# SPEC CPU®2017 Floating Point Speed Result

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**Hewlett Packard Enterprise**
(Test Sponsor: HPE)

ProLiant DL325 Gen11
(3.60 GHz, AMD EPYC 9474F)

SPECspeed®2017_fp_base =

SPECspeed®2017_fp_peak =

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

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Non-Compliant

Threads

603.bwaves_s

607.cactuBSSN_s

619.lbm_s

621.wrf_s

627.cam4_s

628.pop2_s

638.imagick_s

644.nab_s

649.fotonik3d_s

654.roms_s

## Hardware

CPU Name: AMD EPYC 9474F

Nominal: 3600
Enabled: 48 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: 256 MB I+D on chip per chip,
  32 MB shared / 6 cores
 Other: None
Memory: 768 GB (12 x 64 GB 2Rx4 PC5-4800B-R)
Storage: 1 x 480 GB SATA SSD
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 v1.12 11/24/2022 released Nov-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 |

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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 | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| 607.cactuBSSN_s | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| 619.lbm_s | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| 621.wrf_s | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| 627.cam4_s | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| 628.pop2_s | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| 638.imagick_s | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| 644.nab_s | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| 649.fotonik3d_s | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |
| 654.roms_s | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC | NC |

**SPECspeed®2017_fp_base =**

**SPECspeed®2017_fp_peak =**

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.
```

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## Operating System Notes (Continued)

```
To disable address space layout randomization (ASLR) to reduce run-to-run
variability, 'sysctl -w kernel.randomize_va_space=0' run as root.

To enable Transparent Hugepages (THP) for all allocations:
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.
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 = "0-47"
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 = "48"

Environment variables set by runcpu during the 603.bwaves_s peak run:
GOMP_CPU_AFFINITY = "0-47"

Environment variables set by runcpu during the 619.lbm_s peak run:
GOMP_CPU_AFFINITY = "0-47"

Environment variables set by runcpu during the 621.wrf_s peak run:
GOMP_CPU_AFFINITY = "0-47"

Environment variables set by runcpu during the 628.pop2_s peak run:
GOMP_CPU_AFFINITY = "0-47"

Environment variables set by runcpu during the 638.imagick_s peak run:
GOMP_CPU_AFFINITY = "0-47"

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

Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

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## General Notes

Binaries were compiled on a system with 2x AMD EPYC 9174F CPU + 1.5TB 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 in this result contains microcode version 0xa10110e for the
AMD EPYC 9nn4X family 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 2022-11-07 982a61ec0915b55891ef0e16acafc64d
 running on localhost.localdomain Thu Apr  7 05:32:43 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 9474F 48-Core Processor
       1 "physical id"s (chips)
       48 "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 : 48
       siblings  : 48
       physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
       32 33 34 35 36 37 40 41 42 43 44 45 48 49 50 51 52 53 56 57 58 59 60 61

 From lscpu from util-linux 2.37.4:
    Architecture:           x86_64
    CPU op-mode(s):         32-bit, 64-bit

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## Platform Notes (Continued)

```
        Address sizes:              52 bits physical, 48 bits virtual
        Byte Order:                 Little Endian
        CPU(s):                     48
        On-line CPU(s) list:        0-47
        Vendor ID:                  AuthenticAMD
        BIOS Vendor ID:             Advanced Micro Devices, Inc.
        Model name:                 AMD EPYC 9474F 48-Core Processor
        BIOS Model name:            AMD EPYC 9474F 48-Core Processor
        CPU family:                 25
        Model:                      17
        Thread(s) per core:         1
        Core(s) per socket:         48
        Socket(s):                  1
        Stepping:                   1
        Frequency boost:            enabled
        CPU max MHz:                4113.2808
        CPU min MHz:                1500.0000
        BogoMIPS:                   7189.20
        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 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:                  1.5 MiB (48 instances)
        L1i cache:                  1.5 MiB (48 instances)
        L2 cache:                   48 MiB (48 instances)
        L3 cache:                   256 MiB (8 instances)
        NUMA node(s):               8
        NUMA node0 CPU(s):          0-5
        NUMA node1 CPU(s):          24-29
        NUMA node2 CPU(s):          12-17
        NUMA node3 CPU(s):          36-41
        NUMA node4 CPU(s):          18-23
        NUMA node5 CPU(s):          42-47
        NUMA node6 CPU(s):          6-11
        NUMA node7 CPU(s):          30-35
        Vulnerability Itlb multihit: Not affected
        Vulnerability L1tf:         Not affected
        Vulnerability Mds:          Not affected
        Vulnerability Meltdown:     Not affected
```

**(Continued on next page)**

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```
      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     1.5M      Data          1    64      1            64
      L1i       32K     1.5M      Instruction   1    64      1            64
      L2         1M      48M      Unified       2  2048      1            64
      L3        32M     256M   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: 8 nodes (0-7)
    node 0 cpus: 0 1 2 3 4 5
    node 0 size: 96520 MB
    node 0 free: 96265 MB
    node 1 cpus: 24 25 26 27 28 29
    node 1 size: 96766 MB
    node 1 free: 96590 MB
    node 2 cpus: 12 13 14 15 16 17
    node 2 size: 96766 MB
    node 2 free: 96597 MB
    node 3 cpus: 36 37 38 39 40 41
    node 3 size: 96766 MB
    node 3 free: 96597 MB
    node 4 cpus: 18 19 20 21 22 23
    node 4 size: 96766 MB
    node 4 free: 96607 MB
    node 5 cpus: 42 43 44 45 46 47
    node 5 size: 96718 MB
    node 5 free: 96396 MB
    node 6 cpus: 6 7 8 9 10 11
    node 6 size: 96766 MB
    node 6 free: 96473 MB
    node 7 cpus: 30 31 32 33 34 35
    node 7 size: 96730 MB
    node 7 free: 96530 MB
    node distances:
    node   0   1   2   3   4   5   6   7
      0:  10  11  11  11  11  11  11  11
      1:  11  10  11  11  11  11  11  11
      2:  11  11  10  11  11  11  11  11
```

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```
      3:  11  11  11  10  11  11  11  11
      4:  11  11  11  11  10  11  11  11
      5:  11  11  11  11  11  10  11  11
      6:  11  11  11  11  11  11  10  11
      7:  11  11  11  11  11  11  11  10

  From /proc/meminfo
     MemTotal:       792372436 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

  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;"
     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
               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
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## Platform Notes (Continued)

```
   run-level 3 Apr 7 05:30

   SPEC is set to: /home/cpu2017
      Filesystem              Type  Size  Used Avail Use% Mounted on
      /dev/mapper/rhel-home xfs   372G   17G  356G    ... /home

   From /sys/devices/virtual/dmi/id
      Vendor:          HPE
      Product:         ProLiant DL325 Gen11
      Product Family:  ProLiant
      Serial:          DL325GEN11-02

   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:
       12x Hynix HMCG94MEBRA121N 64 GB 2 rank 4800

   BIOS:
      BIOS Vendor:      HPE
      BIOS Version:     1.12
      BIOS Date:        /24/202
      BIOS Revision:    1.
      Firmware Revi     1.10

   (End of data from sysinfo program)
```

## Compiler Version Notes

```
==============================================================================================
     | 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)
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Target: x86_64-unknown-linux-gnu
Thread model: posix
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--------------------------------------------------------------------------------------

======================================================================================
Fortran      | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak) 654.roms_s(base, peak)
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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
--------------------------------------------------------------------------------------

======================================================================================
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 DL325 Gen11
(3.60 GHz, AMD EPYC 9474F)

SPECspeed®2017_fp_base =

SPECspeed®2017_fp_peak =

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

**SPEC has determined that this result does not comply with the SPEC CPU 2017 run and reporting rules. Specifically, the test sponsor notified SPEC that the results were measured on an unsupported configuration.**

## 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
```

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# SPEC CPU®2017 Floating Point Speed Result

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**Hewlett Packard Enterprise**
(Test Sponsor: HPE)

ProLiant DL325 Gen11
(3.60 GHz, AMD EPYC 9474F)

SPECspeed®2017_fp_base =

SPECspeed®2017_fp_peak =

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

## Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
```
-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
```

## Base Other Flags

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

```
-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
```

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# SPEC CPU®2017 Floating Point Speed Result

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ProLiant DL325 Gen11
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SPECspeed®2017_fp_base =

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

## Peak 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: -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:

**(Continued on next page)**

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**SPEC has determined that this result does not comply with the SPEC CPU 2017 run and reporting rules. Specifically, the test sponsor notified SPEC that the results were measured on an unsupported configuration.**

## Peak Optimization Flags (Continued)

```
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

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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# SPEC CPU®2017 Floating Point Speed Result

**Hewlett Packard Enterprise**
(Test Sponsor: HPE)

ProLiant DL325 Gen11
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**SPEC has determined that this result does not comply with the SPEC CPU 2017 run and reporting rules. Specifically, the test sponsor notified SPEC that the results were measured on an unsupported configuration.**

## Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: `basepeak = yes`

## 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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