## Lenovo Global Technology

**ThinkSystem SR655**

**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology  
**Hardware Availability:** Jun-2021  
**Software Availability:** Mar-2021

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_int_base</th>
<th>SPECspeed®2017_int_peak</th>
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**600.perlbench_s**

<table>
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**602.gcc_s**

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**605.mcf_s**

<table>
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**620.omnetpp_s**

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**623.xalancbmk_s**

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**625.x264_s**

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**631.deepsjeng_s**

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**641.leela_s**

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**648.exchange2_s**

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**657.xz_s**

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<tbody>
<tr>
<td>32</td>
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</table>

### Hardware

**CPU Name:** AMD EPYC 75F3  
**Max MHz:** 4000  
**Nominal:** 2950  
**Enabled:** 32 cores, 1 chip, 2 threads/core  
**Orderable:** 1 chip  
**Cache L1:** 32 KB I + 32 KB D on chip per core  
**Cache L2:** 512 KB I+D on chip per core  
**Cache 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

### 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
Lenovo Global Technology
ThinkSystem SR655
2.95 GHz, AMD EPYC 75F3

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

Results Table

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</table>

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>
'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

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR655
2.95 GHz, AMD EPYC 75F3

SPECspeed®2017_int_base = 13.4
SPECspeed®2017_int_peak = 13.6

CPU2017 License: 9017
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Operating System Notes (Continued)
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.

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 600.perlbench_s peak run:
GOMP_CPU_AFFINITY = "0"

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

Environment variables set by runcpu during the 605.mcf_s peak run:
GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 620.omnetpp_s peak run:
GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 623.xalancbmk_s peak run:
GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 625.x264_s peak run:
GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 631.deepsjeng_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"
Lenovo Global Technology

ThinkSystem SR655
2.95 GHz, AMD EPYC 75F3

**SPEC CPU®2017 Integer Speed Result**

<table>
<thead>
<tr>
<th>SPECenergy®2017_int_base</th>
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**Lenovo Global Technology**

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---

**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

---

**Platform Notes**

BIOS configuration:

Choose Operating Mode set to Maximum Performance

SOC P-states set to P0

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 982a61dec0915b55891ef0e16acaf6d

running on localhost Fri Apr 17 21:15:51 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 75F3 32-Core Processor
- 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

(Continued on next page)
## Lenovo Global Technology

### ThinkSystem SR655

2.95 GHz, AMD EPYC 75F3

### SPEC CPU®2017 Integer Speed Result

#### Lenovo Global Technology

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## Platform Notes (Continued)

- **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 75F3 32-Core Processor
- **Stepping:** 1
- **CPU MHz:** 1856.707
- **CPU max MHz:** 2950.0000
- **CPU min MHz:** 1500.0000
- **BogoMIPS:** 5889.52
- **Virtualization:** AMD-V
- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 512K
- **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 mce 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 aperfmpref pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2 movbe popcnt aes avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misaligns64 3dnowprefetch osvw ibs skinit wdt tce topoext perfctr_core perfctr_nb bpext perfctr_l1c 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 sha2 ni xsaveopt xsave cvtsi_cx xsaveic xsaveprec xsaveerptr wbnoinvd arat npt ibrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter pthreshold v_vmsave_vmload vgif umip pku ospke vaes vpclmulqdq rdpid overflow_recoev 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: 128785 MB
- node 0 free: 128350 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: 128343 MB
Lenovo Global Technology
ThinkSystem SR655
2.95 GHz, AMD EPYC 75F3

SPEC CPU®2017 Integer Speed Result
Copyright 2017-2021 Standard Performance Evaluation Corporation

SPECspeed®2017_int_base = 13.4
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Platform Notes (Continued)

node distances:
node   0   1
  0:  10  12
  1:  12  10

From /proc/meminfo
MemTotal: 263974292 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has performance

/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 15 SP2

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/swapsgs 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

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

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**Platform Notes (Continued)**

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

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<tr>
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<td>891G</td>
<td>98G</td>
<td>793G</td>
<td>11%</td>
<td>/</td>
</tr>
</tbody>
</table>

From /sys/devices/virtual/dmi/id

**Vendor:** Lenovo

**Product:** ThinkSystem SR655 -[7Y00000000]-

**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
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**

```
==============================================================================
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
```

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Compiler Version Notes (Continued)

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 | 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

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`  
- `mllvm -Wl,-allow-multiple-definition`  
- `Wl,-mllvm -Wl,-region-vectorize`  
- `mllvm -Wl,-function-specialize`  
- `Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`  
- `Wl,-mllvm fveclib=AMDLIBM -ffast-math -fito -fstruct-layout=5`  
- `mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000`  
- `mllvm -fremap-arrays -mllvm -function-specialize -flv-function-specialization`  
- `mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true`  
- `mllvm -reduce-array-computations=3 -z muldefs`  
- `DSPEC_OPENMP`  
- `fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc`  
- `lflang -lflangrti`

### C++ benchmarks:
- `m64`  
- `std=c++98`  
- `mllvm -Wl,-do-block-reorder=aggressive`  
- `Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize`  
- `Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`  
- `Wl,-mllvm fveclib=AMDLIBM -ffast-math -fito -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 -disable-recursion=4 -fvisibility=hidden -DSPEC_OPENMP`  
- `fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc`  
- `lflang -lflangrti`

### Fortran benchmarks:
- `m64`  
- `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 -fito -z muldefs`  
- `mllvm -unroll-aggressive -mllvm -unroll-threshold=150 -DSPEC_OPENMP`  
- `fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc`  
- `lflang -lflangrti`
Lenovo Global Technology
ThinkSystem SR655
2.95 GHz, AMD EPYC 75F3

**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`

C++ benchmarks:
- `clang++`

Fortran benchmarks:
- `flang`

**Peak Portability Flags**

Same as Base Portability Flags

**Peak Optimization Flags**

C benchmarks:
- `-m64`  
- `-mno-adx`  
- `-mno-sse4a`  
- `-Wl,-allow-multiple-definition`  
- `-Wl,-mllvm -Wl,-enable-licm-vrp`  
- `-Wl,-mllvm -Wl,-function-specialize`  
- `-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`  
- `-Wl,-mllvm -Wl,-reduce-array-computations=3`  
- `-Ofast`  
- `-march=znver3`  
- `-mllvm -fveclib=AMDLIBM`  
- `-ffast-math`  
- `-flto`  
- `-fstruct-layout=5`  
- `-fveclib=AMDLIBM`  
- `-ffast-math`  
- `-flto`  
- `-fstruct-layout=5`  
- `-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`  
- `-DSPEC_OPENMP`  
- `-fopenmp`  
- `-fopenmp=libomp`  
- `-lomp`  
- `-lamdlibm`  
- `-ljemalloc`  
- `-lflang`

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SPEC CPU®2017 Integer Speed Result

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SPECspeed®2017_int_base = 13.4
SPECspeed®2017_int_peak = 13.6

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: Jul-2021
Hardware Availability: Jun-2021
Tested by: Lenovo Global Technology
Software Availability: Mar-2021

Peak Optimization Flags (Continued)

C++ benchmarks:
- -m64 -std=c++98 -mno-adx -mno-sse4a
- -Wl,-mllvm -Wl,-do-block-reorder=aggressive
- -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 -ffast-math -flto -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 -DSPEC_OPENMP
- -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang

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,-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 -mllvm -unroll-aggressive
- -mllvm -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:
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Milan1P-G.html

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
## SPEC CPU®2017 Integer Speed Result

### Lenovo Global Technology

ThinkSystem SR655  
2.95 GHz, AMD EPYC 75F3

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