# SPEC CPU®2017 Integer Rate Result

## Lenovo Global Technology

**ThinkSystem SR635**  
3.10 GHz, AMD EPYC 7252

### SPECrate®2017_int_base = 59.7  
### SPECrate®2017_int_peak = 62.8

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## Hardware

- **CPU Name:** AMD EPYC 7252  
- **Max MHz:** 3200  
- **Nominal:** 3100  
- **Enabled:** 8 cores, 1 chip, 2 threads/core  
- **Orderable:** 1 chip  
- **Cache L1:** 32 KB I + 32 KB D on chip per core  
- **L2:** 512 KB I+D on chip per core  
- **L3:** 64 MB I+D on chip per chip, 16 MB shared / 2 cores  
- **Other:** None  
- **Memory:** 256 GB (8 x 32 GB 2Rx4 PC4-3200AA-R)  
- **Storage:** 1 x 960 GB SATA SSD  
- **Other:** None

## Software

- **OS:** SUSE Linux Enterprise Server 12 SP5 (x86_64)  
  Kernel 4.12.14-120-default  
- **Compiler:** C/C++/Fortran: Version 2.0.0 of AOCC  
- **Parallel:** No  
- **Firmware:** Lenovo BIOS Version CFE107O released Dec-2019  
- **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
Lenovo Global Technology
ThinkSystem SR635
3.10 GHz, AMD EPYC 7252

SPEC CPU®2017 Integer Rate Result
Copyright 2017-2020 Standard Performance Evaluation Corporation

Lenovo Global Technology

SPECrate®2017_int_base = 59.7
SPECrate®2017_int_peak = 62.8

Results Table

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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
'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).

Transparent huge pages set to 'always' for this run (OS default)
**Lenovo Global Technology**

**ThinkSystem SR635**

3.10 GHz, AMD EPYC 7252

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<thead>
<tr>
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</table>

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**Environment Variables Notes**

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

LD_LIBRARY_PATH =

"/home/cpu2017-1.1.0-amd-rome-aocc200-C1/amd_rate_aocc200_rome_C_lib/64;
/home/cpu2017-1.1.0-amd-rome-aocc200-C1/amd_rate_aocc200_rome_C_lib/32:"

MALLOC_CONF = "retain:true"

**General Notes**

Binaries were compiled on a system with 2x AMD EPYC 7601 CPU + 512GB Memory using Fedora 26

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.

Yes: The test sponsor attests, as of date of publication, that CVE-2018-3640 (Spectre variant 3a) is mitigated in the system as tested and documented.

Yes: The test sponsor attests, as of date of publication, that CVE-2018-3639 (Spectre variant 4) 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:
Set Operating Mode set to Maximum Performance

Sysinfo program /home/cpu2017-1.1.0-amd-rome-aocc200-C1/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed81e6e46a485a0011
running on linux-4au0 Wed Mar 18 07:05:16 2020

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 7252 8-Core Processor

  1 "physical id"s (chips)
  16 "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 : 8

(Continued on next page)
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Lenovo Global Technology
ThinkSystem SR635
3.10 GHz, AMD EPYC 7252

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Platform Notes (Continued)

siblings : 16
physical 0: cores 0 1 4 5 8 9 12 13

From lscpu:
Architecture:       x86_64
CPU op-mode(s):     32-bit, 64-bit
Byte Order:         Little Endian
Address sizes:      43 bits physical, 48 bits virtual
CPU(s):             16
On-line CPU(s) list: 0-15
Thread(s) per core: 2
Core(s) per socket: 8
Socket(s):          1
NUMA node(s):       1
Vendor ID:          AuthenticAMD
CPU family:         23
Model:              49
Model name:         AMD EPYC 7252 8-Core Processor
Stepping:           0
CPU MHZ:            3100.000
CPU max MHZ:        3100.00000
CPU min MHZ:        1500.00000
BogoMIPS:           6188.63
Virtualization:     AMD-V
L1d cache:          32K
L1i cache:          32K
L2 cache:           512K
L3 cache:           16384K
NUMA node0 CPU(s): 0-15
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 rdtsscp lm
constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperfmperf pni pclmulqdq
monitor sse3 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 ibs
skinit wdt tce topoext perfctr_core perfctr_nb bpecx perfctr_l2 mwaitx cpb cat_l3
cdp_l3 hw_pstate sme ssbd sev ibrs iobp stibp vmmcall fsgsbase bmi1 avx2 smep bmi2
cqm rdt_a rdseed adx smap clflushopt clwb sha ni xsaveopt xsavec xsaveopt xsaveopt
xsaves qm_llc qm_occup_llc qm_mbm_total qm_mbm_local clzero irlperf xsaves qnptr
xsavecrd lbrv svm_lock nrip_save tsca qmcb_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.

(Continued on next page)
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Platform Notes (Continued)

available: 1 nodes (0)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
node 0 size: 257760 MB
node 0 free: 257025 MB
node distances:
node 0
0: 10

From /proc/meminfo
MemTotal:       263946832 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
SuSE-release:
  SUSE Linux Enterprise Server 12 (x86_64)
  VERSION = 12
  PATCHLEVEL = 5
  # 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-SP5"
    VERSION_ID="12.5"
    PRETTY_NAME="SUSE Linux Enterprise Server 12 SP5"
    ID="sles"
    ANSI_COLOR="0;32"
    CPE_NAME="cpe:/o:suse:sles:12:sp5"

uname -a:
  Linux linux-4au0 4.12.14-120-default #1 SMP Thu Nov 7 16:39:09 UTC 2019 (fd9dc36)
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: conditional, RSB filling
tsx_async_abort: Not affected

(Continued on next page)
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**Platform Notes (Continued)**

run-level 3 Mar 18 06:59

SPEC is set to: /home/cpu2017-1.1.0-amd-rome-aocc200-C1

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 xfs 893G 31G 862G 4% /

From /sys/devices/virtual/dmi/id
BIOS: Lenovo CFE107O 12/28/2019
Vendor: Lenovo
Product: ThinkSystem SR635 -[7Y00000000]-
Product Family: ThinkSystem
Serial: 0123456789

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.

Memory:
8x Samsung M393A4K40DB2-CWE 32 kB 2 rank 3200
8x Unknown Unknown

(End of data from sysinfo program)

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**Compiler Version Notes**

```
C       | 502.gcc_r(peak)
-------------
AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/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)
-------------
AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin
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**Software Availability:** Dec-2019

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**Compiler Version Notes (Continued)**

AOCC_2_0_0-Build#191 (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)  
Target: i386-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin

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

AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins)  
AOCC_2_0_0-Build#191 (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)  
Target: x86_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin

Fortran  
| 548.exchange2_r(base, peak) |

AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins)  
AOCC_2_0_0-Build#191 (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)  
Target: x86_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/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

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR635
3.10 GHz, AMD EPYC 7252

SPEC® CPU®2017 Integer Rate Result
Copyright 2017-2020 Standard Performance Evaluation Corporation

Test Date: Mar-2020
Hardware Availability: Jan-2020
Software Availability: Dec-2019

**Base 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

**Base Optimization Flags**

C benchmarks:
- -flto -Wl,-stdlib=libstdc++ -Wl,-function-specialize
- -Wl,-mlibvm -Wl,-region-vectorize -Wl,-mlibvm -Wl,-vector-library=LIBMVEC
- -Wl,-mlibvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
- -march=znver2 -fstruct-layout=3 -mlibvm -unroll-threshold=50
- -fremap-arrays -mlibvm -function-specialize -mlibvm -enable-gvn-hoist
- -mlibvm -reduce-array-computations=3 -mlibvm -global-vectorize-slp
- -mlibvm -vector-library=LIBMVEC -mlibvm -inline-threshold=1000
- -flv-function-specialization -z muldefs -lmvec -lamdlibm -ljemalloc -lflang

C++ benchmarks:
- -flto -Wl,-stdlib=libstdc++ -Wl,-function-specialize
- -Wl,-mlibvm -Wl,-region-vectorize -Wl,-mlibvm -Wl,-vector-library=LIBMVEC
- -Wl,-mlibvm -Wl,-reduce-array-computations=3
- -Wl,-mlibvm -Wl,-suppress-fmas -O3 -ffast-math -march=znver2
- -mlibvm -loop-unswitch-threshold=200000 -mlibvm -vector-library=LIBMVEC
- -mlibvm -unroll-threshold=100 -flv-function-specialization
- -mlibvm -enable-partial-unswitch -z muldefs -lmvec -lamdlibm -ljemalloc -lflang

Fortran benchmarks:
- -flto -Wl,-stdlib=libstdc++ -Wl,-function-specialize
- -Wl,-mlibvm -Wl,-region-vectorize -Wl,-mlibvm -Wl,-vector-library=LIBMVEC
- -Wl,-mlibvm -Wl,-reduce-array-computations=3 -ffast-math
- -Wl,-mlibvm -Wl,-inline-recursion=4 -Wl,-mlibvm -Wl,-lsr-in-nested-loop
- -Wl,-mlibvm -Wl,-enable-iv-split -O3 -march=znver2 -funroll-loops
- -Mrecursive -mlibvm -vector-library=LIBMVEC -z muldefs
- -mlibvm -disable-indvar-simplify -mlibvm -unroll-aggressive
- -mlibvm -unroll-threshold=150 -lmvec -lamdlibm -ljemalloc -lflang
### Lenovo Global Technology

**ThinkSystem SR635**  
3.10 GHz, AMD EPYC 7252  

<table>
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<td>Jan-2020</td>
</tr>
<tr>
<td>Software Availability</td>
<td>Dec-2019</td>
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</table>

#### 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 -D_FILE_OFFSET_BITS=64
- 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:**

(Continued on next page)
Lenovo Global Technology  
ThinkSystem SR635  
3.10 GHz, AMD EPYC 7252

SPEC CPU®2017 Integer Rate Result

SPECrates®2017_int_base = 59.7
SPECrates®2017_int_peak = 62.8

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Mar-2020
Hardware Availability: Jan-2020
Software Availability: Dec-2019

Peak Optimization Flags (Continued)

502.gcc_r: -m32 -flto -Wl,-mlllvm -Wl, -function-specialize 
-Wl, -mlllvm -Wl, -region-vectorize 
-Wl, -mlllvm -Wl, -vector-library=LIBMVEC 
-Wl, -mlllvm -Wl, -reduce-array-computations=3 -Ofast 
-march=znver2 -mno-sse4a -fstruct-layout=5 
-mlllvm -vectorize-memory-aggressively 
-mlllvm -function-specialize -mlllvm -enable-gvn-hoist 
-mlllvm -unroll-threshold=50 -fremap-arrays 
-mlllvm -vector-library=LIBMVEC 
-mlllvm -reduce-array-computations=3 
-mlllvm -global-vectorize-slp -mlllvm -inline-threshold=1000 
-llv-function-specialization -fgnu89-inlined -ljemalloc

505.mcf_r: -flto -Wl,-mlllvm -Wl, -function-specialize 
-Wl, -mlllvm -Wl, -region-vectorize 
-Wl, -mlllvm -Wl, -vector-library=LIBMVEC 
-Wl, -mlllvm -Wl, -reduce-array-computations=3 -Ofast 
-march=znver2 -mno-sse4a -fstruct-layout=5 
-mlllvm -vectorize-memory-aggressively 
-mlllvm -function-specialize -mlllvm -enable-gvn-hoist 
-mlllvm -unroll-threshold=50 -fremap-arrays 
-mlllvm -vector-library=LIBMVEC 
-mlllvm -reduce-array-computations=3 
-mlllvm -global-vectorize-slp -mlllvm -inline-threshold=1000 
-llv-function-specialization -lmvec -lamdlibm -ljemalloc 
-llflang

525.x264_r: Same as 500.perlbench_r

557.xz_r: Same as 505.mcf_r

C++ benchmarks:

520.omnetpp_r: basepeak = yes

523.xalanbmk_r: -m32 -flto -Wl,-mlllvm -Wl, -function-specialize 
-Wl, -mlllvm -Wl, -region-vectorize 
-Wl, -mlllvm -Wl, -vector-library=LIBMVEC 
-Wl, -mlllvm -Wl, -reduce-array-computations=3 -Ofast 
-march=znver2 -llv-function-specialization 
-mlllvm -unroll-threshold=100 
-mlllvm -enable-partial-unswitch 
-mlllvm -loop-unswitch-threshold=200000 
-mlllvm -vector-library=LIBMVEC 
-mlllvm -inline-threshold=1000 -ljemalloc

(Continued on next page)
### Peak Optimization Flags (Continued)

<table>
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<tr>
<td>541.leela_r: basepeak = yes</td>
<td></td>
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Fortran benchmarks:

- 548.exchange2_r: basepeak = yes

### Peak Other Flags

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<th>C benchmarks</th>
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<tr>
<td>502.gcc_r: -L/sppo/dev/cpu2017/v110/amd_rate_aocc200_rome_C_lib/32</td>
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<td>C++ benchmarks</td>
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<tr>
<td>523.xalancbmk_r: -L/sppo/dev/cpu2017/v110/amd_rate_aocc200_rome_C_lib/32</td>
</tr>
</tbody>
</table>

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


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


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