SPEC CPU®2017 Floating Point Rate Result

Cisco Systems

Cisco UCS X410c M7 (Intel Xeon Platinum 8460H, 2.20GHz)

SPECrate®2017_fp_base = 1600

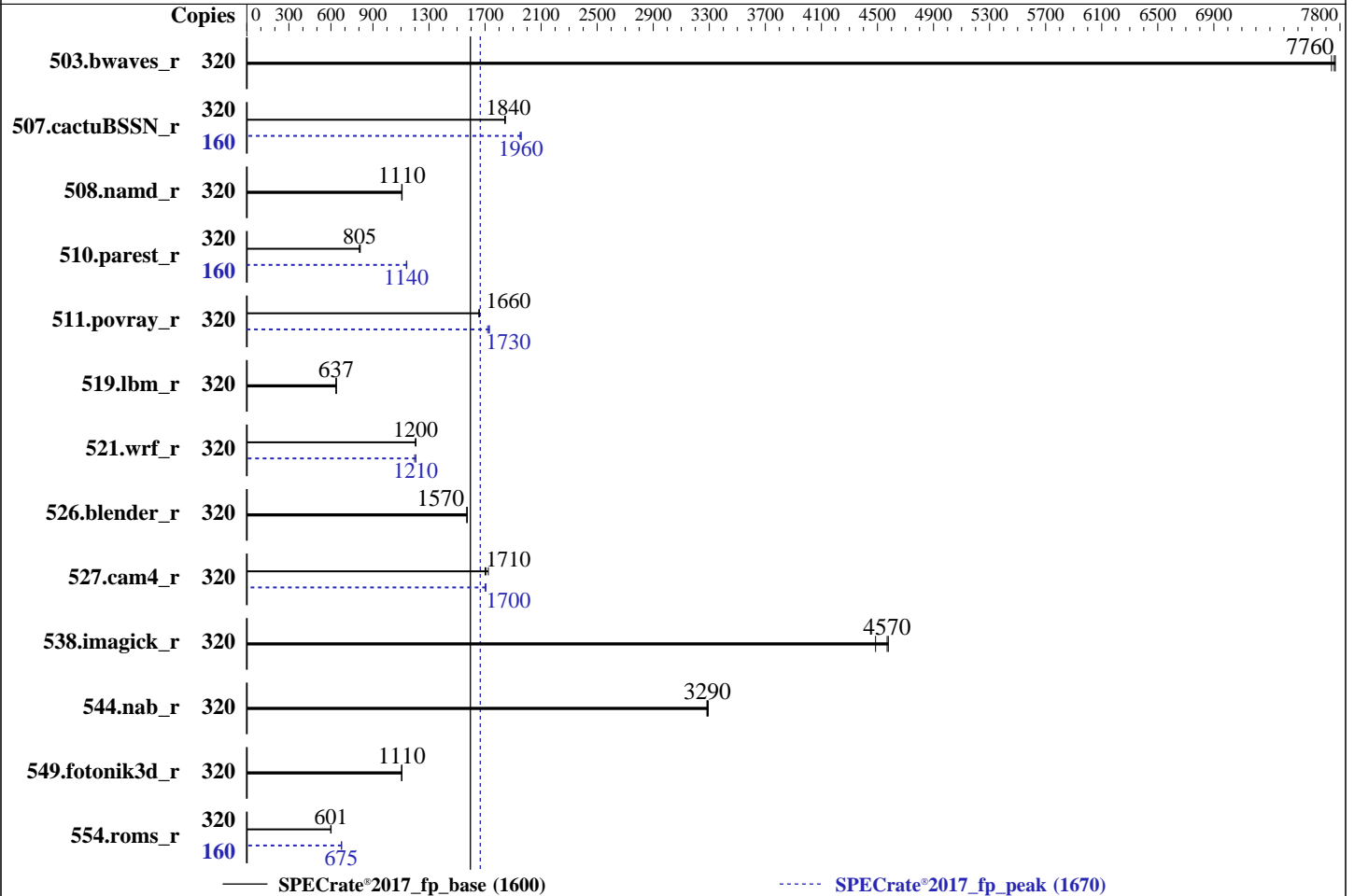SPECrate®2017_fp_peak = 1670

CPU2017 License: 9019

Test Sponsor: Cisco Systems

Tested by: Cisco Systems

Test Date: Sep-2023

Hardware Availability: Mar-2023

Software Availability: Dec-2022

Benchmark	Copies	base	peak
503.bwaves_r	320	7760	
507.cactuBSSN_r	320 / 160	1840	1960
508.namd_r	320	1110	
510.parest_r	320 / 160	805	1140
511.povray_r	320	1660	1730
519.lbm_r	320	637	
521.wrf_r	320	1200	1210
526.blender_r	320	1570	
527.cam4_r	320	1710	1700
538.imagick_r	320	4570	
544.nab_r	320	3290	
549.fotonik3d_r	320	1110	
554.roms_r	320 / 160	601	675

SPECrate®2017_fp_base (1600)
SPECrate®2017_fp_peak (1670)

Hardware

CPU Name: Intel Xeon Platinum 8460H
 Max MHz: 3800
 Nominal: 2200
Enabled: 160 cores, 4 chips, 2 threads/core
Orderable: 1,2,3,4 Chips
Cache L1: 32 KB I + 48 KB D on chip per core
 L2: 2 MB I+D on chip per core
 L3: 105 MB I+D on chip per chip
 Other: None
Memory: 2 TB (32 x 64 GB 2Rx4 PC5-4800B-R)
Storage: 1 x 1.9 TB 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 5.1.1e released May-2023
File System: btrfs
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

Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2023 Standard Performance Evaluation Corporation

Cisco Systems

Cisco UCS X410c M7 (Intel Xeon Platinum 8460H, 2.20GHz)

SPECrate®2017_fp_base = 1600

SPECrate®2017_fp_peak = 1670

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

Results Table

Benchmark	Base						Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	320	415	7740	**414**	**7760**	413	7770	320	415	7740	**414**	**7760**	413	7770
507.cactuBSSN_r	320	220	1840	220	1840	**220**	**1840**	160	104	1950	103	1960	**104**	**1960**
508.namd_r	320	**275**	**1110**	274	1110	275	1110	320	**275**	**1110**	274	1110	275	1110
510.parest_r	320	1042	804	1034	810	**1040**	**805**	160	367	1140	**367**	**1140**	367	1140
511.povray_r	320	450	1660	**451**	**1660**	451	1660	320	**432**	**1730**	432	1730	435	1720
519.lbm_r	320	**529**	**637**	529	637	529	638	320	**529**	**637**	529	637	529	638
521.wrf_r	320	594	1210	596	1200	**595**	**1200**	320	594	1210	**595**	**1210**	599	1200
526.blender_r	320	310	1570	310	1570	**310**	**1570**	320	310	1570	310	1570	**310**	**1570**
527.cam4_r	320	**328**	**1710**	325	1720	329	1700	320	**329**	**1700**	328	1710	329	1700
538.imagick_r	320	174	4580	177	4490	**174**	**4570**	320	174	4580	177	4490	**174**	**4570**
544.nab_r	320	164	3280	**164**	**3290**	164	3290	320	164	3280	**164**	**3290**	164	3290
549.fotonik3d_r	320	1128	1110	**1128**	**1110**	1129	1100	320	1128	1110	**1128**	**1110**	1129	1100
554.roms_r	320	845	601	**847**	**601**	850	598	160	**377**	**675**	377	674	376	676
SPECrate®2017_fp_base =	**1600**												
SPECrate®2017_fp_peak =	**1670**												

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/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:
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.
```

(Continued on next page)

Standard Performance Evaluation Corporation (info@spec.org)   https://www.spec.org/

SPEC CPU®2017 Floating Point Rate Result

Cisco Systems

Cisco UCS X410c M7 (Intel Xeon Platinum 8460H, 2.20GHz)

SPECrate®2017_fp_base = 1600

SPECrate®2017_fp_peak = 1670

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

General Notes (Continued)

```
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.
cpupower frequency-set -g performance
 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
```

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
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 Fri Sep  8 21:37:32 2023

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

 ----------------------------------------------------------
 Table of contents
 ----------------------------------------------------------
  1. uname -a
  2. w
  3. Username
  4. ulimit -a
  5. sysinfo process ancestry
  6. /proc/cpuinfo
  7. lscpu
  8. numactl --hardware
  9. /proc/meminfo
 10. who -r
 11. Systemd service manager version: systemd 249 (249.11+suse.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
 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

 ----------------------------------------------------------
```

(Continued on next page)

Cisco Systems

Cisco UCS X410c M7 (Intel Xeon Platinum 8460H, 2.20GHz)

SPECrate®2017_fp_base = 1600

SPECrate®2017_fp_peak = 1670

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

Platform Notes (Continued)

```
  2. w
     21:37:32 up  6:28,  1 user,  load average: 131.50, 265.47, 296.68
     USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
     root     tty1     -                15:10    6:27m  1.44s  0.42s -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) 8255214
    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) 8255214
    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=320 -c
     ic2023.0-lin-sapphirerapids-rate-20221201.cfg --reportable --iterations 3 --define smt-on --define
     cores=160 --define physicalfirst --define invoke_with_interleave --define drop_caches --tune all -o all
     fprate
   runcpu --action build --action validate --define default-platform-flags --define numcopies=320 --configfile
     ic2023.0-lin-sapphirerapids-rate-20221201.cfg --reportable --iterations 3 --define smt-on --define
     cores=160 --define physicalfirst --define invoke_with_interleave --define drop_caches --tune all
     --output_format all --nopower --runmode rate --tune base:peak --size refrate fprate --nopreenv
     --note-preenv --logfile $SPEC/tmp/CPU2017.107/templogs/preenv.fprate.107.0.log --lognum 107.0
     --from_runcpu 2
   specperl $SPEC/bin/sysinfo
   $SPEC = /home/cpu2017

  -----------------------------------------------------------
  6. /proc/cpuinfo
    model name      : Intel(R) Xeon(R) Platinum 8460H
    vendor_id       : GenuineIntel
    cpu family      : 6
    model           : 143
    stepping        : 8
    microcode       : 0x2b000461
    bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
    cpu cores       : 40
    siblings        : 80
    4 physical ids (chips)
    320 processors (hardware threads)
```

(Continued on next page)

Cisco Systems

Cisco UCS X410c M7 (Intel Xeon Platinum 8460H, 2.20GHz)

SPECrate®2017_fp_base = 1600

SPECrate®2017_fp_peak = 1670

CPU2017 License: 9019

Test Sponsor: Cisco Systems

Tested by: Cisco Systems

Test Date: Sep-2023

Hardware Availability: Mar-2023

Software Availability: Dec-2022

Platform Notes (Continued)

```
      physical id 0: core ids 0-39
      physical id 1: core ids 0-39
      physical id 2: core ids 0-39
      physical id 3: core ids 0-39
      physical id 0: apicids 0-79
      physical id 1: apicids 128-207
      physical id 2: apicids 256-335
      physical id 3: apicids 384-463
   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):                     320
      On-line CPU(s) list:        0-319
      Vendor ID:                  GenuineIntel
      Model name:                 Intel(R) Xeon(R) Platinum 8460H
      CPU family:                 6
      Model:                      143
      Thread(s) per core:         2
      Core(s) per socket:         40
      Socket(s):                  4
      Stepping:                   8
      CPU max MHz:                3800.0000
      CPU min MHz:                800.0000
      BogoMIPS:                   4400.00
      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 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_ppin cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced
                                  tpr_shadow vnmi flexpriority ept vpid ept_ad 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 xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
                                  cqm_mbm_local split_lock_detect avx_vnni avx512_bf16 wbnoinvd dtherm ida
                                  arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req avx512vbmi umip pku
                                  ospke waitpkg avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg
                                  tme avx512_vpopcntdq la57 rdpid bus_lock_detect cldemote movdiri movdir64b
                                  enqcmd fsrm md_clear serialize tsxldtrk pconfig arch_lbr avx512_fp16
                                  amx_tile flush_l1d arch_capabilities
      Virtualization:             VT-x
      L1d cache:                  7.5 MiB (160 instances)
      L1i cache:                  5 MiB (160 instances)
      L2 cache:                   320 MiB (160 instances)
      L3 cache:                   420 MiB (4 instances)
      NUMA node(s):               16
      NUMA node0 CPU(s):          0-9,160-169
      NUMA node1 CPU(s):          10-19,170-179
      NUMA node2 CPU(s):          20-29,180-189
      NUMA node3 CPU(s):          30-39,190-199
```

(Continued on next page)

Cisco Systems

Cisco UCS X410c M7 (Intel Xeon Platinum 8460H, 2.20GHz)

SPECrate®2017_fp_base = 1600

SPECrate®2017_fp_peak = 1670

CPU2017 License: 9019

Test Sponsor: Cisco Systems

Tested by: Cisco Systems

Test Date: Sep-2023

Hardware Availability: Mar-2023

Software Availability: Dec-2022

Platform Notes (Continued)

```
  NUMA node4 CPU(s):          40-49,200-209
  NUMA node5 CPU(s):          50-59,210-219
  NUMA node6 CPU(s):          60-69,220-229
  NUMA node7 CPU(s):          70-79,230-239
  NUMA node8 CPU(s):          80-89,240-249
  NUMA node9 CPU(s):          90-99,250-259
  NUMA node10 CPU(s):         100-109,260-269
  NUMA node11 CPU(s):         110-119,270-279
  NUMA node12 CPU(s):         120-129,280-289
  NUMA node13 CPU(s):         130-139,290-299
  NUMA node14 CPU(s):         140-149,300-309
  NUMA node15 CPU(s):         150-159,310-319
  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:
      NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL    SETS PHY-LINE COHERENCY-SIZE
      L1d      48K      7.5M   12 Data            1      64        1             64
      L1i      32K        5M    8 Instruction     1      64        1             64
      L2        2M      320M   16 Unified         2    2048        1             64
      L3      105M      420M   15 Unified         3  114688        1             64

  ----------------------------------------------------------
  8. numactl --hardware
  NOTE: a numactl 'node' might or might not correspond to a physical chip.
    available: 16 nodes (0-15)
    node 0 cpus: 0-9,160-169
    node 0 size: 128662 MB
    node 0 free: 127066 MB
    node 1 cpus: 10-19,170-179
    node 1 size: 129018 MB
    node 1 free: 128099 MB
    node 2 cpus: 20-29,180-189
    node 2 size: 129018 MB
    node 2 free: 128128 MB
    node 3 cpus: 30-39,190-199
    node 3 size: 129018 MB
    node 3 free: 128020 MB
    node 4 cpus: 40-49,200-209
    node 4 size: 129018 MB
    node 4 free: 128063 MB
    node 5 cpus: 50-59,210-219
    node 5 size: 129018 MB
    node 5 free: 127956 MB
    node 6 cpus: 60-69,220-229
    node 6 size: 129018 MB
    node 6 free: 128060 MB
    node 7 cpus: 70-79,230-239
    node 7 size: 129018 MB
    node 7 free: 128097 MB
    node 8 cpus: 80-89,240-249
    node 8 size: 129018 MB
    node 8 free: 128126 MB
```

(Continued on next page)

Cisco Systems

Cisco UCS X410c M7 (Intel Xeon Platinum 8460H, 2.20GHz)

SPECrate®2017_fp_base = 1600

SPECrate®2017_fp_peak = 1670

CPU2017 License: 9019

Test Sponsor: Cisco Systems

Tested by: Cisco Systems

Test Date: Sep-2023

Hardware Availability: Mar-2023

Software Availability: Dec-2022

Platform Notes (Continued)

```
   node 9 cpus: 90-99,250-259
   node 9 size: 129018 MB
   node 9 free: 128081 MB
   node 10 cpus: 100-109,260-269
   node 10 size: 129018 MB
   node 10 free: 128111 MB
   node 11 cpus: 110-119,270-279
   node 11 size: 128984 MB
   node 11 free: 128082 MB
   node 12 cpus: 120-129,280-289
   node 12 size: 129018 MB
   node 12 free: 128115 MB
   node 13 cpus: 130-139,290-299
   node 13 size: 129018 MB
   node 13 free: 128106 MB
   node 14 cpus: 140-149,300-309
   node 14 size: 129018 MB
   node 14 free: 128084 MB
   node 15 cpus: 150-159,310-319
   node 15 size: 128935 MB
   node 15 free: 127985 MB
   node distances:
   node   0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
     0:  10  12  12  12  21  21  21  21  21  21  21  21  21  21  21  21
     1:  12  10  12  12  21  21  21  21  21  21  21  21  21  21  21  21
     2:  12  12  10  12  21  21  21  21  21  21  21  21  21  21  21  21
     3:  12  12  12  10  21  21  21  21  21  21  21  21  21  21  21  21
     4:  21  21  21  21  10  12  12  12  21  21  21  21  21  21  21  21
     5:  21  21  21  21  12  10  12  12  21  21  21  21  21  21  21  21
     6:  21  21  21  21  12  12  10  12  21  21  21  21  21  21  21  21
     7:  21  21  21  21  12  12  12  10  21  21  21  21  21  21  21  21
     8:  21  21  21  21  21  21  21  21  10  12  12  12  21  21  21  21
     9:  21  21  21  21  21  21  21  21  12  10  12  12  21  21  21  21
    10:  21  21  21  21  21  21  21  21  12  12  10  12  21  21  21  21
    11:  21  21  21  21  21  21  21  21  12  12  12  10  21  21  21  21
    12:  21  21  21  21  21  21  21  21  21  21  21  21  10  12  12  12
    13:  21  21  21  21  21  21  21  21  21  21  21  21  12  10  12  12
    14:  21  21  21  21  21  21  21  21  21  21  21  21  12  12  10  12
    15:  21  21  21  21  21  21  21  21  21  21  21  21  12  12  12  10

   -------------------------------------------------------------
9. /proc/meminfo
   MemTotal:      2113359104 kB


   -------------------------------------------------------------
10. who -r
   run-level 3 Sep 8 15:09


   -------------------------------------------------------------
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 lvm2-monitor nscd postfix purge-kernels rollback rsyslog
                   smartd sshd wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
   enabled-runtime systemd-remount-fs
```

(Continued on next page)

Cisco Systems

Cisco UCS X410c M7 (Intel Xeon Platinum 8460H, 2.20GHz)

SPECrate®2017_fp_base = 1600

SPECrate®2017_fp_peak = 1670

CPU2017 License: 9019

Test Sponsor: Cisco Systems

Tested by: Cisco Systems

Test Date: Sep-2023

Hardware Availability: Mar-2023

Software Availability: Dec-2022

Platform Notes (Continued)

```
  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
                    ksm kvm_stat lunmask man-db-create multipathd 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          wickedd


  ----------------------------------------------------------
13. Linux kernel boot-time arguments, from /proc/cmdline
    BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
    root=UUID=e21e8d67-b30a-4ea7-8055-b0885f263ec2
    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.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.extfrag_threshold              500
    vm.min_unmapped_ratio               1
    vm.nr_hugepages                     0
    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
```

(Continued on next page)

Cisco Systems

Cisco UCS X410c M7 (Intel Xeon Platinum 8460H, 2.20GHz)

SPECrate®2017_fp_base = 1600

SPECrate®2017_fp_peak = 1670

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

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

Platform Notes (Continued)

```
   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/sdb2       btrfs  222G   13G  208G   6% /home


  --------------------------------------------------------------
  20. /sys/devices/virtual/dmi/id
     Vendor:        Cisco Systems Inc
     Product:       UCSX-410C-M7
     Serial:        FCH264873NP


  --------------------------------------------------------------
  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:
      4x 0xAD00 HMCG94MEBRA121N 64 GB 2 rank 4800
      28x 0xAD00 HMCG94MEBRA123N 64 GB 2 rank 4800



  --------------------------------------------------------------
  22. BIOS
  (This section combines info from /sys/devices and dmidecode.)
     BIOS Vendor:      Cisco Systems, Inc.
     BIOS Version:     X410M7.5.1.1e.0.0524232049
     BIOS Date:        05/24/2023
     BIOS Revision:    5.29
```

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.
------------------------------------------------------------------------------
```

(Continued on next page)

Cisco Systems

Cisco UCS X410c M7 (Intel Xeon Platinum 8460H, 2.20GHz)

SPECrate®2017_fp_base = 1600

SPECrate®2017_fp_peak = 1670

CPU2017 License: 9019

Test Sponsor: Cisco Systems

Tested by: Cisco Systems

Test Date: Sep-2023

Hardware Availability: Mar-2023

Software Availability: Dec-2022

Compiler Version Notes (Continued)

```
==============================================================================
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
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
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, Fortran | 507.cactuBSSN_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.
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.
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
Fortran         | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base, peak)
------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
Fortran, C      | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
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.
------------------------------------------------------------------------------
```

Base 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
```

(Continued on next page)

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2023 Standard Performance Evaluation Corporation

Cisco Systems

Cisco UCS X410c M7 (Intel Xeon Platinum 8460H, 2.20GHz)

SPECrate®2017_fp_base = 1600

SPECrate®2017_fp_peak = 1670

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

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

Base Compiler Invocation (Continued)

Benchmarks using Fortran, C, and C++:
```
icpx icx ifx
```

Base Portability Flags

503.bwaves_r: `-DSPEC_LP64`
507.cactuBSSN_r: `-DSPEC_LP64`
508.namd_r: `-DSPEC_LP64`
510.parest_r: `-DSPEC_LP64`
511.povray_r: `-DSPEC_LP64`
519.lbm_r: `-DSPEC_LP64`
521.wrf_r: `-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian`
526.blender_r: `-DSPEC_LP64 -DSPEC_LINUX -funsigned-char`
527.cam4_r: `-DSPEC_LP64 -DSPEC_CASE_FLAG`
538.imagick_r: `-DSPEC_LP64`
544.nab_r: `-DSPEC_LP64`
549.fotonik3d_r: `-DSPEC_LP64`
554.roms_r: `-DSPEC_LP64`

Base Optimization Flags

C benchmarks:
```
-w -std=c11 -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-Wno-implicit-int -mprefer-vector-width=512 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

C++ benchmarks:
```
-w -std=c++14 -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -mprefer-vector-width=512 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

Fortran benchmarks:
```
-w -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

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
```

(Continued on next page)

Cisco Systems

Cisco UCS X410c M7 (Intel Xeon Platinum 8460H, 2.20GHz)

SPECrate®2017_fp_base = 1600

SPECrate®2017_fp_peak = 1670

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

Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
```
-Wno-implicit-int -mprefer-vector-width=512 -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

Benchmarks using both C and C++:
```
-w -std=c++14 -m64 -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
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

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
-L/usr/local/jemalloc64-5.0.1/lib
```

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
```

Peak Portability Flags

```
Same as Base Portability Flags
```

Cisco Systems

Cisco UCS X410c M7 (Intel Xeon Platinum 8460H, 2.20GHz)

SPECrate®2017_fp_base = 1600

SPECrate®2017_fp_peak = 1670

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

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

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

 510.parest_r: -w -std=c++14 -m64 -Wl,-z,muldefs -xsapphirerapids
-Ofast -ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -mprefer-vector-width=512
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Fortran benchmarks:

 503.bwaves_r: basepeak = yes

 549.fotonik3d_r: basepeak = yes

 554.roms_r: -w -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

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
-Wno-implicit-int -mprefer-vector-width=512 -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

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)
-flto -Ofast -xCORE-AVX512 -ffast-math -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4 -Wno-implicit-int
-mprefer-vector-width=512 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

(Continued on next page)

Cisco Systems

Cisco UCS X410c M7 (Intel Xeon Platinum 8460H, 2.20GHz)

SPECrate®2017_fp_base = 1600

SPECrate®2017_fp_peak = 1670

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

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

Peak Optimization Flags (Continued)

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
-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
http://www.spec.org/cpu2017/flags/Cisco-Platform-Settings-V1.0-SPR-revM.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/Cisco-Platform-Settings-V1.0-SPR-revM.xml

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 2023-09-08 21:37:31-0400.
Report generated on 2023-11-21 20:30:36 by CPU2017 PDF formatter v6716.
Originally published on 2023-11-21.