SPEC CPU®2017 Floating Point Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL385 Gen11
(2.25 GHz, AMD EPYC 9634)

$SPECrate®2017\_fp\_base = 1230$
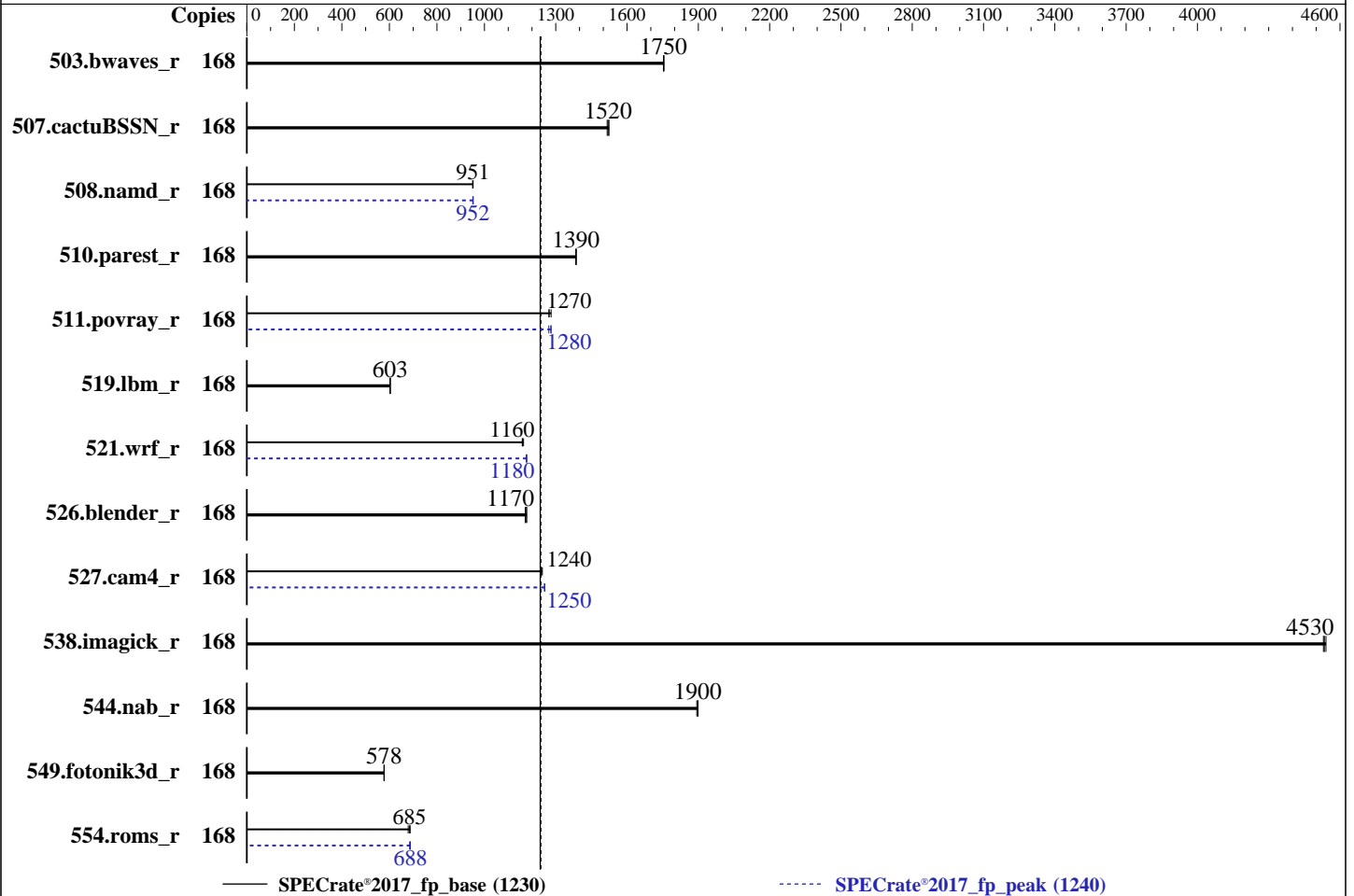
$SPECrate®2017\_fp\_peak = 1240$

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

Test Date: Dec-2022
Hardware Availability: Dec-2022
Software Availability: Nov-2022

Copies — scale: 0 200 400 600 800 1000 1300 1600 1900 2200 2500 2800 3100 3400 3700 4000 4600

Benchmark	Copies	Base	Peak
503.bwaves_r	168	1750	
507.cactuBSSN_r	168	1520	
508.namd_r	168	951	952
510.parest_r	168	1390	
511.povray_r	168	1270	1280
519.lbm_r	168	603	
521.wrf_r	168	1160	1180
526.blender_r	168	1170	
527.cam4_r	168	1240	1250
538.imagick_r	168	4530	
544.nab_r	168	1900	
549.fotonik3d_r	168	578	
554.roms_r	168	685	688

——— SPECrate®2017_fp_base (1230)   ┄┄┄ SPECrate®2017_fp_peak (1240)

Hardware

CPU Name: AMD EPYC 9634
 Max MHz: 3700
 Nominal: 2250
Enabled: 168 cores, 2 chips
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: 384 MB I+D on chip per chip,
 32 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: Ubuntu 22.04.1 LTS
 Kernel 5.15.0-56-generic
Compiler: C/C++/Fortran: Version 4.0.0 of AOCC
Parallel: No
Firmware: HPE BIOS Version v1.12 11/24/2022 released
 Nov-2022
File System: ext4
System State: Run level 5 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 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
503.bwaves_r	168	960	1760	961	1750	**961**	**1750**	168	960	1760	961	1750	**961**	**1750**
507.cactuBSSN_r	168	140	1520	140	1520	**140**	**1520**	168	140	1520	140	1520	**140**	**1520**
508.namd_r	168	168	952	168	951	**168**	**951**	168	168	951	**168**	**952**	167	953
510.parest_r	168	317	1380	317	1390	**317**	**1390**	168	317	1380	317	1390	**317**	**1390**
511.povray_r	168	**308**	**1270**	308	1270	306	1280	168	**307**	**1280**	306	1280	309	1270
519.lbm_r	168	293	603	294	603	**293**	**603**	168	293	603	294	603	**293**	**603**
521.wrf_r	168	323	1160	**325**	**1160**	325	1160	168	320	1180	319	1180	**320**	**1180**
526.blender_r	168	217	1180	218	1170	**218**	**1170**	168	217	1180	218	1170	**218**	**1170**
527.cam4_r	168	236	1240	**237**	**1240**	237	1240	168	**234**	**1250**	234	1250	235	1250
538.imagick_r	168	**92.1**	**4530**	92.0	4540	92.2	4530	168	**92.1**	**4530**	92.0	4540	92.2	4530
544.nab_r	168	149	1900	149	1890	**149**	**1900**	168	149	1900	149	1890	**149**	**1900**
549.fotonik3d_r	168	1133	578	1133	578	**1133**	**578**	168	1133	578	1133	578	**1133**	**578**
554.roms_r	168	388	687	393	679	**390**	**685**	168	390	685	388	689	**388**	**688**
SPECrate®2017_fp_base =		**1230**											
SPECrate®2017_fp_peak =		**1240**											

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.

(Continued on next page)

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Operating System Notes (Continued)

```
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) for all allocations,
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
     "/home/cpu2017/amd_rate_aocc400_genoa_B_lib/lib:/home/cpu2017/amd_rate_a
     occ400_genoa_B_lib/lib32:"
MALLOC_CONF = "retain:true"
```

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
 AMD SMT Option 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
  L2 HW Prefetcher set to Disabled
  Power Regulator set to OS Control Mode
```

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Platform Notes (Continued)

```
The system ROM used for this result contains microcode version 0xa10110e for the
AMD EPYC 9nn4X family of processors. The reference code/AGESA version used in this
ROM is version GenoaPI 1.0.0.1-L6

 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
 running on admin1 Mon Jun 27 18:37:41 2022

 SUT (System Under Test) info as seen by some common utilities.
 For more information on this section, see
    https://www.spec.org/cpu2017/Docs/config.html#sysinfo

 From /proc/cpuinfo
    model name : AMD EPYC 9634 84-Core Processor
       2  "physical id"s (chips)
       168 "processors"
    cores, siblings (Caution: counting these is hw and system dependent. The following
    excerpts from /proc/cpuinfo might not be reliable.  Use with caution.)
       cpu cores : 84
       siblings  : 84
       physical 0: cores 0 1 2 3 4 5 6 16 17 18 19 20 21 22 32 33 34 35 36 37 38 48 49 50
       51 52 53 54 64 65 66 67 68 69 70 80 81 82 83 84 85 86 96 97 98 99 100 101 102 112
       113 114 115 116 117 118 128 129 130 131 132 133 134 144 145 146 147 148 149 150 160
       161 162 163 164 165 166 176 177 178 179 180 181 182
       physical 1: cores 0 1 2 3 4 5 6 16 17 18 19 20 21 22 32 33 34 35 36 37 38 48 49 50
       51 52 53 54 64 65 66 67 68 69 70 80 81 82 83 84 85 86 96 97 98 99 100 101 102 112
       113 114 115 116 117 118 128 129 130 131 132 133 134 144 145 146 147 148 149 150 160
       161 162 163 164 165 166 176 177 178 179 180 181 182

 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):                  168
       On-line CPU(s) list:     0-167
       Vendor ID:               AuthenticAMD
       Model name:              AMD EPYC 9634 84-Core Processor
       CPU family:              25
       Model:                   17
       Thread(s) per core:      1
       Core(s) per socket:      84
       Socket(s):               2
       Stepping:                1
       Frequency boost:         enabled
       CPU max MHz:             3701.0000
       CPU min MHz:             400.0000
```

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Platform Notes (Continued)

```
    BogoMIPS:                       4493.15
    Flags:                          fpu vme de pse tsc msr pae mce cx8 apic sep mtrr
    pge mca cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt
    pdpe1gb rdtscp lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid
    aperfmperf rapl pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe
    popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a
    misalignsse 3dnowprefetch osvw ibs skinit wdt tce topoext perfctr_core perfctr_nb
    bpext perfctr_llc mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs
    ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2 erms invpcid cqm rdt_a avx512f
    avx512dq rdseed adx smap avx512ifma clflushopt clwb avx512cd sha_ni avx512bw
    avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
    cqm_mbm_local avx512_bf16 clzero irperf xsaveerptr rdpru wbnoinvd amd_ppin cppc 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:                      5.3 MiB (168 instances)
    L1i cache:                      5.3 MiB (168 instances)
    L2 cache:                       168 MiB (168 instances)
    L3 cache:                       768 MiB (24 instances)
    NUMA node(s):                   24
    NUMA node0 CPU(s):              0-6
    NUMA node1 CPU(s):              28-34
    NUMA node2 CPU(s):              56-62
    NUMA node3 CPU(s):              14-20
    NUMA node4 CPU(s):              42-48
    NUMA node5 CPU(s):              70-76
    NUMA node6 CPU(s):              21-27
    NUMA node7 CPU(s):              49-55
    NUMA node8 CPU(s):              77-83
    NUMA node9 CPU(s):              7-13
    NUMA node10 CPU(s):             35-41
    NUMA node11 CPU(s):             63-69
    NUMA node12 CPU(s):             84-90
    NUMA node13 CPU(s):             112-118
    NUMA node14 CPU(s):             140-146
    NUMA node15 CPU(s):             98-104
    NUMA node16 CPU(s):             126-132
    NUMA node17 CPU(s):             154-160
    NUMA node18 CPU(s):             105-111
    NUMA node19 CPU(s):             133-139
    NUMA node20 CPU(s):             161-167
    NUMA node21 CPU(s):             91-97
    NUMA node22 CPU(s):             119-125
    NUMA node23 CPU(s):             147-153
    Vulnerability Itlb multihit:    Not affected
```

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Platform Notes (Continued)

```
      Vulnerability L1tf:                Not affected
      Vulnerability Mds:                 Not affected
      Vulnerability Meltdown:            Not affected
      Vulnerability Mmio stale data:     Not affected
      Vulnerability Retbleed:            Not affected
      Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via
      prctl and seccomp
      Vulnerability Spectre v1:          Mitigation; usercopy/swapgs barriers and __user
      pointer sanitization
      Vulnerability Spectre v2:          Mitigation; Retpolines, IBPB conditional, IBRS_FW,
      STIBP disabled, RSB filling, PBRSB-eIBRS Not affected
      Vulnerability Srbds:               Not affected
      Vulnerability Tsx async abort:     Not affected

  From lscpu --cache:
      NAME ONE-SIZE ALL-SIZE WAYS TYPE         LEVEL   SETS PHY-LINE COHERENCY-SIZE
      L1d       32K     5.3M    8 Data           1     64        1               64
      L1i       32K     5.3M    8 Instruction    1     64        1               64
      L2         1M     168M    8 Unified        2   2048        1               64
      L3        32M     768M   16 Unified        3  32768        1               64

  /proc/cpuinfo cache data
     cache size : 1024 KB

  From numactl --hardware
  WARNING: a numactl 'node' might or might not correspond to a physical chip.
    available: 24 nodes (0-23)
    node 0 cpus: 0 1 2 3 4 5 6
    node 0 size: 64199 MB
    node 0 free: 64019 MB
    node 1 cpus: 28 29 30 31 32 33 34
    node 1 size: 64510 MB
    node 1 free: 64376 MB
    node 2 cpus: 56 57 58 59 60 61 62
    node 2 size: 64510 MB
    node 2 free: 64375 MB
    node 3 cpus: 14 15 16 17 18 19 20
    node 3 size: 64510 MB
    node 3 free: 64368 MB
    node 4 cpus: 42 43 44 45 46 47 48
    node 4 size: 64510 MB
    node 4 free: 64366 MB
    node 5 cpus: 70 71 72 73 74 75 76
    node 5 size: 64510 MB
    node 5 free: 64366 MB
    node 6 cpus: 21 22 23 24 25 26 27
    node 6 size: 64474 MB
```

(Continued on next page)

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Platform Notes (Continued)

```
     node 6 free: 64333 MB
     node 7 cpus: 49 50 51 52 53 54 55
     node 7 size: 64510 MB
     node 7 free: 64385 MB
     node 8 cpus: 77 78 79 80 81 82 83
     node 8 size: 64510 MB
     node 8 free: 64374 MB
     node 9 cpus: 7 8 9 10 11 12 13
     node 9 size: 64510 MB
     node 9 free: 64382 MB
     node 10 cpus: 35 36 37 38 39 40 41
     node 10 size: 64510 MB
     node 10 free: 64382 MB
     node 11 cpus: 63 64 65 66 67 68 69
     node 11 size: 64510 MB
     node 11 free: 64369 MB
     node 12 cpus: 84 85 86 87 88 89 90
     node 12 size: 64510 MB
     node 12 free: 64376 MB
     node 13 cpus: 112 113 114 115 116 117 118
     node 13 size: 64510 MB
     node 13 free: 64366 MB
     node 14 cpus: 140 141 142 143 144 145 146
     node 14 size: 64510 MB
     node 14 free: 64355 MB
     node 15 cpus: 98 99 100 101 102 103 104
     node 15 size: 64510 MB
     node 15 free: 64366 MB
     node 16 cpus: 126 127 128 129 130 131 132
     node 16 size: 64510 MB
     node 16 free: 64363 MB
     node 17 cpus: 154 155 156 157 158 159 160
     node 17 size: 64510 MB
     node 17 free: 64356 MB
     node 18 cpus: 105 106 107 108 109 110 111
     node 18 size: 64510 MB
     node 18 free: 64306 MB
     node 19 cpus: 133 134 135 136 137 138 139
     node 19 size: 64510 MB
     node 19 free: 64322 MB
     node 20 cpus: 161 162 163 164 165 166 167
     node 20 size: 64510 MB
     node 20 free: 64318 MB
     node 21 cpus: 91 92 93 94 95 96 97
     node 21 size: 64510 MB
     node 21 free: 64354 MB
     node 22 cpus: 119 120 121 122 123 124 125
```

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Platform Notes (Continued)

```
node 22 size: 64510 MB
node 22 free: 64309 MB
node 23 cpus: 147 148 149 150 151 152 153
node 23 size: 64456 MB
node 23 free: 64282 MB
node distances:
node    0    1    2    3    4    5    6    7    8    9   10   11   12   13   14   15   16   17   18   19
 20   21   22   23
   0:   10   11   11   12   12   12   12   12   12   12   12   12   32   32   32   32   32   32   32   32
 32   32   32   32
   1:   11   10   11   12   12   12   12   12   12   12   12   12   32   32   32   32   32   32   32   32
 32   32   32   32
   2:   11   11   10   12   12   12   12   12   12   12   12   12   32   32   32   32   32   32   32   32
 32   32   32   32
   3:   12   12   12   10   11   11   12   12   12   12   12   12   32   32   32   32   32   32   32   32
 32   32   32   32
   4:   12   12   12   11   10   11   12   12   12   12   12   12   32   32   32   32   32   32   32   32
 32   32   32   32
   5:   12   12   12   11   11   10   12   12   12   12   12   12   32   32   32   32   32   32   32   32
 32   32   32   32
   6:   12   12   12   12   12   12   10   11   11   12   12   12   32   32   32   32   32   32   32   32
 32   32   32   32
   7:   12   12   12   12   12   12   11   10   11   12   12   12   32   32   32   32   32   32   32   32
 32   32   32   32
   8:   12   12   12   12   12   12   11   11   10   12   12   12   32   32   32   32   32   32   32   32
 32   32   32   32
   9:   12   12   12   12   12   12   12   12   12   10   11   11   32   32   32   32   32   32   32   32
 32   32   32   32
  10:   12   12   12   12   12   12   12   12   12   11   10   11   32   32   32   32   32   32   32   32
 32   32   32   32
  11:   12   12   12   12   12   12   12   12   12   11   11   10   32   32   32   32   32   32   32   32
 32   32   32   32
  12:   32   32   32   32   32   32   32   32   32   32   32   32   10   11   11   12   12   12   12   12
 12   12   12   12
  13:   32   32   32   32   32   32   32   32   32   32   32   32   11   10   11   12   12   12   12   12
 12   12   12   12
  14:   32   32   32   32   32   32   32   32   32   32   32   32   11   11   10   12   12   12   12   12
 12   12   12   12
  15:   32   32   32   32   32   32   32   32   32   32   32   32   12   12   12   10   11   11   12   12
 12   12   12   12
  16:   32   32   32   32   32   32   32   32   32   32   32   32   12   12   12   11   10   11   12   12
 12   12   12   12
  17:   32   32   32   32   32   32   32   32   32   32   32   32   12   12   12   11   11   10   12   12
 12   12   12   12
  18:   32   32   32   32   32   32   32   32   32   32   32   32   12   12   12   12   12   12   10   11
 11   12   12   12
  19:   32   32   32   32   32   32   32   32   32   32   32   32   12   12   12   12   12   12   11   10
```

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Platform Notes (Continued)

```
   11  12  12  12
  20:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  11  11
   10  12  12  12
  21:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  12  12
   12  10  11  11
  22:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  12  12
   12  11  10  11
  23:  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  12  12
   12  11  11  10

From /proc/meminfo
   MemTotal:       1584992780 kB
   HugePages_Total:        0
   Hugepagesize:        2048 kB

/sbin/tuned-adm active
   Current active profile: throughput-performance

/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has
   performance

/usr/bin/lsb_release -d
   Ubuntu 22.04.1 LTS

From /etc/*release* /etc/*version*
   debian_version: bookworm/sid
   os-release:
      PRETTY_NAME="Ubuntu 22.04.1 LTS"
      NAME="Ubuntu"
      VERSION_ID="22.04"
      VERSION="22.04.1 LTS (Jammy Jellyfish)"
      VERSION_CODENAME=jammy
      ID=ubuntu
      ID_LIKE=debian
      HOME_URL="https://www.ubuntu.com/"

uname -a:
   Linux admin1 5.15.0-56-generic #62-Ubuntu SMP Tue Nov 22 19:54:14 UTC 2022 x86_64
   x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit):                   Not affected
CVE-2018-3620 (L1 Terminal Fault):                Not affected
Microarchitectural Data Sampling:                 Not affected
CVE-2017-5754 (Meltdown):                         Not affected
mmio_stale_data:                                  Not affected
```

(Continued on next page)

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL385 Gen11
(2.25 GHz, AMD EPYC 9634)

SPECrate®2017_fp_base = 1230

SPECrate®2017_fp_peak = 1240

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

Test Date: Dec-2022
Hardware Availability: Dec-2022
Software Availability: Nov-2022

Platform Notes (Continued)

```
retbleed:                                          Not affected
CVE-2018-3639 (Speculative Store Bypass):          Mitigation: Speculative Store
                                                   Bypass disabled via prctl and
                                                   seccomp
CVE-2017-5753 (Spectre variant 1):                 Mitigation: usercopy/swapgs
                                                   barriers and __user pointer
                                                   sanitization
CVE-2017-5715 (Spectre variant 2):                 Mitigation: Retpolines, IBPB:
                                                   conditional, IBRS_FW, STIBP:
                                                   disabled, RSB filling,
                                                   PBRSB-eIBRS: Not affected
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort):           Not affected


run-level 5 Jun 27 18:30


SPEC is set to: /home/cpu2017
   Filesystem                      Type  Size  Used Avail Use% Mounted on
   /dev/mapper/ubuntu--vg-ubuntu--lv ext4  437G   34G  385G   9% /


From /sys/devices/virtual/dmi/id
    Vendor:          HPE
    Product:         ProLiant DL385 Gen11
    Product Family:  ProLiant
    Serial:          DL385GEN11-003


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:
     13x Hynix HMCG94MEBRA121N 64 GB 2 rank 4800
     11x Hynix HMCG94MEBRA123N 64 GB 2 rank 4800


BIOS:
    BIOS Vendor:       HPE
    BIOS Version:      1.12
    BIOS Date:         11/24/2022
    BIOS Revision:     1.12
    Firmware Revision: 1.10


(End of data from sysinfo program)
```

SPEC CPU®2017 Floating Point Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL385 Gen11
(2.25 GHz, AMD EPYC 9634)

SPECrate®2017_fp_base = 1230

SPECrate®2017_fp_peak = 1240

CPU2017 License: 3	**Test Date:**	Dec-2022
Test Sponsor: HPE	**Hardware Availability:**	Dec-2022
Tested by: HPE	**Software Availability:**	Nov-2022

Compiler Version Notes

```
================================================================================
C                    | 519.lbm_r(base, peak) 538.imagick_r(base, peak)
                     | 544.nab_r(base, peak)
--------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
--------------------------------------------------------------------------------


================================================================================
C++                  | 508.namd_r(base, peak) 510.parest_r(base, peak)
--------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
--------------------------------------------------------------------------------


================================================================================
C++, C               | 511.povray_r(base, peak) 526.blender_r(base, peak)
--------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
--------------------------------------------------------------------------------


================================================================================
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
--------------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
```

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Hewlett Packard Enterprise
(Test Sponsor: HPE)

SPECrate®2017_fp_base = 1230

ProLiant DL385 Gen11
(2.25 GHz, AMD EPYC 9634)

SPECrate®2017_fp_peak = 1240

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

Test Date: Dec-2022
Hardware Availability: Dec-2022
Software Availability: Nov-2022

Compiler Version Notes (Continued)

```
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
------------------------------------------------------------------------


==============================================================================
Fortran          | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
                 | 554.roms_r(base, peak)
------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
------------------------------------------------------------------------


==============================================================================
Fortran, C       | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
------------------------------------------------------------------------
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
  LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
clang

C++ benchmarks:
clang++

Fortran benchmarks:
flang

(Continued on next page)

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL385 Gen11
(2.25 GHz, AMD EPYC 9634)

SPECrate®2017_fp_base = 1230

SPECrate®2017_fp_peak = 1240

CPU2017 License: 3		**Test Date:**	Dec-2022
Test Sponsor:	HPE	**Hardware Availability:**	Dec-2022
Tested by:	HPE	**Software Availability:**	Nov-2022

Base Compiler Invocation (Continued)

Benchmarks using both Fortran and C:
```
flang clang
```

Benchmarks using both C and C++:
```
clang++ clang
```

Benchmarks using Fortran, C, and C++:
```
clang++ clang flang
```

Base Portability Flags

503.bwaves_r: `-DSPEC_LP64`
507.cactuBSSN_r: `-DSPEC_LP64`
508.namd_r: `-DSPEC_LP64`
510.parest_r: `-DSPEC_LP64`
511.povray_r: `-DSPEC_LP64`
519.lbm_r: `-DSPEC_LP64`
521.wrf_r: `-DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64`
526.blender_r: `-funsigned-char -DSPEC_LP64`
527.cam4_r: `-DSPEC_CASE_FLAG -DSPEC_LP64`
538.imagick_r: `-DSPEC_LP64`
544.nab_r: `-DSPEC_LP64`
549.fotonik3d_r: `-DSPEC_LP64`
554.roms_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 -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 -lamdalloc -lflang
```

C++ benchmarks:
```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -mllvm -unroll-threshold=100
-finline-aggressive -mllvm -loop-unswitch-threshold=200000
```

(Continued on next page)

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL385 Gen11
(2.25 GHz, AMD EPYC 9634)

SPECrate®2017_fp_base = 1230

SPECrate®2017_fp_peak = 1240

CPU2017 License:	3	**Test Date:**	Dec-2022
Test Sponsor:	HPE	**Hardware Availability:**	Dec-2022
Tested by:	HPE	**Software Availability:**	Nov-2022

Base Optimization Flags (Continued)

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

Fortran benchmarks:
```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -Kieee -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -mllvm -reduce-array-computations=3
-fepilog-vectorization-of-inductions -zopt -lamdlibm -lamdalloc
-lflang
```

Benchmarks using both Fortran and C:
```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -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 -Kieee -Mrecursive -funroll-loops -mllvm -lsr-in-nested-loop
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc -lflang
```

Benchmarks using both C and C++:
```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -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 -mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -lamdlibm -lamdalloc -lflang
```

Benchmarks using Fortran, C, and C++:
```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -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 -mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -Kieee -Mrecursive
-funroll-loops -mllvm -lsr-in-nested-loop
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc -lflang
```

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2023 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)

SPECrate®2017_fp_base = 1230

ProLiant DL385 Gen11
(2.25 GHz, AMD EPYC 9634)

SPECrate®2017_fp_peak = 1240

CPU2017 License: 3		**Test Date:**	Dec-2022
Test Sponsor: HPE		**Hardware Availability:**	Dec-2022
Tested by: HPE		**Software Availability:**	Nov-2022

Base Other Flags

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

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

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

Benchmarks using both Fortran and C:
```
-Wno-unused-command-line-argument
```

Benchmarks using both C and C++:
```
-Wno-unused-command-line-argument
```

Benchmarks using Fortran, C, and C++:
```
-Wno-unused-command-line-argument
```

Peak Compiler Invocation

C benchmarks:
```
clang
```

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

Fortran benchmarks:
```
flang
```

Benchmarks using both Fortran and C:
```
flang clang
```

Benchmarks using both C and C++:
```
clang++ clang
```

Benchmarks using Fortran, C, and C++:
```
clang++ clang flang
```

Peak Portability Flags

```
Same as Base Portability Flags
```

SPEC CPU®2017 Floating Point Rate Result

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Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL385 Gen11
(2.25 GHz, AMD EPYC 9634)

SPECrate®2017_fp_base = 1230

SPECrate®2017_fp_peak = 1240

CPU2017 License:	3	**Test Date:**	Dec-2022
Test Sponsor:	HPE	**Hardware Availability:**	Dec-2022
Tested by:	HPE	**Software Availability:**	Nov-2022

Peak Optimization Flags

C benchmarks:

519.lbm_r: basepeak = yes

538.imagick_r: basepeak = yes

544.nab_r: basepeak = yes

C++ benchmarks:

508.namd_r: -m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math
-finline-aggressive -mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -zopt -lamdlibm
-lamdalloc

510.parest_r: basepeak = yes

Fortran benchmarks:

503.bwaves_r: basepeak = yes

549.fotonik3d_r: basepeak = yes

554.roms_r: -m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -Mrecursive
-mllvm -reduce-array-computations=3
-fepilog-vectorization-of-inductions -zopt -lamdlibm
-lamdalloc -lflang

Benchmarks using both Fortran and C:

521.wrf_r: -m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -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 -Mrecursive
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc
-lflang

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Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

SPEC CPU®2017 Floating Point Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL385 Gen11
(2.25 GHz, AMD EPYC 9634)

SPECrate®2017_fp_base = 1230

SPECrate®2017_fp_peak = 1240

CPU2017 License: 3		**Test Date:**	Dec-2022
Test Sponsor:	HPE	**Hardware Availability:**	Dec-2022
Tested by:	HPE	**Software Availability:**	Nov-2022

Peak Optimization Flags (Continued)

527.cam4_r: `-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6 -Wl,-mllvm -Wl,-reduce-array-computations=3 -Wl,-mllvm -Wl,-enable-X86-prefetching -O3 -march=znver4 -fveclib=AMDLIBM -ffast-math -fstruct-layout=7 -mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000 -fremap-arrays -mllvm -reduce-array-computations=3 -zopt -Kieee -Mrecursive -funroll-loops -mllvm -lsr-in-nested-loop -fepilog-vectorization-of-inductions -lamdlibm -lamdalloc -lflang`

Benchmarks using both C and C++:

511.povray_r: `-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6 -Wl,-mllvm -Wl,-reduce-array-computations=3 -Wl,-mllvm -Wl,-x86-use-vzeroupper=false -O3 -march=znver4 -fveclib=AMDLIBM -ffast-math -fstruct-layout=7 -mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000 -fremap-arrays -mllvm -reduce-array-computations=3 -zopt -mllvm -unroll-threshold=100 -finline-aggressive -mllvm -loop-unswitch-threshold=200000 -lamdlibm -lamdalloc`

526.blender_r: `basepeak = yes`

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: `basepeak = yes`

Peak Other Flags

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

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

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

Benchmarks using both Fortran and C:
`-Wno-unused-command-line-argument`

(Continued on next page)

Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL385 Gen11
(2.25 GHz, AMD EPYC 9634)

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CPU2017 License:	3	**Test Date:**	Dec-2022
Test Sponsor:	HPE	**Hardware Availability:**	Dec-2022
Tested by:	HPE	**Software Availability:**	Nov-2022

Peak Other Flags (Continued)

Benchmarks using both C and C++:

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

Benchmarks using Fortran, C, and C++:

`-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-rev2.1.html`
`http://www.spec.org/cpu2017/flags/aocc400-flags.2023-02-15.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-rev2.1.xml`
`http://www.spec.org/cpu2017/flags/aocc400-flags.2023-02-15.xml`

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

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