



# SPEC CPU®2017 Integer Rate Result

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## Hewlett Packard Enterprise

(Test Sponsor: HPE)

### ProLiant DL325 Gen11

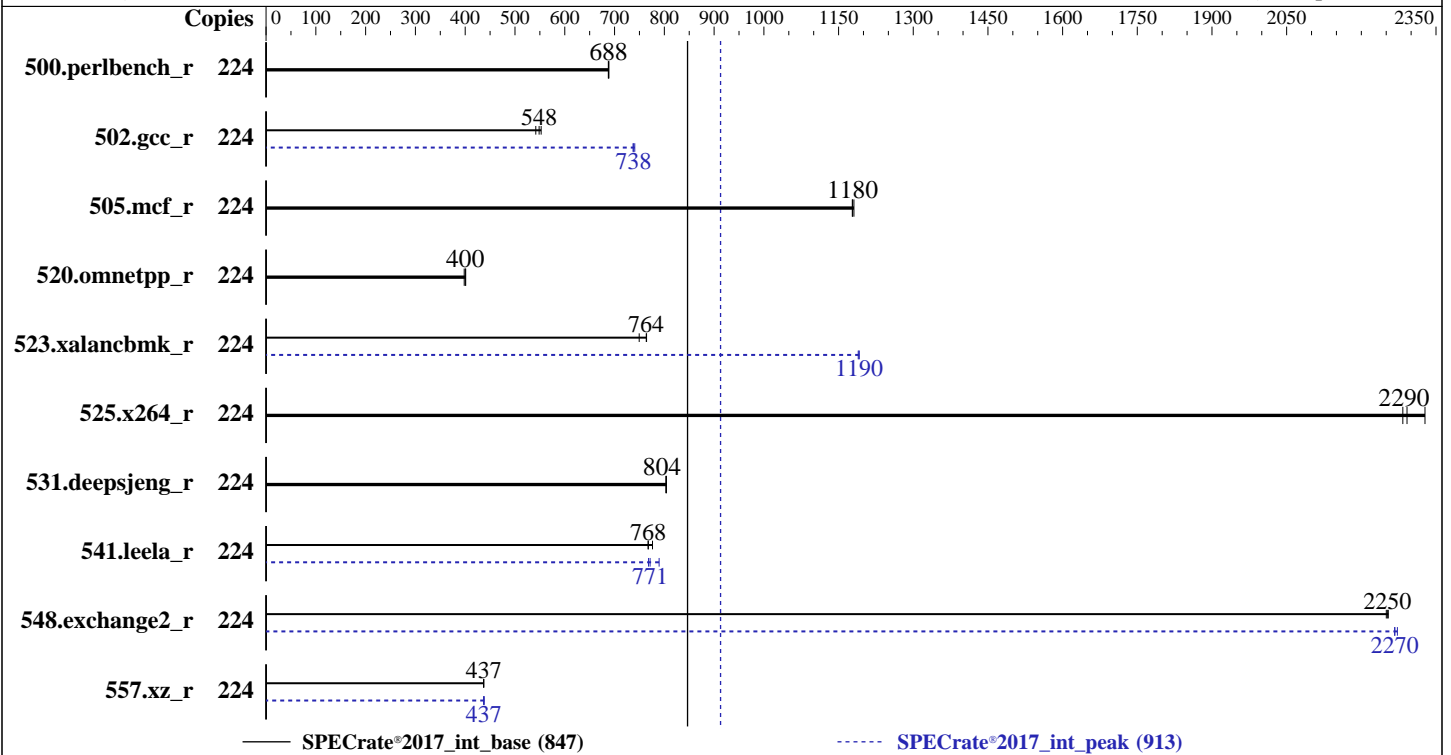
(2.20 GHz, AMD EPYC 9734)

## SPECrate®2017\_int\_base = 847

## SPECrate®2017\_int\_peak = 913

**CPU2017 License:** 3  
**Test Sponsor:** HPE  
**Tested by:** HPE

**Test Date:** Sep-2023  
**Hardware Availability:** Sep-2023  
**Software Availability:** Apr-2023



### Hardware

CPU Name: AMD EPYC 9734  
 Max MHz: 3000  
 Nominal: 2200  
 Enabled: 112 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: 256 MB I+D on chip per chip,  
 16 MB shared / 7 cores  
 Other: None  
 Memory: 768 GB (12 x 64 GB 2Rx4 PC5-4800B-R)  
 Storage: 1 x 480 GB SATA SSD  
 Other: None

### Software

OS: Red Hat Enterprise Linux 9.0 (Plow)  
 Kernel 5.14.0-70.13.1.el9\_0.x86\_64  
 Compiler: C/C++/Fortran: Version 4.0.0 of AOCC  
 Parallel: No  
 Firmware: HPE BIOS Version v1.42 08/16/2023 released  
 Aug-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



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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	224	518	689	<b>518</b>	<b>688</b>	519	688	224	518	689	<b>518</b>	<b>688</b>	519	688
502.gcc_r	224	574	553	585	542	<b>578</b>	<b>548</b>	224	<b>430</b>	<b>738</b>	430	737	428	741
505.mcf_r	224	<b>307</b>	<b>1180</b>	307	1180	307	1180	224	<b>307</b>	<b>1180</b>	307	1180	307	1180
520.omnetpp_r	224	738	398	733	401	<b>734</b>	<b>400</b>	224	738	398	733	401	<b>734</b>	<b>400</b>
523.xalancbmk_r	224	309	764	316	750	<b>310</b>	<b>764</b>	224	199	1190	<b>199</b>	<b>1190</b>	199	1190
525.x264_r	224	172	2280	<b>171</b>	<b>2290</b>	168	2330	224	172	2280	<b>171</b>	<b>2290</b>	168	2330
531.deepsjeng_r	224	<b>319</b>	<b>804</b>	319	804	320	803	224	<b>319</b>	<b>804</b>	319	804	320	803
541.leela_r	224	483	767	478	776	<b>483</b>	<b>768</b>	224	<b>481</b>	<b>771</b>	483	768	470	790
548.exchange2_r	224	260	2250	261	2250	<b>261</b>	<b>2250</b>	224	259	2270	258	2270	<b>259</b>	<b>2270</b>
557.xz_r	224	554	437	553	437	<b>553</b>	<b>437</b>	224	552	438	<b>553</b>	<b>437</b>	554	437

SPECrate®2017\_int\_base = **847**

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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:"

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 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 0xaa00212 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.localdomain Tue Sep 19 10:45:17 2023

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

-----  
Table of contents  
-----

1. uname -a
2. w
3. Username
4. ulimit -a
5. sysinfo process ancestry
6. /proc/cpuinfo
7. lscpu
8. numactl --hardware
9. /proc/meminfo
10. who -r
11. Systemd service manager version: systemd 250 (250-6.el9\_0)

(Continued on next page)



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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.localdomain 5.14.0-70.13.1.el9_0.x86_64 #1 SMP PREEMPT Thu Apr 14 12:42:38 EDT 2022 x86_64
x86_64 x86_64 GNU/Linux
```

```
2. w
10:45:17 up 1:26, 1 user, load average: 0.18, 0.05, 0.01
USER      TTY      LOGIN@  IDLE   JCPU   PCPU WHAT
root      pts/0    07Apr22 13.00s  1.21s  0.05s /bin/bash ./amd_rate_aocc400_znver4_A1.sh
```

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

```
4. ulimit -a
real-time non-blocking time (microseconds, -R) unlimited
core file size (blocks, -c) 0
data seg size (kbytes, -d) unlimited
scheduling priority (-e) 0
file size (blocks, -f) unlimited
pending signals (-i) 3094580
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) 3094580
virtual memory (kbytes, -v) unlimited
file locks (-x) unlimited
```

```
5. sysinfo process ancestry
/usr/lib/systemd/systemd --switched-root --system --deserialize 28
sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
sshd: root [priv]
sshd: root@pts/0
-bash
python3 ./run_intrate.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
```

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## Platform Notes (Continued)

```
--runmode rate --tune base:peak --size test:train:refrate intrate --nopreenv --note-preenv --logfile
$SPEC/tmp/CPU2017.006/templogs/preenv.intrate.006.0.log --lognum 006.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017
```

```
-----
6. /proc/cpuinfo
model name      : AMD EPYC 9734 112-Core Processor
vendor_id      : AuthenticAMD
cpu family     : 25
model          : 160
stepping       : 2
microcode      : 0xaa00212
bugs           : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
TLB size      : 3584 4K pages
cpu cores     : 112
siblings      : 224
1 physical ids (chips)
224 processors (hardware threads)
physical id 0: core ids
0-6,8-14,16-22,24-30,32-38,40-46,48-54,56-62,64-70,72-78,80-86,88-94,96-102,104-110,112-118,120-126
physical id 0: apicids
0-13,16-29,32-45,48-61,64-77,80-93,96-109,112-125,128-141,144-157,160-173,176-189,192-205,208-221,224-237
,240-253
```

Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for virtualized systems. Use the above data carefully.

### 7. lscpu

From lscpu from util-linux 2.37.4:

```
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Address sizes:         52 bits physical, 57 bits virtual
Byte Order:            Little Endian
CPU(s):                224
On-line CPU(s) list:   0-223
Vendor ID:             AuthenticAMD
BIOS Vendor ID:       Advanced Micro Devices, Inc.
Model name:            AMD EPYC 9734 112-Core Processor
BIOS Model name:      AMD EPYC 9734 112-Core Processor
CPU family:            25
Model:                160
Thread(s) per core:    2
Core(s) per socket:    112
Socket(s):             1
Stepping:              2
Frequency boost:       enabled
CPU max MHz:           2200.0000
CPU min MHz:           1500.0000
BogoMIPS:              4393.48
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 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
```

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## Platform Notes (Continued)

```
clflushopt clwb avx512cd sha_ni avx512bw avx512v1 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
pftreshold 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
AMD-V
```

### Virtualization:

L1d cache: 3.5 MiB (112 instances)  
L1i cache: 3.5 MiB (112 instances)  
L2 cache: 112 MiB (112 instances)  
L3 cache: 256 MiB (16 instances)

### NUMA node(s):

16  
NUMA node0 CPU(s): 0-6,112-118  
NUMA node1 CPU(s): 7-13,119-125  
NUMA node2 CPU(s): 14-20,126-132  
NUMA node3 CPU(s): 21-27,133-139  
NUMA node4 CPU(s): 28-34,140-146  
NUMA node5 CPU(s): 35-41,147-153  
NUMA node6 CPU(s): 42-48,154-160  
NUMA node7 CPU(s): 49-55,161-167  
NUMA node8 CPU(s): 56-62,168-174  
NUMA node9 CPU(s): 63-69,175-181  
NUMA node10 CPU(s): 70-76,182-188  
NUMA node11 CPU(s): 77-83,189-195  
NUMA node12 CPU(s): 84-90,196-202  
NUMA node13 CPU(s): 91-97,203-209  
NUMA node14 CPU(s): 98-104,210-216  
NUMA node15 CPU(s): 105-111,217-223

Vulnerability Itlb multihit: Not affected

Vulnerability L1tf: Not affected

Vulnerability Mds: Not affected

Vulnerability Meltdown: Not affected

Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl

Vulnerability Spectre v1: Mitigation; usercopy/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	3.5M	8	Data	1	64	1	64
L1i	32K	3.5M	8	Instruction	1	64	1	64
L2	1M	112M	8	Unified	2	2048	1	64
L3	16M	256M	16	Unified	3	16384	1	64

### 8. numactl --hardware

NOTE: a numactl 'node' might or might not correspond to a physical chip.

```
available: 16 nodes (0-15)
node 0 cpus: 0-6,112-118
node 0 size: 48134 MB
node 0 free: 47720 MB
node 1 cpus: 7-13,119-125
node 1 size: 48380 MB
node 1 free: 47900 MB
node 2 cpus: 14-20,126-132
node 2 size: 48380 MB
node 2 free: 48163 MB
```

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## Platform Notes (Continued)

```

node 3 cpus: 21-27,133-139
node 3 size: 48380 MB
node 3 free: 48177 MB
node 4 cpus: 28-34,140-146
node 4 size: 48380 MB
node 4 free: 48170 MB
node 5 cpus: 35-41,147-153
node 5 size: 48380 MB
node 5 free: 48202 MB
node 6 cpus: 42-48,154-160
node 6 size: 48380 MB
node 6 free: 48180 MB
node 7 cpus: 49-55,161-167
node 7 size: 48380 MB
node 7 free: 48205 MB
node 8 cpus: 56-62,168-174
node 8 size: 48380 MB
node 8 free: 48177 MB
node 9 cpus: 63-69,175-181
node 9 size: 48380 MB
node 9 free: 48180 MB
node 10 cpus: 70-76,182-188
node 10 size: 48380 MB
node 10 free: 48185 MB
node 11 cpus: 77-83,189-195
node 11 size: 48380 MB
node 11 free: 48046 MB
node 12 cpus: 84-90,196-202
node 12 size: 48344 MB
node 12 free: 48155 MB
node 13 cpus: 91-97,203-209
node 13 size: 48380 MB
node 13 free: 48183 MB
node 14 cpus: 98-104,210-216
node 14 size: 48380 MB
node 14 free: 48182 MB
node 15 cpus: 105-111,217-223
node 15 size: 48318 MB
node 15 free: 48103 MB
node distances:
node  0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15
0:  10 11 11 11 12 12 12 12 12 12 12 12 12 12 12 12
1:  11 10 11 11 12 12 12 12 12 12 12 12 12 12 12 12
2:  11 11 10 11 12 12 12 12 12 12 12 12 12 12 12 12
3:  11 11 11 10 12 12 12 12 12 12 12 12 12 12 12 12
4:  12 12 12 12 10 11 11 11 12 12 12 12 12 12 12 12
5:  12 12 12 12 12 11 10 11 11 12 12 12 12 12 12 12
6:  12 12 12 12 12 11 11 10 11 12 12 12 12 12 12 12
7:  12 12 12 12 12 11 11 11 10 12 12 12 12 12 12 12
8:  12 12 12 12 12 12 12 12 12 10 11 11 11 12 12 12
9:  12 12 12 12 12 12 12 12 12 11 10 11 11 12 12 12
10: 12 12 12 12 12 12 12 12 12 11 11 10 11 12 12 12
11: 12 12 12 12 12 12 12 12 12 11 11 11 10 12 12 12
12: 12 12 12 12 12 12 12 12 12 12 12 12 12 10 11 11
13: 12 12 12 12 12 12 12 12 12 12 12 12 11 10 11 11
14: 12 12 12 12 12 12 12 12 12 12 12 12 11 11 10 11
15: 12 12 12 12 12 12 12 12 12 12 12 12 11 11 11 10

```

9. /proc/meminfo

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## Platform Notes (Continued)

MemTotal: 792319300 kB

-----  
10. who -r  
run-level 3 Apr 7 05:30  
-----

-----  
11. Systemd service manager version: systemd 250 (250-6.el9\_0)  
Default Target Status  
multi-user running  
-----

-----  
12. Services, from systemctl list-unit-files  
STATE UNIT FILES  
enabled NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd crond  
dbus-broker firewalld getty@ irqbalance kdump lvm2-monitor mdmonitor microcode  
nis-domainname rhsmcertd rsyslog selinux-autorelabel-mark sshd sssd  
systemd-network-generator tuned udisks2 upower  
enabled-runtime systemd-remount-fs  
disabled blk-availability canberra-system-bootup canberra-system-shutdown  
canberra-system-shutdown-reboot chrony-wait chronyd console-getty cpupower debug-shell  
hwloc-dump-hwdata ipsec kvm\_stat man-db-restart-cache-update nftables powertop rdisc rhsm  
rhsm-facts rpmdb-rebuild serial-getty@ sshd-keygen@ systemd-boot-check-no-failures  
systemd-pstore systemd-sysexit  
indirect sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo  
-----

-----  
13. Linux kernel boot-time arguments, from /proc/cmdline  
BOOT\_IMAGE=(hd2,gpt2)/vmlinuz-5.14.0-70.13.1.el9\_0.x86\_64  
root=/dev/mapper/rhel-root  
ro  
resume=/dev/mapper/rhel-swap  
rd.lvm.lv=rhel/root  
rd.lvm.lv=rhel/swap  
-----

-----  
14. cpupower frequency-info  
analyzing CPU 0:  
current policy: frequency should be within 1.50 GHz and 2.20 GHz.  
The governor "performance" may decide which speed to use  
within this range.  
boost state support:  
Supported: yes  
Active: yes  
Boost States: 0  
Total States: 3  
Pstate-P0: 2200MHz  
-----

-----  
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  
-----

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## Platform Notes (Continued)

```

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
max_ptes_swap          64
pages_to_scan          4096
scan_sleep_millisecs  10000

```

```

-----
19. OS release
From /etc/*-release /etc/*-version
os-release      Red Hat Enterprise Linux 9.0 (Plow)
redhat-release  Red Hat Enterprise Linux release 9.0 (Plow)
system-release Red Hat Enterprise Linux release 9.0 (Plow)

```

```

-----
20. Disk information
SPEC is set to: /home/cpu2017
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs  372G  15G  357G   4% /home

```

```

-----
21. /sys/devices/virtual/dmi/id
Vendor:          HPE
Product:         ProLiant DL325 Gen11
Product Family: ProLiant
Serial:          DL325GEN11-002

```

```

-----
22. dmidecode
Additional information from dmidecode 3.3 follows.  WARNING: Use caution when you interpret this section.
The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately
determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the
"DMTF SMBIOS" standard.
Memory:
  11x Hynix HMC94AEBRA103N 64 GB 2 rank 4800
  1x Hynix HMC94MEBRA121N 64 GB 2 rank 4800

```

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# SPEC CPU®2017 Integer Rate Result

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**Hewlett Packard Enterprise**

(Test Sponsor: HPE)

ProLiant DL325 Gen11

(2.20 GHz, AMD EPYC 9734)

SPECrate®2017\_int\_base = 847

SPECrate®2017\_int\_peak = 913

**CPU2017 License:** 3  
**Test Sponsor:** HPE  
**Tested by:** HPE

**Test Date:** Sep-2023  
**Hardware Availability:** Sep-2023  
**Software Availability:** Apr-2023

## Platform Notes (Continued)

-----  
23. BIOS  
(This section combines info from /sys/devices and dmidecode.)  
BIOS Vendor: HPE  
BIOS Version: 1.42  
BIOS Date: 08/16/2023  
BIOS Revision: 1.42  
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  
-----

=====  
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  
-----

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**CPU2017 License:** 3  
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**Tested by:** HPE

**Test Date:** Sep-2023  
**Hardware Availability:** Sep-2023  
**Software Availability:** Apr-2023

## Compiler Version Notes (Continued)

=====  
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  
=====

=====  
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



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**SPECrate®2017\_int\_peak = 913**

**CPU2017 License:** 3

**Test Sponsor:** HPE

**Tested by:** HPE

**Test Date:** Sep-2023

**Hardware Availability:** Sep-2023

**Software Availability:** Apr-2023

## 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
-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

```



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**CPU2017 License:** 3

**Test Sponsor:** HPE

**Tested by:** HPE

**Test Date:** Sep-2023

**Hardware Availability:** Sep-2023

**Software Availability:** Apr-2023

## 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++

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

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SPECrate®2017\_int\_peak = 913

**CPU2017 License:** 3

**Test Sponsor:** HPE

**Tested by:** HPE

**Test Date:** Sep-2023

**Hardware Availability:** Sep-2023

**Software Availability:** Apr-2023

## Peak Optimization Flags (Continued)

```
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
-lamalloc
```

505.mcf\_r: basepeak = yes

525.x264\_r: basepeak = yes

```
557.xz_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
-fstruct-layout=7 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -zopt -lamdlibm
-lflang -lamalloc
```

C++ benchmarks:

520.omnetpp\_r: basepeak = yes

```
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
-lamalloc-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 -lamalloc-ext
```

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## Peak Optimization Flags (Continued)

Fortran benchmarks:

```
-m64 -flt0 -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
```

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.2023-09-13.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.2023-09-13.xml>

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