Cisco Systems
Cisco UCS C240 M7 (Intel Xeon Gold 6434, 3.70GHz)

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

Copies

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>SPECrate®2017_fp_base</th>
<th>SPECrate®2017_fp_peak</th>
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<td>503.bwaves_r</td>
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<td>507.caCtuBSSN_r</td>
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</tr>
<tr>
<td>554.roms_r</td>
<td>32</td>
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</table>

Hardware
CPU Name: Intel Xeon Gold 6434
Max MHz: 4100
Nominal: 3700
Enabled: 16 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: 22.5 MB I+D on chip per core
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 4.3.1a released Feb-2023
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: jemalloc memory allocator V5.0.1
Power Management: BIOS set to prefer performance at the cost of additional power usage
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SPECrate®2017_fp_base = 290
SPECrate®2017_fp_peak = 294

Results Table

<table>
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<tr>
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</tbody>
</table>

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/je5.0.1-64"
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:

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General Notes (Continued)

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:
Sub NUMA Clustering set to Enable SNC4
LLC Dead Line set to Disabled
ADDDC Sparing set to Disabled
Processor C6 Report set to Enabled
UPI Link Enablement 3
UPI Link Power Management Enabled

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91e89b7ed5c36ae2c92cc097bec197
running on specsrv Tue May 9 20:54:44 2023

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

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17. /sys/kernel/mm/transparent_hugepage/cheapaged
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19. Disk information
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21. dmidecode
22. BIOS

------------------------------------------
1. uname -a
   Linux specsrv 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
   20:54:44 up 17:52,  1 user,  load average: 0.00, 0.00, 0.00
   USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1     -                03:05    8.00s  0.92s  0.07s -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       (-i) 4127011
   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) 4127011
   virtual memory        (kbytes, -v) unlimited
   file locks            (-x) unlimited

------------------------------------------
5. sysinfo process ancestry

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Platform Notes (Continued)

/usr/lib/systemd/systemd --switched-root --system --deserialize 30
login -- root
-bash
-bash
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=32 --configfile ic2023.0-lin-sapphirerapids-rate-20221201.cfg --reportable --iterations 3 --define smt-on --define cores=16 --define physicalfirst --define invoke_with_interleave --define drop_caches --tune all -o all fprate
--from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017

------------------------------------------------------------
6. /proc/cpuinfo
   model name : Intel(R) Xeon(R) Gold 6434
   vendor_id : GenuineIntel
   cpu family : 6
   model : 143
   stepping : 8
   microcode : 0x2b000161
   bugs : spectre_v1 spectre_v2 spec_store_bypass swapgs
   cpu cores : 8
   siblings : 16
   2 physical ids (chips)
   32 processors (hardware threads)
   physical id 0: core ids 0-7
   physical id 1: core ids 0-7
   physical id 0: apicids 0-15
   physical id 1: apicids 128-143
   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): 32
   On-line CPU(s) list: 0-31

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Platform Notes (Continued)

Vendor ID: GenuineIntel
Model name: Intel(R) Xeon(R) Gold 6434
CPU family: 6
Model: 143
Thread(s) per core: 2
Core(s) per socket: 8
Socket(s): 2
Stepping: 8
CPU max MHz: 4100.0000
CPU min MHz: 800.0000
BogoMIPS: 7400.00
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 tsc_known_freq pni pclmulqdq dtes64 monitor
ds_cpl vmx smx est tm2 ssse3 sse2 sse sse2 ss ht tm pbe syscall nx pdpe1gb
des cpl tsc msr tsc意见反馈 tsc意见反馈 tsc tsc意见反馈 tsc意见反馈 tsc意见反馈
des cpl tsc msr tsc意见反馈 tsc意见反馈 tsc意见反馈 tsc意见反馈 tsc意见反馈
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Virtualization: VT-x
L1d cache: 768 KiB (16 instances)
L1i cache: 512 KiB (16 instances)
L2 cache: 32 MiB (16 instances)
L3 cache: 45 MiB (2 instances)
NUMA node(s): 4
NUMA node0 CPU(s): 0-3, 16-19
NUMA node1 CPU(s): 4-7, 20-23
NUMA node2 CPU(s): 8-11, 24-27
NUMA node3 CPU(s): 12-15, 28-31
Vulnerability Itlb multi-hit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected

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SPEC CPU®2017 Floating Point Rate Result
Copyright 2017-2023 Standard Performance Evaluation Corporation

SPECrate®2017_fp_peak = 294
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Platform Notes (Continued)

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>
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<td>768K</td>
<td>12</td>
<td>Data</td>
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<td>64</td>
<td>1</td>
<td>64</td>
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<tr>
<td>L1i</td>
<td>32K</td>
<td>512K</td>
<td>8</td>
<td>Instruction</td>
<td>1</td>
<td>64</td>
<td>1</td>
<td>64</td>
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<td>2M</td>
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<td>24576</td>
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</table>

8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
available: 4 nodes (0-3)
node 0 cpus: 0-3,16-19
node 0 size: 257659 MB
node 0 free: 256717 MB
node 1 cpus: 4-7,20-23
node 1 size: 258045 MB
node 1 free: 257607 MB
node 2 cpus: 8-11,24-27
node 2 size: 258045 MB
node 2 free: 257627 MB
node 3 cpus: 12-15,28-31
node 3 size: 258025 MB
node 3 free: 257621 MB
node distances:
node   0   1   2   3
0:  10  12  21  21
1:  12  10  21  21
2:  21  21  10  12
3:  21  21  12  10

9. /proc/meminfo
MemTotal: 1056539688 kB

10. who -r
run-level 3 May 9 03:02

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

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Platform Notes (Continued)

STATE UNIT FILES
enabled YaST2-Firstboot YaST2-Second-Stage apparmor auditd cron getty@ haveged irqbalance
issue-generator kbdsettings lvm2-monitor nscd postfix purge-kernels rollback rsyslog
smartd sshd wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
enabled-runtime systemd-remount-fs
disabled autofs 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 ipmievd issue-add-ssh-keys kexec-load
lunmask man-db-create multipathd nscd nfs nfs-blkmap rdisc rpcbind rpmconfigcheck rsyncd
serial-getty@ 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=7a984919-bd0d-4451-8476-5139e3d5b29b
splash=silent
mitigations=auto
quiet
security=apparmor

14. cpupower frequency-info
analyzing CPU 0:
current policy: frequency should be within 800 MHz and 4.10 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.compaction_proactiveness 20
    vm.dirty_background_bytes 0
    vm.dirty_background_ratio 10
    vm.dirty_bytes 0
    vm.dirty_expire_centisecs 3000
    vm.dirty_ratio 20
    vm.dirty_writeback_centisecs 500
    vm.dirtytime_expire_seconds 43200
    vm.extrfrag_threshold 500
    vm.min_unmapped_ratio 1
    vm.nr_hugepages 0

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Platform Notes (Continued)

```plaintext
vm.nr_hugepages_mempolicy          0
vm.nr_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
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/sdb3      xfs   220G   13G  208G   6% /

20. /sys/devices/virtual/dmi/id
   Vendor: Cisco Systems Inc
   Product: UCSC-C240-M7SX
   Serial: WZP26330JLV

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.
```

(Continued on next page)
Cisco Systems
Cisco UCS C240 M7 (Intel Xeon Gold 6434, 3.70GHz)

Platform Notes (Continued)

Memory:
16x 0xAD00 HMCG94MEBRA109N 64 GB 2 rank 4800

22. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor: Cisco Systems, Inc.
BIOS Version: C240M7.4.3.1a.0.0201231701
BIOS Date: 02/01/2023
BIOS Revision: 5.29
The system clock was reset to a future date before running the test and the exact test date is updated

Compiler Version Notes

---

C               | 519.lbm_r(base, peak) 538.imagick_r(base, peak)
                | 544.nab_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++             | 508.namd_r(base, peak) 510.parest_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++, C          | 511.povray_r(base, peak) 526.blender_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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---

C++, C, Fortran | 507.cactuBSSN_r(base, peak)

(Continued on next page)
Cisco Systems
Cisco UCS C240 M7 (Intel Xeon Gold 6434, 3.70GHz)

Compiler Version Notes (Continued)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifx

Benchmarks using both Fortran and C:
ifx icx

(Continued on next page)
Cisco Systems
Cisco UCS C240 M7 (Intel Xeon Gold 6434, 3.70GHz)
Cisco Systems
Cisco UCS C240 M7 (Intel Xeon Gold 6434, 3.70GHz)

| SPECrate®2017_fp_base = 290 |
| SPECrate®2017_fp_peak = 294 |

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

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

### Base Optimization Flags (Continued)

Benchmarks using both Fortran and C:
- `-w` `-m64` `-std=c11` `-Wl,-z,muldefs -xsapphirerapids -Ofast -ffast-math` `-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`

Benchmarks using both C and C++:

Benchmarks using Fortran, C, and C++:

### Peak Compiler Invocation

C benchmarks:
- `icx`

C++ benchmarks:
- `icpx`

Fortran benchmarks:
- `ifx`

Benchmarks using both Fortran and C:
- `ifx icx`

Benchmarks using both C and C++:
- `icpx icx`

Benchmarks using Fortran, C, and C++:
- `icpx icx ifx`
Cisco Systems
Cisco UCS C240 M7 (Intel Xeon Gold 6434, 3.70GHz)

<table>
<thead>
<tr>
<th>CPU2017 License: 9019</th>
<th>Test Date: Mar-2023</th>
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<td>Test Sponsor: Cisco Systems</td>
<td>Hardware Availability: Mar-2023</td>
</tr>
<tr>
<td>Tested by: Cisco Systems</td>
<td>Software Availability: Dec-2022</td>
</tr>
</tbody>
</table>

**SPEC CPU®2017 Floating Point Rate Result**

**SPECrate®2017_fp_base = 290**

**SPECrate®2017_fp_peak = 294**

---

**Peak Portability Flags**

Same as Base Portability Flags

---

**Peak Optimization Flags**

C benchmarks:

519.lbm_r: `basepeak = yes`

538.imagick_r: `basepeak = yes`

544.nab_r: `basepeak = yes`

C++ benchmarks:

508.namd_r: `basepeak = yes`

C++ benchmarks:

508.namd_r: `basepeak = yes`

Fortran benchmarks:

503.bwaves_r: `basepeak = yes`

549.fotonik3d_r: `basepeak = yes`

Fortran benchmarks:


Fortran benchmarks:

Benchmarks using both Fortran and C:


Benchmarks using both C and C++:

511.povray_r: `-w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs -fprofile-generate(pass 1) -fprofile-use=default.profdata(pass 2) -xCORE-AVX2(pass 1)`

(Continued on next page)
Cisco Systems
Cisco UCS C240 M7 (Intel Xeon Gold 6434, 3.70GHz)

SPECrate®2017_fp_base = 290
SPECrate®2017_fp_peak = 294

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

Peak Optimization Flags (Continued)

511.povray_r (continued):
-ffast-math -mfpmath=sse -funroll-loops -flto -xCORE-AVX512
-mprefer-vector-width=512 -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
-Ofast -Wno-implicit-int -mprefer-vector-width=512 -ljemalloc
-Ofast -flto -ffast-math -mfpmath=sse -funroll-loops
-mprefer-vector-width=512 -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

526.blender_r: basepeak = yes

Benchmarks using Fortran, C, and C++:
-w -m64 -std=c++14 -std=c11 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int -mprefer-vector-width=512
-nostandard-realloc lhs -align array32byte -auto -ljemalloc
-Ofast -flto -ffast-math -mfpmath=sse -funroll-loops
-mprefer-vector-width=512 -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

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.

Tested with SPEC CPU®2017 v1.1.9 on 2023-05-09 23:54:43-0400.
Report generated on 2023-03-29 18:07:27 by CPU2017 PDF formatter v6442.
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