SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)
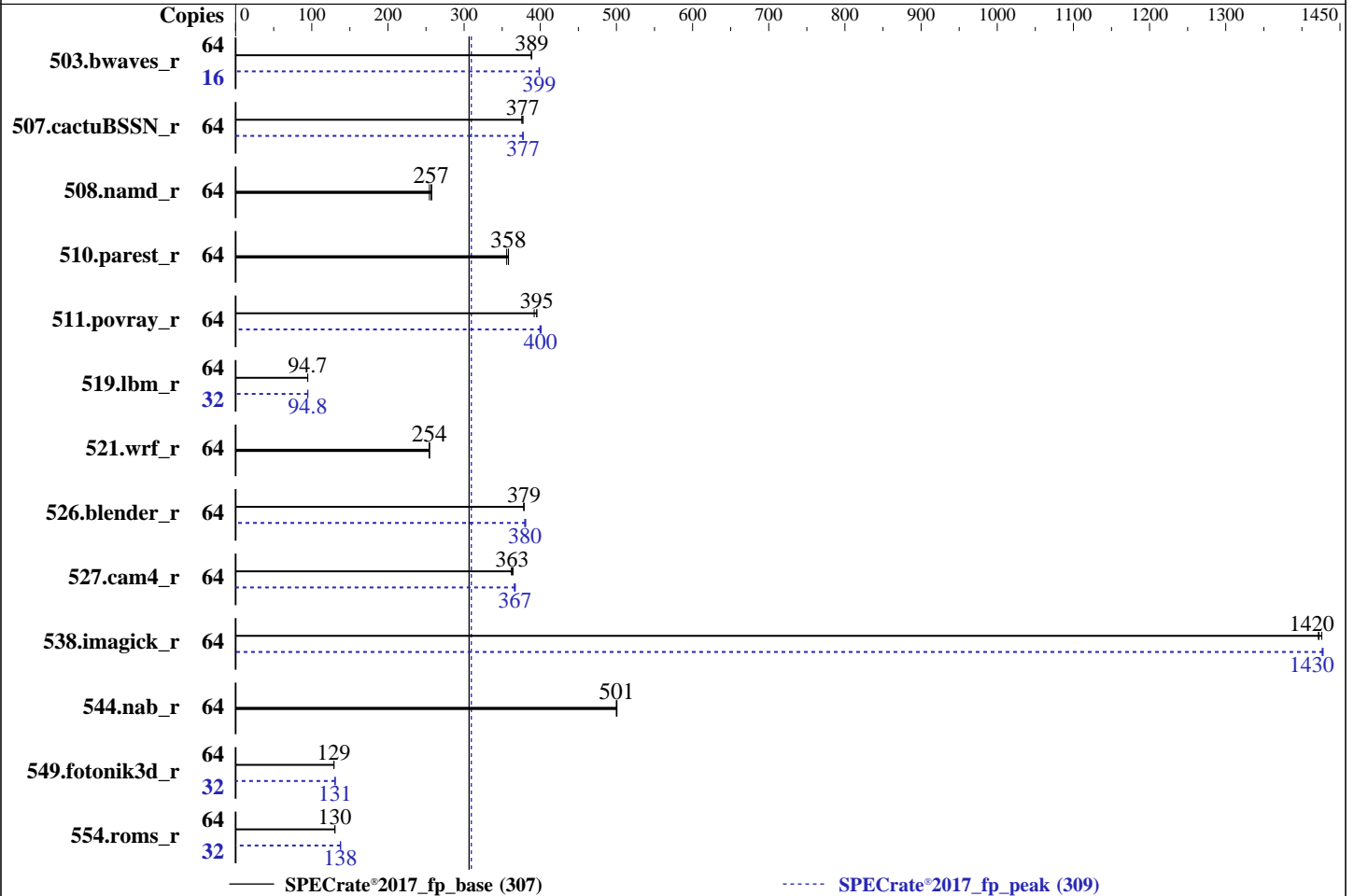
ProLiant DL345 Gen10 Plus
(2.00 GHz, AMD EPYC 7713P)

SPECrate®2017_fp_base = 307

SPECrate®2017_fp_peak = 309

CPU2017 License: 3   **Test Date:** Sep-2021
Test Sponsor: HPE   **Hardware Availability:** Jun-2021
Tested by: HPE   **Software Availability:** Aug-2021

Benchmark	Copies	base	peak
503.bwaves_r	64 / 16	389	399
507.cactuBSSN_r	64	377	377
508.namd_r	64	257	
510.parest_r	64	358	
511.povray_r	64	395	400
519.lbm_r	64 / 32	94.7	94.8
521.wrf_r	64	254	
526.blender_r	64	379	380
527.cam4_r	64	363	367
538.imagick_r	64	1420	1430
544.nab_r	64	501	
549.fotonik3d_r	64 / 32	129	131
554.roms_r	64 / 32	130	138

——— SPECrate®2017_fp_base (307)   ------- SPECrate®2017_fp_peak (309)

Hardware

CPU Name: AMD EPYC 7713P
 Max MHz: 3675
 Nominal: 2000
Enabled: 64 cores, 1 chip
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 / 8 cores
 Other: None
Memory: 1 TB (8 x 128 GB 4Rx4 PC4-3200AA-L)
Storage: 1 x 480 GB SAS SSD, RAID 0
Other: None

Software

OS: Ubuntu 20.04.1 LTS (x86_64)
 Kernel 5.4.0-84-generic
Compiler: C/C++/Fortran: Version 3.0.0 of AOCC
Parallel: No
Firmware: HPE BIOS Version A43 v2.52 08/24/2021 released Aug-2021
File System: ext4
System State: Run level 5 (multi-user)
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

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL345 Gen10 Plus
(2.00 GHz, AMD EPYC 7713P)

SPECrate®2017_fp_base = 307

SPECrate®2017_fp_peak = 309

CPU2017 License: 3	**Test Date:**	Sep-2021
Test Sponsor: HPE	**Hardware Availability:**	Jun-2021
Tested by: HPE	**Software Availability:**	Aug-2021

Results Table

Benchmark	Base						Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	64	1651	389	**1651**	**389**	1654	388	16	**402**	**399**	402	399	403	398
507.cactuBSSN_r	64	216	376	**215**	**377**	215	377	64	215	377	**215**	**377**	215	377
508.namd_r	64	239	254	236	257	**237**	**257**	64	239	254	236	257	**237**	**257**
510.parest_r	64	467	358	**468**	**358**	470	356	64	467	358	**468**	**358**	470	356
511.povray_r	64	378	395	381	392	**378**	**395**	64	374	400	**373**	**400**	372	401
519.lbm_r	64	712	94.7	713	94.7	**712**	**94.7**	32	356	94.8	**356**	**94.8**	357	94.5
521.wrf_r	64	**563**	**254**	563	255	564	254	64	**563**	**254**	563	255	564	254
526.blender_r	64	257	379	258	378	**257**	**379**	64	257	380	256	381	**257**	**380**
527.cam4_r	64	**308**	**363**	309	362	307	364	64	305	367	306	366	**305**	**367**
538.imagick_r	64	112	1420	112	1430	**112**	**1420**	64	111	1430	**112**	**1430**	112	1430
544.nab_r	64	**215**	**501**	216	500	215	501	64	**215**	**501**	216	500	215	501
549.fotonik3d_r	64	1933	129	1932	129	**1932**	**129**	32	955	131	**955**	**131**	955	131
554.roms_r	64	779	131	781	130	**781**	**130**	32	**369**	**138**	369	138	370	137
SPECrate®2017_fp_base =	**307**												
SPECrate®2017_fp_peak =	**309**												

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>
'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)

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

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL345 Gen10 Plus
(2.00 GHz, AMD EPYC 7713P)

SPECrate®2017_fp_base = 307

SPECrate®2017_fp_peak = 309

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 for peak
integer runs and all FP runs to enable Transparent Hugepages (THP).
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root for base
integer runs to enable THP only on request.
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
     "/home/cpu2017/amd_rate_aocc300_milan_B_lib/lib;/home/cpu2017/amd_rate_a
     occ300_milan_B_lib/lib32:"
MALLOC_CONF = "retain:true"
```

General Notes

```
Binaries were compiled on a system with 2x AMD EPYC 7742 CPU + 512GiB 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 Throughput Compute
AMD SMT Option set to Disabled
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 Four memory domains per socket
Data Fabric C-State Enable set to Force Enabled
Thermal Configuration set to Maximum Cooling
Workload Profile set to Custom
L1 HW Prefetcher set to Disabled
```

(Continued on next page)

Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL345 Gen10 Plus
(2.00 GHz, AMD EPYC 7713P)

SPECrate®2017_fp_base = 307

SPECrate®2017_fp_peak = 309

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

Test Date: Sep-2021
Hardware Availability: Jun-2021
Software Availability: Aug-2021

Platform Notes (Continued)

```
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on admin1 Mon Sep 13 12:10:06 2021

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 7713P 64-Core Processor
      1  "physical id"s (chips)
      64 "processors"
   cores, siblings (Caution: counting these is hw and system dependent. The following
   excerpts from /proc/cpuinfo might not be reliable.  Use with caution.)
      cpu cores : 64
      siblings  : 64
      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

From lscpu from util-linux 2.34:
   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):                   64
   On-line CPU(s) list:      0-63
   Thread(s) per core:       1
   Core(s) per socket:       64
   Socket(s):                1
   NUMA node(s):             8
   Vendor ID:                AuthenticAMD
   CPU family:               25
   Model:                    1
   Model name:               AMD EPYC 7713P 64-Core Processor
   Stepping:                 1
   CPU MHz:                  1784.118
   BogoMIPS:                 3992.45
   Virtualization:           AMD-V
   L1d cache:                2 MiB
   L1i cache:                2 MiB
   L2 cache:                 32 MiB
   L3 cache:                 256 MiB
   NUMA node0 CPU(s):        0-7
   NUMA node1 CPU(s):        8-15
   NUMA node2 CPU(s):        16-23
```

(Continued on next page)

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL345 Gen10 Plus
(2.00 GHz, AMD EPYC 7713P)

SPECrate®2017_fp_base = 307

SPECrate®2017_fp_peak = 309

CPU2017 License: 3		**Test Date:**	Sep-2021
Test Sponsor:	HPE	**Hardware Availability:**	Jun-2021
Tested by:	HPE	**Software Availability:**	Aug-2021

Platform Notes (Continued)

```
      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
      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 disabled, 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 sse 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

  From lscpu --cache:
      NAME ONE-SIZE ALL-SIZE WAYS TYPE          LEVEL
      L1d       32K      2M     8 Data            1
      L1i       32K      2M     8 Instruction     1
      L2       512K     32M     8 Unified         2
      L3        32M    256M    16 Unified         3

  /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 7
    node 0 size: 128776 MB
    node 0 free: 128559 MB
    node 1 cpus: 8 9 10 11 12 13 14 15
```

(Continued on next page)

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL345 Gen10 Plus
(2.00 GHz, AMD EPYC 7713P)

SPECrate®2017_fp_base = 307

SPECrate®2017_fp_peak = 309

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

Test Date: Sep-2021
Hardware Availability: Jun-2021
Software Availability: Aug-2021

Platform Notes (Continued)

```
   node 1 size: 129020 MB
   node 1 free: 128846 MB
   node 2 cpus: 16 17 18 19 20 21 22 23
   node 2 size: 129022 MB
   node 2 free: 128857 MB
   node 3 cpus: 24 25 26 27 28 29 30 31
   node 3 size: 129021 MB
   node 3 free: 128857 MB
   node 4 cpus: 32 33 34 35 36 37 38 39
   node 4 size: 129022 MB
   node 4 free: 128797 MB
   node 5 cpus: 40 41 42 43 44 45 46 47
   node 5 size: 128996 MB
   node 5 free: 128728 MB
   node 6 cpus: 48 49 50 51 52 53 54 55
   node 6 size: 129022 MB
   node 6 free: 128829 MB
   node 7 cpus: 56 57 58 59 60 61 62 63
   node 7 size: 129008 MB
   node 7 free: 128852 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:       1056654148 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"
```

(Continued on next page)

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL345 Gen10 Plus
(2.00 GHz, AMD EPYC 7713P)

CPU2017 License: 3   **Test Date:** Sep-2021
Test Sponsor: HPE   **Hardware Availability:** Jun-2021
Tested by: HPE   **Software Availability:** Aug-2021

Platform Notes (Continued)

```
        VERSION_ID="20.04"
        HOME_URL="https://www.ubuntu.com/"
        SUPPORT_URL="https://help.ubuntu.com/"

uname -a:
   Linux admin1 5.4.0-84-generic #94-Ubuntu SMP Thu Aug 26 20:27:37 UTC 2021 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:
                                              disabled, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort):      Not affected

run-level 5 Sep 13 11:51

SPEC is set to: /home/cpu2017
   Filesystem                      Type  Size  Used Avail Use% Mounted on
   /dev/mapper/ubuntu--vg-ubuntu--lv ext4  196G   16G  171G   9% /

From /sys/devices/virtual/dmi/id
    Vendor:         HPE
    Product:        ProLiant DL345 Gen10 Plus
    Product Family: ProLiant
    Serial:         J20APP000K

Additional information from dmidecode 3.2 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 Samsung M386AAG40AM3-CWE 128 GB 4 rank 3200
    8x UNKNOWN NOT AVAILABLE

  BIOS:
```

(Continued on next page)

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL345 Gen10 Plus
(2.00 GHz, AMD EPYC 7713P)

SPECrate®2017_fp_base = 307

SPECrate®2017_fp_peak = 309

CPU2017 License: 3		**Test Date:** Sep-2021
Test Sponsor: HPE		**Hardware Availability:** Jun-2021
Tested by: HPE		**Software Availability:** Aug-2021

Platform Notes (Continued)

```
    BIOS Vendor:       HPE
    BIOS Version:      A43
    BIOS Date:         08/24/2021
    BIOS Revision:     2.52
    Firmware Revision: 2.55

  (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)
------------------------------------------------------------------------------
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
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
------------------------------------------------------------------------------
```

(Continued on next page)

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL345 Gen10 Plus
(2.00 GHz, AMD EPYC 7713P)

SPECrate®2017_fp_base = 307

SPECrate®2017_fp_peak = 309

CPU2017 License:	3	**Test Date:**	Sep-2021
Test Sponsor:	HPE	**Hardware Availability:**	Jun-2021
Tested by:	HPE	**Software Availability:**	Aug-2021

Compiler Version Notes (Continued)

```
==============================================================================
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)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
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
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         | 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
  LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
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
------------------------------------------------------------------------------
```

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL345 Gen10 Plus
(2.00 GHz, AMD EPYC 7713P)

SPECrate®2017_fp_base = 307

SPECrate®2017_fp_peak = 309

CPU2017 License:	3	**Test Date:**	Sep-2021
Test Sponsor:	HPE	**Hardware Availability:**	Jun-2021
Tested by:	HPE	**Software Availability:**	Aug-2021

Base 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
```

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
```

(Continued on next page)

Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL345 Gen10 Plus
(2.00 GHz, AMD EPYC 7713P)

SPECrate®2017_fp_base = 307

SPECrate®2017_fp_peak = 309

CPU2017 License:	3	**Test Date:**	Sep-2021
Test Sponsor:	HPE	**Hardware Availability:**	Jun-2021
Tested by:	HPE	**Software Availability:**	Aug-2021

Base Optimization Flags (Continued)

C benchmarks (continued):
```
-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 -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
```

(Continued on next page)

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

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL345 Gen10 Plus
(2.00 GHz, AMD EPYC 7713P)

SPECrate®2017_fp_base = 307

SPECrate®2017_fp_peak = 309

CPU2017 License:	3	**Test Date:**	Sep-2021
Test Sponsor:	HPE	**Hardware Availability:**	Jun-2021
Tested by:	HPE	**Software Availability:**	Aug-2021

Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
```
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop -z muldefs
-lamdlibm -ljemalloc -lflang -lflangrti
```

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
-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
-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
-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
-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
```

(Continued on next page)

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL345 Gen10 Plus
(2.00 GHz, AMD EPYC 7713P)

SPECrate®2017_fp_base = 307

SPECrate®2017_fp_peak = 309

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

Test Date: Sep-2021
Hardware Availability: Jun-2021
Software Availability: Aug-2021

Base Other Flags (Continued)

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
```

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
```

Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL345 Gen10 Plus
(2.00 GHz, AMD EPYC 7713P)

SPECrate®2017_fp_base = 307

SPECrate®2017_fp_peak = 309

CPU2017 License:	3	**Test Date:**	Sep-2021
Test Sponsor:	HPE	**Hardware Availability:**	Jun-2021
Tested by:	HPE	**Software Availability:**	Aug-2021

Peak Optimization Flags

C benchmarks:

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: basepeak = yes

C++ benchmarks:

508.namd_r: basepeak = yes

510.parest_r: basepeak = yes

Fortran benchmarks:

503.bwaves_r: -m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-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 -Kieee -Mrecursive
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -enable-licm-vrp
-lamdlibm -ljemalloc -lflang -lflangrti

549.fotonik3d_r: Same as 503.bwaves_r

554.roms_r: -m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-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 -Kieee -Mrecursive
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -enable-licm-vrp
-Hz,1,0x1 -mllvm -fuse-tile-inner-loop -lamdlibm
-ljemalloc -lflang -lflangrti

(Continued on next page)

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

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL345 Gen10 Plus
(2.00 GHz, AMD EPYC 7713P)

SPECrate®2017_fp_base = 307

SPECrate®2017_fp_peak = 309

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

Test Date: Sep-2021
Hardware Availability: Jun-2021
Software Availability: Aug-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++:
-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

Benchmarks using Fortran, C, and C++:
-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
-mllvm -unroll-threshold=100 -mllvm -loop-unswitch-threshold=200000

(Continued on next page)

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL345 Gen10 Plus
(2.00 GHz, AMD EPYC 7713P)

SPECrate®2017_fp_base = 307

SPECrate®2017_fp_peak = 309

CPU2017 License: 3		**Test Date:**	Sep-2021
Test Sponsor:	HPE	**Hardware Availability:**	Jun-2021
Tested by:	HPE	**Software Availability:**	Aug-2021

Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
```
-finline-aggressive -mllvm -reroll-loops
-mllvm -aggressive-loop-unswitch -mllvm -extra-vectorizer-passes
-mllvm -convert-pow-exp-to-int=false -Kieee -Mrecursive -lamdlibm
-ljemalloc -lflang -lflangrti
```

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/HPE-Platform-Flags-AMD-V1.2-EPYC-revQ.html
http://www.spec.org/cpu2017/flags/aocc300-flags-B2.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-V1.2-EPYC-revQ.xml
http://www.spec.org/cpu2017/flags/aocc300-flags-B2.xml

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 2021-09-13 08:10:05-0400.
Report generated on 2021-10-12 17:18:28 by CPU2017 PDF formatter v6442.
Originally published on 2021-10-12.