**SPEC CPU®2017 Integer Speed Result**

**Lenovo Global Technology**

ThinkSystem SR655  
3.70 GHz, AMD EPYC 72F3

---

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

---

**Test Date:** May-2021  
**Hardware Availability:** Jun-2021  
**Software Availability:** Mar-2021

---

### SPECspeed®2017_int_base = 13.5  
### SPECspeed®2017_int_peak = 13.5

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**Threads**

<table>
<thead>
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<tbody>
<tr>
<td>600.perlb Bench_s</td>
<td>8</td>
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<tr>
<td>602.gcc_s</td>
<td>8</td>
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<tr>
<td>605.mcf_s</td>
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<tr>
<td>625.x264_s</td>
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<tr>
<td>631.deepsjeng_s</td>
<td>8</td>
</tr>
<tr>
<td>641.leela_s</td>
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<tr>
<td>648.exchange2_s</td>
<td>8</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>8</td>
</tr>
</tbody>
</table>

---

**SPECspeed®2017_int_base (13.5)**  
**SPECspeed®2017_int_peak (13.5)**

---

**Hardware**

**CPU Name:** AMD EPYC 72F3  
**Max MHz:** 4100  
**Nominal:** 3700  
**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:** 256 MB I+D on chip per core, 32 MB per core  
**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 CFE125S 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**

3.70 GHz, AMD EPYC 72F3

### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<tr>
<td>600.perlbench_s</td>
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<tr>
<td>648.exchange2_s</td>
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</tbody>
</table>

**SPECspeed®2017_int_base = 13.5**

**SPECspeed®2017_int_peak = 13.5**

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

## Compiler Notes


## 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.

(Continued on next page)
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**SPECspeed®2017_int_base = 13.5**  
**SPECspeed®2017_int_peak = 13.5**

**Operating System Notes (Continued)**

'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and  
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root to enable  
Transparent Hugepages (THP) for this run.  
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root for peak  
runs of 628.pop2_s and 638.imagick_s to enable THP only on request.

**Environment Variables Notes**

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

```bash
GOMP_CPU_AFFINITY = "0-15"
LD_LIBRARY_PATH =  
"/home/cpu2017-1.1.7-amd-aocc300-milan-B1/amd_speed_aocc300_milan_B_lib/  
64;/home/cpu2017-1.1.7-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 = "16"
```

Environment variables set by runcpu during the 625.x264_s peak run:

```bash
GOMP_CPU_AFFINITY = "0"
```

Environment variables set by runcpu during the 641.leela_s peak run:

```bash
GOMP_CPU_AFFINITY = "0"
```

Environment variables set by runcpu during the 648.exchange2_s peak run:

```bash
GOMP_CPU_AFFINITY = "0"
```

**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:
Set Operating Mode set to Maximum Performance
LLC as NUMA Node set to Disabled
SOC P-states set to P0

Sysinfo program /home/cpu2017-1.1.7-amd-aocc300-milan-B1/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afea89d4b38e2f1c
running on localhost Sun May 23 08:11:18 2021

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 72F3 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
  siblings : 16
physical 0: cores 0 1 2 3 4 5 6 7

From lscpu:
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): 16
On-line CPU(s) list: 0-15
Thread(s) per core: 2
Core(s) per socket: 8
Socket(s): 1
NUMA node(s): 2
Vendor ID: AuthenticAMD
CPU family: 25
Model: 1
Model name: AMD EPYC 72F3 8-Core Processor
Stepping: 1
CPU MHz: 3908.594
CPU max MHz: 3700.0000
CPU min MHz: 1500.0000
BogoMIPS: 7386.23
Virtualization: AMD-V
L1d cache: 32K
L1i cache: 32K
L2 cache: 512K

(Continued on next page)
Table: Lenovo Global Technology ThinkSystem SR655 3.70 GHz, AMD EPYC 72F3

| CPU2017 License: 9017 | Test Date: May-2021 |
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**Platform Notes (Continued)**

- **L3 cache:** 32768K
- **NUMA node0 CPU(s):** 0-3, 8-11
- **NUMA node1 CPU(s):** 4-7, 12-15
- **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 rdtscp lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperfmperf pni pclmulqdq monitor ssse3 fma cx16 pcl 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 bpext perfctr_llc mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2 ertms invpcid cqm rdt_a rdseed advx smap clflushopt clwb sha_ni xsaveopt xsave xsetbv xsavec cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local czero irperf xsaver pror wbnoinvd arat npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter pfthreshold v_vmsave_vmload vgif umip pkp ospe 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 8 9 10 11
- **node 0 size:** 128824 MB
- **node 0 free:** 128467 MB
- **node 1 cpus:** 4 5 6 7 12 13 14 15
- **node 1 size:** 128973 MB
- **node 1 free:** 128621 MB
- **node distances:**
  - node 0: 1 10
  - node 1: 1 12

From `/proc/meminfo`

- **MemTotal:** 263985568 kB
- **HugePages_Total:** 0
- **Hugepagesize:** 2048 kB

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

From `/usr/bin/lsb_release -d`

- **SUSE Linux Enterprise Server 15 SP2**

From `/etc/*release` /etc/*version*

- **os-release:**
  - **NAME**="SLES"

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

**SPECspeed®2017_int_base = 13.5**  
**SPECspeed®2017_int_peak = 13.5**

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### Platform Notes (Continued)

```
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/swapgs 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
- **CVE-2019-11135 (TSX Asynchronous Abort):** Not affected

**run-level 3 May 23 08:05**

**SPEC is set to:** /home/cpu2017-1.1.7-amd-aocc300-milan-B1

**Filesystem**  
Type  Size  Used Avail Use% Mounted on  
/dev/sdb3  xfs  891G  84G  807G  10% /

---

**From /sys/devices/virtual/dmi/id**

- **Vendor:** Lenovo
- **Product:** ThinkSystem SR655 -[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:**

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Platform Notes (Continued)

8x Samsung M393A4K40DB2-CWE 32 GB 2 rank 3200
8x Unknown Unknown

BIOS:
BIOS Vendor: Lenovo
BIOS Version: CFE125S
BIOS Date: 05/11/2021
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
==============================================================================

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
==============================================================================

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

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

C++ benchmarks (continued):
-W1,-mllvm -W1,-align-all-nofallthru-blocks=6
-W1,-mllvm -W1,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -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 -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 -lflang
-lflangrti

Fortran benchmarks:
-m64 -mno-adx -mno-sse4a -W1,-mllvm -W1,-inline-recursion=4
-W1,-mllvm -W1,-lsr-in-nested-loop -W1,-mllvm -W1,-enable-iv-split
-W1,-mllvm -W1,-region-vectorize -W1,-mllvm -W1,-function-specialize
-W1,-mllvm -W1,-align-all-nofallthru-blocks=6
-W1,-mllvm -W1,-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 -lflang
-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

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR655
3.70 GHz, AMD EPYC 72F3

SPEC CPU®2017 Integer Speed Result
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SPECspeed®2017_int_base = 13.5
SPECspeed®2017_int_peak = 13.5

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

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

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: basepeak = yes
605.mcf_s: basepeak = yes
625.x264_s: -m64 -mno-adx -mno-sse4a -Wl,-allow-multiple-definition
-Wl,-mlllvm -Wl,-enable-licm-vrp
-Wl,-mlllvm -Wl,-function-specialize
-Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -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 -llflang
657.xz_s: basepeak = yes

C++ benchmarks:

620.omnetpp_s: basepeak = yes
623.xalancbmk_s: basepeak = yes

(Continued on next page)
Lenovo Global Technology
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Peak Optimization Flags (Continued)

631.deepsjeng_s: basepeak = yes
641.leela_s: -m64 -std=cpp98 -mno-adx -mno-sse4a
-W1,-mlvm -W1,-do-block-reorder=aggressive
-W1,-mlvm -W1,-function-specialize
-W1,-mlvm -W1,-align-all-nofallthru-blocks=6
-W1,-mlvm -W1,-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 -W1,-mlvm -W1,-inline-recursion=4
-W1,-mlvm -W1,-lsr-in-nested-loop -W1,-mlvm -W1,-enable-iv-split
-W1,-mlvm -W1,-function-specialize
-W1,-mlvm -W1,-align-all-nofallthru-blocks=6
-W1,-mlvm -W1,-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:
-#no-unused-command-line-argument -#no-return-type

C++ benchmarks:
-#no-unused-command-line-argument -#no-return-type

Fortran benchmarks:
-#no-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
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**ThinkSystem SR655**  
3.70 GHz, AMD EPYC 72F3

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<tbody>
<tr>
<td>SPECspeed®2017_int_peak</td>
<td>13.5</td>
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</tbody>
</table>

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

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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