



SPEC CPU®2017 Floating Point Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL385 Gen11

(2.25 GHz, AMD EPYC 9754)

SPECrate®2017_fp_base = 1430

SPECrate®2017_fp_peak = 1450

CPU2017 License: 3

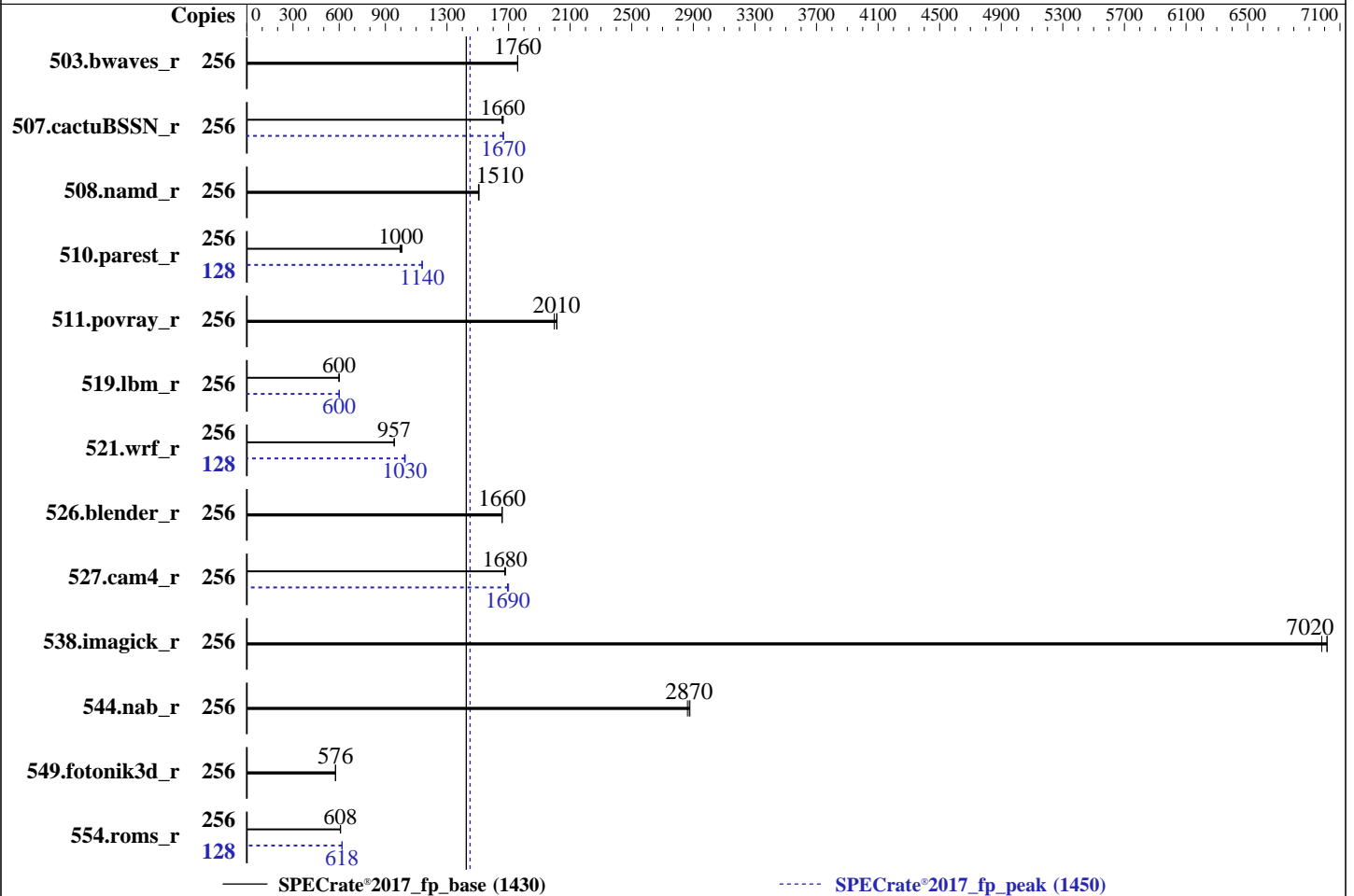
Test Sponsor: HPE

Tested by: HPE

Test Date: May-2023

Hardware Availability: Jun-2023

Software Availability: Nov-2022



Hardware

CPU Name: AMD EPYC 9754
 Max MHz: 3100
 Nominal: 2250
 Enabled: 256 cores, 2 chips
 Orderable: 1,2 chips
 Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 256 MB I+D on chip per chip,
 16 MB shared / 8 cores
 Other: None
 Memory: 1536 GB (24 x 64 GB 2Rx4 PC5-4800B-R)
 Storage: 1 x 480 GB SATA SSD
 Other: None

Software

OS: Red Hat Enterprise Linux 9.0 (Plow)
 Kernel 5.14.0-70.13.1.el9_0.x86_64
 Compiler: C/C++/Fortran: Version 4.0.0 of AOCC
 Parallel: No
 Firmware: HPE BIOS Version v1.30 03/06/2023 released Mar-2023
 File System: xfs
 System State: Run level 3 (multi-user)
 Base Pointers: 64-bit
 Peak Pointers: 64-bit
 Other: None
 Power Management: BIOS and OS set to prefer performance at the cost of additional power usage



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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	256	1459	1760	1460	1760	<u>1459</u>	<u>1760</u>	256	1459	1760	1460	1760	<u>1459</u>	<u>1760</u>
507.cactuBSSN_r	256	195	1670	196	1660	<u>195</u>	<u>1660</u>	256	195	1660	195	1670	<u>195</u>	<u>1670</u>
508.namd_r	256	161	1510	<u>162</u>	<u>1510</u>	162	1500	256	161	1510	<u>162</u>	<u>1510</u>	162	1500
510.parest_r	256	673	996	665	1010	<u>668</u>	<u>1000</u>	128	294	1140	<u>294</u>	<u>1140</u>	294	1140
511.povray_r	256	297	2010	299	2000	<u>297</u>	<u>2010</u>	256	297	2010	299	2000	<u>297</u>	<u>2010</u>
519.lbm_r	256	450	600	451	598	<u>450</u>	<u>600</u>	256	450	599	<u>450</u>	<u>600</u>	449	601
521.wrf_r	256	599	958	<u>599</u>	<u>957</u>	599	957	128	<u>280</u>	<u>1030</u>	280	1020	279	1030
526.blender_r	256	<u>235</u>	<u>1660</u>	235	1660	235	1660	256	<u>235</u>	<u>1660</u>	235	1660	235	1660
527.cam4_r	256	267	1680	<u>267</u>	<u>1680</u>	267	1680	256	263	1700	<u>264</u>	<u>1690</u>	264	1690
538.imagick_r	256	91.2	6980	90.7	7020	<u>90.7</u>	<u>7020</u>	256	91.2	6980	90.7	7020	<u>90.7</u>	<u>7020</u>
544.nab_r	256	151	2860	150	2880	<u>150</u>	<u>2870</u>	256	151	2860	150	2880	<u>150</u>	<u>2870</u>
549.fotonik3d_r	256	1731	576	<u>1731</u>	<u>576</u>	1731	576	256	1731	576	<u>1731</u>	<u>576</u>	1731	576
554.roms_r	256	668	609	<u>669</u>	<u>608</u>	670	607	128	329	618	<u>329</u>	<u>618</u>	328	619

SPECrate®2017_fp_base = **1430**

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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,

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Operating System Notes (Continued)

```
'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/amd_rate_aocc400_genoa_B_lib/lib:/home/cpu2017/amd_rate_aocc400_genoa_B_lib/lib32:"
MALLOC_CONF = "retain:true"
```

General Notes

Binaries were compiled on a system with 2x AMD EPYC 9174F CPU + 1.5TiB Memory using RHEL 8.6

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1) is mitigated in the system as tested and documented.

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2) is mitigated in the system as tested and documented.

Platform Notes

BIOS Configuration

```
Workload Profile set to General 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
ACPI CST C2 Latency set to 18 microseconds
Thermal Configuration set to Maximum Cooling
Data Fabric C-State Enable set to Force Enabled
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 Thu May 18 23:34:11 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

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Platform Notes (Continued)

```

8. numactl --hardware
9. /proc/meminfo
10. who -r
11. Systemd service manager version: systemd 250 (250-6.el9_0)
12. Failed units, from systemctl list-units --state=failed
13. Services, from systemctl list-unit-files
14. Linux kernel boot-time arguments, from /proc/cmdline
15. cpupower frequency-info
16. tuned-adm active
17. sysctl
18. /sys/kernel/mm/transparent_hugepage
19. /sys/kernel/mm/transparent_hugepage/khugepaged
20. OS release
21. Disk information
22. /sys/devices/virtual/dmi/id
23. dmidecode
24. 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
 23:34:11 up 1:09, 2 users, load average: 0.26, 0.06, 0.02
USER   TTY      LOGIN@  IDLE   JCPU   PCPU   WHAT
root   tty1     23:27   6:19   0.00s  0.00s  -bash
root   pts/0    23:28  24.00s 1.44s  0.15s  /bin/bash ./amd_rate_aocc400_genoa_B1.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) 6191076
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) 6191076
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]

```

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Platform Notes (Continued)

```

ssh: root@pts/0
-bash
python3 ./run_fprate.py
/bin/bash ./amd_rate_aocc400_genoa_B1.sh
runcpu --config amd_rate_aocc400_genoa_B1.cfg --tune all --reportable --iterations 3 fprate
runcpu --configfile amd_rate_aocc400_genoa_B1.cfg --tune all --reportable --iterations 3 --nopower --runmode
rate --tune base:peak --size test:train:refrate fprate --nopreenv --note-preenv --logfile
$SPEC/tmp/CPU2017.005/templogs/preenv.fprate.005.0.log --lognum 005.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017

```

```

-----
6. /proc/cpuinfo
model name      : AMD EPYC 9754 128-Core Processor
vendor_id      : AuthenticAMD
cpu family     : 25
model          : 160
stepping       : 2
bugs           : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
TLB size      : 3584 4K pages
cpu cores     : 128
siblings      : 128
2 physical ids (chips)
256 processors (hardware threads)
physical id 0: core ids
0-7,16-23,32-39,48-55,64-71,80-87,96-103,112-119,128-135,144-151,160-167,176-183,192-199,208-215,224-231,
240-247
physical id 1: core ids
0-7,16-23,32-39,48-55,64-71,80-87,96-103,112-119,128-135,144-151,160-167,176-183,192-199,208-215,224-231,
240-247
physical id 0: apicids
0-7,16-23,32-39,48-55,64-71,80-87,96-103,112-119,128-135,144-151,160-167,176-183,192-199,208-215,224-231,
240-247
physical id 1: apicids
256-263,272-279,288-295,304-311,320-327,336-343,352-359,368-375,384-391,400-407,416-423,432-439,448-455,4
64-471,480-487,496-503
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: 52 bits physical, 57 bits virtual
Byte Order: Little Endian
CPU(s): 256
On-line CPU(s) list: 0-255
Vendor ID: AuthenticAMD
BIOS Vendor ID: Advanced Micro Devices, Inc.
Model name: AMD EPYC 9754 128-Core Processor
BIOS Model name: AMD EPYC 9754 128-Core Processor
CPU family: 25
Model: 160
Thread(s) per core: 1
Core(s) per socket: 128
Socket(s): 2
Stepping: 2
Frequency boost: enabled

```

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Platform Notes (Continued)

```

CPU max MHz:          2250.0000
CPU min MHz:          1500.0000
BogoMIPS:             4493.27
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 sse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe
                    popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy
                    abm sse4a misalignsse 3dnowprefetch osvw ibs skinit wdt tce topoext
                    perfctr_core perfctr_nb bpext perfctr_llc mwaitx cpb cat_l3 cdp_l3
                    invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsgsbase bmi1
                    avx2 smep bmi2 erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap
                    avx512ifma clflushopt clwb avx512cd sha_ni avx512bw avx512vl xsaveopt
                    xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
                    avx512_bf16 clzero irperf xsaveerptr rdpru wbnoinvd amd_ppin arat npt lbrv
                    svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists
                    pausefilter pfthreshold avic v_vmsave_vmload vgif v_spec_ctrl avx512vbmi
                    umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg
                    avx512_vpopcntdq la57 rdpid overflow_recov succor smca fsrm flush_l1d
Virtualization:      AMD-V
L1d cache:           8 MiB (256 instances)
L1i cache:           8 MiB (256 instances)
L2 cache:            256 MiB (256 instances)
L3 cache:            512 MiB (32 instances)
NUMA node(s):        32
NUMA node0 CPU(s):  0-7
NUMA node1 CPU(s):  8-15
NUMA node2 CPU(s):  64-71
NUMA node3 CPU(s):  72-79
NUMA node4 CPU(s):  32-39
NUMA node5 CPU(s):  40-47
NUMA node6 CPU(s):  96-103
NUMA node7 CPU(s):  104-111
NUMA node8 CPU(s):  48-55
NUMA node9 CPU(s):  56-63
NUMA node10 CPU(s): 112-119
NUMA node11 CPU(s): 120-127
NUMA node12 CPU(s): 16-23
NUMA node13 CPU(s): 24-31
NUMA node14 CPU(s): 80-87
NUMA node15 CPU(s): 88-95
NUMA node16 CPU(s): 128-135
NUMA node17 CPU(s): 136-143
NUMA node18 CPU(s): 192-199
NUMA node19 CPU(s): 200-207
NUMA node20 CPU(s): 160-167
NUMA node21 CPU(s): 168-175
NUMA node22 CPU(s): 224-231
NUMA node23 CPU(s): 232-239
NUMA node24 CPU(s): 176-183
NUMA node25 CPU(s): 184-191
NUMA node26 CPU(s): 240-247
NUMA node27 CPU(s): 248-255
NUMA node28 CPU(s): 144-151
NUMA node29 CPU(s): 152-159
NUMA node30 CPU(s): 208-215
NUMA node31 CPU(s): 216-223
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf:         Not affected
Vulnerability Mds:         Not affected

```

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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	8M	8	Data	1	64	1	64
L1i	32K	8M	8	Instruction	1	64	1	64
L2	1M	256M	8	Unified	2	2048	1	64
L3	16M	512M	16	Unified	3	16384	1	64

8. `numactl --hardware`

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

available: 32 nodes (0-31)

```
node 0 cpus: 0-7
node 0 size: 48135 MB
node 0 free: 47908 MB
node 1 cpus: 8-15
node 1 size: 48382 MB
node 1 free: 48216 MB
node 2 cpus: 16-23
node 2 size: 48382 MB
node 2 free: 48229 MB
node 3 cpus: 24-31
node 3 size: 48382 MB
node 3 free: 48242 MB
node 4 cpus: 32-39
node 4 size: 48382 MB
node 4 free: 48245 MB
node 5 cpus: 40-47
node 5 size: 48382 MB
node 5 free: 48253 MB
node 6 cpus: 48-55
node 6 size: 48382 MB
node 6 free: 48260 MB
node 7 cpus: 56-63
node 7 size: 48382 MB
node 7 free: 48203 MB
node 8 cpus: 64-71
node 8 size: 48382 MB
node 8 free: 48012 MB
node 9 cpus: 72-79
node 9 size: 48382 MB
node 9 free: 48079 MB
node 10 cpus: 80-87
node 10 size: 48382 MB
node 10 free: 48068 MB
node 11 cpus: 88-95
node 11 size: 48382 MB
node 11 free: 48192 MB
node 12 cpus: 96-103
node 12 size: 48382 MB
node 12 free: 48124 MB
node 13 cpus: 104-111
node 13 size: 48382 MB
```

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Platform Notes (Continued)

```

node 13 free: 48196 MB
node 14 cpus: 80-87
node 14 size: 48382 MB
node 14 free: 48190 MB
node 15 cpus: 88-95
node 15 size: 48382 MB
node 15 free: 48198 MB
node 16 cpus: 128-135
node 16 size: 48382 MB
node 16 free: 48295 MB
node 17 cpus: 136-143
node 17 size: 48382 MB
node 17 free: 48294 MB
node 18 cpus: 192-199
node 18 size: 48382 MB
node 18 free: 48253 MB
node 19 cpus: 200-207
node 19 size: 48382 MB
node 19 free: 48225 MB
node 20 cpus: 160-167
node 20 size: 48382 MB
node 20 free: 48223 MB
node 21 cpus: 168-175
node 21 size: 48382 MB
node 21 free: 48218 MB
node 22 cpus: 224-231
node 22 size: 48382 MB
node 22 free: 48220 MB
node 23 cpus: 232-239
node 23 size: 48382 MB
node 23 free: 48219 MB
node 24 cpus: 176-183
node 24 size: 48382 MB
node 24 free: 48249 MB
node 25 cpus: 184-191
node 25 size: 48382 MB
node 25 free: 48247 MB
node 26 cpus: 240-247
node 26 size: 48382 MB
node 26 free: 48220 MB
node 27 cpus: 248-255
node 27 size: 48382 MB
node 27 free: 48221 MB
node 28 cpus: 144-151
node 28 size: 48382 MB
node 28 free: 48207 MB
node 29 cpus: 152-159
node 29 size: 48382 MB
node 29 free: 48219 MB
node 30 cpus: 208-215
node 30 size: 48382 MB
node 30 free: 48127 MB
node 31 cpus: 216-223
node 31 size: 48273 MB
node 31 free: 48122 MB
node distances:
node 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
0: 10 11 11 11 12 12 12 12 12 12 12 12 12 12 12 32 32 32 32 32 32 32 32 32
32 32 32 32 32 32 32

```

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```

1: 11 10 11 11 12 12 12 12 12 12 12 12 12 12 12 32 32 32 32 32 32 32 32
32 32 32 32 32 32 32
2: 11 11 10 11 12 12 12 12 12 12 12 12 12 12 12 32 32 32 32 32 32 32 32
32 32 32 32 32 32 32
3: 11 11 11 10 12 12 12 12 12 12 12 12 12 12 12 32 32 32 32 32 32 32 32
32 32 32 32 32 32 32
4: 12 12 12 12 12 10 11 11 11 12 12 12 12 12 12 32 32 32 32 32 32 32 32
32 32 32 32 32 32 32
5: 12 12 12 12 11 10 11 11 12 12 12 12 12 12 12 32 32 32 32 32 32 32 32
32 32 32 32 32 32 32
6: 12 12 12 12 12 11 11 10 11 12 12 12 12 12 12 32 32 32 32 32 32 32 32
32 32 32 32 32 32 32
7: 12 12 12 12 11 11 11 10 12 12 12 12 12 12 12 32 32 32 32 32 32 32 32
32 32 32 32 32 32 32
8: 12 12 12 12 12 12 12 12 10 11 11 11 12 12 12 32 32 32 32 32 32 32 32
32 32 32 32 32 32 32
9: 12 12 12 12 12 12 12 12 12 11 10 11 11 12 12 32 32 32 32 32 32 32 32
32 32 32 32 32 32 32
10: 12 12 12 12 12 12 12 12 12 11 11 10 11 12 12 32 32 32 32 32 32 32 32
32 32 32 32 32 32 32
11: 12 12 12 12 12 12 12 12 12 12 11 11 11 10 12 12 32 32 32 32 32 32 32
32 32 32 32 32 32 32
12: 12 12 12 12 12 12 12 12 12 12 12 10 11 11 11 32 32 32 32 32 32 32 32
32 32 32 32 32 32 32
13: 12 12 12 12 12 12 12 12 12 12 12 11 10 11 11 32 32 32 32 32 32 32 32
32 32 32 32 32 32 32
14: 12 12 12 12 12 12 12 12 12 12 12 11 11 10 11 32 32 32 32 32 32 32 32
32 32 32 32 32 32 32
15: 12 12 12 12 12 12 12 12 12 12 12 11 11 11 10 32 32 32 32 32 32 32 32
32 32 32 32 32 32 32
16: 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 10 11 11 11 12 12 12 12
12 12 12 12 12 12 12
17: 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 11 10 11 11 12 12 12 12
12 12 12 12 12 12 12
18: 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 11 11 10 11 12 12 12 12
12 12 12 12 12 12 12
19: 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 11 11 11 10 12 12 12 12
12 12 12 12 12 12 12
20: 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 12 12 12 12 10 11 11 12
12 12 12 12 12 12 12
21: 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 12 12 12 12 11 10 11 12
12 12 12 12 12 12 12
22: 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 12 12 12 12 11 11 10 12
12 12 12 12 12 12 12
23: 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 12 12 12 12 11 11 11 12
12 12 12 12 12 12 12
24: 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 12 12 12 12 12 12 12 10
11 11 11 12 12 12 12
25: 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 12 12 12 12 12 12 12 11
10 11 11 12 12 12 12
26: 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 12 12 12 12 12 12 12 11
11 10 11 12 12 12 12
27: 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 12 12 12 12 12 12 12 11
11 11 10 12 12 12 12
28: 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 12 12 12 12 12 12 12 12
12 12 12 10 11 11 11
29: 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 12 12 12 12 12 12 12 12
12 12 12 11 10 11 11
30: 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 12 12 12 12 12 12 12 12
12 12 12 11 11 10 11

```

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

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(Test Sponsor: HPE)

ProLiant DL385 Gen11

(2.25 GHz, AMD EPYC 9754)

SPECrate®2017_fp_base = 1430

SPECrate®2017_fp_peak = 1450

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

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

Platform Notes (Continued)

31: 32 32 32 32 32 32 32 32 32 32 32 32 32 32 32 12 12 12 12 12 12 12 12 12
12 12 12 11 11 11 10

9. /proc/meminfo
MemTotal: 1585022512 kB

10. who -r
run-level 3 May 18 22:25

11. Systemd service manager version: systemd 250 (250-6.el9_0)
Default Target Status
multi-user degraded

12. Failed units, from systemctl list-units --state=failed
UNIT LOAD ACTIVE SUB DESCRIPTION
* dnf-makecache.service loaded failed failed dnf makecache

13. 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 tuned udisks2 upower
enabled-runtime systemd-remount-fs
disabled blk-availability canberra-system-bootup canberra-system-shutdown
canberra-system-shutdown-reboot chrony-wait chronyd cni-dhcp console-getty cpupower
debug-shell hwloc-dump-hwdata ipsec kvm_stat man-db-restart-cache-update nftables podman
podman-auto-update podman-restart powertop rdisc rhsm rhsm-facts rpmdb-rebuild
serial-getty@ sshd-keygen@ systemd-boot-check-no-failures systemd-pstore systemd-sysext
indirect sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo

14. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=(hd1,gpt2)/vmlinuz-5.14.0-70.13.1.el9_0.x86_64
root=/dev/mapper/rhel-root
ro
resume=/dev/mapper/rhel-swap
rd.lvm.lv=rhel/root
rd.lvm.lv=rhel/swap

15. cpupower frequency-info
analyzing CPU 0:
current policy: frequency should be within 1.50 GHz and 2.25 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: 2250MHz

16. tuned-adm active

(Continued on next page)



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Software Availability: Nov-2022

Platform Notes (Continued)

Current active profile: throughput-performance

17. 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

```

18. /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

```

19. /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

```

20. 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)

```

21. Disk information

```

SPEC is set to: /home/cpu2017
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs  372G  8.5G  363G   3% /home

```

22. /sys/devices/virtual/dmi/id

```

Vendor:      HPE
Product:     ProLiant DL385 Gen11
Product Family: ProLiant
Serial:      DL385G11-003

```

(Continued on next page)



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Platform Notes (Continued)

23. 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:

24x Hynix HMCG94AEBRA103N 64 GB 2 rank 4800

24. BIOS

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

BIOS Vendor: HPE
BIOS Version: 1.30
BIOS Date: 03/06/2023
BIOS Revision: 1.30
Firmware Revision: 1.20

Compiler Version Notes

=====
C | 519.lbm_r(base, peak) 538.imagick_r(base, peak) 544.nab_r(base, peak)
=====

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
=====

=====
C++ | 508.namd_r(base, peak) 510.parest_r(base, peak)
=====

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
=====

=====
C++, C | 511.povray_r(base, peak) 526.blender_r(base, peak)
=====

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
=====

=====
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
=====

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix

(Continued on next page)



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Tested by: HPE

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Compiler Version Notes (Continued)

```

InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
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Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin

```

```

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

```

```

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin

```

```

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

```

```

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin

```

Base Compiler Invocation

C benchmarks:

clang

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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SPECrate®2017_fp_peak = 1450

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

Test Date: May-2023
Hardware Availability: Jun-2023
Software Availability: Nov-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 -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,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-ldist-scalar-expand -fenable-aggressive-gather -O3
-march=znver4 -fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-zopt -lamdlibm -lamdalloc -lflang

C++ benchmarks:

-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -mllvm -unroll-threshold=100
-finline-aggressive -mllvm -loop-unswitch-threshold=200000
-mllvm -reduce-array-computations=3 -zopt -lamdlibm -lamdalloc
-lflang

Fortran benchmarks:

-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -Kieee -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop -mllvm -reduce-array-computations=3
-fepilog-vectorization-of-inductions -zopt -lamdlibm -lamdalloc
-lflang

(Continued on next page)



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SPECrate®2017_fp_peak = 1450

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

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

Base Optimization Flags (Continued)

Benchmarks using both Fortran and C:

```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-freemap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-zopt -Kieee -Mrecursive -funroll-loops -mllvm -lsr-in-nested-loop
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc -lflang
```

Benchmarks using both C and C++:

```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-freemap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-zopt -mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -lamdlibm -lamdalloc -lflang
```

Benchmarks using Fortran, C, and C++:

```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-freemap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-zopt -mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -Kieee -Mrecursive
-funroll-loops -mllvm -lsr-in-nested-loop
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc -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

(Continued on next page)



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Base 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`

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: -m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math`

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Tested by: HPE

Test Date: May-2023

Hardware Availability: Jun-2023

Software Availability: Nov-2022

Peak Optimization Flags (Continued)

519.lbm_r (continued):

```
-fstruct-layout=7 -mllvm -unroll-threshold=50
-freemap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -zopt -lamdlibm
-lamdalloc
```

538.imagick_r: basepeak = yes

544.nab_r: basepeak = yes

C++ benchmarks:

508.namd_r: basepeak = yes

```
510.parest_r: -m64 -flto -Wl,-mllvm -Wl,-suppress-fmas
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math
-finline-aggressive -mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -zopt -lamdlibm
-lamdalloc
```

Fortran benchmarks:

503.bwaves_r: basepeak = yes

549.fotonik3d_r: basepeak = yes

```
554.roms_r: -m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -Mrecursive
-mllvm -reduce-array-computations=3
-fepilog-vectorization-of-inductions -zopt -lamdlibm
-lamdalloc -lflang
```

Benchmarks using both Fortran and C:

```
521.wrf_r: -m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math
-fstruct-layout=7 -mllvm -unroll-threshold=50
-freemap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -zopt -Mrecursive
```

(Continued on next page)



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Tested by: HPE

Test Date: May-2023

Hardware Availability: Jun-2023

Software Availability: Nov-2022

Peak Optimization Flags (Continued)

521.wrf_r (continued):

```
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc
-lflang
```

```
527.cam4_r: -m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-freemap-arrays -mllvm -reduce-array-computations=3 -zopt
-Kieee -Mrecursive -funroll-loops
-mllvm -lsr-in-nested-loop
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc
-lflang
```

Benchmarks using both C and C++:

511.povray_r: basepeak = yes

526.blender_r: basepeak = yes

Benchmarks using Fortran, C, and C++:

```
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Ofast -march=znver4
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -freemap-arrays -fstrip-mining
-mllvm -inline-threshold=1000 -mllvm -reduce-array-computations=3 -zopt
-mllvm -unroll-threshold=100 -mllvm -loop-unswitch-threshold=200000
-finline-aggressive -faggressive-loop-transform -fvector-transform
-fscalar-transform -Mrecursive -fepilog-vectorization-of-inductions
-lamdlibm -lamdalloc -lflang
```

Peak Other Flags

C benchmarks:

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

C++ benchmarks:

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

Fortran benchmarks:

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

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SPEC CPU®2017 Floating Point Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL385 Gen11

(2.25 GHz, AMD EPYC 9754)

SPECrate®2017_fp_base = 1430

SPECrate®2017_fp_peak = 1450

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: May-2023

Hardware Availability: Jun-2023

Software Availability: Nov-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-Bergamo-rev1.0.html>

<http://www.spec.org/cpu2017/flags/aocc400-flags.html>

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

<http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-Bergamo-rev1.0.xml>

<http://www.spec.org/cpu2017/flags/aocc400-flags.xml>

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU®2017 v1.1.9 on 2023-05-18 14:04:10-0400.

Report generated on 2023-06-13 15:17:07 by CPU2017 PDF formatter v6716.

Originally published on 2023-06-13.