



SPEC CPU®2017 Floating Point Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL365 Gen11

(2.40 GHz, AMD EPYC 9654)

SPECrate®2017_fp_base = 1340

SPECrate®2017_fp_peak = 1450

CPU2017 License: 3

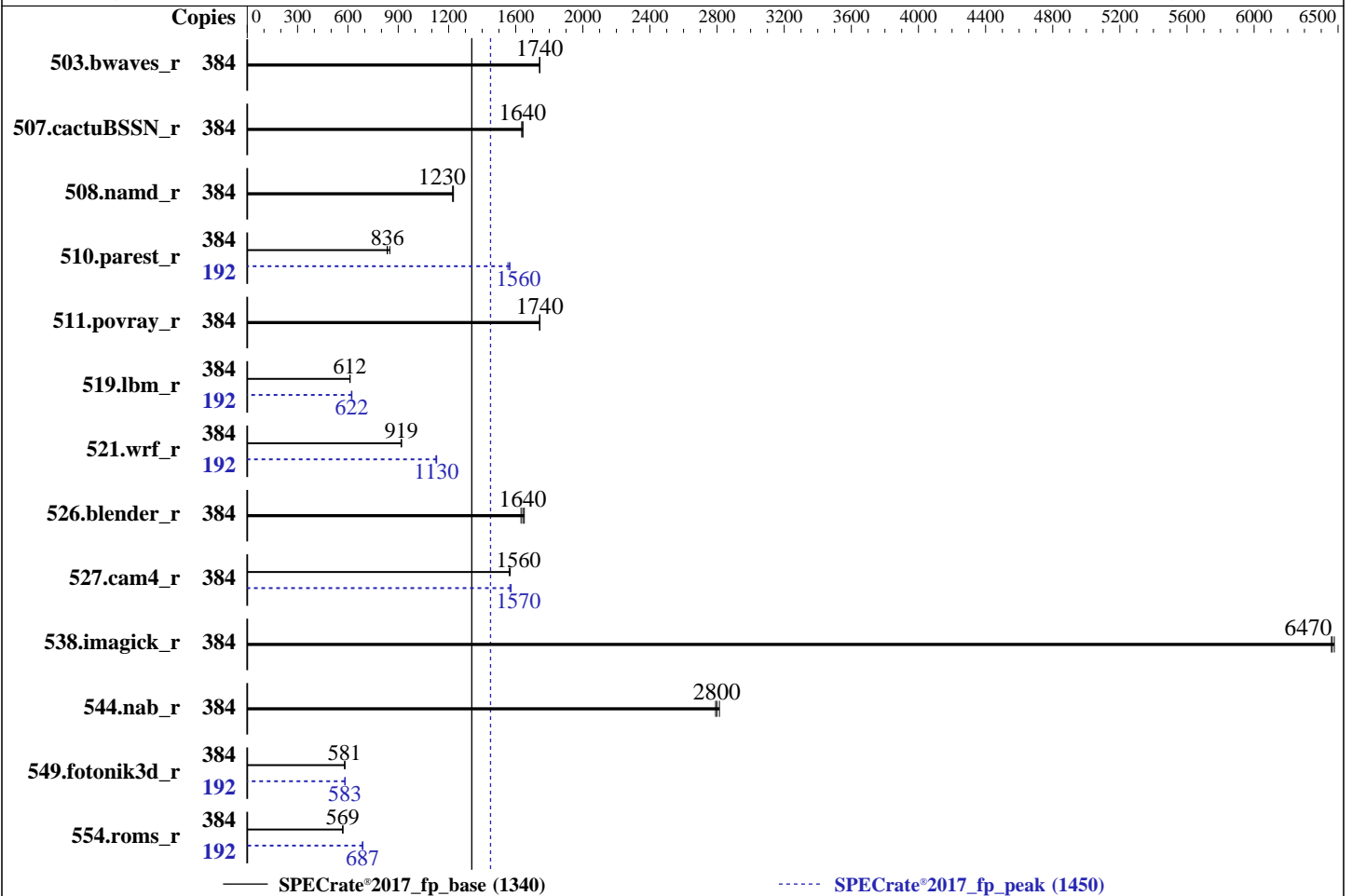
Test Sponsor: HPE

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, 2 threads/core
 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: 2 x 480 GB SATA SSD
 Other: None

Software

OS: Ubuntu 22.04.1 LTS
 Kernel 5.15.0-43-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 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	384	<u>2209</u>	<u>1740</u>	2210	1740	2209	1740	384	<u>2209</u>	<u>1740</u>	2210	1740	2209	1740
507.cactuBSSN_r	384	296	1640	<u>296</u>	<u>1640</u>	297	1640	384	296	1640	<u>296</u>	<u>1640</u>	297	1640
508.namd_r	384	297	1230	298	1220	<u>298</u>	<u>1230</u>	384	297	1230	298	1220	<u>298</u>	<u>1230</u>
510.parest_r	384	1205	834	1182	850	<u>1202</u>	<u>836</u>	192	321	1570	<u>321</u>	<u>1560</u>	323	1550
511.povray_r	384	514	1740	<u>514</u>	<u>1740</u>	515	1740	384	514	1740	<u>514</u>	<u>1740</u>	515	1740
519.lbm_r	384	661	612	<u>661</u>	<u>612</u>	660	613	192	<u>325</u>	<u>622</u>	324	624	326	621
521.wrf_r	384	936	919	<u>936</u>	<u>919</u>	938	917	192	382	1120	<u>381</u>	<u>1130</u>	381	1130
526.blender_r	384	354	1650	<u>356</u>	<u>1640</u>	358	1630	384	354	1650	<u>356</u>	<u>1640</u>	358	1630
527.cam4_r	384	430	1560	<u>430</u>	<u>1560</u>	428	1570	384	429	1570	<u>427</u>	<u>1570</u>	427	1570
538.imagick_r	384	<u>148</u>	<u>6470</u>	148	6460	147	6480	384	<u>148</u>	<u>6470</u>	148	6460	147	6480
544.nab_r	384	232	2790	<u>231</u>	<u>2800</u>	230	2810	384	232	2790	<u>231</u>	<u>2800</u>	230	2810
549.fotonik3d_r	384	2573	582	2577	581	<u>2575</u>	<u>581</u>	192	<u>1284</u>	<u>583</u>	1284	583	1284	583
554.roms_r	384	1073	569	<u>1072</u>	<u>569</u>	1071	570	192	442	690	<u>444</u>	<u>687</u>	444	686

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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.

(Continued on next page)



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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_aocc400_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
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

The system ROM used for this result contains microcode version 0xa10110d for the

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Platform Notes (Continued)

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 admin1 Wed Oct 12 20:01:15 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)

384 "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 : 192

physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
81 82 83 84 85 86 87 88 89 90 91 92 93 94 95

physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80
81 82 83 84 85 86 87 88 89 90 91 92 93 94 95

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): 384
On-line CPU(s) list: 0-383
Vendor ID: AuthenticAMD
Model name: AMD EPYC 9654 96-Core Processor
CPU family: 25
Model: 17
Thread(s) per core: 2
Core(s) per socket: 96
Socket(s): 2
Stepping: 1
Frequency boost: enabled
CPU max MHz: 3709.0000
CPU min MHz: 400.0000
BogoMIPS: 4792.80

(Continued on next page)



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Platform Notes (Continued)

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 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 avx512v1 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):

0-7,192-199

NUMA node1 CPU(s):

8-15,200-207

NUMA node2 CPU(s):

16-23,208-215

NUMA node3 CPU(s):

24-31,216-223

NUMA node4 CPU(s):

32-39,224-231

NUMA node5 CPU(s):

40-47,232-239

NUMA node6 CPU(s):

48-55,240-247

NUMA node7 CPU(s):

56-63,248-255

NUMA node8 CPU(s):

64-71,256-263

NUMA node9 CPU(s):

72-79,264-271

NUMA node10 CPU(s):

80-87,272-279

NUMA node11 CPU(s):

88-95,280-287

NUMA node12 CPU(s):

96-103,288-295

NUMA node13 CPU(s):

104-111,296-303

NUMA node14 CPU(s):

112-119,304-311

NUMA node15 CPU(s):

120-127,312-319

NUMA node16 CPU(s):

128-135,320-327

NUMA node17 CPU(s):

136-143,328-335

NUMA node18 CPU(s):

144-151,336-343

NUMA node19 CPU(s):

152-159,344-351

NUMA node20 CPU(s):

160-167,352-359

NUMA node21 CPU(s):

168-175,360-367

NUMA node22 CPU(s):

176-183,368-375

NUMA node23 CPU(s):

184-191,376-383

Vulnerability Itlb multihit:

Not affected

Vulnerability L1tf:

Not affected

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Platform Notes (Continued)

Vulnerability Mds: Not affected
 Vulnerability Meltdown: Not affected
 Vulnerability Mmio stale data: 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 always-on, 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	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 7 192 193 194 195 196 197 198 199
 node 0 size: 31941 MB
 node 0 free: 31540 MB
 node 1 cpus: 8 9 10 11 12 13 14 15 200 201 202 203 204 205 206 207
 node 1 size: 32252 MB
 node 1 free: 31949 MB
 node 2 cpus: 16 17 18 19 20 21 22 23 208 209 210 211 212 213 214 215
 node 2 size: 32252 MB
 node 2 free: 31825 MB
 node 3 cpus: 24 25 26 27 28 29 30 31 216 217 218 219 220 221 222 223
 node 3 size: 32252 MB
 node 3 free: 31967 MB
 node 4 cpus: 32 33 34 35 36 37 38 39 224 225 226 227 228 229 230 231
 node 4 size: 32252 MB
 node 4 free: 31865 MB
 node 5 cpus: 40 41 42 43 44 45 46 47 232 233 234 235 236 237 238 239
 node 5 size: 32252 MB
 node 5 free: 32012 MB
 node 6 cpus: 48 49 50 51 52 53 54 55 240 241 242 243 244 245 246 247
 node 6 size: 32252 MB
 node 6 free: 31878 MB
 node 7 cpus: 56 57 58 59 60 61 62 63 248 249 250 251 252 253 254 255

(Continued on next page)



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Platform Notes (Continued)

```

node 7 size: 32252 MB
node 7 free: 32007 MB
node 8 cpus: 64 65 66 67 68 69 70 71 256 257 258 259 260 261 262 263
node 8 size: 32252 MB
node 8 free: 31827 MB
node 9 cpus: 72 73 74 75 76 77 78 79 264 265 266 267 268 269 270 271
node 9 size: 32252 MB
node 9 free: 31997 MB
node 10 cpus: 80 81 82 83 84 85 86 87 272 273 274 275 276 277 278 279
node 10 size: 32252 MB
node 10 free: 31869 MB
node 11 cpus: 88 89 90 91 92 93 94 95 280 281 282 283 284 285 286 287
node 11 size: 32218 MB
node 11 free: 31989 MB
node 12 cpus: 96 97 98 99 100 101 102 103 288 289 290 291 292 293 294 295
node 12 size: 32252 MB
node 12 free: 32040 MB
node 13 cpus: 104 105 106 107 108 109 110 111 296 297 298 299 300 301 302 303
node 13 size: 32252 MB
node 13 free: 32063 MB
node 14 cpus: 112 113 114 115 116 117 118 119 304 305 306 307 308 309 310 311
node 14 size: 32252 MB
node 14 free: 32064 MB
node 15 cpus: 120 121 122 123 124 125 126 127 312 313 314 315 316 317 318 319
node 15 size: 32252 MB
node 15 free: 32063 MB
node 16 cpus: 128 129 130 131 132 133 134 135 320 321 322 323 324 325 326 327
node 16 size: 32252 MB
node 16 free: 32043 MB
node 17 cpus: 136 137 138 139 140 141 142 143 328 329 330 331 332 333 334 335
node 17 size: 32252 MB
node 17 free: 32073 MB
node 18 cpus: 144 145 146 147 148 149 150 151 336 337 338 339 340 341 342 343
node 18 size: 32252 MB
node 18 free: 31985 MB
node 19 cpus: 152 153 154 155 156 157 158 159 344 345 346 347 348 349 350 351
node 19 size: 32252 MB
node 19 free: 32063 MB
node 20 cpus: 160 161 162 163 164 165 166 167 352 353 354 355 356 357 358 359
node 20 size: 32252 MB
node 20 free: 32073 MB
node 21 cpus: 168 169 170 171 172 173 174 175 360 361 362 363 364 365 366 367
node 21 size: 32193 MB
node 21 free: 32007 MB
node 22 cpus: 176 177 178 179 180 181 182 183 368 369 370 371 372 373 374 375
node 22 size: 32252 MB
node 22 free: 32060 MB

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```

node 23 cpus: 184 185 186 187 188 189 190 191 376 377 378 379 380 381 382 383
node 23 size: 32252 MB
node 23 free: 32031 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 10 12 12 12 11 12 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 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
 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
 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

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(Continued on next page)



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```

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:      792214728 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

```

/sbin/tuned-adm active
  Current active profile: balanced

```

```

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

```

```

/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 admin1 5.15.0-43-generic #46-Ubuntu SMP Tue Jul 12 10:30:17 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
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store
                                         Bypass disabled via prctl and

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Platform Notes (Continued)

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CVE-2017-5753 (Spectre variant 1):      seccomp
                                         Mitigation: usercopy/swaps
                                         barriers and __user pointer
                                         sanitization
CVE-2017-5715 (Spectre variant 2):      Mitigation: Retpolines, IBPB:
                                         conditional, IBRS_FW, STIBP:
                                         always-on, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

```

run-level 5 Oct 12 19:57

SPEC is set to: /home/cpu2017

```

Filesystem                Type      Size  Used Avail Use% Mounted on
/dev/mapper/ubuntu--vg-ubuntu--lv ext4      437G   17G  401G   5% /

```

```

From /sys/devices/virtual/dmi/id
Vendor:          HPE
Product:         ProLiant DL365 Gen11
Product Family: ProLiant
Serial:          DL365G11-001

```

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)
-----

```

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)

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SPEC CPU®2017 Floating Point Rate Result

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(Test Sponsor: HPE)

ProLiant DL365 Gen11

(2.40 GHz, AMD EPYC 9654)

SPECrate®2017_fp_base = 1340

SPECrate®2017_fp_peak = 1450

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)

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 LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix

(Continued on next page)



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Software Availability: Nov-2022

Compiler Version Notes (Continued)

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

(Continued on next page)



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Tested by: HPE

Test Date: Oct-2022

Hardware Availability: Dec-2022

Software Availability: Nov-2022

Base Compiler Invocation (Continued)

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

```

Fortran benchmarks:

```

-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3

```

(Continued on next page)



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Tested by: HPE

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

Base Optimization Flags (Continued)

Fortran benchmarks (continued):

```
-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
```

Base Other Flags

C benchmarks:

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

(Continued on next page)



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SPECrate®2017_fp_peak = 1450

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Oct-2022

Hardware Availability: Dec-2022

Software Availability: Nov-2022

Base Other Flags (Continued)

C++ benchmarks:

-Wno-unused-command-line-argument

Fortran benchmarks:

-Wno-unused-command-line-argument

Benchmarks using both Fortran and C:

-Wno-unused-command-line-argument

Benchmarks using both C and C++:

-Wno-unused-command-line-argument

Benchmarks using Fortran, C, and C++:

-Wno-unused-command-line-argument

Peak Compiler Invocation

C benchmarks:

clang

C++ benchmarks:

clang++

Fortran benchmarks:

flang

Benchmarks using both Fortran and C:

flang clang

Benchmarks using both C and C++:

clang++ clang

Benchmarks using Fortran, C, and C++:

clang++ clang flang

Peak Portability Flags

Same as Base Portability Flags



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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
-fremap-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
-fininline-aggressive -mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -zopt -lamdlibm
-lamdalloc
```

Fortran benchmarks:

503.bwaves_r: basepeak = yes

```
549.fotonik3d_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 -Kieee
-Mrecursive -mllvm -reduce-array-computations=3
-fepilog-vectorization-of-inductions -fvector-transform
-fscalar-transform -lamdlibm -lamdalloc -lflang
```

```
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
```

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Tested by: HPE

Test Date: Oct-2022

Hardware Availability: Dec-2022

Software Availability: Nov-2022

Peak Optimization Flags (Continued)

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
-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++:

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

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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-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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