SPEC CPU®2017 Integer Rate Result

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Lenovo Global Technology

(Test Sponsor: Ampere Computing)

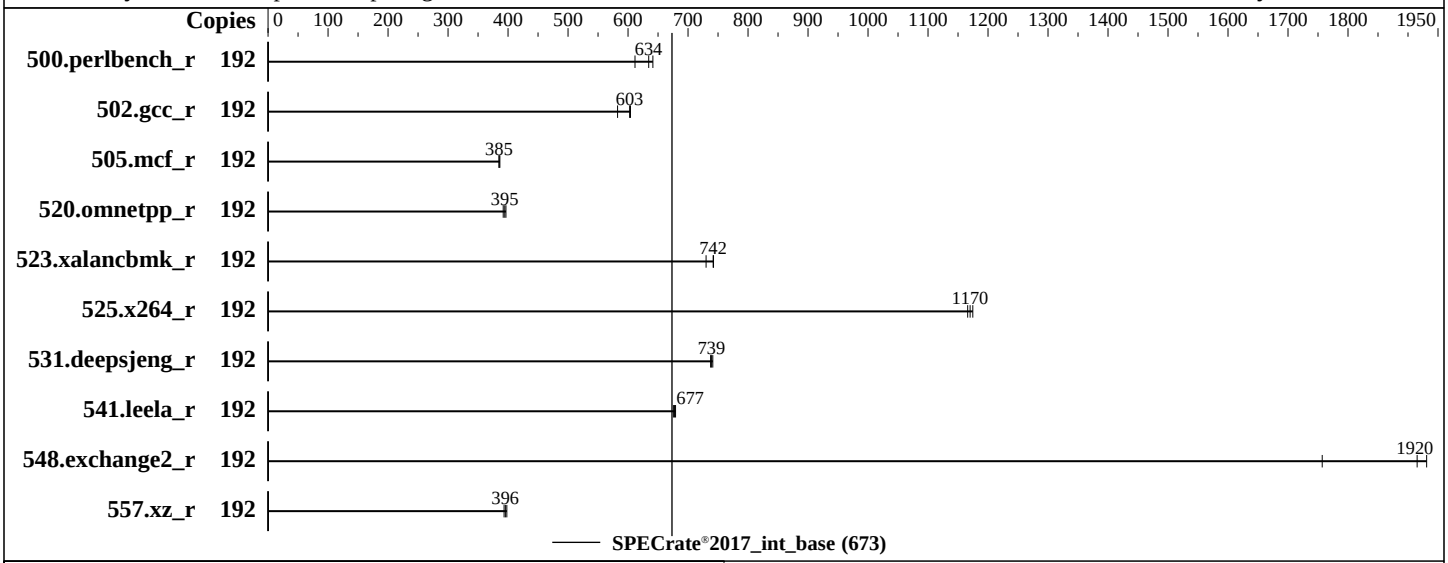
ThinkSystem SR635 V3
(2.40 GHz,AMD EPYC 9654P)

SPECrate®2017_int_base = 673

SPECrate®2017_int_peak = Not Run

CPU2017 License: 6412
Test Sponsor: Ampere Computing
Tested by: Ampere Computing

Test Date: Aug-2024
Hardware Availability: Apr-2023
Software Availability: Jun-2024



Hardware

CPU Name:	AMD EPYC 9654P
Max MHz:	3700
Nominal:	2400
Enabled:	96 cores, 1 chip, 2 threads/core
Orderable:	1 chip
Cache L1:	32 KB I + 32 KB D on chip per core
L2:	1 MB I+D on chip per core
L3:	384 MB I+D on chip per chip, 32 MB shared / 8 cores
Other:	None
Memory:	384 GB (12 x 32 GB 2Rx8 PC5-5600B-R , running at 4800)
Storage:	1 x 480 GB SATA SSD
Other:	CPU Cooling: Air

Software

OS:	SUSE Linux Enterprise Server 15 SP6 Kernel 6.4.0-150600.21-default 6.4.0-150600.21-default
Compiler:	C/C++/Fortran: Version 13.2.0 of GCC, the GNU Compiler Collection
Parallel:	No
Firmware:	Lenovo BIOS Version KAE118M 4.11 released Feb-2024
File System:	xfs
System State:	Run level 5 (multi-user and boots up in X window)
Base Pointers:	64-bit
Peak Pointers:	Not Applicable
Other:	Jemalloc memory allocator library v5.3.0
Power Management:	BIOS sets 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
500.perlbench_r	192	500	612	**482**	**634**	477	641							
502.gcc_r	192	**451**	**603**	467	583	450	604							
505.mcf_r	192	803	386	806	385	**806**	**385**							
520.omnetpp_r	192	643	392	**639**	**395**	635	396							
523.xalancbmk_r	192	273	742	**273**	**742**	278	730							
525.x264_r	192	**287**	**1170**	288	1170	286	1170							
531.deepsjeng_r	192	298	738	297	741	**298**	**739**							
541.leela_r	192	**469**	**677**	468	679	471	676							
548.exchange2_r	192	**263**	**1920**	260	1930	286	1760							
557.xz_r	192	**524**	**396**	521	398	527	393							

SPECrate®2017_int_base = 673

SPECrate®2017_int_peak = Not Run

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Compiler Notes

```
The GCC Compiler 13.2.0 is available at
https://gcc.gnu.org/
```

Submit Notes

```
The config file option 'submit' was used.
'numactl' was used to bind copies to the cores.
See the configuration file for details.
```

Operating System Notes

```
'ulimit -s unlimited' was used to set environment stack size limit
'ulimit -l 2097152' was used to set environment locked pages in memory limit

runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>

To limit dirty cache to 8% of memory, 'sysctl -w vm.dirty_ratio=8' run as root.
To limit swap usage to minimum necessary, 'sysctl -w vm.swappiness=1' run as root.
To free node-local memory and avoid remote memory usage,
'sysctl -w vm.zone_reclaim_mode=1' run as root.
To clear filesystem caches, 'sync; sysctl -w vm.drop_caches=3' run as root.
To disable address space layout randomization (ASLR) to reduce run-to-run
variability, 'sysctl -w kernel.randomize_va_space=0' run as root.

To enable Transparent Hugepages (THP) only on request for base runs,
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root.
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
     "/home/amptest/workspace/sir2017_pkg_verify/ampere_spec2017/spec2017/jemalloc/install/lib:/home/amptes
     t/workspace/sir2017_pkg_verify/ampere_spec2017/spec2017/gcc/install/lib64:/home/amptest/ampere_spec201
     7/spec2017/jemalloc/install/lib:/home/amptest/ampere_spec2017/spec2017/gcc/install/lib64:/home/amptest
     /workspace/sir2017_pkg_verify/ampere_spec2017/spec2017/gcc/install/lib64:"
MALLOC_CONF =
     "thp:always,metadata_thp:always,dirty_decay_ms:-1,muzzy_decay_ms:-1,retain:true,percpu_arena:percpu"
```

General Notes

```
Binaries were compiled on a system with 1x AMD EPYC 9654 CPU + 384GiB Memory
using SUSE Linux Enterprise Server 15 SP6

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2)
is mitigated in the system as tested and documented.

Jemalloc v5.3.0 is available via
https://github.com/jemalloc/jemalloc/releases/download/5.3.0/jemalloc-5.3.0.tar.bz2
It was built on SUSE Linux Enterprise Server 15 SP6 using Version 13.2.0 of GCC
The configure options are
"--with-lg-page=16" for building libjemalloc.so, and
"--with-lg-quantum=3 --with-lg-page=18" for building libjemalloc_ext.so
 Tuned MALLOC_CONF in terms of https://jemalloc.net/jemalloc.3.html#tuning
```

Platform Notes

```
BIOS configuration:
Operating Mode set to Maximum Performance and then set it to Custom Mode
NUMA Nodes per Socket set to NPS4

 Sysinfo program /home/amptest/workspace/sir2017_pkg_verify/ampere_spec2017/spec2017/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on scc1-sut02sys-r165 Thu Aug  8 22:08:19 2024

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

 ------------------------------------------------------------
 Table of contents
 ------------------------------------------------------------
  1. uname -a
  2. w
  3. Username
  4. ulimit -a
  5. sysinfo process ancestry
  6. /proc/cpuinfo
  7. lscpu
  8. numactl --hardware
  9. /proc/meminfo
 10. who -r
 11. Systemd service manager version: systemd 254 (254.10+suse.84.ge8d77af424)
 12. Services, from systemctl list-unit-files
 13. Linux kernel boot-time arguments, from /proc/cmdline
```

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Platform Notes (Continued)

```
14. cpupower frequency-info
15. tuned-adm active
16. sysctl
17. /sys/kernel/mm/transparent_hugepage
18. /sys/kernel/mm/transparent_hugepage/khugepaged
19. OS release
20. Disk information
21. /sys/devices/virtual/dmi/id
22. dmidecode
23. BIOS
------------------------------------------------------------

------------------------------------------------------------
1. uname -a
  Linux scc1-sut02sys-r165 6.4.0-150600.21-default #1 SMP PREEMPT_DYNAMIC Thu May 16 11:09:22 UTC 2024
  (36c1e09) x86_64 x86_64 x86_64 GNU/Linux

------------------------------------------------------------
2. w
   22:08:19 up  8:04,  2 users,  load average: 120.20, 131.73, 164.68
  USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
  amptest           :                14:04   ?xdm?   5:08m  0.03s gdm-session-worker [pam/gdm-password]
  amptest  seat0    login-           14:04    0.00s  0.00s  0.00s /usr/lib/gdm/gdm-x-session
  --register-session --run-script gnome
  amptest           :1               14:04   ?xdm?   5:08m  0.00s /usr/lib/gdm/gdm-x-session
  --register-session --run-script gnome

------------------------------------------------------------
3. Username
  From environment variable $USER:  root
  From the command 'logname':       amptest

------------------------------------------------------------
4. ulimit -a
  core file size          (blocks, -c) 0
  data seg size           (kbytes, -d) unlimited
  scheduling priority             (-e) 0
  file size               (blocks, -f) unlimited
  pending signals                 (-i) 1544523
  max locked memory       (kbytes, -l) 8192
  max memory size         (kbytes, -m) unlimited
  open files                      (-n) 1048576
  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) 1048576
  virtual memory          (kbytes, -v) unlimited
  file locks                      (-x) 1048576

------------------------------------------------------------
5. sysinfo process ancestry
 /usr/lib/systemd/systemd --switched-root --system --deserialize=42 ITMZ INTP
 sshd: amptest [priv]
 sshd: amptest@notty
 java -jar remoting.jar -workDir /home/amptest -jar-cache /home/amptest/remoting/jarCache
 /bin/bash /tmp/jenkins11094392986948535180.sh
 sudo -S -E UPDATE_UTIL=false /home/amptest/util/jenkins/speccpu_pkg_verify.sh
   http://eng21sys-r143.scc-lab.amperecomputing.com/fromsc/GreenSIR2017/without_report/spec2017_intrate_gcc13
```

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Platform Notes (Continued)

```
    _genoa_thinksystem_sr635_v3_with_noinline_384.tgz
  /bin/bash /home/amptest/util/jenkins/speccpu_pkg_verify.sh
    http://eng21sys-r143.scc-lab.amperecomputing.com/fromsc/GreenSIR2017/without_report/spec2017_intrate_gcc13
    _genoa_thinksystem_sr635_v3_with_noinline_384.tgz
  /bin/bash /home/amptest/workspace/sir2017_pkg_verify/ampere_spec2017/run_spec2017.sh --iterations 3
    --nobuild --action run --copies 192 --reportable --tune=base intrate
  runcpu --config=ampere_aarch64 --define numasize=48 --define
    gcc_dir=/home/amptest/ampere_spec2017/spec2017/gcc/install --define
    llvm_dir=/home/amptest/ampere_spec2017/spec2017/llvm/install --define
    jemalloc_dir=/home/amptest/ampere_spec2017/spec2017/jemalloc/install --define glibc_dir=/ --iterations 3
    --nobuild --action run --copies 192 --reportable --tune=base intrate
  runcpu --configfile ampere_aarch64 --define numasize=48 --define
    gcc_dir=/home/amptest/ampere_spec2017/spec2017/gcc/install --define
    llvm_dir=/home/amptest/ampere_spec2017/spec2017/llvm/install --define
    jemalloc_dir=/home/amptest/ampere_spec2017/spec2017/jemalloc/install --define glibc_dir=/ --iterations 3
    --nobuild --action run --copies 192 --reportable --tune base --nopower --runmode rate --tune base --size
    refrate intrate --nopreenv --note-preenv --logfile $SPEC/tmp/CPU2017.003/templogs/preenv.intrate.003.0.log
    --lognum 003.0 --from_runcpu 2
  specperl $SPEC/bin/sysinfo
$SPEC = /home/amptest/workspace/sir2017_pkg_verify/ampere_spec2017/spec2017

------------------------------------------------------------
6. /proc/cpuinfo
     model name      : AMD EPYC 9654P 96-Core Processor
     vendor_id       : AuthenticAMD
     cpu family      : 25
     model           : 17
     stepping        : 1
     microcode       : 0xa101144
     bugs            : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass srso
     TLB size        : 3584 4K pages
     cpu cores       : 96
     siblings        : 192
     1 physical ids (chips)
     192 processors (hardware threads)
     physical id 0: core ids 0-95
     physical id 0: apicids 0-191
   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 2.39.3:
   Architecture:                         x86_64
   CPU op-mode(s):                       32-bit, 64-bit
   Address sizes:                        52 bits physical, 57 bits virtual
   Byte Order:                           Little Endian
   CPU(s):                               192
   On-line CPU(s) list:                  0-191
   Vendor ID:                            AuthenticAMD
   BIOS Vendor ID:                       Advanced Micro Devices, Inc.
   Model name:                           AMD EPYC 9654P 96-Core Processor
   BIOS Model name:                      AMD EPYC 9654P 96-Core Processor                Unknown CPU @ 2.4GHz
   BIOS CPU family:                      107
   CPU family:                           25
   Model:                                17
   Thread(s) per core:                   2
   Core(s) per socket:                   96
   Socket(s):                            1
```

(Continued on next page)

Platform Notes (Continued)

```
  Stepping:                            1
  Frequency boost:                     enabled
  CPU(s) scaling MHz:                  52%
  CPU max MHz:                         3707.8120
  CPU min MHz:                         1500.0000
  BogoMIPS:                            4792.60
  Flags:                               fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat
                                       pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb
                                       rdtscp lm constant_tsc rep_good amd_lbr_v2 nopl nonstop_tsc cpuid
                                       extd_apicid aperfmperf rapl pni pclmulqdq monitor ssse3 fma cx16 pcid
                                       sse4_1 sse4_2 x2apic movbe popcnt aes xsave avx f16c rdrand lahf_lm
                                       cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch
                                       osvw ibs skinit wdt tce topoext perfctr_core perfctr_nb bpext
                                       perfctr_llc mwaitx cpb cat_l3 cdp_l3 hw_pstate ssbd mba perfmon_v2
                                       ibrs ibpb stibp ibrs_enhanced vmmcall fsgsbase bmi1 avx2 smep bmi2
                                       erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma
                                       clflushopt clwb avx512cd sha_ni avx512bw avx512vl xsaveopt xsavec
                                       xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
                                       user_shstk avx512_bf16 clzero irperf xsaveerptr rdpru wbnoinvd
                                       amd_ppin cppc arat npt lbrv svm_lock nrip_save tsc_scale vmcb_clean
                                       flushbyasid decodeassists pausefilter pfthreshold avic
                                       v_vmsave_vmload vgif x2avic v_spec_ctrl vnmi avx512vbmi umip pku
                                       ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg
                                       avx512_vpopcntdq la57 rdpid overflow_recov succor smca fsrm flush_l1d
                                       debug_swap
  Virtualization:                      AMD-V
  L1d cache:                           3 MiB (96 instances)
  L1i cache:                           3 MiB (96 instances)
  L2 cache:                            96 MiB (96 instances)
  L3 cache:                            384 MiB (12 instances)
  NUMA node(s):                        4
  NUMA node0 CPU(s):                   0-23,96-119
  NUMA node1 CPU(s):                   24-47,120-143
  NUMA node2 CPU(s):                   48-71,144-167
  NUMA node3 CPU(s):                   72-95,168-191
  Vulnerability Gather data sampling:  Not affected
  Vulnerability Itlb multihit:         Not affected
  Vulnerability L1tf:                  Not affected
  Vulnerability Mds:                   Not affected
  Vulnerability Meltdown:              Not affected
  Vulnerability Mmio stale data:       Not affected
  Vulnerability Reg file data sampling: Not affected
  Vulnerability Retbleed:              Not affected
  Vulnerability Spec rstack overflow:  Mitigation; Safe RET
  Vulnerability Spec store bypass:     Mitigation; Speculative Store Bypass disabled via prctl
  Vulnerability Spectre v1:            Mitigation; usercopy/swapgs barriers and __user pointer sanitization
  Vulnerability Spectre v2:            Mitigation; Enhanced / Automatic IBRS; IBPB conditional; STIBP
                                       always-on; RSB filling; PBRSB-eIBRS Not affected; BHI Not affected
  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       32K       3M    8 Data            1    64        1             64
     L1i       32K       3M    8 Instruction     1    64        1             64
     L2         1M      96M    8 Unified         2  2048        1             64
     L3        32M     384M   16 Unified         3 32768        1             64

------------------------------------------------------------
8. numactl --hardware
```

(Continued on next page)

Platform Notes (Continued)

```
NOTE: a numactl 'node' might or might not correspond to a physical chip.
  available: 4 nodes (0-3)
  node 0 cpus: 0-23,96-119
  node 0 size: 96381 MB
  node 0 free: 94530 MB
  node 1 cpus: 24-47,120-143
  node 1 size: 96716 MB
  node 1 free: 95360 MB
  node 2 cpus: 48-71,144-167
  node 2 size: 96755 MB
  node 2 free: 94441 MB
  node 3 cpus: 72-95,168-191
  node 3 size: 96305 MB
  node 3 free: 94162 MB
  node distances:
  node   0   1   2   3
    0:  10  20  20  20
    1:  20  10  20  20
    2:  20  20  10  20
    3:  20  20  20  10

------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       395427672 kB

------------------------------------------------------------
10. who -r
  run-level 5 Aug 8 14:04

------------------------------------------------------------
11. Systemd service manager version: systemd 254 (254.10+suse.84.ge8d77af424)
  Default Target  Status
  graphical       running

------------------------------------------------------------
12. Services, from systemctl list-unit-files
  STATE            UNIT FILES
  enabled          YaST2-Firstboot YaST2-Second-Stage apparmor appstream-sync-cache auditd bluetooth cron
                   display-manager firewalld getty@ irqbalance issue-generator kbdsettings kdump kdump-early
                   kdump-notify klog lvm2-monitor nscd postfix purge-kernels rollback rsyslog smartd sshd
                   systemd-pstore wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
  enabled-runtime  systemd-remount-fs
  disabled         accounts-daemon autofs autoyast-initscripts blk-availability bluetooth-mesh boot-sysctl
                   ca-certificates chrony-wait chronyd console-getty cups cups-browsed debug-shell ebtables
                   exchange-bmc-os-info fancontrol fsidd gpm grub2-once haveged ipmi ipmievd
                   issue-add-ssh-keys kexec-load lm_sensors lunmask man-db-create multipathd nfs nfs-blkmap
                   nmb ostree-remount rpcbind rpmconfigcheck rsyncd rtkit-daemon serial-getty@
                   smartd_generate_opts smb snmpd snmptrapd speech-dispatcherd svnserve
                   systemd-boot-check-no-failures systemd-confext systemd-network-generator systemd-sysext
                   systemd-time-wait-sync systemd-timesyncd tuned udisks2 update-system-flatpaks upower
                   vncserver@
  indirect         pcscd systemd-userdbd wickedd

------------------------------------------------------------
13. Linux kernel boot-time arguments, from /proc/cmdline
  BOOT_IMAGE=/boot/vmlinuz-6.4.0-150600.21-default
  root=UUID=fc8dda5b-cc39-41f3-8182-76f5b78f93be
  splash=silent
  ipv6.disable=1
  IRPO=/os/suse/SLE-15-SP6-GA/Server/x86_64/os
```

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Platform Notes (Continued)

```
  IFST=xfs
  IURL=http://isorepo.SCC-LAB.amperecomputing.com
  ITMZ
  INTP
  ITO=10
  mitigations=auto
  quiet
  security=apparmor
  crashkernel=369M,high
  crashkernel=72M,low

------------------------------------------------------------
14. cpupower frequency-info
  analyzing CPU 149:
    current policy: frequency should be within 1.50 GHz and 2.40 GHz.
                    The governor "ondemand" may decide which speed to use
                    within this range.
    boost state support:
      Supported: yes
      Active: yes

------------------------------------------------------------
15. tuned-adm active
  No current active profile.

------------------------------------------------------------
16. sysctl
  kernel.numa_balancing               0
  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                      8
  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                       1
  vm.watermark_boost_factor       15000
  vm.watermark_scale_factor          10
  vm.zone_reclaim_mode                1

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

------------------------------------------------------------
18. /sys/kernel/mm/transparent_hugepage/khugepaged
  alloc_sleep_millisecs   60000
  defrag                      1
  max_ptes_none             511
  max_ptes_shared           256
```

(Continued on next page)

Platform Notes (Continued)

```
  max_ptes_swap             64
  pages_to_scan           4096
  scan_sleep_millisecs   10000

------------------------------------------------------------
19. OS release
  From /etc/*-release /etc/*-version
  os-release SUSE Linux Enterprise Server 15 SP6

------------------------------------------------------------
20. Disk information
SPEC is set to: /home/amptest/workspace/sir2017_pkg_verify/ampere_spec2017/spec2017
  Filesystem     Type  Size  Used Avail Use% Mounted on
  /dev/sda6      xfs   378G  295G   83G  79% /home

------------------------------------------------------------
21. /sys/devices/virtual/dmi/id
    Vendor:         Lenovo
    Product:        ThinkSystem SR635 V3
    Product Family: ThinkSystem
    Serial:         JZ0045EC

------------------------------------------------------------
22. dmidecode
  Additional information from dmidecode 3.4 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:
    12x Samsung M321R4GA3PB0-CWMXJ 32 GB 2 rank 5600, configured at 4800


------------------------------------------------------------
23. BIOS
(This section combines info from /sys/devices and dmidecode.)
   BIOS Vendor:       Lenovo
   BIOS Version:      KAE118M-4.11
   BIOS Date:         02/29/2024
   BIOS Revision:     4.11
   Firmware Revision: 2.81
```

Compiler Version Notes

```
==============================================================================================================
C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base) 557.xz_r(base)
--------------------------------------------------------------------------------------------------------------
gcc (GCC) 13.2.0
Copyright (C) 2023 Free Software Foundation, Inc.
This is free software; see the source for copying conditions.  There is NO
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
C++     | 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base) 541.leela_r(base)
--------------------------------------------------------------------------------------------------------------
g++ (GCC) 13.2.0
Copyright (C) 2023 Free Software Foundation, Inc.
This is free software; see the source for copying conditions.  There is NO
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.
```

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Compiler Version Notes (Continued)

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

==============================================================================================================
Fortran | 548.exchange2_r(base)
------------------------------------------------------------------------------------------------------------------------
GNU Fortran (GCC) 13.2.0
Copyright (C) 2023 Free Software Foundation, Inc.
This is free software; see the source for copying conditions.  There is NO
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.
------------------------------------------------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
gcc

C++ benchmarks:
g++

Fortran benchmarks:
gfortran

Base Portability Flags

500.perlbench_r: -DSPEC_LINUX_X64 -DSPEC_LP64
502.gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LINUX -DSPEC_LP64
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-std=c99 -z muldefs -static -fwhole-program
-L/home/amptest/ampere_spec2017/spec2017/gcc/install/lib64
-L/home/amptest/ampere_spec2017/spec2017/gcc/install/lib
-L/home/amptest/ampere_spec2017/spec2017/jemalloc/install/lib -g -O3
-march=znver4 -flto=32 -funroll-loops
-freorder-blocks-algorithm=simple --param early-inlining-insns=96

(Continued on next page)

Base Optimization Flags (Continued)

C benchmarks (continued):
--param max-inline-insns-auto=64 --param inline-unit-growth=96
-fno-strict-aliasing -fgnu89-inline -u malloc -ljemalloc

C++ benchmarks:
-std=c++03 -static -fwhole-program
-L/home/amptest/ampere_spec2017/spec2017/gcc/install/lib64
-L/home/amptest/ampere_spec2017/spec2017/gcc/install/lib
-L/home/amptest/ampere_spec2017/spec2017/jemalloc/install/lib -g -O3
-march=znver4 -flto=32 -funroll-loops
-freorder-blocks-algorithm=simple --param early-inlining-insns=256
--param max-inline-insns-auto=128 --param inline-unit-growth=256
-ffinite-loops -u malloc -ljemalloc_ext

Fortran benchmarks:
-static -fwhole-program
-L/home/amptest/ampere_spec2017/spec2017/gcc/install/lib64
-L/home/amptest/ampere_spec2017/spec2017/gcc/install/lib
-L/home/amptest/ampere_spec2017/spec2017/jemalloc/install/lib -g -O3
-march=znver4 -flto=32 -funroll-loops
-freorder-blocks-algorithm=simple --param ipa-cp-eval-threshold=1
--param ipa-cp-unit-growth=80 --param ipa-cp-max-recursive-depth=8
-fno-inline-functions-called-once -fstack-arrays

Base Other Flags

C benchmarks:
-fcommon -Wl,-Map,mapfile

C++ benchmarks:
-Wl,-Map,mapfile

Fortran benchmarks:
-Wl,-Map,mapfile

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-Genoa-R.html
http://www.spec.org/cpu2017/flags/gcc.2024-08-14.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-Genoa-R.xml
http://www.spec.org/cpu2017/flags/gcc.2024-08-14.xml

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

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