SPEC CPU®2017 Floating Point Rate Result

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Lenovo Global Technology

ThinkSystem SR630 V3
(2.20 GHz, Intel Xeon Platinum 8461V)

$SPECrate^{®}2017\_fp\_base = 423$

$SPECrate^{®}2017_fp_peak = $ Not Run

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

Test Date: May-2023
Hardware Availability: May-2023
Software Availability: Dec-2022

Copies — scale 0 to 2050

- **503.bwaves_r** 96 — 2010
- **507.cactuBSSN_r** 96 — 471
- **508.namd_r** 96 — 305
- **510.parest_r** 96 — 194
- **511.povray_r** 96 — 453
- **519.lbm_r** 96 — 199
- **521.wrf_r** 96 — 293
- **526.blender_r** 96 — 427
- **527.cam4_r** 96 — 452
- **538.imagick_r** 96 — 1300
- **544.nab_r** 96 — 903
- **549.fotonik3d_r** 96 — 273
- **554.roms_r** 96 — 152

SPECrate®2017_fp_base (423)

Hardware

CPU Name: Intel Xeon Platinum 8461V
Max MHz: 3700
Nominal: 2200
Enabled: 48 cores, 1 chip, 2 threads/core
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: 97.5 MB I+D on chip per chip
Other: None
Memory: 256 GB (8 x 32 GB 2Rx8 PC5-4800B-R)
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 ESE113G 2.10 released Mar-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

Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

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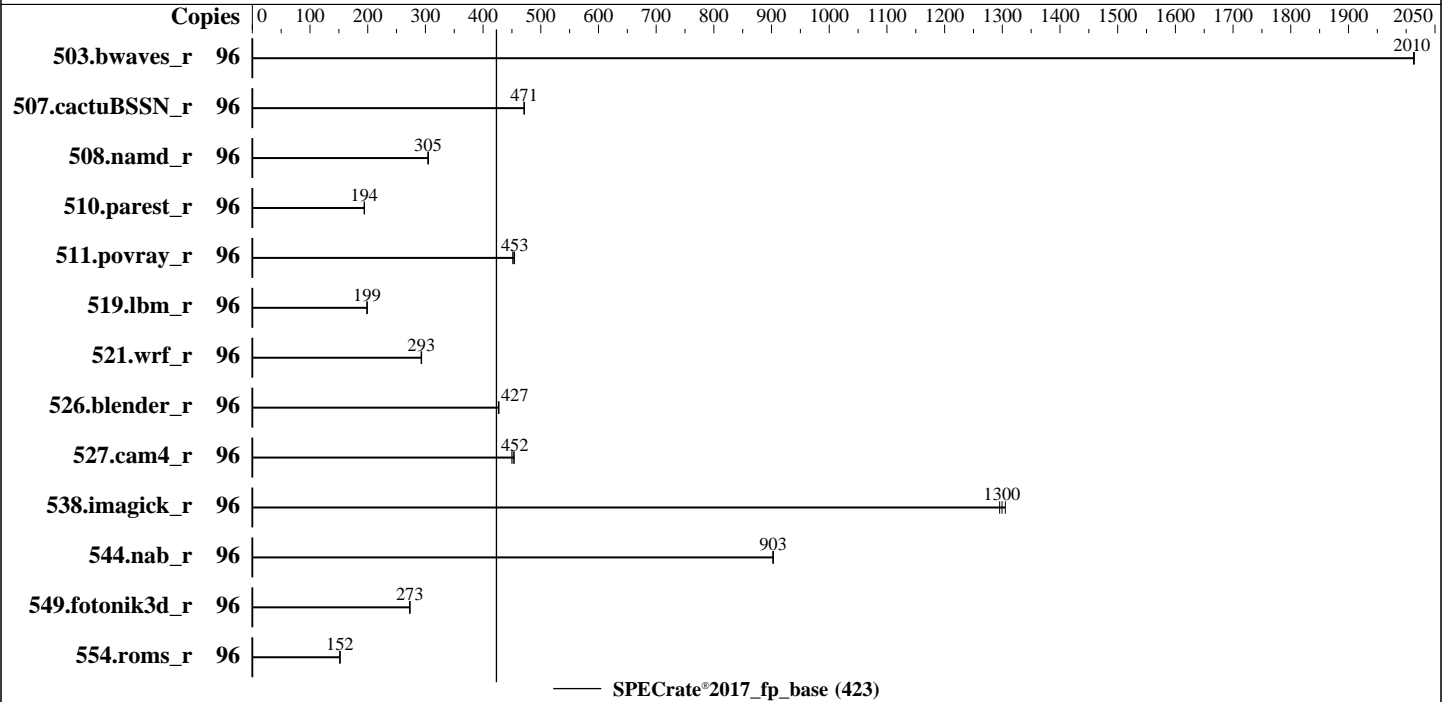SPECrate®2017_fp_peak = Not Run

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Hardware Availability: May-2023
Software Availability: Dec-2022

Results Table

Benchmark	Copies	Base Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Peak Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	96	478	2010	**478**	**2010**	478	2010							
507.cactuBSSN_r	96	**258**	**471**	258	471	258	471							
508.namd_r	96	**299**	**305**	299	305	299	305							
510.parest_r	96	1294	194	**1293**	**194**	1293	194							
511.povray_r	96	**495**	**453**	493	455	497	451							
519.lbm_r	96	**509**	**199**	509	199	509	199							
521.wrf_r	96	**734**	**293**	733	293	735	293							
526.blender_r	96	**343**	**427**	343	427	342	428							
527.cam4_r	96	373	450	**371**	**452**	370	454							
538.imagick_r	96	**184**	**1300**	184	1300	183	1310							
544.nab_r	96	**179**	**903**	179	903	179	902							
549.fotonik3d_r	96	1369	273	**1370**	**273**	1372	273							
554.roms_r	96	1005	152	1003	152	**1004**	**152**							

SPECrate®2017_fp_base = **423**

SPECrate®2017_fp_peak = **Not Run**

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/je5.0.1-64"
MALLOC_CONF = "retain:true"

General Notes

Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM
memory using Red Hat Enterprise Linux 8.4
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesystem page cache synced and cleared with:
sync; echo 3>   /proc/sys/vm/drop_caches
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>
NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
is mitigated in the system as tested and documented.

(Continued on next page)

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General Notes (Continued)

```
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2)
is mitigated in the system as tested and documented.
 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:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
SNC set to SNC2
LLC Prefetch set to Disabled

 Sysinfo program /home/cpu2017-1.1.9-ic2023.0/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost Fri May  5 00:53:31 2023

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

 ------------------------------------------------------------
 Table of contents
 ------------------------------------------------------------
  1. uname -a
  2. w
  3. Username
  4. ulimit -a
  5. sysinfo process ancestry
  6. /proc/cpuinfo
  7. lscpu
  8. numactl --hardware
  9. /proc/meminfo
 10. who -r
 11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
 12. Services, from systemctl list-unit-files
 13. Linux kernel boot-time arguments, from /proc/cmdline
 14. cpupower frequency-info
 15. sysctl
 16. /sys/kernel/mm/transparent_hugepage
 17. /sys/kernel/mm/transparent_hugepage/khugepaged
 18. OS release
 19. Disk information
 20. /sys/devices/virtual/dmi/id
 21. dmidecode
 22. BIOS
 ------------------------------------------------------------


 ------------------------------------------------------------
 1. uname -a
   Linux localhost 5.14.21-150400.22-default #1 SMP PREEMPT_DYNAMIC Wed May 11 06:57:18 UTC 2022 (49db222)
   x86_64 x86_64 x86_64 GNU/Linux


 ------------------------------------------------------------
 2. w
   00:53:31 up  2:08,  1 user,  load average: 16.70, 67.33, 85.10
   USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1     -                22:45    7.00s  1.12s  0.01s -bash
```

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Platform Notes (Continued)

```
     ----------------------------------------------------------
     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) 1030403
       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) 1030403
       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 --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/CPU2017.308/templogs/preenv.fprate.308.0.log --lognum 308.0 --from_runcpu 2
      specperl $SPEC/bin/sysinfo
      $SPEC = /home/cpu2017-1.1.9-ic2023.0


     ----------------------------------------------------------
     6. /proc/cpuinfo
         model name      : Intel(R) Xeon(R) Platinum 8461V
         vendor_id       : GenuineIntel
         cpu family      : 6
         model           : 143
         stepping        : 8
         microcode       : 0x2b000190
         bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
         cpu cores       : 48
         siblings        : 96
         1 physical ids (chips)
         96 processors (hardware threads)
         physical id 0: core ids 0-47
         physical id 0: apicids 0-95
       Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
       virtualized systems.  Use the above data carefully.


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

(Continued on next page)

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Software Availability: Dec-2022

Platform Notes (Continued)

```
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
  Model name:               Intel(R) Xeon(R) Platinum 8461V
  CPU family:               6
  Model:                    143
  Thread(s) per core:       2
  Core(s) per socket:       48
  Socket(s):                1
  Stepping:                 8
  BogoMIPS:                 4400.00
  Flags:                    fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36
                            clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
                            lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology
                            nonstop_tsc cpuid aperfmperf tsc_known_freq pni pclmulqdq dtes64 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:                 97.5 MiB (1 instance)
  NUMA node(s):             2
  NUMA node0 CPU(s):        0-23,48-71
  NUMA node1 CPU(s):        24-47,72-95
  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
     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     97.5M    97.5M   15 Unified        3 106496       1            64
```

(Continued on next page)

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Platform Notes (Continued)

```
 8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
  available: 2 nodes (0-1)
  node 0 cpus: 0-23,48-71
  node 0 size: 128675 MB
  node 0 free: 127470 MB
  node 1 cpus: 24-47,72-95
  node 1 size: 128948 MB
  node 1 free: 128301 MB
  node distances:
  node   0   1
    0:  10  12
    1:  12  10


----------------------------------------------------------
 9. /proc/meminfo
   MemTotal:       263807580 kB


----------------------------------------------------------
10. who -r
   run-level 3 May 4 22:45


----------------------------------------------------------
11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
   Default Target  Status
   multi-user      running


----------------------------------------------------------
12. Services, from systemctl list-unit-files
   STATE             UNIT FILES
   enabled           YaST2-Firstboot YaST2-Second-Stage apparmor auditd cron getty@ haveged irqbalance
                     issue-generator kbdsettings klog lvm2-monitor nscd postfix purge-kernels rollback rsyslog
                     smartd sshd wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
   enabled-runtime   systemd-remount-fs
   disabled          autofs autoyast-initscripts blk-availability boot-sysctl ca-certificates chrony-wait
                     chronyd console-getty cups cups-browsed debug-shell ebtables exchange-bmc-os-info
                     firewalld gpm grub2-once haveged-switch-root ipmi ipmievd issue-add-ssh-keys kexec-load
                     lunmask man-db-create multipathd nfs nfs-blkmap rdisc rpcbind rpmconfigcheck rsyncd
                     serial-getty@ smartd_generate_opts snmpd snmptrapd systemd-boot-check-no-failures
                     systemd-network-generator systemd-sysext systemd-time-wait-sync systemd-timesyncd
   indirect          wickedd

----------------------------------------------------------
13. Linux kernel boot-time arguments, from /proc/cmdline
   BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
   root=UUID=efe3d3bb-d17b-48bc-af3c-7ee429916327
   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


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

(Continued on next page)

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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                      60
    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 SP4


  ----------------------------------------------------------
  19. Disk information
  SPEC is set to: /home/cpu2017-1.1.9-ic2023.0
    Filesystem      Type  Size  Used Avail Use% Mounted on
    /dev/sda2       xfs   894G   65G  830G   8% /


  ----------------------------------------------------------
  20. /sys/devices/virtual/dmi/id
      Vendor:         Lenovo
      Product:        ThinkSystem SR630 V3 MB,EGS,DDR5,NY,1U
      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
```

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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:
     8x Samsung M321R4GA3BB0-CQKVG 32 GB 2 rank 4800


   ----------------------------------------------------------
   22. BIOS
   (This section combines info from /sys/devices and dmidecode.)
     BIOS Vendor:       Lenovo
     BIOS Version:      ESE113G-2.10
     BIOS Date:         03/16/2023
     BIOS Revision:     2.10
     Firmware Revision: 2.10
```

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
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.
----------------------------------------------------------------------------------------------


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```

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Compiler Version Notes (Continued)

```
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`

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`

SPEC CPU®2017 Floating Point Rate Result

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Lenovo Global Technology

ThinkSystem SR630 V3
(2.20 GHz, Intel Xeon Platinum 8461V)

SPECrate®2017_fp_base =   423

SPECrate®2017_fp_peak = Not Run

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

Test Date: May-2023
Hardware Availability: May-2023
Software Availability: Dec-2022

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
-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-P.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-P.xml
http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.xml

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CPU2017 License: 9017	**Test Date:** May-2023
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