SPEC CPU®2017 Floating Point Speed Result

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Lenovo Global Technology

ThinkSystem SR250 V3
(3.50 GHz,Intel Xeon E-2486)

$SPECspeed®2017\_fp\_base = 75.1$

$SPECspeed®2017\_fp\_peak = 75.1$

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

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

Threads		Result
603.bwaves_s	6	152
607.cactuBSSN_s	6	97.5
619.lbm_s	6	47.2
621.wrf_s	6	97.5
627.cam4_s	6	42.6
628.pop2_s	6	72.7
638.imagick_s	6	175
644.nab_s	6	100
649.fotonik3d_s	6	32.7
654.roms_s	6	47.6

—— **SPECspeed®2017_fp_base (75.1)**   ------ **SPECspeed®2017_fp_peak (75.1)**

Hardware

CPU Name: Intel Xeon E-2486
 Max MHz: 5600
 Nominal: 3500
Enabled: 6 cores, 1 chip
Orderable: 1 chip
Cache L1: 32 KB I + 48 KB D on chip per core
 L2: 2 MB I+D on chip per core
 L3: 18 MB I+D on chip per chip
 Other: None
Memory: 64 GB (2 x 32 GB 2Rx8 PC5-4800B-E, running at 4400)
Storage: 1 x 480 GB SATA SSD
Other: None

Software

OS: Red Hat Enterprise Linux 9.3 (Plow)
 Kernel 5.14.0-362.8.1.el9_3.x86_64
Compiler: C/C++: Version 2023.2.3 of Intel oneAPI DPC++/C++ Compiler for Linux;
 Fortran: Version 2023.2.3 of Intel Fortran Compiler for Linux;
Parallel: Yes
Firmware: Lenovo BIOS Version CTE101Z 1.10 released Dec-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 and OS set to prefer performance at the cost of additional power usage

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

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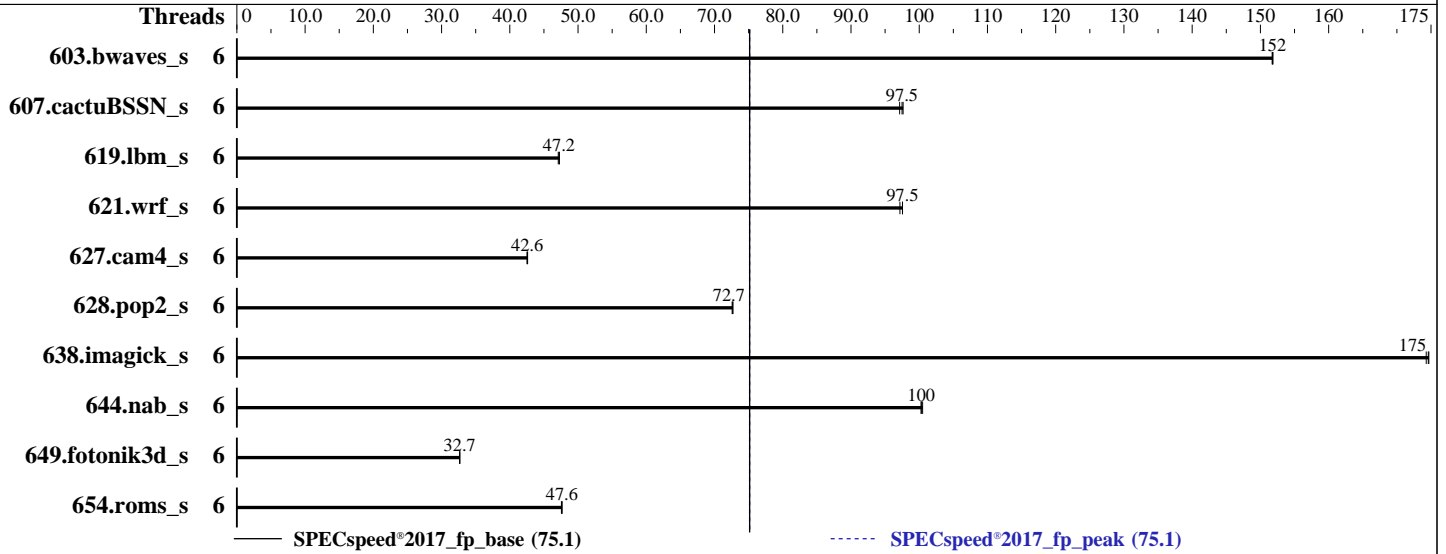
SPECspeed®2017_fp_peak = 75.1

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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	6	**389**	**152**	389	152	389	152	6	**389**	**152**	389	152	389	152
607.cactuBSSN_s	6	171	97.6	172	97.1	**171**	**97.5**	6	171	97.6	172	97.1	**171**	**97.5**
619.lbm_s	6	**111**	**47.2**	111	47.1	111	47.3	6	**111**	**47.2**	111	47.1	111	47.3
621.wrf_s	6	136	97.2	136	97.6	**136**	**97.5**	6	136	97.2	136	97.6	**136**	**97.5**
627.cam4_s	6	208	42.6	**208**	**42.6**	208	42.5	6	208	42.6	**208**	**42.6**	208	42.5
628.pop2_s	6	164	72.6	163	72.7	**163**	**72.7**	6	164	72.6	163	72.7	**163**	**72.7**
638.imagick_s	6	82.8	174	82.6	175	**82.6**	**175**	6	82.8	174	82.6	175	**82.6**	**175**
644.nab_s	6	**174**	**100**	174	100	174	100	6	**174**	**100**	174	100	174	100
649.fotonik3d_s	6	279	32.7	279	32.7	**279**	**32.7**	6	279	32.7	279	32.7	**279**	**32.7**
654.roms_s	6	**330**	**47.6**	330	47.6	331	47.6	6	**330**	**47.6**	330	47.6	331	47.6
SPECspeed®2017_fp_base =		**75.1**												
SPECspeed®2017_fp_peak =		**75.1**												

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/cpu2017-1.1.9-ic2023.2.3/lib/intel64:/home/cpu2017-1.1.9-ic2023.2.3/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 configuration:
Choose Operating Mode set to Maximum Performance
Hyper-Threading set to Disabled
Turbo Limit for 95W CPU set to Disabled

 Sysinfo program /home/cpu2017-1.1.9-ic2023.2.3/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost.localdomain Wed Feb 21 09:38:36 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 252 (252-18.el9)
 12. Services, from systemctl list-unit-files
 13. Linux kernel boot-time arguments, from /proc/cmdline
 14. cpupower frequency-info
 15. tuned-adm active
 16. sysctl
 17. /sys/kernel/mm/transparent_hugepage
 18. /sys/kernel/mm/transparent_hugepage/khugepaged
 19. OS release
 20. Disk information
 21. /sys/devices/virtual/dmi/id
 22. dmidecode
 23. BIOS
 ------------------------------------------------------------


 ------------------------------------------------------------
 1. uname -a
   Linux localhost.localdomain 5.14.0-362.8.1.el9_3.x86_64 #1 SMP PREEMPT_DYNAMIC Tue Oct 3 11:12:36 EDT 2023
   x86_64 x86_64 x86_64 GNU/Linux


 ------------------------------------------------------------
 2. w
   09:38:37 up 39 min,  1 user,  load average: 1.63, 4.59, 4.88
   USER     TTY        LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1       09:00   12.00s  0.57s  0.00s -bash


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


 ------------------------------------------------------------
 4. ulimit -a
   real-time non-blocking time  (microseconds, -R) unlimited
   core file size              (blocks, -c) 0
   data seg size               (kbytes, -d) unlimited
   scheduling priority              (-e) 0
```

(Continued on next page)

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Platform Notes (Continued)

```
   file size                  (blocks, -f) unlimited
   pending signals                  (-i) 256659
   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) 256659
   virtual memory             (kbytes, -v) unlimited
   file locks                       (-x) unlimited


 ----------------------------------------------------------
 5. sysinfo process ancestry
  /usr/lib/systemd/systemd rhgb --switched-root --system --deserialize 31
  login -- root
  -bash
  -bash
  runcpu --nobuild --action validate --define default-platform-flags -c
    ic2023.2.3-lin-core-avx2-speed-20231121.cfg --define cores=6 --tune base,peak -o all --define drop_caches
    fpspeed
  runcpu --nobuild --action validate --define default-platform-flags --configfile
    ic2023.2.3-lin-core-avx2-speed-20231121.cfg --define cores=6 --tune base,peak --output_format all --define
    drop_caches --nopower --runmode speed --tune base:peak --size refspeed fpspeed --nopreenv --note-preenv
    --logfile $SPEC/tmp/CPU2017.103/templogs/preenv.fpspeed.103.0.log --lognum 103.0 --from_runcpu 2
  specperl $SPEC/bin/sysinfo
  $SPEC = /home/cpu2017-1.1.9-ic2023.2.3


 ----------------------------------------------------------
 6. /proc/cpuinfo
    model name         : Intel(R) Xeon(R) E E-2486
    vendor_id          : GenuineIntel
    cpu family         : 6
    model              : 183
    stepping           : 1
    microcode          : 0x11f
    bugs               : spectre_v1 spectre_v2 spec_store_bypass swapgs eibrs_pbrsb
    cpu cores          : 6
    siblings           : 6
    1 physical ids (chips)
    6 processors (hardware threads)
    physical id 0: core ids 0-5
    physical id 0: apicids 0,2,4,6,8,10
  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:                 42 bits physical, 48 bits virtual
   Byte Order:                    Little Endian
   CPU(s):                        6
   On-line CPU(s) list:           0-5
   Vendor ID:                     GenuineIntel
   BIOS Vendor ID:                Intel(R) Corporation
```

(Continued on next page)

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Software Availability: Dec-2023

Platform Notes (Continued)

```
  Model name:                      Intel(R) Xeon(R) E E-2486
  BIOS Model name:                 Intel(R) Xeon(R) E E-2486
  CPU family:                      6
  Model:                           183
  Thread(s) per core:              1
  Core(s) per socket:              6
  Socket(s):                       1
  Stepping:                        1
  BogoMIPS:                        6988.80
  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
                                   sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c
                                   rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb ssbd ibrs ibpb stibp
                                   ibrs_enhanced tpr_shadow flexpriority ept vpid ept_ad fsgsbase
                                   tsc_adjust bmi1 avx2 smep bmi2 erms invpcid rdseed adx smap clflushopt
                                   clwb intel_pt sha_ni xsaveopt xsavec xgetbv1 xsaves split_lock_detect
                                   avx_vnni dtherm ida arat pln pts hfi vnmi umip pku ospke waitpkg gfni
                                   vaes vpclmulqdq tme rdpid movdiri movdir64b fsrm md_clear serialize
                                   pconfig arch_lbr ibt flush_l1d arch_capabilities
  Virtualization:                  VT-x
  L1d cache:                       288 KiB (6 instances)
  L1i cache:                       192 KiB (6 instances)
  L2 cache:                        12 MiB (6 instances)
  L3 cache:                        18 MiB (1 instance)
  NUMA node(s):                    1
  NUMA node0 CPU(s):               0-5
  Vulnerability Gather data sampling: Not affected
  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
  Vulnerability Spectre v1:           Mitigation; usercopy/swapgs barriers and __user pointer sanitization
  Vulnerability Spectre v2:           Mitigation; Enhanced / Automatic 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     288K   12 Data             1    64      1             64
      L1i      32K     192K    8 Instruction      1    64      1             64
      L2        2M      12M   16 Unified          2  2048      1             64
      L3       18M      18M    9 Unified          3 32768      1             64

  ------------------------------------------------------------
  8. numactl --hardware
  NOTE: a numactl 'node' might or might not correspond to a physical chip.
    available: 1 nodes (0)
    node 0 cpus: 0-5
    node 0 size: 64207 MB
    node 0 free: 62506 MB
    node distances:
    node   0
      0:  10
```

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Platform Notes (Continued)

```
    ----------------------------------------------------------
    9. /proc/meminfo
       MemTotal:       65748736 kB


    ----------------------------------------------------------
    10. who -r
      run-level 3 Feb 21 08:59


    ----------------------------------------------------------
    11. Systemd service manager version: systemd 252 (252-18.el9)
      Default Target  Status
      multi-user      running


    ----------------------------------------------------------
    12. Services, from systemctl list-unit-files
      STATE            UNIT FILES
      enabled          NetworkManager NetworkManager-dispatcher NetworkManager-wait-online atd auditd bluetooth
                       chronyd crond dbus-broker firewalld getty@ insights-client-boot irqbalance iscsi
                       iscsi-onboot kdump libstoragemgmt low-memory-monitor lvm2-monitor mcelog mdmonitor
                       microcode multipathd nis-domainname nvmefc-boot-connections rhsmcertd rsyslog rtkit-daemon
                       selinux-autorelabel-mark smartd sshd sssd systemd-boot-update systemd-network-generator
                       tuned udisks2 upower
      enabled-runtime  systemd-remount-fs
      disabled         arp-ethers blk-availability canberra-system-bootup canberra-system-shutdown
                       canberra-system-shutdown-reboot chrony-wait console-getty cpupower debug-shell
                       dnf-system-upgrade iprdump iprinit iprupdate iscsid iscsiuio kpatch kvm_stat ledmon
                       man-db-restart-cache-update nftables nvmf-autoconnect pesign psacct rdisc rhcd rhsm
                       rhsm-facts rpmdb-rebuild selinux-check-proper-disable serial-getty@ sshd-keygen@
                       systemd-boot-check-no-failures systemd-pstore systemd-sysext
      indirect         sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo systemd-sysupdate
                       systemd-sysupdate-reboot

    ----------------------------------------------------------
    13. Linux kernel boot-time arguments, from /proc/cmdline
      BOOT_IMAGE=(hd0,gpt2)/vmlinuz-5.14.0-362.8.1.el9_3.x86_64
      root=/dev/mapper/rhel-root
      ro
      resume=/dev/mapper/rhel-swap
      rd.lvm.lv=rhel/root
      rd.lvm.lv=rhel/swap
      rhgb
      quiet


    ----------------------------------------------------------
    14. cpupower frequency-info
      analyzing CPU 0:
        Unable to determine current policy
        boost state support:
          Supported: yes
          Active: yes


    ----------------------------------------------------------
    15. tuned-adm active
      Current active profile: throughput-performance


    ----------------------------------------------------------
    16. sysctl
      kernel.numa_balancing           0
      kernel.randomize_va_space       2
```

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Platform Notes (Continued)

```
     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                       40
     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                        10
     vm.watermark_boost_factor         15000
     vm.watermark_scale_factor            10
     vm.zone_reclaim_mode                  0


   ---------------------------------------------------------------
17. /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


   ---------------------------------------------------------------
18. /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


   ---------------------------------------------------------------
19. OS release
   From /etc/*-release /etc/*-version
   os-release      Red Hat Enterprise Linux 9.3 (Plow)
   redhat-release Red Hat Enterprise Linux release 9.3 (Plow)
   system-release Red Hat Enterprise Linux release 9.3 (Plow)


   ---------------------------------------------------------------
20. Disk information
SPEC is set to: /home/cpu2017-1.1.9-ic2023.2.3
   Filesystem            Type  Size  Used Avail Use% Mounted on
   /dev/mapper/rhel-home xfs   344G   15G  330G   5% /home


   ---------------------------------------------------------------
21. /sys/devices/virtual/dmi/id
   Vendor:         Lenovo
   Product:        ThinkSystem SR250 V3
   Product Family: ThinkSystem
   Serial:         1234567890


   ---------------------------------------------------------------
22. dmidecode
   Additional information from dmidecode 3.5 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
```

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Platform Notes (Continued)

```
   "DMTF SMBIOS" standard.
   Memory:
     1x Samsung M324R4GA3BB0-CQKOD 32 GB 2 rank 4800, configured at 4400
     1x Samsung M324R4GA3BB0-CQKOL 32 GB 2 rank 4800, configured at 4400


   ------------------------------------------------------------
   23. BIOS
   (This section combines info from /sys/devices and dmidecode.)
     BIOS Vendor:      Lenovo
     BIOS Version:     CTE101Z-1.10
     BIOS Date:        12/27/2023
     BIOS Revision:    1.10
     Firmware Revision: 1.10
```

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 2023.2.3 Build x
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 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
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 2023.2.3 Build x
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 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:

icx

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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 -xCORE-AVX2 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -Wno-implicit-int -L/usr/local/jemalloc64-5.0.1/lib
-ljemalloc
```

Fortran benchmarks:
```
-w -m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX2 -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 -xCORE-AVX2 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
```

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Lenovo Global Technology

ThinkSystem SR250 V3
(3.50 GHz,Intel Xeon E-2486)

SPECspeed®2017_fp_base = 75.1

SPECspeed®2017_fp_peak = 75.1

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

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

Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
```
-DSPEC_OPENMP -Wno-implicit-int -nostandard-realloc-lhs
-align array32byte -auto -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 -xCORE-AVX2 -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP -Wno-implicit-int
-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

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

Peak Optimization Flags (Continued)

Fortran benchmarks:

603.bwaves_s: `basepeak = yes`

649.fotonik3d_s: `basepeak = yes`

654.roms_s: `basepeak = yes`

Benchmarks using both Fortran and C:

621.wrf_s: `basepeak = yes`

627.cam4_s: `basepeak = yes`

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/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Catlow-A.html`
`http://www.spec.org/cpu2017/flags/Intel-ic2023p2-official-linux64.html`

You can also download the XML flags sources by saving the following links:
`http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Catlow-A.xml`
`http://www.spec.org/cpu2017/flags/Intel-ic2023p2-official-linux64.xml`

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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