SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL365 Gen10 Plus v2
AMD EPYC 7373X

$SPECrate®2017\_fp\_base = 384$

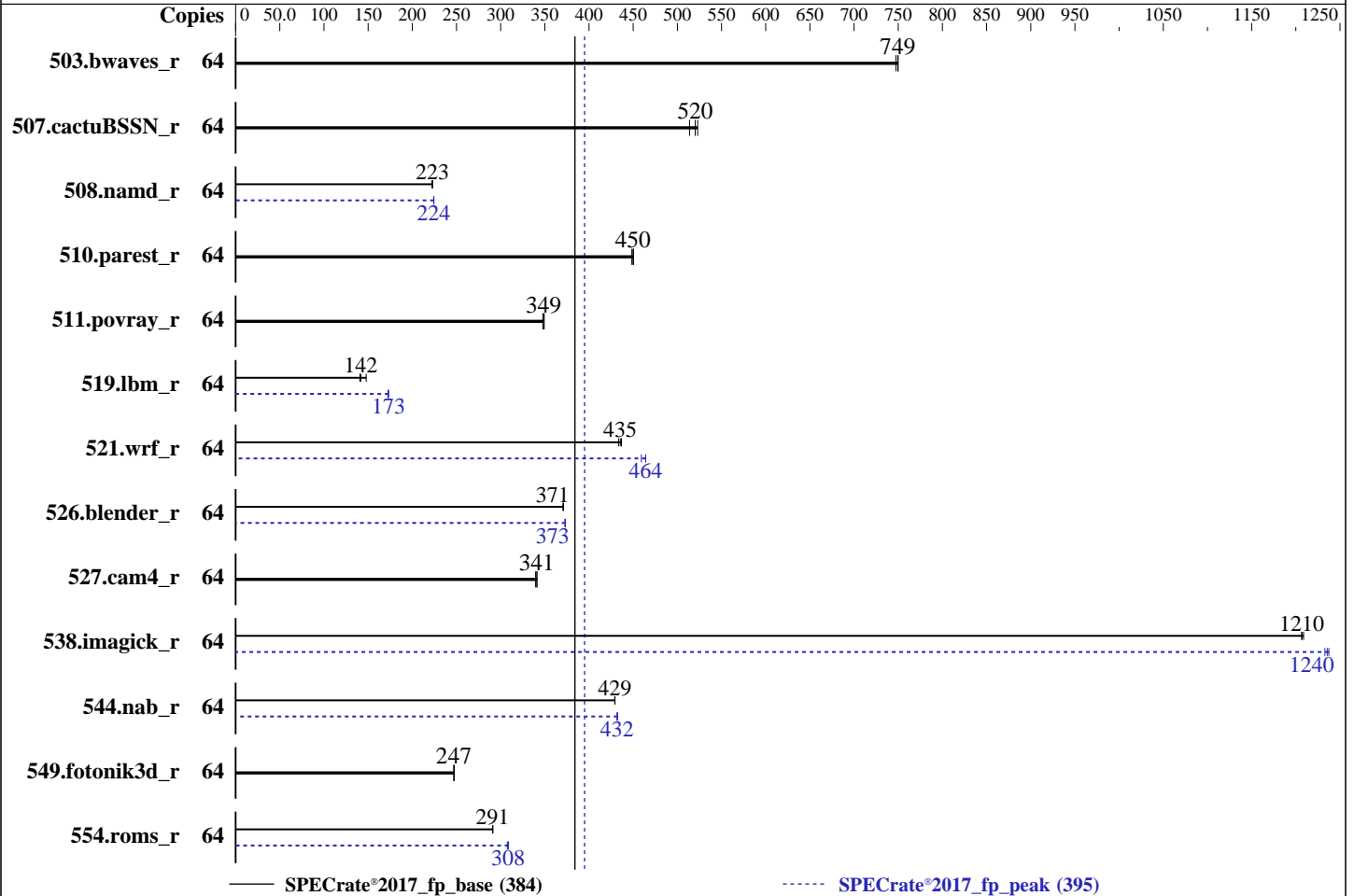$SPECrate®2017\_fp\_peak = 395$

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Apr-2022

Hardware Availability: Mar-2022

Software Availability: Jan-2022

Benchmark	Copies	base	peak
503.bwaves_r	64	749	
507.cactuBSSN_r	64	520	
508.namd_r	64	223	224
510.parest_r	64	450	
511.povray_r	64	349	
519.lbm_r	64	142	173
521.wrf_r	64	435	464
526.blender_r	64	371	373
527.cam4_r	64	341	
538.imagick_r	64	1210	1240
544.nab_r	64	429	432
549.fotonik3d_r	64	247	
554.roms_r	64	291	308

——— SPECrate®2017_fp_base (384)   - - - - SPECrate®2017_fp_peak (395)

Hardware

CPU Name: AMD EPYC 7373X
 Max MHz: 3800
 Nominal: 3050
Enabled: 32 cores, 2 chips, 2 threads/core
Orderable: 1, 2 chip(s)
Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 512 KB I+D on chip per core
 L3: 768 MB I+D on chip per chip,
  96 MB shared / 2 cores
 Other: None
Memory: 2 TB (16 x 128 GB 4Rx4 PC4-3200AA-L)
Storage: 1 x 500 GB SAS SSD, RAID 0
Other: None

Software

OS: Ubuntu 20.04.3 LTS (x86_64)
  Kernel 5.13.0-28-generic
Compiler: C/C++/Fortran: Version 3.2.0 of AOCC
Parallel: No
Firmware: HPE BIOS Version A42 v2.56 02/10/2022 released
  Feb-2022
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 and OS set to prefer performance at the
  cost of additional power usage

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL365 Gen10 Plus v2
AMD EPYC 7373X

SPECrate®2017_fp_base = 384

SPECrate®2017_fp_peak = 395

CPU2017 License: 3	**Test Date:** Apr-2022
Test Sponsor: HPE	**Hardware Availability:** Mar-2022
Tested by: HPE	**Software Availability:** Jan-2022

Results Table

Benchmark	Base						Peak					
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	64	859	747	**856**	**749**	856	750	64	859	747	**856**	**749**	856	750
507.cactuBSSN_r	64	155	523	158	514	**156**	**520**	64	155	523	158	514	**156**	**520**
508.namd_r	64	273	222	**273**	**223**	273	223	64	**271**	**224**	271	224	271	224
510.parest_r	64	**372**	**450**	372	450	373	448	64	**372**	**450**	372	450	373	448
511.povray_r	64	**429**	**349**	428	349	430	348	64	**429**	**349**	428	349	430	348
519.lbm_r	64	**476**	**142**	479	141	456	148	64	390	173	**390**	**173**	391	172
521.wrf_r	64	**329**	**435**	328	437	331	433	64	312	459	**309**	**464**	309	464
526.blender_r	64	263	371	263	371	**263**	**371**	64	261	373	262	373	**261**	**373**
527.cam4_r	64	328	341	330	340	**328**	**341**	64	328	341	330	340	**328**	**341**
538.imagick_r	64	132	1210	132	1210	**132**	**1210**	64	**129**	**1240**	129	1230	129	1240
544.nab_r	64	**251**	**429**	251	429	251	429	64	249	432	249	432	**249**	**432**
549.fotonik3d_r	64	1010	247	**1009**	**247**	1008	247	64	1010	247	**1009**	**247**	1008	247
554.roms_r	64	349	291	**350**	**291**	350	291	64	**330**	**308**	331	307	329	309
SPECrate®2017_fp_base =		**384**										
SPECrate®2017_fp_peak =		**395**										

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.

(Continued on next page)

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

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL365 Gen10 Plus v2
AMD EPYC 7373X

$SPECrate^{®}2017\_fp\_base = 384$

$SPECrate^{®}2017\_fp\_peak = 395$

CPU2017 License: 3		**Test Date:**	Apr-2022
Test Sponsor: HPE		**Hardware Availability:**	Mar-2022
Tested by: HPE		**Software Availability:**	Jan-2022

Operating System Notes (Continued)

```
To clear filesystem caches, 'sync; sysctl -w vm.drop_caches=3' run as root.
To disable address space layout randomization (ASLR) to reduce run-to-run
variability, 'sysctl -w kernel.randomize_va_space=0' run as root.

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.
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
     "/home/cpu2017_rate/amd_rate_aocc320_milanx_A_lib/lib;/home/cpu2017_rate
     /amd_rate_aocc320_milanx_A_lib/lib32:"
MALLOC_CONF = "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 Throughput 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 Four memory domains per socket
 Memory Interleaving set to Disabled
 Thermal Configuration set to Maximum Cooling
 Infinity Fabric Power Management set to Disabled
```

(Continued on next page)

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL365 Gen10 Plus v2
AMD EPYC 7373X

SPECrate®2017_fp_base = 384

SPECrate®2017_fp_peak = 395

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

Test Date: Apr-2022
Hardware Availability: Mar-2022
Software Availability: Jan-2022

Platform Notes (Continued)

```
    Infinity Fabric Performance State set to P0
  Workload Profile set to Custom
    L2 HW Prefetcher set to Disabled


  Sysinfo program /home/cpu2017_rate/bin/sysinfo
  Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
  running on admin1-ProLiant-DL365-Gen10-Plus Mon Jan 10 15:37:29 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 7373X 16-Core Processor
        2  "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 : 16
        siblings  : 32
        physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
        physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15


  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:       2
     Core(s) per socket:       16
     Socket(s):                2
     NUMA node(s):             16
     Vendor ID:                AuthenticAMD
     CPU family:               25
     Model:                    1
     Model name:               AMD EPYC 7373X 16-Core Processor
     Stepping:                 2
     Frequency boost:          enabled
     CPU MHz:                  3050.000
     CPU max MHz:              3050.0000
     CPU min MHz:              1500.0000
     BogoMIPS:                 6088.65
     Virtualization:           AMD-V
     L1d cache:                1 MiB
     L1i cache:                1 MiB
```

(Continued on next page)

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL365 Gen10 Plus v2
AMD EPYC 7373X

$SPECrate^{®}2017\_fp\_base = 384$

$SPECrate^{®}2017\_fp\_peak = 395$

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

Test Date: Apr-2022
Hardware Availability: Mar-2022
Software Availability: Jan-2022

Platform Notes (Continued)

```
    L2 cache:                      16 MiB
    L3 cache:                      1.5 GiB
    NUMA node0 CPU(s):             0,1,32,33
    NUMA node1 CPU(s):             2,3,34,35
    NUMA node2 CPU(s):             4,5,36,37
    NUMA node3 CPU(s):             6,7,38,39
    NUMA node4 CPU(s):             8,9,40,41
    NUMA node5 CPU(s):             10,11,42,43
    NUMA node6 CPU(s):             12,13,44,45
    NUMA node7 CPU(s):             14,15,46,47
    NUMA node8 CPU(s):             16,17,48,49
    NUMA node9 CPU(s):             18,19,50,51
    NUMA node10 CPU(s):            20,21,52,53
    NUMA node11 CPU(s):            22,23,54,55
    NUMA node12 CPU(s):            24,25,56,57
    NUMA node13 CPU(s):            26,27,58,59
    NUMA node14 CPU(s):            28,29,60,61
    NUMA node15 CPU(s):            30,31,62,63
    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 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 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 rdpru wbnoinvd amd_ppin arat
    npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists
    pausefilter pfthreshold v_vmsave_vmload vgif v_spec_ctrl umip pku ospke vaes
    vpclmulqdq rdpid overflow_recov succor smca

 From lscpu --cache:
    NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL
    L1d      32K       1M     8 Data            1
```

(Continued on next page)

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

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL365 Gen10 Plus v2
AMD EPYC 7373X

SPECrate®2017_fp_base = 384

SPECrate®2017_fp_peak = 395

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

Test Date: Apr-2022
Hardware Availability: Mar-2022
Software Availability: Jan-2022

Platform Notes (Continued)

```
    L1i           32K        1M     8 Instruction     1
    L2           512K       16M     8 Unified         2
    L3            96M      1.5G    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: 16 nodes (0-15)
   node 0 cpus: 0 1 32 33
   node 0 size: 128711 MB
   node 0 free: 128013 MB
   node 1 cpus: 2 3 34 35
   node 1 size: 129020 MB
   node 1 free: 128825 MB
   node 2 cpus: 4 5 36 37
   node 2 size: 129022 MB
   node 2 free: 128857 MB
   node 3 cpus: 6 7 38 39
   node 3 size: 129021 MB
   node 3 free: 128891 MB
   node 4 cpus: 8 9 40 41
   node 4 size: 129022 MB
   node 4 free: 128668 MB
   node 5 cpus: 10 11 42 43
   node 5 size: 129021 MB
   node 5 free: 128736 MB
   node 6 cpus: 12 13 44 45
   node 6 size: 129022 MB
   node 6 free: 128889 MB
   node 7 cpus: 14 15 46 47
   node 7 size: 129009 MB
   node 7 free: 128869 MB
   node 8 cpus: 16 17 48 49
   node 8 size: 129022 MB
   node 8 free: 128888 MB
   node 9 cpus: 18 19 50 51
   node 9 size: 129021 MB
   node 9 free: 128875 MB
   node 10 cpus: 20 21 52 53
   node 10 size: 129022 MB
   node 10 free: 128878 MB
   node 11 cpus: 22 23 54 55
   node 11 size: 129021 MB
   node 11 free: 128886 MB
   node 12 cpus: 24 25 56 57
```

(Continued on next page)

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

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL365 Gen10 Plus v2
AMD EPYC 7373X

SPECrate®2017_fp_base = 384

SPECrate®2017_fp_peak = 395

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

Test Date: Apr-2022
Hardware Availability: Mar-2022
Software Availability: Jan-2022

Platform Notes (Continued)

```
   node 12 size: 128989 MB
   node 12 free: 128846 MB
   node 13 cpus: 26 27 58 59
   node 13 size: 129021 MB
   node 13 free: 128879 MB
   node 14 cpus: 28 29 60 61
   node 14 size: 129022 MB
   node 14 free: 128801 MB
   node 15 cpus: 30 31 62 63
   node 15 size: 129018 MB
   node 15 free: 128788 MB
   node distances:
   node   0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
     0:  10  11  12  12  12  12  12  12  32  32  32  32  32  32  32  32
     1:  11  10  12  12  12  12  12  12  32  32  32  32  32  32  32  32
     2:  12  12  10  11  12  12  12  12  32  32  32  32  32  32  32  32
     3:  12  12  11  10  12  12  12  12  32  32  32  32  32  32  32  32
     4:  12  12  12  12  10  11  12  12  32  32  32  32  32  32  32  32
     5:  12  12  12  12  11  10  12  12  32  32  32  32  32  32  32  32
     6:  12  12  12  12  12  12  10  11  32  32  32  32  32  32  32  32
     7:  12  12  12  12  12  12  11  10  32  32  32  32  32  32  32  32
     8:  32  32  32  32  32  32  32  32  10  11  12  12  12  12  12  12
     9:  32  32  32  32  32  32  32  32  11  10  12  12  12  12  12  12
    10:  32  32  32  32  32  32  32  32  12  12  10  11  12  12  12  12
    11:  32  32  32  32  32  32  32  32  12  12  11  10  12  12  12  12
    12:  32  32  32  32  32  32  32  32  12  12  12  12  10  11  12  12
    13:  32  32  32  32  32  32  32  32  12  12  12  12  11  10  12  12
    14:  32  32  32  32  32  32  32  32  12  12  12  12  12  12  10  11
    15:  32  32  32  32  32  32  32  32  12  12  12  12  12  12  11  10

  From /proc/meminfo
     MemTotal:       2113530868 kB
     HugePages_Total:        0
     Hugepagesize:        2048 kB

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

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

  /usr/bin/lsb_release -d
     Ubuntu 20.04.3 LTS

  From /etc/*release* /etc/*version*
     debian_version: bullseye/sid
     os-release:
```

(Continued on next page)

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL365 Gen10 Plus v2
AMD EPYC 7373X

SPECrate®2017_fp_base = 384

SPECrate®2017_fp_peak = 395

CPU2017 License: 3		**Test Date:**	Apr-2022
Test Sponsor:	HPE	**Hardware Availability:**	Mar-2022
Tested by:	HPE	**Software Availability:**	Jan-2022

Platform Notes (Continued)

```
        NAME="Ubuntu"
        VERSION="20.04.3 LTS (Focal Fossa)"
        ID=ubuntu
        ID_LIKE=debian
        PRETTY_NAME="Ubuntu 20.04.3 LTS"
        VERSION_ID="20.04"
        HOME_URL="https://www.ubuntu.com/"
        SUPPORT_URL="https://help.ubuntu.com/"

  uname -a:
     Linux admin1-ProLiant-DL365-Gen10-Plus 5.13.0-28-generic #31~20.04.1-Ubuntu SMP Wed
     Jan 19 14:08:10 UTC 2022 x86_64 x86_64 x86_64 GNU/Linux


  Kernel self-reported vulnerability status:

  CVE-2018-12207 (iTLB Multihit):            Not affected
  CVE-2018-3620 (L1 Terminal Fault):         Not affected
  Microarchitectural Data Sampling:          Not affected
  CVE-2017-5754 (Meltdown):                  Not affected
  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 Jan 10 10:27


  SPEC is set to: /home/cpu2017_rate
     Filesystem      Type  Size  Used Avail Use% Mounted on
     /dev/sda2       ext4  439G   41G  376G  10% /


  From /sys/devices/virtual/dmi/id
     Vendor:          HPE
     Product:         ProLiant DL365 Gen10 Plus
     Product Family:  ProLiant
     Serial:          CN70430NKR


  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.
```

(Continued on next page)

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL365 Gen10 Plus v2
AMD EPYC 7373X

SPECrate®2017_fp_base = 384

SPECrate®2017_fp_peak = 395

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

Test Date: Apr-2022
Hardware Availability: Mar-2022
Software Availability: Jan-2022

Platform Notes (Continued)

```
      Memory:
        9x Hynix HMABAGL7ABR4N-XN 128 GB 4 rank 3200
        7x Samsung M386AAG40AM3-CWE 128 GB 4 rank 3200
        16x UNKNOWN NOT AVAILABLE

     BIOS:
        BIOS Vendor:       HPE
        BIOS Version:      A42
        BIOS Date:         02/10/2022
        BIOS Revision:     2.56
        Firmware Revision: 2.50

     (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 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
  LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
------------------------------------------------------------------------------


==============================================================================
C++             | 508.namd_r(base, peak) 510.parest_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
  LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
------------------------------------------------------------------------------


==============================================================================
C++, C          | 511.povray_r(base, peak) 526.blender_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
  LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
```

(Continued on next page)

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL365 Gen10 Plus v2
AMD EPYC 7373X

SPECrate®2017_fp_base = 384

SPECrate®2017_fp_peak = 395

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

Test Date: Apr-2022
Hardware Availability: Mar-2022
Software Availability: Jan-2022

Compiler Version Notes (Continued)

```
   LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
------------------------------------------------------------------------


==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
------------------------------------------------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
   LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
   LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
   LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
------------------------------------------------------------------------


==============================================================================
Fortran         | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
                | 554.roms_r(base, peak)
------------------------------------------------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
   LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
------------------------------------------------------------------------


==============================================================================
Fortran, C      | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
------------------------------------------------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
   LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
   LLVM Mirror.Version.13.0.0)
```

(Continued on next page)

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL365 Gen10 Plus v2
AMD EPYC 7373X

SPECrate®2017_fp_base = 384

SPECrate®2017_fp_peak = 395

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

Test Date: Apr-2022
Hardware Availability: Mar-2022
Software Availability: Jan-2022

Compiler Version Notes (Continued)

```
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
-----------------------------------------------------------------------
```

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`

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL365 Gen10 Plus v2
AMD EPYC 7373X

SPECrate®2017_fp_base = 384

SPECrate®2017_fp_peak = 395

CPU2017 License:	3	**Test Date:**	Apr-2022
Test Sponsor:	HPE	**Hardware Availability:**	Mar-2022
Tested by:	HPE	**Software Availability:**	Jan-2022

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
-Wl,-mllvm -Wl,-enable-loop-fusion -O3 -march=znver3 -fveclib=AMDLIBM
-ffast-math -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-loop-fusion -z muldefs -lamdlibm -ljemalloc -lflang
```

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
-Wl,-mllvm -Wl,-enable-loop-fusion -O3 -march=znver3 -fveclib=AMDLIBM
-ffast-math -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
-mllvm -enable-loop-fusion -z muldefs -lamdlibm -ljemalloc -lflang
```

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
-Wl,-mllvm -Wl,-enable-loop-fusion -Hz,1,0x1 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -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 -mllvm -enable-loop-fusion
-mllvm -enable-loopinterchange -mllvm -compute-interchange-order
-z muldefs -lamdlibm -ljemalloc -lflang
```

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
```

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

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL365 Gen10 Plus v2
AMD EPYC 7373X

SPECrate®2017_fp_base = 384

SPECrate®2017_fp_peak = 395

CPU2017 License:	3	**Test Date:**	Apr-2022
Test Sponsor:	HPE	**Hardware Availability:**	Mar-2022
Tested by:	HPE	**Software Availability:**	Jan-2022

Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):

```
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-loop-fusion -O3 -march=znver3 -fveclib=AMDLIBM
-ffast-math -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-loop-fusion -Hz,1,0x1 -Kieee -Mrecursive
-mllvm -fuse-tile-inner-loop -funroll-loops
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop
-mllvm -enable-loopinterchange -mllvm -compute-interchange-order
-z muldefs -lamdlibm -ljemalloc -lflang
```

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
-Wl,-mllvm -Wl,-enable-loop-fusion -O3 -march=znver3 -fveclib=AMDLIBM
-ffast-math -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-loop-fusion -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
```

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
-Wl,-mllvm -Wl,-enable-loop-fusion -O3 -march=znver3 -fveclib=AMDLIBM
-ffast-math -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)

Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL365 Gen10 Plus v2
AMD EPYC 7373X

SPECrate®2017_fp_base = 384

SPECrate®2017_fp_peak = 395

CPU2017 License: 3		**Test Date:**	Apr-2022
Test Sponsor:	HPE	**Hardware Availability:**	Mar-2022
Tested by:	HPE	**Software Availability:**	Jan-2022

Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):

```
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -enable-loop-fusion -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
-mllvm -enable-loopinterchange -mllvm -compute-interchange-order
-z muldefs -lamdlibm -ljemalloc -lflang
```

Base 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
```

Peak Compiler Invocation

C benchmarks:
```
clang
```

C++ benchmarks:
```
clang++
```

Fortran benchmarks:
```
flang
```

(Continued on next page)

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL365 Gen10 Plus v2
AMD EPYC 7373X

SPECrate®2017_fp_base = 384

SPECrate®2017_fp_peak = 395

CPU2017 License: 3		**Test Date:**	Apr-2022
Test Sponsor: HPE		**Hardware Availability:**	Mar-2022
Tested by: HPE		**Software Availability:**	Jan-2022

Peak Compiler Invocation (Continued)

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:

```
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 -ffast-math
-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 -ffast-math -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:

(Continued on next page)

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL365 Gen10 Plus v2
AMD EPYC 7373X

SPECrate®2017_fp_base = 384

SPECrate®2017_fp_peak = 395

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

Test Date: Apr-2022
Hardware Availability: Mar-2022
Software Availability: Jan-2022

Peak Optimization Flags (Continued)

508.namd_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 -ffast-math
-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

510.parest_r: basepeak = yes

Fortran benchmarks:

503.bwaves_r: basepeak = yes

549.fotonik3d_r: basepeak = yes

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 -ffast-math -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

Benchmarks using both Fortran and C:

521.wrf_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 -ffast-math
-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 -Mrecursive -lamdlibm

(Continued on next page)

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL365 Gen10 Plus v2
AMD EPYC 7373X

SPECrate®2017_fp_base = 384

SPECrate®2017_fp_peak = 395

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

Test Date: Apr-2022
Hardware Availability: Mar-2022
Software Availability: Jan-2022

Peak Optimization Flags (Continued)

521.wrf_r (continued):
```
-ljemalloc -lflang
```

527.cam4_r: basepeak = yes

Benchmarks using both C and C++:

511.povray_r: basepeak = yes

526.blender_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 -ffast-math
-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++:

507.cactuBSSN_r: basepeak = yes

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
```

(Continued on next page)

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL365 Gen10 Plus v2
AMD EPYC 7373X

SPECrate®2017_fp_base = 384

SPECrate®2017_fp_peak = 395

CPU2017 License: 3	**Test Date:** Apr-2022
Test Sponsor: HPE	**Hardware Availability:** Mar-2022
Tested by: HPE	**Software Availability:** Jan-2022

Peak Other Flags (Continued)

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-revR.html
http://www.spec.org/cpu2017/flags/aocc320-flags-A1.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-revR.xml
http://www.spec.org/cpu2017/flags/aocc320-flags-A1.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 2022-01-10 05:07:29-0500.
Report generated on 2022-05-25 13:12:03 by CPU2017 PDF formatter v6442.
Originally published on 2022-05-24.