SPEC CPU®2017 Integer Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL385 Gen11
(2.20 GHz, AMD EPYC 9734)

$SPECrate®2017\_int\_base = 1690$

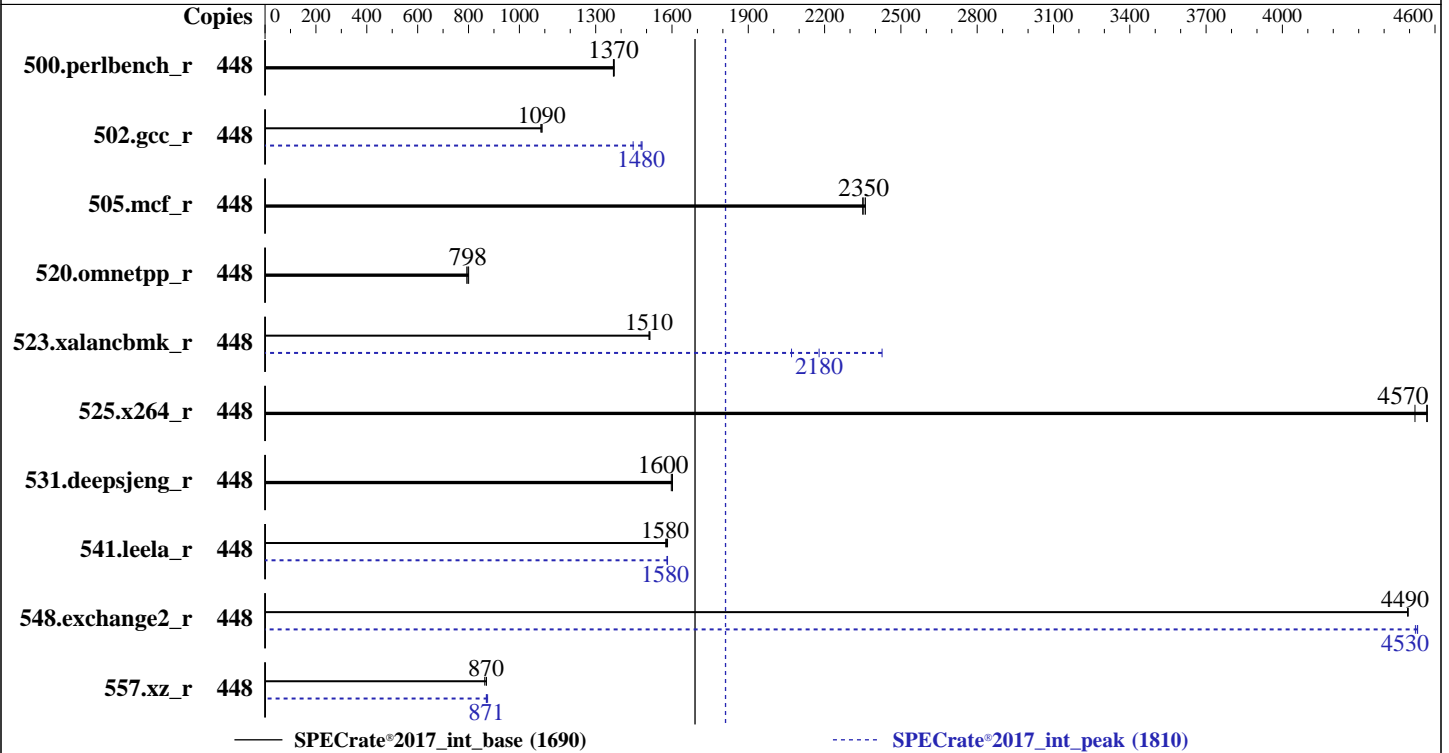$SPECrate®2017\_int\_peak = 1810$

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Jun-2023

Hardware Availability: Sep-2023

Software Availability: Apr-2023

Benchmark	Copies	base	peak
500.perlbench_r	448	1370	
502.gcc_r	448	1090	1480
505.mcf_r	448	2350	
520.omnetpp_r	448	798	
523.xalancbmk_r	448	1510	2180
525.x264_r	448	4570	
531.deepsjeng_r	448	1600	
541.leela_r	448	1580	1580
548.exchange2_r	448	4490	4530
557.xz_r	448	870	871

SPECrate®2017_int_base (1690)   SPECrate®2017_int_peak (1810)

Hardware

CPU Name: AMD EPYC 9734
  Max MHz: 3000
  Nominal: 2200
Enabled: 224 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: 256 MB I+D on chip per chip,
  16 MB shared / 7 cores
  Other: None
Memory: 1536 GB (24 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 v1.30 03/06/2023 released
  Mar-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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CPU2017 License: 3	**Test Date:** Jun-2023
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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	448	**520**	**1370**	519	1370	521	1370	448	**520**	**1370**	519	1370	521	1370
502.gcc_r	448	585	1080	**583**	**1090**	582	1090	448	**429**	**1480**	428	1480	438	1450
505.mcf_r	448	307	2360	308	2350	**308**	**2350**	448	307	2360	308	2350	**308**	**2350**
520.omnetpp_r	448	**737**	**798**	734	800	741	793	448	**737**	**798**	734	800	741	793
523.xalancbmk_r	448	313	1510	**313**	**1510**	313	1510	448	195	2430	**217**	**2180**	229	2070
525.x264_r	448	174	4520	172	4570	**172**	**4570**	448	174	4520	172	4570	**172**	**4570**
531.deepsjeng_r	448	321	1600	**321**	**1600**	321	1600	448	321	1600	**321**	**1600**	321	1600
541.leela_r	448	471	1580	469	1580	**470**	**1580**	448	470	1580	469	1580	**469**	**1580**
548.exchange2_r	448	261	4490	**261**	**4490**	261	4490	448	**259**	**4530**	259	4530	260	4520
557.xz_r	448	**556**	**870**	556	870	560	864	448	556	870	553	875	**556**	**871**
SPECrate®2017_int_base =	**1690**													
SPECrate®2017_int_peak =	**1810**													

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
 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
 Data Fabric C-State Enable set to Force Enabled
 Memory PStates set to Disabled
 Workload Profile set to Custom
  Power Regulator set to OS Control Mode

 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost.localdomain Wed Jun 28 15:11:21 2023

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

 ------------------------------------------------------------
 Table of contents
 ------------------------------------------------------------
  1. uname -a
  2. w
  3. Username
  4. ulimit -a
  5. sysinfo process ancestry
  6. /proc/cpuinfo
  7. lscpu
  8. numactl --hardware
  9. /proc/meminfo
 10. who -r
 11. Systemd service manager version: systemd 250 (250-6.el9_0)
 12. Services, from systemctl list-unit-files
 13. Linux kernel boot-time arguments, from /proc/cmdline
```

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Platform Notes (Continued)

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


  ------------------------------------------------------------
  1. uname -a
    Linux 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
     15:11:21 up 13 min,  2 users,  load average: 0.27, 0.06, 0.02
    USER     TTY        LOGIN@   IDLE   JCPU   PCPU WHAT
    root     tty1       24May22 400days  0.00s  0.00s -bash
    root     pts/0      24May22 25.00s  1.42s  0.12s /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) 6190879
    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) 6190879
    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 [priv]
   sshd: root@pts/0
   -bash
   python3 ./run_intrate_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
```

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Platform Notes (Continued)

```
    $SPEC/tmp/CPU2017.011/templogs/preenv.intrate.011.0.log --lognum 011.0 --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
    bugs             : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
    TLB size         : 3584 4K pages
    cpu cores        : 112
    siblings         : 224
    2 physical ids (chips)
    448 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 1: 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
    physical id 1: apicids
    256-269,272-285,288-301,304-317,320-333,336-349,352-365,368-381,384-397,400-413,416-429,432-445,448-461,4
    64-477,480-493,496-509
  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):                    448
    On-line CPU(s) list:       0-447
    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):                 2
    Stepping:                  2
    Frequency boost:           enabled
    CPU max MHz:               2200.0000
    CPU min MHz:               1500.0000
    BogoMIPS:                  4393.30
    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
```

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Platform Notes (Continued)

```
                    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:        7 MiB (224 instances)
  L1i cache:        7 MiB (224 instances)
  L2 cache:         224 MiB (224 instances)
  L3 cache:         512 MiB (32 instances)
  NUMA node(s):     32
  NUMA node0 CPU(s):   0-6,224-230
  NUMA node1 CPU(s):   7-13,231-237
  NUMA node2 CPU(s):   56-62,280-286
  NUMA node3 CPU(s):   63-69,287-293
  NUMA node4 CPU(s):   28-34,252-258
  NUMA node5 CPU(s):   35-41,259-265
  NUMA node6 CPU(s):   84-90,308-314
  NUMA node7 CPU(s):   91-97,315-321
  NUMA node8 CPU(s):   42-48,266-272
  NUMA node9 CPU(s):   49-55,273-279
  NUMA node10 CPU(s):  98-104,322-328
  NUMA node11 CPU(s):  105-111,329-335
  NUMA node12 CPU(s):  14-20,238-244
  NUMA node13 CPU(s):  21-27,245-251
  NUMA node14 CPU(s):  70-76,294-300
  NUMA node15 CPU(s):  77-83,301-307
  NUMA node16 CPU(s):  112-118,336-342
  NUMA node17 CPU(s):  119-125,343-349
  NUMA node18 CPU(s):  168-174,392-398
  NUMA node19 CPU(s):  175-181,399-405
  NUMA node20 CPU(s):  140-146,364-370
  NUMA node21 CPU(s):  147-153,371-377
  NUMA node22 CPU(s):  196-202,420-426
  NUMA node23 CPU(s):  203-209,427-433
  NUMA node24 CPU(s):  154-160,378-384
  NUMA node25 CPU(s):  161-167,385-391
  NUMA node26 CPU(s):  210-216,434-440
  NUMA node27 CPU(s):  217-223,441-447
  NUMA node28 CPU(s):  126-132,350-356
  NUMA node29 CPU(s):  133-139,357-363
  NUMA node30 CPU(s):  182-188,406-412
  NUMA node31 CPU(s):  189-195,413-419
  Vulnerability Itlb multihit:  Not affected
  Vulnerability L1tf:           Not affected
  Vulnerability Mds:            Not affected
  Vulnerability Meltdown:       Not affected
  Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl
  Vulnerability Spectre v1:     Mitigation; usercopy/swapgs barriers and __user pointer sanitization
  Vulnerability Spectre v2:     Mitigation; Retpolines, IBPB conditional, IBRS_FW, STIBP always-on, RSB
                                filling
  Vulnerability Srbds:          Not affected
  Vulnerability Tsx async abort: Not affected

  From lscpu --cache:
```

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Platform Notes (Continued)

```
      NAME ONE-SIZE ALL-SIZE WAYS TYPE          LEVEL   SETS PHY-LINE COHERENCY-SIZE
      L1d       32K       7M   8 Data               1     64        1             64
      L1i       32K       7M   8 Instruction        1     64        1             64
      L2         1M     224M   8 Unified            2   2048        1             64
      L3        16M     512M  16 Unified            3  16384        1             64

    ------------------------------------------------------------
    8. numactl --hardware
    NOTE: a numactl 'node' might or might not correspond to a physical chip.
      available: 32 nodes (0-31)
      node 0 cpus: 0-6,224-230
      node 0 size: 48134 MB
      node 0 free: 47947 MB
      node 1 cpus: 7-13,231-237
      node 1 size: 48380 MB
      node 1 free: 48126 MB
      node 2 cpus: 56-62,280-286
      node 2 size: 48380 MB
      node 2 free: 48247 MB
      node 3 cpus: 63-69,287-293
      node 3 size: 48380 MB
      node 3 free: 48184 MB
      node 4 cpus: 28-34,252-258
      node 4 size: 48380 MB
      node 4 free: 48124 MB
      node 5 cpus: 35-41,259-265
      node 5 size: 48380 MB
      node 5 free: 48248 MB
      node 6 cpus: 84-90,308-314
      node 6 size: 48380 MB
      node 6 free: 48143 MB
      node 7 cpus: 91-97,315-321
      node 7 size: 48380 MB
      node 7 free: 48143 MB
      node 8 cpus: 42-48,266-272
      node 8 size: 48380 MB
      node 8 free: 48049 MB
      node 9 cpus: 49-55,273-279
      node 9 size: 48380 MB
      node 9 free: 48243 MB
      node 10 cpus: 98-104,322-328
      node 10 size: 48380 MB
      node 10 free: 48226 MB
      node 11 cpus: 105-111,329-335
      node 11 size: 48380 MB
      node 11 free: 48051 MB
      node 12 cpus: 14-20,238-244
      node 12 size: 48380 MB
      node 12 free: 48113 MB
      node 13 cpus: 21-27,245-251
      node 13 size: 48380 MB
      node 13 free: 48165 MB
      node 14 cpus: 70-76,294-300
      node 14 size: 48380 MB
      node 14 free: 48229 MB
      node 15 cpus: 77-83,301-307
      node 15 size: 48380 MB
      node 15 free: 48159 MB
      node 16 cpus: 112-118,336-342
      node 16 size: 48380 MB
```

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Platform Notes (Continued)

```
    node 16 free: 48076 MB
    node 17 cpus: 119-125,343-349
    node 17 size: 48380 MB
    node 17 free: 48078 MB
    node 18 cpus: 168-174,392-398
    node 18 size: 48380 MB
    node 18 free: 48137 MB
    node 19 cpus: 175-181,399-405
    node 19 size: 48380 MB
    node 19 free: 47583 MB
    node 20 cpus: 140-146,364-370
    node 20 size: 48380 MB
    node 20 free: 48155 MB
    node 21 cpus: 147-153,371-377
    node 21 size: 48380 MB
    node 21 free: 48214 MB
    node 22 cpus: 196-202,420-426
    node 22 size: 48380 MB
    node 22 free: 48233 MB
    node 23 cpus: 203-209,427-433
    node 23 size: 48380 MB
    node 23 free: 48148 MB
    node 24 cpus: 154-160,378-384
    node 24 size: 48380 MB
    node 24 free: 48206 MB
    node 25 cpus: 161-167,385-391
    node 25 size: 48380 MB
    node 25 free: 48220 MB
    node 26 cpus: 210-216,434-440
    node 26 size: 48380 MB
    node 26 free: 48141 MB
    node 27 cpus: 217-223,441-447
    node 27 size: 48344 MB
    node 27 free: 48112 MB
    node 28 cpus: 126-132,350-356
    node 28 size: 48380 MB
    node 28 free: 48084 MB
    node 29 cpus: 133-139,357-363
    node 29 size: 48380 MB
    node 29 free: 48126 MB
    node 30 cpus: 182-188,406-412
    node 30 size: 48380 MB
    node 30 free: 47718 MB
    node 31 cpus: 189-195,413-419
    node 31 size: 48299 MB
    node 31 free: 48039 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  24
    25  26  27  28  29  30  31
      0:  10  11  11  11  12  12  12  12  12  12  12  12  12  12  12  12  32  32  32  32  32  32  32  32  32
    32  32  32  32  32  32  32
      1:  11  10  11  11  12  12  12  12  12  12  12  12  12  12  12  12  32  32  32  32  32  32  32  32  32
    32  32  32  32  32  32  32
      2:  11  11  10  11  12  12  12  12  12  12  12  12  12  12  12  12  32  32  32  32  32  32  32  32  32
    32  32  32  32  32  32  32
      3:  11  11  11  10  12  12  12  12  12  12  12  12  12  12  12  12  32  32  32  32  32  32  32  32  32
    32  32  32  32  32  32  32
      4:  12  12  12  12  10  11  11  11  12  12  12  12  12  12  12  12  32  32  32  32  32  32  32  32  32
    32  32  32  32  32  32  32
      5:  12  12  12  12  11  10  11  11  12  12  12  12  12  12  12  12  32  32  32  32  32  32  32  32  32
```

(Continued on next page)

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

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL385 Gen11
(2.20 GHz, AMD EPYC 9734)

SPECrate®2017_int_base = 1690

SPECrate®2017_int_peak = 1810

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Jun-2023

Hardware Availability: Sep-2023

Software Availability: Apr-2023

Platform Notes (Continued)

```
    32   32   32   32   32   32   32
 6:  12   12   12   12   11   11   10   11   12   12   12   12   12   12   12   12   32   32   32   32   32   32   32   32   32
    32   32   32   32   32   32   32
 7:  12   12   12   12   11   11   11   10   12   12   12   12   12   12   12   12   32   32   32   32   32   32   32   32   32
    32   32   32   32   32   32   32
 8:  12   12   12   12   12   12   12   12   10   11   11   11   12   12   12   12   32   32   32   32   32   32   32   32   32
    32   32   32   32   32   32   32
 9:  12   12   12   12   12   12   12   12   11   10   11   11   12   12   12   12   32   32   32   32   32   32   32   32   32
    32   32   32   32   32   32   32
10:  12   12   12   12   12   12   12   12   11   11   10   11   12   12   12   12   32   32   32   32   32   32   32   32   32
    32   32   32   32   32   32   32
11:  12   12   12   12   12   12   12   12   11   11   11   10   12   12   12   12   32   32   32   32   32   32   32   32   32
    32   32   32   32   32   32   32
12:  12   12   12   12   12   12   12   12   12   12   12   12   10   11   11   11   32   32   32   32   32   32   32   32   32
    32   32   32   32   32   32   32
13:  12   12   12   12   12   12   12   12   12   12   12   12   11   10   11   11   32   32   32   32   32   32   32   32   32
    32   32   32   32   32   32   32
14:  12   12   12   12   12   12   12   12   12   12   12   12   11   11   10   11   32   32   32   32   32   32   32   32   32
    32   32   32   32   32   32   32
15:  12   12   12   12   12   12   12   12   12   12   12   12   11   11   11   10   32   32   32   32   32   32   32   32   32
    32   32   32   32   32   32   32
16:  32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   10   11   11   11   12   12   12   12   12
    12   12   12   12   12   12   12
17:  32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   11   10   11   11   12   12   12   12   12
    12   12   12   12   12   12   12
18:  32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   11   11   10   11   12   12   12   12   12
    12   12   12   12   12   12   12
19:  32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   11   11   11   10   12   12   12   12   12
    12   12   12   12   12   12   12
20:  32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   12   12   12   12   10   11   11   11   12
    12   12   12   12   12   12   12
21:  32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   12   12   12   12   11   10   11   11   12
    12   12   12   12   12   12   12
22:  32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   12   12   12   12   11   11   10   11   12
    12   12   12   12   12   12   12
23:  32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   12   12   12   12   11   11   11   10   12
    12   12   12   12   12   12   12
24:  32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   12   12   12   12   12   12   12   12   10
    11   11   11   12   12   12   12
25:  32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   12   12   12   12   12   12   12   12   11
    10   11   11   12   12   12   12
26:  32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   12   12   12   12   12   12   12   12   11
    11   10   11   12   12   12   12
27:  32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   12   12   12   12   12   12   12   12   11
    11   11   10   12   12   12   12
28:  32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   12   12   12   12   12   12   12   12   12
    12   12   12   10   11   11   11
29:  32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   12   12   12   12   12   12   12   12   12
    12   12   12   11   10   11   11
30:  32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   12   12   12   12   12   12   12   12   12
    12   12   12   11   11   10   11
31:  32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   32   12   12   12   12   12   12   12   12   12
    12   12   12   11   11   11   10

    -----------------------------------------------------------
 9. /proc/meminfo
    MemTotal:       1584972316 kB


    -----------------------------------------------------------
 10. who -r
```

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Hewlett Packard Enterprise

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ProLiant DL385 Gen11
(2.20 GHz, AMD EPYC 9734)

SPECrate®2017_int_base = 1690

SPECrate®2017_int_peak = 1810

CPU2017 License: 3		**Test Date:**	Jun-2023
Test Sponsor:	HPE	**Hardware Availability:**	Sep-2023
Tested by:	HPE	**Software Availability:**	Apr-2023

Platform Notes (Continued)

```
  run-level 3 May 24 11:25

  ----------------------------------------------------------
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 chronyd 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
  enabled-runtime  systemd-remount-fs
  disabled         blk-availability chrony-wait console-getty cpupower debug-shell hwloc-dump-hwdata 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-sysext
                   target targetclid
  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
  vm.dirty_expire_centisecs     3000
  vm.dirty_ratio                   8
  vm.dirty_writeback_centisecs   500
  vm.dirtytime_expire_seconds  43200
  vm.extfrag_threshold           500
```

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL385 Gen11
(2.20 GHz, AMD EPYC 9734)

SPECrate®2017_int_base = 1690

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

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

Platform Notes (Continued)

```
  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   18G  354G   5% /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 3.3 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:
    24x Samsung M321R8GA0BB0-CQKDG 64 GB 2 rank 4800


  -------------------------------------------------------------
  23. BIOS
  (This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor:       HPE
```

(Continued on next page)

SPEC CPU®2017 Integer Rate Result

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Hewlett Packard Enterprise

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ProLiant DL385 Gen11
(2.20 GHz, AMD EPYC 9734)

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SPECrate®2017_int_peak = 1810

CPU2017 License: 3	**Test Date:** Jun-2023
Test Sponsor: HPE	**Hardware Availability:** Sep-2023
Tested by: HPE	**Software Availability:** Apr-2023

Platform Notes (Continued)

```
      BIOS Version:     1.30
      BIOS Date:        03/06/2023
      BIOS Revision:    1.30
      Firmware Revision: 1.10
```

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
------------------------------------------------------------------------------


==============================================================================
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)
```

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Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL385 Gen11
(2.20 GHz, AMD EPYC 9734)

SPECrate®2017_int_base = 1690

SPECrate®2017_int_peak = 1810

CPU2017 License: 3		**Test Date:**	Jun-2023
Test Sponsor:	HPE	**Hardware Availability:**	Sep-2023
Tested by:	HPE	**Software Availability:**	Apr-2023

Compiler Version Notes (Continued)

```
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
```

Base Portability Flags

500.perlbench_r: `-DSPEC_LINUX_X64 -DSPEC_LP64`
502.gcc_r: `-DSPEC_LP64`
505.mcf_r: `-DSPEC_LP64`

(Continued on next page)

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL385 Gen11
(2.20 GHz, AMD EPYC 9734)

SPECrate®2017_int_base = 1690

SPECrate®2017_int_peak = 1810

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

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

Base Portability Flags (Continued)

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
```

SPEC CPU®2017 Integer Rate Result

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(Test Sponsor: HPE)

ProLiant DL385 Gen11
(2.20 GHz, AMD EPYC 9734)

SPECrate®2017_int_base = 1690

SPECrate®2017_int_peak = 1810

CPU2017 License:	3	**Test Date:**	Jun-2023
Test Sponsor:	HPE	**Hardware Availability:**	Sep-2023
Tested by:	HPE	**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`

(Continued on next page)

Hewlett Packard Enterprise

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(2.20 GHz, AMD EPYC 9734)

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Test Sponsor:	HPE	**Hardware Availability:**	Sep-2023
Tested by:	HPE	**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
-lamdalloc

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 -lamdalloc

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
-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

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SPEC CPU®2017 Integer Rate Result

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SPECrate®2017_int_peak = 1810

CPU2017 License: 3		**Test Date:**	Jun-2023
Test Sponsor:	HPE	**Hardware Availability:**	Sep-2023
Tested by:	HPE	**Software Availability:**	Apr-2023

Peak Optimization Flags (Continued)

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`

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-Bergamo-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-Bergamo-rev1.0.xml
http://www.spec.org/cpu2017/flags/aocc400-flags.xml

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

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