### Lenovo Global Technology

**ThinkSystem SR635**  
2.80 GHz, AMD EPYC 7543P

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>12.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_int_peak</td>
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**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology  
**Test Date:** Jul-2021  
**Hardware Availability:** Jun-2021  
**Software Availability:** Mar-2021

#### Hardware

<table>
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<tr>
<th>Threads</th>
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<tbody>
<tr>
<td><strong>0</strong></td>
</tr>
<tr>
<td>600.perlbench_s</td>
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<tr>
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<tr>
<td>641.leela_s</td>
</tr>
<tr>
<td>648.exchange2_s</td>
</tr>
<tr>
<td>657.xz_s</td>
</tr>
</tbody>
</table>

#### Software

| OS: | SUSE Linux Enterprise Server 15 SP2 (x86_64)  
| Kernel: | 5.3.18-22-default |
| Compiler: | C/C++/Fortran: Version 3.0.0 of AOCC |
| Parallel: | Yes |
| Firmware: | Lenovo BIOS Version CFE125U 6.0 released May-2021 |
| File System: | xfs |
| System State: | Run level 3 (multi-user) |
| Base Pointers: | 64-bit |
| Peak Pointers: | 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 |

**CPU Name:** AMD EPYC 7543P  
**Max MHz:** 3700  
**Nominal:** 2800  
**Enabled:** 32 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:** 256 MB I+D on chip per chip, 32 MB shared / 4 cores  
**Other:** None  
**Memory:** 256 GB (8 x 32 GB 2Rx4 PC4-3200AA-R)  
**Storage:** 1 x 960 GB SATA SSD  
**Other:** None
# Lenovo Global Technology

## ThinkSystem SR635

**2.80 GHz, AMD EPYC 7543P**

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**SPECspeed®2017_int_base = 12.6**

**SPECspeed®2017_int_peak = 12.6**

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## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
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<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
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<td>6.42</td>
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<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 numacl1 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.

To enable Transparent Hugepages (THP) for all allocations, 'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and

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SPECspeed®2017_int_base = 12.6
SPECspeed®2017_int_peak = 12.6

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-63"
LD_LIBRARY_PATH = "/home/cpu2017-1.1.8-amd-aocc300-milan-B1/amd_speed_aocc300_milan_B_lib/64;/home/cpu2017-1.1.8-amd-aocc300-milan-B1/amd_speed_aocc300_milan_B_lib/32;"
MALLOC_CONF = "retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "64"

Environment variables set by runcpu during the 602.gcc_s peak run:
GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 641.leela_s peak run:
GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 648.exchange2_s peak run:
GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 657.xz_s peak run:
GOMP_CPU_AFFINITY = "0-31"

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
SPEC CPU®2017 Integer Speed Result

Lenovo Global Technology
ThinkSystem SR635
2.80 GHz, AMD EPYC 7543P

| SPECspeed®2017_int_base = 12.6 |
| SPECspeed®2017_int_peak = 12.6 |

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

Test Date: Jul-2021
Hardware Availability: Jun-2021
Software Availability: Mar-2021

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance
NUMA nodes per socket set to NPS2

Sysinfo program /home/cpu2017-1.1.8-amd-aocc300-milan-B1/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acaf64d
running on localhost Fri Apr 17 21:38:50 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 7543P 32-Core Processor
  1 "physical id"s (chips)
  64 "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 : 32
siblings : 64
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

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): 64
On-line CPU(s) list: 0-63
Thread(s) per core: 2
Core(s) per socket: 32
Socket(s): 1
NUMA node(s): 2
Vendor ID: AuthenticAMD
CPU family: 25
Model: 1
Model name: AMD EPYC 7543P 32-Core Processor
Stepping: 1
CPU MHz: 1795.297
CPU max MHz: 2800.0000
CPU min MHz: 1500.0000
BogoMIPS: 5589.49
Virtualization: AMD-V
L1d cache: 32K
L1i cache: 32K
L2 cache: 512K

(Continued on next page)
Platform Notes (Continued)

L3 cache: 32768K
NUMA node0 CPU(s): 0-15,32-47
NUMA node1 CPU(s): 16-31,48-63
Flags: fpu vme de pse tsc msr pae 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 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 bpxe perfctr_llc mwaitx cpb
cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs ibp btip vmmcall fsgsbase
bm1 avx2 smep bmi2 erms invpcid cqm rdr_a rdseed adx smap clflushopt clwb sha
xsaveopt xsavevc xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local
clzero irperf xsaveopt xsavepr xsaveopt wmbxnvnd arat npt lbrv svm_lock nrip_save tsc_scale
vmcb_clean flushbyasid decodeassists pausefilter pfthreshold v_vmsave_vmload vgif
umip pku ospke vaes vpcmclmulqdo rdpid overflow_reco recov succor smca

From numactl --hardware
WARNING: a numactl 'node' might or might not correspond to a physical chip.
   available: 2 nodes (0-1)
   node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 32 33 34 35 36 37 38 39 40 41 42 43
   44 45 46 47
   node 0 size: 128787 MB
   node 0 free: 128359 MB
   node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 48 49 50 51 52 53 54 55 56
   57 58 59 60 61 62 63
   node 1 size: 129001 MB
   node 1 free: 128404 MB
   node distances:
      node 0 1
      0: 10 12
      1: 12 10

From /proc/meminfo
   MemTotal: 263975588 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"

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SPECspeed®2017_int_base = 12.6
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Platform Notes (Continued)

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):
    Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2018-3639 (Speculative Store Bypass):
    Mitigation: usercopy/swapgs barriers and __user pointer sanitation
CVE-2017-5753 (Spectre variant 1):
    Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBP: always-on, RSB filling
CVE-2017-5715 (Spectre variant 2):
    Not affected
CVE-2020-0543 (Special Register Buffer Data Sampling):
    Not affected
CVE-2019-11135 (TSX Asynchronous Abort):
    Not affected

run-level 3 Apr 17 21:14

SPEC is set to: /home/cpu2017-1.1.8-amd-aocc300-milan-B1
Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda3      xfs   892G   57G  835G   7% /

From /sys/devices/virtual/dmi/id
Vendor: Lenovo
Product: ThinkSystem SR635 -[7Y98XXXXXX]-
Product Family: ThinkSystem
Serial: 0123456789

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:
    8x Samsung M393A4K40DB3-CWE 32 GB 2 rank 3200

(Continued on next page)
**SPEC CPU®2017 Integer Speed Result**

**Lenovo Global Technology**

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<td>Software Availability:</td>
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**Platform Notes (Continued)**

8x Unknown Unknown

**BIOS:**
- BIOS Vendor: Lenovo  
- BIOS Version: CFE125U  
- BIOS Date: 05/28/2021  
- BIOS Revision: 6.0

*(End of data from sysinfo program)*

**Compiler Version Notes**

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**C**
- 600.perlbench_s(base, peak)  
- 602.gcc_s(base, peak)  
- 605.mcf_s(base, peak)  
- 625.x264_s(base, peak)  
- 657.xz_s(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++**
- 620.omnetpp_s(base, peak)  
- 623.xalancbmk_s(base, peak)  
- 631.deepsjeng_s(base, peak)  
- 641.leela_s(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

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**Fortran**
- 648.exchange2_s(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

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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 -mno-adx -mno-sse4a -Wl,-allow-multiple-definition
-Wl, -mllvm -Wl,-enable-licm-vrp -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 -march=znver3
-ffast-math -flto -fstruct-layout=5
-mllvm -unroll-threshold=50 -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 -z muldefs
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-lflang -lflangrti

C++ benchmarks:
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl, -mllvm -Wl,-do-block-reorder=aggressive
-Wl, -mllvm -Wl,-region-vectorize -Wl, -mllvm -Wl,-function-specialize

(Continued on next page)
Base Optimization Flags (Continued)

C++ benchmarks (continued):
- Wl, -mllvm -Wl, -align-all-nofallthru-blocks=6
- Wl, -mllvm -Wl, -reduce-array-computations=3 -O3 -march=znver3
- fveclib=AMDLIBM -ffast-math -flto -mllvm -enable-partial-unswitch
- mllvm -unroll-threshold=100 -finline-aggressive
- fllvm-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
- z muldefs -mllvm -do-block-reorder=aggressive
- fvirtual-function-elimination -fvisibility=hidden -DSPEC_OPENMP
- fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflangrti

Fortran benchmarks:
- m64 -mno-adx -mno-sse4a -Wl, -mllvm -Wl, -inline-recursion=4
- Wl, -mllvm -Wl, -lsr-in-nested-loop -Wl, -mllvm -Wl, -enable-iv-split
- 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 -march=znver3
- fveclib=AMDLIBM -ffast-math -flto -z muldefs
- mllvm -unroll-aggressive -mllvm -unroll-threshold=150 -DSPEC_OPENMP
- fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflangrti

Base Other Flags

C benchmarks:
- Wno-unused-command-line-argument -Wno-return-type

C++ benchmarks:
- Wno-unused-command-line-argument -Wno-return-type

Fortran benchmarks:
- Wno-return-type

Peak Compiler Invocation

C benchmarks:
clang
### Peak Compiler Invocation (Continued)

**C++ benchmarks:**
```
clang++
```

**Fortran benchmarks:**
```
flang
```

### Peak Portability Flags

Same as Base Portability Flags

### Peak Optimization Flags

**C benchmarks:**
```
600.perlbench_s: basepeak = yes
```
```
602.gcc_s: -m64 -mno-adx -mno-sse4a -Wl,-allow-multiple-definition
-W1,-mlllvm -W1,-enable-licm-vrp
-W1,-mlllvm -W1,-function-specialize
-W1,-mlllvm -W1,-align-all-nofallthru-blocks=6
-W1,-mlllvm -W1,-reduce-array-computations=3 -Ofast
-marclznver3 -fveclib=AMDLIBM -ffast-math -flto
-fstruct-layout=5 -mlllvm -unroll-threshold=50
-fremap-arrays -flv-function-specialization
-mlllvm -inline-threshold=1000 -mlllvm -enable-gvn-hoist
-mlllvm -global-vectorize-slp=true
-mlllvm -function-specialize -mlllvm -enable-licm-vrp
-mlllvm -reduce-array-computations=3 -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang
```

```
605.mcf_s: basepeak = yes
```
```
625.x264_s: basepeak = yes
```
```
657.xz_s: Same as 602.gcc_s
```

**C++ benchmarks:**
```
620.omnetpp_s: basepeak = yes
```
```
623.xalancbmk_s: basepeak = yes
```

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

```
631.deepsjeng_s: basepeak = yes

641.leela_s: -m64 -std=c++98 -mno-adx -mno-sse4a
-1l, -mlvm -1l, -do-block-reorder=aggressive
-1l, -mlvm -1l, -function-specialize
-1l, -mlvm -1l, -align-all-nofallthru-blocks=6
-1l, -mlvm -1l, -reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math -flto
-finline-aggressive -mlvm -unroll-threshold=100
-flv-function-specialization -mlvm -enable-licm-vrp
-mlvm -reroll-loops -mlvm -aggressive-loop-unswitch
-mlvm -reduce-array-computations=3
-mlvm -global-vectorize-slp=true
-mlvm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm
-ljemalloc -lflang

Fortran benchmarks:
-m64 -mno-adx -mno-sse4a -1l, -mlvm -1l, -inline-recursion=4
-1l, -mlvm -1l, -lsr-in-nested-loop -1l, -mlvm -1l, -enable-iv-split
-1l, -mlvm -1l, -function-specialize
-1l, -mlvm -1l, -align-all-nofallthru-blocks=6
-1l, -mlvm -1l, -reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -mlvm -unroll-aggressive
-mlvm -unroll-threshold=150 -DSPEC_OPENMP -fopenmp -fopenmp=libomp
-lomp -lamdlibm -ljemalloc -lflang
```

## Peak Other Flags

**C** benchmarks:

```
-Wno-unused-command-line-argument -Wno-return-type
```

**C++** benchmarks:

```
-Wno-unused-command-line-argument -Wno-return-type
```

**Fortran** benchmarks:

```
-Wno-return-type
```

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

## Lenovo Global Technology

**ThinkSystem SR635**  
2.80 GHz, AMD EPYC 7543P

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

http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Milan1P-G.xml


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