SPEC CPU®2017 Floating Point Rate Result

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Lenovo Global Technology

$SPECrate®2017\_fp\_base = 1830$

ThinkSystem SR850 V3
(1.90 GHz, Intel Xeon Platinum 8490H)

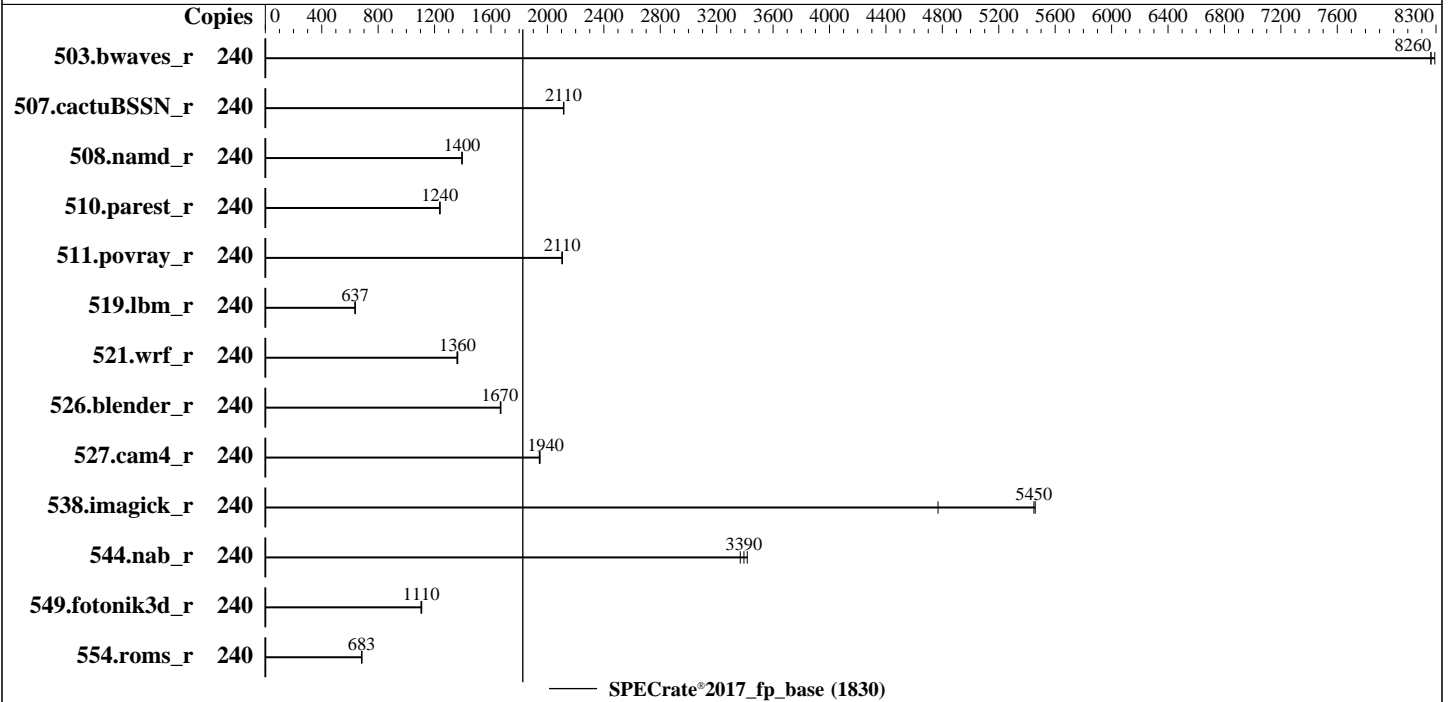$SPECrate®2017\_fp\_peak = Not Run$

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

Test Date: Aug-2023
Hardware Availability: Jun-2023
Software Availability: Dec-2022

Benchmark	Copies	Result
503.bwaves_r	240	8260
507.cactuBSSN_r	240	2110
508.namd_r	240	1400
510.parest_r	240	1240
511.povray_r	240	2110
519.lbm_r	240	637
521.wrf_r	240	1360
526.blender_r	240	1670
527.cam4_r	240	1940
538.imagick_r	240	5450
544.nab_r	240	3390
549.fotonik3d_r	240	1110
554.roms_r	240	683

SPECrate®2017_fp_base (1830)

Hardware

CPU Name: Intel Xeon Platinum 8490H
 Max MHz: 3500
 Nominal: 1900
Enabled: 240 cores, 4 chips
Orderable: 2,4 chips
Cache L1: 32 KB I + 48 KB D on chip per core
 L2: 2 MB I+D on chip per core
 L3: 112.5 MB I+D on chip per chip
 Other: None
Memory: 2 TB (32 x 64 GB 2Rx4 PC5-4800B-R)
Storage: 1 x 960GB M.2 NVME SSD
Other: None

Software

OS: Red Hat Enterprise Linux 9.0 (Plow)
 Kernel 5.14.0-70.22.1.el9_0.x86_64
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 RSE105E 1.10 released May-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 Copies	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Peak Copies	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio
503.bwaves_r	240	291	8260	290	8290	**291**	**8260**							
507.cactuBSSN_r	240	144	2110	**144**	**2110**	144	2120							
508.namd_r	240	164	1390	**163**	**1400**	163	1400							
510.parest_r	240	507	1240	508	1240	**507**	**1240**							
511.povray_r	240	**266**	**2110**	266	2110	267	2100							
519.lbm_r	240	397	637	398	636	**397**	**637**							
521.wrf_r	240	394	1360	**394**	**1360**	396	1360							
526.blender_r	240	219	1670	219	1670	**219**	**1670**							
527.cam4_r	240	215	1950	216	1940	**216**	**1940**							
538.imagick_r	240	**110**	**5450**	125	4770	109	5460							
544.nab_r	240	120	3370	118	3420	**119**	**3390**							
549.fotonik3d_r	240	**846**	**1110**	847	1100	843	1110							
554.roms_r	240	559	682	557	685	**558**	**683**							

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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/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)

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

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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
Hyper-Threading set to Disabled
DCU Streamer  Prefetcher set to Disabled
LLC Prefetch set to Disabled
SNC set to SNC4

 Sysinfo program /home/cpu2017-1.1.9-ic2023.0/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost.localdomain Tue Aug  1 00:09:47 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 250 (250-6.el9_0)
 12. Failed units, from systemctl list-units --state=failed
 13. Services, from systemctl list-unit-files
 14. Linux kernel boot-time arguments, from /proc/cmdline
 15. cpupower frequency-info
 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 5.14.0-70.22.1.el9_0.x86_64 #1 SMP PREEMPT Tue Aug 2 10:02:12 EDT 2022 x86_64
   x86_64 x86_64 GNU/Linux


 -----------------------------------------------------------
 2. w
    00:09:47 up 2 min,  1 user,  load average: 0.40, 0.21, 0.08
```

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Platform Notes (Continued)

```
   USER     TTY        LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1       00:08   12.00s  1.13s  0.01s -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
    file size                   (blocks, -f) unlimited
    pending signals                 (-i) 8255594
    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) 8255594
    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=240 -c
    ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define cores=240 --define physicalfirst --define
    invoke_with_interleave --define drop_caches --tune base -o all fprate
  runcpu --nobuild --action validate --define default-platform-flags --define numcopies=240 --configfile
    ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define cores=240 --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/CPU2017.005/templogs/preenv.fprate.005.0.log --lognum 005.0 --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 8490H
    vendor_id       : GenuineIntel
    cpu family      : 6
    model           : 143
    stepping        : 8
    microcode       : 0x2b0001b0
    bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
    cpu cores       : 60
    siblings        : 60
    4 physical ids (chips)
    240 processors (hardware threads)
    physical id 0: core ids 0-59
    physical id 1: core ids 0-59
    physical id 2: core ids 0-59
```

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Platform Notes (Continued)

```
     physical id 3: core ids 0-59
     physical id 0: apicids
     0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52,54,56,58,60,62,64,66,68,70,72
     ,74,76,78,80,82,84,86,88,90,92,94,96,98,100,102,104,106,108,110,112,114,116,118
     physical id 1: apicids
     128,130,132,134,136,138,140,142,144,146,148,150,152,154,156,158,160,162,164,166,168,170,172,174,176,178,1
     80,182,184,186,188,190,192,194,196,198,200,202,204,206,208,210,212,214,216,218,220,222,224,226,228,230,23
     2,234,236,238,240,242,244,246
     physical id 2: apicids
     256,258,260,262,264,266,268,270,272,274,276,278,280,282,284,286,288,290,292,294,296,298,300,302,304,306,3
     08,310,312,314,316,318,320,322,324,326,328,330,332,334,336,338,340,342,344,346,348,350,352,354,356,358,36
     0,362,364,366,368,370,372,374
     physical id 3: apicids
     384,386,388,390,392,394,396,398,400,402,404,406,408,410,412,414,416,418,420,422,424,426,428,430,432,434,4
     36,438,440,442,444,446,448,450,452,454,456,458,460,462,464,466,468,470,472,474,476,478,480,482,484,486,48
     8,490,492,494,496,498,500,502
  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):                     240
    On-line CPU(s) list:        0-239
    Vendor ID:                  GenuineIntel
    BIOS Vendor ID:             Intel(R) Corporation
    Model name:                 Intel(R) Xeon(R) Platinum 8490H
    BIOS Model name:            Intel(R) Xeon(R) Platinum 8490H
    CPU family:                 6
    Model:                      143
    Thread(s) per core:         1
    Core(s) per socket:         60
    Socket(s):                  4
    Stepping:                   8
    BogoMIPS:                   3800.00
    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 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 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:                  11.3 MiB (240 instances)
    L1i cache:                  7.5 MiB (240 instances)
```

(Continued on next page)

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Platform Notes (Continued)

```
    L2 cache:                        480 MiB (240 instances)
    L3 cache:                        450 MiB (4 instances)
    NUMA node(s):                    16
    NUMA node0 CPU(s):               0-14
    NUMA node1 CPU(s):               15-29
    NUMA node2 CPU(s):               30-44
    NUMA node3 CPU(s):               45-59
    NUMA node4 CPU(s):               60-74
    NUMA node5 CPU(s):               75-89
    NUMA node6 CPU(s):               90-104
    NUMA node7 CPU(s):               105-119
    NUMA node8 CPU(s):               120-134
    NUMA node9 CPU(s):               135-149
    NUMA node10 CPU(s):              150-164
    NUMA node11 CPU(s):              165-179
    NUMA node12 CPU(s):              180-194
    NUMA node13 CPU(s):              195-209
    NUMA node14 CPU(s):              210-224
    NUMA node15 CPU(s):              225-239
    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
    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    11.3M   12 Data            1     64        1             64
      L1i       32K     7.5M    8 Instruction     1     64        1             64
      L2         2M     480M   16 Unified         2   2048        1             64
      L3     112.5M     450M   15 Unified         3 122880        1             64


    -----------------------------------------------------------
8. numactl --hardware
  NOTE: a numactl 'node' might or might not correspond to a physical chip.
    available: 16 nodes (0-15)
    node 0 cpus: 0-14
    node 0 size: 128682 MB
    node 0 free: 127756 MB
    node 1 cpus: 15-29
    node 1 size: 129020 MB
    node 1 free: 128635 MB
    node 2 cpus: 30-44
    node 2 size: 129020 MB
    node 2 free: 128691 MB
    node 3 cpus: 45-59
    node 3 size: 129020 MB
    node 3 free: 128682 MB
    node 4 cpus: 60-74
    node 4 size: 129020 MB
    node 4 free: 128714 MB
    node 5 cpus: 75-89
    node 5 size: 129020 MB
    node 5 free: 128718 MB
    node 6 cpus: 90-104
    node 6 size: 129020 MB
```

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Platform Notes (Continued)

```
   node 6 free: 128814 MB
   node 7 cpus: 105-119
   node 7 size: 129020 MB
   node 7 free: 128665 MB
   node 8 cpus: 120-134
   node 8 size: 129020 MB
   node 8 free: 128669 MB
   node 9 cpus: 135-149
   node 9 size: 129020 MB
   node 9 free: 128656 MB
   node 10 cpus: 150-164
   node 10 size: 128984 MB
   node 10 free: 128401 MB
   node 11 cpus: 165-179
   node 11 size: 129020 MB
   node 11 free: 128642 MB
   node 12 cpus: 180-194
   node 12 size: 129020 MB
   node 12 free: 128713 MB
   node 13 cpus: 195-209
   node 13 size: 129020 MB
   node 13 free: 128822 MB
   node 14 cpus: 210-224
   node 14 size: 129020 MB
   node 14 free: 128766 MB
   node 15 cpus: 225-239
   node 15 size: 129000 MB
   node 15 free: 128714 MB
   node distances:
   node   0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
     0:  10  12  12  12  21  21  21  21  21  21  21  21  21  21  21  21
     1:  12  10  12  12  21  21  21  21  21  21  21  21  21  21  21  21
     2:  12  12  10  12  21  21  21  21  21  21  21  21  21  21  21  21
     3:  12  12  12  10  21  21  21  21  21  21  21  21  21  21  21  21
     4:  21  21  21  21  10  12  12  12  21  21  21  21  21  21  21  21
     5:  21  21  21  21  12  10  12  12  21  21  21  21  21  21  21  21
     6:  21  21  21  21  12  12  10  12  21  21  21  21  21  21  21  21
     7:  21  21  21  21  12  12  12  10  21  21  21  21  21  21  21  21
     8:  21  21  21  21  21  21  21  21  10  12  12  12  21  21  21  21
     9:  21  21  21  21  21  21  21  21  12  10  12  12  21  21  21  21
    10:  21  21  21  21  21  21  21  21  12  12  10  12  21  21  21  21
    11:  21  21  21  21  21  21  21  21  12  12  12  10  21  21  21  21
    12:  21  21  21  21  21  21  21  21  21  21  21  21  10  12  12  12
    13:  21  21  21  21  21  21  21  21  21  21  21  21  12  10  12  12
    14:  21  21  21  21  21  21  21  21  21  21  21  21  12  12  10  12
    15:  21  21  21  21  21  21  21  21  21  21  21  21  12  12  12  10

   ------------------------------------------------------------
   9. /proc/meminfo
      MemTotal:       2113469880 kB


   ------------------------------------------------------------
   10. who -r
      run-level 3 Aug 1 00:07


   ------------------------------------------------------------
   11. Systemd service manager version: systemd 250 (250-6.el9_0)
      Default Target  Status
      multi-user      degraded
```

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Platform Notes (Continued)

```
   -----------------------------------------------------------
   12. Failed units, from systemctl list-units --state=failed
      UNIT                            LOAD   ACTIVE SUB    DESCRIPTION
    * NetworkManager-wait-online.service loaded failed failed Network Manager Wait Online

   -----------------------------------------------------------
   13. Services, from systemctl list-unit-files
      STATE            UNIT FILES
      enabled          NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd crond
                       dbus-broker firewalld getty@ irqbalance kdump mdmonitor microcode nis-domainname rhsmcertd
                       rsyslog selinux-autorelabel-mark sshd sssd systemd-network-generator udisks2 upower
      enabled-runtime  systemd-remount-fs
      disabled         canberra-system-bootup canberra-system-shutdown canberra-system-shutdown-reboot
                       console-getty cpupower debug-shell kvm_stat man-db-restart-cache-update nftables rdisc
                       rhsm rhsm-facts rpmdb-rebuild 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

   -----------------------------------------------------------
   14. Linux kernel boot-time arguments, from /proc/cmdline
      BOOT_IMAGE=(hd0,gpt3)/boot/vmlinuz-5.14.0-70.22.1.el9_0.x86_64
      root=UUID=ab67882b-b899-4e91-927d-11b46332da76
      ro
      resume=UUID=be9a090f-c3a8-4064-8608-f8324bf589c3

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


   -----------------------------------------------------------
   16. 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


   -----------------------------------------------------------
   17. /sys/kernel/mm/transparent_hugepage
      defrag          always defer defer+madvise [madvise] never
      enabled         [always] madvise never
      hpage_pmd_size  2097152
```

(Continued on next page)

Lenovo Global Technology

ThinkSystem SR850 V3
(1.90 GHz, Intel Xeon Platinum 8490H)

SPECrate®2017_fp_base =　　1830

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 9017

Test Sponsor:　Lenovo Global Technology

Tested by:　Lenovo Global Technology

Test Date:　　Aug-2023

Hardware Availability: Jun-2023

Software Availability:　Dec-2022

Platform Notes (Continued)

```
   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 9.0 (Plow)
   redhat-release Red Hat Enterprise Linux release 9.0 (Plow)
   system-release Red Hat Enterprise Linux release 9.0 (Plow)


   ------------------------------------------------------------
 20. Disk information
 SPEC is set to: /home/cpu2017-1.1.9-ic2023.0
   Filesystem    Type  Size  Used Avail Use% Mounted on
   /dev/nvme1n1p4 xfs   819G   15G  804G   2% /home


   ------------------------------------------------------------
 21. /sys/devices/virtual/dmi/id
   Vendor:          Lenovo
   Product:         ThinkSystem SR850 V3
   Product Family:  ThinkSystem
   Serial:          None


   ------------------------------------------------------------
 22. 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:
     21x SK Hynix HMCG94AEBRA102N 64 GB 2 rank 4800
     4x SK Hynix HMCG94AEBRA109N 64 GB 2 rank 4800
     7x SK Hynix HMCG94AEBRA123N 64 GB 2 rank 4800


   ------------------------------------------------------------
 23. BIOS
 (This section combines info from /sys/devices and dmidecode.)
   BIOS Vendor:       Lenovo
   BIOS Version:      RSE105E-1.10
   BIOS Date:         05/12/2023
   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 2023.0.0 Build 20221201
```

(Continued on next page)

Lenovo Global Technology

ThinkSystem SR850 V3
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Test Date: Aug-2023
Hardware Availability: Jun-2023
Software Availability: Dec-2022

Compiler Version Notes (Continued)

```
 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.
 ------------------------------------------------------------------------------


 ==============================================================================
 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`

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2023 Standard Performance Evaluation Corporation

Lenovo Global Technology

ThinkSystem SR850 V3
(1.90 GHz, Intel Xeon Platinum 8490H)

SPECrate®2017_fp_base = 1830

SPECrate®2017_fp_peak = Not Run

Base Compiler Invocation (Continued)

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`

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
```

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Lenovo Global Technology

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CPU2017 License: 9017
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Tested by: Lenovo Global Technology

Test Date: Aug-2023
Hardware Availability: Jun-2023
Software Availability: Dec-2022

Base Optimization Flags (Continued)

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/Intel-ic2023-official-linux64.html
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Eaglestream-W.html

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

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

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