SPEC CPU®2017 Floating Point Speed Result

Cisco Systems

Cisco UCS C240 M7 (Intel Xeon Platinum 8558U, 2.00GHz)

$SPECspeed^{®}2017\_fp\_base = 254$

$SPECspeed^{®}2017\_fp\_peak = 254$

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

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

Benchmark	Threads	Result
603.bwaves_s	48	634 / 633
607.cactuBSSN_s	48	338
619.lbm_s	48	165
621.wrf_s	48	202
627.cam4_s	48	162 / 162
628.pop2_s	48	106
638.imagick_s	48	602
644.nab_s	48	432
649.fotonik3d_s	48	115
654.roms_s	48	304

— SPECspeed®2017_fp_base (254) ----- SPECspeed®2017_fp_peak (254)

Hardware

CPU Name: Intel Xeon Platinum 8558U
 Max MHz: 4000
 Nominal: 2000
Enabled: 48 cores, 1 chip
Orderable: 1 Chips
Cache L1: 32 KB I + 48 KB D on chip per core
 L2: 2 MB I+D on chip per core
 L3: 260 MB I+D on chip per chip
 Other: None
Memory: 512 GB (8 x 64 GB 2Rx4 PC5-5600B-R, running at 4800)
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
Copyright 2017-2024 Standard Performance Evaluation Corporation

Cisco Systems
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SPECspeed®2017_fp_base = 254

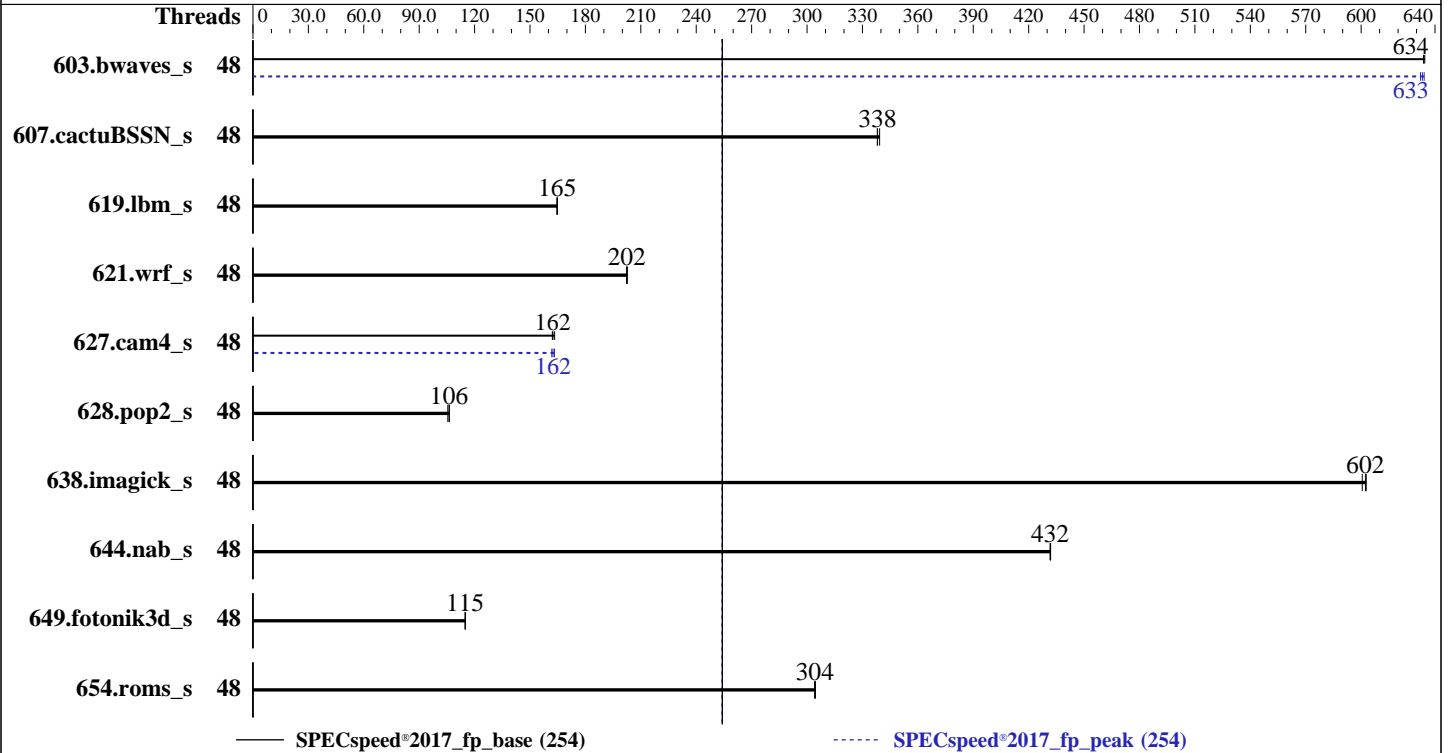SPECspeed®2017_fp_peak = 254

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Results Table

Benchmark	Base						Peak					
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	48	93.1	634	93.0	634	**93.1**	**634**	48	93.3	632	93.0	634	**93.2**	**633**
607.cactuBSSN_s	48	49.1	339	49.3	338	**49.3**	**338**	48	49.1	339	49.3	338	**49.3**	**338**
619.lbm_s	48	31.8	165	31.8	165	**31.8**	**165**	48	31.8	165	31.8	165	**31.8**	**165**
621.wrf_s	48	65.3	203	65.4	202	**65.3**	**202**	48	65.3	203	65.4	202	**65.3**	**202**
627.cam4_s	48	54.3	163	54.7	162	**54.6**	**162**	48	**54.6**	**162**	54.3	163	54.8	162
628.pop2_s	48	112	106	**112**	**106**	113	106	48	112	106	**112**	**106**	113	106
638.imagick_s	48	23.9	603	24.0	601	**23.9**	**602**	48	23.9	603	24.0	601	**23.9**	**602**
644.nab_s	48	40.5	432	40.5	432	**40.5**	**432**	48	40.5	432	40.5	432	**40.5**	**432**
649.fotonik3d_s	48	**79.3**	**115**	79.3	115	79.3	115	48	**79.3**	**115**	79.3	115	79.3	115
654.roms_s	48	51.7	305	51.8	304	**51.7**	**304**	48	51.7	305	51.8	304	**51.7**	**304**
SPECspeed®2017_fp_base =		**254**										
SPECspeed®2017_fp_peak =		**254**										

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 Wed Apr  3 02:25:57 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
    02:25:57 up 36 min,  1 user,  load average: 0.08, 0.02, 0.01
   USER     TTY       FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1      -                02:25   12.00s  1.00s  0.13s -bash

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


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

(Continued on next page)

Cisco Systems

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CPU2017 License: 9019　　　　　　　　　　　　　　　　　　**Test Date:** Apr-2024
Test Sponsor: Cisco Systems　　　　　　　　　　　　　**Hardware Availability:** Feb-2024
Tested by: Cisco Systems　　　　　　　　　　　　　　**Software Availability:** Dec-2023

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) 2061856
   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) 2061856
   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=48
   --tune all -o all --define drop_caches fpspeed
 runcpu --define default-platform-flags --configfile ic2024.0.2-lin-sapphirerapids-speed-20231213.cfg
   --define cores=48 --tune all --output_format all --define drop_caches --nopower --runmode speed --tune
   base:peak --size refspeed fpspeed --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.063/templogs/preenv.fpspeed.063.0.log --lognum 063.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
 $SPEC = /home/cpu2017


    ------------------------------------------------------------
6. /proc/cpuinfo
   model name        : INTEL(R) XEON(R) PLATINUM 8558U
   vendor_id         : GenuineIntel
   cpu family        : 6
   model             : 207
   stepping          : 2
   microcode         : 0x21000200
   bugs              : spectre_v1 spectre_v2 spec_store_bypass swapgs eibrs_pbrsb
   cpu cores         : 48
   siblings          : 48
   1 physical ids (chips)
   48 processors (hardware threads)
   physical id 0: core ids 0-47
   physical id 0: apicids
   0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52,54,56,58,60,62,64,66,68,70,72
   ,74,76,78,80,82,84,86,88,90,92,94
  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):                      48
On-line CPU(s) list:         0-47
Vendor ID:                   GenuineIntel
Model name:                  INTEL(R) XEON(R) PLATINUM 8558U
CPU family:                  6
Model:                       207
Thread(s) per core:          1
Core(s) per socket:          48
Socket(s):                   1
Stepping:                    2
CPU max MHz:                 4000.0000
CPU min MHz:                 800.0000
BogoMIPS:                    4000.00
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
                             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 avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pln pts hwp
                             hwp_act_window hwp_epp hwp_pkg_req hfi 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:                   2.3 MiB (48 instances)
L1i cache:                   1.5 MiB (48 instances)
L2 cache:                    96 MiB (48 instances)
L3 cache:                    260 MiB (1 instance)
NUMA node(s):                1
NUMA node0 CPU(s):           0-47
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      2.3M   12 Data            1      64       1              64
    L1i      32K      1.5M    8 Instruction     1      64       1              64
    L2        2M       96M   16 Unified         2    2048       1              64
    L3      260M      260M   20 Unified         3  212992       1              64

    -------------------------------------------------------------
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
  available: 1 nodes (0)
```

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Platform Notes (Continued)

```
   node 0 cpus: 0-47
   node 0 size: 515493 MB
   node 0 free: 514557 MB
   node distances:
   node   0
     0:  10


  ----------------------------------------------------------
9. /proc/meminfo
   MemTotal:       527865816 kB


  ----------------------------------------------------------
10. who -r
   run-level 3 Apr 3 01:50


  ----------------------------------------------------------
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 4.00 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            0
   kernel.randomize_va_space        2
   vm.compaction_proactiveness      20
```

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Platform Notes (Continued)

```
  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/sda5       btrfs   60G   16G   42G  28% /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
  determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the
  "DMTF SMBIOS" standard.
  Memory:
    8x 0xCE00 M321R8GA0PB0-CWMCH 64 GB 2 rank 5600, configured at 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:     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
```

Fortran benchmarks:

```
ifx
```

(Continued on next page)

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Base Compiler Invocation (Continued)

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

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Cisco Systems

Cisco UCS C240 M7 (Intel Xeon Platinum 8558U, 2.00GHz)

SPECspeed®2017_fp_base = 254

SPECspeed®2017_fp_peak = 254

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

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

Base Optimization Flags (Continued)

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:

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`

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Peak Optimization Flags (Continued)

603.bwaves_s (continued):
```
-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.

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