SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2023 Standard Performance Evaluation Corporation

Lenovo Global Technology

ThinkSystem SR650 V3
(2.00 GHz, Intel Xeon Gold 5418Y)

SPECrate®2017_fp_base =   524

SPECrate®2017_fp_peak = Not Run
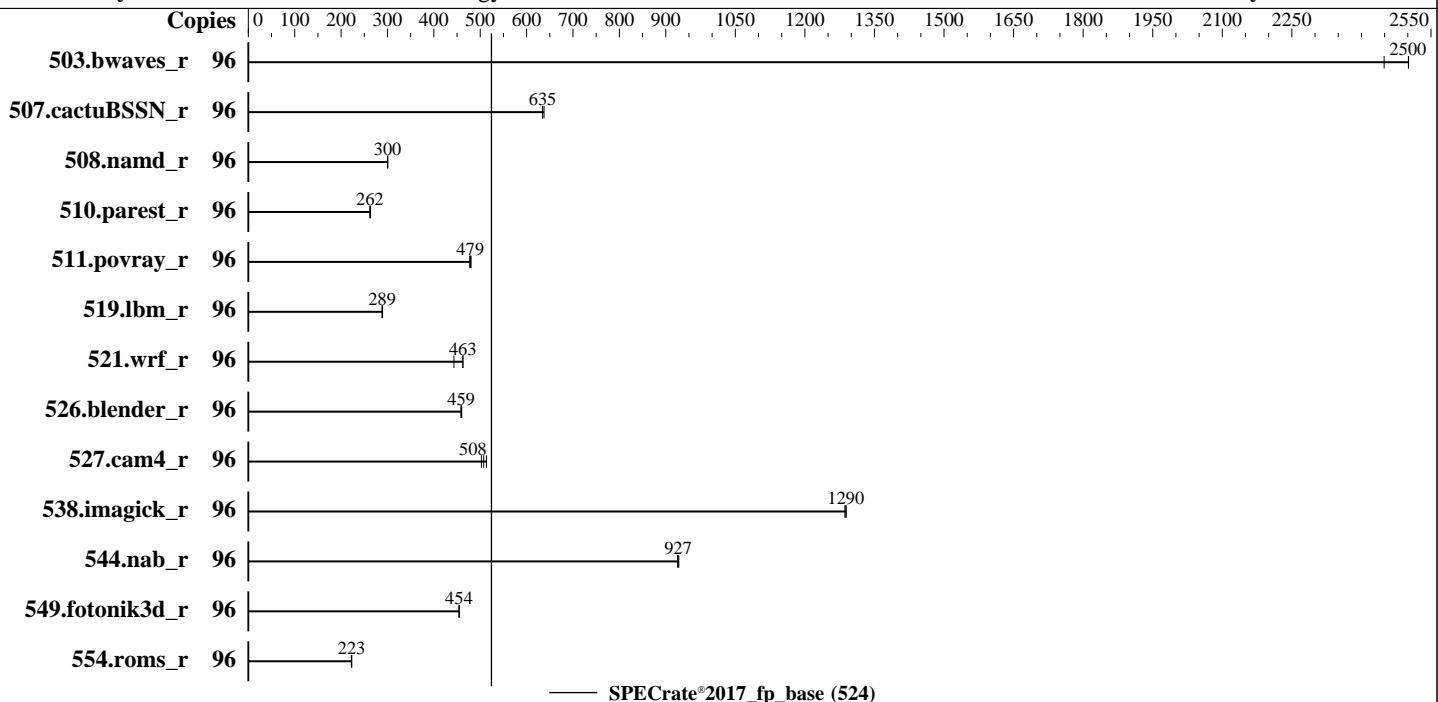
CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

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

Benchmark	Copies	Result
503.bwaves_r	96	2500
507.cactuBSSN_r	96	635
508.namd_r	96	300
510.parest_r	96	262
511.povray_r	96	479
519.lbm_r	96	289
521.wrf_r	96	463
526.blender_r	96	459
527.cam4_r	96	508
538.imagick_r	96	1290
544.nab_r	96	927
549.fotonik3d_r	96	454
554.roms_r	96	223

SPECrate®2017_fp_base (524)

Hardware

CPU Name: Intel Xeon Gold 5418Y
 Max MHz: 3800
 Nominal: 2000
Enabled: 48 cores, 2 chips, 2 threads/core
Orderable: 1,2 chips
Cache L1: 32 KB I + 48 KB D on chip per core
 L2: 2 MB I+D on chip per core
 L3: 45 MB I+D on chip per chip
 Other: None
Memory: 512 GB (16 x 32 GB 2Rx8 PC5-4800B-R, running at 4400)
Storage: 1 x 960 GB SATA SSD
Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP4 (x86_64)
 Kernel 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: Lenovo BIOS Version ESE109L 1.10 released Jan-2023
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: jemalloc memory allocator V5.0.1
Power Management: BIOS and OS set to prefer performance at the cost of additional power usage

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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	96	**385**	**2500**	385	2500	393	2450							
507.cactuBSSN_r	96	191	638	192	634	**192**	**635**							
508.namd_r	96	304	300	**304**	**300**	304	300							
510.parest_r	96	**957**	**262**	957	262	955	263							
511.povray_r	96	**468**	**479**	467	480	470	477							
519.lbm_r	96	**350**	**289**	351	288	350	289							
521.wrf_r	96	465	463	485	443	**465**	**463**							
526.blender_r	96	319	458	**318**	**459**	318	460							
527.cam4_r	96	327	514	**331**	**508**	334	503							
538.imagick_r	96	186	1290	185	1290	**185**	**1290**							
544.nab_r	96	175	926	174	928	**174**	**927**							
549.fotonik3d_r	96	822	455	823	454	**823**	**454**							
554.roms_r	96	687	222	**685**	**223**	685	223							

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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/cpu2017-1.1.9-ic2023.0/lib/intel64:/home/cpu2017-1.1.9-ic2023.0/j
    e5.0.1-64"
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

(Continued on next page)

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General Notes (Continued)

```
 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.
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
```

Platform Notes

```
BIOS configuration:
Operating Mode set to Maximum Performance and then set it to Custom Mode
MONITOR/MWAIT set to Enabled
SNC set to SNC2
LLC Prefetch set to Disabled
XPT Prefetcher set to Disabled

 Sysinfo program /home/cpu2017-1.1.9-ic2023.0/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost Sat Apr 30 00:57:58 2022

 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
```

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Platform Notes (Continued)

```
    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


    -----------------------------------------------------------
    2. w
       00:57:58 up  4:58,  1 user,  load average: 20.58, 69.70, 85.45
       USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
       root     tty1     -                20:00    4:54m  1.10s  0.01s -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) 2062598
      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) 2062598
      virtual memory          (kbytes, -v) unlimited
      file locks                      (-x) unlimited


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

(Continued on next page)

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Platform Notes (Continued)

```
 /usr/lib/systemd/systemd --switched-root --system --deserialize 30
 login -- root
 -bash
 -bash
 -bash
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=96 -c
   ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=48 --define physicalfirst
    --define invoke_with_interleave --define drop_caches --tune base -o all fprate
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=96 --configfile
   ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=48 --define physicalfirst
    --define invoke_with_interleave --define drop_caches --tune base --output_format all --nopower --runmode
    rate --tune base --size refrate fprate --nopreenv --note-preenv --logfile
    $SPEC/tmp/CPU2017.055/templogs/preenv.fprate.055.0.log --lognum 055.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017-1.1.9-ic2023.0


 ------------------------------------------------------------
 6. /proc/cpuinfo
     model name        : Intel(R) Xeon(R) Gold 5418Y
     vendor_id         : GenuineIntel
     cpu family        : 6
     model             : 143
     stepping          : 8
     microcode         : 0x2b000161
     bugs              : spectre_v1 spectre_v2 spec_store_bypass swapgs
     cpu cores         : 24
     siblings          : 48
     2 physical ids (chips)
     96 processors (hardware threads)
     physical id 0: core ids 0-23
     physical id 1: core ids 0-23
     physical id 0: apicids 0-47
     physical id 1: apicids 128-175
  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):                     96
   On-line CPU(s) list:        0-95
   Vendor ID:                  GenuineIntel
```

(Continued on next page)

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Test Sponsor:　Lenovo Global Technology　　　　　　　**Hardware Availability:** Feb-2023
Tested by:　　　Lenovo Global Technology　　　　　　　**Software Availability:**　Dec-2022

Platform Notes (Continued)

```
     Model name:                Intel(R) Xeon(R) Gold 5418Y
     CPU family:                6
     Model:                     143
     Thread(s) per core:        2
     Core(s) per socket:        24
     Socket(s):                 2
     Stepping:                  8
     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 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 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:                 2.3 MiB (48 instances)
     L1i cache:                 1.5 MiB (48 instances)
     L2 cache:                  96 MiB (48 instances)
     L3 cache:                  90 MiB (2 instances)
     NUMA node(s):              4
     NUMA node0 CPU(s):         0-11,48-59
     NUMA node1 CPU(s):         12-23,60-71
     NUMA node2 CPU(s):         24-35,72-83
     NUMA node3 CPU(s):         36-47,84-95
     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
```

(Continued on next page)

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Platform Notes (Continued)

```
      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       45M     90M   15 Unified       3 49152     1        64


    -----------------------------------------------------------
 8. numactl --hardware
 NOTE: a numactl 'node' might or might not correspond to a physical chip.
   available: 4 nodes (0-3)
   node 0 cpus: 0-11,48-59
   node 0 size: 128683 MB
   node 0 free: 127587 MB
   node 1 cpus: 12-23,60-71
   node 1 size: 129017 MB
   node 1 free: 127952 MB
   node 2 cpus: 24-35,72-83
   node 2 size: 129017 MB
   node 2 free: 128165 MB
   node 3 cpus: 36-47,84-95
   node 3 size: 128954 MB
   node 3 free: 128112 MB
   node distances:
   node   0   1   2   3
     0:  10  12  21  21
     1:  12  10  21  21
     2:  21  21  10  12
     3:  21  21  12  10


    -----------------------------------------------------------
 9. /proc/meminfo
    MemTotal:       528049704 kB


    -----------------------------------------------------------
10. who -r
    run-level 3 Apr 29 20:00


    -----------------------------------------------------------
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 iscsi
                    issue-generator kbdsettings klog lvm2-monitor nscd postfix purge-kernels rollback rsyslog
                      smartd sshd wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
```

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Platform Notes (Continued)

```
   enabled-runtime  systemd-remount-fs
  disabled          autofs autoyast-initscripts blk-availability boot-sysctl ca-certificates chrony-wait
                     chronyd console-getty cups cups-browsed debug-shell ebtables exchange-bmc-os-info
                     firewalld gpm grub2-once haveged-switch-root ipmi ipmievd iscsi-init iscsid iscsiuio
                     issue-add-ssh-keys kexec-load lunmask man-db-create multipathd nfs nfs-blkmap nmb rdisc
                     rpcbind rpmconfigcheck rsyncd serial-getty@ smartd_generate_opts smb snmpd snmptrapd
                        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=cf0c8526-2665-4565-b656-0513c168d1bb
  splash=silent
  mitigations=auto
  quiet
  security=apparmor


  ----------------------------------------------------------------
14. cpupower frequency-info
  analyzing CPU 0:
    Unable to determine current policy
    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                    60
  vm.watermark_boost_factor     15000
  vm.watermark_scale_factor        10
```

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Platform Notes (Continued)

```
    vm.zone_reclaim_mode                  0


    ----------------------------------------------------------
16. /sys/kernel/mm/transparent_hugepage
   defrag          always defer defer+madvise [madvise] never
   enabled         [always] madvise never
   hpage_pmd_size  2097152
   shmem_enabled   always within_size advise [never] deny force


    ----------------------------------------------------------
17. /sys/kernel/mm/transparent_hugepage/khugepaged
   alloc_sleep_millisecs   60000
   defrag                      1
   max_ptes_none             511
   max_ptes_shared           256
   max_ptes_swap              64
   pages_to_scan            4096
   scan_sleep_millisecs    10000


    ----------------------------------------------------------
18. OS release
   From /etc/*-release /etc/*-version
   os-release SUSE Linux Enterprise Server 15 SP4


    ----------------------------------------------------------
19. Disk information
SPEC is set to: /home/cpu2017-1.1.9-ic2023.0
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/sda3       xfs   446G   59G  387G  14% /


    ----------------------------------------------------------
20. /sys/devices/virtual/dmi/id
    Vendor:         Lenovo
    Product:        ThinkSystem SR650 V3 MB,EGS,DDR5,SH,2U
    Product Family: ThinkSystem
    Serial:         1234567890


    ----------------------------------------------------------
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:
    9x Samsung M321R4GA3BB0-CQKEG 32 GB 2 rank 4800, configured at 4400
    7x Samsung M321R4GA3BB0-CQKVG 32 GB 2 rank 4800, configured at 4400
```

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Platform Notes (Continued)

```
    ----------------------------------------------------------------
    22. BIOS
    (This section combines info from /sys/devices and dmidecode.)
       BIOS Vendor:        Lenovo
       BIOS Version:       ESE109L-1.10
       BIOS Date:          01/07/2023
       BIOS Revision:      1.10
       Firmware Revision: 1.0
  System date/time for this result was not updated to right time
  and actual testing date can be referred to "spec.cpu2017.test_date"
```

Compiler Version Notes

```
==============================================================================
 C                | 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
------------------------------------------------------------------------------
 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) 510.parest_r(base)
------------------------------------------------------------------------------
 Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
   Version 2023.0.0 Build 20221201
 Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
 C++, C           | 511.povray_r(base) 526.blender_r(base)
------------------------------------------------------------------------------
 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)
------------------------------------------------------------------------------
 Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
   Version 2023.0.0 Build 20221201
```

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Compiler Version Notes (Continued)

```
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) 549.fotonik3d_r(base) 554.roms_r(base)
-----------------------------------------------------------------------
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) 527.cam4_r(base)
-----------------------------------------------------------------------
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)

Lenovo Global Technology

ThinkSystem SR650 V3
(2.00 GHz, Intel Xeon Gold 5418Y)

SPECrate®2017_fp_base =   524

SPECrate®2017_fp_peak = Not Run

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

Test Date: Mar-2023
Hardware Availability: Feb-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
```

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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
```

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-Eaglestream-O.html
http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Eaglestream-O.xml
http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.xml

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

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