



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Tyrone Systems

(Test Sponsor: Netweb Pte Ltd)

Tyrone Camarero DSA72NGAO-46/424RT
(2.40 GHz, AMD EPYC 7532)

SPECrate®2017_fp_base = 263

SPECrate®2017_fp_peak = 264

CPU2017 License: 006042

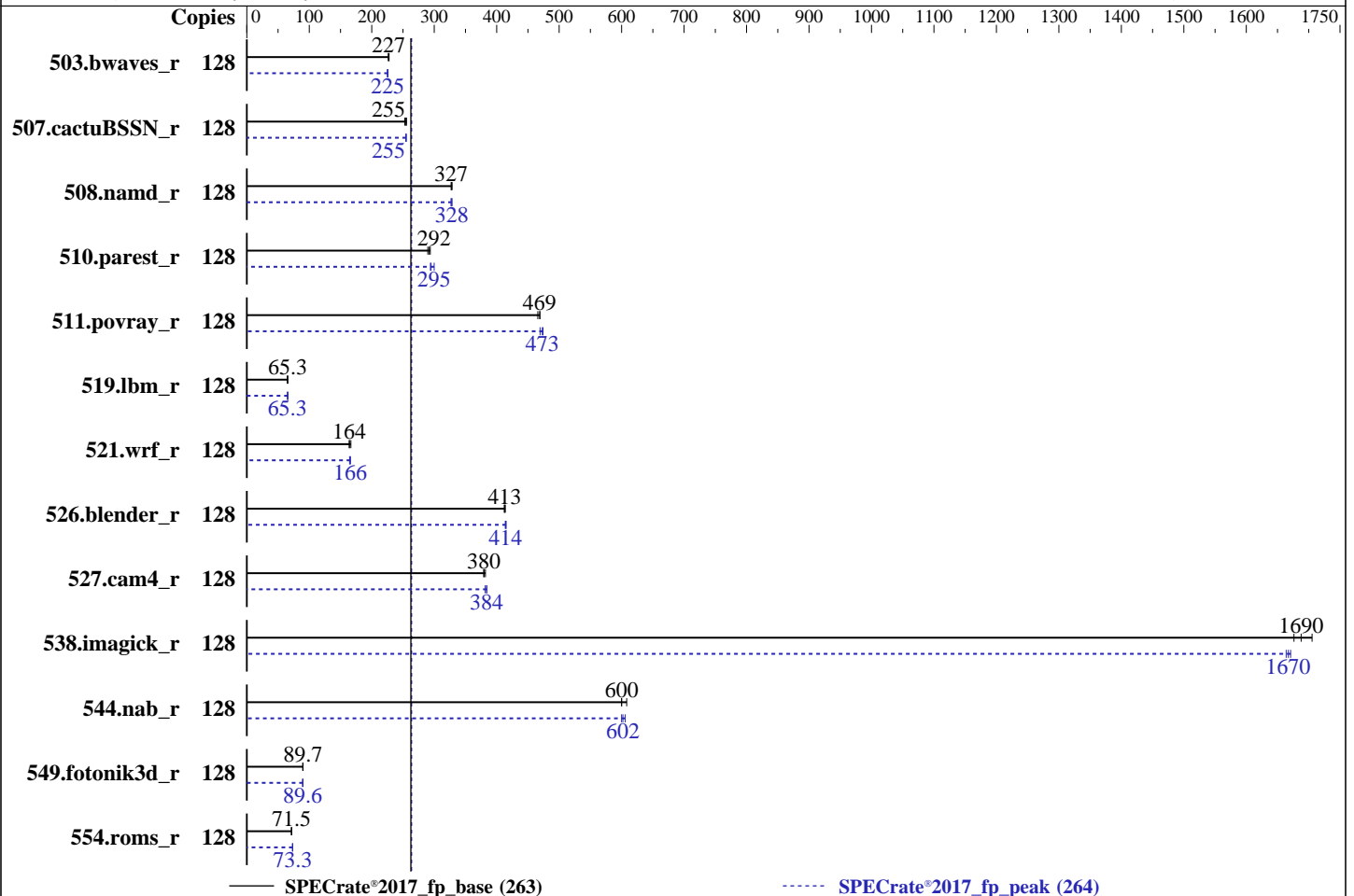
Test Sponsor: Netweb Pte Ltd

Tested by: Tyrone Systems

Test Date: Oct-2021

Hardware Availability: Mar-2020

Software Availability: Mar-2021



Hardware

CPU Name: AMD EPYC 7532
 Max MHz: 3300
 Nominal: 2400
 Enabled: 64 cores, 2 chips, 2 threads/core
 Orderable: 1,2 chips
 Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 512 KB I+D on chip per core
 L3: 256 MB I+D on chip per chip, 16 MB shared / 2 cores
 Other: None
 Memory: 256 GB (8 x 32 GB 2Rx4 PC4-2933P-R)
 Storage: 1 x 480 GB SATA SSD
 Other: None

Software

OS: Red Hat Enterprise Linux release 8.0 (Ootpa) 4.18.0-80.el8.x86_64
 Compiler: C/C++/Fortran: Version 3.0.0 of AOCC
 Parallel: No
 Firmware: Version 2.3 released Aug-2021
 File System: xfs
 System State: Run level 3 (Multi User)
 Base Pointers: 64-bit
 Peak Pointers: 64-bit
 Other: jemalloc: jemalloc memory allocator library v5.2.0
 Power Management: BIOS set to prefer performance at the cost of additional power usage



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Results Table

Benchmark	Base						Peak							
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Copies	Seconds	Ratio	Seconds	Ratio			
503.bwaves_r	128	5669	226	5636	228	5655	227	128	5695	225	5705	225	5680	226
507.cactuBSSN_r	128	641	253	636	255	634	256	128	635	255	635	255	637	254
508.namd_r	128	372	327	372	327	370	329	128	371	328	370	328	372	327
510.parest_r	128	1140	294	1156	290	1147	292	128	1139	294	1135	295	1116	300
511.povray_r	128	642	466	637	469	637	469	128	632	473	637	469	630	474
519.lbm_r	128	2059	65.5	2065	65.3	2079	64.9	128	2067	65.3	2053	65.7	2072	65.1
521.wrf_r	128	1721	167	1745	164	1749	164	128	1743	165	1730	166	1732	166
526.blender_r	128	472	413	471	414	473	412	128	471	414	470	415	470	414
527.cam4_r	128	590	380	590	379	586	382	128	583	384	583	384	587	382
538.imagick_r	128	190	1680	189	1690	187	1710	128	191	1670	191	1660	191	1670
544.nab_r	128	359	600	359	600	354	608	128	359	600	356	606	358	602
549.fotonik3d_r	128	5567	89.6	5541	90.0	5560	89.7	128	5568	89.6	5553	89.8	5585	89.3
554.roms_r	128	2848	71.4	2845	71.5	2830	71.9	128	2784	73.1	2768	73.5	2774	73.3

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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

'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
'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>

Set dirty_ratio=8 to limit dirty cache to 8% of memory
Set swappiness=1 to swap only if necessary
Set zone_reclaim_mode=1 to free local node memory and avoid remote memory
sync then drop_caches=3 to reset caches before invoking runcpu

dirty_ratio, swappiness, zone_reclaim_mode and drop_caches were
all set using privileged echo (e.g. echo 1 > /proc/sys/vm/swappiness).

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Operating System Notes (Continued)

Transparent huge pages set to 'always' for this run (OS default)

Environment Variables Notes

Environment variables set by runcpu before the start of the run:

`LD_LIBRARY_PATH =`

```
"/home/cpu2017/{lib_dir}/lib:/home/cpu2017/{lib_dir}/lib32:/usr/lib64:  
/usr/lib:/home/cpu2017/aocc-compiler-3.0.0/ompd:/home/cpu2017/aocc-compi  
ler-3.0.0/lib:/home/cpu2017/aocc-compiler-3.0.0/lib32:"
```

`LIBRARY_PATH =`

```
"/home/cpu2017/amd_rate_aocc300_milan_A_lib/lib:/home/cpu2017/amd_rate_a  
occ300_milan_A_lib/lib32:/usr/lib64:/usr/lib:/home/cpu2017/aocc-compiler  
-3.0.0/lib:/home/cpu2017/aocc-compiler-3.0.0/lib32:"
```

`MALLOC_CONF = "retain:true"`

General Notes

Binaries were compiled on a system with 2x AMD EPYC 7532 CPU + 256GB Memory using Redhat 8.0 x86_64-bit

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 v9.1.0 in Ubuntu 19.04 with `-O3 -znver2 -flto`
jemalloc 5.2.0 is available here:

<https://github.com/jemalloc/jemalloc/releases/download/5.2.0/jemalloc-5.2.0.tar.bz2>

Platform Notes

BIOS Settings:

Determinism Control set to Manual

Determinism Slider set to Power

cTDP Control set to Manual

cTDP set to 200

Package Power Limit Control set to Manual

Package Power Limit set to 200

APBDIS set to 1

NUMA Nodes Per Socket set to Auto

Sysinfo program `/home/cpu2017/bin/sysinfo`

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Platform Notes (Continued)

Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on spec Tue Oct 26 22:55:23 2021

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 7532 32-Core Processor

2 "physical id"s (chips)

128 "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 4 5 8 9 12 13 16 17 20 21 24 25 28 29 32 33 36 37 40 41 44 45
48 49 52 53 56 57 60 61

physical 1: cores 0 1 4 5 8 9 12 13 16 17 20 21 24 25 28 29 32 33 36 37 40 41 44 45
48 49 52 53 56 57 60 61

From lscpu from util-linux 2.32.1:

Architecture: x86_64

CPU op-mode(s): 32-bit, 64-bit

Byte Order: Little Endian

CPU(s): 128

On-line CPU(s) list: 0-127

Thread(s) per core: 2

Core(s) per socket: 32

Socket(s): 2

NUMA node(s): 2

Vendor ID: AuthenticAMD

CPU family: 23

Model: 49

Model name: AMD EPYC 7532 32-Core Processor

Stepping: 0

CPU MHz: 2670.860

CPU max MHz: 2400.0000

CPU min MHz: 1500.0000

BogoMIPS: 4800.07

Virtualization: AMD-V

L1d cache: 32K

L1i cache: 32K

L2 cache: 512K

L3 cache: 16384K

NUMA node0 CPU(s): 0-31,64-95

NUMA node1 CPU(s): 32-63,96-127

Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov

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Platform Notes (Continued)

```

pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp lm
constant_tsc rep_good nopl xtopology nonstop_tsc cpuid extd_apicid aperfmperf pni
pclmulqdq monitor ssse3 fma cxl6 sse4_1 sse4_2 x2apic movbe popcnt aes xsave avx
f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse
3dnowprefetch osvw ibs skinit wdt tce topoext perfctr_core perfctr_nb bpext
perfctr_llc mwaitx cpb cat_l3 cdp_l3 hw_pstate sme ssbd sev ibrs ibpb stibp vmmcall
fsgsbase bmi1 avx2 smep bmi2 cqm rdt_a rdseed adx smap clflushopt clwb sha_ni
xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
clzero irperf xsaveerptr wbnoinvd arat npt lbrv svm_lock nrip_save tsc_scale
vmcb_clean flushbyasid decodeassists pausefilter pfthreshold avic v_vmsave_vmload
vgif umip rdpid overflow_recov succor smca

```

```

/proc/cpuinfo cache data
cache size : 512 KB

```

From numactl --hardware

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

available: 2 nodes (0-1)

```

node 0 cpus: 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 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88
89 90 91 92 93 94 95

```

node 0 size: 128772 MB

node 0 free: 124452 MB

```

node 1 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56
57 58 59 60 61 62 63 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112
113 114 115 116 117 118 119 120 121 122 123 124 125 126 127

```

node 1 size: 128993 MB

node 1 free: 125303 MB

node distances:

```

node 0 1
0: 10 32
1: 32 10

```

From /proc/meminfo

```

MemTotal: 263952068 kB
HugePages_Total: 2048
Hugepagesize: 2048 kB

```

/sbin/tuned-adm active

Current active profile: throughput-performance

```

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

```

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

```

os-release:
NAME="Red Hat Enterprise Linux"

```

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Platform Notes (Continued)

```

VERSION="8.0 (Ootpa)"
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="8.0"
PLATFORM_ID="platform:el8"
PRETTY_NAME="Red Hat Enterprise Linux 8.0 (Ootpa)"
ANSI_COLOR="0;31"

```

```

redhat-release: Red Hat Enterprise Linux release 8.0 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.0 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.0:ga

```

uname -a:

```

Linux spec 4.18.0-80.el8.x86_64 #1 SMP Wed Mar 13 12:02:46 UTC 2019 x86_64 x86_64
x86_64 GNU/Linux

```

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit):	No status reported
CVE-2018-3620 (L1 Terminal Fault):	Not affected
Microarchitectural Data Sampling:	No status reported
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: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2):	Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBP: conditional, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling):	No status reported
CVE-2019-11135 (TSX Asynchronous Abort):	No status reported

run-level 3 Oct 18 16:03

SPEC is set to: /home/cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/mapper/rhel-home	xfs	392G	22G	370G	6%	/home

From /sys/devices/virtual/dmi/id

```

Vendor:      Tyrone Systems
Product:     Tyrone Camarero DSA72NGAO-46RT
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 frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

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Platform Notes (Continued)

Memory:

8x NO DIMM Unknown

8x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

BIOS:

BIOS Vendor: American Megatrends Inc.

BIOS Version: 2.3

BIOS Date: 08/02/2021

BIOS Revision: 5.14

(End of data from sysinfo program)

Compiler Version Notes

```
=====
C                | 519.lbm_r(base, peak) 538.imagick_r(base, peak)
                  | 544.nab_r(base, peak)
-----
```

```
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /home/cpu2017/aocc-compiler-3.0.0/bin
-----
```

```
=====
C++              | 508.namd_r(base, peak) 510.parest_r(base, peak)
-----
```

```
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /home/cpu2017/aocc-compiler-3.0.0/bin
-----
```

```
=====
C++, C          | 511.povray_r(base, peak) 526.blender_r(base, peak)
-----
```

```
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
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LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
```

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Compiler Version Notes (Continued)

Thread model: posix
InstalledDir: /home/cpu2017/aocc-compiler-3.0.0/bin

=====
C++, C, Fortran | 507.cactuBSSN_r(base, peak)

AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)

Target: x86_64-unknown-linux-gnu

Thread model: posix

InstalledDir: /home/cpu2017/aocc-compiler-3.0.0/bin

AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)

Target: x86_64-unknown-linux-gnu

Thread model: posix

InstalledDir: /home/cpu2017/aocc-compiler-3.0.0/bin

AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)

Target: x86_64-unknown-linux-gnu

Thread model: posix

InstalledDir: /home/cpu2017/aocc-compiler-3.0.0/bin

=====
Fortran | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
| 554.roms_r(base, peak)

AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)

Target: x86_64-unknown-linux-gnu

Thread model: posix

InstalledDir: /home/cpu2017/aocc-compiler-3.0.0/bin

=====
Fortran, C | 521.wrf_r(base, peak) 527.cam4_r(base, peak)

AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)

Target: x86_64-unknown-linux-gnu

Thread model: posix

InstalledDir: /home/cpu2017/aocc-compiler-3.0.0/bin

AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)

Target: x86_64-unknown-linux-gnu

Thread model: posix

(Continued on next page)



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Compiler Version Notes (Continued)

InstalledDir: /home/cpu2017/aocc-compiler-3.0.0/bin

Base Compiler Invocation

C benchmarks:

clang

C++ benchmarks:

clang++

Fortran benchmarks:

flang

Benchmarks using both Fortran and C:

flang clang

Benchmarks using both C and C++:

clang++ clang

Benchmarks using Fortran, C, and C++:

clang++ clang flang

Base Portability Flags

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
526.blender_r: -funsigned-char -D__BOOL_DEFINED -DSPEC_LP64
527.cam4_r: -DSPEC_CASE_FLAG -DSPEC_LP64
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64



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Base Optimization Flags

C benchmarks:

```
-m64 -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 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -fstruct-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 -z muldefs
-lamdlibm -ljemalloc -lflang -lflangrti
```

C++ benchmarks:

```
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -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 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -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
-z muldefs -lamdlibm -ljemalloc -lflang -lflangrti
```

Fortran benchmarks:

```
-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-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 -Hz,1,0x1 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -Kieee -Mrecursive
-mllvm -fuse-tile-inner-loop -funroll-loops
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -z muldefs -lamdlibm -ljemalloc
-lflang -lflangrti
```

Benchmarks using both Fortran and C:

```
-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-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 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -fstruct-layout=5
```

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Tyrone Camarero DSA72NGAO-46/424RT
(2.40 GHz, AMD EPYC 7532)

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SPECrate®2017_fp_peak = 264

CPU2017 License: 006042

Test Sponsor: Netweb Pte Ltd

Tested by: Tyrone Systems

Test Date: Oct-2021

Hardware Availability: Mar-2020

Software Availability: Mar-2021

Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):

```
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-freemap-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 -Hz,1,0x1
-Kieeee -Mrecursive -mllvm -fuse-tile-inner-loop -funroll-loops
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop -z muldefs
-lamdlibm -ljemalloc -lflang -lflangrti
```

Benchmarks using both C and C++:

```
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -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 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -fstruct-layout=5
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-freemap-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-partial-unswitch -mllvm -unroll-threshold=100
-finline-aggressive -mllvm -loop-unswitch-threshold=200000
-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
-mllvm -extra-vectorizer-passes -mllvm -convert-pow-exp-to-int=false
-z muldefs -lamdlibm -ljemalloc -lflang -lflangrti
```

Benchmarks using Fortran, C, and C++:

```
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -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 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -fstruct-layout=5
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-freemap-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-partial-unswitch -mllvm -unroll-threshold=100
-finline-aggressive -mllvm -loop-unswitch-threshold=200000
-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
-mllvm -extra-vectorizer-passes -mllvm -convert-pow-exp-to-int=false
-Hz,1,0x1 -Kieeee -Mrecursive -mllvm -fuse-tile-inner-loop
-funroll-loops -mllvm -lsr-in-nested-loop -z muldefs -lamdlibm
-ljemalloc -lflang -lflangrti
```



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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++

Fortran benchmarks:

flang

Benchmarks using both Fortran and C:

flang clang

Benchmarks using both C and C++:

clang++ clang

Benchmarks using Fortran, C, and C++:

clang++ clang flang

Peak Portability Flags

Same as Base Portability Flags



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Peak Optimization Flags

C benchmarks:

```
519.lbm_r: -m64 -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 -fstruct-layout=7
-mllvm -unroll-threshold=50 -fremap-arrays
-flv-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
```

538.imagick_r: Same as 519.lbm_r

```
544.nab_r: -m64 -flto -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize -Ofast -march=znver3
-fveclib=AMDLIBM -fstruct-layout=7
-mllvm -unroll-threshold=50 -fremap-arrays
-flv-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
```

C++ benchmarks:

```
508.namd_r: -m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false
-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 -Ofast
-march=znver3 -fveclib=AMDLIBM -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 -lamdlibm -ljemalloc
```

```
510.parest_r: -m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-suppress-fmas
-Wl,-mllvm -Wl,-function-specialize -Ofast -march=znver3
-fveclib=AMDLIBM -finline-aggressive
-mllvm -unroll-threshold=100 -flv-function-specialization
-mllvm -enable-licm-vrp -mllvm -reroll-loops
```

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Peak Optimization Flags (Continued)

510.parest_r (continued):

```
-mllvm -aggressive-loop-unswitch
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -lamdlibm -ljemalloc
```

Fortran benchmarks:

```
503.bwaves_r: -m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-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 -Ofast
-march=znver3 -fveclib=AMDLIBM -Kieee -Mrecursive
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -enable-licm-vrp
-lamdlibm -ljemalloc -lflang -lflangrti
```

549.fotonik3d_r: Same as 503.bwaves_r

```
554.roms_r: -m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-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 -Ofast
-march=znver3 -fveclib=AMDLIBM -Kieee -Mrecursive
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -enable-licm-vrp
-Hz,1,0x1 -mllvm -fuse-tile-inner-loop -lamdlibm
-ljemalloc -lflang -lflangrti
```

Benchmarks using both Fortran and C:

```
521.wrf_r: -m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-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 -Ofast
-march=znver3 -fveclib=AMDLIBM -fstruct-layout=7
-mllvm -unroll-threshold=50 -fremap-arrays
-flv-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 -Kieee -Mrecursive
-lamdlibm -ljemalloc -lflang -lflangrti
```

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Peak Optimization Flags (Continued)

```
527.cam4_r: -m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-force-vector-interleave=1 -Ofast
-march=znver3 -fveclib=AMDLIBM -fstruct-layout=7
-mllvm -unroll-threshold=50 -fremap-arrays
-flv-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 -O3 -ffast-math
-funroll-loops -mllvm -extra-vectorizer-passes
-mllvm -lsr-in-nested-loop -Mrecursive -lamdlibm
-ljemalloc -lflang -lflangrti
```

Benchmarks using both C and C++:

```
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -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 -Ofast -march=znver3
-fveclib=AMDLIBM -fstruct-layout=7 -mllvm -unroll-threshold=50
-fremap-arrays -flv-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
-finline-aggressive -mllvm -unroll-threshold=100 -mllvm -reroll-loops
-mllvm -aggressive-loop-unswitch -lamdlibm -ljemalloc
```

Benchmarks using Fortran, C, and C++:

```
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -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 -Ofast -march=znver3
-fveclib=AMDLIBM -fstruct-layout=7 -mllvm -unroll-threshold=50
-fremap-arrays -flv-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
-mllvm -unroll-threshold=100 -mllvm -loop-unswitch-threshold=200000
-finline-aggressive -mllvm -reroll-loops
-mllvm -aggressive-loop-unswitch -mllvm -extra-vectorizer-passes
-mllvm -convert-pow-exp-to-int=false -Kieee -Mrecursive -lamdlibm
-ljemalloc -lflang -lflangrti
```



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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/aocc300-flags-A1.html>

<http://www.spec.org/cpu2017/flags/Tyrone-Platform-Settings-V1.2-Milan-revB.html>

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2017/flags/aocc300-flags-A1.xml>

<http://www.spec.org/cpu2017/flags/Tyrone-Platform-Settings-V1.2-Milan-revB.xml>

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