



SPEC CPU®2017 Integer Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

KTNF

(Test Sponsor: Telecommunications Technology Association)

KTNF KR580S2

(3.00 GHz, Intel Xeon Gold 6354)

SPECrate®2017_int_base = 294

SPECrate®2017_int_peak = 303

CPU2017 License: A83

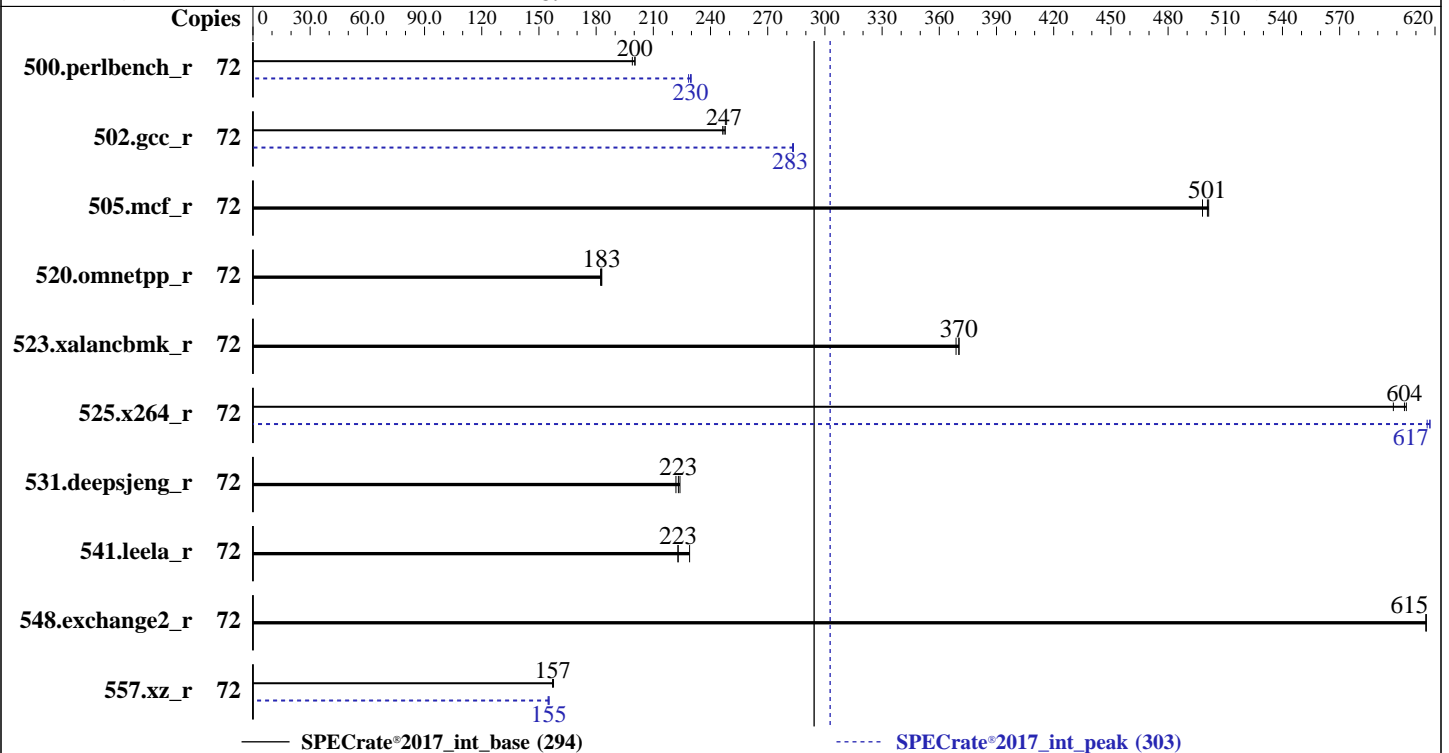
Test Sponsor: Telecommunications Technology Association

Tested by: Telecommunications Technology Association

Test Date: Aug-2021

Hardware Availability: Jul-2021

Software Availability: Jun-2021



Hardware

CPU Name: Intel Xeon Gold 6354
 Max MHz: 3600
 Nominal: 3000
 Enabled: 36 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: 39 MB I+D on chip per chip
 Other: None
 Memory: 1 TB (32 x 32 GB 2Rx4 PC4-3200AA-R)

Storage: 1 X 762 GB SATA SSD
 Other: None

Software

OS: CentOS Linux release 8.2.2004 (Core)
 4.18.0-193.el8.x86_64
 Compiler: C/C++: Version 2021.3.0 of Intel oneAPI DPC++/C++
 Compiler Build 20210619 for Linux;
 Fortran: Version 2021.3.0 of Intel Fortran
 Compiler
 Classic Build 20210609 for Linux;
 C/C++: Version 2021.3.0 of Intel C/C++ Compiler
 Classic Build 20210609 for Linux;
 Parallel: No
 Firmware: Version KM-M640-027-MS1 released Jun-2021
 File System: xfs
 System State: Run level 5 (multi-user)
 Base Pointers: 64-bit
 Peak Pointers: 32/64-bit
 Other: jemalloc: jemalloc memory allocator library
 V5.0.1
 Power Management: Default



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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 | 72 | 576 | 199 | <u>572</u> | <u>200</u> | 572 | 200 | 72 | 499 | 230 | <u>499</u> | <u>230</u> | 502 | 228 |
| 502.gcc_r | 72 | 411 | 248 | <u>413</u> | <u>247</u> | 414 | 246 | 72 | 360 | 283 | 360 | 284 | <u>360</u> | <u>283</u> |
| 505.mcf_r | 72 | <u>232</u> | <u>501</u> | 232 | 501 | 234 | 498 | 72 | <u>232</u> | <u>501</u> | 232 | 501 | 234 | 498 |
| 520.omnetpp_r | 72 | 516 | 183 | 518 | 182 | <u>517</u> | <u>183</u> | 72 | 516 | 183 | 518 | 182 | <u>517</u> | <u>183</u> |
| 523.xalancbmk_r | 72 | 205 | 370 | <u>205</u> | <u>370</u> | 206 | 369 | 72 | 205 | 370 | <u>205</u> | <u>370</u> | 206 | 369 |
| 525.x264_r | 72 | 208 | 605 | 211 | 598 | <u>209</u> | <u>604</u> | 72 | <u>204</u> | <u>617</u> | 205 | 616 | 204 | 617 |
| 531.deepsjeng_r | 72 | <u>370</u> | <u>223</u> | 368 | 224 | 372 | 222 | 72 | <u>370</u> | <u>223</u> | 368 | 224 | 372 | 222 |
| 541.leela_r | 72 | <u>535</u> | <u>223</u> | 535 | 223 | 521 | 229 | 72 | <u>535</u> | <u>223</u> | 535 | 223 | 521 | 229 |
| 548.exchange2_r | 72 | 307 | 615 | <u>307</u> | <u>615</u> | 307 | 615 | 72 | 307 | 615 | <u>307</u> | <u>615</u> | 307 | 615 |
| 557.xz_r | 72 | <u>495</u> | <u>157</u> | 495 | 157 | 493 | 158 | 72 | <u>501</u> | <u>155</u> | 501 | 155 | 502 | 155 |

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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"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:

LD_LIBRARY_PATH =

"/home/spec/speccpu/cpu2017/ia32:/home/spec/speccpu/cpu2017/intel64:/home/spec/speccpu/cpu2017/je5.0.1-32:/home/spec/speccpu/cpu2017/je5.0.1-64"

MALLOC_CONF = "retain:true"

General Notes

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.:
numactl --interleave=all runcpu <etc>

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General Notes (Continued)

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>

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.

Platform Notes

Patrol Scrub -> Disabled
Intel VT for Directed I/O(VT-d) -> Disabled
LLC dead line alloc -> Disabled
SR-IOV Support -> Disabled
CSM Support -> Disabled
SNC set to Enabled

Sysinfo program /home/spec/speccpu/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on localhost.localdomain Wed Aug 11 11:01:31 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) Gold 6354 CPU @ 3.00GHz
2 "physical id"s (chips)
72 "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 : 18
siblings : 36
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

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): 72
On-line CPU(s) list: 0-71
Thread(s) per core: 2

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Platform Notes (Continued)

```

Core(s) per socket: 18
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Gold 6354 CPU @ 3.00GHz
Stepping: 6
CPU MHz: 3600.000
CPU max MHz: 3600.0000
CPU min MHz: 800.0000
BogoMIPS: 6000.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 39936K
NUMA node0 CPU(s): 0-8,36-44
NUMA node1 CPU(s): 9-17,45-53
NUMA node2 CPU(s): 18-26,54-62
NUMA node3 CPU(s): 27-35,63-71
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 hwp hwp_act_window hwp_epp hwp_pkg_req avx512vbmi umip pku
ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg tme
avx512_vpopcntdq la57 rdpid md_clear pconfig flush_lld arch_capabilities

```

```

/proc/cpuinfo cache data
cache size : 39936 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 3 4 5 6 7 8 36 37 38 39 40 41 42 43 44
node 0 size: 257378 MB
node 0 free: 256063 MB
node 1 cpus: 9 10 11 12 13 14 15 16 17 45 46 47 48 49 50 51 52 53
node 1 size: 258043 MB
node 1 free: 256848 MB

```

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Platform Notes (Continued)

```

node 2 cpus: 18 19 20 21 22 23 24 25 26 54 55 56 57 58 59 60 61 62
node 2 size: 258043 MB
node 2 free: 255759 MB
node 3 cpus: 27 28 29 30 31 32 33 34 35 63 64 65 66 67 68 69 70 71
node 3 size: 258013 MB
node 3 free: 256234 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:      1056235408 kB
HugePages_Total:    2048
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*

```

centos-release: CentOS Linux release 8.2.2004 (Core)
centos-release-upstream: Derived from Red Hat Enterprise Linux 8.2 (Source)
os-release:
  NAME="CentOS Linux"
  VERSION="8 (Core)"
  ID="centos"
  ID_LIKE="rhel fedora"
  VERSION_ID="8"
  PLATFORM_ID="platform:el8"
  PRETTY_NAME="CentOS Linux 8 (Core)"
  ANSI_COLOR="0;31"
redhat-release: CentOS Linux release 8.2.2004 (Core)
system-release: CentOS Linux release 8.2.2004 (Core)
system-release-cpe: cpe:/o:centos:centos:8

```

uname -a:

```

Linux localhost.localdomain 4.18.0-193.el8.x86_64 #1 SMP Fri May 8 10:59:10 UTC 2020
x86_64 x86_64 x86_64 GNU/Linux

```

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit): Not affected

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Platform Notes (Continued)

| | |
|--|--|
| 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 5 2021-08-11 10:31

SPEC is set to: /home/spec/speccpu/cpu2017

| | | | | | | |
|------------|------|------|------|-------|------|------------|
| Filesystem | Type | Size | Used | Avail | Use% | Mounted on |
| /dev/sda4 | xfs | 762G | 172G | 590G | 23% | / |

```
From /sys/devices/virtual/dmi/id
Vendor:          SYSTEM_MANUFACTURER
Product:         KM-M640
Product Family:  Family
```

```
Cannot run dmidecode; consider saying (as root)
chmod +s /usr/sbin/dmidecode
```

```
BIOS:
  BIOS Vendor:      American Megatrends International, LLC.
  BIOS Version:     KM-M640-027-MS1
  BIOS Date:        06/07/2021
```

(End of data from sysinfo program)

Compiler Version Notes

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

```
Intel(R) oneAPI DPC++/C++ Compiler 2021.3.0 (2021.3.0.20210619)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/intel/oneapi/compiler/2021.3.0/linux/bin
=====
```

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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) oneAPI DPC++/C++ Compiler 2021.3.0 (2021.3.0.20210619)

Target: x86_64-unknown-linux-gnu

Thread model: posix

InstalledDir: /opt/intel/oneapi/compiler/2021.3.0/linux/bin

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

icc (ICC) 2021.3.0 20210609

Copyright (C) 1985-2021 Intel Corporation. All rights reserved.

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

Intel(R) oneAPI DPC++/C++ Compiler 2021.3.0 (2021.3.0.20210619)

Target: i386-unknown-linux-gnu

Thread model: posix

InstalledDir: /opt/intel/oneapi/compiler/2021.3.0/linux/bin

```
=====
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 2021.3.0 (2021.3.0.20210619)

Target: x86_64-unknown-linux-gnu

Thread model: posix

InstalledDir: /opt/intel/oneapi/compiler/2021.3.0/linux/bin

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

icc (ICC) 2021.3.0 20210609

Copyright (C) 1985-2021 Intel Corporation. All rights reserved.

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

Intel(R) oneAPI DPC++/C++ Compiler 2021.3.0 (2021.3.0.20210619)

(Continued on next page)



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Compiler Version Notes (Continued)

Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/intel/oneapi/compiler/2021.3.0/linux/bin

=====
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 2021.3.0 (2021.3.0.20210619)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/intel/oneapi/compiler/2021.3.0/linux/bin

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

icc (ICC) 2021.3.0 20210609
Copyright (C) 1985-2021 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 2021.3.0 (2021.3.0.20210619)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/intel/oneapi/compiler/2021.3.0/linux/bin

=====
Fortran | 548.exchange2_r(base, peak)

ifort (IFORT) 2021.3.0 20210609
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Base Compiler Invocation

C benchmarks:

icx

C++ benchmarks:

icpx

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Base Compiler Invocation (Continued)

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/2021.3.0/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/opt/intel/oneapi/compiler/2021.3.0/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/opt/intel/oneapi/compiler/2021.3.0/linux/compiler/lib/intel64_lin
-lqkmalloc
```



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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: -w1, -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/opt/intel/oneapi/compiler/2021.3.0/linux/compiler/lib/intel64_lin

-lqkmallo

502.gcc_r: -m32

-L/opt/intel/oneapi/compiler/2021.3.0/linux/compiler/lib/ia32_lin

-std=gnu89 -w1, -z, muldefs -fprofile-generate(pass 1)

-fprofile-use=default.profdatas(pass 2) -xCORE-AVX512 -flto

-Ofast(pass 1) -O3 -ffast-math -qopt-mem-layout-trans=4

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Peak Optimization Flags (Continued)

502.gcc_r (continued):

```
-mbranches-within-32B-boundaries  
-L/usr/local/je5.0.1-32/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/opt/intel/oneapi/compiler/2021.3.0/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/2021.3.0/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/KTNF-Platform-Flags-Version-KM-M640-027-MS1.html>
http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.html

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

<http://www.spec.org/cpu2017/flags/KTNF-Platform-Flags-Version-KM-M640-027-MS1.xml>
http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml

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

Tested with SPEC CPU®2017 v1.1.8 on 2021-08-10 22:01:31-0400.

Report generated on 2021-09-14 19:15:54 by CPU2017 PDF formatter v6442.

Originally published on 2021-09-14.