SPEC CPU®2017 Floating Point Speed Result

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Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL365 Gen11
(2.25 GHz, AMD EPYC 9634)

$SPECspeed®2017\_fp\_base = 395$
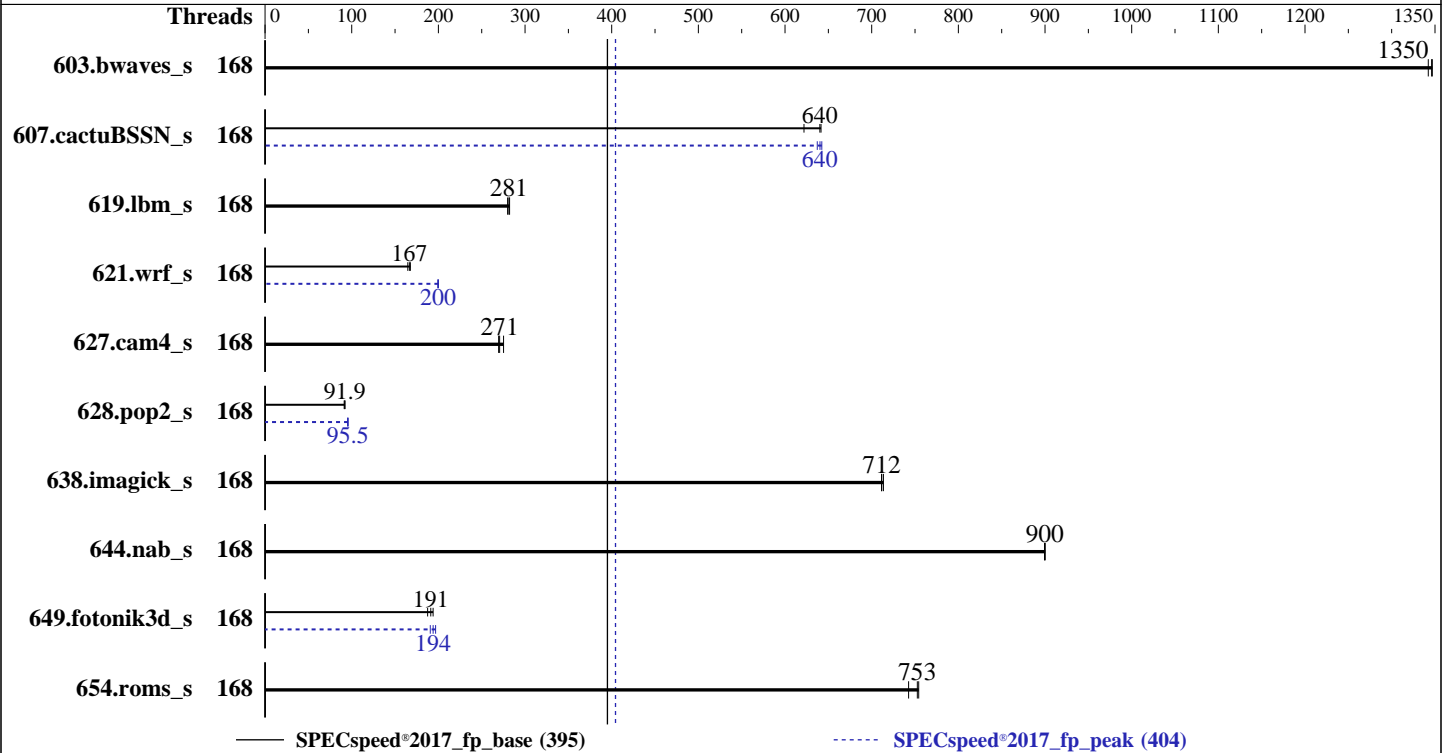
$SPECspeed®2017\_fp\_peak = 404$

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

Test Date: Jan-2023
Hardware Availability: Dec-2022
Software Availability: Nov-2022

Threads chart (all 168 threads):

- 603.bwaves_s — 168 — 1350
- 607.cactuBSSN_s — 168 — 640 / 640
- 619.lbm_s — 168 — 281
- 621.wrf_s — 168 — 167 / 200
- 627.cam4_s — 168 — 271
- 628.pop2_s — 168 — 91.9 / 95.5
- 638.imagick_s — 168 — 712
- 644.nab_s — 168 — 900
- 649.fotonik3d_s — 168 — 191 / 194
- 654.roms_s — 168 — 753

——— SPECspeed®2017_fp_base (395)   - - - - SPECspeed®2017_fp_peak (404)

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: Yes
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						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	168	**43.8**	**1350**	44.0	1340	43.8	1350	168	**43.8**	**1350**	44.0	1340	43.8	1350
607.cactuBSSN_s	168	26.8	622	26.0	642	**26.0**	**640**	168	26.2	637	25.9	642	**26.0**	**640**
619.lbm_s	168	18.6	282	18.7	280	**18.6**	**281**	168	18.6	282	18.7	280	**18.6**	**281**
621.wrf_s	168	**79.4**	**167**	80.3	165	78.9	168	168	**66.3**	**200**	66.1	200	66.3	200
627.cam4_s	168	32.2	275	**32.7**	**271**	32.9	270	168	32.2	275	**32.7**	**271**	32.9	270
628.pop2_s	168	130	91.3	129	92.2	**129**	**91.9**	168	124	95.8	**124**	**95.5**	124	95.4
638.imagick_s	168	20.2	714	**20.3**	**712**	20.3	711	168	20.2	714	**20.3**	**712**	20.3	711
644.nab_s	168	19.4	899	**19.4**	**900**	19.4	900	168	19.4	899	**19.4**	**900**	19.4	900
649.fotonik3d_s	168	48.6	188	47.0	194	**47.7**	**191**	168	46.3	197	47.8	191	**47.0**	**194**
654.roms_s	168	**20.9**	**753**	20.9	754	21.2	743	168	**20.9**	**753**	20.9	754	21.2	743
SPECspeed®2017_fp_base =	**395**													
SPECspeed®2017_fp_peak =	**404**													

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) for all allocations,
```

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Operating System Notes (Continued)

```
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.
To always enable THP for peak runs of:
603.bwaves_s, 607.cactuBSSN_s, 619.lbm_s, 627.cam4_s, 628.pop2_s, 638.imagick_s, 644.nab_s, 649.fotonik3d_s:
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled; echo always > /sys/kernel/mm/transparent_hugepage/defrag'
run as root.
To disable THP for peak runs of 621.wrf_s:
'echo never > /sys/kernel/mm/transparent_hugepage/enabled; echo always > /sys/kernel/mm/transparent_hugepage/defrag'
run as root.
To enable THP only on request for peak runs of 654.roms_s:
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled; echo madvise > /sys/kernel/mm/transparent_hugepage/defrag'
run as root.
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-167"
LD_LIBRARY_PATH = "/home/cpu2017/amd_speed_aocc400_genoa_B_lib/lib:"
LIBOMP_NUM_HIDDEN_HELPER_THREADS = "0"
MALLOC_CONF = "oversize_threshold:0,retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "168"

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:
GOMP_CPU_AFFINITY = "0-167"

Environment variables set by runcpu during the 621.wrf_s peak run:
GOMP_CPU_AFFINITY = "0-167"

Environment variables set by runcpu during the 628.pop2_s peak run:
GOMP_CPU_AFFINITY = "0-167"

Environment variables set by runcpu during the 649.fotonik3d_s peak run:
GOMP_CPU_AFFINITY = "0-167"
PGHPF_ZMEM = "yes"
```

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)
```

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Test Sponsor:	HPE		**Hardware Availability:**	Dec-2022
Tested by:	HPE		**Software Availability:**	Nov-2022

General Notes (Continued)

```
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 Peak Frequency 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
 ACPI CST C2 Latency set to 18 microseconds
 Memory PStates set to Disabled
 Thermal Configuration set to Maximum Cooling


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 Tue Jun 28 04:04:04 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
```

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Platform Notes (Continued)

```
  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
       BogoMIPS:                    4493.39
       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
```

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Platform Notes (Continued)

```
      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
      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
```

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Platform Notes (Continued)

```
        node 0 free: 64008 MB
        node 1 cpus: 28 29 30 31 32 33 34
        node 1 size: 64510 MB
        node 1 free: 64357 MB
        node 2 cpus: 56 57 58 59 60 61 62
        node 2 size: 64510 MB
        node 2 free: 64363 MB
        node 3 cpus: 14 15 16 17 18 19 20
        node 3 size: 64510 MB
        node 3 free: 64314 MB
        node 4 cpus: 42 43 44 45 46 47 48
        node 4 size: 64510 MB
        node 4 free: 64317 MB
        node 5 cpus: 70 71 72 73 74 75 76
        node 5 size: 64510 MB
        node 5 free: 64353 MB
        node 6 cpus: 21 22 23 24 25 26 27
        node 6 size: 64510 MB
        node 6 free: 64361 MB
        node 7 cpus: 49 50 51 52 53 54 55
        node 7 size: 64510 MB
        node 7 free: 64380 MB
        node 8 cpus: 77 78 79 80 81 82 83
        node 8 size: 64510 MB
        node 8 free: 64307 MB
        node 9 cpus: 7 8 9 10 11 12 13
        node 9 size: 64510 MB
        node 9 free: 64338 MB
        node 10 cpus: 35 36 37 38 39 40 41
        node 10 size: 64474 MB
        node 10 free: 64305 MB
        node 11 cpus: 63 64 65 66 67 68 69
        node 11 size: 64510 MB
        node 11 free: 64392 MB
        node 12 cpus: 84 85 86 87 88 89 90
        node 12 size: 64510 MB
        node 12 free: 64411 MB
        node 13 cpus: 112 113 114 115 116 117 118
        node 13 size: 64510 MB
        node 13 free: 64409 MB
        node 14 cpus: 140 141 142 143 144 145 146
        node 14 size: 64510 MB
        node 14 free: 64413 MB
        node 15 cpus: 98 99 100 101 102 103 104
        node 15 size: 64510 MB
        node 15 free: 64412 MB
        node 16 cpus: 126 127 128 129 130 131 132
```

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Platform Notes (Continued)

```
    node 16 size: 64510 MB
    node 16 free: 64408 MB
    node 17 cpus: 154 155 156 157 158 159 160
    node 17 size: 64510 MB
    node 17 free: 64420 MB
    node 18 cpus: 105 106 107 108 109 110 111
    node 18 size: 64510 MB
    node 18 free: 64408 MB
    node 19 cpus: 133 134 135 136 137 138 139
    node 19 size: 64510 MB
    node 19 free: 64415 MB
    node 20 cpus: 161 162 163 164 165 166 167
    node 20 size: 64456 MB
    node 20 free: 64347 MB
    node 21 cpus: 91 92 93 94 95 96 97
    node 21 size: 64510 MB
    node 21 free: 64405 MB
    node 22 cpus: 119 120 121 122 123 124 125
    node 22 size: 64510 MB
    node 22 free: 64408 MB
    node 23 cpus: 147 148 149 150 151 152 153
    node 23 size: 64510 MB
    node 23 free: 64412 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   11   11   11   11   11   11   11   11   11   32   32   32   32   32   32   32   32
      32   32   32   32
       1:  11   10   11   11   11   11   11   11   11   11   11   11   32   32   32   32   32   32   32   32
      32   32   32   32
       2:  11   11   10   11   11   11   11   11   11   11   11   11   32   32   32   32   32   32   32   32
      32   32   32   32
       3:  11   11   11   10   11   11   11   11   11   11   11   11   32   32   32   32   32   32   32   32
      32   32   32   32
       4:  11   11   11   11   10   11   11   11   11   11   11   11   32   32   32   32   32   32   32   32
      32   32   32   32
       5:  11   11   11   11   11   10   11   11   11   11   11   11   32   32   32   32   32   32   32   32
      32   32   32   32
       6:  11   11   11   11   11   11   10   11   11   11   11   11   32   32   32   32   32   32   32   32
      32   32   32   32
       7:  11   11   11   11   11   11   11   10   11   11   11   11   32   32   32   32   32   32   32   32
      32   32   32   32
       8:  11   11   11   11   11   11   11   11   10   11   11   11   32   32   32   32   32   32   32   32
      32   32   32   32
       9:  11   11   11   11   11   11   11   11   11   10   11   11   32   32   32   32   32   32   32   32
      32   32   32   32
      10:  11   11   11   11   11   11   11   11   11   11   10   11   32   32   32   32   32   32   32   32
```

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Platform Notes (Continued)

```
  32  32  32  32
  11:  11  11  11  11  11  11  11  11  11  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  11  11  11  11  11
  11  11  11  11
  13:  32  32  32  32  32  32  32  32  32  32  32  32  11  10  11  11  11  11  11  11
  11  11  11  11
  14:  32  32  32  32  32  32  32  32  32  32  32  32  11  11  10  11  11  11  11  11
  11  11  11  11
  15:  32  32  32  32  32  32  32  32  32  32  32  32  11  11  11  10  11  11  11  11
  11  11  11  11
  16:  32  32  32  32  32  32  32  32  32  32  32  32  11  11  11  11  10  11  11  11
  11  11  11  11
  17:  32  32  32  32  32  32  32  32  32  32  32  32  11  11  11  11  11  10  11  11
  11  11  11  11
  18:  32  32  32  32  32  32  32  32  32  32  32  32  11  11  11  11  11  11  10  11
  11  11  11  11
  19:  32  32  32  32  32  32  32  32  32  32  32  32  11  11  11  11  11  11  11  10
  11  11  11  11
  20:  32  32  32  32  32  32  32  32  32  32  32  32  11  11  11  11  11  11  11  11
  10  11  11  11
  21:  32  32  32  32  32  32  32  32  32  32  32  32  11  11  11  11  11  11  11  11
  11  10  11  11
  22:  32  32  32  32  32  32  32  32  32  32  32  32  11  11  11  11  11  11  11  11
  11  11  10  11
  23:  32  32  32  32  32  32  32  32  32  32  32  32  11  11  11  11  11  11  11  11
  11  11  11  10

 From /proc/meminfo
    MemTotal:       1584992744 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"
```

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Hewlett Packard Enterprise
(Test Sponsor: HPE)

$SPECspeed^{®}2017\_fp\_base = 395$

ProLiant DL365 Gen11
(2.25 GHz, AMD EPYC 9634)

$SPECspeed^{®}2017\_fp\_peak = 404$

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

Test Date: Jan-2023
Hardware Availability: Dec-2022
Software Availability: Nov-2022

Platform Notes (Continued)

```
        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
  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 28 00:00


  SPEC is set to: /home/cpu2017
     Filesystem                      Type  Size  Used Avail Use% Mounted on
     /dev/mapper/ubuntu--vg-ubuntu--lv ext4  437G   20G  399G   5% /


  From /sys/devices/virtual/dmi/id
     Vendor:         HPE
     Product:        ProLiant DL365 Gen11
     Product Family: ProLiant
     Serial:         DL365G11-003


  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
```

(Continued on next page)

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL365 Gen11
(2.25 GHz, AMD EPYC 9634)

SPECspeed®2017_fp_base = 395

SPECspeed®2017_fp_peak = 404

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

Test Date: Jan-2023
Hardware Availability: Dec-2022
Software Availability: Nov-2022

Platform Notes (Continued)

```
  frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.
    Memory:
      24x Hynix HMCG94AEBRA103N 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)
```

Compiler Version Notes

```
==============================================================================
C                    | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
                     | 644.nab_s(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, Fortran | 607.cactuBSSN_s(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
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
------------------------------------------------------------------------------
```

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Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL365 Gen11
(2.25 GHz, AMD EPYC 9634)

$SPECspeed^{®}2017\_fp\_base = 395$

$SPECspeed^{®}2017\_fp\_peak = 404$

CPU2017 License: 3		**Test Date:**	Jan-2023
Test Sponsor:	HPE	**Hardware Availability:**	Dec-2022
Tested by:	HPE	**Software Availability:**	Nov-2022

Compiler Version Notes (Continued)

```
==============================================================================
Fortran           | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
                  | 654.roms_s(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        | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
                  | 628.pop2_s(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
```

Fortran benchmarks:
```
flang
```

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

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

SPEC CPU®2017 Floating Point Speed Result

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Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL365 Gen11
(2.25 GHz, AMD EPYC 9634)

SPECspeed®2017_fp_base = 395

SPECspeed®2017_fp_peak = 404

CPU2017 License: 3	**Test Date:** Jan-2023
Test Sponsor: HPE	**Hardware Availability:** Dec-2022
Tested by: HPE	**Software Availability:** Nov-2022

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
627.cam4_s: -DSPEC_CASE_FLAG -DSPEC_LP64
628.pop2_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang

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

Benchmarks using both Fortran and C:
-m64 -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 -fopenmp -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang

Benchmarks using Fortran, C, and C++:
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6

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SPEC CPU®2017 Floating Point Speed Result

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Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL365 Gen11
(2.25 GHz, AMD EPYC 9634)

SPECspeed®2017_fp_base = 395

SPECspeed®2017_fp_peak = 404

CPU2017 License:	3	**Test Date:**	Jan-2023
Test Sponsor:	HPE	**Hardware Availability:**	Dec-2022
Tested by:	HPE	**Software Availability:**	Nov-2022

Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
```
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -fopenmp=libomp -lomp -lamdlibm -lamdalloc
-lflang
```

Base Other Flags

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

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

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

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

Peak Compiler Invocation

C benchmarks:
```
clang
```

Fortran benchmarks:
```
flang
```

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

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

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ProLiant DL365 Gen11
(2.25 GHz, AMD EPYC 9634)

SPECspeed®2017_fp_base = 395

SPECspeed®2017_fp_peak = 404

CPU2017 License: 3	**Test Date:** Jan-2023
Test Sponsor: HPE	**Hardware Availability:** Dec-2022
Tested by: HPE	**Software Availability:** Nov-2022

Peak Portability Flags

```
Same as Base Portability Flags
```

Peak Optimization Flags

C benchmarks:

 619.lbm_s: basepeak = yes

 638.imagick_s: basepeak = yes

 644.nab_s: basepeak = yes

Fortran benchmarks:

 603.bwaves_s: basepeak = yes

 649.fotonik3d_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -DSPEC_OPENMP
-Ofast -march=znver4 -fveclib=AMDLIBM -ffast-math
-fopenmp -flto -Mrecursive
-mllvm -reduce-array-computations=3 -zopt -fopenmp=libomp
-lomp -lamdlibm -lamdalloc -lflang

 654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

 621.wrf_s: -m64 -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 -fopenmp
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-O3 -Mrecursive -funroll-loops -mllvm -lsr-in-nested-loop
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang

 627.cam4_s: basepeak = yes

 628.pop2_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -Ofast

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ProLiant DL365 Gen11
(2.25 GHz, AMD EPYC 9634)

SPECspeed®2017_fp_base = 395

SPECspeed®2017_fp_peak = 404

CPU2017 License: 3	**Test Date:**	Jan-2023
Test Sponsor: HPE	**Hardware Availability:**	Dec-2022
Tested by: HPE	**Software Availability:**	Nov-2022

Peak Optimization Flags (Continued)

628.pop2_s (continued):
```
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-Mrecursive -fvector-transform -fscalar-transform
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang
```

Benchmarks using Fortran, C, and C++:
```
-m64 -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 -fopenmp -flto -fstruct-layout=9
-mllvm -unroll-threshold=50 -fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000 -mllvm -reduce-array-computations=3
-DSPEC_OPENMP -zopt -finline-aggressive -mllvm -unroll-threshold=100
-Mrecursive -fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang
```

Peak Other Flags

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

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

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

Benchmarks using Fortran, C, and C++:
```
-Wno-return-type -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.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.xml

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$SPECspeed®2017\_fp\_base = 395$

$SPECspeed®2017\_fp\_peak = 404$

CPU2017 License: 3		**Test Date:**	Jan-2023
Test Sponsor:	HPE	**Hardware Availability:**	Dec-2022
Tested by:	HPE	**Software Availability:**	Nov-2022

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

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