## SPEC CPU®2017 Floating Point Speed Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL345 Gen11  
(3.00 GHz, AMD EPYC 9124)  

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base = 139</th>
<th>SPECspeed®2017_fp_peak = 139</th>
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</table>

### threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>16</td>
<td>199</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>16</td>
<td>200</td>
</tr>
<tr>
<td>619.ibm_s</td>
<td>16</td>
<td>74.6</td>
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<tr>
<td>621.wrf_s</td>
<td>16</td>
<td>140</td>
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<tr>
<td>627.cam4_s</td>
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<td>644.nab_s</td>
<td>16</td>
<td>187</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
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<td>170</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>16</td>
<td>170</td>
</tr>
</tbody>
</table>

### Software

- **OS:** Ubuntu 22.04.1 LTS  
- **Kernel:** 5.15.0-53-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  
- **Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage

### Hardware

- **CPU Name:** AMD EPYC 9124  
- **Max MHz:** 3700  
- **Nominal:** 3000  
- **Enabled:** 16 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:** 64 MB I+D on chip per core, 16 MB shared / 4 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
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL345 Gen11
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SPECspeed®2017_fp_base = 139
SPECspeed®2017_fp_peak = 139

Results Table

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<tr>
<th>Benchmark</th>
<th>Threads</th>
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<td>603.bwaves_s</td>
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<td>607.cactuBSSN_s</td>
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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)
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SPECspeed®2017_fp_base = 139
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Operating System Notes (Continued)

To enable Transparent Hugepages (THP) for all allocations,
'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/defrag' run as root.
To disable THP for peak runs of 621.wrf_s:
'echo never > /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/defrag' run as root.

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-15"
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 = "16"

Environment variables set by runcpu during the 603.bwaves_s peak run:
GOMP_CPU_AFFINITY = "0-15"

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:
GOMP_CPU_AFFINITY = "0-15"

Environment variables set by runcpu during the 619.lbm_s peak run:
GOMP_CPU_AFFINITY = "0-15"

Environment variables set by runcpu during the 621.wrf_s peak run:
GOMP_CPU_AFFINITY = "0-15"

Environment variables set by runcpu during the 627.cam4_s peak run:
GOMP_CPU_AFFINITY = "0-15"

Environment variables set by runcpu during the 628.pop2_s peak run:
GOMP_CPU_AFFINITY = "0-15"

Environment variables set by runcpu during the 638.imagick_s peak run:
GOMP_CPU_AFFINITY = "0-15"

(Continued on next page)
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SPECspeed®2017_fp_base = 139
SPECspeed®2017_fp_peak = 139

Environment Variables Notes (Continued)

Environment variables set by runcpu during the 644.nab_s peak run:
GOMP_CPU_AFFINITY = "0-15"

Environment variables set by runcpu during the 649.fotonik3d_s peak run:
GOMP_CPU_AFFINITY = "0-15"
PGHPF_ZMEM = "yes"

Environment variables set by runcpu during the 654.roms_s peak run:
GOMP_CPU_AFFINITY = "0 8 1 9 2 10 3 11 4 12 5 13 6 14 7 15"

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 0x0A10110e 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 982a61ec0915b55891ef0e16acaf64d
running on admin1 Mon Jun 27 18:32:48 2022

(Continued on next page)
Platform Notes (Continued)

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 9124 16-Core Processor
  1 "physical id"s (chips)
  16 "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 : 16
siblings : 16
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

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):                              16
On-line CPU(s) list:                 0-15
Vendor ID:                           AuthenticAMD
Model name:                          AMD EPYC 9124 16-Core Processor
CPU family:                          25
Model:                               17
Thread(s) per core:                  1
Core(s) per socket:                  16
Socket(s):                           1
Stepping:                            1
Frequency boost:                     enabled
CPU max MHz:                         3713.000
CPU min MHz:                         400.0000
BogoMIPS:                            5990.87
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 rdscp lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid
                                     aperfmperf rafi 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
                                     bext 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 cmp rt_a avx512f
                                     avx512dq rdseed adx smap avx512ifma clflushopt clwb avx512cd sha_ni avx512bw
                                     avx512vl xsaeopt xsavec xgetbv1 xsaves cqm_llc cqm_occu_llc cqm_mbb_total
                                     cqm_mbb local avx512_bf16 clzero irperf xsaverptr rdpru wbnoinvd amd_pinn cpc arat
                                     npt lbv svm_lock nrip_save ts=scale vmcb_clean flushbyas decodeassists
                                     pausefilter pfthreshold avic v_vmsave_vmload vgif v_spec_ctrl avx512vbmi umip pku
                                     ospke avx512_vmbi2 gfn vaes vpcmflushdq avx512_vnni avx512_bitalg avx512_vpopcntdq

(Continued on next page)
Platform Notes (Continued)

la57 rdpid overflow_recov succor smca fsrm flush_lld

Virtualization: AMD-V
L1d cache: 512 KiB (16 instances)
L1i cache: 512 KiB (16 instances)
L2 cache: 16 MiB (16 instances)
L3 cache: 64 MiB (4 instances)
NUMA node(s): 4
NUMA node0 CPU(s): 0-3
NUMA node1 CPU(s): 8-11
NUMA node2 CPU(s): 12-15
NUMA node3 CPU(s): 4-7
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: 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 sanitation
Vulnerability Spectre v2: Mitigation; Retpolines, IBPB conditional, IBRS_FW, STIBP disabled, RSB filling, PBRSB-eIBRS Not affected
Vulnerability Srbd: Not affected
Vulnerability Txs async abort: Not affected

From lscpu --cache:
NAME ONE-SIZE ALL-SIZE WAYS TYPE  LEVEL SETS PHY-LINE COHERENCY-SIZE
L1d  32K  512K   8  Data   1  64   1   64
L1i  32K  512K   8 Instruction 1  64   1   64
L2   1M   16M   8  Unified  2 2048  1   64
L3   16M  64M  16  Unified  3 16384 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: 4 nodes (0-3)
  node 0 cpus: 0 1 2 3
  node 0 size: 96456 MB
  node 0 free: 96164 MB
  node 1 cpus: 8 9 10 11
  node 1 size: 96766 MB
  node 1 free: 96467 MB
  node 2 cpus: 12 13 14 15
  node 2 size: 96693 MB

(Continued on next page)
**Platform Notes (Continued)**

node 2 free: 96340 MB
node 3 cpus: 4 5 6 7
node 3 size: 96766 MB
node 3 free: 96507 MB
node distances:
  node 0 1 2 3
  0: 10 11 11 11
  1: 11 10 11 11
  2: 11 11 10 11
  3: 11 11 11 10

From /proc/meminfo
  MemTotal: 395963896 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

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

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

/usr/bin/lsb_release -d
  Ubuntu 22.04.1 LTS

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

uname -a:
  Linux admin1 5.15.0-53-generic #59-Ubuntu SMP Mon Oct 17 18:53:30 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

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<td>Test Date: Dec-2022</td>
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<td>Test Sponsor: HPE</td>
<td>Hardware Availability: Dec-2022</td>
</tr>
<tr>
<td>Tested by: HPE</td>
<td>Software Availability: Nov-2022</td>
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### Platform Notes (Continued)

- **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 27 18:30**

**SPEC is set to: /home/cpu2017**

```
Filesystem               Type     Size  Used  Avail Use% Mounted on
/devmapper/ubuntu--vg-ubuntu--lv  ext4   98G   18G   75G  20%  /
```

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:**

- 4x Hynix HMC8G8AEBRA168N 32 GB 2 rank 4800
- 4x Hynix HMC8G8MEBRA113N 32 GB 2 rank 4800
- 4x Hynix HMC8G8MEBRA115N 32 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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### Compiler Version Notes

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<tr>
<td>Target: x86_64-unknown-linux-gnu</td>
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<tr>
<td>Thread model: posix</td>
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<tr>
<td>InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin</td>
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<td>Target: x86_64-unknown-linux-gnu</td>
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<td>InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin</td>
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<tr>
<th>Fortran, C</th>
<th>621.wrf_s(base, peak) 627.cam4_s(base, peak) 628.pop2_s(base, peak)</th>
</tr>
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<tr>
<td>AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)</td>
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**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL345 Gen11  
(3.00 GHz, AMD EPYC 9124)  

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**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

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- 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.potonik3d_s: -DSPEC_LP64
- 654.roms_s: -DSPEC_LP64
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL345 Gen11
(3.00 GHz, AMD EPYC 9124)

SPEC CPU®2017 Floating Point Speed Result

SPECspeed®2017_fp_base = 139
SPECspeed®2017_fp_peak = 139

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
-llf

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 -llf

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 -DSPEC_OPENMP -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
-llf

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
-llf

Software Availability: Nov-2022
SPEC CPU®2017 Floating Point Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL345 Gen11
(3.00 GHz, AMD EPYC 9124)

| SPECspeed®2017_fp_base = 139 |
| SPECspeed®2017_fp_peak = 139 |

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

**Base Other Flags**

C benchmarks:
- `-Wno-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:

```bash
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
```

(Continued on next page)
Peak Optimization Flags (Continued)

619.lbm_s (continued):
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: -m64 -Wl,-mllvm -Wl,-region-vectorize -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-vectorize=9 -mlvm -unroll-threshold=50
-freemap-arrays -fstrip-mining
-mlvm -inline-threshold=1000
-mlvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang

Fortran benchmarks:

603.bwaves_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthrough-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
-mlvm -reduce-array-computations=3 -zopt -fopenmp=libomp
-lomp -lamdlibm -lamdalloc -lflang

649.fotonik3d_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthrough-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
-mlvm -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-nofallthrough-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-vectorize=9 -mlvm -unroll-threshold=50
-freemap-arrays -fstrip-mining
-mlvm -inline-threshold=1000
-mlvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-o3 -Mrecursive -funroll-loops -mlvm -lsr-in-nested-loop
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang

(Continued on next page)
Peak Optimization Flags (Continued)

627.cam4_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 -fopenmp=libomp -lomp -lamdlibm -lamlalloc
-1flang

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 -lamlalloc -1flang

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 -lamlalloc -1flang

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

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL345 Gen11
(3.00 GHz, AMD EPYC 9124)

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

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

Peak Other Flags (Continued)

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

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