SPEC CPU®2017 Integer Rate Result

xFusion
FusionServer 1258H V7
(AMD EPYC 9224)

SPECrated®2017_int_base = 514
SPECrated®2017_int_peak = 534

CPU2017 License: 6488
Test Sponsor: xFusion
Tested by: xFusion

Test Date: Apr-2024
Hardware Availability: Jun-2023
Software Availability: Dec-2023

---

### Hardware

**CPU Name:** AMD EPYC 9224
**Max MHz:** 3700
**Nominal:** 2500
**Enabled:** 48 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:** 64 MB I+D on chip per chip, 16 MB shared / 6 cores
**Other:** None
**Memory:** 768 GB (24 x 32 GB 2Rx4 PC5-4800B-R)
**Storage:** 1 x 960 GB SATA SSD
**Other:** CPU Cooling: Air

---

### Software

**OS:** Red Hat Enterprise Linux release 9.0 (Plow)
5.14.0-70.13.1.el9_0.x86_64
**Compiler:** C/C++/Fortran: Version 4.0.0 of AOCC
**Parallel:** No
**Firmware:** Version 2.08.18 released Apr-2024
**File System:** xfs
**System State:** Run level 3 (multi-user)
**Base Pointers:** 64-bit
**Peak Pointers:** 32/64-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

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</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

'u-limit -s unlimited' was used to set environment stack size limit
'u-limit -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) only on request for base runs,
'echo madvise > /sys/kernel/mm/transparent_hugepage/enable' run as root.
To enable THP for all allocations for peak runs,
'echo always > /sys/kernel/mm/transparent_hugepage/enable' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.
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Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/cpu2017/amd_rate_aocc400_znver4_A_lib/lib:/cpu2017/amd_rate_aocc400_znver4_A_lib/lib32:" MALLOC_CONF = "retain: true"

Environment variables set by runcpu during the 523.xalancbmk_r peak run:
MALLOC_CONF = "thp: never"

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 settings:
Determinism Control = Manual
Determinism Enable = Power
TDP Control = Manual
TDP = 400
PPT Control = Manual
PPT = 400
NUMA Nodes Per Socket = NPS4

Sysinfo program /cpu2017/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Thu Apr 25 04:42:34 2024

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

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4. ulimit -a
5. sysinfo process ancestry
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7. lscpu
8. numactl --hardware
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10. who -r
11. Systemd service manager version: systemd 250 (250-6.e19_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

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Platform Notes (Continued)

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
   04:42:34 up 8 min,  2 users,  load average: 0.00, 0.01, 0.00
   USER     TTY        LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1      04:40    2:18   0.00s  0.00s -bash
   root     pts/0     04:40   34.00s  1.04s  0.00s -bash

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) 6191057
   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) 6191057
   virtual memory (kbytes, -v) unlimited
   file locks (-x) unlimited

5. sysinfo process ancestry
   /usr/lib/systemd/systemd --switched-root --system --deserialize 30
   sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
   sshd: root [priv]
   sshd: root@pts/0
   -bash
   python3 ./run_amd_rate_aocc400_znver4_A1.py
   /bin/bash ./amd_rate_aocc400_znver4_A1.sh
   runcpu --config amd_rate_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 intrate
   runcpu --configfile amd_rate_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 --nopower
   --runmode rate --tune base:peak --size test:train:refrate intrate --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.047/templogs/preenv.intrate.047.0.log --lognum 047.0 --from_runcpu 2
   specperl $SPEC/bin/sysinfo
   $SPEC = /cpu2017

(Continued on next page)
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Platform Notes (Continued)

6. /proc/cpuinfo

   model name : AMD EPYC 9224 24-Core Processor
   vendor_id : AuthenticAMD
   cpu family : 25
   model : 17
   stepping : 1
   microcode : 0xa101144
   bugs : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
   TLB size : 3584 4K pages
   cpu cores : 24
   siblings : 48
   2 physical ids (chips)
   96 processors (hardware threads)
   physical id 0: core ids 0-5,8-13,16-21,24-29
   physical id 1: core ids 0-5,8-13,16-21,24-29
   physical id 0: apicids 0-11,16-27,32-43,48-59
   physical id 1: apicids 64-75,80-91,96-107,112-123
   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):                          96
   On-line CPU(s) list:             0-95
   Vendor ID:                       AuthenticAMD
   BIOS Vendor ID:                  Advanced Micro Devices, Inc.
   Model name:                      AMD EPYC 9224 24-Core Processor
   BIOS Model name:                 AMD EPYC 9224 24-Core Processor
   CPU family:                      25
   Model:                           17
   Thread(s) per core:              2
   Core(s) per socket:              24
   Socket(s):                       2
   Stepping:                        1
   Frequency boost:                 enabled
   CPU max MHz:                     3706.0540
   CPU min MHz:                     1500.0000
   BogoMIPS:                        4992.54
   Flags:                           fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36
                                      ciferflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp lm
                                      constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperffisperf rapi
                                      pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe
                                      popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extatic cr8_legacy
                                      ahm sae4a misaignment 3dnowprefetch osuw ubs skinit wdt tce topoext
                                      perfctr_core perfctr_nb bpost perfctr_11c mwaitx cpb cat_l3 odp_l3
                                      invpcid_single hw_pstate ssbd mba ibrs ibbp stibp vmmcall fsgsbase bmi1
                                      avx2 smep bmi2 erms invpcid cqm rdt_a avx512f avx512idq rdsded adx smap
                                      avx512fmeta clflushopt clwb avx512cd sha ni avx512bw avx512vl vmp leaveopt
                                      xsaveopt xgetbv1 xsaveav cqm_11c cqm_occup_11c cqm_mmb_total cqm_mmb_local
                                      avx512_bf16 clzero irperf xsaveeprtr rdptr wbnoinvd amd_ppln arat npt lbrv
                                      svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists
                                      pausefilter pfthreshold avic v_vmaa_vmlode vgif v_spec_ctrl avx512vBMI
                                      umip pku ospke avx512_vBMI2 gfni vaes vpcmulqdg avx512_vnni avx512_bitalg

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Platform Notes (Continued)

avx512_vpopcntdq la57 rdpid overflow_recoev succor smca fsrm flush_l1d

Virtualization: AMD-V
L1d cache: 1.5 MiB (48 instances)
L1i cache: 1.5 MiB (48 instances)
L2 cache: 48 MiB (48 instances)
L3 cache: 128 MiB (8 instances)
NUMA node(s): 8
NUMA node0 CPU(s): 0-5,48-53
NUMA node1 CPU(s): 6-11,54-59
NUMA node2 CPU(s): 12-17,60-65
NUMA node3 CPU(s): 18-23,66-71
NUMA node4 CPU(s): 24-29,72-77
NUMA node5 CPU(s): 30-35,78-83
NUMA node6 CPU(s): 36-41,84-89
NUMA node7 CPU(s): 42-47,90-95

Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Mdts: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl
Vulnerability Spectre v1: Mitigation; usercopy/swappgs barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Retpolines, IBPB conditional, IBRS_FW, STIBP always-on, RSB filling
Vulnerability Srbds: Not affected
Vulnerability Tax async abort: Not affected

From lscpu --cache:

NAME  ONE-SIZE  ALL-SIZE  WAYS  TYPE       LEVEL    SETS  PHY-LINE  COHERENCY-SIZE
L1d    32K     1.5M    8  Data  1  64  1  64
L1i    32K     1.5M    8 Instruction  1  64  1  64
L2    1M     48M    8  Unified  2 2048  1  64
L3    16M   128M   16  Unified  3 16384  1  64

8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
available: 8 nodes (0-7)
node 0 cpus: 0-5,48-53
node 0 size: 95933 MB
node 0 free: 95520 MB
node 1 cpus: 6-11,54-59
node 1 size: 96728 MB
node 1 free: 96331 MB
node 2 cpus: 12-17,60-65
node 2 size: 96765 MB
node 2 free: 96338 MB
node 3 cpus: 18-23,66-71
node 3 size: 96765 MB
node 3 free: 96155 MB
node 4 cpus: 24-29,72-77
node 4 size: 96765 MB
node 4 free: 96450 MB
node 5 cpus: 30-35,78-83
node 5 size: 96765 MB
node 5 free: 96413 MB
node 6 cpus: 36-41,84-89
node 6 size: 96765 MB
node 6 free: 96426 MB
node 7 cpus: 42-47,90-95
node 7 size: 96715 MB

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Platform Notes (Continued)

node 7 free: 96396 MB
node distances:
node 0 1 2 3 4 5 6 7
0: 10 12 12 12 32 32 32 32
1: 12 10 12 12 32 32 32 32
2: 12 12 10 12 32 32 32 32
3: 12 12 12 12 32 32 32 32
4: 32 32 32 32 12 12 12 12
5: 32 32 32 32 12 12 12 12
6: 32 32 32 32 12 12 12 12
7: 32 32 32 32 12 12 12 12

9. /proc/meminfo
MemTotal: 791762000 kB

10. who -r
run-level 3 Apr 25 04:34

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

12. Failed units, from systemctl list-units --state=failed
UNIT LOAD ACTIVE SUB DESCRIPTION
* sep5.service loaded failed failed systemd script to load sep5 driver at boot time

13. Services, from systemctl list-unit-files
STATE UNIT FILES
enabled NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd crond
dbus-broker firewalld getty@ irqbalance kmdd monitor microcode nis-domainname rshcmcertd
rsyslog selinux-autorelabel-mark sep5 sshd ssd systemd-network-generator tuned udisks2
enabled-runtime systemd-remount-fs

disabled console-getty cpupower debug-shell hwloc-dump-hwdata kvm_stat man-db-restart-cache-update
ntables rdisc rsm rshm-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.e19_0.x86_64
root=UUID=bf6bc58c-3b41-4aaf-9518-ed72b3e61e3a
ro
crashkernel=1G-4G:192M,4G-64G:256M,64G-:512M
resume=UUID=ec5e493d-3de8-4312-8688-2d477be3721e
nohz_full=1-383

15. cpupower frequency-info
analyzing CPU 0:
current policy: frequency should be within 1.50 GHz and 2.50 GHz.
The governor "performance" may decide which speed to use
within this range.
boost state support:
Supported: yes
Active: yes

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### SPEC CPU®2017 Integer Rate Result

**xFusion**  
**FusionServer 1258H V7**  
(AMD EPYC 9224)

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<thead>
<tr>
<th>SPECrate®2017_int_peak</th>
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**Platform Notes (Continued)**

- Boost States: 0  
- Total States: 3  
- Pstate-P0: 2500MHz

---

### 16. tuned-adm active

- Current active profile: throughput-performance

---

### 17. sysctl

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
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<tbody>
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<td>kernel.numa_balancing</td>
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<td>kernel.randomize_va_space</td>
<td>0</td>
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<td>vm.compaction_proactiveness</td>
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<td>vm.dirty_background_bytes</td>
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<tr>
<td>vm.swappiness</td>
<td>1</td>
</tr>
<tr>
<td>vm.watermark_boost_factor</td>
<td>15000</td>
</tr>
<tr>
<td>vm.watermark_scale_factor</td>
<td>10</td>
</tr>
<tr>
<td>vm.zone_reclaim_mode</td>
<td>1</td>
</tr>
</tbody>
</table>

---

### 18. /sys/kernel/mm/transparent_hugepage

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>defrag</td>
<td>[always]</td>
</tr>
<tr>
<td>enabled</td>
<td>[always]</td>
</tr>
<tr>
<td>hpage_pmd_size</td>
<td>2097152</td>
</tr>
<tr>
<td>shmem_enabled</td>
<td>always</td>
</tr>
</tbody>
</table>

---

### 19. /sys/kernel/mm/transparent_hugepage/khugepaged

<table>
<thead>
<tr>
<th>Setting</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>alloc_sleep_millisecs</td>
<td>60000</td>
</tr>
<tr>
<td>defrag</td>
<td>1</td>
</tr>
<tr>
<td>max_ptes_none</td>
<td>511</td>
</tr>
<tr>
<td>max_ptes_shared</td>
<td>256</td>
</tr>
<tr>
<td>max_ptes_swap</td>
<td>64</td>
</tr>
<tr>
<td>pages_to_scan</td>
<td>4096</td>
</tr>
<tr>
<td>scan_sleep_millisecs</td>
<td>10000</td>
</tr>
</tbody>
</table>

---

### 20. OS release

From /etc/*-release /etc/*-version

- **os-release** Red Hat Enterprise Linux 9.0 (Plow)  
- **system-release** Red Hat Enterprise Linux release 9.0 (Plow)

---

### 21. Disk information

SPEC is set to: /cpu2017

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/nvme0nlp4</td>
<td>xfs</td>
<td>450G</td>
<td>13G</td>
<td>437G</td>
<td>3%</td>
<td>/</td>
</tr>
</tbody>
</table>

(Continued on next page)
SPEC CPU®2017 Integer Rate Result

xFusion
FusionServer 1258H V7
(AMD EPYC 9224)

SPECrate®2017_int_base = 514
SPECrate®2017_int_peak = 534

CPU2017 License: 6488
Test Sponsor: xFusion
Tested by: xFusion

Test Date: Apr-2024
Hardware Availability: Jun-2023
Software Availability: Dec-2023

Platform Notes (Continued)

---
22. /sys/devices/virtual/dmi/id
   Product: 1258H V7
   Product Family: Genoa
---
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:
   17x Samsung M321R4GA3BB6-CQKDG 32 GB 2 rank 4800
   4x Samsung M321R4GA3BB6-CQKEG 32 GB 2 rank 4800
   3x Samsung M321R4GA3BB6-CQKMG 32 GB 2 rank 4800
---
24. BIOS
   (This section combines info from /sys/devices and dmidecode.)
   BIOS Vendor: INSYDE Corp.
   BIOS Version: 2.08.18
   BIOS Date: 04/10/2024
   BIOS Revision: 2.8
---
Compiler Version Notes

---
C | 502.gcc_r(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: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
---
C | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak) 557.xz_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 | 502.gcc_r(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: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin
---
C | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak) 557.xz_r(base, peak)
---
(Continued on next page)
xFusion
FusionServer 1258H V7
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**SPEC CPU®2017 Integer Rate Result**

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</tr>
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**SPECrate®2017_int_base = 514**
**SPECrate®2017_int_peak = 534**

**Compiler Version Notes (Continued)**

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

Base Compiler Invocation

C benchmarks:
clang

(Continued on next page)
SPEC CPU®2017 Integer Rate Result

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Base Compiler Invocation (Continued)

C++ benchmarks:
clang++

Fortran benchmarks:
flang

Base Portability Flags

500.perlbench_r: -DSPEC_LINUX_X64 -DSPEC_LP64
502.gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalanchmk_r: -DSPEC_LINUX -DSPEC_LP64
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_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
-z muldefs -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 -1flang
-lamdalloc

C++ benchmarks:
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -z muldefs -O3
-march=znver4 -fveclib=AMDLIBM -ffast-math
-mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000
-mllvm -reduce-array-computations=3 -zopt
-fvirtual-function-elimination -fvisibility=hidden -lamdlibm -1flang
-lamdalloc-ext

(Continued on next page)
**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,-inline-recursion=4 -Wl,-mllvm -Wl,-lsr-in-nested-loop`
- `-Wl,-mllvm -Wl,-enable-iv-split -z muldefs -O3 -march=znver4`
- `-fveclib=AMDLIBM -ffast-math -fepilog-vectorization-of-inductions`
- `-mllvm -optimize-strided-mem-cost -floop-transform`
- `-mllvm -unroll-aggressive -mllvm -unroll-threshold=500 -lamdlibm`
- `-flang -lamdalloc`

**Base Other Flags**

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

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

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

**Peak Compiler Invocation**

C benchmarks:
- `clang`

C++ benchmarks:
- `clang++`

Fortran benchmarks:
- `flang`

**Peak Portability Flags**

500.perlbench_r: `-DSPEC_LINUX_X64` `-DSPEC_LP64`
502.gcc_r: `-D_FILE_OFFSET_BITS=64`
505.mcf_r: `-DSPEC_LP64`
**SPEC CPU®2017 Integer Rate Result**

**xFusion**  
FusionServer 1258H V7  
(AMD EPYC 9224)

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base = 514</th>
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</tr>
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<tbody>
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<td>SPECrate®2017_int_peak = 534</td>
<td>Hardware Availability: Jun-2023</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 6488  
**Test Sponsor:** xFusion  
**Tested by:** xFusion

---

**Peak Portability Flags (Continued)**

- 520.omnetpp_r: -DSPEC_LP64
- 523.xalancbmk_r: -DSPEC_LINUX -DSPEC_LP64
- 525.x264_r: -DSPEC_LP64
- 531.deepsjeng_r: -DSPEC_LP64
- 541.leela_r: -DSPEC_LP64
- 548.exchange2_r: -DSPEC_LP64
- 557.xz_r: -DSPEC_LP64

---

**Peak Optimization Flags**

### C benchmarks:

- 500.perlbench_r: basepeak = yes
- 502.gcc_r: -m32 -flto -z muldefs -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 -fgnu89-inline  
  -lamdalloc
- 505.mcf_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  
  -lflang -lamdalloc
- 525.x264_r: basepeak = yes
- 557.xz_r: basepeak = yes

### C++ benchmarks:

- 520.omnetpp_r: basepeak = yes
- 523.xalancbmk_r: -m32 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
  -Wl,-mllvm -Wl,-reduce-array-computations=3  
  -Wl,-mllvm -Wl,-do-block-reorder=aggressive  
  -fno-loop-reroll -Ofast -march=znver4 -fveclib=AMDLIBM  
  -ffast-math -finline-aggressive  
  -mllvm -unroll-threshold=100

---

(Continued on next page)
Peak Optimization Flags (Continued)

523.xalancbmk_r (continued):
-mllvm -reduce-array-computations=3 -zopt
-mllvm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden
-lamdalloc-ext

531.deepsjeng_r: -m64 -flto -Wl, -mllvm -Wl, -align-all-nofallthru-blocks=6
-Wl, -mllvm -Wl, -reduce-array-computations=3 -O3
-march=znver4 -fveclib=AMDLIBM -ffast-math
-mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000
-mllvm -reduce-array-computations=3 -zopt
-fvirtual-function-elimination -fvisibility=hidden
-lamdlibm -lamdalloc-ext

541.leela_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
-finline-aggressive -mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -zopt
-fvirtual-function-elimination -fvisibility=hidden
-lamdlibm -lflang -lamdalloc-ext

Fortran benchmarks:
-m64 -flto -Wl, -mllvm -Wl, -align-all-nofallthru-blocks=6
-Wl, -mllvm -Wl, -reduce-array-computations=3
-Wl, -mllvm -Wl, -inline-recursion=4 -Wl, -mllvm -Wl, -lsr-in-nested-loop
-Wl, -mllvm -Wl, -enable-iv-split -O3 -march=znver4 -fveclib=AMDLIBM
-ffast-math -fepilog-vectorization-of-inductions
-mllvm -optimize-strided-mem-cost -floop-transform
-mllvm -unroll-aggressive -mllvm -unroll-threshold=500 -lamdlibm
-lflang -lamdalloc

Peak Other Flags

C benchmarks (except as noted below):
-Wno-unused-command-line-argument

502.gcc_r: -L/usr/lib32 -Wno-unused-command-line-argument
-L/home/work/cpu2017/v119/aocc4/znver4/rate/amd_rate_aocc400_znver4_A_lib/lib32

C++ benchmarks (except as noted below):
-Wno-unused-command-line-argument

(Continued on next page)
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Peak Other Flags (Continued)

523.xalancbmk_r: -L/usr/lib32 -Wno-unused-command-line-argument
-L/home/work/cpu2017/v119/aocc4/znver4/rate/amd_rate_aocc400_znver4_A_lib/lib32

Fortran benchmarks:
-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/aocc400-flags.html
http://www.spec.org/cpu2017/flags/xFusion-Platform-Settings-AMD-V1.1.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/aocc400-flags.xml
http://www.spec.org/cpu2017/flags/xFusion-Platform-Settings-AMD-V1.1.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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