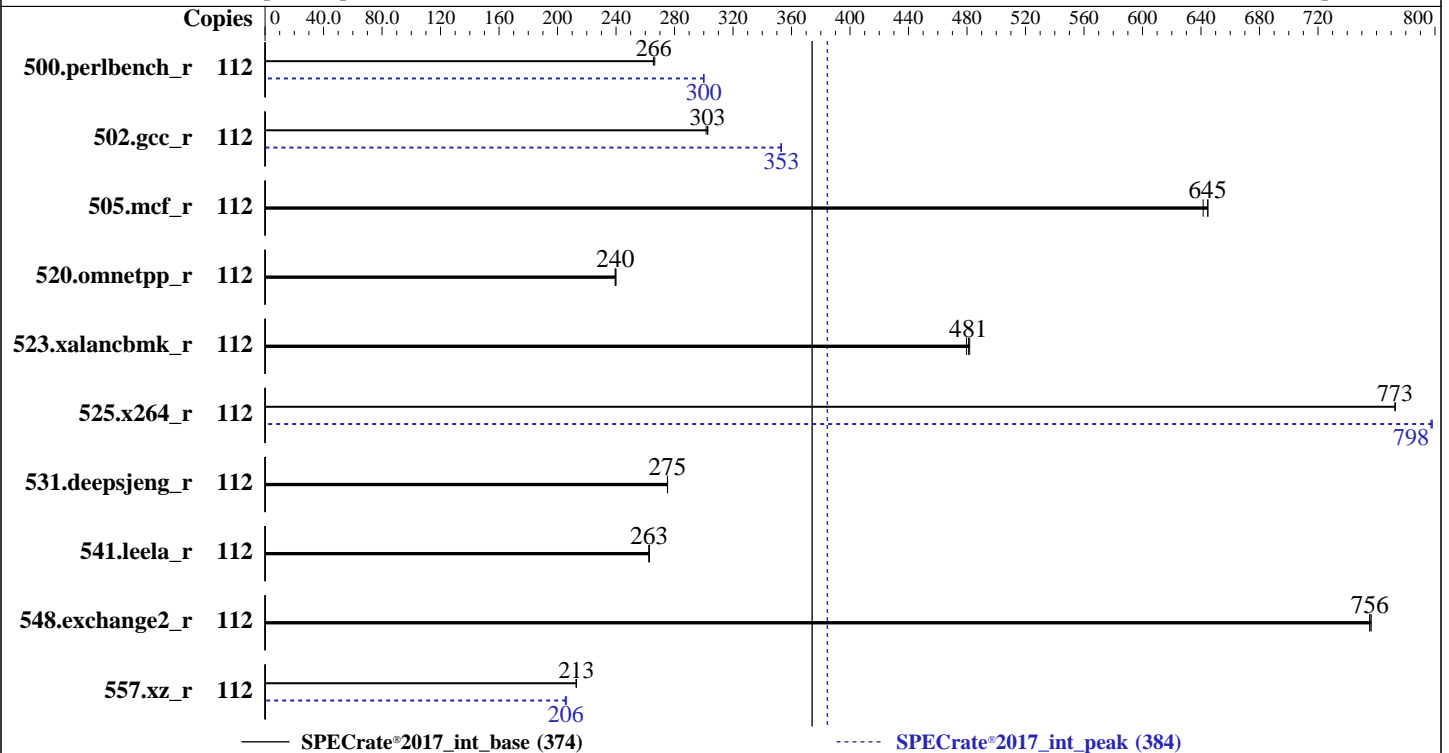
Inspur NF5280M6 (Intel Xeon Gold 6330)

$SPECrate^{®}2017\_int\_base = 374$

$SPECrate^{®}2017\_int\_peak = 384$

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

**Test Date:** Jul-2022
**Hardware Availability:** Apr-2021
**Software Availability:** Sep-2021

| Benchmark | Copies | base | peak |
|---|---|---|---|
| 500.perlbench_r | 112 | 266 | 300 |
| 502.gcc_r | 112 | 303 | 353 |
| 505.mcf_r | 112 | 645 | |
| 520.omnetpp_r | 112 | 240 | |
| 523.xalancbmk_r | 112 | 481 | |
| 525.x264_r | 112 | 773 | 798 |
| 531.deepsjeng_r | 112 | 275 | |
| 541.leela_r | 112 | 263 | |
| 548.exchange2_r | 112 | 756 | |
| 557.xz_r | 112 | 213 | 206 |

SPECrate®2017_int_base (374)       SPECrate®2017_int_peak (384)

## Hardware

CPU Name: Intel Xeon Gold 6330
 Max MHz: 3100
 Nominal: 2000
Enabled: 56 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: 42 MB I+D on chip per chip
 Other: None
Memory: 1 TB (32 x 32 GB 2Rx8 PC4-3200AA-R, running at 2933)
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 | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Base | | | | | | | Peak | | | |
| 500.perlbench_r | 112 | 669 | 266 | **671** | **266** | 671 | 266 | 112 | **594** | **300** | 594 | 300 | 595 | 300 |
| 502.gcc_r | 112 | 524 | 303 | **524** | **303** | 526 | 302 | 112 | 450 | 353 | 449 | 353 | **449** | **353** |
| 505.mcf_r | 112 | 281 | 645 | 282 | 641 | **281** | **645** | 112 | 281 | 645 | 282 | 641 | **281** | **645** |
| 520.omnetpp_r | 112 | **613** | **240** | 614 | 239 | 612 | 240 | 112 | **613** | **240** | 614 | 239 | 612 | 240 |
| 523.xalancbmk_r | 112 | 247 | 480 | 245 | 482 | **246** | **481** | 112 | 247 | 480 | 245 | 482 | **246** | **481** |
| 525.x264_r | 112 | 254 | 773 | **254** | **773** | 254 | 773 | 112 | 246 | 798 | 246 | 797 | **246** | **798** |
| 531.deepsjeng_r | 112 | **466** | **275** | 466 | 275 | 466 | 275 | 112 | **466** | **275** | 466 | 275 | 466 | 275 |
| 541.leela_r | 112 | **706** | **263** | 707 | 262 | 706 | 263 | 112 | **706** | **263** | 707 | 262 | 706 | 263 |
| 548.exchange2_r | 112 | 388 | 755 | **388** | **756** | 388 | 756 | 112 | 388 | 755 | **388** | **756** | 388 | 756 |
| 557.xz_r | 112 | 568 | 213 | **568** | **213** | 569 | 213 | 112 | 589 | 205 | 587 | 206 | **588** | **206** |

SPECrate®2017_int_base = **374**

SPECrate®2017_int_peak = **384**

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"

## 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
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)

```
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 and OS 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
Scaling_Governor set to Performance

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on localhost.localdomain Wed Jul  6 05:20:58 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 6330 CPU @ 2.00GHz
      2  "physical id"s (chips)
      112 "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 : 28
      siblings  : 56
      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
      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

From lscpu from util-linux 2.32.1:
      Architecture:        x86_64
```

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| | | | |
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| **Test Sponsor:** | Inspur Corporation | **Hardware Availability:** | Apr-2021 |
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## Platform Notes (Continued)

```
          CPU op-mode(s):        32-bit, 64-bit
          Byte Order:            Little Endian
          CPU(s):                112
          On-line CPU(s) list:   0-111
          Thread(s) per core:    2
          Core(s) per socket:    28
          Socket(s):             2
          NUMA node(s):          8
          Vendor ID:             GenuineIntel
          CPU family:            6
          Model:                 106
          Model name:            Intel(R) Xeon(R) Gold 6330 CPU @ 2.00GHz
          Stepping:              6
          CPU MHz:               2600.000
          CPU max MHz:           3100.0000
          CPU min MHz:           800.0000
          BogoMIPS:              4000.00
          Virtualization:        VT-x
          L1d cache:             48K
          L1i cache:             32K
          L2 cache:              1280K
          L3 cache:              43008K
          NUMA node0 CPU(s):     0-6,56-62
          NUMA node1 CPU(s):     7-13,63-69
          NUMA node2 CPU(s):     14-20,70-76
          NUMA node3 CPU(s):     21-27,77-83
          NUMA node4 CPU(s):     28-34,84-90
          NUMA node5 CPU(s):     35-41,91-97
          NUMA node6 CPU(s):     42-48,98-104
          NUMA node7 CPU(s):     49-55,105-111
          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
          aperfmperf 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
    cache size : 43008 KB
```

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## Platform Notes (Continued)

```
 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 56 57 58 59 60 61 62
   node 0 size: 127746 MB
   node 0 free: 128851 MB
   node 1 cpus: 7 8 9 10 11 12 13 63 64 65 66 67 68 69
   node 1 size: 127382 MB
   node 1 free: 128328 MB
   node 2 cpus: 14 15 16 17 18 19 20 70 71 72 73 74 75 76
   node 2 size: 127782 MB
   node 2 free: 128882 MB
   node 3 cpus: 21 22 23 24 25 26 27 77 78 79 80 81 82 83
   node 3 size: 127762 MB
   node 3 free: 128881 MB
   node 4 cpus: 28 29 30 31 32 33 34 84 85 86 87 88 89 90
   node 4 size: 127728 MB
   node 4 free: 128807 MB
   node 5 cpus: 35 36 37 38 39 40 41 91 92 93 94 95 96 97
   node 5 size: 127832 MB
   node 5 free: 128837 MB
   node 6 cpus: 42 43 44 45 46 47 48 98 99 100 101 102 103 104
   node 6 size: 127758 MB
   node 6 free: 128875 MB
   node 7 cpus: 49 50 51 52 53 54 55 105 106 107 108 109 110 111
   node 7 size: 127656 MB
   node 7 free: 128895 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:       1056481100 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
```

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## Platform Notes (Continued)

```
    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 6 05:17

 SPEC is set to: /home/cpu2017
    Filesystem          Type  Size  Used Avail Use% Mounted on
    /dev/mapper/rhel-home xfs  1.4T   92G  1.3T   7% /home

 From /sys/devices/virtual/dmi/id
     Vendor:        Inspur
     Product:       NF5280M6
     Product Family: Family
```

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## Platform Notes (Continued)

```
      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, configured at 2933

 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)
------------------------------------------------------------------------------
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.
------------------------------------------------------------------------------


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

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## Compiler Version Notes (Continued)

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--------------------------------------------------------------------------------


================================================================================
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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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
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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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--------------------------------------------------------------------------------
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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
Copyright (C) 1985-2021 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------
```

## 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.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 -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)**

## Inspur Corporation

Inspur NF5280M6 (Intel Xeon Gold 6330)

SPECrate®2017_int_base = 374

SPECrate®2017_int_peak = 384

**CPU2017 License:** 3358　　　　　　　　　　　　　　　　　　**Test Date:**　　　　Jul-2022
**Test Sponsor:**　Inspur Corporation　　　　　　　　　　**Hardware Availability:** Apr-2021
**Tested by:**　　　Inspur Corporation　　　　　　　　　　**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/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/Inspur-Platform-Settings-V2.5.xml`

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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