



SPEC CPU®2017 Integer Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL385 Gen11

(2.55 GHz, AMD EPYC 9684X)

SPECrate®2017_int_base = 1740

SPECrate®2017_int_peak = 1800

CPU2017 License: 3

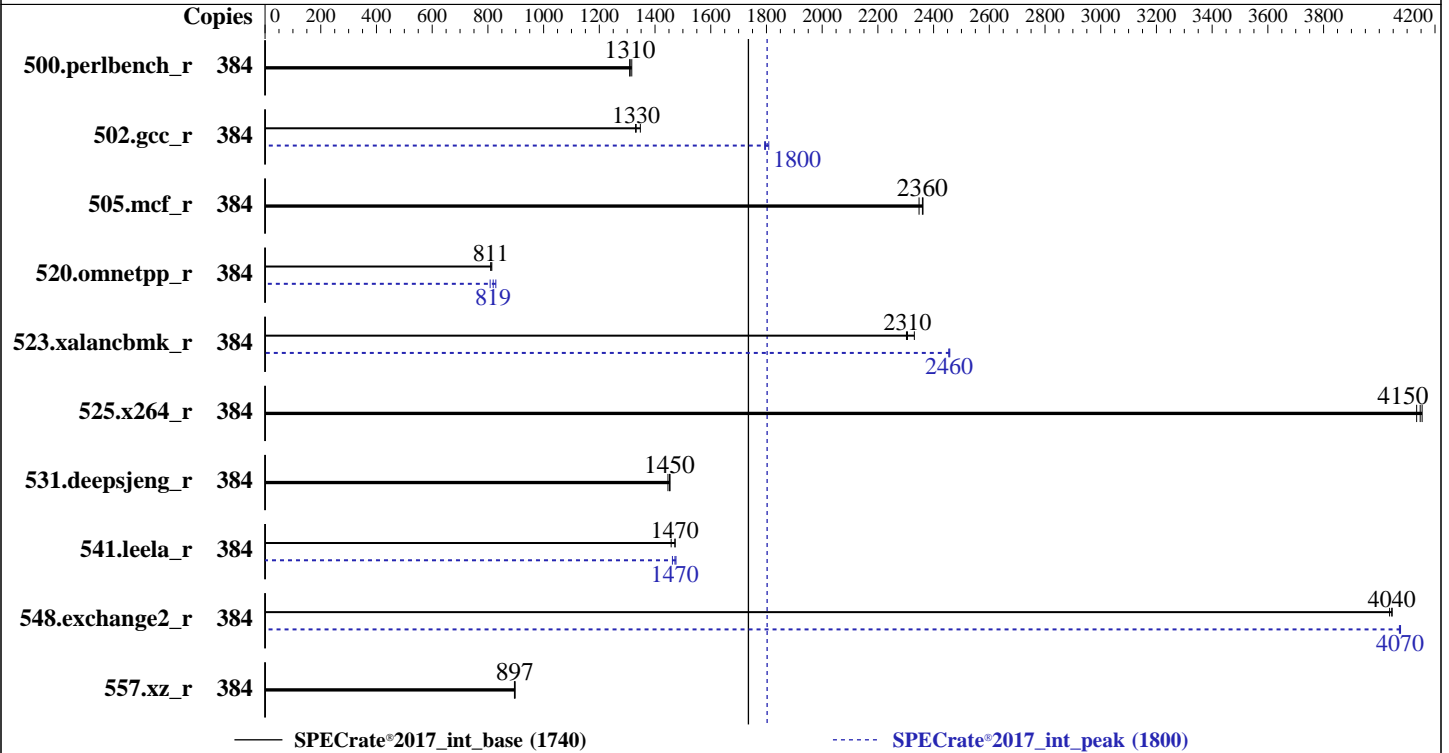
Test Sponsor: HPE

Tested by: HPE

Test Date: Aug-2023

Hardware Availability: Sep-2023

Software Availability: Apr-2023



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: 768 GB (24 x 32 GB 2Rx8 PC5-4800B-R)
 Storage: 1 x 480 GB SATA SSD
 Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP4
 Kernel 5.14.21-150400.22-default
 Compiler: C/C++/Fortran: Version 4.0.0 of AOCC
 Parallel: No
 Firmware: HPE BIOS Version v1.40 07/12/2023 released Jul-2023
 File System: btrfs
 System State: Run level 5 (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



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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	384	467	1310	466	1310	464	1320	384	467	1310	466	1310	464	1320
502.gcc_r	384	404	1350	409	1330	408	1330	384	301	1810	303	1790	303	1800
505.mcf_r	384	263	2360	263	2360	264	2350	384	263	2360	263	2360	264	2350
520.omnetpp_r	384	619	814	622	811	622	811	384	615	819	608	828	623	808
523.xalancbmk_r	384	176	2310	174	2330	176	2300	384	165	2460	165	2460	165	2460
525.x264_r	384	162	4150	162	4150	163	4130	384	162	4150	162	4150	163	4130
531.deepsjeng_r	384	304	1450	303	1450	303	1450	384	304	1450	303	1450	303	1450
541.leela_r	384	436	1460	432	1470	432	1470	384	431	1480	432	1470	435	1460
548.exchange2_r	384	249	4040	249	4040	249	4050	384	247	4070	247	4080	247	4070
557.xz_r	384	463	895	463	897	462	897	384	463	895	463	897	462	897

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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/amd_rate_aocc400_znver4_A_lib/lib:/home/cpu2017/amd_rate_aocc400_znver4_A_lib/lib32:"
MALLOCONF = "retain:true"
```

Environment variables set by runcpu during the 523.xalancbmk_r peak run:

```
MALLOCONF = "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 Configuration

Workload Profile set to General Throughput Compute
Determinism Control set to Manual
Performance Determinism set to Power Deterministic
Memory Patrol Scrubbing set to Disabled
Last-Level Cache (LLC) as NUMA Node set to Enabled
NUMA memory domains per socket set to Four memory domains per socket
ACPI CST C2 Latency set to 18 microseconds
Thermal Configuration set to Maximum Cooling
Workload Profile set to Custom

Power Regulator set to OS Control Mode

The system ROM used for this result contains microcode version 0xal0123e for the AMD EPYC 9nn4X family of processors. The reference code/AGESA version used in this ROM is version Genoa-XPI 1.0.0.8

```
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Sun Aug 6 16:39:31 2023
```

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

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10. who -r
11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)

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Platform Notes (Continued)

- 12. Services, from `systemctl list-unit-files`
- 13. Linux kernel boot-time arguments, from `/proc/cmdline`
- 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 localhost 5.14.21-150400.22-default #1 SMP PREEMPT_DYNAMIC Wed May 11 06:57:18 UTC 2022 (49db222/lp)
x86_64 x86_64 x86_64 GNU/Linux
```

```
2. w
16:39:31 up 7 min, 3 users, load average: 0.50, 8.64, 7.10
USER      TTY      FROM          LOGIN@   IDLE   JCPU   PCPU WHAT
root      :        :             16:33   ?xdm?  4:46   0.01s gdm-session-worker [pam/gdm-password]
root      :l       :l            16:33   ?xdm?  4:46   0.02s /usr/lib/gdm/gdm-x-session
--register-session --run-script gnome
root      pts/1    172.16.0.100  16:35   35.00s 1.23s  0.13s /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) 3094179
max locked memory       (kbytes, -l) 2097152
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) 3094179
virtual memory          (kbytes, -v) unlimited
file locks              (-x) unlimited
```

```
5. sysinfo process ancestry
/usr/lib/systemd/systemd --switched-root --system --deserialize 30
sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
sshd: root@pts/1
-bash
python3 ./run_intrrate_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
```

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```
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/CPU2017.029/templogs/preenv.intrate.029.0.log --lognum 029.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017
```

```
-----
6. /proc/cpuinfo
model name      : AMD EPYC 9684X 96-Core Processor
vendor_id      : AuthenticAMD
cpu family     : 25
model          : 17
stepping       : 2
microcode      : 0xa10123e
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:           2550.0000
CPU min MHz:           1500.0000
BogoMIPS:              5092.30
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
```

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Platform Notes (Continued)

avx512_bf16 clzero irperf xsaveerptr rdpru wbnoinvd amd_ppin arat npt lbrv
svm_lock nrrip_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_lld

AMD-V

Virtualization:
L1d cache: 6 MiB (192 instances)
L1i cache: 6 MiB (192 instances)
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: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swaps barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Retpolines, IBPB conditional, IBRS_FW, STIBP always-on, 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	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: 31941 MB
node 0 free: 31363 MB

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Platform Notes (Continued)

```

node 1 cpus: 8-15,200-207
node 1 size: 32251 MB
node 1 free: 32113 MB
node 2 cpus: 16-23,208-215
node 2 size: 32251 MB
node 2 free: 32142 MB
node 3 cpus: 24-31,216-223
node 3 size: 32251 MB
node 3 free: 31861 MB
node 4 cpus: 32-39,224-231
node 4 size: 32251 MB
node 4 free: 31910 MB
node 5 cpus: 40-47,232-239
node 5 size: 32251 MB
node 5 free: 32104 MB
node 6 cpus: 48-55,240-247
node 6 size: 32251 MB
node 6 free: 32121 MB
node 7 cpus: 56-63,248-255
node 7 size: 32251 MB
node 7 free: 32128 MB
node 8 cpus: 64-71,256-263
node 8 size: 32251 MB
node 8 free: 32109 MB
node 9 cpus: 72-79,264-271
node 9 size: 32217 MB
node 9 free: 31885 MB
node 10 cpus: 80-87,272-279
node 10 size: 32251 MB
node 10 free: 31837 MB
node 11 cpus: 88-95,280-287
node 11 size: 32251 MB
node 11 free: 31863 MB
node 12 cpus: 96-103,288-295
node 12 size: 32251 MB
node 12 free: 32128 MB
node 13 cpus: 104-111,296-303
node 13 size: 32251 MB
node 13 free: 32138 MB
node 14 cpus: 112-119,304-311
node 14 size: 32251 MB
node 14 free: 32150 MB
node 15 cpus: 120-127,312-319
node 15 size: 32251 MB
node 15 free: 32141 MB
node 16 cpus: 128-135,320-327
node 16 size: 32251 MB
node 16 free: 32102 MB
node 17 cpus: 136-143,328-335
node 17 size: 32251 MB
node 17 free: 32131 MB
node 18 cpus: 144-151,336-343
node 18 size: 32251 MB
node 18 free: 31872 MB
node 19 cpus: 152-159,344-351
node 19 size: 32251 MB
node 19 free: 31754 MB
node 20 cpus: 160-167,352-359
node 20 size: 32251 MB
node 20 free: 31845 MB

```

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Platform Notes (Continued)

node 21 cpus: 168-175,360-367
node 21 size: 32251 MB
node 21 free: 32097 MB
node 22 cpus: 176-183,368-375
node 22 size: 32251 MB
node 22 free: 32120 MB
node 23 cpus: 184-191,376-383
node 23 size: 32121 MB
node 23 free: 31947 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	10	11	11	12	12	12	12	12	12	12	12	12	12
13:	32	32	32	32	32	32	32	32	32	32	32	11	10	11	12	12	12	12	12	12	12	12	12	12
14:	32	32	32	32	32	32	32	32	32	32	32	11	11	10	12	12	12	12	12	12	12	12	12	12
15:	32	32	32	32	32	32	32	32	32	32	32	12	12	12	10	11	11	12	12	12	12	12	12	12
16:	32	32	32	32	32	32	32	32	32	32	32	12	12	12	11	10	11	12	12	12	12	12	12	12
17:	32	32	32	32	32	32	32	32	32	32	32	12	12	12	11	11	10	12	12	12	12	12	12	12
18:	32	32	32	32	32	32	32	32	32	32	32	12	12	12	12	12	12	10	11	11	12	12	12	12
19:	32	32	32	32	32	32	32	32	32	32	32	12	12	12	12	12	12	11	10	11	12	12	12	12
20:	32	32	32	32	32	32	32	32	32	32	32	12	12	12	12	12	12	11	11	10	12	12	12	12
21:	32	32	32	32	32	32	32	32	32	32	32	12	12	12	12	12	12	12	12	12	12	10	11	11
22:	32	32	32	32	32	32	32	32	32	32	32	12	12	12	12	12	12	12	12	12	12	11	10	11
23:	32	32	32	32	32	32	32	32	32	32	32	12	12	12	12	12	12	12	12	12	12	11	11	10

9. /proc/meminfo
MemTotal: 792135628 kB

10. who -r
run-level 5 Aug 6 16:33

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

12. Services, from systemctl list-unit-files
STATE UNIT FILES
enabled ModemManager YaST2-Firstboot YaST2-Second-Stage apparmor auditd bluetooth cron
display-manager firewalld getty@ haveged irqbalance iscsi issue-generator kbdsettings klog
lvm2-monitor nscd postfix purge-kernels rollback rsyslog smartd sshd wicked wickedd-auto4
wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny wpa_supplicant
enabled-runtime systemd-remount-fs
disabled NetworkManager NetworkManager-dispatcher NetworkManager-wait-online accounts-daemon
appstream-sync-cache autofs autoyast-initscripts blk-availability bluetooth-mesh
boot-sysctl ca-certificates chrony-wait chronyd console-getty cups cups-browsed

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Platform Notes (Continued)

```

debug-shell dmraid-activation dnsmasq ebttables exchange-bmc-os-info gpm grub2-once
haveged-switch-root hwloc-dump-hwdata ipmi ipmievd iscsi-init iscsid iscsiuiio
issue-add-ssh-keys kexec-load lunmask man-db-create multipathd nfs nfs-blkmap
nm-cloud-setup nmb openvpn@ ostree-remount pppoe pppoe-server rdisc rpcbind rpmconfigcheck
rsyncd rtkit-daemon serial-getty@ smartd_generate_opts smb snmpd snmptrapd
speech-dispatcherd systemd-boot-check-no-failures systemd-network-generator systemd-sysext
systemd-time-wait-sync systemd-timesyncd tuned udisks2 upower wpa_supplicant@
indirect pcsd saned@ wickedd

```

13. Linux kernel boot-time arguments, from /proc/cmdline

```

BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
root=UUID=e710f57a-f290-46a0-a58f-3ef44a1e3f08
splash=silent
mitigations=auto
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

Current active 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

```

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Platform Notes (Continued)

```
-----
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 SUSE Linux Enterprise Server 15 SP4
-----
```

```
-----
20. Disk information
   SPEC is set to: /home/cpu2017
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/sdb2       btrfs 445G  99G  346G  23% /home
-----
```

```
-----
21. /sys/devices/virtual/dmi/id
   Vendor:          HPE
   Product:         ProLiant DL385 Gen11
   Product Family: ProLiant
   Serial:          DL385G11-006
-----
```

```
-----
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:
     9x Samsung M321R4GA3BB0-CQKDG 32 GB 2 rank 4800
     15x Samsung M321R4GA3BB6-CQKDG 32 GB 2 rank 4800
-----
```

```
-----
23. BIOS
   (This section combines info from /sys/devices and dmidecode.)
   BIOS Vendor:      HPE
   BIOS Version:     1.40
   BIOS Date:        07/12/2023
   BIOS Revision:    1.40
   Firmware Revision: 1.40
-----
```

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
-----
```

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Compiler Version Notes (Continued)

```
=====
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          | 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,
=====
```

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Compiler Version Notes (Continued)

| 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
-----

```

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

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Base Optimization Flags (Continued)

C benchmarks (continued):

```
-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
-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



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Peak Compiler Invocation

C benchmarks:

clang

C++ benchmarks:

clang++

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
```

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Peak Optimization Flags (Continued)

C++ benchmarks:

```
520.omnetpp_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 -lamdalloc-ext
```

```
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
```



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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

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/HPE-Platform-Flags-AMD-Genoa-X-rev1.0.html>

<http://www.spec.org/cpu2017/flags/aocc400-flags.html>

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

<http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-Genoa-X-rev1.0.xml>

<http://www.spec.org/cpu2017/flags/aocc400-flags.xml>

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