



# SPEC CPU®2017 Floating Point Rate Result

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## Hewlett Packard Enterprise

(Test Sponsor: HPE)

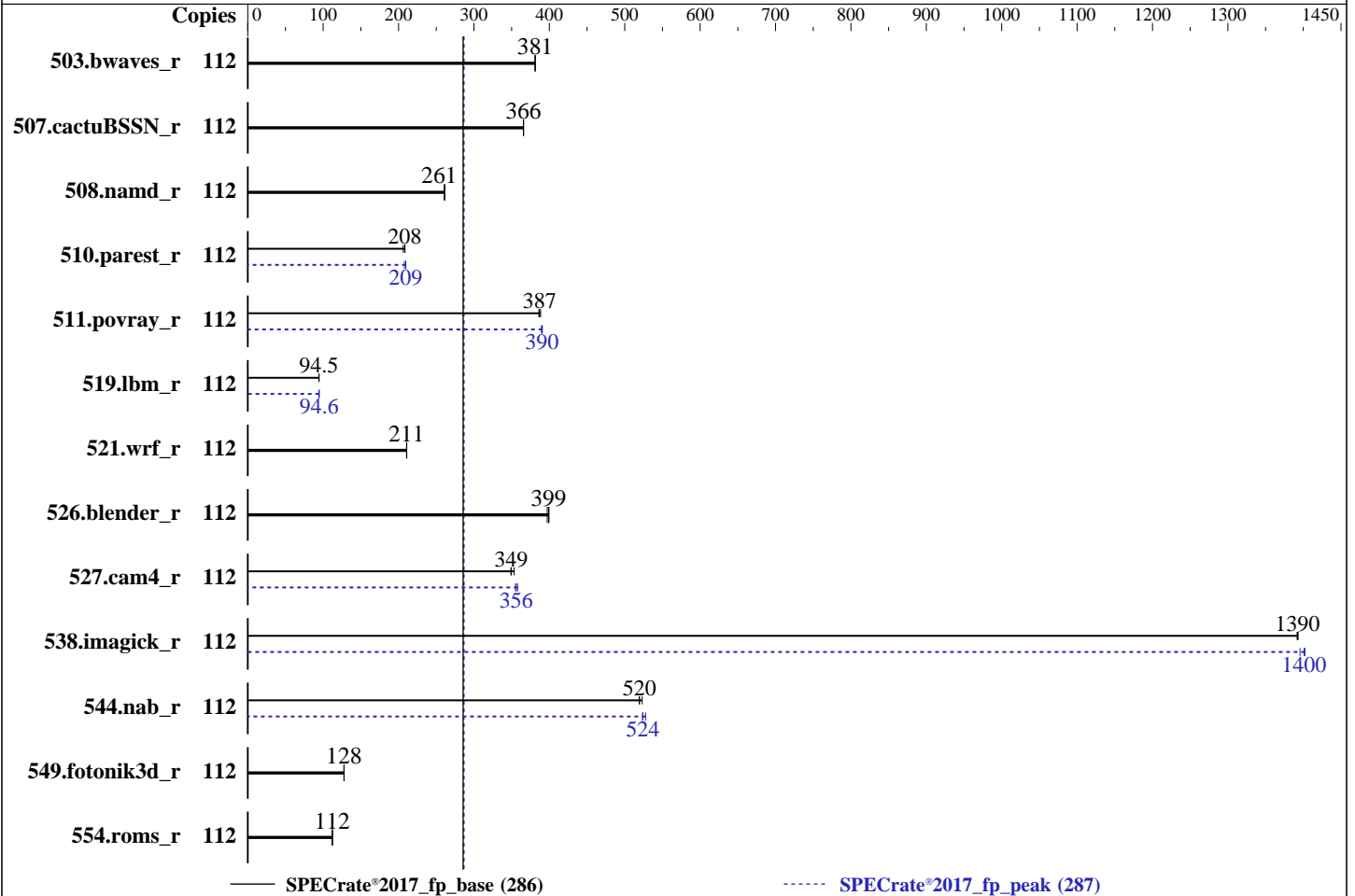
ProLiant DL325 Gen10 Plus v2  
(2.00 GHz, AMD EPYC 7663)

SPECrate®2017\_fp\_base = 286

SPECrate®2017\_fp\_peak = 287

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

Test Date: Apr-2021  
Hardware Availability: Jun-2021  
Software Availability: Mar-2021



### Hardware

CPU Name: AMD EPYC 7663  
 Max MHz: 3500  
 Nominal: 2000  
 Enabled: 56 cores, 1 chip, 2 threads/core  
 Orderable: 1 chip  
 Cache L1: 32 KB I + 32 KB D on chip per core  
 L2: 512 KB I+D on chip per core  
 L3: 256 MB I+D on chip per chip,  
 32 MB shared / 7 cores  
 Other: None  
 Memory: 1 TB (8 x 128 GB 4Rx4 PC4-3200AA-L)  
 Storage: 1 x 800 GB SAS SSD, RAID 0  
 Other: None

### Software

OS: Ubuntu 20.04.1 LTS (x86\_64)  
 Kernel 5.4.0-54-generic  
 Compiler: C/C++/Fortran: Version 3.0.0 of AOCC  
 Parallel: No  
 Firmware: HPE BIOS Version A43 v2.40 02/15/2021 released Mar-2021  
 File System: ext4  
 System State: Run level 5 (multi-user, GUI disabled)  
 Base Pointers: 64-bit  
 Peak Pointers: 64-bit  
 Other: jemalloc: jemalloc memory allocator library v5.1.0  
 Power Management: BIOS set to prefer performance at the cost of additional power usage



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## Results Table

Benchmark	Base						Peak							
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	112	2947	381	<b><u>2946</u></b>	<b><u>381</u></b>	2946	381	112	2947	381	<b><u>2946</u></b>	<b><u>381</u></b>	2946	381
507.cactuBSSN_r	112	387	366	<b><u>388</u></b>	<b><u>366</u></b>	388	366	112	387	366	<b><u>388</u></b>	<b><u>366</u></b>	388	366
508.namd_r	112	<b><u>408</u></b>	<b><u>261</u></b>	407	261	408	261	112	<b><u>408</u></b>	<b><u>261</u></b>	407	261	408	261
510.parest_r	112	1405	209	1421	206	<b><u>1407</u></b>	<b><u>208</u></b>	112	1398	210	1410	208	<b><u>1399</u></b>	<b><u>209</u></b>
511.povray_r	112	677	386	673	388	<b><u>676</u></b>	<b><u>387</u></b>	112	671	390	669	391	<b><u>670</u></b>	<b><u>390</u></b>
519.lbm_r	112	<b><u>1250</u></b>	<b><u>94.5</u></b>	1250	94.5	1250	94.5	112	1248	94.6	1248	94.6	<b><u>1248</u></b>	<b><u>94.6</u></b>
521.wrf_r	112	1190	211	1191	211	<b><u>1191</u></b>	<b><u>211</u></b>	112	1190	211	1191	211	<b><u>1191</u></b>	<b><u>211</u></b>
526.blender_r	112	429	397	427	399	<b><u>427</u></b>	<b><u>399</u></b>	112	429	397	427	399	<b><u>427</u></b>	<b><u>399</u></b>
527.cam4_r	112	<b><u>561</u></b>	<b><u>349</u></b>	554	353	561	349	112	547	358	552	355	<b><u>550</u></b>	<b><u>356</u></b>
538.imagick_r	112	<b><u>200</u></b>	<b><u>1390</u></b>	200	1390	200	1390	112	<b><u>199</u></b>	<b><u>1400</u></b>	199	1400	200	1400
544.nab_r	112	363	519	<b><u>363</u></b>	<b><u>520</u></b>	360	523	112	<b><u>360</u></b>	<b><u>524</u></b>	357	528	360	524
549.fotonik3d_r	112	<b><u>3418</u></b>	<b><u>128</u></b>	3417	128	3419	128	112	<b><u>3418</u></b>	<b><u>128</u></b>	3417	128	3419	128
554.roms_r	112	<b><u>1587</u></b>	<b><u>112</u></b>	1589	112	1584	112	112	<b><u>1587</u></b>	<b><u>112</u></b>	1589	112	1584	112

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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
'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>
'echo 8 > /proc/sys/vm/dirty_ratio' run as root to limit dirty cache to 8% of
memory.
'echo 1 > /proc/sys/vm/swappiness' run as root to limit swap usage to minimum
necessary.
'echo 1 > /proc/sys/vm/zone_reclaim_mode' run as root to free node-local memory
and avoid remote memory usage.
'sync; echo 3 > /proc/sys/vm/drop_caches' run as root to reset filesystem caches.
'sysctl -w kernel.randomize_va_space=0' run as root to disable address space layout
```

(Continued on next page)



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## Operating System Notes (Continued)

randomization (ASLR) to reduce run-to-run variability.  
'echo always > /sys/kernel/mm/transparent\_hugepage/enabled' and  
'echo always > /sys/kernel/mm/transparent\_hugepage/defrag' run as root to enable  
Transparent Hugepages (THP) for this run.  
'echo madvise > /sys/kernel/mm/transparent\_hugepage/enabled' run as root for peak  
runs of 628.pop2\_s and 638.imagick\_s to enable THP only on request.

The real test date is Apr-2021. The clock was mistakenly set to 2020 before the benchmark was run.

## Environment Variables Notes

Environment variables set by runcpu before the start of the run:

```
LD_LIBRARY_PATH =  
    "/cpu2017/amd_rate_aocc300_milan_A_lib/64;/cpu2017/amd_rate_aocc300_mila  
    n_A_lib/32:"  
MALLOCONF = "retain:true"
```

## General Notes

Binaries were compiled on a system with 2x AMD EPYC 7742 CPU + 1TiB Memory using opensUSE 15.2

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.

jemalloc: configured and built with GCC v4.8.2 in RHEL 7.4 (No options specified)

jemalloc 5.1.0 is available here:

<https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2>

## Platform Notes

BIOS Configuration

Workload Profile set to General Peak Frequency Compute

Determinism Control set to Manual

Performance Determinism set to Power Deterministic

Last-Level Cache (LLC) as NUMA Node set to Enabled

NUMA memory domains per socket set to One memory domain per socket

Thermal Configuration set to Maximum Cooling

Workload Profile set to Custom

Infinity Fabric Power Management set to Disabled

(Continued on next page)



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## Platform Notes (Continued)

Infinity Fabric Performance State set to P0  
Power Regulator set to OS Control Mode

Sysinfo program /cpu2017/bin/sysinfo  
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c  
running on dl325gen10plus Thu Apr 2 01:33:05 2020

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 7663 56-Core Processor  
1 "physical id"s (chips)  
112 "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 : 56  
siblings : 112  
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27  
28 29 30 32 33 34 35 36 37 38 40 41 42 43 44 45 46 48 49 50 51 52 53 54 56 57 58 59  
60 61 62

From lscpu:  
Architecture: x86\_64  
CPU op-mode(s): 32-bit, 64-bit  
Byte Order: Little Endian  
Address sizes: 48 bits physical, 48 bits virtual  
CPU(s): 112  
On-line CPU(s) list: 0-111  
Thread(s) per core: 2  
Core(s) per socket: 56  
Socket(s): 1  
NUMA node(s): 8  
Vendor ID: AuthenticAMD  
CPU family: 25  
Model: 1  
Model name: AMD EPYC 7663 56-Core Processor  
Stepping: 1  
CPU MHz: 2606.904  
BogoMIPS: 3992.63  
Virtualization: AMD-V  
L1d cache: 1.8 MiB  
L1i cache: 1.8 MiB  
L2 cache: 28 MiB  
L3 cache: 256 MiB  
NUMA node0 CPU(s): 0-6,56-62

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## Platform Notes (Continued)

```

NUMA node1 CPU(s):          7-13,63-69
NUMA node2 CPU(s):          14-20,70-76
NUMA node3 CPU(s):          21-27,77-83
NUMA node4 CPU(s):          28-34,84-90
NUMA node5 CPU(s):          35-41,91-97
NUMA node6 CPU(s):          42-48,98-104
NUMA node7 CPU(s):          49-55,105-111
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 and seccomp
Vulnerability Spectre v1:    Mitigation; usercopy/swapgs barriers and __user pointer sanitization
Vulnerability Spectre v2:    Mitigation; Full AMD retpoline, IBPB conditional, IBRS_FW, STIBP always-on, RSB filling
Vulnerability Srbds:         Not affected
Vulnerability Tsx async abort: Not affected
Flags:                        fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush mmx fxsr sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperfmperf pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2 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 invpcid cqm rdt_a rdseed adx smap clflushopt clwb sha_ni xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local clzero irperf xsaveerptr wbnoinvd arat npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter pfthreshold v_vmsave_vmload vgif umip pku ospke vaes vpclmulqdq rdpid overflow_recov succor smca

```

```

/proc/cpuinfo cache data
cache size : 512 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 6 56 57 58 59 60 61 62
node 0 size: 128774 MB
node 0 free: 128459 MB
node 1 cpus: 7 8 9 10 11 12 13 63 64 65 66 67 68 69
node 1 size: 129018 MB
node 1 free: 128670 MB
node 2 cpus: 14 15 16 17 18 19 20 70 71 72 73 74 75 76
node 2 size: 129020 MB
node 2 free: 128834 MB

```

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## Platform Notes (Continued)

```

node 3 cpus: 21 22 23 24 25 26 27 77 78 79 80 81 82 83
node 3 size: 129019 MB
node 3 free: 128845 MB
node 4 cpus: 28 29 30 31 32 33 34 84 85 86 87 88 89 90
node 4 size: 129020 MB
node 4 free: 128327 MB
node 5 cpus: 35 36 37 38 39 40 41 91 92 93 94 95 96 97
node 5 size: 129019 MB
node 5 free: 128815 MB
node 6 cpus: 42 43 44 45 46 47 48 98 99 100 101 102 103 104
node 6 size: 128996 MB
node 6 free: 128802 MB
node 7 cpus: 49 50 51 52 53 54 55 105 106 107 108 109 110 111
node 7 size: 129006 MB
node 7 free: 128832 MB
node distances:
node   0   1   2   3   4   5   6   7
  0:  10  11  12  12  12  12  12  12
  1:  11  10  12  12  12  12  12  12
  2:  12  12  10  11  12  12  12  12
  3:  12  12  11  10  12  12  12  12
  4:  12  12  12  12  10  11  12  12
  5:  12  12  12  12  11  10  12  12
  6:  12  12  12  12  12  12  10  11
  7:  12  12  12  12  12  12  11  10

```

```

From /proc/meminfo
MemTotal:      1056642672 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

```

/usr/bin/lsb_release -d
Ubuntu 20.04.1 LTS

```

```

From /etc/*release* /etc/*version*
debian_version: bullseye/sid
os-release:
NAME="Ubuntu"
VERSION="20.04.1 LTS (Focal Fossa)"
ID=ubuntu
ID_LIKE=debian
PRETTY_NAME="Ubuntu 20.04.1 LTS"
VERSION_ID="20.04"
HOME_URL="https://www.ubuntu.com/"
SUPPORT_URL="https://help.ubuntu.com/"

```

uname -a:

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## Platform Notes (Continued)

Linux dl325gen10plus 5.4.0-54-generic #60-Ubuntu SMP Fri Nov 6 10:37:59 UTC 2020  
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 and seccomp
CVE-2017-5753 (Spectre variant 1):	Mitigation: usercopy/swapgs barriers and __user pointer sanitization
CVE-2017-5715 (Spectre variant 2):	Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBP: always-on, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling):	Not affected
CVE-2019-11135 (TSX Asynchronous Abort):	Not affected

run-level 5 Apr 1 17:25

SPEC is set to: /cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/sdb2	ext4	733G	23G	672G	4%	/

From /sys/devices/virtual/dmi/id

Vendor:	HPE
Product:	ProLiant DL325 Gen10 Plus
Product Family:	ProLiant
Serial:	CN79290FKQ

Additional information from dmidecode 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:

8x UNKNOWN M386AAG40AM3-CWE 128 GB 4 rank 3200  
8x UNKNOWN NOT AVAILABLE

BIOS:

BIOS Vendor:	HPE
BIOS Version:	A43
BIOS Date:	02/15/2021
BIOS Revision:	2.40
Firmware Revision:	2.40

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## Platform Notes (Continued)

(End of data from sysinfo program)

## Compiler Version Notes

=====  
C | 519.lbm\_r(base, peak) 538.imagick\_r(base, peak)  
544.nab\_r(base, peak)

AMD clang version 12.0.0 (CLANG: AOCC\_3.0.0-Build#78 2020\_12\_10) (based on LLVM Mirror.Version.12.0.0)  
Target: x86\_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin  
-----

=====  
C++ | 508.namd\_r(base, peak) 510.parest\_r(base, peak)  
-----

AMD clang version 12.0.0 (CLANG: AOCC\_3.0.0-Build#78 2020\_12\_10) (based on LLVM Mirror.Version.12.0.0)  
Target: x86\_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin  
-----

=====  
C++, C | 511.povray\_r(base, peak) 526.blender\_r(base, peak)  
-----

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Target: x86\_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin  
-----

=====  
C++, C, Fortran | 507.cactuBSSN\_r(base, peak)  
-----

AMD clang version 12.0.0 (CLANG: AOCC\_3.0.0-Build#78 2020\_12\_10) (based on LLVM Mirror.Version.12.0.0)

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```

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InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
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InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

```

```

=====
Fortran          | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
                  | 554.roms_r(base, peak)

```

```

AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
  LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

```

```

=====
Fortran, C       | 521.wrf_r(base, peak) 527.cam4_r(base, peak)

```

```

AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
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Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

```

## Base Compiler Invocation

C benchmarks:  
clang

(Continued on next page)



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## Base Compiler Invocation (Continued)

C++ benchmarks:

clang++

Fortran benchmarks:

flang

Benchmarks using both Fortran and C:

flang clang

Benchmarks using both C and C++:

clang++ clang

Benchmarks using Fortran, C, and C++:

clang++ clang flang

## Base Portability Flags

503.bwaves\_r: -DSPEC\_LP64  
507.cactuBSSN\_r: -DSPEC\_LP64  
508.namd\_r: -DSPEC\_LP64  
510.parest\_r: -DSPEC\_LP64  
511.povray\_r: -DSPEC\_LP64  
519.lbm\_r: -DSPEC\_LP64  
521.wrf\_r: -DSPEC\_CASE\_FLAG -Mbyteswapio -DSPEC\_LP64  
526.blender\_r: -funsigned-char -D\_\_BOOL\_DEFINED -DSPEC\_LP64  
527.cam4\_r: -DSPEC\_CASE\_FLAG -DSPEC\_LP64  
538.imagick\_r: -DSPEC\_LP64  
544.nab\_r: -DSPEC\_LP64  
549.fotonik3d\_r: -DSPEC\_LP64  
554.roms\_r: -DSPEC\_LP64

## Base Optimization Flags

C benchmarks:

-m64 -flto -Wl,-mllvm -Wl,-region-vectorize  
-Wl,-mllvm -Wl,-function-specialize  
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math  
-march=znver3 -fveclib=AMDLIBM -fstruct-layout=5  
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000  
-fremap-arrays -mllvm -function-specialize -flv-function-specialization  
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true

(Continued on next page)



# SPEC CPU®2017 Floating Point Rate Result

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**Hewlett Packard Enterprise**

(Test Sponsor: HPE)

**ProLiant DL325 Gen10 Plus v2**  
(2.00 GHz, AMD EPYC 7663)

**SPECrate®2017\_fp\_base = 286**

**SPECrate®2017\_fp\_peak = 287**

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

**Test Date:** Apr-2021  
**Hardware Availability:** Jun-2021  
**Software Availability:** Mar-2021

## Base Optimization Flags (Continued)

C benchmarks (continued):

```
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3 -z muldefs  
-lamdlibm -ljemalloc -lflang -lflangrti
```

C++ benchmarks:

```
-m64 -std=c++98 -mno-adx -mno-sse4a  
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -flto  
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize  
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math  
-march=znver3 -fveclib=AMDLIBM -mllvm -enable-partial-unswitch  
-mllvm -unroll-threshold=100 -finline-aggressive  
-flv-function-specialization -mllvm -loop-unswitch-threshold=200000  
-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch  
-mllvm -extra-vectorizer-passes -mllvm -reduce-array-computations=3  
-mllvm -global-vectorize-slp=true -mllvm -convert-pow-exp-to-int=false  
-z muldefs -lamdlibm -ljemalloc -lflang -lflangrti
```

Fortran benchmarks:

```
-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching  
-Wl,-mllvm -Wl,-enable-licm-vrp -flto -Wl,-mllvm -Wl,-region-vectorize  
-Wl,-mllvm -Wl,-function-specialize  
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Hz,1,0x1 -O3 -ffast-math  
-march=znver3 -fveclib=AMDLIBM -Kieee -Mrecursive  
-mllvm -fuse-tile-inner-loop -funroll-loops  
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop  
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3  
-mllvm -global-vectorize-slp=true -z muldefs -lamdlibm -ljemalloc  
-lflang -lflangrti
```

Benchmarks using both Fortran and C:

```
-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching  
-Wl,-mllvm -Wl,-enable-licm-vrp -flto -Wl,-mllvm -Wl,-region-vectorize  
-Wl,-mllvm -Wl,-function-specialize  
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math  
-march=znver3 -fveclib=AMDLIBM -fstruct-layout=5  
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000  
-fremap-arrays -mllvm -function-specialize -flv-function-specialization  
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true  
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3 -Hz,1,0x1  
-Kieee -Mrecursive -mllvm -fuse-tile-inner-loop -funroll-loops  
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop -z muldefs  
-lamdlibm -ljemalloc -lflang -lflangrti
```

(Continued on next page)



# SPEC CPU®2017 Floating Point Rate Result

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**Hewlett Packard Enterprise**

(Test Sponsor: HPE)

ProLiant DL325 Gen10 Plus v2  
(2.00 GHz, AMD EPYC 7663)

SPECrate®2017\_fp\_base = 286

SPECrate®2017\_fp\_peak = 287

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

**Test Date:** Apr-2021  
**Hardware Availability:** Jun-2021  
**Software Availability:** Mar-2021

## Base Optimization Flags (Continued)

Benchmarks using both C and C++:

```
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -flto
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -fstruct-layout=5
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-freemap-arrays -mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -enable-partial-unswitch -mllvm -unroll-threshold=100
-finline-aggressive -mllvm -loop-unswitch-threshold=200000
-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
-mllvm -extra-vectorizer-passes -mllvm -convert-pow-exp-to-int=false
-z muldefs -lamdlibm -ljemalloc -lflang -lflangrti
```

Benchmarks using Fortran, C, and C++:

```
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -flto
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -fstruct-layout=5
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-freemap-arrays -mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -enable-partial-unswitch -mllvm -unroll-threshold=100
-finline-aggressive -mllvm -loop-unswitch-threshold=200000
-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
-mllvm -extra-vectorizer-passes -mllvm -convert-pow-exp-to-int=false
-Hz,1,0x1 -Kieee -Mrecursive -mllvm -fuse-tile-inner-loop
-funroll-loops -mllvm -lsr-in-nested-loop -z muldefs -lamdlibm
-ljemalloc -lflang -lflangrti
```

## Base Other Flags

C benchmarks:

```
-Wno-unused-command-line-argument
```

C++ benchmarks:

```
-Wno-unused-command-line-argument
```

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# SPEC CPU®2017 Floating Point Rate Result

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**Hewlett Packard Enterprise**

(Test Sponsor: HPE)

**ProLiant DL325 Gen10 Plus v2**

(2.00 GHz, AMD EPYC 7663)

**SPECrate®2017\_fp\_base = 286**

**SPECrate®2017\_fp\_peak = 287**

**CPU2017 License:** 3

**Test Sponsor:** HPE

**Tested by:** HPE

**Test Date:** Apr-2021

**Hardware Availability:** Jun-2021

**Software Availability:** Mar-2021

## Base Other Flags (Continued)

Fortran benchmarks:

-Wno-unused-command-line-argument

Benchmarks using both Fortran and C:

-Wno-unused-command-line-argument

Benchmarks using both C and C++:

-Wno-unused-command-line-argument

Benchmarks using Fortran, C, and C++:

-Wno-unused-command-line-argument

## Peak Compiler Invocation

C benchmarks:

clang

C++ benchmarks:

clang++

Fortran benchmarks:

flang

Benchmarks using both Fortran and C:

flang clang

Benchmarks using both C and C++:

clang++ clang

Benchmarks using Fortran, C, and C++:

clang++ clang flang

## Peak Portability Flags

Same as Base Portability Flags

## Peak Optimization Flags

C benchmarks:

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ProLiant DL325 Gen10 Plus v2  
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SPECrate®2017\_fp\_base = 286

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

**Test Date:** Apr-2021  
**Hardware Availability:** Jun-2021  
**Software Availability:** Mar-2021

## Peak Optimization Flags (Continued)

```
519.lbm_r: -m64 -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -fstruct-layout=7
-mllvm -unroll-threshold=50 -fremap-arrays
-flv-function-specialization -mllvm -inline-threshold=1000
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-licm-vrp
-mllvm -reduce-array-computations=3 -lamdlibm -ljemalloc
```

538.imagick\_r: Same as 519.lbm\_r

```
544.nab_r: -m64 -flto -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize -Ofast -march=znver3
-fveclib=AMDLIBM -fstruct-layout=7
-mllvm -unroll-threshold=50 -fremap-arrays
-flv-function-specialization -mllvm -inline-threshold=1000
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-licm-vrp
-mllvm -reduce-array-computations=3 -lamdlibm -ljemalloc
```

C++ benchmarks:

508.namd\_r: basepeak = yes

```
510.parest_r: -m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-suppress-fmas
-Wl,-mllvm -Wl,-function-specialize -Ofast -march=znver3
-fveclib=AMDLIBM -finline-aggressive
-mllvm -unroll-threshold=100 -flv-function-specialization
-mllvm -enable-licm-vrp -mllvm -reroll-loops
-mllvm -aggressive-loop-unswitch
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -lamdlibm -ljemalloc
```

Fortran benchmarks:

503.bwaves\_r: basepeak = yes

549.fotonik3d\_r: basepeak = yes

554.roms\_r: basepeak = yes

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SPECrate®2017\_fp\_base = 286

SPECrate®2017\_fp\_peak = 287

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

**Test Date:** Apr-2021  
**Hardware Availability:** Jun-2021  
**Software Availability:** Mar-2021

## Peak Optimization Flags (Continued)

Benchmarks using both Fortran and C:

521.wrf\_r: basepeak = yes

```
527.cam4_r: -m64 -Wl,-mllvm -Wl,-enable-x86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-force-vector-interleave=1 -Ofast
-march=znver3 -fveclib=AMDLIBM -fstruct-layout=7
-mllvm -unroll-threshold=50 -fremap-arrays
-flv-function-specialization -mllvm -inline-threshold=1000
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-licm-vrp
-mllvm -reduce-array-computations=3 -O3 -ffast-math
-funroll-loops -mllvm -extra-vectorizer-passes
-mllvm -lsr-in-nested-loop -Mrecursive -lamdlibm
-ljemalloc -lflang -lflangrti
```

Benchmarks using both C and C++:

```
511.povray_r: -m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -fstruct-layout=7
-mllvm -unroll-threshold=50 -fremap-arrays
-flv-function-specialization -mllvm -inline-threshold=1000
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-licm-vrp
-mllvm -reduce-array-computations=3 -finline-aggressive
-mllvm -unroll-threshold=100 -mllvm -reroll-loops
-mllvm -aggressive-loop-unswitch -lamdlibm -ljemalloc
```

526.blender\_r: basepeak = yes

Benchmarks using Fortran, C, and C++:

507.cactuBSSN\_r: basepeak = yes



# SPEC CPU®2017 Floating Point Rate Result

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**Hewlett Packard Enterprise**

(Test Sponsor: HPE)

ProLiant DL325 Gen10 Plus v2  
(2.00 GHz, AMD EPYC 7663)

SPECrate®2017\_fp\_base = 286

SPECrate®2017\_fp\_peak = 287

**CPU2017 License:** 3

**Test Sponsor:** HPE

**Tested by:** HPE

**Test Date:** Apr-2021

**Hardware Availability:** Jun-2021

**Software Availability:** Mar-2021

## Peak Other Flags

C benchmarks:

-Wno-unused-command-line-argument

C++ benchmarks:

-Wno-unused-command-line-argument

Fortran benchmarks:

-Wno-unused-command-line-argument

Benchmarks using both Fortran and C:

-Wno-unused-command-line-argument

Benchmarks using both C and C++:

-Wno-unused-command-line-argument

Benchmarks using Fortran, C, and C++:

-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/aocc300-flags-A1.html>

<http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-V1.2-EPYC-revP.html>

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

<http://www.spec.org/cpu2017/flags/aocc300-flags-A1.xml>

<http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-V1.2-EPYC-revP.xml>

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Tested with SPEC CPU®2017 v1.1.5 on 2020-04-01 21:33:05-0400.

Report generated on 2021-05-12 13:43:01 by CPU2017 PDF formatter v6442.

Originally published on 2021-05-11.