



# SPEC CPU®2017 Floating Point Rate Result

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## Hewlett Packard Enterprise

(Test Sponsor: HPE)

### ProLiant DL385 Gen11

(2.40 GHz, AMD EPYC 9654)

SPECrate®2017\_fp\_base = 1400

SPECrate®2017\_fp\_peak = 1400

CPU2017 License: 3

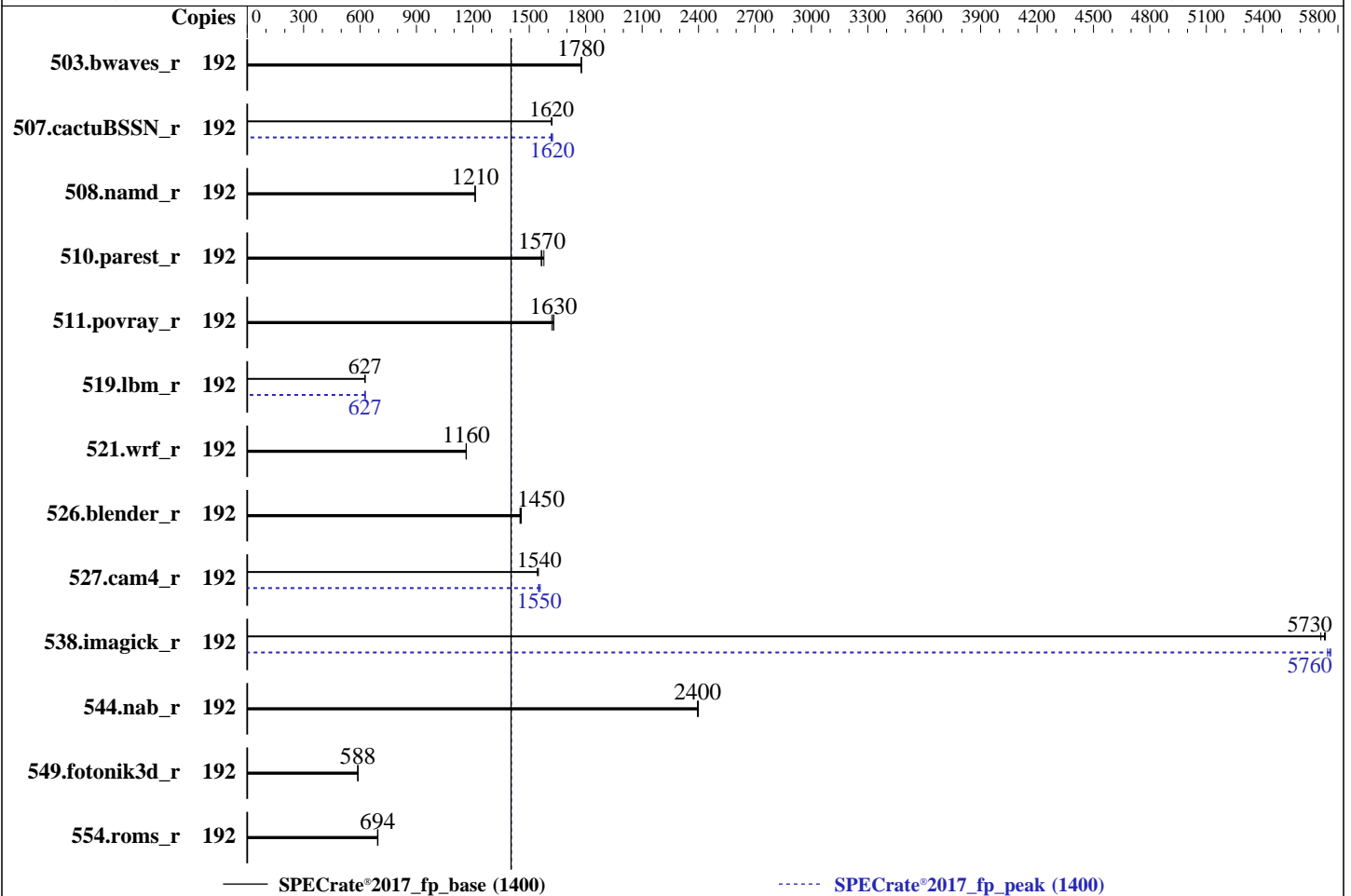
Test Sponsor: HPE

Tested by: HPE

Test Date: Oct-2022

Hardware Availability: Dec-2022

Software Availability: Nov-2022



### Hardware

CPU Name: AMD EPYC 9654  
 Max MHz: 3700  
 Nominal: 2400  
 Enabled: 192 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: 384 MB I+D on chip per chip,  
 32 MB shared / 8 cores  
 Other: None  
 Memory: 768 GB (24 x 32 GB 2Rx8 PC5-4800B-R)  
 Storage: 1 x 480 GB SATA SSD  
 Other: None

### Software

OS: Ubuntu 22.04.1 LTS  
 Kernel 5.15.0-52-generic  
 Compiler: C/C++/Fortran: Version 4.0.0 of AOCC  
 Parallel: No  
 Firmware: HPE BIOS Version v1.10 10/06/2022 released Oct-2022  
 File System: ext4  
 System State: Run level 5 (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	192	1083	1780	<b>1084</b>	<b>1780</b>	1084	1780	192	1083	1780	<b>1084</b>	<b>1780</b>	1084	1780
507.cactuBSSN_r	192	<b>150</b>	<b>1620</b>	150	1620	150	1620	192	150	1620	<b>150</b>	<b>1620</b>	150	1620
508.namd_r	192	151	1210	150	1210	<b>150</b>	<b>1210</b>	192	151	1210	150	1210	<b>150</b>	<b>1210</b>
510.parest_r	192	318	1580	321	1560	<b>321</b>	<b>1570</b>	192	318	1580	321	1560	<b>321</b>	<b>1570</b>
511.povray_r	192	277	1620	275	1630	<b>275</b>	<b>1630</b>	192	277	1620	275	1630	<b>275</b>	<b>1630</b>
519.lbm_r	192	323	627	<b>323</b>	<b>627</b>	323	626	192	<b>323</b>	<b>627</b>	323	627	323	627
521.wrf_r	192	369	1160	369	1160	<b>369</b>	<b>1160</b>	192	369	1160	369	1160	<b>369</b>	<b>1160</b>
526.blender_r	192	201	1460	<b>201</b>	<b>1450</b>	202	1450	192	201	1460	<b>201</b>	<b>1450</b>	202	1450
527.cam4_r	192	<b>218</b>	<b>1540</b>	218	1540	217	1550	192	217	1550	<b>216</b>	<b>1550</b>	215	1560
538.imagick_r	192	83.3	5730	<b>83.4</b>	<b>5730</b>	83.6	5710	192	<b>83.0</b>	<b>5760</b>	83.1	5740	82.9	5760
544.nab_r	192	135	2390	135	2400	<b>135</b>	<b>2400</b>	192	135	2390	135	2400	<b>135</b>	<b>2400</b>
549.fotonik3d_r	192	1272	588	1272	588	<b>1272</b>	<b>588</b>	192	1272	588	1272	588	<b>1272</b>	<b>588</b>
554.roms_r	192	439	695	<b>440</b>	<b>694</b>	440	693	192	439	695	<b>440</b>	<b>694</b>	440	693

SPECrate®2017\_fp\_base = **1400**

SPECrate®2017\_fp\_peak = **1400**

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.

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## 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/amd_rate_aocc400_genoa_B_lib/lib:/home/cpu2017/amd_rate_a  
    occ400_genoa_B_lib/lib32:"  
MALLOCONF = "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  
Workload Profile set to Custom  
L2 HW Prefetcher set to Disabled  
Power Regulator set to OS Control Mode

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## Platform Notes (Continued)

The system ROM used for this result contains microcode version 0xa10110d for the AMD EPYC 9nn4X family of processors. The reference code/AGESA version used in this ROM is version GenoAPI 1.0.0.1-L2

```
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on dl385gen11 Mon Oct 31 20:06:25 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 9654 96-Core Processor
 2 "physical id"s (chips)
192 "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 : 96
siblings : 96
physical 0: cores 0 1 2 3 4 5 6 7 16 17 18 19 20 21 22 23 32 33 34 35 36 37 38 39
48 49 50 51 52 53 54 55 64 65 66 67 68 69 70 71 80 81 82 83 84 85 86 87 96 97 98 99
100 101 102 103 112 113 114 115 116 117 118 119 128 129 130 131 132 133 134 135 144
145 146 147 148 149 150 151 160 161 162 163 164 165 166 167 176 177 178 179 180 181
182 183
physical 1: cores 0 1 2 3 4 5 6 7 16 17 18 19 20 21 22 23 32 33 34 35 36 37 38 39
48 49 50 51 52 53 54 55 64 65 66 67 68 69 70 71 80 81 82 83 84 85 86 87 96 97 98 99
100 101 102 103 112 113 114 115 116 117 118 119 128 129 130 131 132 133 134 135 144
145 146 147 148 149 150 151 160 161 162 163 164 165 166 167 176 177 178 179 180 181
182 183
```

```
From lscpu from util-linux 2.37.2:
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): 192
On-line CPU(s) list: 0-191
Vendor ID: AuthenticAMD
Model name: AMD EPYC 9654 96-Core Processor
CPU family: 25
Model: 17
Thread(s) per core: 1
Core(s) per socket: 96
Socket(s): 2
Stepping: 1
Frequency boost: enabled
```

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## Platform Notes (Continued)

```

CPU max MHz:          3709.0000
CPU min MHz:          400.0000
BogoMIPS:             4792.89
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
aperfmpperf rapl pni pclmulqdq monitor ssse3 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 vmcall 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 cppc 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_lld
Virtualization:      AMD-V
L1d cache:           6 MiB (192 instances)
L1i cache:           6 MiB (192 instances)
L2 cache:            192 MiB (192 instances)
L3 cache:            768 MiB (24 instances)
NUMA node(s):        24
NUMA node0 CPU(s):  0-7
NUMA node1 CPU(s):  8-15
NUMA node2 CPU(s):  16-23
NUMA node3 CPU(s):  24-31
NUMA node4 CPU(s):  32-39
NUMA node5 CPU(s):  40-47
NUMA node6 CPU(s):  48-55
NUMA node7 CPU(s):  56-63
NUMA node8 CPU(s):  64-71
NUMA node9 CPU(s):  72-79
NUMA node10 CPU(s): 80-87
NUMA node11 CPU(s): 88-95
NUMA node12 CPU(s): 96-103
NUMA node13 CPU(s): 104-111
NUMA node14 CPU(s): 112-119
NUMA node15 CPU(s): 120-127
NUMA node16 CPU(s): 128-135
NUMA node17 CPU(s): 136-143
NUMA node18 CPU(s): 144-151
NUMA node19 CPU(s): 152-159
NUMA node20 CPU(s): 160-167
NUMA node21 CPU(s): 168-175
NUMA node22 CPU(s): 176-183

```

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## Platform Notes (Continued)

```

NUMA node23 CPU(s):          184-191
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf:          Not affected
Vulnerability Mds:           Not affected
Vulnerability Meltdown:     Not affected
Vulnerability Mmio stale data: Not affected
Vulnerability Retbleed:     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; Retpolines, IBPB conditional, IBRS_FW, STIBP disabled, RSB filling, PBRSE-eIBRS Not affected
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	6M	8	Data	1	64	1	64
L1i	32K	6M	8	Instruction	1	64	1	64
L2	1M	192M	8	Unified	2	2048	1	64
L3	32M	768M	16	Unified	3	32768	1	64

`/proc/cpuinfo` cache data

cache size : 1024 KB

From `numactl --hardware`

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

```

available: 24 nodes (0-23)
node 0 cpus: 0 1 2 3 4 5 6 7
node 0 size: 31943 MB
node 0 free: 31597 MB
node 1 cpus: 8 9 10 11 12 13 14 15
node 1 size: 32253 MB
node 1 free: 32105 MB
node 2 cpus: 16 17 18 19 20 21 22 23
node 2 size: 32253 MB
node 2 free: 32100 MB
node 3 cpus: 24 25 26 27 28 29 30 31
node 3 size: 32253 MB
node 3 free: 32109 MB
node 4 cpus: 32 33 34 35 36 37 38 39
node 4 size: 32253 MB
node 4 free: 31994 MB
node 5 cpus: 40 41 42 43 44 45 46 47
node 5 size: 32253 MB
node 5 free: 32108 MB

```

(Continued on next page)



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## Platform Notes (Continued)

```

node 6 cpus: 48 49 50 51 52 53 54 55
node 6 size: 32253 MB
node 6 free: 32112 MB
node 7 cpus: 56 57 58 59 60 61 62 63
node 7 size: 32253 MB
node 7 free: 32102 MB
node 8 cpus: 64 65 66 67 68 69 70 71
node 8 size: 32253 MB
node 8 free: 32072 MB
node 9 cpus: 72 73 74 75 76 77 78 79
node 9 size: 32218 MB
node 9 free: 32067 MB
node 10 cpus: 80 81 82 83 84 85 86 87
node 10 size: 32253 MB
node 10 free: 32084 MB
node 11 cpus: 88 89 90 91 92 93 94 95
node 11 size: 32253 MB
node 11 free: 32110 MB
node 12 cpus: 96 97 98 99 100 101 102 103
node 12 size: 32253 MB
node 12 free: 32119 MB
node 13 cpus: 104 105 106 107 108 109 110 111
node 13 size: 32253 MB
node 13 free: 32102 MB
node 14 cpus: 112 113 114 115 116 117 118 119
node 14 size: 32253 MB
node 14 free: 32110 MB
node 15 cpus: 120 121 122 123 124 125 126 127
node 15 size: 32253 MB
node 15 free: 32118 MB
node 16 cpus: 128 129 130 131 132 133 134 135
node 16 size: 32253 MB
node 16 free: 32129 MB
node 17 cpus: 136 137 138 139 140 141 142 143
node 17 size: 32253 MB
node 17 free: 32109 MB
node 18 cpus: 144 145 146 147 148 149 150 151
node 18 size: 32253 MB
node 18 free: 32109 MB
node 19 cpus: 152 153 154 155 156 157 158 159
node 19 size: 32253 MB
node 19 free: 32120 MB
node 20 cpus: 160 161 162 163 164 165 166 167
node 20 size: 32253 MB
node 20 free: 32111 MB
node 21 cpus: 168 169 170 171 172 173 174 175
node 21 size: 32200 MB

```

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## Platform Notes (Continued)

```

node 21 free: 32068 MB
node 22 cpus: 176 177 178 179 180 181 182 183
node 22 size: 32253 MB
node 22 free: 32107 MB
node 23 cpus: 184 185 186 187 188 189 190 191
node 23 size: 32253 MB
node 23 free: 32115 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
0:  10 12 12 12 11 12 12 12 11 12 12 12 32 32 32 32 32 32 32 32
   32 32 32 32
1:  12 10 12 12 12 11 12 12 12 11 12 12 32 32 32 32 32 32 32 32
   32 32 32 32
2:  12 12 10 12 12 12 11 12 12 12 11 12 32 32 32 32 32 32 32 32
   32 32 32 32
3:  12 12 12 10 12 12 12 11 12 12 12 11 32 32 32 32 32 32 32 32
   32 32 32 32
4:  11 12 12 12 12 10 12 12 12 11 12 12 32 32 32 32 32 32 32 32
   32 32 32 32
5:  12 11 12 12 12 10 12 12 12 11 12 12 32 32 32 32 32 32 32 32
   32 32 32 32
6:  12 12 11 12 12 12 10 12 12 12 11 12 32 32 32 32 32 32 32 32
   32 32 32 32
7:  12 12 12 11 12 12 12 10 12 12 12 11 32 32 32 32 32 32 32 32
   32 32 32 32
8:  11 12 12 12 11 12 12 12 10 12 12 12 32 32 32 32 32 32 32 32
   32 32 32 32
9:  12 11 12 12 12 11 12 12 12 10 12 12 32 32 32 32 32 32 32 32
   32 32 32 32
10: 12 12 11 12 12 12 11 12 12 12 10 12 32 32 32 32 32 32 32 32
   32 32 32 32
11: 12 12 12 12 11 12 12 12 11 12 12 12 10 32 32 32 32 32 32 32 32
   32 32 32 32
12: 32 32 32 32 32 32 32 32 32 32 32 32 32 10 12 12 12 11 12 12 12
   11 12 12 12
13: 32 32 32 32 32 32 32 32 32 32 32 32 32 12 10 12 12 12 11 12 12
   12 11 12 12
14: 32 32 32 32 32 32 32 32 32 32 32 32 32 12 12 10 12 12 12 11 12
   12 12 11 12
15: 32 32 32 32 32 32 32 32 32 32 32 32 32 12 12 12 10 12 12 12 11
   12 12 12 11
16: 32 32 32 32 32 32 32 32 32 32 32 32 32 11 12 12 12 10 12 12 12
   11 12 12 12
17: 32 32 32 32 32 32 32 32 32 32 32 32 32 12 11 12 12 12 10 12 12
   12 11 12 12
18: 32 32 32 32 32 32 32 32 32 32 32 32 32 12 12 11 12 12 12 10 12

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## Platform Notes (Continued)

```

12 12 11 12
19: 32 32 32 32 32 32 32 32 32 32 32 32 32 12 12 12 11 12 12 12 10
12 12 12 11
20: 32 32 32 32 32 32 32 32 32 32 32 32 32 11 12 12 12 11 12 12 12
10 12 12 12
21: 32 32 32 32 32 32 32 32 32 32 32 32 32 12 11 12 12 12 11 12 12
12 10 12 12
22: 32 32 32 32 32 32 32 32 32 32 32 32 32 12 12 11 12 12 12 11 12
12 12 10 12
23: 32 32 32 32 32 32 32 32 32 32 32 32 32 12 12 12 11 12 12 12 11
12 12 12 10

```

```

From /proc/meminfo
MemTotal:      792263860 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

```

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

```

```

/usr/bin/lsb_release -d
Ubuntu 22.04.1 LTS

```

```

From /etc/*release* /etc/*version*
debian_version: bookworm/sid
os-release:
  PRETTY_NAME="Ubuntu 22.04.1 LTS"
  NAME="Ubuntu"
  VERSION_ID="22.04"
  VERSION="22.04.1 LTS (Jammy Jellyfish)"
  VERSION_CODENAME=jammy
  ID=ubuntu
  ID_LIKE=debian
  HOME_URL="https://www.ubuntu.com/"

```

```

uname -a:
Linux dl385gen11 5.15.0-52-generic #58-Ubuntu SMP Thu Oct 13 08:03:55 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
mmio_stale_data:                    Not affected
retbleed:                            Not affected

```

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## Platform Notes (Continued)

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: Retpolines, IBPB: conditional, IBRS\_FW, STIBP: disabled, RSB filling, PBRSE-eIBRS: Not affected

CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected

CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 5 Oct 31 19:32

SPEC is set to: /home/cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/mapper/ubuntu--vg-ubuntu--lv	ext4	437G	29G	389G	7%	/

From /sys/devices/virtual/dmi/id

Vendor: HPE  
 Product: ProLiant DL385 Gen11  
 Product Family: ProLiant  
 Serial: DL385G11-005

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 HMC88MEBRA113N 32 GB 2 rank 4800

BIOS:  
 BIOS Vendor: HPE  
 BIOS Version: 1.10  
 BIOS Date: 10/06/2022  
 BIOS Revision: 1.10  
 Firmware Revision: 1.10

(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)
```

(Continued on next page)



# SPEC CPU®2017 Floating Point Rate Result

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**Hewlett Packard Enterprise**

(Test Sponsor: HPE)

ProLiant DL385 Gen11

(2.40 GHz, AMD EPYC 9654)

SPECrate®2017\_fp\_base = 1400

SPECrate®2017\_fp\_peak = 1400

**CPU2017 License:** 3

**Test Sponsor:** HPE

**Tested by:** HPE

**Test Date:** Oct-2022

**Hardware Availability:** Dec-2022

**Software Availability:** Nov-2022

## Compiler Version Notes (Continued)

-----

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  
 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

AMD clang version 14.0.6 (CLANG: AOCC\_4.0.0-Build#389 2022\_10\_07) (based on

(Continued on next page)



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(Test Sponsor: HPE)

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SPECrate®2017\_fp\_base = 1400

SPECrate®2017\_fp\_peak = 1400

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

**Test Date:** Oct-2022  
**Hardware Availability:** Dec-2022  
**Software Availability:** Nov-2022

## Compiler Version Notes (Continued)

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 | 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

(Continued on next page)



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(Test Sponsor: HPE)

ProLiant DL385 Gen11

(2.40 GHz, AMD EPYC 9654)

SPECrate®2017\_fp\_base = 1400

SPECrate®2017\_fp\_peak = 1400

**CPU2017 License:** 3

**Test Sponsor:** HPE

**Tested by:** HPE

**Test Date:** Oct-2022

**Hardware Availability:** Dec-2022

**Software Availability:** Nov-2022

## Base Compiler Invocation (Continued)

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 -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

(Continued on next page)



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SPECrate®2017\_fp\_base = 1400

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

**Test Date:** Oct-2022  
**Hardware Availability:** Dec-2022  
**Software Availability:** Nov-2022

## Base Optimization Flags (Continued)

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
```

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
```



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SPECrate®2017\_fp\_base = 1400

SPECrate®2017\_fp\_peak = 1400

**CPU2017 License:** 3

**Test Sponsor:** HPE

**Tested by:** HPE

**Test Date:** Oct-2022

**Hardware Availability:** Dec-2022

**Software Availability:** Nov-2022

## 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

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



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SPECrate®2017\_fp\_peak = 1400

**CPU2017 License:** 3

**Test Sponsor:** HPE

**Tested by:** HPE

**Test Date:** Oct-2022

**Hardware Availability:** Dec-2022

**Software Availability:** Nov-2022

## 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
-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: Same as 519.lbm\_r

544.nab\_r: basepeak = yes

C++ benchmarks:

508.namd\_r: basepeak = yes

510.parest\_r: basepeak = yes

Fortran benchmarks:

503.bwaves\_r: 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 -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++:

(Continued on next page)





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

**Test Date:** Oct-2022  
**Hardware Availability:** Dec-2022  
**Software Availability:** Nov-2022

## Peak Optimization Flags (Continued)

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 -fremap-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
-lamdlbm -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

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-Genoa-rev2.0.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-Genoa-rev2.0.xml>

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



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Tested with SPEC CPU®2017 v1.1.8 on 2022-10-31 16:06:25-0400.

Report generated on 2022-11-22 19:58:54 by CPU2017 PDF formatter v6442.

Originally published on 2022-11-22.