



# SPEC CPU®2017 Integer Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

## Cisco Systems

Cisco UCS C245 M6 (AMD EPYC 7763 64-Core Processor)

SPECrate®2017\_int\_base = 854

SPECrate®2017\_int\_peak = 898

CPU2017 License: 9019

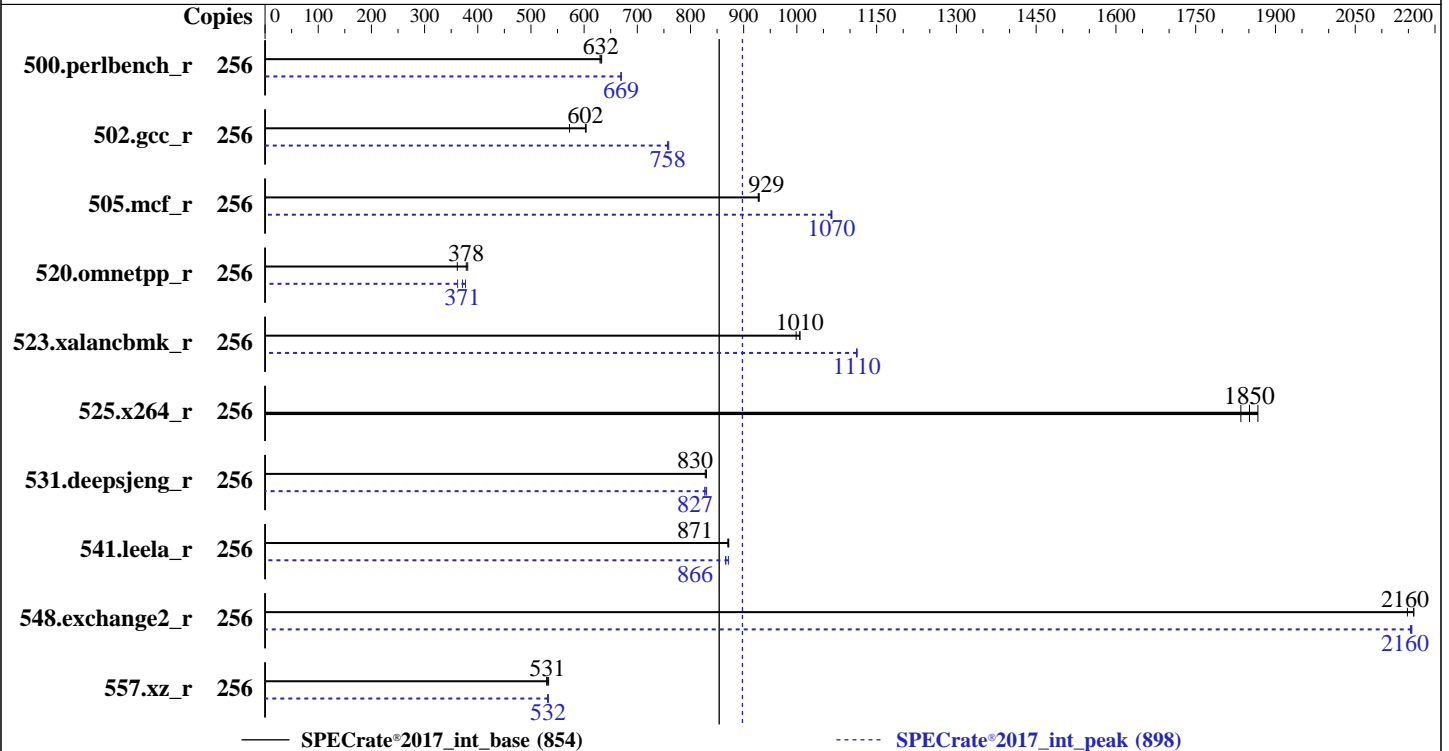
Test Sponsor: Cisco Systems

Tested by: Cisco Systems

Test Date: Jun-2021

Hardware Availability: Jun-2021

Software Availability: Mar-2021



### Hardware

CPU Name: AMD EPYC 7763  
 Max MHz: 3500  
 Nominal: 2450  
 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: 256 MB I+D on chip per chip,  
 32 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 SP2 (x86\_64)  
 kernel version 5.3.18-22-default  
 Compiler: C/C++/Fortran: Version 3.0.0 of AOCC  
 Parallel: No  
 Firmware: Version 4.2.0.221 released Jun-2021  
 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 v5.2.0  
 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	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	256	<b>645</b>	<b>632</b>	644	633	647	630	256	608	670	609	669	<b>609</b>	<b>669</b>
502.gcc_r	256	<b>602</b>	<b>602</b>	600	604	633	573	256	479	757	<b>478</b>	<b>758</b>	478	759
505.mcf_r	256	<b>445</b>	<b>929</b>	445	929	446	927	256	388	1070	389	1060	<b>388</b>	<b>1070</b>
520.omnetpp_r	256	929	362	<b>888</b>	<b>378</b>	881	381	256	891	377	928	362	<b>905</b>	<b>371</b>
523.xalancbmk_r	256	<b>269</b>	<b>1010</b>	269	1010	271	999	256	243	1110	<b>243</b>	<b>1110</b>	243	1110
525.x264_r	256	244	1830	<b>242</b>	<b>1850</b>	240	1870	256	244	1830	<b>242</b>	<b>1850</b>	240	1870
531.deepsjeng_r	256	354	828	<b>354</b>	<b>830</b>	354	830	256	355	827	353	830	<b>355</b>	<b>827</b>
541.leela_r	256	486	872	487	870	<b>487</b>	<b>871</b>	256	<b>489</b>	<b>866</b>	487	871	489	866
548.exchange2_r	256	311	2160	312	2150	<b>311</b>	<b>2160</b>	256	311	2150	<b>311</b>	<b>2160</b>	311	2160
557.xz_r	256	522	529	<b>521</b>	<b>531</b>	518	533	256	519	533	<b>520</b>	<b>532</b>	520	531

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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>
'echo 8 > /proc/sys/vm/dirty_ratio' run as root to limit dirty cache to 8% of
memory.
'echo 1 > /proc/sys/vm/swappiness' run as root to limit swap usage to minimum
necessary.
'echo 1 > /proc/sys/vm/zone_reclaim_mode' run as root to free node-local memory
and avoid remote memory usage.
'sync; echo 3 > /proc/sys/vm/drop_caches' run as root to reset filesystem caches.
'sysctl -w kernel.randomize_va_space=0' run as root to disable address space layout
randomization (ASLR) to reduce run-to-run variability.
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
```

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## Operating System Notes (Continued)

'echo always > /sys/kernel/mm/transparent\_hugepage/defrag' run as root for peak integer runs and all FP runs to enable Transparent Hugepages (THP).  
'echo madvise > /sys/kernel/mm/transparent\_hugepage/enabled' run as root for base integer runs to enable THP only on request.

## Environment Variables Notes

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

```
LD_LIBRARY_PATH =  
    "/home/arthur_backups/AMD/cpu2017v8/amd_rate_aocc300_milan_A_lib/64;/home/arthur_backups/AMD/cpu2017v8/amd_rate_aocc300_milan_A_lib/32:"  
MALLOCONF = "retain:true"
```

Environment variables set by runcpu during the 523.xalancbmk\_r peak run:

```
MALLOCONF = "thp:never"
```

## General Notes

Binaries were compiled on a system with 2x AMD EPYC 7742 CPU + 512GiB 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 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 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  
cTDP Control set to Manual  
cTDP set to 280  
EDC Control set to Manual  
EDC set to 300  
L2 Stream HW Prefetcher set to Disabled
```

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### Platform Notes (Continued)

Memory Interleaving set to Disabled  
APBDIS set to 1  
xGMI Link config set to 4  
4-link xGMI Max Speed set to 18Gbps

Sysinfo program /home/arthur\_backups/AMD/cpu2017v8/bin/sysinfo  
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d  
running on localhost Mon Jun 21 09:16:15 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 7763 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 2.33.1:

```
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 7763 64-Core Processor
Stepping: 1
CPU MHz: 2521.329
CPU max MHz: 2450.0000
CPU min MHz: 1500.0000
```

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### Platform Notes (Continued)

```

BogoMIPS:                4890.70
Virtualization:          AMD-V
L1d cache:               32K
L1i cache:               32K
L2 cache:                 512K
L3 cache:                 32768K
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
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 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 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

```

```

/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: 128830 MB
node 0 free: 126649 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: 127044 MB

```

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### Platform Notes (Continued)

```

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: 127046 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: 127052 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: 126870 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: 127049 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: 126904 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: 126992 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: 127063 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: 127073 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: 127063 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: 127079 MB
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: 127091 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: 127090 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: 127093 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: 127094 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

```

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### Platform Notes (Continued)

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	11	10	12	12	32	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	10	11	12	12	12	12	12	12
9:	32	32	32	32	32	32	32	32	11	10	12	12	12	12	12	12
10:	32	32	32	32	32	32	32	32	12	12	10	11	12	12	12	12
11:	32	32	32	32	32	32	32	32	12	12	11	10	12	12	12	12
12:	32	32	32	32	32	32	32	32	12	12	12	12	10	11	12	12
13:	32	32	32	32	32	32	32	32	12	12	12	12	11	10	12	12
14:	32	32	32	32	32	32	32	32	12	12	12	12	12	12	10	11
15:	32	32	32	32	32	32	32	32	12	12	12	12	12	12	11	10

From /proc/meminfo

MemTotal: 2113605452 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-SP2"

VERSION\_ID="15.2"

PRETTY\_NAME="SUSE Linux Enterprise Server 15 SP2"

ID="sles"

ID\_LIKE="suse"

ANSI\_COLOR="0;32"

CPE\_NAME="cpe:/o:suse:sles:15:sp2"

uname -a:

Linux localhost 5.3.18-22-default #1 SMP Wed Jun 3 12:16:43 UTC 2020 (720aeba) 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

(Continued on next page)



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## Platform Notes (Continued)

```

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 Apr 17 13:13

SPEC is set to: /home/arthur_backups/AMD/cpu2017v8
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/nvme0n1p17 xfs   792G 153G  640G  20% /home

From /sys/devices/virtual/dmi/id
Vendor:          Cisco Systems Inc
Product:         UCSC-C245-M6SX
Serial:         WZP25120AZB

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
 16x Unknown Unknown

BIOS:
BIOS Vendor:     Cisco Systems, Inc.
BIOS Version:    C245M6.4.2.0.221.0607212321
BIOS Date:       06/07/2021
BIOS Revision:   5.22

(End of data from sysinfo program)

```

## Compiler Version Notes

=====  
C | 502.gcc\_r(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: i386-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin  
=====

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```
=====
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 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: /opt/AMD/aocc-compiler-3.0.0/bin
=====
```

```
=====
C          | 502.gcc_r(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: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
=====
```

```
=====
C          | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak)
          | 525.x264_r(base, peak) 557.xz_r(base, peak)
=====
```

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AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
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=====
```

```
=====
C++       | 523.xalancbmk_r(peak)
=====
```

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LLVM Mirror.Version.12.0.0)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
=====
```

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

(Continued on next page)



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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: /opt/AMD/aocc-compiler-3.0.0/bin

=====  
C++ | 523.xalanbmk\_r(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: i386-unknown-linux-gnu

Thread model: posix

InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

=====  
C++ | 520.omnetpp\_r(base, peak) 523.xalanbmk\_r(base)  
| 531.deepsjeng\_r(base, peak) 541.leela\_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: /opt/AMD/aocc-compiler-3.0.0/bin

=====  
Fortran | 548.exchange2\_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: /opt/AMD/aocc-compiler-3.0.0/bin

### Base Compiler Invocation

C benchmarks:

clang

C++ benchmarks:

clang++

(Continued on next page)



# SPEC CPU®2017 Integer Rate Result

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## Cisco Systems

Cisco UCS C245 M6 (AMD EPYC 7763 64-Core Processor)

SPECrate®2017\_int\_base = 854

SPECrate®2017\_int\_peak = 898

**CPU2017 License:** 9019

**Test Sponsor:** Cisco Systems

**Tested by:** Cisco Systems

**Test Date:** Jun-2021

**Hardware Availability:** Jun-2021

**Software Availability:** Mar-2021

## Base Compiler Invocation (Continued)

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 -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 -z muldefs
-lamdlibm -ljemalloc -lflang -lflangrti

```

C++ benchmarks:

```

-m64 -std=c++98 -Wl,-mllvm -Wl,-do-block-reorder=aggressive -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

```

(Continued on next page)



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## Base Optimization Flags (Continued)

C++ benchmarks (continued):

```
-z muldefs -mllvm -do-block-reorder=aggressive  
-fvirtual-function-elimination -fvisibility=hidden -lamdlibm  
-ljemalloc -lflang -lflangrti
```

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 -O3 -ffast-math  
-march=znver3 -fveclib=AMDLIBM -z muldefs -mllvm -unroll-aggressive  
-mllvm -unroll-threshold=500 -lamdlibm -ljemalloc -lflang -lflangrti
```

## Base Other Flags

C benchmarks:

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

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
```

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**Hardware Availability:** Jun-2021

**Software Availability:** Mar-2021

## Peak Portability Flags (Continued)

```

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

```

## Peak Optimization Flags

C benchmarks:

```

500.perlbench_r: -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 -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
-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 -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 -fstruct-layout=7
-mllvm -unroll-threshold=50 -fremap-arrays

```

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## Peak Optimization Flags (Continued)

505.mcf\_r (continued):

```
-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: Same as 505.mcf\_r

C++ benchmarks:

520.omnetpp\_r: -m64 -std=c++98

```
-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 -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  
-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 -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: Same as 520.omnetpp\_r

541.leela\_r: Same as 520.omnetpp\_r

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## Peak Optimization Flags (Continued)

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 -ffast-math
-march=znver3 -fveclib=AMDLIBM -mllvm -unroll-aggressive
-mllvm -unroll-threshold=500 -lamdlibm -ljemalloc -lflang -lflangrti
```

## 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/cpu2017v115aocc3/amd_rate_aocc300_milan_A_lib/32
```

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/cpu2017v115aocc3/amd_rate_aocc300_milan_A_lib/32
```

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

<http://www.spec.org/cpu2017/flags/aocc300-flags-B2.html>

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

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

<http://www.spec.org/cpu2017/flags/aocc300-flags-B2.xml>

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

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