



SPEC CPU®2017 Integer Rate Result

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xFusion

SPECrate®2017_int_base = 168

FusionServer 1158H V7 (AMD EPYC 9124)

SPECrate®2017_int_peak = Not Run

CPU2017 License: 6488

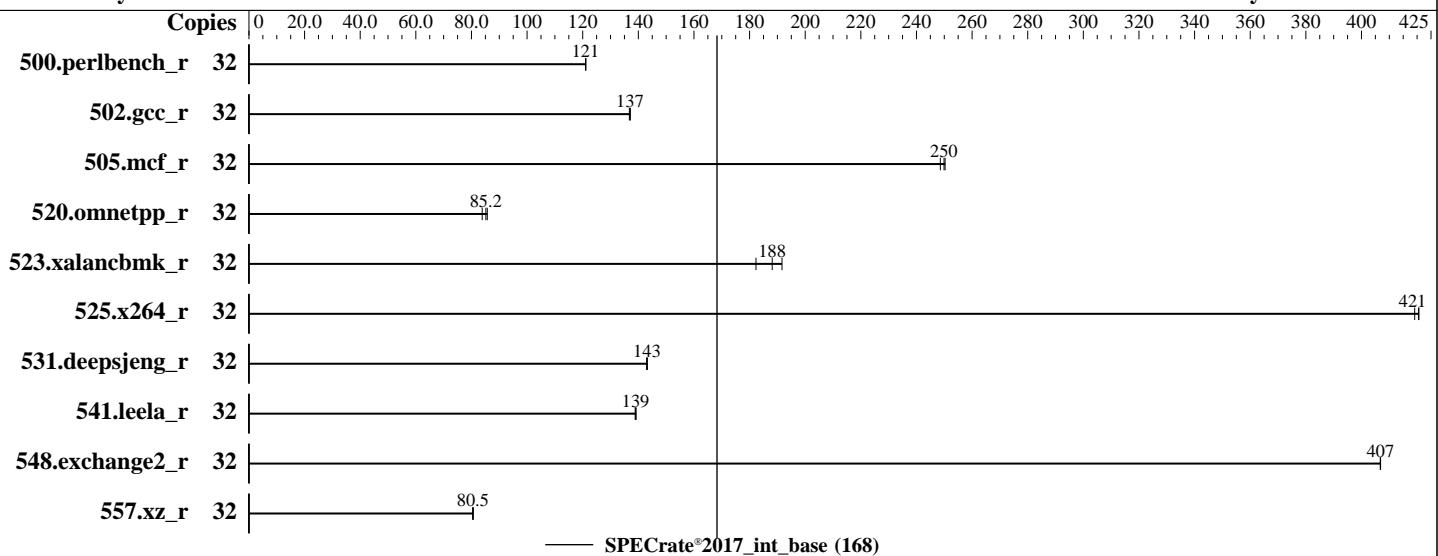
Test Sponsor: xFusion

Tested by: xFusion

Test Date: Oct-2024

Hardware Availability: Nov-2023

Software Availability: Dec-2022



Hardware

CPU Name: AMD EPYC 9124
Max MHz: 3700
Nominal: 3000
Enabled: 16 cores, 1 chip, 2 threads/core
Orderable: 1 chip
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 / 4 cores
Other: None
Memory: 768 GB (6 x 128 GB 2Rx4 PC5-4800B-R)
Storage: 1 x 480 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 2.09.19 released Jul-2024
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
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
500.perlbench_r	32	421	121	420	121	421	121							
502.gcc_r	32	331	137	331	137	331	137							
505.mcf_r	32	208	249	207	250	207	250							
520.omnetpp_r	32	490	85.7	501	83.9	493	85.2							
523.xalancbmk_r	32	180	188	176	192	185	182							
525.x264_r	32	134	419	133	421	133	421							
531.deepsjeng_r	32	256	143	256	143	256	143							
541.leela_r	32	381	139	381	139	382	139							
548.exchange2_r	32	206	407	206	407	206	407							
557.xz_r	32	429	80.5	430	80.4	428	80.7							

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Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Compiler Notes

The AMD64 AOCC Compiler Suite is available at
<http://developer.amd.com/amd-aocc/>

Submit Notes

The config file option 'submit' was used.
 'numactl' was used to bind copies to the cores.
 See the configuration file for details.

Operating System Notes

'ulimit -s unlimited' was used to set environment stack size limit
 'ulimit -l 2097152' was used to set environment locked pages in memory limit

runcpu command invoked through numactl i.e.:
 numactl --interleave=all runcpu <etc>

To limit dirty cache to 8% of memory, 'sysctl -w vm.dirty_ratio=8' run as root.
 To limit swap usage to minimum necessary, 'sysctl -w vm.swappiness=1' run as root.
 To free node-local memory and avoid remote memory usage,
 'sysctl -w vm.zone_reclaim_mode=1' run as root.
 To clear filesystem caches, 'sync; sysctl -w vm.drop_caches=3' run as root.
 To disable address space layout randomization (ASLR) to reduce run-to-run
 variability, 'sysctl -w kernel.randomize_va_space=0' run as root.

To enable Transparent Hugepages (THP) for all allocations,
 'echo always > /sys/kernel/mm/transparent_hugepage/enabled' 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"

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 = NPS1

Sysinfo program /cpu2017/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Tue Oct 15 20:13:37 2024

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

Table of contents

1. uname -a
2. w
3. Username
4. ulimit -a
5. sysinfo process ancestry
6. /proc/cpuinfo
7. lscpu
8. numactl --hardware
9. /proc/meminfo
10. who -r
11. Systemd service manager version: systemd 250 (250-6.el9_0)
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. sysctl
17. /sys/kernel/mm/transparent_hugepage
18. /sys/kernel/mm/transparent_hugepage/khugepaged
19. OS release
20. Disk information
21. /sys/devices/virtual/dmi/id

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Platform Notes (Continued)

22. dmidecode
23. 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 GNU/Linux

2. w
20:13:37 up 8 min, 2 users, load average: 0.07, 0.02, 0.00
USER TTY LOGIN@ IDLE JCPU PCPU WHAT
root ttys1 20:06 3:53 0.03s 0.03s -bash
root pts/0 20:11 9.00s 0.93s 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 18
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 base --reportable --iterations 3 intrate
runcpu --configfile amd_rate_aocc400_znver4_A1.cfg --tune base --reportable --iterations 3 --nopower
--runmode rate --tune base --size test:train:refrate intrate --nopreenv --note-preenv --logfile
\$SPEC/tmp/CPU2017.050/templogs/preenv.intrate.050.0.log --lognum 050.0 --from_runcpu 2
specperl \$SPEC/bin/sysinfo
\$SPEC = /cpu2017

6. /proc/cpuinfo
model name : AMD EPYC 9124 16-Core Processor
vendor_id : AuthenticAMD

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Platform Notes (Continued)

```
cpu family      : 25
model          : 17
stepping        : 1
microcode       : 0xa101148
bugs           : sysret_ss_attrs spectre_v1 spectre_v2 spec_store_bypass
TLB size        : 3584 4K pages
cpu cores       : 16
siblings        : 32
1 physical ids (chips)
32 processors (hardware threads)
physical id 0: core ids 0-3,8-11,16-19,24-27
physical id 0: apicids 0-7,16-23,32-39,48-55
```

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):                        32
On-line CPU(s) list:          0-31
Vendor ID:                     AuthenticAMD
BIOS Vendor ID:               Advanced Micro Devices, Inc.
Model name:                    AMD EPYC 9124 16-Core Processor
BIOS Model name:              AMD EPYC 9124 16-Core Processor
CPU family:                   25
Model:                         17
Thread(s) per core:           2
Core(s) per socket:           16
Socket(s):                    1
Stepping:                      1
Frequency boost:              enabled
CPU max MHz:                  3711.9141
CPU min MHz:                  1500.0000
BogoMIPS:                      5990.91
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 aperfmpfperf 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 bpxt perfctr_llc mwaitx cpb cat_13 cdp_13
                                invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsbsbase bmi1
                                avx2 smep bmi2 erms invpcid cqmq rdt_a avx512f avx512dq rdseed adx smap
                                avx512ifma clflushopt clwb avx512cd sha_ni avx512bw avx512vl xsaveopt
                                xsavec xgetbv1 xsaves cqmq_llc cqmq_occup_llc cqmq_mbm_total cqmq_mbm_local
                                avx512_bf16 clzero irperf xsaveopt rdpru wbnoinvd amd_ppin arat npt lbrv
                                svm_lock nrrip_save tsc_scale vmcb_clean flushbyasid decodeassists
                                pausefilter pfthreshold avic v_vmsave_vmload vgif v_spec_ctrl avx512vbmi
                                umip pkru ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg
                                avx512_vpocntdq la57 rdpid overflow_recov succor smca fsrm flush_ll1
Virtualization:                AMD-V
L1d cache:                     512 KiB (16 instances)
L1i cache:                     512 KiB (16 instances)
L2 cache:                      16 MiB (16 instances)
L3 cache:                      64 MiB (4 instances)
```

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Platform Notes (Continued)

```
NUMA node(s): 1
NUMA node0 CPU(s): 0-31
Vulnerability Itlb multihit: Not affected
Vulnerability Llftf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl
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     512K    8 Data          1       64      1        64
  L1i    32K     512K    8 Instruction   1       64      1        64
  L2     1M      16M     8 Unified       2      2048      1        64
  L3     16M     64M    16 Unified      3     16384      1        64
```

```
-----  
8. numactl --hardware  
NOTE: a numactl 'node' might or might not correspond to a physical chip.  
available: 1 nodes (0)  
node 0 cpus: 0-31  
node 0 size: 772850 MB  
node 0 free: 771620 MB  
node distances:  
node 0  
 0: 10
```

```
-----  
9. /proc/meminfo  
MemTotal: 791399392 kB
```

```
-----  
10. who -r  
run-level 3 Oct 15 20:05
```

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

```
-----  
12. Services, from systemctl list-unit-files  
STATE          UNIT FILES
enabled        NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd crond
               dbus-broker firewalld getty@ irqbalance kdump lvm2-monitor mdmonitor microcode
               nis-domainname rhsmcertd rsyslog selinux-autorelabel-mark sshd sssd
               systemd-network-generator tuned udisks2
enabled-runtime  systemd-remount-fs
disabled       blk-availability console-getty cpupower debug-shell hwloc-dump-hwdata kvm_stat
               man-db-restart-cache-update nftables rdisc rhsm-facts rpmbuild 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
```

```
-----  
13. Linux kernel boot-time arguments, from /proc/cmdline  
BOOT_IMAGE=(hd0,gpt2)/vmlinuz-5.14.0-70.13.1.el9_0.x86_64
```

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Platform Notes (Continued)

```
root=/dev/mapper/rhel-root
ro
crashkernel=1G-4G:192M,4G-64G:256M,64G-:512M
resume=/dev/mapper/rhel-swap
rd.lvm.lv=rhel/root
rd.lvm.lv=rhel/swap

-----
14. cpupower frequency-info
analyzing CPU 0:
    current policy: frequency should be within 1.50 GHz and 3.00 GHz.
                    The governor "performance" may decide which speed to use
                    within this range.
    boost state support:
        Supported: yes
        Active: yes
        Boost States: 0
        Total States: 3
        Pstate-P0: 3000MHz

-----
15. tuned-adm active
Current active profile: latency-performance throughput-performance

-----
16. sysctl
kernel.numa_balancing          0
kernel.randomize_va_space       0
vm.compression_proactiveness   20
vm.dirty_background_bytes       0
vm.dirty_background_ratio       10
vm.dirty_bytes                 0
vm.dirty_expire_centisecs      3000
vm.dirty_ratio                 8
vm.dirty_writeback_centisecs   500
vm.dirtytime_expire_seconds    43200
vm.extfrag_threshold           500
vm.min_unmapped_ratio          1
vm.nr_hugepages                0
vm.nr_hugepages_mempolicy      0
vm.nr_overcommit_hugepages     0
vm.swappiness                  1
vm.watermark_boost_factor      15000
vm.watermark_scale_factor      10
vm.zone_reclaim_mode           1

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

-----
18. /sys/kernel/mm/transparent_hugepage/khugepaged
alloc_sleep_millisecs 60000
defrag             1
max_ptes_none     511
max_ptes_shared   256
max_ptes_swap     64
```

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Platform Notes (Continued)

```
pages_to_scan      4096
scan_sleep_millisecs 10000
```

```
-----  
19. OS release  
From /etc/*-release /etc/*-version  
os-release      Red Hat Enterprise Linux 9.0 (Plow)  
redhat-release Red Hat Enterprise Linux release 9.0 (Plow)  
system-release Red Hat Enterprise Linux release 9.0 (Plow)
```

```
-----  
20. Disk information  
SPEC is set to: /cpu2017  
Filesystem          Type  Size  Used  Avail Use% Mounted on  
/dev/mapper/rhel-root xfs   170G  7.5G  163G  5%  /
```

```
-----  
21. /sys/devices/virtual/dmi/id  
Product:           1158H V7  
Product Family: Genoa
```

```
-----  
22. 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:  
 6x Samsung M321RAGA0B20-CWKZH 128 GB 2 rank 4800
```

```
-----  
23. BIOS  
(This section combines info from /sys/devices and dmidecode.)  
BIOS Vendor:      INSYDE Corp.  
BIOS Version:     2.09.19  
BIOS Date:        07/18/2024  
BIOS Revision:    2.9
```

Compiler Version Notes

```
=====  
C      | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base) 557.xz_r(base)  
-----  
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++    | 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base) 541.leela_r(base)  
-----  
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  
-----
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Compiler Version Notes (Continued)

=====

Fortran | 548.exchange2_r(base)

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

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.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

Base Optimization Flags

C benchmarks:

-m64 -fllto -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 -lflang

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Base Optimization Flags (Continued)

C benchmarks (continued):

-lamdalloc

C++ benchmarks:

```
-m64 -futto -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 -lflang  
-lamdalloc-ext
```

Fortran benchmarks:

```
-m64 -futto -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  
-lflang -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

The flags files that were used to format this result can be browsed at

<http://www.spec.org/cpu2017/flags/aoicc400-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/aoicc400-flags.xml>

<http://www.spec.org/cpu2017/flags/xFusion-Platform-Settings-AMD-V1.1.xml>



SPEC CPU®2017 Integer Rate Result

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xFusion

SPECrate®2017_int_base = 168

FusionServer 1158H V7 (AMD EPYC 9124)

SPECrate®2017_int_peak = Not Run

CPU2017 License: 6488

Test Date: Oct-2024

Test Sponsor: xFusion

Hardware Availability: Nov-2023

Tested by: xFusion

Software Availability: Dec-2022

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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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