



SPEC® CPU2017 Integer Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL325 Gen10

(2.00 GHz, AMD EPYC 7401)

SPECrate2017_int_base =

SPECrate2017_int_peak =

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Jun-2018

Hardware Availability: Jul-2018

Software Availability: Feb-2018

C has determined that this result does not comply with the SPEC CPU2017 run reporting rules. Specifically, the submitter has notified SPEC that the system was run with a processor that is not supported in the tested system.

Copies

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

Hardware

CPU Name: AMD EPYC 7401

Max MHz.: 3000

Nominal: 2000

Enabled: 24 cores, 1 chip, 2 threads/core

Orderable: 1 chip

Cache L1: 64 KB I+D on chip per core

L2: 512 KB D on chip per core

L3: 64 MB I+D on chip per chip, 8 MB shared / 3 cores

Memory: 128 GB (8 x 16 GB 1Rx4 PC4-2666V-R, running at 2400)

Storage: 1 x 480 GB SATA SSD, RAID 0

Other: None

Software

OS: SUSE Linux Enterprise Server 12 (x86_64) SP3
Kernel 4.4.131-94.25-default

Compiler: C/C++: Version 1.0.0 of AOCC
Fortran: Version 4.8.2 of GCC

Parallel: No

Firmware: HPE BIOS Version A41 04/06/2018 released Apr-2018

File System: xfs

System State: Run level 3 (multi-user)

Base Pointers: 64-bit

Peak Pointers: Not Applicable

Other: jemalloc general purpose malloc implementation v4.5.0;



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

SPECrate2017_int_base =

SPECrate2017_int_peak =

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

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
'ulimit -l 2097152' was used to set environment locked pages in memory limit

runspec command invoked through numactl i.e.:
numactl --interleave=all runspec <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
Linux governor set to performance with cpupower "cpupower frequency-set -r -g performance"
dirty_ratio, swappiness, zone_reclaim_mode and drop_caches were
all set using privileged echo (e.g. echo 1 > /proc/sys/vm/swappiness).
Transparent huge pages were enabled for this run (OS default)

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Operating System Notes (Continued)

Huge pages were not configured for this run.
IRQ balance service stopped using "systemctl stop irqbalance.service"
Tuned profile set with "tuned-adm profile throughput-performance"

General Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017/amd1704-rate-libs-revC/64:/home/cpu2017/amd1704-rate-libs-revC/32:"
MALLOCCONF = "lg_chunk:21"

The AMD64 AOCC Compiler Suite is available at
<http://developer.amd.com/amd-aocc/>

Binaries were compiled on a system with 2x AMD EPYC 7601 CPU + 512GB Memory using RHEL 7.4

The AOCC Gold Linker plugin was installed and used for the link stage.

The AOCC Fortran Plugin version 1.0 was used to leverage AOCC optimizers with gfortran. It is available here:
<http://developer.amd.com/amd-aocc/>

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

NA: 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, a general purpose malloc implementation, was obtained at
<https://github.com/jemalloc/jemalloc/releases/download/4.5.0/jemalloc-4.5.0.tar.bz2>
jemalloc was built with GCC v4.8.5 in RHEL v7.2 under default conditions.
jemalloc uses environment variable MALLOCCONF with values narenas and lg_chunk:
narenas: sets the maximum number of arenas to use for automatic multiplexing of threads and arenas.
lg_chunk: set the virtual memory chunk size (log base 2). For example, lg_chunk:21 sets the default chunk size to 2^21 = 2MiB.



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Platform Notes

BIOS Configuration:

Thermal Configuration set to Maximum Cooling
Memory Patrol Scrubbing set to Disabled
Performance Determinism set to Power Deterministic
Processor Power and Utilization Monitoring set to Disabled
Workload Profile set to General Throughput Compute
Minimum Processor Idle Power Core C-State set to C6 State
Sysinfo program /source/home2/cpu2017/bin/sysinfo
Rev: r5797 of 2017-06-14 6c45e4568ad5735fd618bcc091c0f
running on dl325-gen10 Thu Jul 5 11:27:10 2018

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 7401 24-Core Processor
 1 "physical id" (chips)
 48 "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      : 24
siblings       : 48
physical id    : 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
```

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:    2
Core(s) per socket:    24
Socket(s):             1
NUMA node(s):         4
Vendor ID:             AuthenticAMD
CPU family:            23
Model:                 1
Model name:            AMD EPYC 7401 24-Core Processor
Stepping:              2
```

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Platform Notes (Continued)

```

CPU MHz:                2000.000
CPU max MHz:            2000.0000
CPU min MHz:            1200.0000
BogoMIPS:               3992.40
Virtualization:         AMD-V
L1d cache:              32K
L1i cache:              64K
L2 cache:               512K
L3 cache:               8192K
NUMA node0 CPU(s):     0-5,24-29
NUMA node1 CPU(s):     6-11,30-35
NUMA node2 CPU(s):     12-17,36-41
NUMA node3 CPU(s):     18-23,42-47
Flags:                   fpu 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 extd_apicid amd_dcm aperfmperf eagerfpu pni
pclmulqdq monitor ssse3 fma cx16 sse4_1 sse4_2 movbe popcnt aes xsave avx f16c
rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch
osvw skinit amd_tce topoext perfctr_core perfctr_nb bpext perfctr_l2 mwaitx arat
hw_pstate rdtscp retpoline retpoline_amd npt lbrv svm_lock nrip_save tsc_scale
vmcb_clear_flush vid decodassist pausefilter pftreshold vmcall avic fsgsbase
bmi1 avx2 smep bmi2 rdseed adx smap clflushopt sha_ni xsaveopt xsavec xgetbv1 clzero
irperf_1ibpb overflow_recov succor smca

```

```

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

```

```

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

```

```

available: 4 nodes (0-3)
node 0 cpus: 0 1 2 3 4 5 24 25 26 27 28 29
node 0 size: 32073 MB
node 0 free: 31893 MB
node 1 cpus: 6 7 8 9 10 11 30 31 32 33 34 35
node 1 size: 32253 MB
node 1 free: 32089 MB
node 2 cpus: 12 13 14 15 16 17 36 37 38 39 40 41
node 2 size: 32253 MB
node 2 free: 32100 MB
node 3 cpus: 18 19 20 21 22 23 42 43 44 45 46 47

```

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Platform Notes (Continued)

```
node 3 size: 32252 MB
node 3 free: 32094 MB
node distances:
node  0  1  2  3
  0:  10 16 16 16
  1:  16 10 16 16
  2:  16 16 10 16
  3:  16 16 16 10
```

```
From /proc/meminfo
MemTotal:      131920768 kB
HugePages_Total:
Hugepagesize:   2048 kB
```

```
/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 12 SP3
```

```
From /etc/*release* /etc/*version*
SuSE-release
SUSE Linux Enterprise Server 12 (x86_64)
VERSION_ID=12
PATCHLEVEL=3
# This file is deprecated and will be removed in a future service pack or release.
# Please check /etc/os-release for details about this release.
os-release
NAME="SLES"
VERSION="12-SP3"
VERSION_ID="12.3"
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP3"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp3"
```

```
uname -a:
Linux dl325-gen10 4.4.131-94.25-default #1 SMP Mon May 7 11:22:19 UTC 2018 (9700bac)
x86_64 x86_64 x86_64 GNU/Linux
```

run-level 3 Dec 31 17:54

SPEC is set to: /source/home/cpu2017

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Platform Notes (Continued)

Filesystem	Type	Size	Used	Avail	Use	Mounted on
/dev/sdb4	xfs	445G	5.8G	439G	2%	/source/home

Additional information from dmidecode 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.

BIOS HPE A41 04/06/2018

Memory:

8x UNKNOWN NOT AVAILABLE

8x UNKNOWN NOT AVAILABLE 16 GB 1 rank 2666

(End of data from sysinfo program)

Compiler Version Notes

=====
CC 500.perlbenc_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base)
557.xz_r(base)
=====

=====
AOCC.LLVM.4.0.0.B35.2017_04_26 clang version 4.0.0 (CLANG:) (based on LLVM
AOCC.LLVM.4.0.0.B35.2017_04_26)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /root/work/compilers/AOCC-1.0-Compiler/bin
=====

=====
CXXc 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)
541.leela_r(base)
=====

=====
AOCC.LLVM.4.0.0.B35.2017_04_26 clang version 4.0.0 (CLANG:) (based on LLVM
AOCC.LLVM.4.0.0.B35.2017_04_26)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /root/work/compilers/AOCC-1.0-Compiler/bin
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Compiler Version Notes (Continued)

FC 548.exchange2_r(base)

GNU Fortran (GCC) 4.8.2

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For more information about these matters, see the file named COPYING

Base Compiler Invocation

C benchmarks:

clang

C++ benchmarks:

clang++

Fortran benchmarks:

clang gfortran

Base Portability Flags

500.perfbench_r: -DSPEC_LINUX_X64 -DSPEC_LP64

503.gcc_r: -DSPEC_LP64

505.mcf_r: -DSPEC_LP64

520.omniobj_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



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Base Optimization Flags

C benchmarks:

```
-flto -Wl, -plugin-opt= -merge-constant -l -in-nested-loop
-disable-vect-cmp -O3 -ffast-math -march=znver1 -fsruct-layout=2
-mllvm -unroll-threshold=100 -fremap-arrays -m -avx2
-inline-threshold=1000 -z muldefs -ljemalloc
```

C++ benchmarks:

```
-flto -Wl, -plugin-opt= -merge-constant -l -in-nested-loop
-disable-vect-cmp -O3 -march=znver1 -mllvm -unroll-threshold=100
-finline-aggressive -fremap-arrays -inline-threshold=1000 -z muldefs
-ljemalloc
```

Fortran benchmarks:

```
-flto -Wl, -plugin-opt= -merge-constant -lsr-in-nested-loop
-disable-vect-cmp -O3 -mavx -madox -funroll-loops -ffast-math
-z muldefs -Ofast -fd -fault -integer-8 -fplugin=dragonegg.so
-fplugin-arg-dragonegg -mllvm-option=" -enable-iv-split
-inline-threshold=1000 -disable-vect-cmp" -ljemalloc -lgfortran
-lamdlibm
```

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

<http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-V1.2-EPYC-revD.html>

<http://www.spec.org/cpu2017/flags/aocc100-flags-revC-I.2018-02-16.html>

<http://www.spec.org/cpu2017/flags/gcc.2018-02-16.html>

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

<http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-V1.2-EPYC-revD.xml>

<http://www.spec.org/cpu2017/flags/aocc100-flags-revC-I.2018-02-16.xml>

<http://www.spec.org/cpu2017/flags/gcc.2018-02-16.xml>

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU2017 v1.0.2 on 2018-07-05 13:27:09-0400.

Report generated on 2019-02-21 18:08:24 by CPU2017 PDF formatter v6067.

Originally published on 2018-08-21.