# SPEC CPU®2017 Floating Point Rate Result

## Hewlett Packard Enterprise

**(Test Sponsor: HPE)**

**ProLiant DL365 Gen11**

(2.55 GHz, AMD EPYC 9684X)

<table>
<thead>
<tr>
<th>CPU2017 License: 3</th>
<th>Test Date: Sep-2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor: HPE</td>
<td>Hardware Availability: Sep-2023</td>
</tr>
<tr>
<td>Tested by: HPE</td>
<td>Software Availability: Apr-2023</td>
</tr>
</tbody>
</table>

### SPECrate®2017 fp base = 1540

### SPECrate®2017 fp peak = 1600

<table>
<thead>
<tr>
<th>Copy</th>
<th>SPECrate®2017 fp_peak</th>
<th>SPECrate®2017 fp_base</th>
</tr>
</thead>
<tbody>
<tr>
<td>384</td>
<td>1600</td>
<td>1540</td>
</tr>
</tbody>
</table>

### Hardware

<table>
<thead>
<tr>
<th>CPU Name: AMD EPYC 9684X</th>
<th>OS: SUSE Linux Enterprise Server 15 SP4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz: 3700</td>
<td>Kernel 5.14.21-150400.24.60-default</td>
</tr>
<tr>
<td>Nominal: 2550</td>
<td>Compiler: C/C++/Fortran: Version 4.0.0 of AOCC</td>
</tr>
<tr>
<td>Enabled: 192 cores, 2 chips, 2 threads/core</td>
<td>Parallel: No</td>
</tr>
<tr>
<td>Orderable: 1,2 chips</td>
<td>Firmware: HPE BIOS Version v1.40 07/12/2023 released</td>
</tr>
<tr>
<td>Cache L1: 32 KB I + 32 KB D on chip per core</td>
<td>File System: xfs</td>
</tr>
<tr>
<td>L2: 1 MB I+D on chip per core</td>
<td>System State: Run level 5 (multi-user)</td>
</tr>
<tr>
<td>L3: 1152 MB I+D on chip per chip, 96 MB shared / 8 cores</td>
<td>Base Pointers: 64-bit</td>
</tr>
<tr>
<td>Other: None</td>
<td>Peak Pointers: 64-bit</td>
</tr>
<tr>
<td>Memory: 768 GB (24 x 32 GB 2Rx8 PC5-4800B-R)</td>
<td>Other: None</td>
</tr>
<tr>
<td>Storage: 1 x 960 GB SATA SSD</td>
<td>Power Management: BIOS and OS set to prefer performance at the cost of additional power usage</td>
</tr>
<tr>
<td>Other: None</td>
<td></td>
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</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>OS: SUSE Linux Enterprise Server 15 SP4</th>
</tr>
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<tbody>
<tr>
<td>Kernel 5.14.21-150400.24.60-default</td>
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<tr>
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<td>Firmware: HPE BIOS Version v1.40 07/12/2023 released</td>
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<tr>
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<tr>
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</tr>
<tr>
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</tr>
<tr>
<td>Peak Pointers: 64-bit</td>
</tr>
<tr>
<td>Other: None</td>
</tr>
<tr>
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</tr>
</tbody>
</table>
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Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL365 Gen11
(2.55 GHz, AMD EPYC 9684X)

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Hardware Availability: Sep-2023
Software Availability: Apr-2023

CPU2017 License: 3
Test Date: Sep-2023
Tested by: HPE

SPECrate®2017_fp_base = 1540
SPECrate®2017_fp_peak = 1600

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
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<td>503.bwaves_r</td>
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<td>2166</td>
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<td>511.povray_r</td>
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<td>587</td>
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<td>554.roms_r</td>
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<td>384</td>
<td>853</td>
<td>715</td>
<td>850</td>
<td>718</td>
</tr>
</tbody>
</table>

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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(2.55 GHz, AMD EPYC 9684X)

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Tested by: HPE

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_znver4_A_lib/lib:/home/cpu2017/amd_rate_aocc400_znver4_A_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
Determinism Control set to Manual
Performance Determinism set to Power Deterministic
Memory Patrol Scrubbing set to Disabled
Last-Level Cache (LLC) as NUMA Node set to Enabled
NUMA memory domains per socket set to Four memory domains per socket
ACPI CST C2 Latency set to 18 microseconds
Thermal Configuration set to Maximum Cooling
Workload Profile set to Custom
Power Regulator set to OS Control Mode
L2 HW Prefetcher set to Disabled

The system ROM used for this result contains microcode version 0xa10123e for the AMD EPYC 9nn4X family of processors. The reference code/AGESA version used in this ROM is version Genoa-XPI 1.0.0.8

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c3ae2c92cc097bec197 running on localhost Fri Sep 15 12:40:07 2023

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

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Software Availability: Apr-2023

Platform Notes (Continued)

6. /proc/cpuinfo
7. lscpu
8. numactl --hardware
9. /proc/meminfo
10. who -r
11. Systemd service manager version: systemd 249 (249.16+suse.171.gdad0071f15)
12. Services, from systemctl list-unit-files
13. Linux kernel boot-time arguments, from /proc/cmdline
14. cpupower frequency-info
15. tuned-adm active
16. sysct1
17. /sys/kernel/mm/transparent_hugepage
18. /sys/kernel/mm/transparent_hugepage/klhugepaged
19. OS release
20. Disk information
21. /sys/devices/virtual/dmi/id
22. dmidecode
23. BIOS

1. uname -a
   x86_64 x86_64 x86_64 GNU/Linux

2. w
   12:40:07 up 5 min, 1 user, load average: 0.25, 0.28, 0.17
   USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT
   root pts/0 10.3.198.173 12:37 31.00s 1.26s 0.13s /bin/bash ./amd_rate_aocc400_znver4_A1.sh

3. Username
   From environment variable $USER: root

4. ulimit -a
   core file size    (blocks, -c) unlimited
   data seg size     (kbytes, -d) unlimited
   scheduling priority (-e) 0
   file size         (blocks, -f) unlimited
   pending signals   (-l) 3094146
   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) 3094146
   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@pts/0
   -bash

(Continued on next page)
Platform Notes (Continued)

```python
python3 ./run_fprate.py
/bin/bash ./amd_rate_aocc400_znver4_A1.sh
runcpu --config amd_rate_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 fprate
runcpu --configfile amd_rate_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 --nopower
--runmode rate --tune base:peak --size test:train:fprate --nopreevn --note-preevn --logfile
$SPEC/tmp/CPUP2017.012/templogs/preenv.fprate.012.0.log --lognum 012.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017
```

6. `/proc/cpuinfo`

```plaintext
model name      : AMD EPYC 9684X 96-Core Processor
vendor_id       : AuthenticAMD
cpu family      : 25
model           : 17
stepping        : 2
microcode       : 0xa10123e
bugs            : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
TLB size        : 3584 4K pages
cpu cores       : 96
siblings        : 192
2 physical ids (chips)
384 processors (hardware threads)
physical id 0: core ids 0-95
physical id 1: core ids 0-95
physical id 0: apicids 0-191
physical id 1: apicids 256-447
Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for virtualized systems. Use the above data carefully.
```

7. `lscpu`

```plaintext
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 9684X 96-Core Processor
CPU family:                      25
Model:                           17
Thread(s) per core:              2
Core(s) per socket:              96
Socket(s):                       2
Stepping:                        2
Frequency boost:                 enabled
CPU max Mhz:                     2550.000
CPU min Mhz:                     1500.000
BogomIPS:                        5092.27
Flags:
   fpu vme de pse tsc msr mae mce cx8 apic sep mtrr pge mca cmov pat pse36
   cli flush mxr fsx sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp lm
   constant_tsc rep_good nopl nonstop_tsc cpubi 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 ibrnit wdt tce topoext
   perfctr_core perfctr_nb bext perfctr_l1c mwaitx cdp cat l3 cdq l3
   invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsgsbse bmid
```

(Continued on next page)
Platform Notes (Continued)

<table>
<thead>
<tr>
<th>Vulnerability</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Itlb multihit</td>
<td>Not affected</td>
</tr>
<tr>
<td>Lft</td>
<td>Not affected</td>
</tr>
<tr>
<td>Mds:</td>
<td>Not affected</td>
</tr>
<tr>
<td>Meltdown</td>
<td>Not affected</td>
</tr>
<tr>
<td>Mnio stale data:</td>
<td>Not affected</td>
</tr>
<tr>
<td>Retbleed</td>
<td>Not affected</td>
</tr>
<tr>
<td>Spec store bypass:</td>
<td>Mitigation; Speculative Store Bypass disabled via prctl and seccomp</td>
</tr>
<tr>
<td>Spectre v1</td>
<td>Mitigation; usercopy/swapgs barriers and __user pointer sanitization</td>
</tr>
<tr>
<td>Spectre v2</td>
<td>Mitigation; Retpolines, IBPB conditional, iBRS_FW, STIBP always-on, RSB filling, PBRB-eIBRS Not affected</td>
</tr>
<tr>
<td>Srbd:</td>
<td>Not affected</td>
</tr>
<tr>
<td>Tax async abort:</td>
<td>Not affected</td>
</tr>
</tbody>
</table>

From lscpu --cache:

<table>
<thead>
<tr>
<th>NAME</th>
<th>ONE-SIZE</th>
<th>ALL-SIZE</th>
<th>WAYS</th>
<th>TYPE</th>
<th>LEVEL</th>
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<th>COHERENCY-SIZE</th>
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<tbody>
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<td>32K</td>
<td>6M</td>
<td>8</td>
<td>Data</td>
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<td>L1i</td>
<td>32K</td>
<td>6M</td>
<td>8</td>
<td>Instruction</td>
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<td>64</td>
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<td>L2</td>
<td>1M</td>
<td>192M</td>
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<td>98304</td>
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</tbody>
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8. numactl --hardware

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(Continued on next page)
### Platform Notes (Continued)

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

<table>
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<tr>
<th>Node</th>
<th>CPUs</th>
<th>Size</th>
<th>Free</th>
</tr>
</thead>
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<td>31789 MB</td>
</tr>
<tr>
<td>1</td>
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<td>32114 MB</td>
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<td>18</td>
<td>144-151,336-343</td>
<td>32251 MB</td>
<td>32049 MB</td>
</tr>
<tr>
<td>19</td>
<td>152-159,344-351</td>
<td>32251 MB</td>
<td>32049 MB</td>
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</table>
**SPEC CPU®2017 Floating Point Rate Result**

*Test Sponsor: HPE*

**ProLiant DL365 Gen11 (2.55 GHz, AMD EPYC 9684X)**

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

**Specification**

**SPECrate®2017_fp_base = 1540**  
**SPECrate®2017_fp_peak = 1600**

**Platform Notes (Continued)**

---

9. /proc/meminfo  
MemTotal: 792133380 kB  

10. who -r  
run-level 5 Sep 15 12:35  

11. Systemd service manager version: systemd 249 (249.16+suse.171.gdad0071f15)  
Default Target Status  
graphical running  

12. Services, from systemctl list-unit-files  
STATE UNIT FILES  
enabled ModemManager YaST2-Firstboot YaST2-Second-Stage ahslog amsd apparmor auditd bluetooth cpqFca cpqIde cpqScsi cron display-manager getty8 haveged irqbalance iscsi issue-generator kbdsettings klog lvm2-monitor mr_cpqScsi nscd postfix purge-kernels rollback rsyslog smad

---

(Continued on next page)
### Platform Notes (Continued)

smartd sshd systemd-pstore wicked wickeddd-auto4 wickeddd-dhcp4 wickeddd-dhcp6 wickeddd-nanny wpasupplicant

disabled

---

13. Linux kernel boot-time arguments, from /proc/cmdline

14. cpupower frequency-info

15. tuned-adm active

16. sysctl

---

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL365 Gen11
(2.55 GHz, AMD EPYC 9684X)

SPECrate®2017_fp_base = 1540
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CPU2017 License: 3
Test Sponsor: HPE
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Test Date: Sep-2023
Hardware Availability: Sep-2023
Software Availability: Apr-2023

Platform Notes (Continued)

vm.watermark_scale_factor 10
vm.zone_reclaim_mode 1

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

18. /sys/kernel/mm/transparent_hugepage/hugepaged
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

19. OS release
From /etc/*-release /etc/*-version
os-release SUSE Linux Enterprise Server 15 SP4

20. Disk information
SPEC is set to: /home/cpu2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/sdb3 xfs 791G 7.7G 784G 1% /home

21. /sys/devices/virtual/dmi/id
Vendor: HPE
Product: ProLiant DL365 Gen11
Product Family: ProLiant
Serial: DL3x5GEN11

22. dmidecode
Additional information from dmidecode 3.4 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:
3x Samsung M321R4GA3BB0-CQKDG 32 GB 2 rank 4800
21x Samsung M321R4GA3BB0-CQKVG 32 GB 2 rank 4800

23. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor: HPE
BIOS Version: 1.40
BIOS Date: 07/12/2023
BIOS Revision: 1.40
Firmware Revision: 1.45
### Compiler Version Notes

<table>
<thead>
<tr>
<th>Language</th>
<th>Command Line</th>
<th>Notes</th>
</tr>
</thead>
</table>
| C        | 519.libm_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#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6) 
Target: x86_64-unknown-linux-gnu 
Thread model: posix 
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin |
| C++      | 508.namd_r(base, peak) 510.parest_r(base, peak) | AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6) 
Target: x86_64-unknown-linux-gnu 
Thread model: posix 
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/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#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6) 
Target: x86_64-unknown-linux-gnu 
Thread model: posix 
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/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#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6) 
Target: x86_64-unknown-linux-gnu 
Thread model: posix 
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/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#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6) 
Target: x86_64-unknown-linux-gnu 
Thread model: posix 
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin |
Hewlett Packard Enterprise
ProLiant DL365 Gen11
(2.55 GHz, AMD EPYC 9684X)
Hewlett Packard Enterprise
ProLiant DL365 Gen11
(2.55 GHz, AMD EPYC 9684X)

SPEC CPU®2017 Floating Point Rate Result
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HPE

SPECrate®2017_fp_base = 1540
SPECrate®2017_fp_peak = 1600

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

Test Date: Sep-2023
Hardware Availability: Sep-2023
Software Availability: Apr-2023

Base Optimization Flags

C benchmarks:
- -m64 -flto -Wl,-mlllvm -Wl,-march=znver4 -Ofast -mllvm -ldist-scalar-expand -fenable-aggressive-gather -O3 -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,-mlllvm -Wl,-align-all-nofallthru-blocks=6
- -Wl,-mlllvm -Wl,-reduce-array-computations=3
- -Wl,-mlllvm -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,-mlllvm -Wl,-align-all-nofallthru-blocks=6
- -Wl,-mlllvm -Wl,-reduce-array-computations=3
- -Wl,-mlllvm -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,-mlllvm -Wl,-align-all-nofallthru-blocks=6
- -Wl,-mlllvm -Wl,-reduce-array-computations=3
- -Wl,-mlllvm -Wl,-enable-X86-prefetching -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 -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,-mlllvm -Wl,-align-all-nofallthru-blocks=6
- -Wl,-mlllvm -Wl,-reduce-array-computations=3
- -Wl,-mlllvm -Wl,-x86-use-vzeroupper=false -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 -mllvm -unroll-threshold=100 -finline-aggressive
- -mllvm -loop-unswitch-threshold=200000 -lamdlibm -lamdalloc
- -lflang

(Continued on next page)
**SPEC CPU®2017 Floating Point Rate Result**

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL365 Gen11  
(2.55 GHz, AMD EPYC 9684X)

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>SPECrate®2017_fp_base</td>
<td>1540</td>
</tr>
<tr>
<td>SPECrate®2017_fp_peak</td>
<td>1600</td>
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</table>

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

**Test Date:** Sep-2023  
**Hardware Availability:** Sep-2023  
**Software Availability:** Apr-2023

---

**Base Optimization Flags (Continued)**

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

**Base Other Flags**

C benchmarks:
- `-Wno-unused-command-line-argument`

C++ benchmarks:
- `-Wno-unused-command-line-argument`

Fortran benchmarks:
- `-Wno-unused-command-line-argument`

Benchmarks using both Fortran and C:
- `-Wno-unused-command-line-argument`

Benchmarks using both C and C++:
- `-Wno-unused-command-line-argument`

Benchmarks using Fortran, C, and C++:
- `-Wno-unused-command-line-argument`

**Peak Compiler Invocation**

C benchmarks:
- `clang`

C++ benchmarks:
- `clang++`

(Continued on next page)
Peak Compiler Invocation (Continued)

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,-mlllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math
-fstruct-layout=7 -mlllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mlllvm -inline-threshold=1000
-mlllvm -reduce-array-computations=3 -zopt -lamdlibm
-lamdalloc

538.imagick_r: basepeak = yes

544.nab_r: basepeak = yes

C++ benchmarks:

508.namd_r: -m64 -flto -Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlllvm -Wl,-reduce-array-computations=3
-Wl,-mlllvm -Wl,-x86-use-vzeroupper=false -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math
-finline-aggressive -mlllvm -unroll-threshold=100
-mlllvm -reduce-array-computations=3 -zopt -lamdlibm
-lamdalloc
Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL365 Gen11  
(2.55 GHz, AMD EPYC 9684X)  

SPECrates:  
- SPECrate®2017_fp_base = 1540  
- SPECrate®2017_fp_peak = 1600  

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

Peak Optimization Flags (Continued)

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 -Wl,-mllvm -unroll-threshold=100  
-mllvm -reduce-array-computations=3 -zopt -llamdlibm  
-lamdalloc

Fortran benchmarks:

503. bwaves_r: basepeak = yes

549. fotokin3d_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 -llamdlibm -llamdalloc -llflag

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  
-fremap-arrays -fstrip-mining  
-mllvm -inline-threshold=1000  
-mllvm -reduce-array-computations=3 -zopt -Mrecursive  
-fepilog-vectorization-of-inductions -llamdlibm -llamdalloc  
-llflag

527. cam4_r: basepeak = yes

Benchmarks using both C and C++:

(Continued on next page)
Hewlett Packard Enterprise

ProLiant DL365 Gen11
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Peak Optimization Flags (Continued)

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

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-X-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-Genoa-X-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.

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