Cisco Systems
Cisco UCS X210C M7 (Intel Xeon Platinum 8468V, 2.40GHz)

**Software**
- OS: SUSE Linux Enterprise Server 15 SP4 5.14.21-150400.22-default
- 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 4.3.2a released Jul-2023
- File System: btrfs
- 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 set to prefer performance at the cost of additional power usage

**Hardware**
- CPU Name: Intel Xeon Platinum 8468V
- Max MHz: 3800
- Nominal: 2400
- Enabled: 96 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: 97.5 MB I+D on chip per chip
- Other: None
- Memory: 1 TB (16 x 64 GB 2Rx4 PC5-4800B-R)
- Storage: 1 x 240 GB M.2 SSD SATA
- Other: None

**Test Sponsor:** Cisco Systems
**Test Date:** Aug-2023
**Hardware Availability:** Mar-2023
**Software Availability:** Dec-2022

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**SPEC CPU®2017 Integer Rate Result**

**Tested by:** Cisco Systems

<table>
<thead>
<tr>
<th>Test</th>
<th>SPECrate®2017_int_base</th>
<th>SPECrate®2017_int_peak</th>
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<td>502.gcc_r</td>
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<td>523.xalancbmk_r</td>
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<td>548.exchange2_r</td>
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Cisco Systems
Cisco UCS X210C M7 (Intel Xeon Platinum 8468V, 2.40GHz)

Results Table

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<td>565</td>
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<td>564</td>
<td>368</td>
</tr>
</tbody>
</table>

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.xalancbmk_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/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
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>
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

Platform Notes

BIOS Settings:
Adjacent Cache Line Prefetcher set to Enabled
DCU streamer Prefetch set to Enabled
Enhanced CPU Performance set to Auto
LLC Dead Line set to Disabled
ADDCS Sparing set to Disabled
Processor C6 Report set to Enabled

SysInfo program /home/cpu2017/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Sat Aug 19 22:19:28 2023

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

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12. Services, from systemctl list-unit-files
13. Linux kernel boot-time arguments, from /proc/cmdline
14. cpupower frequency-info
15. sysctl
16. /sys/kernel/mm/transient_hugepage
17. /sys/kernel/mm/transient_hugepage/khugepaged
18. OS release
19. Disk information
20. /sys/devices/virtual/dmi/id
21. dmidecode

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Platform Notes (Continued)

22. BIOS
------------------------------------------------------------
1. uname -a
   Linux localhost 5.14.21-150400.22-default #1 SMP PREEMPT_DYNAMIC Wed May 11 06:57:18 UTC 2022 (49db222)
   x86_64 x86_64 x86_64 GNU/Linux
------------------------------------------------------------
2. w
   22:19:28 up 5 min, 1 user, load average: 0.43, 3.18, 1.88
   USER   TTY     FROM       LOGIN@    IDLE   JCPU   PCPU WHAT
   root   tty1    -          22:19    8.00s  1.50s  0.31s -bash
------------------------------------------------------------
3. Username
   From environment variable $USER: root
------------------------------------------------------------
4. ulimit -a
   core file size  (blocks, -c)  unlimited
   data seg size   (kbytes, -d)  unlimited
   scheduling priority  (-e) 0
   file size      (blocks, -f)  unlimited
   pending signals (-l) 4126747
   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) 4126747
   virtual memory (kbytes, -v)  unlimited
   file locks      (-x)  unlimited
------------------------------------------------------------
5. sysinfo process ancestry
   /usr/lib/systemd/systemd --switched-root --system --deserialize 30
   login -- root
   -bash
   -bash
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=192 -c
   ic2023.0-lin-sapphirerapids-rate-20221201.cfg --reportable --iterations 3 --define amt-on --define cores=96 --define physicalfirst --define invoke_with_interleave --define drop_caches --tune all o all intrate
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=192 --configfile
   ic2023.0-lin-sapphirerapids-rate-20221201.cfg --reportable --iterations 3 --define amt-on --define cores=96 --define physicalfirst --define invoke_with_interleave --define drop_caches --tune all --output_format all --nopower --runmode rate --tune base:peak --size refrate intrate --nopreenv
   --note-preenv --logfile $SPEC/tmp/CPU2017.044/templogs/preenv.intrate.044.0.log --lognum 044.0
   --from_runcpu 2
   specperl $SPEC/bin/sysinfo
   $SPEC = /home/cpu2017
   $SPEC = /home/cpu2017
------------------------------------------------------------
6. /proc/cpuinfo
   model name : Intel(R) Xeon(R) Platinum 8468V
   vendor_id : GenuineIntel

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Cisco Systems
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CPU2017 License: 9019
Test Sponsor: Cisco Systems
Tested by: Cisco Systems
Test Date: Aug-2023
Hardware Availability: Mar-2023
Software Availability: Dec-2022

SPECrate®2017_int_base = 763
SPECrate®2017_int_peak = 791

Platform Notes (Continued)

cpu family : 6
model : 143
stepping : 8
microcode : 0x2b000461
bugs : spectre_v1 spectre_v2 spec_store_bypass swapgs
cpu cores : 48
siblings : 96
2 physical ids (chips)
192 processors (hardware threads)
physical id 0: core ids 0-47
physical id 1: core ids 0-47
physical id 0: apicids 0-95
physical id 1: apicids 128-223
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 2.37.2:
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): 192
On-line CPU(s) list: 0-191
Vendor ID: GenuineIntel
Model name: Intel(R) Xeon(R) Platinum 8468V
CPU family: 6
Model: 143
Thread(s) per core: 2
Core(s) per socket: 48
Socket(s): 2
Stepping: 8
CPU max MHz: 3800.0000
CPU min MHz: 800.0000
BogoMIPS: 4800.00
Flags: fpu vme de pse tsc msr pae mce cmov pat pse36
clflush dts acpi mmx fxsr sse sse2 ss ht tm pe syscall nx pdpe1gb rdtscp
lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology
nonstop_tsc cpuid aperfmperf tsc_known_freq pni pclmulqdq dtes64 monitor
ds_cpl 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 cat_l2 cdp_l3 invpcid_single
intel_pni cdp_l2 sbd mba ibrs ibpb stibp ibs Enhanced fsbgbase
tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cmp rdt_a avx512f
avx512dq rdseed adx smap avx512fma clflushopt clwb intel_pt avx512cd
sha ni avx512bw avx512vl xsaves xsaveopt xsaves xsave cqm_1lc
cqm_occupied cqm_mmm total cqm_mmm_local split_lock_detect avx_vnni
avx512 bf16 wmmioxid dtherm ida arat pln pts hwp hwp_act_window hwp_epp
hwp_pkreq avx512_vbm uimp pk uopke waitpkg avx512_vbm gfn vaes
vpcmulldqg avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid
bus_lock_detect cldemote movdiri movdir64b enqcmd farm md_clear serialize
txsl1dtrk pconfign arch_lbr avx512_fp16 amx_tile flush_l1d arch_capabilities

L1d cache: 4.5 MiB (96 instances)
L1i cache: 3 MiB (96 instances)
L2 cache: 192 MiB (96 instances)
L3 cache: 195 MiB (2 instances)
NUMA node(s): 8
NUMA node0 CPU(s): 0-11,96-107

(Continued on next page)
**Cisco Systems**

Cisco UCS X210C M7 (Intel Xeon Platinum 8468V, 2.40GHz)

SPEC CPU®2017 Integer Rate Result

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**CPU2017 License:** 9019  
**Test Sponsor:** Cisco Systems  
**Test Date:** Aug-2023  
**Hardware Availability:** Mar-2023  
**Tested by:** Cisco Systems  
**Software Availability:** Dec-2022

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**Platform Notes (Continued)**

NUMA node1 CPU(s): 12-23,108-119  
NUMA node2 CPU(s): 24-35,120-131  
NUMA node3 CPU(s): 36-47,132-143  
NUMA node4 CPU(s): 48-59,144-155  
NUMA node5 CPU(s): 60-71,156-167  
NUMA node6 CPU(s): 72-83,168-179  
NUMA node7 CPU(s): 84-95,180-191  
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 and seccomp  
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:

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<th>ONE-SIZE</th>
<th>ALL-SIZE</th>
<th>WAYS</th>
<th>TYPE</th>
<th>LEVEL</th>
<th>SETS</th>
<th>PHY-LINE</th>
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<td>106496</td>
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<td>64</td>
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</table>

8. numactl --hardware

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

available: 8 nodes (0-7)

node 0 cpus: 0-11,96-107
node 0 size: 128666 MB
node 0 free: 127672 MB
node 1 cpus: 12-23,108-119
node 1 size: 129017 MB
node 1 free: 128851 MB
node 2 cpus: 24-35,120-131
node 2 size: 129017 MB
node 2 free: 128688 MB
node 3 cpus: 36-47,132-143
node 3 size: 129017 MB
node 3 free: 128634 MB
node 4 cpus: 48-59,144-155
node 4 size: 129017 MB
node 4 free: 128761 MB
node 5 cpus: 60-71,156-167
node 5 size: 129017 MB
node 5 free: 128983 MB
node 6 cpus: 72-83,168-179
node 6 size: 129017 MB
node 6 free: 128708 MB
node 7 cpus: 84-95,180-191
node 7 size: 129017 MB
node 7 free: 128684 MB

node distances:

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CPU2017 License: 9019
Test Sponsor: Cisco Systems
Tested by: Cisco Systems

SPECRate®2017_int_base = 763
SPECRate®2017_int_peak = 791

Platform Notes (Continued)

6: 21 21 21 21 12 12 12 12
7: 21 21 21 21 12 12 12 10

9. /proc/meminfo
MemTotal: 1056471476 kB

10. who -r
run-level 3 Aug 19 22:15

11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
Default Target Status
multi-user running

12. Services, from systemctl list-unit-files
STATE UNIT FILES
enabled YaST2-Firstboot YaST2-Second-Stage apparmor auditd cron getty@ haveged irqbalance
issue-generator kbdsettings klog 1vm2-monitor nscd postfix purge-kernels rollback rayslog
smartd sshd wicked wickedd-aut04 wicked-d-dhcp4 wicked-d-dhcp6 wickedd-nanny
enabled-runtime systemd-remount-fs
disabled autosys autoyast-initscripts blk-availability boot-sysctl ca-certificates chrony-wait
chronyD console-getty cups cups-browsed debug-shell ebtables exchange-bmc-os-info
firewallD gpm grub2-once haveged-switch-root ipmi ipmiievD issue-add-ssh-keys kexec-load
ksm kvm_stat lunmask man-db-create multipathD nfs nfs-blkmap rdisc rpbind rpmconfigcheck
rsyncd serial-getty@ once haveged-switch-root ipmi ipmiievD issue-add-ssh-keys kexec-load
smartd_generate_opts snmpd snmptrapd svnserve
systemd-boot-check-no-failures systemd-network-generator systemd-sysext
systemd-time-wait-sync systemd-timesyncd udisks2
indirect wicked

13. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
root=UUID=105eebe6-343f-430f-8199-ebf93f502b47
splash=silent
mitigations=auto
quiet
security=apparmor

14. cpupower frequency-info
analyzing CPU 0:
current policy: frequency should be within 800 MHz and 3.80 GHz.
The governor "performance" may decide which speed to use
within this range.
boost state support:
Supported: yes
Active: yes

15. sysctl
kernel.numa_balancing 1
kernel.randomize_va_space 2
vm.compartment_proactiveness 20
vm.dirty_background_bytes 0
vm.dirty_background_ratio 10
vm.dirty_bytes 0
vm.dirty_expire_centisecs 3000

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Cisco Systems
Cisco UCS X210C M7 (Intel Xeon Platinum 8468V, 2.40GHz)

**CPU2017 License:** 9019  
**Test Sponsor:** Cisco Systems  
**Tested by:** Cisco Systems

---

### Platform Notes (Continued)

- `vm.dirty_ratio`: 20
- `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.overcommit_hugepages`: 0
- `vm.swappiness`: 1
- `vm.watermark_boost_factor`: 15000
- `vm.watermark_scale_factor`: 10
- `vm.zone_reclaim_mode`: 0

---

16. `/sys/kernel/mm/transparent_hugepage`
   - `defrag`: always defer defer+madvise [madvise] never
   - `enabled`: [always] madvise never
   - `hpage_pmd_size`: 2097152
   - `shmem_enabled`: always within_size advise [never] deny force

---

17. `/sys/kernel/mm/transparent_hugepage/khugepaged`
   - `alloc_sleep_millisecs`: 60000
   - `defrag`: 1
   - `max_ptes_none`: 511
   - `max_ptes_shared`: 256
   - `max_ptes_swap`: 64
   - `pages_to_scan`: 4096
   - `scan_sleep_millisecs`: 10000

---

18. OS release
   - From `/etc/*-release /etc/*-version`
   - os-release SUSE Linux Enterprise Server 15 SP4

---

19. Disk information
   - SPEC is set to: `/home/cpu2017`
   - `/dev/sda2`: btrfs 222G 13G 208G 6t /home

---

20. `/sys/devices/virtual/dmi/id`
   - `Vendor`: Cisco Systems Inc
   - `Product`: UCSX-210C-M7
   - `Serial`: FCH27097BFN

---

21. dmidecode
   - Additional information from dmidecode 3.2 follows. **WARNING:** Use caution when you interpret this section.

   - Memory:
     - 16x 0xCE00 M321R8GA0BB0-CQKDG 64 GB 2 rank 4800

---

22. BIOS
   - (This section combines info from `/sys/devices` and `dmidecode`)

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Cisco UCS X210C M7 (Intel Xeon Platinum 8468V, 2.40GHz)

SPECrate®2017_int_base = 763
SPECrate®2017_int_peak = 791

CPU2017 License: 9019
Test Sponsor: Cisco Systems
Tested by: Cisco Systems
Test Date: Aug-2023
Hardware Availability: Mar-2023
Software Availability: Dec-2022

Platform Notes (Continued)

BIOS Vendor: Cisco Systems, Inc.
BIOS Version: X210M7.4.3.2a.0.0710230213
BIOS Date: 07/10/2023
BIOS Revision: 5.29

Compiler Version Notes

Base Compiler Invocation

C benchmarks:
  icx

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Cisco Systems
Cisco UCS X210C M7 (Intel Xeon Platinum 8468V, 2.40GHz)

SPEC CPU®2017 Integer Rate Result
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Base Compiler Invocation (Continued)

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.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64 -DSPEC_LINUX
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
Cisco Systems
Cisco UCS X210C M7 (Intel Xeon Platinum 8468V, 2.40GHz)

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CPU2017 License: 9019
Test Sponsor: Cisco Systems
Tested by: Cisco Systems

Test Date: Aug-2023
Hardware Availability: Mar-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

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Cisco Systems
Cisco UCS X210C M7 (Intel Xeon Platinum 8468V, 2.40GHz)

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</table>

### 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


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