SPEC CPU®2017 Floating Point Speed Result

Cisco Systems

Cisco UCS C240 M7 (Intel Xeon Silver 4510, 2.40GHz)

$SPECspeed^{®}2017\_fp\_base = 208$

$SPECspeed^{®}2017\_fp\_peak = 208$

CPU2017 License: 9019

Test Sponsor: Cisco Systems

Tested by: Cisco Systems

Test Date: Mar-2024

Hardware Availability: Feb-2024

Software Availability: Dec-2023

Threads	Result
603.bwaves_s 24	711 / 710
607.cactuBSSN_s 24	250
619.lbm_s 24	176
621.wrf_s 24	160
627.cam4_s 24	106 / 106
628.pop2_s 24	83.6
638.imagick_s 24	399
644.nab_s 24	275
649.fotonik3d_s 24	136
654.roms_s 24	227

SPECspeed®2017_fp_base (208)   SPECspeed®2017_fp_peak (208)

Hardware

CPU Name: Intel Xeon Silver 4510
  Max MHz: 4100
  Nominal: 2400
Enabled: 24 cores, 2 chips
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: 30 MB I+D on chip per chip
  Other: None
Memory: 1 TB (16 x 64 GB 2Rx4 PC5-5600B-R, running at 4400)
Storage: 1 x 960 GB M.2 SSD SATA
Other: CPU Cooling: Air

Software

OS: SUSE Linux Enterprise Server 15 SP5
  5.14.21-150500.53-default
Compiler: C/C++: Version 2024.0.2 of Intel oneAPI DPC++/C++ Compiler for Linux;
  Fortran: Version 2024.0.2 of Intel Fortran Compiler for Linux;
Parallel: Yes
Firmware: Version 4.3.3a released Jan-2024
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 power save
  with minimal impact on performance

Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

SPEC CPU®2017 Floating Point Speed Result

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Cisco Systems

Cisco UCS C240 M7 (Intel Xeon Silver 4510, 2.40GHz)

SPECspeed®2017_fp_base = 208

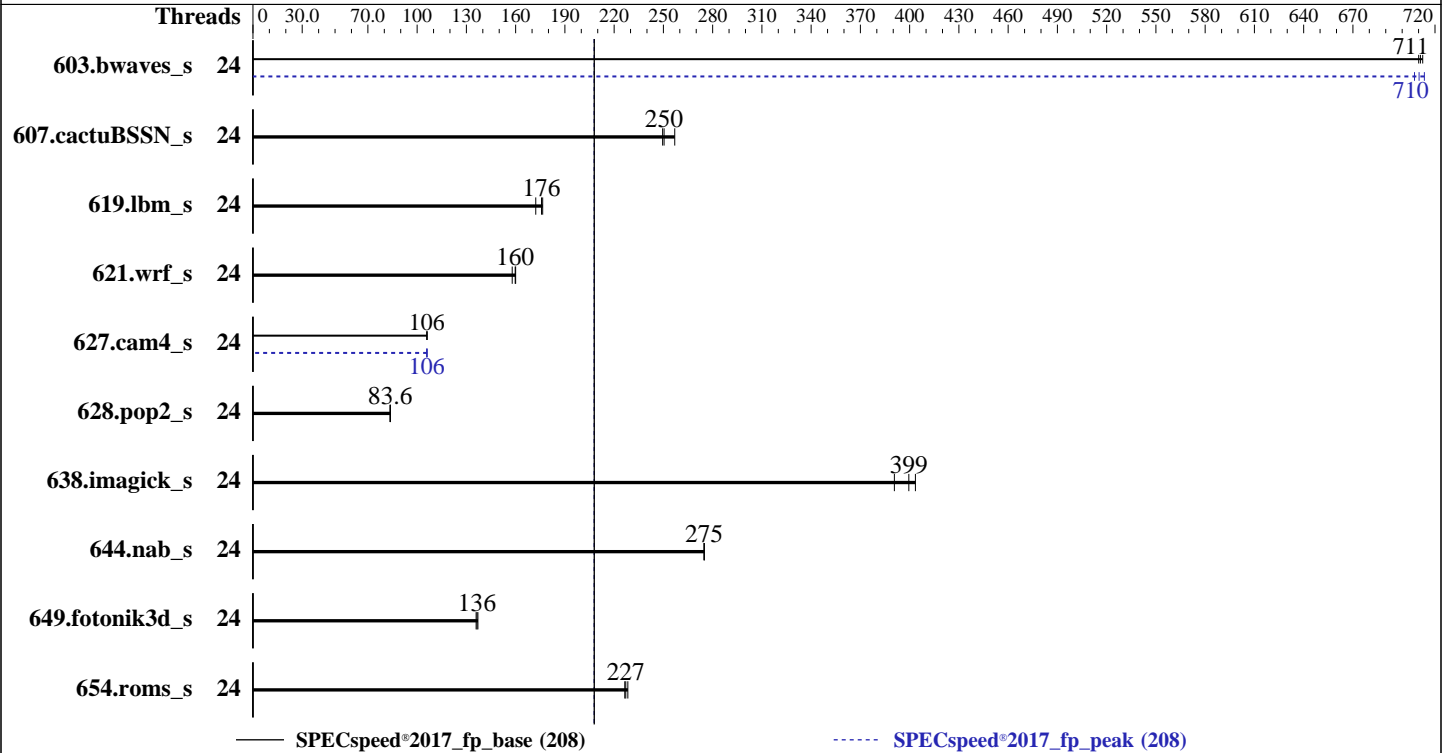SPECspeed®2017_fp_peak = 208

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

Test Date: Mar-2024
Hardware Availability: Feb-2024
Software Availability: Dec-2023

Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	24	82.8	713	**83.0**	**711**	83.1	710	24	83.4	708	**83.1**	**710**	82.7	714
607.cactuBSSN_s	24	**66.6**	**250**	64.9	257	66.8	250	24	**66.6**	**250**	64.9	257	66.8	250
619.lbm_s	24	**29.8**	**176**	29.7	176	30.4	172	24	**29.8**	**176**	29.7	176	30.4	172
621.wrf_s	24	83.8	158	**82.8**	**160**	82.7	160	24	83.8	158	**82.8**	**160**	82.7	160
627.cam4_s	24	83.5	106	83.7	106	**83.7**	**106**	24	83.5	106	83.7	106	**83.6**	**106**
628.pop2_s	24	142	83.5	**142**	**83.6**	142	83.7	24	142	83.5	**142**	**83.6**	142	83.7
638.imagick_s	24	35.8	404	36.9	391	**36.1**	**399**	24	35.8	404	36.9	391	**36.1**	**399**
644.nab_s	24	63.6	275	**63.6**	**275**	63.6	275	24	63.6	275	**63.6**	**275**	63.6	275
649.fotonik3d_s	24	66.5	137	**66.8**	**136**	67.1	136	24	66.5	137	**66.8**	**136**	67.1	136
654.roms_s	24	69.5	226	69.0	228	**69.3**	**227**	24	69.5	226	69.0	228	**69.3**	**227**
SPECspeed®2017_fp_base =	**208**													
SPECspeed®2017_fp_peak =	**208**													

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

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:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-64"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"
```

General Notes

```
  Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM
  memory using Redhat Enterprise Linux 8.0
  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
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
  sources available from jemalloc.net or https://github.com/jemalloc/jemalloc/releases
```

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Platform Notes

```
BIOS Settings:
Intel Hyper-Threading Technology set to Disabled
Sub NUMA Clustering set to Disabled
LLC Dead Line set to Disabled
ADDDC Sparing set to Disabled
Processor C6 Report set to Enabled
UPI Power Management set to Enabled
Enhanced CPU performance set to Auto


 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost Tue Mar 19 01:24:33 2024

 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 (249.16+suse.171.gdad0071f15)
 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 5.14.21-150500.53-default #1 SMP PREEMPT_DYNAMIC Wed May 10 07:56:26 UTC 2023 (b630043)
   x86_64 x86_64 x86_64 GNU/Linux


 ------------------------------------------------------------
 2. w
    01:24:33 up 2 min,  1 user,  load average: 0.43, 0.39, 0.17
   USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1     -                01:24    9.00s  1.02s  0.11s -bash

 ------------------------------------------------------------
 3. Username
   From environment variable $USER:  root


 ------------------------------------------------------------
 4. ulimit -a
```

<div align="center">(Continued on next page)</div>

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Platform Notes (Continued)

```
   core file size          (blocks, -c) unlimited
   data seg size           (kbytes, -d) unlimited
   scheduling priority             (-e) 0
   file size               (blocks, -f) unlimited
   pending signals                 (-i) 4127047
   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) 4127047
   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 --define default-platform-flags -c ic2024.0.2-lin-sapphirerapids-speed-20231213.cfg --define cores=24
   --tune all -o all --define drop_caches fpspeed
 runcpu --define default-platform-flags --configfile ic2024.0.2-lin-sapphirerapids-speed-20231213.cfg
   --define cores=24 --tune all --output_format all --define drop_caches --nopower --runmode speed --tune
   base:peak --size refspeed fpspeed --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.056/templogs/preenv.fpspeed.056.0.log --lognum 056.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
 $SPEC = /home/cpu2017


   ------------------------------------------------------------
6. /proc/cpuinfo
   model name        : INTEL(R) XEON(R) SILVER 4510
   vendor_id         : GenuineIntel
   cpu family        : 6
   model             : 143
   stepping          : 8
   microcode         : 0x2b000571
   bugs              : spectre_v1 spectre_v2 spec_store_bypass swapgs eibrs_pbrsb
   cpu cores         : 12
   siblings          : 12
   2 physical ids (chips)
   24 processors (hardware threads)
   physical id 0: core ids 0-11
   physical id 1: core ids 0-11
   physical id 0: apicids 0,2,4,6,8,10,12,14,16,18,20,22
   physical id 1: apicids 64,66,68,70,72,74,76,78,80,82,84,86
  Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
  virtualized systems.  Use the above data carefully.


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

 From lscpu from util-linux 2.37.4:
  Architecture:                 x86_64
  CPU op-mode(s):               32-bit, 64-bit
  Address sizes:                46 bits physical, 57 bits virtual
  Byte Order:                   Little Endian
```

(Continued on next page)

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Platform Notes (Continued)

```
CPU(s):                     24
On-line CPU(s) list:        0-23
Vendor ID:                  GenuineIntel
Model name:                 INTEL(R) XEON(R) SILVER 4510
CPU family:                 6
Model:                      143
Thread(s) per core:         1
Core(s) per socket:         12
Socket(s):                  2
Stepping:                   8
CPU max MHz:                4100.0000
CPU min MHz:                800.0000
BogoMIPS:                   4800.00
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 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 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
L1d cache:                  1.1 MiB (24 instances)
L1i cache:                  768 KiB (24 instances)
L2 cache:                   48 MiB (24 instances)
L3 cache:                   60 MiB (2 instances)
NUMA node(s):               2
NUMA node0 CPU(s):          0-11
NUMA node1 CPU(s):          12-23
Vulnerability Itlb multihit:    Not affected
Vulnerability L1tf:             Not affected
Vulnerability Mds:              Not affected
Vulnerability Meltdown:         Not affected
Vulnerability Mmio stale data:  Not affected
Vulnerability Retbleed:         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, PBRSB-eIBRS SW
                                sequence
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     1.1M   12 Data              1    64        1             64
    L1i       32K     768K    8 Instruction       1    64        1             64
    L2         2M      48M   16 Unified           2  2048        1             64
    L3        30M      60M   15 Unified           3 32768        1             64

    ------------------------------------------------------------
    8. numactl --hardware
    NOTE: a numactl 'node' might or might not correspond to a physical chip.
```

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Platform Notes (Continued)

```
   available: 2 nodes (0-1)
   node 0 cpus: 0-11
   node 0 size: 515706 MB
   node 0 free: 514892 MB
   node 1 cpus: 12-23
   node 1 size: 516085 MB
   node 1 free: 515431 MB
   node distances:
   node   0   1
     0:  10  21
     1:  21  10


  --------------------------------------------------------------
  9. /proc/meminfo
    MemTotal:       1056554900 kB


  --------------------------------------------------------------
  10. who -r
    run-level 3 Mar 19 01:22


  --------------------------------------------------------------
  11. Systemd service manager version: systemd 249 (249.16+suse.171.gdad0071f15)
    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@ irqbalance issue-generator
                     kbdsettings klog lvm2-monitor nscd postfix purge-kernels rollback rsyslog smartd sshd
                     systemd-pstore 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 haveged-switch-root ipmi ipmievd issue-add-ssh-keys
                     kexec-load ksm kvm_stat lunmask man-db-create multipathd nfs nfs-blkmap 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-5.14.21-150500.53-default
    root=UUID=ec07819c-bf3e-428b-8399-e735655f61af
    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
```

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Platform Notes (Continued)

```
    ----------------------------------------------------------
    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
      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 SP5


    ----------------------------------------------------------
    19. Disk information
    SPEC is set to: /home/cpu2017
      Filesystem      Type   Size  Used Avail Use% Mounted on
      /dev/sdb5       btrfs   60G   16G   42G  27% /home


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


    ----------------------------------------------------------
    21. dmidecode
      Additional information from dmidecode 3.4 follows.  WARNING: Use caution when you interpret this section.
      The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately
```

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Platform Notes (Continued)

```
   determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the
   "DMTF SMBIOS" standard.
   Memory:
     16x 0xCE00 M321R8GA0PB0-CWMCH 64 GB 2 rank 5600, configured at 4400


   ------------------------------------------------------------
   22. BIOS
   (This section combines info from /sys/devices and dmidecode.)
     BIOS Vendor:       Cisco Systems, Inc.
     BIOS Version:      C240M7.4.3.3a.0.0118241337
     BIOS Date:         01/18/2024
     BIOS Revision:     5.32
```

Compiler Version Notes

```
==============================================================================
C                | 619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
C++, C, Fortran | 607.cactuBSSN_s(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
Fortran          | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak) 654.roms_s(base, peak)
------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
Fortran, C       | 621.wrf_s(base, peak) 627.cam4_s(base, peak) 628.pop2_s(base, peak)
------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:

```
icx
```

(Continued on next page)

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SPECspeed®2017_fp_base = 208

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Base Compiler Invocation (Continued)

Fortran benchmarks:
`ifx`

Benchmarks using both Fortran and C:
`ifx icx`

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

Base Portability Flags

603.bwaves_s: `-DSPEC_LP64`
607.cactuBSSN_s: `-DSPEC_LP64`
619.lbm_s: `-DSPEC_LP64`
621.wrf_s: `-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian`
627.cam4_s: `-DSPEC_LP64 -DSPEC_CASE_FLAG`
628.pop2_s: `-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian -assume byterecl`
638.imagick_s: `-DSPEC_LP64`
644.nab_s: `-DSPEC_LP64`
649.fotonik3d_s: `-DSPEC_LP64`
654.roms_s: `-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 -fiopenmp -DSPEC_OPENMP -Wno-implicit-int -mprefer-vector-width=512 -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

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

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 -fiopenmp -DSPEC_OPENMP -Wno-implicit-int -mprefer-vector-width=512 -nostandard-realloc-lhs -align array32byte -auto`

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Cisco Systems

Cisco UCS C240 M7 (Intel Xeon Silver 4510, 2.40GHz)

SPECspeed®2017_fp_base = 208

SPECspeed®2017_fp_peak = 208

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

Test Date: Mar-2024
Hardware Availability: Feb-2024
Software Availability: Dec-2023

Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
```
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Benchmarks using Fortran, 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 -fiopenmp -DSPEC_OPENMP -Wno-implicit-int
-mprefer-vector-width=512 -nostandard-realloc-lhs -align array32byte
-auto -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Peak Compiler Invocation

C benchmarks:
```
icx
```

Fortran benchmarks:
```
ifx
```

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

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

Peak Portability Flags

```
Same as Base Portability Flags
```

Peak Optimization Flags

C benchmarks:

619.lbm_s: `basepeak = yes`

638.imagick_s: `basepeak = yes`

644.nab_s: `basepeak = yes`

Fortran benchmarks:

(Continued on next page)

Cisco Systems

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Peak Optimization Flags (Continued)

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

649.fotonik3d_s: `basepeak = yes`

654.roms_s: `basepeak = yes`

Benchmarks using both Fortran and C:

621.wrf_s: `basepeak = yes`

627.cam4_s: `-w -m64 -std=c11 -Wl,-z,muldefs -xsapphirerapids -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP -Wno-implicit-int -mprefer-vector-width=512 -nostandard-realloc-lhs -align array32byte -auto -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

628.pop2_s: `basepeak = yes`

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: `basepeak = yes`

The flags files that were used to format this result can be browsed at
`http://www.spec.org/cpu2017/flags/Intel-ic2024-official-linux64.html`
`http://www.spec.org/cpu2017/flags/Cisco-Platform-Settings-V1.0-EMR-revD.html`

You can also download the XML flags sources by saving the following links:
`http://www.spec.org/cpu2017/flags/Intel-ic2024-official-linux64.xml`
`http://www.spec.org/cpu2017/flags/Cisco-Platform-Settings-V1.0-EMR-revD.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 2024-03-19 01:24:33-0400.
Report generated on 2024-04-17 09:40:55 by CPU2017 PDF formatter v6716.
Originally published on 2024-04-17.