SPEC CPU®2017 Floating Point Rate Result

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Lenovo Global Technology

ThinkSystem SR950 V3
(2.00 GHz, Intel Xeon Platinum 8450H)

SPECrate®2017_fp_base =   2400
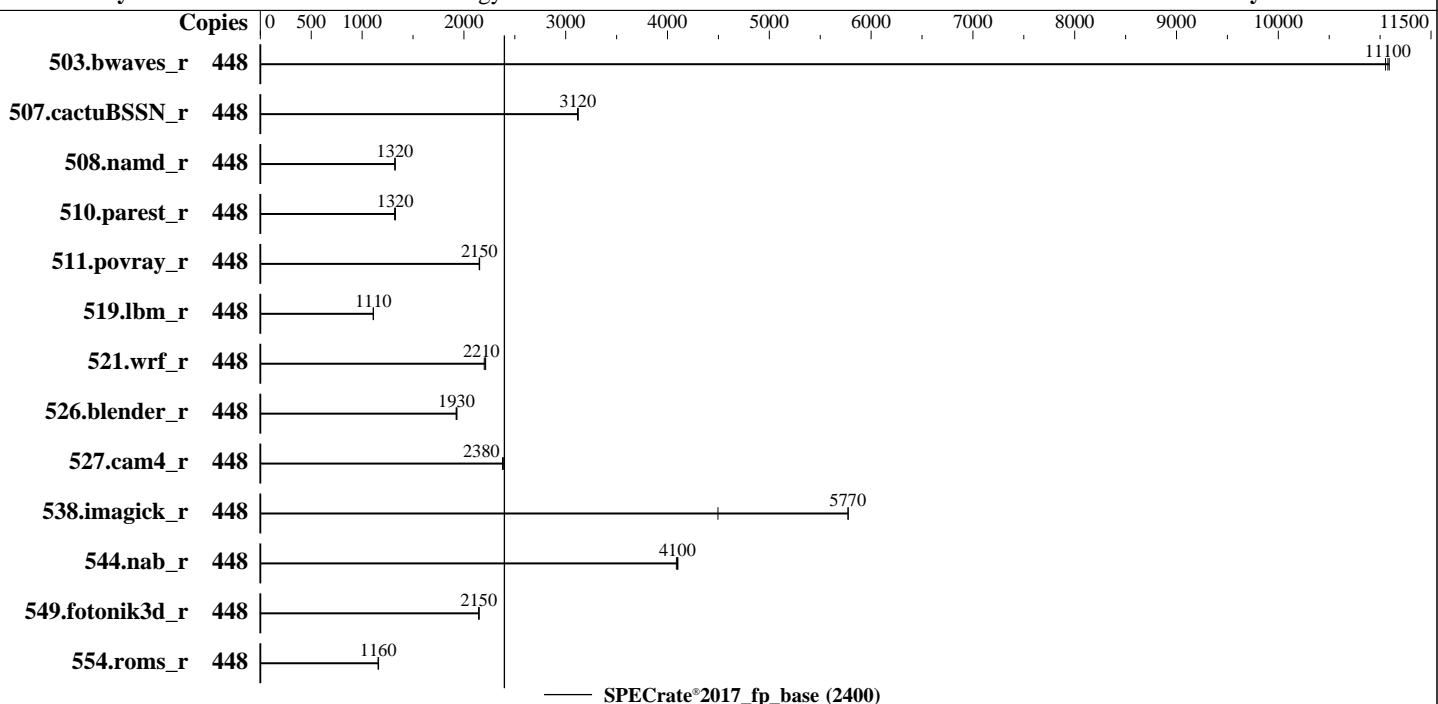
SPECrate®2017_fp_peak = Not Run

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

Test Date: Dec-2023
Hardware Availability: Oct-2023
Software Availability: Dec-2023

Benchmark	Copies	Result
503.bwaves_r	448	11100
507.cactuBSSN_r	448	3120
508.namd_r	448	1320
510.parest_r	448	1320
511.povray_r	448	2150
519.lbm_r	448	1110
521.wrf_r	448	2210
526.blender_r	448	1930
527.cam4_r	448	2380
538.imagick_r	448	5770
544.nab_r	448	4100
549.fotonik3d_r	448	2150
554.roms_r	448	1160

SPECrate®2017_fp_base (2400)

Hardware

CPU Name: Intel Xeon Platinum 8450H
 Max MHz: 3500
 Nominal: 2000
Enabled: 224 cores, 8 chips, 2 threads/core
Orderable: 8 chips
Cache L1: 32 KB I + 48 KB D on chip per core
 L2: 2 MB I+D on chip per core
 L3: 75 MB I+D on chip per chip
 Other: None
Memory: 4 TB (64 x 64 GB 2Rx4 PC5-4800B-R)
Storage: 1 x 480 GB SATA SSD
Other: None

Software

OS: Red Hat Enterprise Linux 9.2 (Plow)
 Kernel 5.14.0-284.11.1.el9_2.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: No
Firmware: Lenovo BIOS Version EBE104O-1.10 released Dec-2023;
 tested with pre-release version EBE103M-1.10
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	448	406	11100	405	11100	**406**	**11100**							
507.cactuBSSN_r	448	182	3120	**182**	**3120**	182	3120							
508.namd_r	448	**322**	**1320**	322	1320	322	1320							
510.parest_r	448	888	1320	**885**	**1320**	883	1330							
511.povray_r	448	**486**	**2150**	486	2150	486	2150							
519.lbm_r	448	**425**	**1110**	425	1110	425	1110							
521.wrf_r	448	**454**	**2210**	456	2200	453	2210							
526.blender_r	448	353	1930	355	1920	**354**	**1930**							
527.cam4_r	448	**329**	**2380**	329	2380	328	2390							
538.imagick_r	448	248	4500	193	5780	**193**	**5770**							
544.nab_r	448	184	4090	**184**	**4100**	184	4100							
549.fotonik3d_r	448	**813**	**2150**	813	2150	813	2150							
554.roms_r	448	**614**	**1160**	615	1160	613	1160							

SPECrate®2017_fp_base =	**2400**
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-ic2023.2.3/lib/intel64:/home/cpu2017-1.1.9-ic2023.2.3/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.
```

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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
SNC set to SNC4
LLC Prefetch set to Disabled
AMP Prefetch set to Enable

 Sysinfo program /home/cpu2017-1.1.9-ic2023.2.3/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost.localdomain Tue Dec 26 05:41:51 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 252 (252-13.el9_2)
 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.localdomain 5.14.0-284.11.1.el9_2.x86_64 #1 SMP PREEMPT_DYNAMIC Wed Apr 12 10:45:03 EDT
   2023 x86_64 x86_64 x86_64 GNU/Linux


 ------------------------------------------------------------
 2. w
   05:41:51 up  5:01,  1 user,  load average: 9.59, 205.91, 345.63
   USER     TTY        LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1       00:41    4:56m  1.43s  0.03s /bin/bash ./speccpu_rock.sh
```

(Continued on next page)

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Platform Notes (Continued)

```
--------------------------------------------------------
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
  file size                   (blocks, -f) unlimited
  pending signals                  (-i) 16512103
  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) 16512103
  virtual memory              (kbytes, -v) unlimited
  file locks                       (-x) unlimited

--------------------------------------------------------
5. sysinfo process ancestry
 /usr/lib/systemd/systemd --switched-root --system --deserialize 31
 login -- root
 -bash
 /bin/bash ./speccpu_rock.sh
 /bin/bash ./speccpu_rock.sh
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=448 -c
   ic2023.2.3-lin-sapphirerapids-rate-20231121.cfg --define smt-on --define cores=224 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base -o all fprate
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=448 --configfile
   ic2023.2.3-lin-sapphirerapids-rate-20231121.cfg --define smt-on --define cores=224 --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/CPU2017.118/templogs/preenv.fprate.118.0.log --lognum 118.0 --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) Platinum 8450H
   vendor_id       : GenuineIntel
   cpu family      : 6
   model           : 143
   stepping        : 8
   microcode       : 0x2b0004b1
   bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs eibrs_pbrsb
   cpu cores       : 28
   siblings        : 56
   8 physical ids (chips)
   448 processors (hardware threads)
   physical id 0: core ids 0-27
   physical id 1: core ids 0-27
   physical id 2: core ids 0-27
   physical id 3: core ids 0-27
```

(Continued on next page)

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Platform Notes (Continued)

```
      physical id 4: core ids 0-27
      physical id 5: core ids 0-27
      physical id 6: core ids 0-27
      physical id 7: core ids 0-27
      physical id 0: apicids 0-55
      physical id 1: apicids 128-183
      physical id 2: apicids 256-311
      physical id 3: apicids 384-439
      physical id 4: apicids 512-567
      physical id 5: apicids 640-695
      physical id 6: apicids 768-823
      physical id 7: apicids 896-951
   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
     CPU(s):                    448
     On-line CPU(s) list:       0-447
     Vendor ID:                 GenuineIntel
     BIOS Vendor ID:            Intel(R) Corporation
     Model name:                Intel(R) Xeon(R) Platinum 8450H
     BIOS Model name:           Intel(R) Xeon(R) Platinum 8450H
     CPU family:                6
     Model:                     143
     Thread(s) per core:        2
     Core(s) per socket:        28
     Socket(s):                 8
     Stepping:                  8
     CPU max MHz:               3500.0000
     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 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 avx2 smep bmi2 erms
                                invpcid 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 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
                                ibt amx_bf16 avx512_fp16 amx_tile amx_int8 flush_l1d arch_capabilities
     Virtualization:            VT-x
     L1d cache:                 10.5 MiB (224 instances)
     L1i cache:                 7 MiB (224 instances)
     L2 cache:                  448 MiB (224 instances)
     L3 cache:                  600 MiB (8 instances)
```

(Continued on next page)

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Platform Notes (Continued)

```
  NUMA node(s):               32
  NUMA node0 CPU(s):          0-6,224-230
  NUMA node1 CPU(s):          7-13,231-237
  NUMA node2 CPU(s):          14-20,238-244
  NUMA node3 CPU(s):          21-27,245-251
  NUMA node4 CPU(s):          28-34,252-258
  NUMA node5 CPU(s):          35-41,259-265
  NUMA node6 CPU(s):          42-48,266-272
  NUMA node7 CPU(s):          49-55,273-279
  NUMA node8 CPU(s):          56-62,280-286
  NUMA node9 CPU(s):          63-69,287-293
  NUMA node10 CPU(s):         70-76,294-300
  NUMA node11 CPU(s):         77-83,301-307
  NUMA node12 CPU(s):         84-90,308-314
  NUMA node13 CPU(s):         91-97,315-321
  NUMA node14 CPU(s):         98-104,322-328
  NUMA node15 CPU(s):         105-111,329-335
  NUMA node16 CPU(s):         112-118,336-342
  NUMA node17 CPU(s):         119-125,343-349
  NUMA node18 CPU(s):         126-132,350-356
  NUMA node19 CPU(s):         133-139,357-363
  NUMA node20 CPU(s):         140-146,364-370
  NUMA node21 CPU(s):         147-153,371-377
  NUMA node22 CPU(s):         154-160,378-384
  NUMA node23 CPU(s):         161-167,385-391
  NUMA node24 CPU(s):         168-174,392-398
  NUMA node25 CPU(s):         175-181,399-405
  NUMA node26 CPU(s):         182-188,406-412
  NUMA node27 CPU(s):         189-195,413-419
  NUMA node28 CPU(s):         196-202,420-426
  NUMA node29 CPU(s):         203-209,427-433
  NUMA node30 CPU(s):         210-216,434-440
  NUMA node31 CPU(s):         217-223,441-447
  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 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    10.5M  12 Data            1    64       1            64
      L1i      32K       7M   8 Instruction     1    64       1            64
      L2        2M     448M  16 Unified         2  2048       1            64
      L3       75M     600M  15 Unified         3 81920       1            64

  ------------------------------------------------------------
  8. numactl --hardware
  NOTE: a numactl 'node' might or might not correspond to a physical chip.
    available: 32 nodes (0-31)
    node 0 cpus: 0-6,224-230
    node 0 size: 128485 MB
    node 0 free: 127622 MB
```

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Platform Notes (Continued)

```
      node 1 cpus: 7-13,231-237
      node 1 size: 129020 MB
      node 1 free: 128309 MB
      node 2 cpus: 14-20,238-244
      node 2 size: 129020 MB
      node 2 free: 128288 MB
      node 3 cpus: 21-27,245-251
      node 3 size: 129020 MB
      node 3 free: 128308 MB
      node 4 cpus: 28-34,252-258
      node 4 size: 129020 MB
      node 4 free: 128243 MB
      node 5 cpus: 35-41,259-265
      node 5 size: 129020 MB
      node 5 free: 128253 MB
      node 6 cpus: 42-48,266-272
      node 6 size: 128981 MB
      node 6 free: 128197 MB
      node 7 cpus: 49-55,273-279
      node 7 size: 129020 MB
      node 7 free: 128287 MB
      node 8 cpus: 56-62,280-286
      node 8 size: 129020 MB
      node 8 free: 128237 MB
      node 9 cpus: 63-69,287-293
      node 9 size: 129020 MB
      node 9 free: 128336 MB
      node 10 cpus: 70-76,294-300
      node 10 size: 129020 MB
      node 10 free: 128306 MB
      node 11 cpus: 77-83,301-307
      node 11 size: 129020 MB
      node 11 free: 128310 MB
      node 12 cpus: 84-90,308-314
      node 12 size: 129020 MB
      node 12 free: 128242 MB
      node 13 cpus: 91-97,315-321
      node 13 size: 129020 MB
      node 13 free: 128327 MB
      node 14 cpus: 98-104,322-328
      node 14 size: 129020 MB
      node 14 free: 128339 MB
      node 15 cpus: 105-111,329-335
      node 15 size: 129020 MB
      node 15 free: 128354 MB
      node 16 cpus: 112-118,336-342
      node 16 size: 129020 MB
      node 16 free: 128335 MB
      node 17 cpus: 119-125,343-349
      node 17 size: 129020 MB
      node 17 free: 128320 MB
      node 18 cpus: 126-132,350-356
      node 18 size: 129020 MB
      node 18 free: 128313 MB
      node 19 cpus: 133-139,357-363
      node 19 size: 129020 MB
      node 19 free: 128339 MB
      node 20 cpus: 140-146,364-370
      node 20 size: 129020 MB
      node 20 free: 128337 MB
```

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Platform Notes (Continued)

```
   node 21 cpus: 147-153,371-377
   node 21 size: 129020 MB
   node 21 free: 128316 MB
   node 22 cpus: 154-160,378-384
   node 22 size: 129020 MB
   node 22 free: 128339 MB
   node 23 cpus: 161-167,385-391
   node 23 size: 129020 MB
   node 23 free: 128341 MB
   node 24 cpus: 168-174,392-398
   node 24 size: 129020 MB
   node 24 free: 128332 MB
   node 25 cpus: 175-181,399-405
   node 25 size: 129020 MB
   node 25 free: 128341 MB
   node 26 cpus: 182-188,406-412
   node 26 size: 129020 MB
   node 26 free: 128354 MB
   node 27 cpus: 189-195,413-419
   node 27 size: 129020 MB
   node 27 free: 127910 MB
   node 28 cpus: 196-202,420-426
   node 28 size: 129020 MB
   node 28 free: 128331 MB
   node 29 cpus: 203-209,427-433
   node 29 size: 129020 MB
   node 29 free: 128333 MB
   node 30 cpus: 210-216,434-440
   node 30 size: 129020 MB
   node 30 free: 128337 MB
   node 31 cpus: 217-223,441-447
   node 31 size: 128997 MB
   node 31 free: 128322 MB
   node distances:
   node   0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16  17  18  19  20  21  22  23  24
   25  26  27  28  29  30  31
     0:  10  12  12  12  21  21  21  21  21  21  21  21  31  31  31  31  31  31  31  31  21  21  21  21  21
    21  21  21  31  31  31  31
     1:  12  10  12  12  21  21  21  21  21  21  21  21  31  31  31  31  31  31  31  31  21  21  21  21  21
    21  21  21  31  31  31  31
     2:  12  12  10  12  21  21  21  21  21  21  21  21  31  31  31  31  31  31  31  31  21  21  21  21  21
    21  21  21  31  31  31  31
     3:  12  12  12  10  21  21  21  21  21  21  21  21  31  31  31  31  31  31  31  31  21  21  21  21  21
    21  21  21  31  31  31  31
     4:  21  21  21  21  10  12  12  12  31  31  31  31  21  21  21  21  21  21  21  21  31  31  31  31  31
    31  31  31  21  21  21  21
     5:  21  21  21  21  12  10  12  12  31  31  31  31  21  21  21  21  21  21  21  21  31  31  31  31  31
    31  31  31  21  21  21  21
     6:  21  21  21  21  12  12  10  12  31  31  31  31  21  21  21  21  21  21  21  21  31  31  31  31  31
    31  31  31  21  21  21  21
     7:  21  21  21  21  12  12  12  10  31  31  31  31  21  21  21  21  21  21  21  21  31  31  31  31  31
    31  31  31  21  21  21  21
     8:  21  21  21  21  31  31  31  31  10  12  12  12  21  21  21  21  21  21  21  21  31  31  31  31  31
    31  31  31  21  21  21  21
     9:  21  21  21  21  31  31  31  31  12  10  12  12  21  21  21  21  21  21  21  21  31  31  31  31  31
    31  31  31  21  21  21  21
    10:  21  21  21  21  31  31  31  31  12  12  10  12  21  21  21  21  21  21  21  21  31  31  31  31  31
    31  31  31  21  21  21  21
    11:  21  21  21  21  31  31  31  31  12  12  12  10  21  21  21  21  21  21  21  21  31  31  31  31  31
    31  31  31  21  21  21  21
```

Lenovo Global Technology

SPECrate®2017_fp_base = 2400

ThinkSystem SR950 V3
(2.00 GHz, Intel Xeon Platinum 8450H)

SPECrate®2017_fp_peak = Not Run

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

Test Date: Dec-2023
Hardware Availability: Oct-2023
Software Availability: Dec-2023

Platform Notes (Continued)

```
   12:  31  31  31  31  21  21  21  21  21  21  21  21  10  12  12  12  31  31  31  31  21  21  21  21  21
        21  21  21  31  31  31  31
   13:  31  31  31  31  21  21  21  21  21  21  21  21  12  10  12  12  31  31  31  31  21  21  21  21  21
        21  21  21  31  31  31  31
   14:  31  31  31  31  21  21  21  21  21  21  21  21  12  12  10  12  31  31  31  31  21  21  21  21  21
        21  21  21  31  31  31  31
   15:  31  31  31  31  21  21  21  21  21  21  21  21  12  12  12  10  31  31  31  31  21  21  21  21  21
        21  21  21  31  31  31  31
   16:  31  31  31  31  21  21  21  21  21  21  21  31  31  31  31  10  12  12  12  21  21  21  21  21  21
        21  21  21  31  31  31  31
   17:  31  31  31  31  21  21  21  21  21  21  21  31  31  31  31  12  10  12  12  21  21  21  21  21  21
        21  21  21  31  31  31  31
   18:  31  31  31  31  21  21  21  21  21  21  21  31  31  31  31  12  12  10  12  21  21  21  21  21  21
        21  21  21  31  31  31  31
   19:  31  31  31  31  21  21  21  21  21  21  21  31  31  31  31  12  12  12  10  21  21  21  21  21  21
        21  21  21  31  31  31  31
   20:  21  21  21  21  31  31  31  31  31  31  31  21  21  21  21  21  21  21  21  10  12  12  12  31
        31  31  31  21  21  21  21
   21:  21  21  21  21  31  31  31  31  31  31  31  21  21  21  21  21  21  21  21  12  10  12  12  31
        31  31  31  21  21  21  21
   22:  21  21  21  21  31  31  31  31  31  31  31  21  21  21  21  21  21  21  21  12  12  10  12  31
        31  31  31  21  21  21  21
   23:  21  21  21  21  31  31  31  31  31  31  31  21  21  21  21  21  21  21  21  12  12  12  10  31
        31  31  31  21  21  21  21
   24:  21  21  21  21  31  31  31  31  31  31  31  21  21  21  21  21  21  21  21  31  31  31  31  10
        12  12  12  21  21  21  21
   25:  21  21  21  21  31  31  31  31  31  31  31  21  21  21  21  21  21  21  21  31  31  31  31  12
        10  12  12  21  21  21  21
   26:  21  21  21  21  31  31  31  31  31  31  31  21  21  21  21  21  21  21  21  31  31  31  31  12
        12  10  12  21  21  21  21
   27:  21  21  21  21  31  31  31  31  31  31  31  21  21  21  21  21  21  21  21  31  31  31  31  12
        12  12  10  21  21  21  21
   28:  31  31  31  31  21  21  21  21  21  21  21  31  31  31  31  31  31  31  31  21  21  21  21  21
        21  21  21  10  12  12  12
   29:  31  31  31  31  21  21  21  21  21  21  21  31  31  31  31  31  31  31  31  21  21  21  21  21
        21  21  21  12  10  12  12
   30:  31  31  31  31  21  21  21  21  21  21  21  31  31  31  31  31  31  31  31  21  21  21  21  21
        21  21  21  12  12  10  12
   31:  31  31  31  31  21  21  21  21  21  21  21  31  31  31  31  31  31  31  31  21  21  21  21  21
        21  21  21  12  12  12  10

   -----------------------------------------------------------
   9. /proc/meminfo
      MemTotal:       4227139360 kB


   -----------------------------------------------------------
   10. who -r
     run-level 3 Dec 26 00:40


   -----------------------------------------------------------
   11. Systemd service manager version: systemd 252 (252-13.el9_2)
     Default Target  Status
     multi-user      running


   -----------------------------------------------------------
   12. Services, from systemctl list-unit-files
      STATE            UNIT FILES
      enabled          NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd chronyd crond
                       dbus-broker firewalld getty@ insights-client-boot irqbalance kdump low-memory-monitor
                       mdmonitor microcode nis-domainname rhsmcertd rsyslog rtkit-daemon selinux-autorelabel-mark
```

(Continued on next page)

Lenovo Global Technology

ThinkSystem SR950 V3
(2.00 GHz, Intel Xeon Platinum 8450H)

SPECrate®2017_fp_base =   2400

SPECrate®2017_fp_peak = Not Run

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

Test Date: Dec-2023
Hardware Availability: Oct-2023
Software Availability: Dec-2023

Platform Notes (Continued)

```
                      sshd sssd systemd-boot-update systemd-network-generator udisks2 upower
   enabled-runtime    systemd-remount-fs
   disabled           canberra-system-bootup canberra-system-shutdown canberra-system-shutdown-reboot
                      chrony-wait console-getty cpupower debug-shell dnf-system-upgrade kvm_stat
                      man-db-restart-cache-update nftables pesign 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=(hd1,gpt2)/boot/vmlinuz-5.14.0-284.11.1.el9_2.x86_64
   root=UUID=116409c2-57ac-4857-ace6-bb315b1769ff
   ro
   resume=UUID=075e4fda-52f2-4584-8323-c813820fb1bd


 ----------------------------------------------------------
 14. cpupower frequency-info
   analyzing CPU 0:
     current policy: frequency should be within 800 MHz and 3.50 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               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
```

(Continued on next page)

Lenovo Global Technology

ThinkSystem SR950 V3
(2.00 GHz, Intel Xeon Platinum 8450H)

SPECrate®2017_fp_base = 2400

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 9017		**Test Date:**	Dec-2023
Test Sponsor: Lenovo Global Technology		**Hardware Availability:**	Oct-2023
Tested by: Lenovo Global Technology		**Software Availability:**	Dec-2023

Platform Notes (Continued)

```
   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     Red Hat Enterprise Linux 9.2 (Plow)
    redhat-release Red Hat Enterprise Linux release 9.2 (Plow)
    system-release Red Hat Enterprise Linux release 9.2 (Plow)


  --------------------------------------------------------------
  19. Disk information
  SPEC is set to: /home/cpu2017-1.1.9-ic2023.2.3
    Filesystem    Type  Size  Used Avail Use% Mounted on
    /dev/sdb4     xfs   371G  236G  136G  64% /home


  --------------------------------------------------------------
  20. /sys/devices/virtual/dmi/id
     Vendor:          Lenovo
     Product:         ThinkSystem SR950 V3
     Product Family:  ThinkSystem
     Serial:          BLRSDV044


  --------------------------------------------------------------
  21. dmidecode
    Additional information from dmidecode 3.3 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:
      41x SK Hynix HMCG94AEBRA102N 64 GB 2 rank 4800
      14x SK Hynix HMCG94AEBRA109N 64 GB 2 rank 4800
      9x SK Hynix HMCG94AEBRA123N 64 GB 2 rank 4800


  --------------------------------------------------------------
  22. BIOS
  (This section combines info from /sys/devices and dmidecode.)
     BIOS Vendor:       Lenovo
     BIOS Version:      EBE103M-1.10
     BIOS Date:         10/10/2023
     BIOS Revision:     1.10
     Firmware Revision: 1.10
```

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 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
C++         | 508.namd_r(base) 510.parest_r(base)
------------------------------------------------------------------------------
```

(Continued on next page)

Lenovo Global Technology

ThinkSystem SR950 V3
(2.00 GHz, Intel Xeon Platinum 8450H)

SPECrate®2017_fp_base =   2400

SPECrate®2017_fp_peak = Not Run

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

Test Date: Dec-2023
Hardware Availability: Oct-2023
Software Availability: Dec-2023

Compiler Version Notes (Continued)

```
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        | 511.povray_r(base) 526.blender_r(base)
------------------------------------------------------------------------------------------------
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.
------------------------------------------------------------------------------------------------

==============================================================================================
C++, C, Fortran | 507.cactuBSSN_r(base)
------------------------------------------------------------------------------------------------
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       | 503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)
------------------------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
Copyright (C) 1985-2023 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 2023.2.3 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
```

C++ benchmarks:
```
icpx
```

Fortran benchmarks:
```
ifx
```

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

(Continued on next page)

Lenovo Global Technology

ThinkSystem SR950 V3
(2.00 GHz, Intel Xeon Platinum 8450H)

SPECrate®2017_fp_base =   2400

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 9017	**Test Date:** Dec-2023
Test Sponsor: Lenovo Global Technology	**Hardware Availability:** Oct-2023
Tested by: Lenovo Global Technology	**Software Availability:** Dec-2023

Base Compiler Invocation (Continued)

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`

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`

Lenovo Global Technology

ThinkSystem SR950 V3
(2.00 GHz, Intel Xeon Platinum 8450H)

SPECrate®2017_fp_base = 2400

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 9017		**Test Date:**	Dec-2023
Test Sponsor: Lenovo Global Technology		**Hardware Availability:**	Oct-2023
Tested by: Lenovo Global Technology		**Software Availability:**	Dec-2023

Base Optimization Flags (Continued)

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-AA.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-Eaglestream-AA.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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