### SPEC CPU®2017 Integer Rate Result

**xFusion**

FusionServer 1288H V7 (Intel Xeon Gold 6430)

**SPECrates**
- **SPECrates®2017_int_base** = 541
- **SPECrates®2017_int_peak** = 557

**CPU2017 License:** 6488  
**Test Date:** Jun-2023

**Test Sponsor:** xFusion  
**Hardware Availability:** Jan-2023

**Tested by:** xFusion  
**Software Availability:** Dec-2022

<table>
<thead>
<tr>
<th>Benchmark</th>
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<td>395</td>
<td>541</td>
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**Software**

- **OS:** Red Hat Enterprise Linux release 9.0 (Plow) 5.14.0-70.13.1.el9_0.x86_64
- **Compiler:** C/C++: Version 2023.0 of Intel oneAPI DPC++/C++ Compiler for Linux; Fortran: Version 2023.0 of Intel Fortran Compiler for Linux;
- **Parallel:** No
- **Firmware:** Version 2.00.55 Released Mar-2023
- **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

**Hardware**

- **CPU Name:** Intel Xeon Gold 6430
- **Max MHz:** 3400
- **Nominal:** 2100
- **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:** 2 MB I+D on chip per core
- **L3:** 60 MB I+D on chip per chip
- **Other:** None
- **Memory:** 512 GB (16 x 32 GB 2Rx8 PC5-4800B-R, running at 4400)
- **Storage:** 1 x 1920 GB SATA SSD
- **Other:** None
## Results Table

<table>
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SPECrAte²017_int_base = 541

SPECrAte²017_int_peak = 557

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

## Compiler Notes

SPEC has ruled that the compiler used for this result was performing a compilation that specifically improves the performance of the 523.xalancbmk_r / 623.xalanchmk_s benchmarks using a priori knowledge of the SPEC code and dataset to perform a transformation that has narrow applicability.

In order to encourage optimizations that have wide applicability (see rule 1.4 https://www.spec.org/cpu2017/Docs/runrules.html#rule_1.4), SPEC will no longer publish results using this optimization.

This result is left in the SPEC results database for historical reference.

## 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/spec2017-1.1.9-ic2023/lib/intel64:/home/spec2017-1.1.9-ic2023/lib/ia32:/home/spec2017-1.1.9-ic2
023/jc5.0.1-32"
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
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>

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**

BIOS configuration:
Performance Profile Set to Performance
SNC Set to Enable SNC4 (4-clusters)
Sysinfo program /home/spec2017-1.1.9-ic2023/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Mon Jun 12 20:28:30 2023

SUT (System Under Test) info as seen by some common utilities.

```
------------------------------------------------------------
| 1. uname -a     | 2. w     | 3. Username | 4. ulimit -a | 5. sysinfo process ancestry |
| 11. systemctl service manager version: systemd 250 (250-6.e19_0) |
| 12. Failed units, from systemctl list-units --state=failed |
| 13. Services, from systemctl list-unit-files |
| 14. Linux kernel boot-time arguments, from /proc/cmdline |
| 15. cpufreqinfo frequency-info |
| 16. tuned-adm active |
| 17. sysctl |
| 18. /sys/kernel/mm/transparent_hugepage |
| 19. /sys/kernel/mm/transparent_hugepage/linear-page |
| 20. OS release |
| 21. Disk information |
| 22. /sys/devices/virtual/dmi/id |
| 23. dmidecode |
| 24. BIOS |
```

(Continued on next page)
## Platform Notes (Continued)

1. `uname -a`
   ```bash
   Linux localhost.localdomain 5.14.0-70.13.1.el9_0.x86_64 #1 SMP PREEMPT Thu Apr 14 12:42:38 EDT 2022 x86_64 x86_64 GNU/Linux
   ```

2. `w`
   ```bash
   20:28:30 up 3 min,  2 users, load average: 0.15, 0.32, 0.16
   USER     TTY        LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1      20:27    1:02   1.46s  0.07s -bash
   root     pts/0     20:27   36.00s  0.04s  0.04s -bash
   ```

3. `Username`
   ```bash
   From environment variable $USER: root
   ```

4. `ulimit -a`
   ```bash
   real-time non-blocking time (microseconds, -R) unlimited
   core file size (blocks, -c) 0
   data seg size (kbytes, -d) unlimited
   scheduling priority (-e) 0
   file size (blocks, -f) unlimited
   pending signals (-l) 2060168
   max locked memory (kbytes, -l) 64
   max memory size (kbytes, -m) unlimited
   open files (-n) 1024
   pipe size (512 bytes, -p) 8
   POSIX message queues (bytes, -q) 819200
   real-time priority (-r) 0
   stack size (kbytes, -s) unlimited
   cpu time (seconds, -t) unlimited
   max user processes (-u) 2060168
   virtual memory (kbytes, -v) unlimited
   file locks (-x) unlimited
   ```

5. `sysinfo process ancestry`
   ```bash
   /usr/lib/systemd/systemd --switched-root --system --deserialize 28
   login -- root
   -bash
   runcpu --define default-platform-flags --copies 128 -- -c ic2023.0-lin-sapphirerapids-rate-20221201.cfg
   --define smt-on --define cores=64 --define physicalfirst --define invoke_with_interleave --define
   drop_caches --tune base,peak --iterations 2 -o all intrate
   runcpu --define default-platform-flags --copies 128 --configfile
   ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=64 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base,peak --iterations 2 --output_format all
   --nopower --runmode rate --tune rate --tune_refrate intrate --nopreenv --note-reprev --logfile
   $SPEC/tmp/CPU2017.061/templogs/preenv.intrate.061.0.log --lognum 061.0 --from_runcpu 2
   specperl $SPEC/bin/sysinfo
   $SPEC = /home/spec2017-1.1.9-ic2023
   ```

6. `/proc/cpuinfo`
   ```bash
   model name : Intel(R) Xeon(R) Gold 6430
   vendor_id : GenuineIntel
   cpu family : 6
   model : 143
   stepping : 8
   ```
   (Continued on next page)
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CPU2017 License: 6488
Test Sponsor: xFusion
Tested by: xFusion

Test Date: Jun-2023
Hardware Availability: Jan-2023
Software Availability: Dec-2022

Platform Notes (Continued)

- microcode : 0x2b000111
- bugs : spectre_v1 spectre_v2 spec_store_bypass swapgs
- cpu cores : 32
- siblings : 64
- 2 physical ids (chips)
- 128 processors (hardware threads)
- physical id 0: core ids 0-31
- physical id 1: core ids 0-31
- physical id 0: apicids 0-63
- physical id 1: apicids 128-191

Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for virtualized systems. Use the above data carefully.

--------------------------------------------
7. lscpu

From lscpu from util-linux 2.37.4:

Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Address sizes: 46 bits physical, 57 bits virtual
Byte Order: Little Endian
CPU(s): 128
On-line CPU(s) list: 0-127
Vendor ID: GenuineIntel
BIOS Vendor ID: Intel(R) Corporation
Model name: Intel(R) Xeon(R) Gold 6430
BIOS Model name: Intel(R) Xeon(R) Gold 6430
CPU family: 6
Model: 143
Thread(s) per core: 2
Core(s) per socket: 32
Socket(s): 2
Stepping: 8
BogoMIPS: 4200.00

Flags:

Virtualization: VT-x
L1d cache: 3 MiB (64 instances)
L1i cache: 2 MiB (64 instances)
L2 cache: 128 MiB (64 instances)
L3 cache: 120 MiB (2 instances)
NUMA node(s): 8
NUMA node0 CPU(s): 0-7,64-71
NUMA node1 CPU(s): 8-15,72-79
NUMA node2 CPU(s): 16-23,80-87

(Continued on next page)
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Platform Notes (Continued)

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
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl
Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected

From lscpu --cache:
NAME ONE-SIZE ALL-SIZE WAYS TYPE LEVEL SETS PHY-LINE COHERENCY-SIZE
L1d 48K 3M 12 Data 1 64 1 64
L1i 32K 2M 8 Instruction 1 64 1 64
L2 2M 128M 16 Unified 2 2048 1 64
L3 60M 120M 15 Unified 3 65536 1 64

-----------------------------------------------------------------------------------------------
8. numactl --hardware
available: 8 nodes (0-7)
note: a numactl 'node' might or might not correspond to a physical chip.
node 0 cpus: 0-7,64-71
node 0 size: 63569 MB
node 0 free: 60743 MB
node 1 cpus: 8-15,72-79
node 1 size: 64472 MB
node 1 free: 64085 MB
node 2 cpus: 16-23,80-87
node 2 size: 64508 MB
node 2 free: 64058 MB
node 3 cpus: 24-31,88-95
node 3 size: 64508 MB
node 3 free: 64197 MB
node 4 cpus: 32-39,96-103
node 4 size: 64508 MB
node 4 free: 64219 MB
node 5 cpus: 40-47,104-111
node 5 size: 64508 MB
node 5 free: 64282 MB
node 6 cpus: 48-55,112-119
node 6 size: 64508 MB
node 6 free: 61008 MB
node 7 cpus: 56-63,120-127
node 7 size: 64497 MB
node 7 free: 64221 MB
node distances:
node 0 1 2 3 4 5 6 7
0: 10 12 12 12 12 12 12 12
1: 12 10 12 12 12 12 12 12
2: 12 12 10 12 12 12 12 12
3: 12 12 12 10 12 12 12 12
4: 21 21 21 21 10 12 12 12
5: 21 21 21 21 12 10 12 12
6: 21 21 21 21 12 12 10 12
7: 21 21 21 21 12 12 12 10

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Platform Notes (Continued)

9. /proc/meminfo
   MemTotal: 527440848 KB

10. who -r
    run-level 3 Jun 12 20:25

11. Systemd service manager version: systemd 250 (250-6.el9_0)
    Default Target Status
    multi-user degraded

12. Failed units, from systemctl list-units --state=failed
    UNIT LOAD ACTIVE SUB DESCRIPTION
    * sep5.service loaded failed systemd script to load sep5 driver at boot time

13. Services, from systemctl list-unit-files
    STATE UNIT FILES
    enabled NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd chronyd crond
dbus-broker getty@ irqbalance kdump lvm2-monitor mdmonitor microcode nis-domainname
    rhsmcertd rsyslog sepk5 sshd ssd sssd systemd systemd-network-generator tuned udisks2 upower
    enabled-runtime systemd-remount-fs
    disabled arp-ethers blk-availability canberra-system-bootup canberra-system-shutdown
canberra-system-shutdown-reboot chrony-wait console-getty cputop debug-shell firewalld
dainal-getty@ ssd-keygen@ systemd-boot-check-no-failures systemd-pstore systemd-sysext
    indirect sssd-autofs sssd-kcm ssssd-ns ssssd-pac ssssd-pam ssssd-ssh ssssd-sudo

14. Linux kernel boot-time arguments, from /proc/cmdline
    BOOT_IMAGE=(hd0,gpt2)/vmlinuz-5.14.0-70.13.1.el9_0.x86_64
    root=/dev/mapper/rhel-root
    ro
    crashkernel=1G-4G:192M,4G-64G:256M,64G-:512M
    resume=/dev/mapper/rhel-swap
    rd.lvm.lv=rhel/root
    rd.lvm.lv=rhel/swap

15. cpupower frequency-info
    analyzing CPU 0:
    Unable to determine current policy
    boost state support:
      Supported: yes
      Active: yes

16. tuned-adm active
    Current active profile: throughput-performance

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#### Platform Notes (Continued)

```plaintext
vm.dirty_background_bytes           0
vm.dirty_background_ratio          10
vm.dirty_bytes                      0
vm.dirty_expire_centisecs        3000
vm.dirty_ratio                    40
vm.dirty_writeback_centisecs       500
vm.dirtytime_expire_seconds       43200
vm.extfrag_threshold              500
vm.min_unmapped_ratio             1
vm.nr_hugepages                    0
vm.nr_hugepages_mempolicy         0
vm.nr_overcommit_hugepages        0
vm.swappiness                     10
vm.watermark_boost_factor         15000
vm.watermark_scale_factor         10
vm.zone_reclaim_mode              0
```

---

18. `/sys/kernel/mm/transparent_hugepage`

```plaintext
defrag always defer defer+advise [madvise] never
enabled [always] madvise never
hpage_pmd_size 2097152
shmem_enabled always within_size advise [never] deny force
```

---

19. `/sys/kernel/mm/transparent_hugepage/khugepaged`

```plaintext
alloc_sleep_millisecs  60000
deffrag 1
max_ptes_none  511
max_ptes_shared  256
max_ptes_swap  64
pages_to_scan  4096
scan_sleep_millisecs  10000
```

---

20. OS release

From `/etc/*-release /etc/*-version`

```plaintext
os-release Red Hat Enterprise Linux 9.0 (Plow)
redhat-release Red Hat Enterprise Linux release 9.0 (Plow)
system-release Red Hat Enterprise Linux release 9.0 (Plow)
```

---

21. Disk information

SPEC is set to: /home/spec2017-1.1.9-ic2023

```plaintext
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs 1.7T 254G 1.5T 15% /home
```

---

22. `/sys/devices/virtual/dmi/id`

```plaintext
Vendor: XFUSION
Product: 1288H V7
Product Family: Eagle Stream
Serial: serial
```

---

23. `dmidecode`

Additional information from `dmidecode 3.3` 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.

(Continued on next page)
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Memory:
16x Samsung M321R4GA3BB6-CQKG 32 GB 2 rank 4800, configured at 4400

Platform Notes (Continued)

24. BIOS
(BThis section combines info from /sys/devices and dmidecode.)
BIOS Vendor: XFUSSION
BIOS Version: 2.00.55
BIOS Date: 03/07/2023
BIOS Revision: 0.55

Compiler Version Notes

-------------------------------
C     | 502.gcc_r(peak)
-------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
-------------------------------
C     | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak) 557.xz_r(base, peak)
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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
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C     | 502.gcc_r(peak)
-------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
-------------------------------
C     | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak) 557.xz_r(base, peak)
-------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
-------------------------------
C++    | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak) 531.deepsjeng_r(base, peak)
-------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
-------------------------------
Fortran | 548.exchange2_r(base, peak)
-------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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**SPEC CPU®2017 Integer Rate Result**

* Copyright 2017-2024 Standard Performance Evaluation Corporation

xFusion

**FusionServer 1288H V7 (Intel Xeon Gold 6430)**

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base = 541</th>
</tr>
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<tbody>
<tr>
<td>SPECrate®2017_int_peak = 557</td>
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<tr>
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<th>Test Date:</th>
<th>Jun-2023</th>
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<td>Hardware Availability:</td>
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<tr>
<td>Tested by: xFusion</td>
<td>Software Availability:</td>
<td>Dec-2022</td>
</tr>
</tbody>
</table>

**Base Compiler Invocation**

C benchmarks:
- icx

C++ benchmarks:
- icpx

Fortran benchmarks:
- ifx

**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.xalanchmk_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 -xsapphirerapids -O3 -ffast-math
- -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
- -L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin
- -lqkmalloc

C++ benchmarks:
- -w -std=c++14 -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math
- -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
- -L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin
- -lqkmalloc

Fortran benchmarks:
- -w -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math -flto
- -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
- -nostandard-realloc-lhs -align array32byte -auto
- -L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin
- -lqkmalloc
### SPEC CPU®2017 Integer Rate Result

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**Tested by:** xFusion

**Test Date:** Jun-2023  
**Hardware Availability:** Jan-2023  
**Software Availability:** Dec-2022

### Peak Compiler Invocation

C benchmarks:  
- icx

C++ benchmarks:  
- icpx

Fortran benchmarks:  
- ifx

### 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: -w -std=c11 -m64 -Wl,-z,muldefs
   -fprofile-generate(pass 1)
   -fprofile-use=default.profdata(pass 2) -xCORE-AVX2(pass 1)
   -flto -Ofast -xCORE-AVX512 -ffast-math -mfpmath=sse
   -funroll-loops -gopt-mem-layout-trans=4
   -fno-strict-overflow
   -L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin
   -lqkmallocc

502.gcc_r: -m32
   -L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/ia32_lin
   -std=gnu89 -Wl,-z,muldefs -fprofile-generate(pass 1)
   -fprofile-use=default.profdata(pass 2) -xCORE-AVX2(pass 1)
   -flto -Ofast -xCORE-AVX512 -ffast-math -mfpmath=sse
   -funroll-loops -gopt-mem-layout-trans=4
   -L/usr/local/jemalloc32-5.0.1/lib -ljemalloc
```

(Continued on next page)
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### Peak Optimization Flags (Continued)

505.mcf_r: basepeak = yes

525.x264_r:  
- -w  
- -std=c11  
- -m64  
- -Wl,-z,muldefs  
- -xsapphirerapids  
- -Ofast  
- -ffast-math  
- -flto  
- -mfpmath=sse  
- -funroll-loops  
- -qopt-mem-layout-trans=4  
- -fno-alias  
- -L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin  
- -lqkmalloc

557.xz_r: basepeak = yes

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-ic2023-official-linux64.html


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

http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.xml

http://www.spec.org/cpu2017/flags/xFusion-Platform-Settings-SPR-V1.1-revB.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 v1.1.9 on 2023-06-12 08:28:30-0400.


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