Cisco Systems
Cisco UCS X210c M7 (Intel Xeon Platinum 8444H, 2.90GHz)

SPEC®2017_int_base = 328
SPEC®2017_int_peak = 337

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

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

Cisco Systems
Cisco UCS X210c M7 (Intel Xeon Platinum 8444H, 2.90GHz)

SPECrate®2017_int_base = 328
SPECrate®2017_int_peak = 337

Copies

500.perlbench_r 64
502.gcc_r 64
505.mcf_r 64
520.omnetpp_r 64
523.xalancbmk_r 64
525.x264_r 64
531.deepsjeng_r 64
541.leela_r 64
548.exchange2_r 64
557.xz_r 64

Hardware
CPU Name: Intel Xeon Platinum 8444H
Max MHz: 4000
Nominal: 2900
Enabled: 32 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: 45 MB I+D on chip per chip
Other: None
Memory: 1 TB (16 x 64 GB 2Rx4 PC5-4800B-R)
Storage: 1 x 960 GB M.2 SSD SATA
Other: None

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 5.1.1b released Mar-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
**Cisco Systems**  
Cisco UCS X210c M7 (Intel Xeon Platinum 8444H, 2.90GHz)  

<table>
<thead>
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<td>465</td>
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</tbody>
</table>

**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This result is left in the SPEC results database for historical reference.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/cpu2017/lib/intel64:/home/cpu2017/lib/ia32:/home/cpu2017/je5.0.1-32"  
MALLOC_CONF = "retain:true"
Cisco Systems

Cisco UCS X210c M7 (Intel Xeon Platinum 8444H, 2.90GHz)

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.

Platform Notes

BIOS Settings:
Adjacent Cache Line Prefetcher set to Disabled
DCU streamer Prefetch set to Disabled
Enhanced CPU Performance set to Auto
LLC Dead Line set to Disabled
ADDDC 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 Wed Jun  7 05:24:55 2023

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

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3. Username
4. ulimit -a
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6. /proc/cpuinfo
7. Isacpu
8. numacl --hardware
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10. who -r
11. Systemd service manager version: systemd 249 (249.11+6.124.g2bc0b2c447)
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/transparent_hugepage
17. /sys/kernel/mm/transparent_hugepage/khugepaged
18. OS release
19. Disk information
20. /sys/devices/virtual/dmi/id
21. dmidecode

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SPEC CPU®2017 Integer Rate Result

Cisco Systems
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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
   05:24:55 up 1 min,  1 user,  load average: 2.04, 0.80, 0.29
   USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1     -                05:24   14.00s  1.36s  0.20s -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) 4126950
   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) 4126950
   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 --action=build --action validate --define default-platform-flags --define numcopies=64 -c
   ic2023.0-lin-sapphirerapids-rate-20221201.cfg --reportable --iterations 3 --define smt-on --define
   cores=32 --define physicalfirst --define invoke_with_interleave --define drop_caches --tune all -o all
   intrate
   runcpu --action=build --action validate --define default-platform-flags --define numcopies=64 --configfile
   ic2023.0-lin-sapphirerapids-rate-20221201.cfg --reportable --iterations 3 --define smt-on --define
   cores=32 --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/CPU2017.011/tempplogs/preenv.intrate.011.0.log --lognum 011.0
   --from_runcpu 2
   specperl $SPEC/bin/sysinfo
   $SPEC = /home/cpu2017
   $SPEC = /home/cpu2017
   spec

-------------------------------------------------------------------------------------------------------------------
6. /proc/cpuinfo
   model name : Intel(R) Xeon(R) Platinum 8444H
   vendor_id : GenuineIntel

(Continued on next page)
SPEC CPU®2017 Integer Rate Result

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Cisco Systems
Cisco UCS X210c M7 (Intel Xeon Platinum 8444H, 2.90GHz)

SPECratenew rates
SPECratenewpeak rates

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Platform Notes (Continued)

cpu family : 6
model : 143
stepping : 8
microcode : 0x2b000190
bugs : spectre_v1 spectre_v2 spec_store_bypass swapgs
cpu cores : 16
siblings : 32
2 physical ids (chips)
64 processors (hardware threads)
physical id 0: core ids 0-15
physical id 1: core ids 0-15
physical id 0: apicids 0-31
physical id 1: apicids 128-159

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): 64
On-line CPU(s) list: 0-63
Vendor ID: GenuineIntel
Model name: Intel(R) Xeon(R) Platinum 8444H
CPU family: 6
Model: 143
Thread(s) per core: 2
Core(s) per socket: 16
Socket(s): 2
Stepping: 8
CPU max MHz: 4000.000
CPU min MHz: 800.000
BogoMIPS: 5800.00

Flags:
fpu vme de pse tsc msr pae 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 tsc_known_freq pni pclmulqdq dtes64 monitor
des 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 3nowprefetch cpuid_fault epb cat_l3 cat_12 cdp_l3
invpcid_single intel_ppln cdp_l2 sbbd mha ibrs ibpb stibp ibrs_enhanced
tpr_shadow vmmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust hilcr
hle avx2 smep bmi2 erms invpcid rtm cqm rdt_a avx512f avx512dq

Virtualization: VT-x
L1d cache: 1.5 MiB (32 instances)
L1i cache: 1.0 MiB (32 instances)
L2 cache: 64 MiB (32 instances)
L3 cache: 90 MiB (2 instances)

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Platform Notes (Continued)

NUMA node(s): 8
NUMA node0 CPU(s): 0-3,32-35
NUMA node1 CPU(s): 4-7,36-39
NUMA node2 CPU(s): 8-11,40-43
NUMA node3 CPU(s): 12-15,44-47
NUMA node4 CPU(s): 16-19,48-51
NUMA node5 CPU(s): 20-23,52-55
NUMA node6 CPU(s): 24-27,56-59
NUMA node7 CPU(s): 28-31,60-63

Vulnerability Itlb multihit: Not affected
Vulnerability L1f: 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; userspace 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 1.5M 12 Data 1 64 1 64
L1i 32K 1M 8 Instruction 1 64 1 64
L2 2M 64M 16 Unified 2 2048 1 64
L3 45M 90M 15 Unified 3 49152 1 64

node distances:
node 0 1 2 3 4 5 6 7
0: 10 12 12 12 21 21 21 21
1: 12 10 12 12 21 21 21 21
2: 12 12 10 12 21 21 21 21
3: 12 12 12 10 21 21 21 21

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Cisco Systems
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SPEC CPU®2017 Integer Rate Result

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

---

Platform Notes (Continued)

4: 21 21 21 21 10 12 12 12  
5: 21 21 21 21 12 10 12 12  
6: 21 21 21 21 12 10 12 12  
7: 21 21 21 21 12 12 12 10

9. /proc/meminfo
   MemTotal: 1056523716 kB

10. who -r
    run-level 3 Jun 7 05:24

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 display-manager getty@ havged
   irqbalance issue-generator kbdsettings lkm2-monitor nscd postfix purge-kernels reblock rsyslog smartd sshd wicked wicked-auto4 wicked-dhcp4 wicked-dhcp6 wickedd-nanny
   enabled-runtime systemd-remount-fts
   disabled autofs autoyast-initscripts blk-availability boot-sysctl ca-certificates chrony-wait
   chrony console-getty cups cups-browsed debug-shell ebtables exchange-bmc-os-info
   firewall gpm grub2-once havged-switch-root ipmi ipmi-udev issue-add-ssh-keys keexec-load
   lunmask man-db-create multipathd nfs nfs-blkmap rdisc rpcbind rpmconfigcheck rsyncd
   serial-getty@ smartd_generate_opts systemd-snmpd smmtrapd 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=d49b0b67-61d3-44db-8305-09074fb592fb
    splash=silent
    mitigations=auto
    quiet
    security=apparmor

---

14. cpupower frequency-info
    analyzing CPU 0:
    current policy: frequency should be within 800 MHz and 4.00 GHz.
    The governor "performance" may decide which speed to use within this range.

15. sysct1
    kernel.numa_balancing 1
    kernel.randomize_va_space 2
    vm.compage_proactive 20
    vm.dirty_background_bytes 0
    vm.dirty_background_ratio 10
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<td>vm.dirty_ratio</td>
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<td>vm.dirty_writeback_centisecs</td>
<td>500</td>
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<td>vm.dirtytime_expire_seconds</td>
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<td>vm.extrfrag_threshold</td>
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<td>vm.min_unmapped_ratio</td>
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<td>vm.nr_hugepages</td>
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<td>vm.swappiness</td>
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<td>15000</td>
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<tr>
<td>vm.zone_reclaim_mode</td>
<td>0</td>
</tr>
</tbody>
</table>

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
Filesystem     Type  Size  Used  Avail  Use% Mounted on
/dev/sda2      btrfs  892G  16G  876G   2%  /home

20. /sys/devices/virtual/dmi/id
Vendor:         Cisco Systems Inc
Product:        UCSX-210C-M7
Serial:         FCH270978GK

21. dmidecode
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:
16x 0xAD00 HMCG94MEBRA109N 64 GB 2 rank 4800
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Platform Notes (Continued)

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

BIOS Vendor: Cisco Systems, Inc.
BIOS Version: X210M7.5.1.1b.0.0308231534
BIOS Date: 03/08/2023
BIOS Revision: 5.29

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)
-----------------------------------------------
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       | 502.gcc_r(peak)
-----------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2023.0.0 Build 20221201
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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 2023.0.0 Build 20221201
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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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Cisco Systems
Cisco UCS X210c M7 (Intel Xeon Platinum 8444H, 2.90GHz)

SPEC®2017_int_base = 328
SPEC®2017_int_peak = 337

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

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

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.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 -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 8444H, 2.90GHz)

SPEC CPU®2017 Integer Rate Result
Copyright 2017-2024 Standard Performance Evaluation Corporation

SPECrate®2017_int_base = 328
SPECrate®2017_int_peak = 337

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

CPU2017 License: 9019
Test Date: Jun-2023
Tested by: Cisco Systems

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)
-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
-lqkmalloc

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)
-ffast-math -mfpmath=sse
-funroll-loops -gopt-mem-layout-trans=4
-L/usr/local/jemalloc32-5.0.1/lib -ljemalloc

(Continued on next page)
Cisco Systems
Cisco UCS X210c M7 (Intel Xeon Platinum 8444H, 2.90GHz)

SPECRate®2017_int_base = 328
SPECRate®2017_int_peak = 337

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

Peak Optimization Flags (Continued)

505.mcf_r: basepeak = yes
525.x264_r: -w -std=c11 -m64 -Wl,-z,muldefs -xsaphirerapids -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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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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