



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL345 Gen11

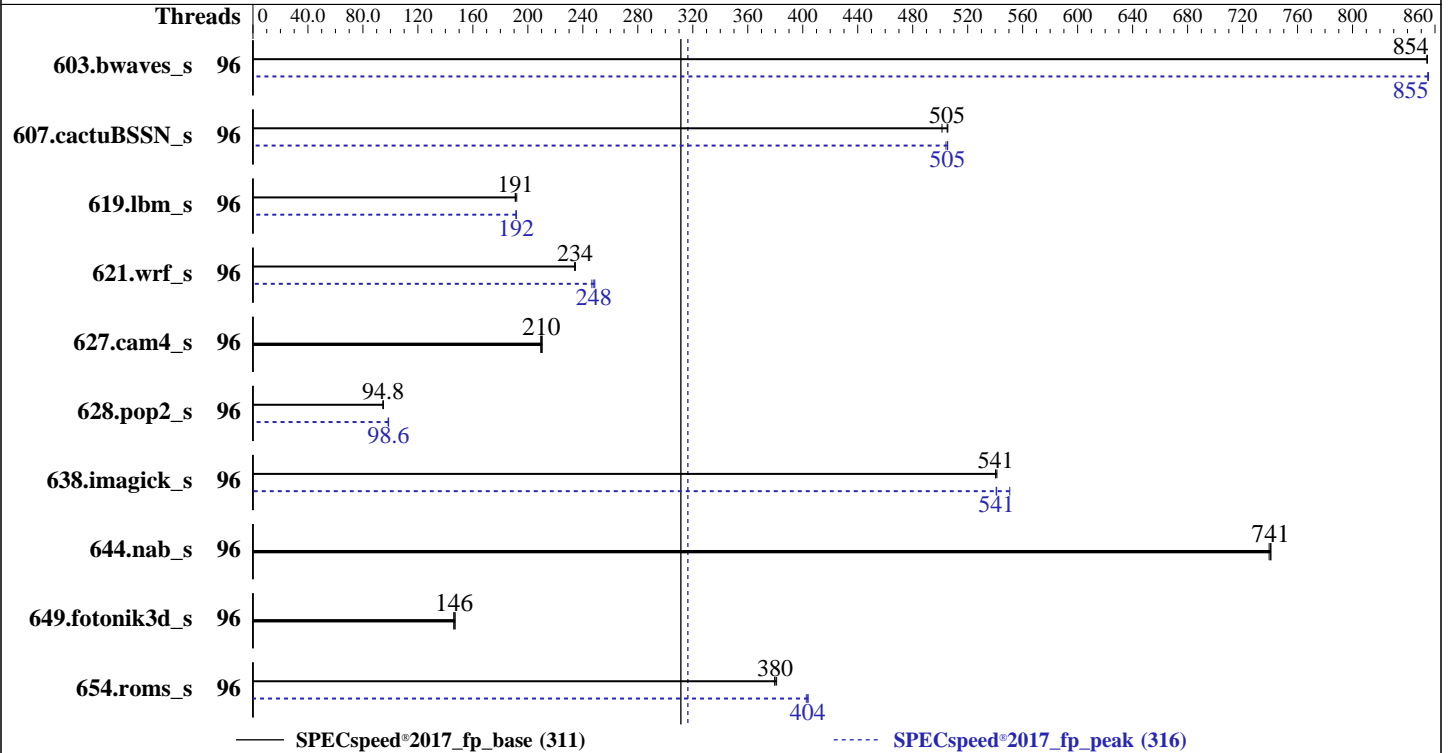
(2.40 GHz, AMD EPYC 9654P)

SPECspeed®2017_fp_base = 311

SPECspeed®2017_fp_peak = 316

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

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



Hardware

CPU Name: AMD EPYC 9654P
 Max MHz: 3700
 Nominal: 2400
 Enabled: 96 cores, 1 chip
 Orderable: 1 chip
 Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 384 MB I+D on chip per chip, 32 MB shared / 8 cores
 Other: None
 Memory: 384 GB (12 x 32 GB 2Rx8 PC5-4800B-R)
 Storage: 1 x 1.6 TB NVMe SSD, RAID 0
 Other: None

Software

OS: Red Hat Enterprise Linux 9.0 (Plow)
 Kernel 5.14.0-70.13.1.el9_0.x86_64
 Compiler: C/C++/Fortran: Version 4.0.0 of AOCC
 Parallel: Yes
 Firmware: HPE BIOS Version v1.10 10/06/2022 released Oct-2022
 File System: xfs
 System State: Run level 3 (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



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL345 Gen11

(2.40 GHz, AMD EPYC 9654P)

SPECspeed®2017_fp_base = 311

SPECspeed®2017_fp_peak = 316

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

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

Results Table

Benchmark	Base						Peak							
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	96	69.1	854	69.1	854	69.0	854	96	69.0	855	69.0	855	69.0	855
607.cactuBSSN_s	96	33.0	506	33.3	501	33.0	505	96	33.0	505	33.1	504	33.0	505
619.lbm_s	96	27.4	191	27.3	192	27.4	191	96	27.4	191	27.3	192	27.4	192
621.wrf_s	96	56.5	234	56.4	235	56.4	234	96	53.3	248	53.6	247	53.2	249
627.cam4_s	96	42.1	210	42.3	209	42.2	210	96	42.1	210	42.3	209	42.2	210
628.pop2_s	96	125	94.8	126	94.6	125	94.8	96	120	98.6	120	98.7	121	98.3
638.imagick_s	96	26.7	541	26.7	540	26.7	541	96	26.7	541	26.2	551	26.7	541
644.nab_s	96	23.6	741	23.6	741	23.6	739	96	23.6	741	23.6	741	23.6	739
649.fotonik3d_s	96	62.3	146	62.0	147	62.4	146	96	62.3	146	62.0	147	62.4	146
654.roms_s	96	41.5	380	41.4	380	41.3	381	96	39.0	404	39.1	403	39.0	404

SPECspeed®2017_fp_base = 311

SPECspeed®2017_fp_peak = 316

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.

(Continued on next page)



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL345 Gen11

(2.40 GHz, AMD EPYC 9654P)

SPECspeed®2017_fp_base = 311

SPECspeed®2017_fp_peak = 316

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

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

Operating System Notes (Continued)

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.

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 = "0-95"
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 = "96"
```

Environment variables set by runcpu during the 603.bwaves_s peak run:

```
GOMP_CPU_AFFINITY = "0-95"
```

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:

```
GOMP_CPU_AFFINITY = "0-95"
```

Environment variables set by runcpu during the 619.lbm_s peak run:

```
GOMP_CPU_AFFINITY = "0-95"
```

Environment variables set by runcpu during the 621.wrf_s peak run:

```
GOMP_CPU_AFFINITY = "0-95"
```

Environment variables set by runcpu during the 628.pop2_s peak run:

```
GOMP_CPU_AFFINITY = "0-95"
```

Environment variables set by runcpu during the 638.imagick_s peak run:

```
GOMP_CPU_AFFINITY = "0-95"
```

Environment variables set by runcpu during the 654.roms_s peak run:

```
GOMP_CPU_AFFINITY = "0 48 1 49 2 50 3 51 4 52 5 53 6 54 7 55 8 56 9 57 10 58"
```

(Continued on next page)



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL345 Gen11

(2.40 GHz, AMD EPYC 9654P)

SPECspeed®2017_fp_base = 311

SPECspeed®2017_fp_peak = 316

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

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

Environment Variables Notes (Continued)

```
11 59 12 60 13 61 14 62 15 63 16 64 17 65 18 66 19 67 20 68 21 69 22 70
23 71 24 72 25 73 26 74 27 75 28 76 29 77 30 78 31 79 32 80 33 81 34 82
35 83 36 84 37 85 38 86 39 87 40 88 41 89 42 90 43 91 44 92 45 93 46 94
47 95"
```

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 0xa10110d for the AMD EPYC 9nn4X family of processors. The reference code/AGESA version used in this ROM is version GenoaPI 1.0.0.1-L2

```
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on localhost.localdomain Fri Oct 21 12:19:49 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 9654P 96-Core Processor
```

(Continued on next page)



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL345 Gen11

(2.40 GHz, AMD EPYC 9654P)

SPECspeed®2017_fp_base = 311

SPECspeed®2017_fp_peak = 316

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

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

Platform Notes (Continued)

```
1 "physical id"s (chips)
96 "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 : 96
siblings : 96
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 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
81 82 83 84 85 86 87 88 89 90 91 92 93 94 95
```

From lscpu from util-linux 2.37.4:

```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Address sizes: 52 bits physical, 57 bits virtual
Byte Order: Little Endian
CPU(s): 96
On-line CPU(s) list: 0-95
Vendor ID: AuthenticAMD
BIOS Vendor ID: Advanced Micro Devices, Inc.
Model name: AMD EPYC 9654P 96-Core Processor
BIOS Model name: AMD EPYC 9654P 96-Core Processor
CPU family: 25
Model: 17
Thread(s) per core: 1
Core(s) per socket: 96
Socket(s): 1
Stepping: 1
Frequency boost: enabled
CPU max MHz: 3707.8120
CPU min MHz: 1500.0000
BogoMIPS: 4792.50
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
aperfmpperf 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 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_lld
```

(Continued on next page)



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL345 Gen11

(2.40 GHz, AMD EPYC 9654P)

SPECspeed®2017_fp_base = 311

SPECspeed®2017_fp_peak = 316

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

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

Platform Notes (Continued)

```

Virtualization:          AMD-V
L1d cache:              3 MiB (96 instances)
L1i cache:              3 MiB (96 instances)
L2 cache:               96 MiB (96 instances)
L3 cache:               384 MiB (12 instances)
NUMA node(s):          12
NUMA node0 CPU(s):     0-7
NUMA node1 CPU(s):     8-15
NUMA node2 CPU(s):     16-23
NUMA node3 CPU(s):     24-31
NUMA node4 CPU(s):     32-39
NUMA node5 CPU(s):     40-47
NUMA node6 CPU(s):     48-55
NUMA node7 CPU(s):     56-63
NUMA node8 CPU(s):     64-71
NUMA node9 CPU(s):     72-79
NUMA node10 CPU(s):    80-87
NUMA node11 CPU(s):    88-95
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf:     Not affected
Vulnerability Mds:      Not affected
Vulnerability Meltdown: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl
Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Retpolines, IBPB conditional, IBRS_FW, STIBP 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	3M	8	Data	1	64	1	64
L1i	32K	3M	8	Instruction	1	64	1	64
L2	1M	96M	8	Unified	2	2048	1	64
L3	32M	384M	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: 12 nodes (0-11)
node 0 cpus: 0 1 2 3 4 5 6 7
node 0 size: 32007 MB
node 0 free: 31425 MB

```

(Continued on next page)



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL345 Gen11

(2.40 GHz, AMD EPYC 9654P)

SPECspeed®2017_fp_base = 311

SPECspeed®2017_fp_peak = 316

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Oct-2022

Hardware Availability: Dec-2022

Software Availability: Nov-2022

Platform Notes (Continued)

```

node 1 cpus: 8 9 10 11 12 13 14 15
node 1 size: 32254 MB
node 1 free: 32017 MB
node 2 cpus: 16 17 18 19 20 21 22 23
node 2 size: 32254 MB
node 2 free: 32073 MB
node 3 cpus: 24 25 26 27 28 29 30 31
node 3 size: 32217 MB
node 3 free: 32080 MB
node 4 cpus: 32 33 34 35 36 37 38 39
node 4 size: 32254 MB
node 4 free: 32127 MB
node 5 cpus: 40 41 42 43 44 45 46 47
node 5 size: 32254 MB
node 5 free: 32116 MB
node 6 cpus: 48 49 50 51 52 53 54 55
node 6 size: 32254 MB
node 6 free: 32129 MB
node 7 cpus: 56 57 58 59 60 61 62 63
node 7 size: 32254 MB
node 7 free: 32134 MB
node 8 cpus: 64 65 66 67 68 69 70 71
node 8 size: 32254 MB
node 8 free: 32134 MB
node 9 cpus: 72 73 74 75 76 77 78 79
node 9 size: 32254 MB
node 9 free: 32119 MB
node 10 cpus: 80 81 82 83 84 85 86 87
node 10 size: 32254 MB
node 10 free: 32134 MB
node 11 cpus: 88 89 90 91 92 93 94 95
node 11 size: 32203 MB
node 11 free: 32063 MB
node distances:
node  0  1  2  3  4  5  6  7  8  9 10 11
0:  10 11 11 11 11 11 11 11 11 11 11 11
1:  11 10 11 11 11 11 11 11 11 11 11 11
2:  11 11 10 11 11 11 11 11 11 11 11 11
3:  11 11 11 10 11 11 11 11 11 11 11 11
4:  11 11 11 11 10 11 11 11 11 11 11 11
5:  11 11 11 11 11 10 11 11 11 11 11 11
6:  11 11 11 11 11 11 10 11 11 11 11 11
7:  11 11 11 11 11 11 11 10 11 11 11 11
8:  11 11 11 11 11 11 11 11 10 11 11 11
9:  11 11 11 11 11 11 11 11 11 10 11 11
10: 11 11 11 11 11 11 11 11 11 11 10 11
11: 11 11 11 11 11 11 11 11 11 11 11 10

```

(Continued on next page)



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL345 Gen11

(2.40 GHz, AMD EPYC 9654P)

SPECspeed®2017_fp_base = 311

SPECspeed®2017_fp_peak = 316

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

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

Platform Notes (Continued)

From /proc/meminfo

MemTotal: 395997920 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

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

From /etc/*release* /etc/*version*

os-release:

NAME="Red Hat Enterprise Linux"
VERSION="9.0 (Plow)"
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="9.0"
PLATFORM_ID="platform:el9"
PRETTY_NAME="Red Hat Enterprise Linux 9.0 (Plow)"
ANSI_COLOR="0;31"

redhat-release: Red Hat Enterprise Linux release 9.0 (Plow)
system-release: Red Hat Enterprise Linux release 9.0 (Plow)
system-release-cpe: cpe:/o:redhat:enterprise_linux:9::baseos

uname -a:

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

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
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled via prctl
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 3 Oct 21 12:16

SPEC is set to: /home/cpu2017

(Continued on next page)



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL345 Gen11

(2.40 GHz, AMD EPYC 9654P)

SPECspeed®2017_fp_base = 311

SPECspeed®2017_fp_peak = 316

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

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

Platform Notes (Continued)

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/mapper/rhel-home	xfs	1.4T	16G	1.4T	2%	/home

```

From /sys/devices/virtual/dmi/id
Vendor:          HPE
Product:         ProLiant DL345 Gen11
Product Family: ProLiant
Serial:          DL3x5GEN11

```

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:
  6x Hynix HMCG88AEBRA168N 32 GB 2 rank 4800
  2x Hynix HMCG88MEBRA113N 32 GB 2 rank 4800
  4x Hynix HMCG88MEBRA115N 32 GB 2 rank 4800

```

```

BIOS:
  BIOS Vendor:      HPE
  BIOS Version:     1.10
  BIOS Date:        10/06/2022
  BIOS Revision:    1.10
  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

```

(Continued on next page)



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL345 Gen11

(2.40 GHz, AMD EPYC 9654P)

SPECspeed®2017_fp_base = 311

SPECspeed®2017_fp_peak = 316

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Oct-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
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
  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

(Continued on next page)



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL345 Gen11

(2.40 GHz, AMD EPYC 9654P)

SPECspeed®2017_fp_base = 311

SPECspeed®2017_fp_peak = 316

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Oct-2022

Hardware Availability: Dec-2022

Software Availability: Nov-2022

Base Compiler Invocation (Continued)

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
```

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
-freemap-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
```

(Continued on next page)



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL345 Gen11

(2.40 GHz, AMD EPYC 9654P)

SPECspeed®2017_fp_base = 311

SPECspeed®2017_fp_peak = 316

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

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

Base Optimization Flags (Continued)

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
-freemap-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
-freemap-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
```

(Continued on next page)



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL345 Gen11

(2.40 GHz, AMD EPYC 9654P)

SPECspeed®2017_fp_base = 311

SPECspeed®2017_fp_peak = 316

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Oct-2022

Hardware Availability: Dec-2022

Software Availability: Nov-2022

Peak Compiler Invocation (Continued)

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: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -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
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang
```

638.imagick_s: Same as 619.lbm_s

644.nab_s: basepeak = yes

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: basepeak = yes

(Continued on next page)



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL345 Gen11

(2.40 GHz, AMD EPYC 9654P)

SPECspeed®2017_fp_base = 311

SPECspeed®2017_fp_peak = 316

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Oct-2022

Hardware Availability: Dec-2022

Software Availability: Nov-2022

Peak Optimization Flags (Continued)

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
-freemap-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
-freemap-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 -freemap-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

(Continued on next page)



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL345 Gen11

(2.40 GHz, AMD EPYC 9654P)

SPECspeed®2017_fp_base = 311

SPECspeed®2017_fp_peak = 316

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Oct-2022

Hardware Availability: Dec-2022

Software Availability: Nov-2022

Peak Other Flags (Continued)

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-rev2.0.html>

<http://www.spec.org/cpu2017/flags/aocc400-flags.html>

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-Genoa-rev2.0.xml>

<http://www.spec.org/cpu2017/flags/aocc400-flags.xml>

SPEC CPU and SPECspeed are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

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

Tested with SPEC CPU®2017 v1.1.8 on 2022-10-21 02:49:49-0400.

Report generated on 2022-11-10 14:44:25 by CPU2017 PDF formatter v6442.

Originally published on 2022-11-10.