SPEC CPU®2017 Integer Rate Result

GIGA-BYTE TECHNOLOGY CO., LTD.
(Test Sponsor: Giga Computing Technology Co., Ltd.)

R283-Z90-AAD1-000
(AMD EPYC 9684X, 2.55GHz)

$SPECrate®2017\_int\_base = 1800$

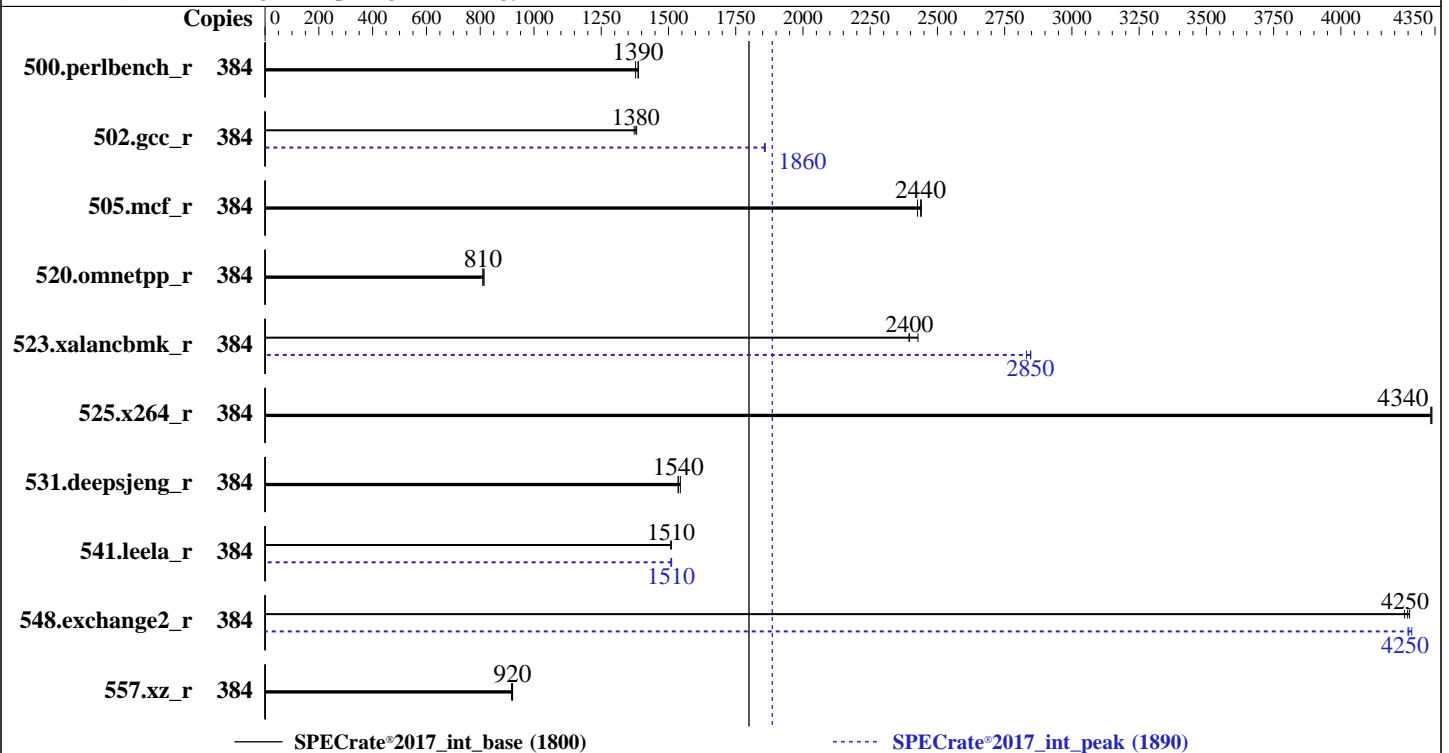$SPECrate®2017\_int\_peak = 1890$

CPU2017 License: 9082　　　　　　　　　　　　　　　　**Test Date:** Sep-2023
Test Sponsor: Giga Computing Technology Co., Ltd.　　　**Hardware Availability:** Jun-2023
Tested by: Giga Computing Technology Co., Ltd.　　　　**Software Availability:** Nov-2022

Copies

Benchmark	Copies	Base	Peak
500.perlbench_r	384	1390	
502.gcc_r	384	1380	1860
505.mcf_r	384	2440	
520.omnetpp_r	384	810	
523.xalancbmk_r	384	2400	2850
525.x264_r	384	4340	
531.deepsjeng_r	384	1540	
541.leela_r	384	1510	1510
548.exchange2_r	384	4250	4250
557.xz_r	384	920	

SPECrate®2017_int_base (1800)　　　　SPECrate®2017_int_peak (1890)

Hardware

CPU Name: AMD EPYC 9684X
 Max MHz: 3700
 Nominal: 2550
Enabled: 192 cores, 2 chips, 2 threads/core
Orderable: 1,2 chips
Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 1152 MB I+D on chip per chip, 96 MB shared / 8
 cores
 Other: None
Memory: 1536 GB (24 x 64 GB 2Rx4 PC5-4800B-R)
Storage: 1 x 3.2TB PCIE NVME SSD
Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP4 (x86_64)
 5.14.21-150400.22-default
Compiler: C/C++/Fortran: Version 4.0.0 of AOCC
Parallel: No
Firmware: Version F09 released May-2023
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other: None
Power Management: BIOS and OS set to prefer performance
 at the cost of additional power usage.

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

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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
500.perlbench_r	384	**441**	**1390**	440	1390	444	1380	384	**441**	**1390**	440	1390	444	1380
502.gcc_r	384	**394**	**1380**	394	1380	396	1370	384	293	1860	**293**	**1860**	292	1860
505.mcf_r	384	**255**	**2440**	256	2430	254	2440	384	**255**	**2440**	256	2430	254	2440
520.omnetpp_r	384	619	814	**622**	**810**	622	810	384	619	814	**622**	**810**	622	810
523.xalancbmk_r	384	167	2430	**169**	**2400**	169	2390	384	142	2850	143	2830	**142**	**2850**
525.x264_r	384	**155**	**4340**	155	4340	155	4340	384	**155**	**4340**	155	4340	155	4340
531.deepsjeng_r	384	285	1540	286	1540	**286**	**1540**	384	285	1540	286	1540	**286**	**1540**
541.leela_r	384	422	1510	421	1510	**421**	**1510**	384	421	1510	**421**	**1510**	421	1510
548.exchange2_r	384	**237**	**4250**	236	4260	237	4240	384	237	4250	236	4260	**237**	**4250**
557.xz_r	384	451	920	453	916	**451**	**920**	384	451	920	453	916	**451**	**920**
SPECrate®2017_int_base =		**1800**												
SPECrate®2017_int_peak =		**1890**												

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

Compiler Notes

The AMD64 AOCC Compiler Suite is available at
http://developer.amd.com/amd-aocc/

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.
To enable THP for all allocations for peak runs,
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.

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Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
     "/home/cpu2017_znver4_A12/amd_rate_aocc400_znver4_A_lib/lib:/home/cpu2017_znver4_A12/amd_rate_aocc400_
     znver4_A_lib/lib32:"
MALLOC_CONF = "retain:true"

Environment variables set by runcpu during the 523.xalancbmk_r peak run:
MALLOC_CONF = "thp:never"
```

General Notes

```
Binaries were compiled on a system with 2x AMD EPYC 9174F CPU + 1.5TiB Memory using RHEL 8.6

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.
```

Platform Notes

```
BIOS settings:
SEV Control = Disable
TSME = Disabled
Determinism Control = Manual
Determinism Enable = Power
TDP Control = Manual
TDP = 400
PPT Control = Manual
PPT = 400

 Sysinfo program /home/cpu2017_znver4_A12/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost Sun Sep 24 00:28:07 2023

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

 ------------------------------------------------------------
 Table of contents
 ------------------------------------------------------------
  1. uname -a
  2. w
  3. Username
  4. ulimit -a
  5. sysinfo process ancestry
  6. /proc/cpuinfo
  7. lscpu
  8. numactl --hardware
  9. /proc/meminfo
 10. who -r
 11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
 12. Services, from systemctl list-unit-files
 13. Linux kernel boot-time arguments, from /proc/cmdline
 14. cpupower frequency-info
 15. tuned-adm active
```

(Continued on next page)

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Platform Notes (Continued)

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

    -----------------------------------------------------------
  2. w
     00:28:07 up 20 min,  1 user,  load average: 0.20, 0.68, 3.01
     USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
     root     tty1     -                00:10   15:35   1.60s  0.35s /bin/bash ./amd_rate_aocc400_znver4_A1.sh

    -----------------------------------------------------------
  3. Username
    From environment variable $USER:  root

    -----------------------------------------------------------
  4. ulimit -a
    core file size          (blocks, -c) unlimited
    data seg size           (kbytes, -d) unlimited
    scheduling priority             (-e) 0
    file size               (blocks, -f) unlimited
    pending signals                 (-i) 6190553
    max locked memory       (kbytes, -l) 2097152
    max memory size         (kbytes, -m) unlimited
    open files                      (-n) 1024000
    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) 6190553
    virtual memory          (kbytes, -v) unlimited
    file locks                      (-x) unlimited

    -----------------------------------------------------------
  5. sysinfo process ancestry
   /usr/lib/systemd/systemd --switched-root --system --deserialize 34
   login -- root
   -bash
   python3 ./run_amd_rate_aocc400_znver4_A1.py
   /bin/bash ./amd_rate_aocc400_znver4_A1.sh
   runcpu --config amd_rate_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 intrate
   runcpu --configfile amd_rate_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 --nopower
     --runmode rate --tune base:peak --size test:train:refrate intrate --nopreenv --note-preenv --logfile
     $SPEC/tmp/CPU2017.001/templogs/preenv.intrate.001.0.log --lognum 001.0 --from_runcpu 2
   specperl $SPEC/bin/sysinfo
   $SPEC = /home/cpu2017_znver4_A12

    -----------------------------------------------------------
  6. /proc/cpuinfo
```

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Platform Notes (Continued)

```
      model name         : AMD EPYC 9684X 96-Core Processor
      vendor_id          : AuthenticAMD
      cpu family         : 25
      model              : 17
      stepping           : 2
      microcode          : 0xa101235
      bugs               : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
      TLB size           : 3584 4K pages
      cpu cores          : 96
      siblings           : 192
      2 physical ids (chips)
      384 processors (hardware threads)
      physical id 0: core ids 0-95
      physical id 1: core ids 0-95
      physical id 0: apicids 0-191
      physical id 1: apicids 256-447
   Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
   virtualized systems.  Use the above data carefully.


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

   From lscpu from util-linux 2.37.2:
     Architecture:            x86_64
     CPU op-mode(s):          32-bit, 64-bit
     Address sizes:           52 bits physical, 57 bits virtual
     Byte Order:              Little Endian
     CPU(s):                  384
     On-line CPU(s) list:     0-383
     Vendor ID:               AuthenticAMD
     Model name:              AMD EPYC 9684X 96-Core Processor
     CPU family:              25
     Model:                   17
     Thread(s) per core:      2
     Core(s) per socket:      96
     Socket(s):               2
     Stepping:                2
     Frequency boost:         enabled
     CPU max MHz:             3715.4290
     CPU min MHz:             1500.0000
     BogoMIPS:                5100.33
     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 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
                              invpcid_single hw_pstate ssbd mba ibrs ibpb stibp 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
                              avx512_bf16 clzero irperf xsaveerptr rdpru wbnoinvd amd_ppin arat npt lbrv
                              svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists
                              pausefilter pfthreshold avic v_vmsave_vmload vgif v_spec_ctrl avx512vbmi
                              umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg
                              avx512_vpopcntdq la57 rdpid overflow_recov succor smca fsrm flush_l1d
     Virtualization:          AMD-V
     L1d cache:               6 MiB (192 instances)
     L1i cache:               6 MiB (192 instances)
```

(Continued on next page)

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Platform Notes (Continued)

```
  L2 cache:                         192 MiB (192 instances)
  L3 cache:                         2.3 GiB (24 instances)
  NUMA node(s):                     24
  NUMA node0 CPU(s):                0-7,192-199
  NUMA node1 CPU(s):                8-15,200-207
  NUMA node2 CPU(s):                16-23,208-215
  NUMA node3 CPU(s):                24-31,216-223
  NUMA node4 CPU(s):                32-39,224-231
  NUMA node5 CPU(s):                40-47,232-239
  NUMA node6 CPU(s):                48-55,240-247
  NUMA node7 CPU(s):                56-63,248-255
  NUMA node8 CPU(s):                64-71,256-263
  NUMA node9 CPU(s):                72-79,264-271
  NUMA node10 CPU(s):               80-87,272-279
  NUMA node11 CPU(s):               88-95,280-287
  NUMA node12 CPU(s):               96-103,288-295
  NUMA node13 CPU(s):               104-111,296-303
  NUMA node14 CPU(s):               112-119,304-311
  NUMA node15 CPU(s):               120-127,312-319
  NUMA node16 CPU(s):               128-135,320-327
  NUMA node17 CPU(s):               136-143,328-335
  NUMA node18 CPU(s):               144-151,336-343
  NUMA node19 CPU(s):               152-159,344-351
  NUMA node20 CPU(s):               160-167,352-359
  NUMA node21 CPU(s):               168-175,360-367
  NUMA node22 CPU(s):               176-183,368-375
  NUMA node23 CPU(s):               184-191,376-383
  Vulnerability Itlb multihit:      Not affected
  Vulnerability L1tf:               Not affected
  Vulnerability Mds:                Not affected
  Vulnerability Meltdown:           Not affected
  Vulnerability Spec store bypass:  Vulnerable
  Vulnerability Spectre v1:         Vulnerable: __user pointer sanitization and usercopy barriers only; no
                                    swapgs barriers
  Vulnerability Spectre v2:         Vulnerable, IBPB: disabled, STIBP: disabled
  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       6M    8 Data            1     64        1             64
     L1i       32K       6M    8 Instruction    1     64        1             64
     L2         1M     192M    8 Unified         2   2048        1             64
     L3        96M     2.3G   16 Unified         3  98304        1             64

     ------------------------------------------------------------
  8. numactl --hardware
  NOTE: a numactl 'node' might or might not correspond to a physical chip.
    available: 24 nodes (0-23)
    node 0 cpus: 0-7,192-199
    node 0 size: 64248 MB
    node 0 free: 61976 MB
    node 1 cpus: 8-15,200-207
    node 1 size: 64506 MB
    node 1 free: 64270 MB
    node 2 cpus: 16-23,208-215
    node 2 size: 64506 MB
    node 2 free: 64251 MB
    node 3 cpus: 24-31,216-223
    node 3 size: 64506 MB
```

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Platform Notes (Continued)

```
      node 3 free: 64325 MB
      node 4 cpus: 32-39,224-231
      node 4 size: 64471 MB
      node 4 free: 64275 MB
      node 5 cpus: 40-47,232-239
      node 5 size: 64506 MB
      node 5 free: 64315 MB
      node 6 cpus: 48-55,240-247
      node 6 size: 64506 MB
      node 6 free: 64293 MB
      node 7 cpus: 56-63,248-255
      node 7 size: 64506 MB
      node 7 free: 64333 MB
      node 8 cpus: 64-71,256-263
      node 8 size: 64506 MB
      node 8 free: 64312 MB
      node 9 cpus: 72-79,264-271
      node 9 size: 64506 MB
      node 9 free: 64316 MB
      node 10 cpus: 80-87,272-279
      node 10 size: 64506 MB
      node 10 free: 64317 MB
      node 11 cpus: 88-95,280-287
      node 11 size: 64506 MB
      node 11 free: 64362 MB
      node 12 cpus: 96-103,288-295
      node 12 size: 64506 MB
      node 12 free: 64330 MB
      node 13 cpus: 104-111,296-303
      node 13 size: 64506 MB
      node 13 free: 64341 MB
      node 14 cpus: 112-119,304-311
      node 14 size: 64506 MB
      node 14 free: 64319 MB
      node 15 cpus: 120-127,312-319
      node 15 size: 64506 MB
      node 15 free: 64173 MB
      node 16 cpus: 128-135,320-327
      node 16 size: 64506 MB
      node 16 free: 64223 MB
      node 17 cpus: 136-143,328-335
      node 17 size: 64506 MB
      node 17 free: 64222 MB
      node 18 cpus: 144-151,336-343
      node 18 size: 64506 MB
      node 18 free: 64318 MB
      node 19 cpus: 152-159,344-351
      node 19 size: 64506 MB
      node 19 free: 64355 MB
      node 20 cpus: 160-167,352-359
      node 20 size: 64506 MB
      node 20 free: 64321 MB
      node 21 cpus: 168-175,360-367
      node 21 size: 64506 MB
      node 21 free: 64131 MB
      node 22 cpus: 176-183,368-375
      node 22 size: 64506 MB
      node 22 free: 63630 MB
      node 23 cpus: 184-191,376-383
      node 23 size: 64304 MB
```

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Platform Notes (Continued)

```
   node 23 free: 64018 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
     0:   10   11   11   12   12   12   12   12   12   12   12   12   32   32   32   32   32   32   32   32   32   32   32   32
     1:   11   10   11   12   12   12   12   12   12   12   12   12   32   32   32   32   32   32   32   32   32   32   32   32
     2:   11   11   10   12   12   12   12   12   12   12   12   12   32   32   32   32   32   32   32   32   32   32   32   32
     3:   12   12   12   10   11   11   12   12   12   12   12   12   32   32   32   32   32   32   32   32   32   32   32   32
     4:   12   12   12   11   10   11   12   12   12   12   12   12   32   32   32   32   32   32   32   32   32   32   32   32
     5:   12   12   12   11   11   10   12   12   12   12   12   12   32   32   32   32   32   32   32   32   32   32   32   32
     6:   12   12   12   12   12   12   10   11   11   12   12   12   32   32   32   32   32   32   32   32   32   32   32   32
     7:   12   12   12   12   12   12   11   10   11   12   12   12   32   32   32   32   32   32   32   32   32   32   32   32
     8:   12   12   12   12   12   12   11   11   10   12   12   12   32   32   32   32   32   32   32   32   32   32   32   32
     9:   12   12   12   12   12   12   12   12   12   10   11   11   32   32   32   32   32   32   32   32   32   32   32   32
    10:   12   12   12   12   12   12   12   12   12   11   10   11   32   32   32   32   32   32   32   32   32   32   32   32
    11:   12   12   12   12   12   12   12   12   12   11   11   10   32   32   32   32   32   32   32   32   32   32   32   32
    12:   32   32   32   32   32   32   32   32   32   32   32   32   10   11   11   12   12   12   12   12   12   12   12   12
    13:   32   32   32   32   32   32   32   32   32   32   32   32   11   10   11   12   12   12   12   12   12   12   12   12
    14:   32   32   32   32   32   32   32   32   32   32   32   32   11   11   10   12   12   12   12   12   12   12   12   12
    15:   32   32   32   32   32   32   32   32   32   32   32   32   12   12   12   10   11   11   12   12   12   12   12   12
    16:   32   32   32   32   32   32   32   32   32   32   32   32   12   12   12   11   10   11   12   12   12   12   12   12
    17:   32   32   32   32   32   32   32   32   32   32   32   32   12   12   12   11   11   10   12   12   12   12   12   12
    18:   32   32   32   32   32   32   32   32   32   32   32   32   12   12   12   12   12   12   10   11   11   12   12   12
    19:   32   32   32   32   32   32   32   32   32   32   32   32   12   12   12   12   12   12   11   10   11   12   12   12
    20:   32   32   32   32   32   32   32   32   32   32   32   32   12   12   12   12   12   12   11   11   10   12   12   12
    21:   32   32   32   32   32   32   32   32   32   32   32   32   12   12   12   12   12   12   12   12   12   10   11   11
    22:   32   32   32   32   32   32   32   32   32   32   32   32   12   12   12   12   12   12   12   12   12   11   10   11
    23:   32   32   32   32   32   32   32   32   32   32   32   32   12   12   12   12   12   12   12   12   12   11   11   10


   ------------------------------------------------------------
   9. /proc/meminfo
     MemTotal:       1584806016 kB


   ------------------------------------------------------------
   10. who -r
     run-level 3 Sep 24 00:10


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


   ------------------------------------------------------------
   12. Services, from systemctl list-unit-files
     STATE             UNIT FILES
     enabled           YaST2-Firstboot YaST2-Second-Stage apparmor auditd cron display-manager getty@ haveged
                       irqbalance issue-generator kbdsettings klog lvm2-monitor nscd nvmefc-boot-connections
                       postfix purge-kernels rollback rsyslog smartd sshd wicked wickedd-auto4 wickedd-dhcp4
                       wickedd-nanny
     enabled-runtime   systemd-remount-fs
     disabled          accounts-daemon autofs autoyast-initscripts blk-availability boot-sysctl ca-certificates
                       chrony-wait chronyd console-getty cups cups-browsed debug-shell ebtables
                       exchange-bmc-os-info fancontrol firewalld gpm grub2-once haveged-switch-root ipmi ipmievd
                       issue-add-ssh-keys kdump kdump-early kexec-load lm_sensors lunmask man-db-create
                       multipathd nfs nfs-blkmap nvmf-autoconnect rdisc rpcbind rpmconfigcheck rsyncd runssj
                       serial-getty@ smartd_generate_opts snmpd snmptrapd systemd-boot-check-no-failures
                       systemd-network-generator systemd-sysext systemd-time-wait-sync systemd-timesyncd tuned
                       udisks2 wickedd-dhcp6
     indirect          wickedd

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

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GIGA-BYTE TECHNOLOGY CO., LTD.

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R283-Z90-AAD1-000

(AMD EPYC 9684X, 2.55GHz)

SPECrate®2017_int_base = 1800

SPECrate®2017_int_peak = 1890

CPU2017 License: 9082

Test Sponsor: Giga Computing Technology Co., Ltd.

Tested by: Giga Computing Technology Co., Ltd.

Test Date: Sep-2023

Hardware Availability: Jun-2023

Software Availability: Nov-2022

Platform Notes (Continued)

```
  13. Linux kernel boot-time arguments, from /proc/cmdline
    BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
    root=UUID=858ea2c3-dac4-45b4-941b-86d7de94c38b
    cgroup_disable=memory,cpu,cpuacct,blkio,hugetlb,pids,cpuset,perf_event,freezer,devices,net_cls,net_prio
    pcie_aspm=force
    pcie_aspm.policy=powersupersave
    splash=silent
    resume=/dev/disk/by-uuid/12c19d51-3466-4994-bf22-cb4ed2a427e3
    mitigations=off
    quiet
    security=apparmor


  -----------------------------------------------------------
  14. cpupower frequency-info
    analyzing CPU 0:
      current policy: frequency should be within 1.50 GHz and 2.55 GHz.
                      The governor "performance" may decide which speed to use
                      within this range.
      boost state support:
        Supported: yes
        Active: yes


  -----------------------------------------------------------
  15. tuned-adm active
    It seems that tuned daemon is not running, preset profile is not activated.
    Preset profile: throughput-performance


  -----------------------------------------------------------
  16. sysctl
    kernel.numa_balancing             1
    kernel.randomize_va_space         0
    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
```

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Platform Notes (Continued)

```
    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 SUSE Linux Enterprise Server 15 SP4

   --------------------------------------------------------------
  20. Disk information
  SPEC is set to: /home/cpu2017_znver4_A12
    Filesystem       Type  Size  Used Avail Use% Mounted on
    /dev/nvme0n1p3 xfs   2.2T   99G  2.1T   5% /home

   --------------------------------------------------------------
  21. /sys/devices/virtual/dmi/id
      Vendor:         GIGABYTE
      Product:        R283-Z90-AAD1-000
      Product Family: Server
      Serial:         GMG6D1212A0002

   --------------------------------------------------------------
  22. dmidecode
    Additional information from dmidecode 3.2 follows.  WARNING: Use caution when you interpret this section.
    The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately
    determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the
    "DMTF SMBIOS" standard.
    Memory:
      24x Micron Technology MTC40F2046S1RC48BA1 64 GB 2 rank 4800


   --------------------------------------------------------------
  23. BIOS
  (This section combines info from /sys/devices and dmidecode.)
      BIOS Vendor:       GIGABYTE
      BIOS Version:      F09
      BIOS Date:         05/19/2023
      BIOS Revision:     5.27
```

Compiler Version Notes

```
====================================================================================================
C    | 502.gcc_r(peak)
----------------------------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
----------------------------------------------------------------------------------------------------


====================================================================================================
C    | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak)
     | 557.xz_r(base, peak)
----------------------------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
```

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R283-Z90-AAD1-000
(AMD EPYC 9684X, 2.55GHz)

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SPECrate®2017_int_peak = 1890

CPU2017 License: 9082   **Test Date:**   Sep-2023
Test Sponsor: Giga Computing Technology Co., Ltd.   **Hardware Availability:** Jun-2023
Tested by: Giga Computing Technology Co., Ltd.   **Software Availability:** Nov-2022

Compiler Version Notes (Continued)

```
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
--------------------------------------------------------------------------------------


==============================================================================
C       | 502.gcc_r(peak)
--------------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
--------------------------------------------------------------------------------------


==============================================================================
C       | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak)
        | 557.xz_r(base, peak)
--------------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
--------------------------------------------------------------------------------------


==============================================================================
C++     | 523.xalancbmk_r(peak)
--------------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
--------------------------------------------------------------------------------------


==============================================================================
C++     | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base) 531.deepsjeng_r(base, peak) 541.leela_r(base,
        | peak)
--------------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
--------------------------------------------------------------------------------------


==============================================================================
C++     | 523.xalancbmk_r(peak)
--------------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
--------------------------------------------------------------------------------------


==============================================================================
C++     | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base) 531.deepsjeng_r(base, peak) 541.leela_r(base,
        | peak)
--------------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
--------------------------------------------------------------------------------------
```

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R283-Z90-AAD1-000
(AMD EPYC 9684X, 2.55GHz)

SPECrate®2017_int_base = 1800

SPECrate®2017_int_peak = 1890

CPU2017 License: 9082

Test Sponsor: Giga Computing Technology Co., Ltd.

Tested by: Giga Computing Technology Co., Ltd.

Test Date: Sep-2023

Hardware Availability: Jun-2023

Software Availability: Nov-2022

Compiler Version Notes (Continued)

```
==============================================================================================
Fortran | 548.exchange2_r(base, peak)
----------------------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
----------------------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
`clang`

C++ benchmarks:
`clang++`

Fortran benchmarks:
`flang`

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:
`-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
`-Wl,-mllvm -Wl,-reduce-array-computations=3`
`-Wl,-mllvm -Wl,-ldist-scalar-expand -fenable-aggressive-gather`
`-z muldefs -O3 -march=znver4 -fveclib=AMDLIBM -ffast-math`
`-fstruct-layout=7 -mllvm -unroll-threshold=50`
`-mllvm -inline-threshold=1000 -fremap-arrays -fstrip-mining`

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R283-Z90-AAD1-000
(AMD EPYC 9684X, 2.55GHz)

SPECrate®2017_int_base = 1800

SPECrate®2017_int_peak = 1890

CPU2017 License: 9082		**Test Date:**	Sep-2023
Test Sponsor:	Giga Computing Technology Co., Ltd.	**Hardware Availability:**	Jun-2023
Tested by:	Giga Computing Technology Co., Ltd.	**Software Availability:**	Nov-2022

Base Optimization Flags (Continued)

C benchmarks (continued):
```
-mllvm -reduce-array-computations=3 -zopt -lamdlibm -lflang
-lamdalloc
```

C++ benchmarks:
```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -z muldefs -O3
-march=znver4 -fveclib=AMDLIBM -ffast-math
-mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000
-mllvm -reduce-array-computations=3 -zopt
-fvirtual-function-elimination -fvisibility=hidden -lamdlibm -lflang
-lamdalloc-ext
```

Fortran benchmarks:
```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-inline-recursion=4 -Wl,-mllvm -Wl,-lsr-in-nested-loop
-Wl,-mllvm -Wl,-enable-iv-split -z muldefs -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fepilog-vectorization-of-inductions
-mllvm -optimize-strided-mem-cost -floop-transform
-mllvm -unroll-aggressive -mllvm -unroll-threshold=500 -lamdlibm
-lflang -lamdalloc
```

Base Other Flags

C benchmarks:
```
-Wno-unused-command-line-argument
```

C++ benchmarks:
```
-Wno-unused-command-line-argument
```

Fortran benchmarks:
```
-Wno-unused-command-line-argument
```

Peak Compiler Invocation

C benchmarks:
```
clang
```

C++ benchmarks:
```
clang++
```

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GIGA-BYTE TECHNOLOGY CO., LTD.
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R283-Z90-AAD1-000
(AMD EPYC 9684X, 2.55GHz)

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CPU2017 License: 9082		**Test Date:**	Sep-2023
Test Sponsor:	Giga Computing Technology Co., Ltd.	**Hardware Availability:**	Jun-2023
Tested by:	Giga Computing Technology Co., Ltd.	**Software Availability:**	Nov-2022

Peak Compiler Invocation (Continued)

Fortran benchmarks:
`flang`

Peak Portability Flags

500.perlbench_r: `-DSPEC_LINUX_X64 -DSPEC_LP64`
502.gcc_r: `-D_FILE_OFFSET_BITS=64`
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`

Peak Optimization Flags

C benchmarks:

500.perlbench_r: `basepeak = yes`

502.gcc_r: `-m32 -flto -z muldefs -Ofast -march=znver4`
`-fveclib=AMDLIBM -ffast-math -fstruct-layout=7`
`-mllvm -unroll-threshold=50 -fremap-arrays -fstrip-mining`
`-mllvm -inline-threshold=1000`
`-mllvm -reduce-array-computations=3 -zopt -fgnu89-inline`
`-lamdalloc`

505.mcf_r: `basepeak = yes`

525.x264_r: `basepeak = yes`

557.xz_r: `basepeak = yes`

C++ benchmarks:

520.omnetpp_r: `basepeak = yes`

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Peak Optimization Flags (Continued)

```
523.xalancbmk_r: -m32 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-do-block-reorder=aggressive
-fno-loop-reroll -Ofast -march=znver4 -fveclib=AMDLIBM
-ffast-math -finline-aggressive
-mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -zopt
-mllvm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden
-lamdalloc-ext

531.deepsjeng_r: basepeak = yes

541.leela_r: -m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math
-finline-aggressive -mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -zopt
-fvirtual-function-elimination -fvisibility=hidden
-lamdlibm -lflang -lamdalloc-ext
```

Fortran benchmarks:
```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-inline-recursion=4 -Wl,-mllvm -Wl,-lsr-in-nested-loop
-Wl,-mllvm -Wl,-enable-iv-split -O3 -march=znver4 -fveclib=AMDLIBM
-ffast-math -fepilog-vectorization-of-inductions
-mllvm -optimize-strided-mem-cost -floop-transform
-mllvm -unroll-aggressive -mllvm -unroll-threshold=500 -lamdlibm
-lflang -lamdalloc
```

Peak Other Flags

C benchmarks (except as noted below):
```
-Wno-unused-command-line-argument
```

```
502.gcc_r: -L/usr/lib32 -Wno-unused-command-line-argument
-L/home/work/cpu2017/v119/aocc4/znver4/rate/amd_rate_aocc400_znver4_A_lib/lib32
```

C++ benchmarks (except as noted below):
```
-Wno-unused-command-line-argument
```

```
523.xalancbmk_r: -L/usr/lib32 -Wno-unused-command-line-argument
-L/home/work/cpu2017/v119/aocc4/znver4/rate/amd_rate_aocc400_znver4_A_lib/lib32
```

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Tested by:	Giga Computing Technology Co., Ltd.	**Software Availability:**	Nov-2022

Peak Other Flags (Continued)

Fortran benchmarks:

`-Wno-unused-command-line-argument`

The flags files that were used to format this result can be browsed at

http://www.spec.org/cpu2017/flags/aocc400-flags-A1.2.html
http://www.spec.org/cpu2017/flags/GIGA-BYTE-Platform-SPECcpu2017-Flags-V1.1-Bergamo.html

You can also download the XML flags sources by saving the following links:

http://www.spec.org/cpu2017/flags/aocc400-flags-A1.2.xml
http://www.spec.org/cpu2017/flags/GIGA-BYTE-Platform-SPECcpu2017-Flags-V1.1-Bergamo.xml

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

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