



# SPEC CPU®2017 Floating Point Rate Result

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## Hewlett Packard Enterprise

(Test Sponsor: HPE)

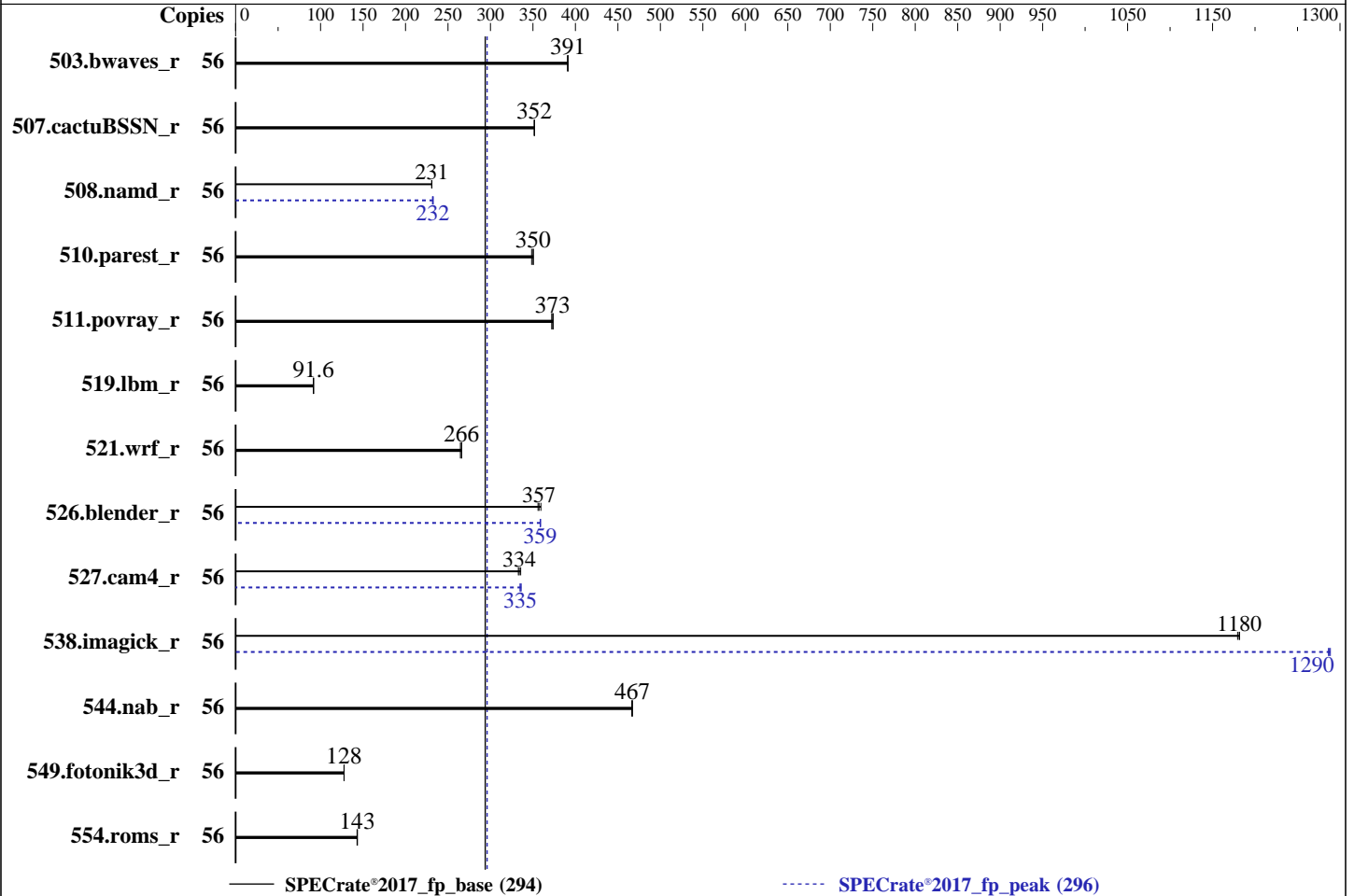
ProLiant DL325 Gen10 Plus v2  
(2.00 GHz, AMD EPYC 7663P)

SPECrate®2017\_fp\_base = 294

SPECrate®2017\_fp\_peak = 296

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

Test Date: Dec-2023  
Hardware Availability: Nov-2023  
Software Availability: May-2022



### Hardware

CPU Name: AMD EPYC 7663P  
 Max MHz: 3500  
 Nominal: 2000  
 Enabled: 56 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 / 7 cores  
 Other: None  
 Memory: 512 GB (8 x 64 GB 2Rx4 PC4-3200AA-R)  
 Storage: 1 x 480 GB SAS SSD  
 Other: None

### Software

OS: Red Hat Enterprise Linux 9.0 (Plow)  
 kernel 5.14.0-70.13.1.el9\_0.x86\_64  
 Compiler: C/C++/Fortran: Version 3.2.0 of AOCC  
 Parallel: No  
 Firmware: HPE BIOS Version A43 v2.90 (10/27/2023) released Oct-2023  
 File System: xfs  
 System State: Run level 3 (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



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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	56	<b>1436</b>	<b>391</b>	1435	391	1437	391	56	<b>1436</b>	<b>391</b>	1435	391	1437	391
507.cactuBSSN_r	56	202	352	<b>202</b>	<b>352</b>	202	352	56	202	352	<b>202</b>	<b>352</b>	202	352
508.namd_r	56	231	231	230	231	<b>230</b>	<b>231</b>	56	230	232	<b>229</b>	<b>232</b>	229	233
510.parest_r	56	418	350	420	348	<b>418</b>	<b>350</b>	56	418	350	420	348	<b>418</b>	<b>350</b>
511.povray_r	56	351	372	<b>350</b>	<b>373</b>	350	374	56	351	372	<b>350</b>	<b>373</b>	350	374
519.lbm_r	56	644	91.7	644	91.6	<b>644</b>	<b>91.6</b>	56	644	91.7	644	91.6	<b>644</b>	<b>91.6</b>
521.wrf_r	56	474	265	<b>472</b>	<b>266</b>	472	266	56	474	265	<b>472</b>	<b>266</b>	472	266
526.blender_r	56	240	356	<b>239</b>	<b>357</b>	237	359	56	<b>238</b>	<b>359</b>	238	359	238	358
527.cam4_r	56	294	333	<b>293</b>	<b>334</b>	292	336	56	<b>292</b>	<b>335</b>	292	335	291	336
538.imagick_r	56	<b>118</b>	<b>1180</b>	118	1180	118	1180	56	108	1290	<b>108</b>	<b>1290</b>	108	1290
544.nab_r	56	<b>202</b>	<b>467</b>	202	467	202	466	56	<b>202</b>	<b>467</b>	202	467	202	466
549.fotonik3d_r	56	1709	128	1710	128	<b>1710</b>	<b>128</b>	56	1709	128	1710	128	<b>1710</b>	<b>128</b>
554.roms_r	56	622	143	<b>621</b>	<b>143</b>	621	143	56	622	143	<b>621</b>	<b>143</b>	621	143

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Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

## Compiler Notes

The AMD64 AOCC Compiler Suite is available at  
<http://developer.amd.com/amd-aocc/>

## Submit Notes

The config file option 'submit' was used.  
'numactl' was used to bind copies to the cores.  
See the configuration file for details.

## Operating System Notes

'ulimit -s unlimited' was used to set environment stack size limit  
'ulimit -l 2097152' was used to set environment locked pages in memory limit

runcpu command invoked through numactl i.e.:  
numactl --interleave=all runcpu <etc>

To limit dirty cache to 8% of memory, 'sysctl -w vm.dirty\_ratio=8' run as root.  
To limit swap usage to minimum necessary, 'sysctl -w vm.swappiness=1' run as root.  
To free node-local memory and avoid remote memory usage,  
'sysctl -w vm.zone\_reclaim\_mode=1' run as root.  
To clear filesystem caches, 'sync; sysctl -w vm.drop\_caches=3' run as root.  
To disable address space layout randomization (ASLR) to reduce run-to-run  
variability, 'sysctl -w kernel.randomize\_va\_space=0' run as root.

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.



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## Environment Variables Notes

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

```
LD_LIBRARY_PATH =  
    "/home/cpu2017/amd_rate_aocc320_milanx_A_lib/lib:/home/cpu2017/amd_rate_aocc320_milanx_A_lib/lib32:"  
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 Throughput Compute  
Determinism Control set to Manual  
Performance Determinism set to Power Deterministic  
AMD SMT Option set to Disabled  
Last-Level-Cache(LLC) As Numa Node set to Enabled  
NUMA memory domains per socket set to Four memory domains per socket  
Memory Patrol Scrubbing set to Disabled  
Thermal Configuration set to Maximum Cooling  
Memory Interleaving set to Disabled  
Workload Profile set to Custom  
Power Regulator set to OS Control Mode  
L2 HW Prefetcher set to Disabled

Sysinfo program /home/cpu2017/bin/sysinfo  
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197  
running on localhost.localdomain Fri Dec 1 00:21:17 2023

SUT (System Under Test) info as seen by some common utilities.

-----  
Table of contents  
-----

1. uname -a
2. w
3. Username
4. ulimit -a
5. sysinfo process ancestry
6. /proc/cpuinfo
7. lscpu
8. numactl --hardware
9. /proc/meminfo
10. who -r
11. Systemd service manager version: systemd 250 (250-6.e19\_0)
12. Services, from systemctl list-unit-files

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## Platform Notes (Continued)

- 13. Linux kernel boot-time arguments, from /proc/cmdline
- 14. cpupower frequency-info
- 15. sysctl
- 16. /sys/kernel/mm/transparent\_hugepage
- 17. /sys/kernel/mm/transparent\_hugepage/khugepaged
- 18. OS release
- 19. Disk information
- 20. /sys/devices/virtual/dmi/id
- 21. dmidecode
- 22. BIOS

```
-----
1. uname -a
Linux localhost.localdomain 5.14.0-70.13.1.el9_0.x86_64 #1 SMP PREEMPT Thu Apr 14 12:42:38 EDT 2022 x86_64
x86_64 x86_64 GNU/Linux
-----
```

```
-----
2. w
00:21:17 up 3 min, 1 user, load average: 0.04, 0.12, 0.07
USER      TTY      LOGIN@  IDLE   JCPU   PCPU   WHAT
root      pts/0    00:19   12.00s  1.13s  0.04s  /bin/bash ./amd_rate_aocc320_milanx_A1.sh
-----
```

```
-----
3. Username
From environment variable $USER: root
-----
```

```
-----
4. ulimit -a
real-time non-blocking time (microseconds, -R) unlimited
core file size              (blocks, -c) 0
data seg size                (kbytes, -d) unlimited
scheduling priority         (-e) 0
file size                    (blocks, -f) unlimited
pending signals              (-i) 2062576
max locked memory            (kbytes, -l) 2097152
max memory size              (kbytes, -m) unlimited
open files                   (-n) 1024
pipe size                    (512 bytes, -p) 8
POSIX message queues         (bytes, -q) 819200
real-time priority           (-r) 0
stack size                   (kbytes, -s) unlimited
cpu time                     (seconds, -t) unlimited
max user processes           (-u) 2062576
virtual memory               (kbytes, -v) unlimited
file locks                   (-x) unlimited
-----
```

```
-----
5. sysinfo process ancestry
/usr/lib/systemd/systemd --switched-root --system --deserialize 30
sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
sshd: root [priv]
sshd: root@pts/0
-bash
python3 ./run_fprate.py
/bin/bash ./amd_rate_aocc320_milanx_A1.sh
runcpu --config amd_rate_aocc320_milanx_A1.cfg --tune all --reportable --iterations 3 fprate
runcpu --configfile amd_rate_aocc320_milanx_A1.cfg --tune all --reportable --iterations 3 --nopower
--runmode rate --tune base:peak --size test:train:refrate fprate --nopreenv --note-preenv --logfile
$SPEC/tmp/CPU2017.002/temlogs/preenv.fprate.002.0.log --lognum 002.0 --from_runcpu 2
-----
```

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## Platform Notes (Continued)

```
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017
```

```
-----
6. /proc/cpuinfo
model name      : AMD EPYC 7663P 56-Core Processor
vendor_id      : AuthenticAMD
cpu family     : 25
model          : 1
stepping       : 1
microcode      : 0xa0011d1
bugs           : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
TLB size       : 2560 4K pages
cpu cores      : 56
siblings       : 56
1 physical ids (chips)
56 processors (hardware threads)
physical id 0: core ids 0-6,8-14,16-22,24-30,32-38,40-46,48-54,56-62
physical id 0: apicids 0-6,8-14,16-22,24-30,32-38,40-46,48-54,56-62
Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
virtualized systems. Use the above data carefully.
```

### 7. lscpu

```
-----
From lscpu from util-linux 2.37.4:
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Address sizes:          48 bits physical, 48 bits virtual
Byte Order:             Little Endian
CPU(s):                 56
On-line CPU(s) list:   0-55
Vendor ID:              AuthenticAMD
BIOS Vendor ID:        Advanced Micro Devices, Inc.
Model name:             AMD EPYC 7663P 56-Core Processor
BIOS Model name:       AMD EPYC 7663P 56-Core Processor
CPU family:             25
Model:                  1
Thread(s) per core:    1
Core(s) per socket:    56
Socket(s):              1
Stepping:               1
Frequency boost:        enabled
CPU max MHz:            2000.0000
CPU min MHz:            1500.0000
BogoMIPS:               3992.59
Flags:                  fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36
                        clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp lm
                        constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperfmperf rapl
                        pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2 movbe popcnt aes
                        xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a
                        misalignsse 3dnowprefetch osvw ibs skinit wdt tce topoext perfctr_core
                        perfctr_nb bpext perfctr_llc mwaitx cpb cat_l3 cdp_l3 invpcid_single
                        hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2
                        erms invpcid cqm rdt_a rdseed adx smap clflushopt clwb sha_ni xsaveopt
                        xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
                        clzero irperf xsaveerpr 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 fsrm
```

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## Platform Notes (Continued)

```

Virtualization:          AMD-V
L1d cache:              1.8 MiB (56 instances)
L1i cache:              1.8 MiB (56 instances)
L2 cache:               28 MiB (56 instances)
L3 cache:               256 MiB (8 instances)
NUMA node(s):          8
NUMA node0 CPU(s):     0-6
NUMA node1 CPU(s):     7-13
NUMA node2 CPU(s):     14-20
NUMA node3 CPU(s):     21-27
NUMA node4 CPU(s):     28-34
NUMA node5 CPU(s):     35-41
NUMA node6 CPU(s):     42-48
NUMA node7 CPU(s):     49-55
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
Vulnerability Spectre v1: Mitigation; usercopy/swaps barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Retpolines, IBPB conditional, IBRS_FW, STIBP disabled, RSB
                          filling
Vulnerability Srbds:     Not affected
Vulnerability Tsx async abort: Not affected

```

From lscpu --cache:

NAME	ONE-SIZE	ALL-SIZE	WAYS	TYPE	LEVEL	SETS	PHY-LINE	COHERENCY-SIZE
L1d	32K	1.8M	8	Data	1	64	1	64
L1i	32K	1.8M	8	Instruction	1	64	1	64
L2	512K	28M	8	Unified	2	1024	1	64
L3	32M	256M	16	Unified	3	32768	1	64

8. numactl --hardware

NOTE: a numactl 'node' might or might not correspond to a physical chip.

```

available: 8 nodes (0-7)
node 0 cpus: 0-6
node 0 size: 64264 MB
node 0 free: 64050 MB
node 1 cpus: 7-13
node 1 size: 64471 MB
node 1 free: 64285 MB
node 2 cpus: 14-20
node 2 size: 64510 MB
node 2 free: 64312 MB
node 3 cpus: 21-27
node 3 size: 64509 MB
node 3 free: 64319 MB
node 4 cpus: 28-34
node 4 size: 64510 MB
node 4 free: 64260 MB
node 5 cpus: 35-41
node 5 size: 64509 MB
node 5 free: 64199 MB
node 6 cpus: 42-48
node 6 size: 64510 MB
node 6 free: 64225 MB
node 7 cpus: 49-55
node 7 size: 64489 MB
node 7 free: 64267 MB

```

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```
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
```

```
-----
9. /proc/meminfo
MemTotal:      528153636 kB
```

```
-----
10. who -r
run-level 3 Dec 1 00:17
```

```
-----
11. Systemd service manager version: systemd 250 (250-6.e19_0)
Default Target  Status
multi-user      running
```

```
-----
12. Services, from systemctl list-unit-files
STATE          UNIT FILES
enabled        NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd crond
                dbus-broker firewalld getty@ irqbalance kdump lvm2-monitor mdmonitor microcode
                nis-domainname rhsmcertd rsyslog selinux-autorelabel-mark sshd sssd
                systemd-network-generator udisks2
enabled-runtime  systemd-remount-fs
disabled        blk-availability chrony-wait chronyd console-getty cpupower debug-shell hwloc-dump-hwdata
                kvm_stat man-db-restart-cache-update nftables rdisc rhsm rhsm-facts rpmdb-rebuild
                serial-getty@ sshd-keygen@ systemd-boot-check-no-failures systemd-pstore systemd-sysex
                target targetclid
indirect        sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo
```

```
-----
13. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=(hd0,gpt2)/vmlinuz-0-rescue-de810009b7df4a35a4c7454f61f3731c
root=/dev/mapper/rhel-root
ro
resume=/dev/mapper/rhel-swap
rd.lvm.lv=rhel/root
rd.lvm.lv=rhel/swap
```

```
-----
14. cpupower frequency-info
analyzing CPU 0:
current policy: frequency should be within 1.50 GHz and 2.00 GHz.
                The governor "performance" may decide which speed to use
                within this range.

boost state support:
Supported: yes
Active: yes
Boost States: 0
Total States: 3
Pstate-P0: 2000MHz
```

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## Platform Notes (Continued)

```

-----
15. sysctl
kernel.numa_balancing          1
kernel.randomize_va_space     0
vm.compaction_proactiveness    20
vm.dirty_background_bytes      0
vm.dirty_background_ratio     10
vm.dirty_bytes                 0
vm.dirty_expire_centisecs     3000
vm.dirty_ratio                 8
vm.dirty_writeback_centisecs   500
vm.dirtytime_expire_seconds    43200
vm.extfrag_threshold           500
vm.min_unmapped_ratio         1
vm.nr_hugepages                0
vm.nr_hugepages_mempolicy      0
vm.nr_overcommit_hugepages    0
vm.swappiness                  1
vm.watermark_boost_factor      15000
vm.watermark_scale_factor      10
vm.zone_reclaim_mode          1

-----
16. /sys/kernel/mm/transparent_hugepage
defrag          [always] defer defer+madvise madvise never
enabled        [always] madvise never
hpage_pmd_size 2097152
shmem_enabled  always within_size advise [never] deny force

-----
17. /sys/kernel/mm/transparent_hugepage/khugepaged
alloc_sleep_millisecs  60000
defrag                 1
max_ptes_none          511
max_ptes_shared        256
max_ptes_swap          64
pages_to_scan          4096
scan_sleep_millisecs   10000

-----
18. OS release
From /etc/*-release /etc/*-version
os-release      Red Hat Enterprise Linux 9.0 (Plow)
redhat-release Red Hat Enterprise Linux release 9.0 (Plow)
system-release Red Hat Enterprise Linux release 9.0 (Plow)

-----
19. Disk information
SPEC is set to: /home/cpu2017
Filesystem      Type      Size      Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs      372G      9.6G  362G   3% /home

-----
20. /sys/devices/virtual/dmi/id
Vendor:          HPE
Product:         ProLiant DL325 Gen10 Plus v2
Product Family: ProLiant
Serial:          CN70381LLR

```

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## Platform Notes (Continued)

### 21. dmidecode

Additional information from dmidecode 3.3 follows. WARNING: Use caution when you interpret this section. The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

Memory:

8x Micron 36ASF8G72PZ-3G2B2 64 GB 2 rank 3200

### 22. BIOS

(This section combines info from /sys/devices and dmidecode.)

BIOS Vendor: HPE  
BIOS Version: A43  
BIOS Date: 10/27/2023  
BIOS Revision: 2.90  
Firmware Revision: 2.72

## 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 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)

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# SPEC CPU®2017 Floating Point Rate Result

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**Hewlett Packard Enterprise**

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

**SPECrate®2017\_fp\_base = 294**

**SPECrate®2017\_fp\_peak = 296**

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

**Test Date:** Dec-2023  
**Hardware Availability:** Nov-2023  
**Software Availability:** May-2022

## Compiler Version Notes (Continued)

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)  
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



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**ProLiant DL325 Gen10 Plus v2**  
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**SPECrate®2017\_fp\_base = 294**

**SPECrate®2017\_fp\_peak = 296**

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

**Test Date:** Dec-2023  
**Hardware Availability:** Nov-2023  
**Software Availability:** May-2022

## 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
-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
```

(Continued on next page)



# SPEC CPU®2017 Floating Point Rate Result

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**Hewlett Packard Enterprise**

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

**SPECrate®2017\_fp\_base = 294**

**SPECrate®2017\_fp\_peak = 296**

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

**Test Date:** Dec-2023  
**Hardware Availability:** Nov-2023  
**Software Availability:** May-2022

## Base Optimization Flags (Continued)

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
-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
```

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

SPECrate®2017\_fp\_base = 294

SPECrate®2017\_fp\_peak = 296

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

**Test Date:** Dec-2023  
**Hardware Availability:** Nov-2023  
**Software Availability:** May-2022

## Base Optimization Flags (Continued)

Benchmarks using both C and C++ (continued):

```
-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
-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
```

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

SPECrate®2017\_fp\_base = 294

SPECrate®2017\_fp\_peak = 296

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

**Test Date:** Dec-2023  
**Hardware Availability:** Nov-2023  
**Software Availability:** May-2022

## Base Other Flags (Continued)

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:

519.lbm\_r: basepeak = yes

538.imagick\_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

(Continued on next page)



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

**SPECrate®2017\_fp\_base = 294**

**SPECrate®2017\_fp\_peak = 296**

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

**Test Date:** Dec-2023  
**Hardware Availability:** Nov-2023  
**Software Availability:** May-2022

## Peak Optimization Flags (Continued)

538.imagick\_r (continued):

```
-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
```

544.nab\_r: basepeak = yes

C++ benchmarks:

```
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: basepeak = yes

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 -ffast-math  
-fstruct-layout=7 -mllvm -unroll-threshold=50  
-fremap-arrays -flv-function-specialization  
-mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
```

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**ProLiant DL325 Gen10 Plus v2**  
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**SPECrate®2017\_fp\_base = 294**

**SPECrate®2017\_fp\_peak = 296**

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

**Test Date:** Dec-2023  
**Hardware Availability:** Nov-2023  
**Software Availability:** May-2022

## Peak Optimization Flags (Continued)

527.cam4\_r (continued):

```
-mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-licm-vrp
-mllvm -reduce-array-computations=3 -O3 -funroll-loops
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop
-Mrecursive -Hz,1,0x1 -mllvm -enable-loopinterchange
-mllvm -compute-interchange-order -lamdlibm -ljemalloc
-lflang
```

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
-freemap-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
```

(Continued on next page)





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SPECrate®2017\_fp\_base = 294

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**CPU2017 License:** 3

**Test Sponsor:** HPE

**Tested by:** HPE

**Test Date:** Dec-2023

**Hardware Availability:** Nov-2023

**Software Availability:** May-2022

## Peak Other Flags (Continued)

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-V1.3-EPYC-revS.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-V1.3-EPYC-revS.xml>

<http://www.spec.org/cpu2017/flags/aocc320-flags-A1.xml>

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