**Lenovo Global Technology**

ThinkSystem SR655
2.65 GHz, AMD EPYC 7413

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**SPEC CPU®2017 Floating Point Speed Result**

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**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

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**Hardware**

- CPU Name: AMD EPYC 7413
- Max MHz: 3600
- Nominal: 2650
- Enabled: 24 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: 128 MB I+D on chip per chip, 32 MB shared / 6 cores
- Other: None
- Memory: 256 GB (8 x 32 GB 2Rx4 PC4-3200AA-R)
- Storage: 1 x 960 GB SATA SSD
- Other: None

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**Threads**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>24</td>
<td>128</td>
<td>132</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>24</td>
<td>128</td>
<td>132</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>24</td>
<td>128</td>
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</tr>
<tr>
<td>621.wrf_s</td>
<td>24</td>
<td>128</td>
<td>132</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>24</td>
<td>128</td>
<td>132</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>24</td>
<td>128</td>
<td>132</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>24</td>
<td>128</td>
<td>132</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>24</td>
<td>128</td>
<td>132</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>24</td>
<td>128</td>
<td>132</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>24</td>
<td>128</td>
<td>132</td>
</tr>
</tbody>
</table>

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**Test Information**

- 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

---

**Notes**

- Lenovo Global Technology
- 2.65 GHz, AMD EPYC 7413
- SPECspeed®2017_fp_base = 128
- SPECspeed®2017_fp_peak = 132

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Lenovo Global Technology
ThinkSystem SR655
2.65 GHz, AMD EPYC 7413

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

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>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Base</td>
<td></td>
<td>Peak</td>
<td></td>
<td></td>
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<tr>
<td>603.bwaves_s</td>
<td>24</td>
<td>177</td>
<td>333</td>
<td>177</td>
<td>333</td>
<td>177</td>
<td>333</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>24</td>
<td>86.3</td>
<td>193</td>
<td>85.1</td>
<td>196</td>
<td>88.4</td>
<td>189</td>
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<tr>
<td>619.lbm_s</td>
<td>24</td>
<td>81.5</td>
<td>64.3</td>
<td>81.6</td>
<td>64.2</td>
<td>81.4</td>
<td>64.3</td>
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<tr>
<td>621.wrf_s</td>
<td>24</td>
<td>77.8</td>
<td>170</td>
<td>77.7</td>
<td>170</td>
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<td>170</td>
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<tr>
<td>627.cam4_s</td>
<td>24</td>
<td>104</td>
<td>85.1</td>
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<td>85.0</td>
<td>105</td>
<td>84.5</td>
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<tr>
<td>628.pop2_s</td>
<td>24</td>
<td>138</td>
<td>86.1</td>
<td>138</td>
<td>86.1</td>
<td>138</td>
<td>85.8</td>
</tr>
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<td>105</td>
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<td>200</td>
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<td>649.fotonik3d_s</td>
<td>24</td>
<td>136</td>
<td>67.2</td>
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<tr>
<td>654.roms_s</td>
<td>24</td>
<td>125</td>
<td>126</td>
<td>126</td>
<td>125</td>
<td>126</td>
<td>126</td>
</tr>
</tbody>
</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 numacl1 i.e.:
numacl --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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ThinkSystem SR655
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SPECspeed®2017_fp_base = 128
SPECspeed®2017_fp_peak = 132

Operating System Notes (Continued)

'echo always > /sys/kernel/mm/transient_hugepage/defrag' run as root.
To enable THP only on request for peak runs of 628.pop2_s, and 638.imagick_s,
'echo madvise > /sys/kernel/mm/transient_hugepage/enabled' run as root.
To disable THP for peak runs of 627.cam4_s, 644.nab_s, 649.fotonik3d_s, and 654.roms_s,
'echo never > /sys/kernel/mm/transient_hugepage/enabled' run as root.

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-47"
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/
64/32;"
MALLOCONF = "retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREADLIMIT = "48"

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:
GOMP_CPU_AFFINITY = "0-23"

Environment variables set by runcpu during the 619.lbm_s peak run:
GOMP_CPU_AFFINITY = "0-23"

Environment variables set by runcpu during the 644.nab_s peak run:
GOMP_CPU_AFFINITY = "0 24 1 25 2 26 3 27 4 28 5 29 6 30 7 31 8 32 9 33 10 34
11 35 12 36 13 37 14 38 15 39 16 40 17 41 18 42 19 43 20 44 21 45 22 46
23 47"

Environment variables set by runcpu during the 654.roms_s peak run:
GOMP_CPU_AFFINITY = "0-23"

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.
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ThinkSystem SR655
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SPECspeed®2017_fp_base = 128
SPECspeed®2017_fp_peak = 132

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

General Notes (Continued)
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
L1 Stream HW Prefetcher set to Disable

Sysinfo program /home/cpu2017-1.1.8-amd-aocc300-milan-B1/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16a6cafc64d
running on localhost Fri Apr 17 23:42:21 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 7413 24-Core Processor
        1 "physical id"s (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 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29

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): 48
    On-line CPU(s) list: 0-47
    Thread(s) per core: 2
    Core(s) per socket: 24
    Socket(s): 1
    NUMA node(s): 1
    Vendor ID: AuthenticAMD
    CPU family: 25
    Model: 1
    Model name: AMD EPYC 7413 24-Core Processor
    Stepping: 1
    CPU MHz: 3079.580
    CPU max MHz: 2650.0000

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

Platform Notes (Continued)

- CPU min MHz: 1500.0000
- BogoMIPS: 5290.53
- Virtualization: AMD-V
- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 512K
- L3 cache: 32768K
- NUMA node0 CPU(s): 0-47
- 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 pcid sse4_1 sse4_2 movbe popcnt aes xsave avx f16c rdrand
- lahf_lm cmp_legacy svm extapic cr8_legacy abi sse4a misalignsse 3dnowprefetch osvw ibr skinit wdt tce topoext perfctr_core perfctr_nb bext perfctr_l1c mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2 erts invpcid cqm rdt_a rdseed adx smap clflushopt clwb sha_ni xsaveopt xsave xsetbvl xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local clzero irperf xsaveerptr wbnoinvd arat npt ibrv svm_lock nrrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilterpfthreshold v_vmsave_vmload vgfl umip pkuset ospe vs vcpu1mulqdq 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.
  available: 1 nodes (0)
  node 0 cpus: 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 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
  node 0 size: 257611 MB
  node 0 free: 256917 MB
  node distances:
  node 0: 10

From /proc/meminfo
  MemTotal: 263794544 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*

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SPECspeed®2017_fp_peak = 132

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 (Continued)

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): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2018-3639 (Speculative Store Bypass): Mitigation: usercopy/swapgs barriers and __user pointer sanitization
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 21:13

SPEC is set to: /home/cpu2017-1.1.8-amd-aocc300-milan-B1

Filesystem Type Size Used Avail Use% Mounted on
/dev/md126p3 xfs 892G 84G 809G 10% /

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

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SPECspeed®2017_fp_base = 128
SPECspeed®2017_fp_peak = 132

Platform Notes (Continued)

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
------------------------------------------
  619.lbm_s(base, peak) 638.imagick_s(base, peak)
  644.nab_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++, C, Fortran | 607.cactuBSSN_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
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
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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ThinkSystem SR655
2.65 GHz, AMD EPYC 7413

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Compiler Version Notes (Continued)

==============================================================================
Fortran
| 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
  654.roms_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, C
| 621.wrf_s(base, peak) 627.cam4_s(base, peak)
  628.pop2_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
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

Fortran benchmarks:
flang

Benchmarks using both Fortran and C:
flang clang

Benchmarks using Fortran, C, and C++:
clang++ clang flang
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Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
627.cam4_s: -DSPEC_CASE_FLAG -DSPEC_LP64
628.pop2_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -mno-adx -mno-sse4a -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallback-thru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -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 -lflangrtl

Fortran benchmarks:
-m64 -mno-adx -mno-sse4a -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallback-thru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Hz,1,0x1 -O3
-march=znver3 -fveclib=AMDLIBM -ffast-math -Mrecursive
-mllvm -fuse-tile-inner-loop -funroll-loops
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop
-mllvm -enable-licm-vrp -mlvlvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -z muldefs -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang -lflangrtl

Benchmarks using both Fortran and C:
-m64 -mno-adx -mno-sse4a -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallback-thru-blocks=6

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

Benchmarks using both Fortran and C (continued):
- `-W1,-mllvm -W1,-reduce-array-computations=3 -O3 -march=znver3`
- `-fveclib=AMDLIBM -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 -Hz,1,0x1`
- `-Mrecursive -mllvm -fuse-tile-inner-loop -funroll-loops`
- `-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop -z muldefs`
- `-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc`
- `-lflang -lfangrti`

Benchmarks using Fortran, C, and C++:
- `-m64 -mno-adx -mno-sse4a -std=c++98`
- `-W1,-mllvm -W1,-x86-use-vzeroupper=false`
- `-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 -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`
- `-mllvm -enable-partial-unswitch -mllvm -unroll-threshold=100`
- `-finline-aggressive -mllvm -loop-unswitch-threshold=200000`
- `-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch`
- `-mllvm -extra-vectorizer-passes -mllvm -convert-pow-exp-to-int=false`
- `-Hz,1,0x1 -Mrecursive -mllvm -fuse-tile-inner-loop -funroll-loops`
- `-mllvm -lsr-in-nested-loop -z muldefs -DSPEC_OPENMP -fopenmp`
- `-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang -lfangrti`

**Base Other Flags**

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

Fortran benchmarks:
- `-Wno-unused-command-line-argument -Wno-return-type`

Benchmarks using both Fortran and C:
- `-Wno-unused-command-line-argument -Wno-return-type`

Benchmarks using Fortran, C, and C++:
- `-Wno-unused-command-line-argument -Wno-return-type`
### Lenovo Global Technology

**ThinkSystem SR655**  
2.65 GHz, AMD EPYC 7413

<table>
<thead>
<tr>
<th>CPU2017 License</th>
<th>Lenovo Global Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Date</td>
<td>Jul-2021</td>
</tr>
<tr>
<td>Hardware Availability</td>
<td>Jun-2021</td>
</tr>
<tr>
<td>Software Availability</td>
<td>Mar-2021</td>
</tr>
</tbody>
</table>

**SPECspeed®2017_fp_base = 128**  
**SPECspeed®2017_fp_peak = 132**

---

### Peak Compiler Invocation

- **C benchmarks:**
  - clang

- **Fortran benchmarks:**
  - flang

- **Benchmarks using both Fortran and C:**
  - flang clang

- **Benchmarks using Fortran, C, and C++:**
  - clang++ clang flang

---

### Peak Portability Flags

Same as Base Portability Flags

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### Peak Optimization Flags

- **C benchmarks:**
  - 619.lbm_s: -m64 -mno-adx -mno-sse4a  
  -W1,-mllvm -W1,-function-specialize  
  -W1,-mllvm -W1,-align-all-nofallthru-blocks=6  
  -W1,-mllvm -W1,-reduce-array-computations=3 -Ofast  
  -march=znver3 -fveclib=AMDLIBM -ffast-math -ftlo  
  -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 -landlibm -ljemalloc -lflang

- 638.imagick_s: basepeak = yes

- 644.nab_s: -m64 -mno-adx -mno-sse4a -W1,-mllvm -W1,-region-vectorize  
  -W1,-mllvm -W1,-function-specialize -Ofast -march=znver3  
  -fveclib=AMDLIBM -ffast-math -ftlo -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

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR655
2.65 GHz, AMD EPYC 7413

SPECspeak®2017_fp_base = 128
SPECspeak®2017_fp_peak = 132

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

Peak Optimization Flags (Continued)

644.nab_s (continued):
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang

Fortran benchmarks:

603.bwaves_s: basepeak = yes

649.fotonik3d_s: basepeak = yes

654.roms_s: -m64 -mno-adx -mno-sse4a
-W1,-mlllvm -W1,-enable-X86-prefetching
-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
-march=znver3 -fveclib=AMDLIBM -ffast-math -Mrecursive
-mlllvm -reduce-array-computations=3
-mlllvm -global-vectorize-slp=true -mlllvm -enable-licm-vrp
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm
-ljemalloc -lflang

Benchmarks using both Fortran and C:

621.wrf_s: basepeak = yes

627.cam4_s: basepeak = yes

628.pop2_s: basepeak = yes

Benchmarks using Fortran, C, and C++:

-m64 -mno-adx -mno-sse4a -std=c++98
-W1,-mlllvm -W1,-x86-use-vzeroupper=false -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 -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
-finline-aggressive -mlllvm -unroll-threshold=100 -mlllvm -reroll-loops
-mlllvm -aggressive-loop-unswitch -Mrecursive -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang
SPEC CPU®2017 Floating Point Speed Result

Lenovo Global Technology
ThinkSystem SR655
2.65 GHz, AMD EPYC 7413

SPECspeed®2017_fp_base = 128
SPECspeed®2017_fp_peak = 132

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

Peak Other Flags

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

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

Benchmarks using both Fortran and C:
-Wno-unused-command-line-argument -Wno-return-type

Benchmarks using Fortran, C, and C++:
-Wno-unused-command-line-argument -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

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