Supermicro
A+ Server 2014TP-HTR
(H12SST-PS, AMD EPYC 7573X)

SPEC CPU®2017 Integer Rate Result
Copyright 2017-2022 Standard Performance Evaluation Corporation

CPU2017 License: 001176
Test Sponsor: Supermicro
Tested by: Supermicro

Test Date: Feb-2022
Hardware Availability: Mar-2022
Software Availability: Feb-2022

500.perlbench_r
502.gcc_r
505.mcf_r
520.omnetpp_r
523.xalancbmk_r
525.x264_r
531.deepsjeng_r
541.leela_r
548.exchange2_r
557.xz_r

Copies

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Name</th>
<th>Version</th>
<th>Date</th>
<th>Notes</th>
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<tr>
<td>Ubuntu</td>
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<td>Kernel</td>
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<td>Version 2.3a released Jan-2022</td>
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<td>ext4</td>
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<tr>
<td>Run level 5 (multi-user)</td>
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<tr>
<td>32/64-bit</td>
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</table>

Other:
jemalloc: jemalloc memory allocator library v5.1.0
Power Management:
BIOS and OS set to prefer performance at the cost of additional power usage.

Hardware

CPU Name: AMD EPYC 7573X
Max MHz: 3600
Nominal: 2800
Enabled: 32 cores, 1 chip, 2 threads/core
Orderable: 1 chip
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 512 KB I+D on chip per core
L3: 768 MB I+D on chip per chip, 96 MB shared / 4 cores
Other: None
Memory: 128 GB (8 x 16 GB 1Rx4 PC4-2933Y-R)
Storage: 1 x 120 GB SATA III SSD
Other: None

Software

OS:
Ubuntu 20.04.3 LTS
Kernel 5.4.0-99-generic
Compiler:
C/C++/Fortran: Version 3.2.0 of AOCC
Parallel:
No
Firmware:
Version 2.3a released Jan-2022
File System:
ext4
System State:
Run level 5 (multi-user)
Base Pointers:
64-bit
Peak Pointers:
32/64-bit
Other:
jemalloc: jemalloc memory allocator library v5.1.0
Power Management:
BIOS and OS set to prefer performance at the cost of additional power usage.

Graph

SPECrate®2017_int_base = 262
SPECrate®2017_int_peak = 278
Supermicro
A+ Server 2014TP-HTR
(H12SST-PS , AMD EPYC 7573X)

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Results Table

<table>
<thead>
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<td>557.xz_r</td>
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<td>156</td>
<td>444</td>
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</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, 'syscall -w vm.dirty_ratio=8' run as root.
To limit swap usage to minimum necessary, 'syscall -w vm.swappiness=1' run as root.
To free node-local memory and avoid remote memory usage,
't syscall -w vm.zone_reclaim_mode=1' run as root.
To clear filesystem caches, 'sync; syscall -w vm.drop_caches=3' run as root.
To disable address space layout randomization (ASLR) to reduce run-to-run variability, 'syscall -w kernel.randomize_va_space=0' run as root.

(Continued on next page)
Operating System Notes (Continued)

To enable Transparent Hugepages (THP) only on request for base runs,
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root.
To enable THP for all allocations for peak runs,
'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_aocc320_milanx_A_lib/lib;/home/cpu2017/amd_rate_aocc320_milanx_A_lib/lib32;"
MALLOCC_CONF = "retain:true"

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

General Notes

Binaries were compiled on a system with 2x AMD EPYC 7742 CPU + 1TiB Memory using OpenSUSE 15.2

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.
jemalloc: configured and built with GCC v4.8.2 in RHEL 7.4 (No options specified)
jemalloc 5.1.0 is available here:
https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2

Platform Notes

BIOS Settings:
Determinism Control = Manual
Determinism Slider = Power
cTDP Control = Manual
cTDP = 280
Package Power Limit Control = Manual
Package Power Limit = 280

(Continued on next page)
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Platform Notes (Continued)

APBDIS = 1
NUMA Nodes Per Socket = NPS4

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca646d
running on h12sst-d-7573x Wed Feb 16 02:46:09 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 7573X 32-Core Processor
    1 "physical id"s (chips)
    64 "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 : 32
    siblings : 64
    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

From lscpu from util-linux 2.34:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
Address sizes: 48 bits physical, 48 bits virtual
CPU(s): 64
On-line CPU(s) list: 0-63
Thread(s) per core: 2
Core(s) per socket: 32
Socket(s): 1
NUMA node(s): 8
Vendor ID: AuthenticAMD
CPU family: 25
Model: 1
Model name: AMD EPYC 7573X 32-Core Processor
Stepping: 2
Frequency boost: enabled
CPU MHz: 1799.023
CPU max MHz: 2800.0000
CPU min MHz: 1500.0000
BogoMIPS: 5599.74
Virtualization: AMD-V
L1d cache: 1 MiB
L1i cache: 1 MiB
L2 cache: 16 MiB

(Continued on next page)
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<th>001176</th>
<th>Test Date:</th>
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<tr>
<td>Test Sponsor:</td>
<td>Supermicro</td>
<td>Hardware Availability:</td>
<td>Mar-2022</td>
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<tr>
<td>Tested by:</td>
<td>Supermicro</td>
<td>Software Availability:</td>
<td>Feb-2022</td>
</tr>
</tbody>
</table>

**Platform Notes (Continued)**

- **L3 cache:** 768 MiB
- **NUMA node0 CPU(s):** 0-3,32-35
- **NUMA node1 CPU(s):** 4-7,36-39
- **NUMA node2 CPU(s):** 8-11,40-43
- **NUMA node3 CPU(s):** 12-15,44-47
- **NUMA node4 CPU(s):** 16-19,48-51
- **NUMA node5 CPU(s):** 20-23,52-55
- **NUMA node6 CPU(s):** 24-27,56-59
- **NUMA node7 CPU(s):** 28-31,60-63

Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meldown: 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; Full AMD retpoline, IBPB conditional, IBRS_FW, STIBP always-on, RSB filling
Vulnerability Srbd: Not affected
Vulnerability Tx with (hash) abort: Not affected

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 pni pclmulqdq monitor ssse3 fma cx16 pcmid sse4_1 sse4_2 movbe popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse dnowprefetch osvw ibr skinit wtld tc eopt perfctr_core perfctr_nb bext perfctr_llc mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsqfsbase bml1 avx2 smep bml2 invpcid cmq rdt_a rdseed adx smap clflushopt clwb sha ni xsaveopt xsave xgetbv1 xsaves qcm_llc qcm_occupt llc qcm_mbb_total qcm_mbb_local clzero irperf xsaverptr wboinvd arat npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassist pauset flushpf threshold v_load vmsave_vmload vgif umip pku ospke vaes vpclmulqdq rdpid overflow_recov succor smca

From lscpu --cache:
NAME ONE-SIZE ALL-SIZE WAYS TYPE LEVEL
L1d 32K 1M 8 Data 1
L1i 32K 1M 8 Instruction 1
L2 512K 16M 8 Unified 2
L3 96M 768M 16 Unified 3

From numactl --hardware
WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 8 nodes (0-7)

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<table>
<thead>
<tr>
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**CPU2017 License:** 001176  
**Test Sponsor:** Supermicro  
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**Test Date:** Feb-2022  
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**Platform Notes (Continued)**

```plaintext
node 0 cpus: 0 1 2 3 32 33 34 35
node 0 size: 16002 MB
node 0 free: 15816 MB
node 1 cpus: 4 5 6 7 36 37 38 39
node 1 size: 16123 MB
node 1 free: 15958 MB
node 2 cpus: 8 9 10 11 40 41 42 43
node 2 size: 16125 MB
node 2 free: 15925 MB
node 3 cpus: 12 13 14 15 44 45 46 47
node 3 size: 16096 MB
node 3 free: 14549 MB
node 4 cpus: 16 17 18 19 48 49 50 51
node 4 size: 16125 MB
node 4 free: 15939 MB
node 5 cpus: 20 21 22 23 52 53 54 55
node 5 size: 16124 MB
node 5 free: 15973 MB
node 6 cpus: 24 25 26 27 56 57 58 59
node 6 size: 16125 MB
node 6 free: 15981 MB
node 7 cpus: 28 29 30 31 60 61 62 63
node 7 size: 16112 MB
node 7 free: 15966 MB
node distances:

node distances:

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node distances:
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```
Platform Notes (Continued)

debian_version: bullseye/sid
os-release:
    NAME="Ubuntu"
    VERSION="20.04.3 LTS (Focal Fossa)"
    ID=ubuntu
    ID_LIKE=debian
    PRETTY_NAME="Ubuntu 20.04.3 LTS"
    VERSION_ID="20.04"
    HOME_URL="https://www.ubuntu.com/
    SUPPORT_URL="https://help.ubuntu.com/

uname -a:
    Linux h12sst-d-7573x 5.4.0-99-generic #112-Ubuntu SMP Thu Feb 3 13:50:55 UTC 2022
    x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit): Not affected
CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Not affected
CVE-2018-3639 (Speculative Store Bypass):
    Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1):
    Mitigation: usercopy/swapgs barriers and __user pointer sanitation
CVE-2017-5715 (Spectre variant 2):
    Mitigation: Full AMD retpoline, 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 Feb 16 02:38

SPEC is set to: /home/cpu2017
    Filesystem Type Size Used Avail Use% Mounted on
    /dev/sda2  ext4 110G 16G 89G 15% /

From /sys/devices/virtual/dmi/id
    Vendor: Supermicro
    Product: Super Server
    Serial: 0123456789

Additional information from dmidecode 3.2 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 (Continued on next page)
**Platform Notes (Continued)**

frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

Memory:
8x Samsung M393A2K40DB2-CVF 16 GB 1 rank 2933

BIOS:
- BIOS Vendor: American Megatrends Inc.
- BIOS Version: 2.3a
- BIOS Date: 01/25/2022
- BIOS Revision: 5.22

(End of data from sysinfo program)

**Compiler Version Notes**

C | 502.gcc_r(peak)

AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/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 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin

C | 502.gcc_r(peak)

AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin

(Continued on next page)
## Compiler Version Notes (Continued)

### C

| 050.perlbench_r(base, peak) 052.gcc_r(base) 055.mcf_r(base, peak) 052.x264_r(base, peak) 057.xz_r(base, peak) |

AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)  
Target: x86_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin

### C++

| 0523.xalancbmk_r(peak) |

AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)  
Target: i386-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin

| 0520.omnetpp_r(base, peak) 0523.xalancbmk_r(base) 0531.deepsjeng_r(base, peak) 0541.leela_r(base, peak) |

AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)  
Target: x86_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin

| 0520.omnetpp_r(base, peak) 0523.xalancbmk_r(base) 0531.deepsjeng_r(base, peak) 0541.leela_r(base, peak) |

AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)  
Target: i386-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin

(Continued on next page)
**Supermicro**  
**A+ Server 2014TP-HTR**  
**(H12SST-PS , AMD EPYC 7573X)**  

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<td><strong>Test Sponsor</strong>: Supermicro</td>
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**Compiler Version Notes (Continued)**

- **Target**: x86_64-unknown-linux-gnu  
- **Thread model**: posix  
- **InstalledDir**: /opt/AMD/aocc-compiler-3.2.0/bin

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**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.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
Supermicro
A+ Server 2014TP-HTR
(H12SST-PS, AMD EPYC 7573X)

SPEC CPU®2017 Integer Rate Result
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SPECrate®2017_int_base = 262
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CPU2017 License: 001176
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Tested by: Supermicro
Test Date: Feb-2022
Hardware Availability: Mar-2022
Software Availability: Feb-2022

Base Optimization Flags

C benchmarks:
-m64 -Wl,-allow-multiple-definition -Wl,-mllvm -Wl,-enable-licm-vrp
-flto -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-loop-fusion -O3 -march=znver3 -fveclib=AMDLIBM
-ffast-math -fsstruct-layout=5 -mllvm -unroll-threshold=50
-mllvm -inline-threshold=1000 -fremap-arrays
-mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -enable-loop-fusion -z muldefs -lamdlibm -ljemalloc -lflang

C++ benchmarks:
-m64 -std=c++98 -flto -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-loop-fusion -O3 -march=znver3 -fveclib=AMDLIBM
-ffast-math -mllvm -enable-partial-unswitch
-mllvm -unroll-threshold=100 -finline-aggressive
-flv-function-specialization -mllvm -loop-unswitch-threshold=200000
-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
-mllvm -extra-vectorizer-passes -mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -convert-pow-exp-to-int=false
-mllvm -enable-loop-fusion -z muldefs -fvirtual-function-elimination
-fvisibility=hidden -lamdlibm -ljemalloc -lflang

Fortran benchmarks:
-m64 -Wl,-mllvm -Wl,-inline-recursion=4
-Wl,-mllvm -Wl,-lsr-in-nested-loop -Wl,-mllvm -Wl,-enable-iv-split
-flto -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-loop-fusion -O3 -march=znver3 -fveclib=AMDLIBM
-ffast-math -z muldefs -mllvm -unroll-aggressive
-mllvm -unroll-threshold=500 -lamdlibm -ljemalloc -lflang

Base Other Flags

C benchmarks:
-Wno-unused-command-line-argument
## SPEC CPU®2017 Integer Rate Result

**Supermicro**  
A+ Server 2014TP-HTR  
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Test Date: Feb-2022  
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### Base Other Flags (Continued)

C++ 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  
- 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: -m64 -Wl,-allow-multiple-definition  
-Wl,-mllvm -Wl,-enable-licm-vrp -flto  
-Wl,-mllvm -Wl,-function-specialize  
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3  
-fprofile-instr-generate(pass 1)  
-fprofile-instr-use(pass 2) -Ofast -march=znver3

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

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Peak Optimization Flags (Continued)

500.perlbench_r (continued):
- fveclib=AMDLIBM -ffast-math -fstruct-layout=7
- mllvm -unroll-threshold=50 -fremap-arrays
- fly-function-specialization -mllvm -inline-threshold=1000
- mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=false
- mllvm -function-specialize -mllvm -enable-licm-vrp
- mllvm -reduce-array-computations=3 -lamdlibm -ljemalloc

502.gcc_r: -m32 -Wl,-allow-multiple-definition
- Wl,-mllvm -Wl,-enable-licm-vrp -flt
- Wl,-mllvm -Wl,-function-specialize -Ofast -march=znver3
- fveclib=AMDLIBM -ffast-math -fstruct-layout=7
- mllvm -unroll-threshold=50 -fremap-arrays
- ffly-function-specialization -mllvm -inline-threshold=1000
- mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
- mllvm -function-specialize -mllvm -enable-licm-vrp
- mllvm -reduce-array-computations=3 -fgnu89-inline
- ljemalloc

505.mcf_r: -m64 -Wl,-allow-multiple-definition
- Wl,-mllvm -Wl,-enable-licm-vrp -flt
- Wl,-mllvm -Wl,-function-specialize
- Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
- Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
- march=znver3 -fveclib=AMDLIBM -ffast-math
- fstruct-layout=7 -mllvm -unroll-threshold=50
- fremap-arrays -ffly-function-specialization
- mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
- mllvm -global-vectorize-slp=true
- mllvm -function-specialize -mllvm -enable-licm-vrp
- mllvm -reduce-array-computations=3 -lamdlibm -ljemalloc

525.x264_r: basepeak = yes

557.xz_r: Same as 505.mcf_r

C++ benchmarks:

520.omnetpp_r: basepeak = yes

523.xalanckmk_r: -m32 -Wl,-mllvm -Wl,-do-block-reorder=aggressive -flt
- Wl,-mllvm -Wl,-function-specialize
- Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
- Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
- march=znver3 -fveclib=AMDLIBM -ffast-math
- finline-aggressive -mllvm -unroll-threshold=100

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

523.xalanckmk_r (continued):
- flv-function-specialization -mllvm -enable-licm-vrp
- mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
- mllvm -reduce-array-computations=3
- mllvm -global-vectorize-slp=true
- mllvm -do-block-reorder=aggressive
- fvirtual-function-elimination -fvisibility=hidden
- ljemalloc

531.deepsjeng_r: -m64 -std=c++98 -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math
-finline-aggressive -mllvm -unroll-threshold=100
-flv-function-specialization -mllvm -enable-licm-vrp
-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true
-fvirtual-function-elimination -fvisibility=hidden
-lamdlibm -ljemalloc

541.leela_r: Same as 531.deepsjeng_r

Fortran benchmarks:
-m64 -Wl,-mllvm -Wl,-inline-recursion=4
-Wl,-mllvm -Wl,-lsr-in-nested-loop -Wl,-mllvm -Wl,-enable-iv-split
-flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -mllvm -unroll-aggressive
-mllvm -unroll-threshold=500 -lamdlibm -ljemalloc -lflang

**Peak Other Flags**

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

502.gcc_r: -L/usr/lib -Wno-unused-command-line-argument
- L/sppo/bin/cpu2017v118-aocc3-milanX/amd_rate_aocc320_milanx_A_lib/lib32

C++ benchmarks (except as noted below):
- Wno-unused-command-line-argument
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**Peak Other Flags (Continued)**

523.xalancbmk_r: -L/usr/lib -Wno-unused-command-line-argument  
-L/sppo/bin/cpu2017v118-aocc3-milanX/amd_rate_aocc320_milanx_A_lib/lib32

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