

# SPEC CPU®2017 Integer Speed Result

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LaCASA Laboratory

SPECspeed®2017\_int\_base = 6.72

AMD EPYC 7402 24-Core Processor

SPECspeed®2017\_int\_peak = Not Run

CPU2017 License: 1269

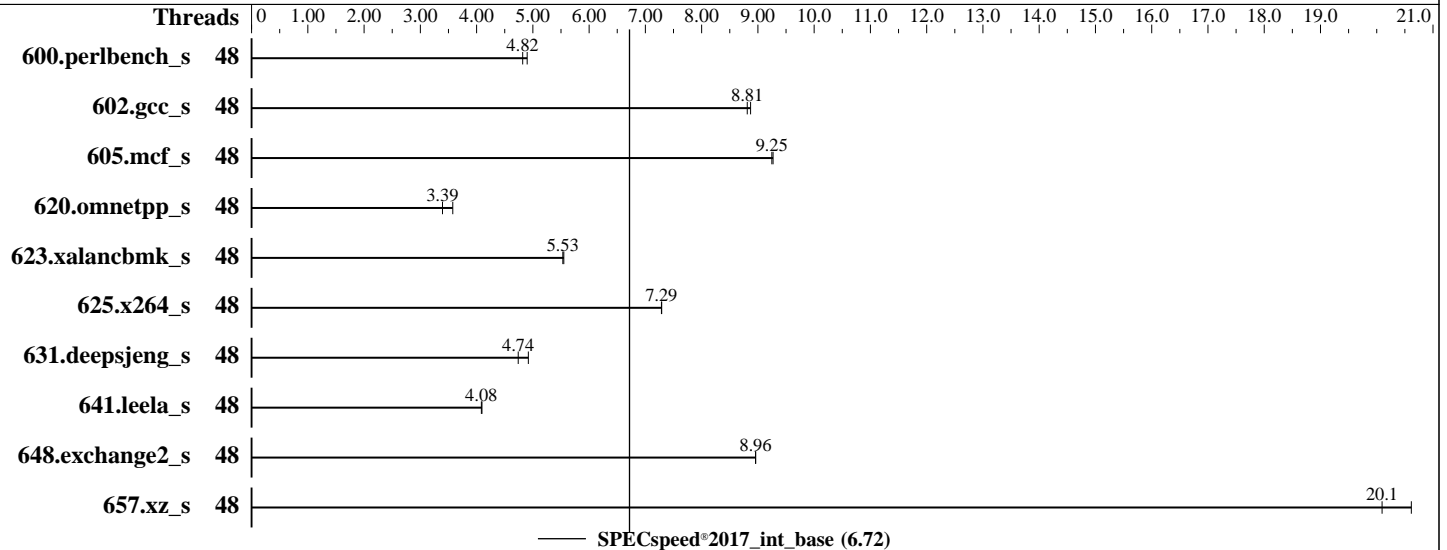
Test Sponsor: LaCASA Laboratory

Tested by: Phillip Lane & Jessica Lobrano

Test Date: Mar-2022

Hardware Availability: February-2021

Software Availability: February-2021



## Hardware

CPU Name: AMD EPYC 7402  
Max MHz: 3350  
Nominal: 2800  
Enabled: 48 cores, 2 chips  
Orderable: 0-47 chips  
Cache L1: 64K  
L2: 512K  
L3: 128M  
Other: --  
Memory: 256 GB  
running at 3200 MHz  
Storage: 2TB  
Other: --

## Software

OS: Linux  
Red Hat Enterprise Linux 8.4  
Compiler: C/C++/Fortran: Version 3.1.0 of AOCC, the AMD Optimizing C/C++ Compiler  
Parallel: Yes  
Firmware: --  
File System: nfs  
System State: Run level N (add definition here)  
Base Pointers: 64-bit  
Peak Pointers: Not Applicable  
Other: --  
Power Management: --

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## Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
600.perlbench_s	48	<b><u>368</u></b>	<b><u>4.82</u></b>	362	4.90									
602.gcc_s	48	449	8.87	<b><u>452</u></b>	<b><u>8.81</u></b>									
605.mcf_s	48	<b><u>511</u></b>	<b><u>9.25</u></b>	509	9.27									
620.omnetpp_s	48	456	3.58	<b><u>481</u></b>	<b><u>3.39</u></b>									
623.xalancbmk_s	48	<b><u>256</u></b>	<b><u>5.53</u></b>	255	5.55									
625.x264_s	48	242	7.29	<b><u>242</u></b>	<b><u>7.29</u></b>									
631.deepsjeng_s	48	291	4.92	<b><u>302</u></b>	<b><u>4.74</u></b>									
641.leela_s	48	<b><u>418</u></b>	<b><u>4.08</u></b>	417	4.10									
648.exchange2_s	48	328	8.96	<b><u>328</u></b>	<b><u>8.96</u></b>									
657.xz_s	48	300	20.6	<b><u>308</u></b>	<b><u>20.1</u></b>									

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

## Environment Variables Notes

Environment variables set by runcpu before the start of the run:  
CPLUS\_INCLUDE\_PATH = "/opt/aocc-compiler-3.1.0/include"  
C\_INCLUDE\_PATH = "/opt/aocc-compiler-3.1.0/include"  
LD\_LIBRARY\_PATH =  
"/opt/aocc-compiler-3.1.0/lib:/opt/aocc-compiler-3.1.0/lib32:/usr/lib64:  
/usr/local/cuda/lib64:/opt/aocc-compiler-3.1.0/lib/:"  
LIBRARY\_PATH =  
"/opt/aocc-compiler-3.1.0/lib:/opt/aocc-compiler-3.1.0/lib32:/usr/lib64:  
/usr/local/cuda/lib64:/opt/aocc-compiler-3.1.0/lib/:"

## Platform Notes

Sysinfo program /apps/arch/cpu2017/bin/sysinfo  
Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011  
running on euler.ece.uah.edu Sat Mar 26 04:42:37 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 7402 24-Core Processor  
2 "physical id"s (chips)  
48 "processors"  
cores, siblings (Caution: counting these is hw and system dependent. The following

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## Platform Notes (Continued)

excerpts from /proc/cpuinfo might not be reliable. Use with caution.)

```
cpu cores : 24
siblings  : 24
physical 0: cores 0 1 2 4 5 6 8 9 10 12 13 14 16 17 18 20 21 22 24 25 26 28 29 30
physical 1: cores 0 1 2 4 5 6 8 9 10 12 13 14 16 17 18 20 21 22 24 25 26 28 29 30
```

From lscpu:

```
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                48
On-line CPU(s) list:   0-47
Thread(s) per core:    1
Core(s) per socket:    24
Socket(s):             2
NUMA node(s):         2
Vendor ID:             AuthenticAMD
CPU family:            23
Model:                49
Model name:            AMD EPYC 7402 24-Core Processor
Stepping:              0
CPU MHz:               2800.000
CPU max MHz:           2800.0000
CPU min MHz:           1500.0000
BogoMIPS:              5589.35
Virtualization:        AMD-V
L1d cache:             32K
L1i cache:             32K
L2 cache:              512K
L3 cache:              16384K
NUMA node0 CPU(s):    0-23
NUMA node1 CPU(s):    24-47
Flags:                 fpvme 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 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 hwpstate ssbd mba 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
amd_ppin arat npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid
decodeassists pausefilter pfthreshold avic v_vmsave_vmload vgif v_spec_ctrl umip
rdpid overflow_recov succor smca sme sev sev_es
```

```
/proc/cpuinfo cache data
cache size : 512 KB
```

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## Platform Notes (Continued)

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

```
From /proc/meminfo
MemTotal:      263581252 kB
HugePages_Total:      0
Hugepagesize:    2048 kB
```

```
From /etc/*release* /etc/*version*
os-release:
NAME="Red Hat Enterprise Linux"
VERSION="8.5 (Ootpa)"
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="8.5"
PLATFORM_ID="platform:el8"
PRETTY_NAME="Red Hat Enterprise Linux 8.5 (Ootpa)"
ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.5 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.5 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8::baseos
```

```
uname -a:
Linux euler.ece.uah.edu 4.18.0-348.20.1.el8_5.x86_64 #1 SMP Tue Mar 8 12:56:54 EST
2022 x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

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/swaps barriers and __user pointer sanitization
CVE-2017-5715 (Spectre variant 2):	Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBP: disabled, RSB filling
srbds:	Not affected
tsx_async_abort:	Not affected

SPEC is set to: /apps/arch/cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
blackhawk.priv:/export/apps/arch	nfs	2.0T	1.4T	580G	70%	/apps/arch

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## Platform Notes (Continued)

```
From /sys/devices/virtual/dmi/id
BIOS: Dell Inc. 2.1.6 03/09/2021
Vendor: Dell Inc.
Product: PowerEdge R7525
Product Family: PowerEdge
```

```
Cannot run dmidecode; consider saying (as root)
chmod +s /usr/sbin/dmidecode
```

(End of data from sysinfo program)

## Compiler Version Notes

```
=====
C      | 600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base)
      | 625.x264_s(base) 657.xz_s(base)
-----
```

```
AMD clang version 12.0.0 (CLANG: AOCC_3_1_0-Build#126 2021_06_07) (based on
LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/aocc-compiler-3.1.0/bin
-----
```

```
=====
C++    | 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)
      | 641.leela_s(base)
-----
```

```
AMD clang version 12.0.0 (CLANG: AOCC_3_1_0-Build#126 2021_06_07) (based on
LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/aocc-compiler-3.1.0/bin
-----
```

```
=====
Fortran | 648.exchange2_s(base)
-----
```

```
AMD clang version 12.0.0 (CLANG: AOCC_3_1_0-Build#126 2021_06_07) (based on
LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/aocc-compiler-3.1.0/bin
-----
```

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## Base Compiler Invocation

C benchmarks:

clang

C++ benchmarks:

clang++

Fortran benchmarks:

flang

## Base Portability Flags

600.perlbench\_s: -DSPEC\_LINUX\_X64 -DSPEC\_LP64  
602.gcc\_s: -DSPEC\_LP64  
605.mcf\_s: -DSPEC\_LP64  
620.omnetpp\_s: -DSPEC\_LP64  
623.xalancbmk\_s: -DSPEC\_LINUX -DSPEC\_LP64  
625.x264\_s: -DSPEC\_LP64  
631.deepsjeng\_s: -DSPEC\_LP64  
641.leela\_s: -DSPEC\_LP64  
648.exchange2\_s: -DSPEC\_LP64  
657.xz\_s: -DSPEC\_LP64

## Base Optimization Flags

C benchmarks:

-m64 -std=c99 -g -O3 -ffast-math -march=native -flto -fopenmp  
-DSPEC\_OPENMP -fgnu89-inline -z muldefs

C++ benchmarks:

-m64 -std=c++03 -g -O3 -ffast-math -march=native -flto -fopenmp  
-DSPEC\_OPENMP -lflang

Fortran benchmarks:

-m64 -g -O3 -march=native -flto -Kieee -fno-finite-math-only  
-DSPEC\_OPENMP -fopenmp -lflang

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For questions about this result, please contact the tester. For other inquiries, please contact [info@spec.org](mailto:info@spec.org).

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