SPEC CPU®2017 Floating Point Speed Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

$SPECspeed^{®}2017\_fp\_base = 318$

ProLiant DL385 Gen11
(3.25 GHz, AMD EPYC 9354)

$SPECspeed^{®}2017\_fp\_peak = 324$

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

Threads

- 603.bwaves_s **64** — 1700 / 1710
- 607.cactuBSSN_s **64** — 472 / 472
- 619.lbm_s **64** — 197
- 621.wrf_s **64** — 179 / 203
- 627.cam4_s **64** — 202
- 628.pop2_s **64** — 68.8 / 72.2
- 638.imagick_s **64** — 418
- 644.nab_s **64** — 595
- 649.fotonik3d_s **64** — 198 / 200
- 654.roms_s **64** — 546 / 546

SPECspeed®2017_fp_base (318)   SPECspeed®2017_fp_peak (324)

Hardware

CPU Name: AMD EPYC 9354
  Max MHz: 3800
  Nominal: 3250
Enabled: 64 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: 256 MB I+D on chip per chip,
    32 MB shared / 4 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 5.15.0-43-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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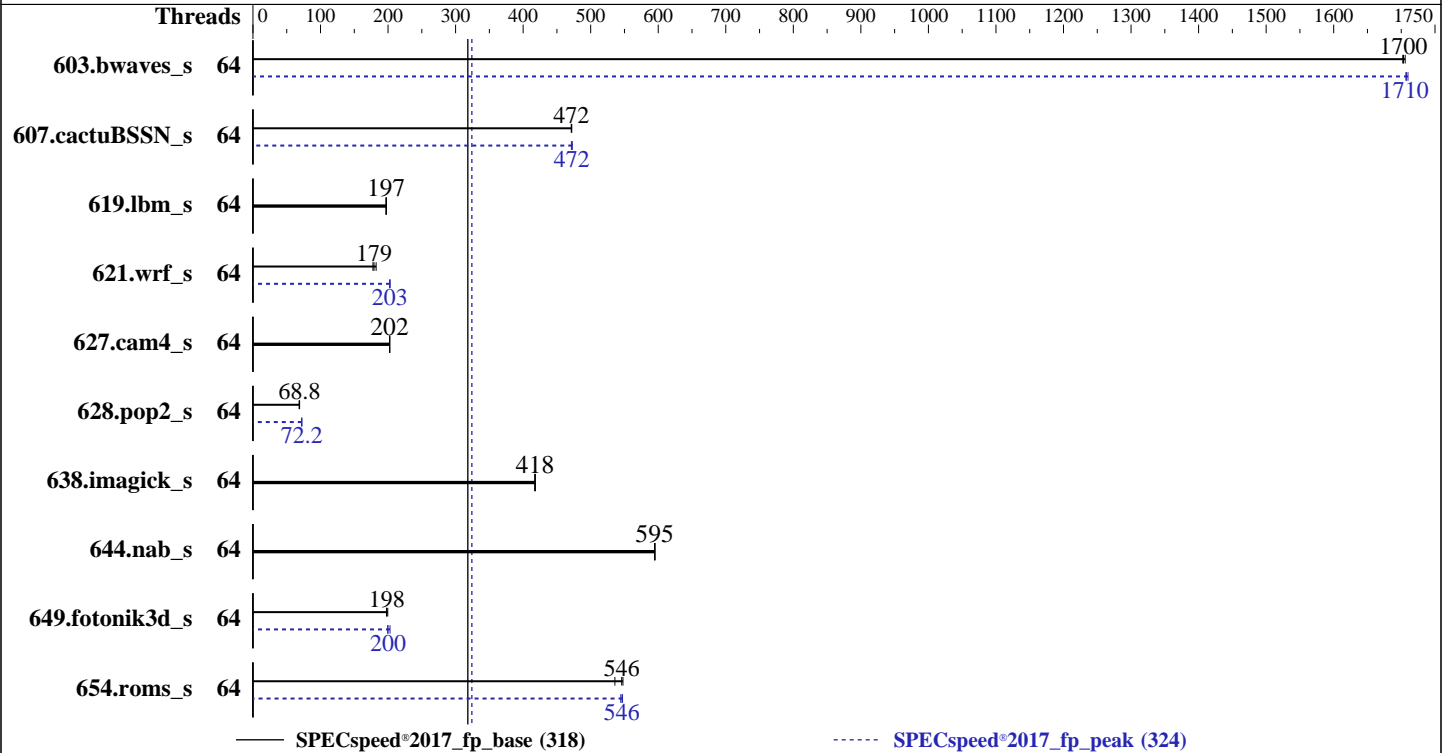**Hewlett Packard Enterprise**
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Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	64	34.7	1700	**34.6**	**1700**	34.6	1710	64	34.6	1710	34.5	1710	**34.5**	**1710**
607.cactuBSSN_s	64	35.4	471	**35.3**	**472**	35.3	472	64	**35.3**	**472**	35.4	471	35.3	473
619.lbm_s	64	26.5	198	26.6	197	**26.6**	**197**	64	26.5	198	26.6	197	**26.6**	**197**
621.wrf_s	64	74.5	178	**73.8**	**179**	72.5	182	64	**65.3**	**203**	65.2	203	65.3	202
627.cam4_s	64	43.8	202	43.8	202	**43.8**	**202**	64	43.8	202	43.8	202	**43.8**	**202**
628.pop2_s	64	174	68.4	**173**	**68.8**	172	69.1	64	165	72.1	164	72.3	**164**	**72.2**
638.imagick_s	64	34.6	417	34.5	418	**34.5**	**418**	64	34.6	417	34.5	418	**34.5**	**418**
644.nab_s	64	29.3	595	29.4	595	**29.4**	**595**	64	29.3	595	29.4	595	**29.4**	**595**
649.fotonik3d_s	64	**46.0**	**198**	45.7	200	46.1	198	64	44.9	203	45.7	199	**45.6**	**200**
654.roms_s	64	29.4	536	**28.8**	**546**	28.7	548	64	28.8	547	28.9	545	**28.8**	**546**
SPECspeed®2017_fp_base =		**318**												
SPECspeed®2017_fp_peak =		**324**												

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

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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 = "0-63"
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 = "64"

Environment variables set by runcpu during the 603.bwaves_s peak run:
GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:
GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 621.wrf_s peak run:
GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 628.pop2_s peak run:
GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 649.fotonik3d_s peak run:
GOMP_CPU_AFFINITY = "0-63"
PGHPF_ZMEM = "yes"

Environment variables set by runcpu during the 654.roms_s peak run:
GOMP_CPU_AFFINITY = "0 32 1 33 2 34 3 35 4 36 5 37 6 38 7 39 8 40 9 41 10 42
        11 43 12 44 13 45 14 46 15 47 16 48 17 49 18 50 19 51 20 52 21 53 22 54
        23 55 24 56 25 57 26 58 27 59 28 60 29 61 30 62 31 63"
```

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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 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
 Workload Profile set to Custom
   Power Regulator set to OS Control Mode


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 18:37:09 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 9354 32-Core Processor
       2  "physical id"s (chips)
       64 "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 : 32
       siblings  : 32
       physical 0: cores 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
```

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Platform Notes (Continued)

```
      physical 1: cores 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

  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):                       64
      On-line CPU(s) list:          0-63
      Vendor ID:                    AuthenticAMD
      Model name:                   AMD EPYC 9354 32-Core Processor
      CPU family:                   25
      Model:                        17
      Thread(s) per core:           1
      Core(s) per socket:           32
      Socket(s):                    2
      Stepping:                     1
      Frequency boost:              enabled
      CPU max MHz:                  3800.0000
      CPU min MHz:                  400.0000
      BogoMIPS:                     6489.58
      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:                    2 MiB (64 instances)
      L1i cache:                    2 MiB (64 instances)
      L2 cache:                     64 MiB (64 instances)
      L3 cache:                     512 MiB (16 instances)
      NUMA node(s):                 16
      NUMA node0 CPU(s):            0-3
      NUMA node1 CPU(s):            16-19
      NUMA node2 CPU(s):            8-11
      NUMA node3 CPU(s):            24-27
```

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Platform Notes (Continued)

```
      NUMA node4 CPU(s):             12-15
      NUMA node5 CPU(s):             28-31
      NUMA node6 CPU(s):             4-7
      NUMA node7 CPU(s):             20-23
      NUMA node8 CPU(s):             32-35
      NUMA node9 CPU(s):             48-51
      NUMA node10 CPU(s):            40-43
      NUMA node11 CPU(s):            56-59
      NUMA node12 CPU(s):            44-47
      NUMA node13 CPU(s):            60-63
      NUMA node14 CPU(s):            36-39
      NUMA node15 CPU(s):            52-55
      Vulnerability Itlb multihit:   Not affected
      Vulnerability L1tf:            Not affected
      Vulnerability Mds:             Not affected
      Vulnerability Meltdown:        Not affected
      Vulnerability Mmio stale data:  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
      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       2M    8 Data            1    64        1             64
      L1i       32K       2M    8 Instruction     1    64        1             64
      L2         1M      64M    8 Unified         2  2048        1             64
      L3        32M     512M   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: 16 nodes (0-15)
    node 0 cpus: 0 1 2 3
    node 0 size: 96422 MB
    node 0 free: 96277 MB
    node 1 cpus: 16 17 18 19
    node 1 size: 96766 MB
    node 1 free: 96554 MB
    node 2 cpus: 8 9 10 11
    node 2 size: 96766 MB
```

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Platform Notes (Continued)

```
    node 2 free: 96635 MB
    node 3 cpus: 24 25 26 27
    node 3 size: 96766 MB
    node 3 free: 96604 MB
    node 4 cpus: 12 13 14 15
    node 4 size: 96766 MB
    node 4 free: 96602 MB
    node 5 cpus: 28 29 30 31
    node 5 size: 96766 MB
    node 5 free: 96609 MB
    node 6 cpus: 4 5 6 7
    node 6 size: 96766 MB
    node 6 free: 96611 MB
    node 7 cpus: 20 21 22 23
    node 7 size: 96766 MB
    node 7 free: 96670 MB
    node 8 cpus: 32 33 34 35
    node 8 size: 96766 MB
    node 8 free: 96681 MB
    node 9 cpus: 48 49 50 51
    node 9 size: 96766 MB
    node 9 free: 96658 MB
    node 10 cpus: 40 41 42 43
    node 10 size: 96766 MB
    node 10 free: 96670 MB
    node 11 cpus: 56 57 58 59
    node 11 size: 96766 MB
    node 11 free: 96692 MB
    node 12 cpus: 44 45 46 47
    node 12 size: 96766 MB
    node 12 free: 96689 MB
    node 13 cpus: 60 61 62 63
    node 13 size: 96719 MB
    node 13 free: 96641 MB
    node 14 cpus: 36 37 38 39
    node 14 size: 96766 MB
    node 14 free: 96681 MB
    node 15 cpus: 52 53 54 55
    node 15 size: 96766 MB
    node 15 free: 96682 MB
    node distances:
    node   0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
      0:  10  11  11  11  11  11  11  11  32  32  32  32  32  32  32  32
      1:  11  10  11  11  11  11  11  11  32  32  32  32  32  32  32  32
      2:  11  11  10  11  11  11  11  11  32  32  32  32  32  32  32  32
      3:  11  11  11  10  11  11  11  11  32  32  32  32  32  32  32  32
      4:  11  11  11  11  10  11  11  11  32  32  32  32  32  32  32  32
```

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Platform Notes (Continued)

```
    5:  11  11  11  11  11  10  11  11  32  32  32  32  32  32  32  32
    6:  11  11  11  11  11  11  10  11  32  32  32  32  32  32  32  32
    7:  11  11  11  11  11  11  11  10  32  32  32  32  32  32  32  32
    8:  32  32  32  32  32  32  32  32  10  11  11  11  11  11  11  11
    9:  32  32  32  32  32  32  32  32  11  10  11  11  11  11  11  11
   10:  32  32  32  32  32  32  32  32  11  11  10  11  11  11  11  11
   11:  32  32  32  32  32  32  32  32  11  11  11  10  11  11  11  11
   12:  32  32  32  32  32  32  32  32  11  11  11  11  10  11  11  11
   13:  32  32  32  32  32  32  32  32  11  11  11  11  11  10  11  11
   14:  32  32  32  32  32  32  32  32  11  11  11  11  11  11  10  11
   15:  32  32  32  32  32  32  32  32  11  11  11  11  11  11  11  10


 From /proc/meminfo
    MemTotal:        1585027248 kB
    HugePages_Total:          0
    Hugepagesize:          2048 kB


 /sbin/tuned-adm active
     Current active profile: balanced


 /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 5.15.0-43-generic #46-Ubuntu SMP Tue Jul 12 10:30:17 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
```

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Platform Notes (Continued)

```
CVE-2017-5754 (Meltdown):                            Not affected
mmio_stale_data:                                     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
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  98G   18G   76G  19% /

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)
```

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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

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


==============================================================================
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
```

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Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL385 Gen11
(3.25 GHz, AMD EPYC 9354)

$SPECspeed^{®}2017\_fp\_base = 318$

$SPECspeed^{®}2017\_fp\_peak = 324$

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

Compiler Version Notes (Continued)

```
  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
```

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`

Hewlett Packard Enterprise
(Test Sponsor: HPE)

$SPECspeed^{®}2017\_fp\_base = 318$

ProLiant DL385 Gen11
(3.25 GHz, AMD EPYC 9354)

$SPECspeed^{®}2017\_fp\_peak = 324$

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

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
-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
```

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL385 Gen11
(3.25 GHz, AMD EPYC 9354)

SPECspeed®2017_fp_base = 318

SPECspeed®2017_fp_peak = 324

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Dec-2022

Hardware Availability: Dec-2022

Software Availability: Nov-2022

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
```

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`

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL385 Gen11
(3.25 GHz, AMD EPYC 9354)

SPECspeed®2017_fp_base = 318

SPECspeed®2017_fp_peak = 324

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)

Fortran benchmarks:

```
603.bwaves_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 -Mrecursive -mllvm -reduce-array-computations=3
-fvector-transform -fscalar-transform -fopenmp=libomp
-lomp -lamdlibm -lamdalloc -lflang
```

```
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: Same as 603.bwaves_s
```

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
-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
```

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Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL385 Gen11
(3.25 GHz, AMD EPYC 9354)

SPECspeed®2017_fp_base = 318

SPECspeed®2017_fp_peak = 324

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)

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

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

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