



SPEC CPU®2017 Integer Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Cisco Systems

SPECrate®2017_int_base = 847

Cisco UCS C245 M6 (AMD EPYC 7773X 64-Core)

SPECrate®2017_int_peak = 910

CPU2017 License: 9019

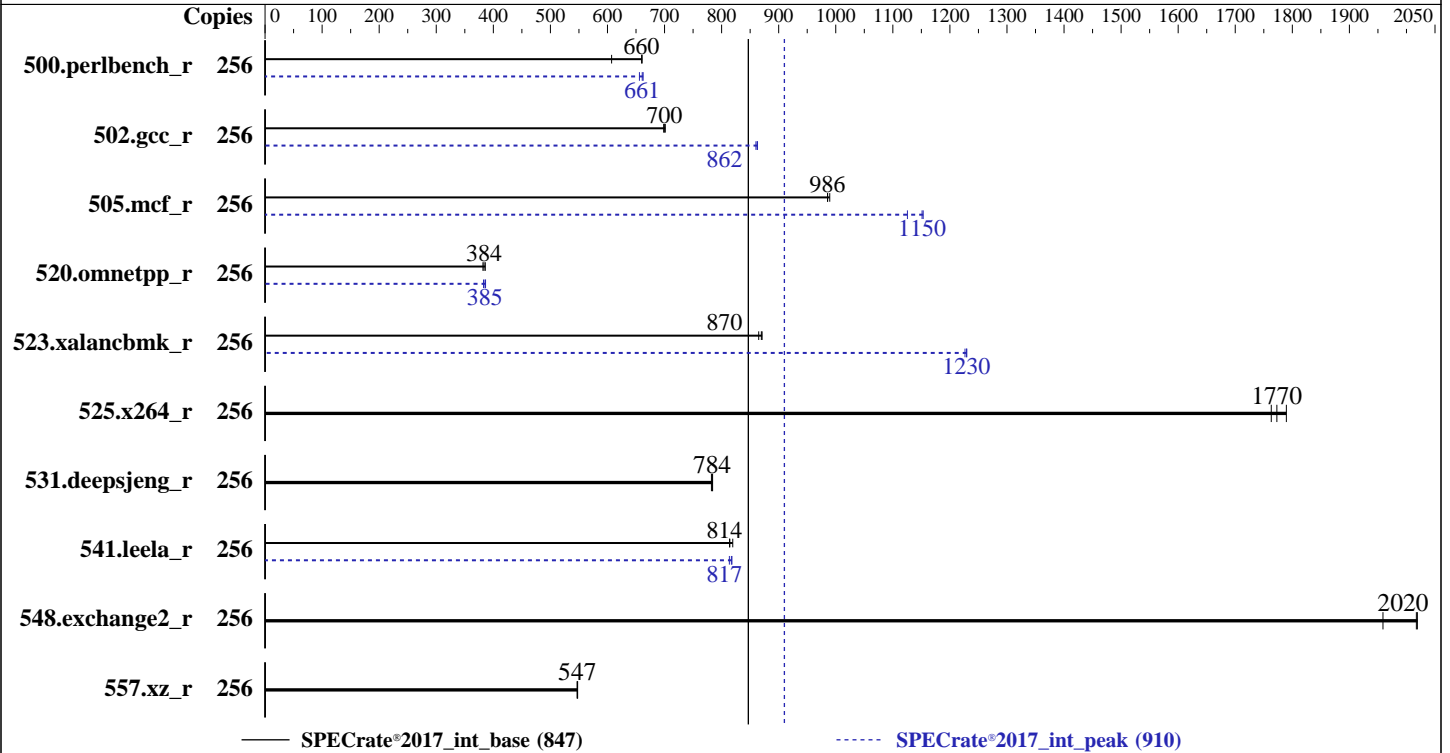
Test Date: Feb-2022

Test Sponsor: Cisco Systems

Hardware Availability: Mar-2022

Tested by: Cisco Systems

Software Availability: Dec-2021



Hardware

CPU Name: AMD EPYC 7773X
 Max MHz: 3500
 Nominal: 2200
 Enabled: 128 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: 768 MB I+D on chip per chip,
 96 MB shared / 8 cores
 Other: None
 Memory: 2 TB (16 x 128 GB 4Rx4 PC4-3200V-L)
 Storage: 1 x 960 GB M.2 SSD SATA
 Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP3 (x86_64)
 kernel version 5.3.18-57-default
 Compiler: C/C++/Fortran: Version 3.2.0 of AOCC
 Parallel: No
 Firmware: Version 4.2.1.30 released Feb-2022
 File System: xfs
 System State: Run level 3 (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



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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	256	671	607	617	661	618	660	256	621	656	617	661	615	662
502.gcc_r	256	517	701	519	698	518	700	256	420	862	420	863	421	860
505.mcf_r	256	420	986	418	989	420	986	256	359	1150	368	1130	359	1150
520.omnetpp_r	256	880	382	875	384	870	386	256	872	385	869	386	877	383
523.xalancbmk_r	256	313	865	310	871	311	870	256	220	1230	220	1230	220	1230
525.x264_r	256	253	1770	254	1760	250	1790	256	253	1770	254	1760	250	1790
531.deepsjeng_r	256	374	784	374	784	375	782	256	374	784	374	784	375	782
541.leela_r	256	521	814	517	820	521	814	256	521	814	519	817	518	818
548.exchange2_r	256	342	1960	332	2020	332	2020	256	342	1960	332	2020	332	2020
557.xz_r	256	505	547	505	548	506	547	256	505	547	505	548	506	547

SPECrate®2017_int_base = **847**

SPECrate®2017_int_peak = **910**

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.

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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:"  
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 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 Configuration

SMT Mode set to Auto

NUMA nodes per socket set to NPS4

ACPI SRAT L3 Cache As NUMA Domain set to Enabled

DRAM Scrub Time set to Disabled

Determinism Slider set to Power

Memory Interleaving set to Disabledd

APBDIS set to 1

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Platform Notes (Continued)

sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on SPEC-SRV02 Sun Feb 27 23:11:37 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 7773X 64-Core Processor
 2 "physical id"s (chips)
256 "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 : 64
siblings  : 128
```

```
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 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
```

```
physical 1: 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 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
```

From lscpu from util-linux 2.36.2:

```
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):                256
On-line CPU(s) list:   0-255
Thread(s) per core:    2
Core(s) per socket:    64
Socket(s):             2
NUMA node(s):         16
Vendor ID:             AuthenticAMD
CPU family:            25
Model:                 1
Model name:            AMD EPYC 7773X 64-Core Processor
Stepping:              2
Frequency boost:       enabled
CPU MHz:               1628.463
CPU max MHz:           2200.0000
CPU min MHz:           1500.0000
BogoMIPS:              4391.61
Virtualization:        AMD-V
L1d cache:             4 MiB
```

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Platform Notes (Continued)

```

L1i cache:                4 MiB
L2 cache:                  64 MiB
L3 cache:                  1.5 GiB
NUMA node0 CPU(s):        0-7,128-135
NUMA node1 CPU(s):        8-15,136-143
NUMA node2 CPU(s):        16-23,144-151
NUMA node3 CPU(s):        24-31,152-159
NUMA node4 CPU(s):        32-39,160-167
NUMA node5 CPU(s):        40-47,168-175
NUMA node6 CPU(s):        48-55,176-183
NUMA node7 CPU(s):        56-63,184-191
NUMA node8 CPU(s):        64-71,192-199
NUMA node9 CPU(s):        72-79,200-207
NUMA node10 CPU(s):       80-87,208-215
NUMA node11 CPU(s):       88-95,216-223
NUMA node12 CPU(s):       96-103,224-231
NUMA node13 CPU(s):       104-111,232-239
NUMA node14 CPU(s):       112-119,240-247
NUMA node15 CPU(s):       120-127,248-255
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf:        Not affected
Vulnerability Mds:         Not affected
Vulnerability Meltdown:    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 Srbds:        Not affected
Vulnerability Tsx async abort: Not affected
Flags:                      fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush mmx fxsr sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp lm constant_tsc rep_good noopl nonstop_tsc cpuid extd_apicid aperfmperf 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 bpext perfctr_llc mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2 erms invpcid 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 amd_ppin arat npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter pfthreshold v_vmsave_vmload vgif umip pku ospke vaes vpclmulqdq rdpid overflow_recov succor smca fsrm

```

From lscpu --cache:

NAME ONE-SIZE ALL-SIZE WAYS TYPE LEVEL SETS PHY-LINE COHERENCY-SIZE

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Platform Notes (Continued)

L1d	32K	4M	8 Data	1	64	1	64
L1i	32K	4M	8 Instruction	1	64	1	64
L2	512K	64M	8 Unified	2	1024	1	64
L3	96M	1.5G	16 Unified	3	98304	1	64

```
/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: 16 nodes (0-15)
node 0 cpus: 0 1 2 3 4 5 6 7 128 129 130 131 132 133 134 135
node 0 size: 128833 MB
node 0 free: 128508 MB
node 1 cpus: 8 9 10 11 12 13 14 15 136 137 138 139 140 141 142 143
node 1 size: 129018 MB
node 1 free: 128771 MB
node 2 cpus: 16 17 18 19 20 21 22 23 144 145 146 147 148 149 150 151
node 2 size: 129020 MB
node 2 free: 128828 MB
node 3 cpus: 24 25 26 27 28 29 30 31 152 153 154 155 156 157 158 159
node 3 size: 129018 MB
node 3 free: 128791 MB
node 4 cpus: 32 33 34 35 36 37 38 39 160 161 162 163 164 165 166 167
node 4 size: 129020 MB
node 4 free: 128769 MB
node 5 cpus: 40 41 42 43 44 45 46 47 168 169 170 171 172 173 174 175
node 5 size: 129018 MB
node 5 free: 128820 MB
node 6 cpus: 48 49 50 51 52 53 54 55 176 177 178 179 180 181 182 183
node 6 size: 129020 MB
node 6 free: 128832 MB
node 7 cpus: 56 57 58 59 60 61 62 63 184 185 186 187 188 189 190 191
node 7 size: 129006 MB
node 7 free: 128816 MB
node 8 cpus: 64 65 66 67 68 69 70 71 192 193 194 195 196 197 198 199
node 8 size: 129020 MB
node 8 free: 128577 MB
node 9 cpus: 72 73 74 75 76 77 78 79 200 201 202 203 204 205 206 207
node 9 size: 129018 MB
node 9 free: 128771 MB
node 10 cpus: 80 81 82 83 84 85 86 87 208 209 210 211 212 213 214 215
node 10 size: 128986 MB
node 10 free: 128792 MB
node 11 cpus: 88 89 90 91 92 93 94 95 216 217 218 219 220 221 222 223
node 11 size: 129018 MB
node 11 free: 128815 MB
```

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Platform Notes (Continued)

```

node 12 cpus: 96 97 98 99 100 101 102 103 224 225 226 227 228 229 230 231
node 12 size: 129020 MB
node 12 free: 128818 MB
node 13 cpus: 104 105 106 107 108 109 110 111 232 233 234 235 236 237 238 239
node 13 size: 129018 MB
node 13 free: 128820 MB
node 14 cpus: 112 113 114 115 116 117 118 119 240 241 242 243 244 245 246 247
node 14 size: 129020 MB
node 14 free: 128802 MB
node 15 cpus: 120 121 122 123 124 125 126 127 248 249 250 251 252 253 254 255
node 15 size: 129016 MB
node 15 free: 128816 MB
node distances:
node  0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15
 0:  10 11 12 12 12 12 12 12 32 32 32 32 32 32 32 32
 1:  11 10 12 12 12 12 12 12 32 32 32 32 32 32 32 32
 2:  12 12 10 11 12 12 12 12 32 32 32 32 32 32 32 32
 3:  12 12 11 10 12 12 12 12 32 32 32 32 32 32 32 32
 4:  12 12 12 12 10 11 12 12 32 32 32 32 32 32 32 32
 5:  12 12 12 12 12 11 10 12 12 32 32 32 32 32 32 32
 6:  12 12 12 12 12 12 10 11 32 32 32 32 32 32 32 32
 7:  12 12 12 12 12 12 11 10 32 32 32 32 32 32 32 32
 8:  32 32 32 32 32 32 32 32 32 10 11 12 12 12 12 12
 9:  32 32 32 32 32 32 32 32 32 11 10 12 12 12 12 12
10:  32 32 32 32 32 32 32 32 32 12 12 10 11 12 12 12
11:  32 32 32 32 32 32 32 32 32 12 12 11 10 12 12 12
12:  32 32 32 32 32 32 32 32 32 12 12 12 12 10 11 12
13:  32 32 32 32 32 32 32 32 32 12 12 12 12 11 10 12
14:  32 32 32 32 32 32 32 32 32 12 12 12 12 12 10 11
15:  32 32 32 32 32 32 32 32 32 12 12 12 12 12 11 10

```

From /proc/meminfo

MemTotal: 2113607800 kB

HugePages_Total: 0

Hugepagesize: 2048 kB

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

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

os-release:

NAME="SLES"

VERSION="15-SP3"

VERSION_ID="15.3"

PRETTY_NAME="SUSE Linux Enterprise Server 15 SP3"

ID="sles"

ID_LIKE="suse"

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Platform Notes (Continued)

```
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp3"
```

```
uname -a:
Linux SPEC-SRV02 5.3.18-57-default #1 SMP Wed Apr 28 10:54:41 UTC 2021 (ba3c2e9)
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 sanitization
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 3 Feb 27 23:09
```

```
SPEC is set to: /home/cpu2017
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda1       xfs   223G  9.5G  214G   5% /
```

```
From /sys/devices/virtual/dmi/id
Vendor:          Cisco Systems Inc
Product:         UCSC-C245-M6SX
Serial:         WZP251302NJ
```

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.

```
Memory:
16x 0xCE00 M386AAG40AM3-CWE 128 GB 4 rank 3200
```

```
BIOS:
BIOS Vendor:     Cisco Systems, Inc.
BIOS Version:    C245M6.4.2.1.30.0221222139
BIOS Date:      02/21/2022
```

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Platform Notes (Continued)

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

=====
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

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Compiler Version Notes (Continued)

=====
C++ | 523.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

=====
C++ | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base)
531.deepsjeng_r(base, peak) 541.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

=====
C++ | 523.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

=====
C++ | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base)
531.deepsjeng_r(base, peak) 541.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

=====
Fortran | 548.exchange2_r(base, peak)

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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

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 -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 -fstruct-layout=5 -mllvm -unroll-threshold=50

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SPEC CPU®2017 Integer Rate Result

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Cisco Systems

SPECrate®2017_int_base = 847

Cisco UCS C245 M6 (AMD EPYC 7773X 64-Core)

SPECrate®2017_int_peak = 910

CPU2017 License: 9019

Test Date: Feb-2022

Test Sponsor: Cisco Systems

Hardware Availability: Mar-2022

Tested by: Cisco Systems

Software Availability: Dec-2021

Base Optimization Flags (Continued)

C benchmarks (continued):

```
-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
```

C++ benchmarks:

```
-Wno-unused-command-line-argument
```



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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
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -fremap-arrays
-flv-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 -flto
```

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Peak Optimization Flags (Continued)

502.gcc_r (continued):

```
-Wl,-mllvm -Wl,-function-specialize -Ofast -march=znver3
-fveclib=AMDLIBM -ffast-math -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 -fgnu89-inline
-ljemalloc
```

505.mcf_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 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math
-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
```

525.x264_r: basepeak = yes

557.xz_r: basepeak = yes

C++ benchmarks:

520.omnetpp_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
-fininline-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
```

523.xalancbmk_r: -m32 -Wl,-mllvm -Wl,-do-block-reorder=aggressive -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
```

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Peak Optimization Flags (Continued)

523.xalancbmk_r (continued):

```
-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
-mllvm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden
-ljemalloc
```

531.deepsjeng_r: basepeak = yes

541.leela_r: Same as 520.omnetpp_r

Fortran benchmarks:

548.exchange2_r: basepeak = yes

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
```

523.xalancbmk_r: -L/usr/lib -Wno-unused-command-line-argument

```
-L/sppo/bin/cpu2017v118-aocc3-milanX/amd_rate_aocc320_milanx_A_lib/lib32
```

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

<http://www.spec.org/cpu2017/flags/aocc320-flags-A1.html>

<http://www.spec.org/cpu2017/flags/Cisco-Platform-Settings-AMD-v2-revD.html>

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

<http://www.spec.org/cpu2017/flags/aocc320-flags-A1.xml>

<http://www.spec.org/cpu2017/flags/Cisco-Platform-Settings-AMD-v2-revD.xml>



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