## Lenovo Global Technology

**ThinkSystem SR645**  
**2.95 GHz, AMD EPYC 75F3**

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base = 231</th>
<th>SPECspeed®2017_fp_peak = 241</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lenovo Global Technology</td>
<td>Lenovo Global Technology</td>
</tr>
</tbody>
</table>

### CPU2017 License: 9017

<table>
<thead>
<tr>
<th>Test Sponsor:</th>
<th>Lenovo Global Technology</th>
</tr>
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<tbody>
<tr>
<td>Tested by:</td>
<td>Lenovo Global Technology</td>
</tr>
<tr>
<td>Test Date:</td>
<td>May-2021</td>
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<tr>
<td>Hardware Availability:</td>
<td>Apr-2021</td>
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<tr>
<td>Software Availability:</td>
<td>Mar-2021</td>
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### Thread Performance

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_fp_base (231)</th>
<th>SPECspeed®2017_fp_peak (241)</th>
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</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>64, 128</td>
<td>381</td>
<td></td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
<td>381</td>
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<td>619.Ibm_s</td>
<td>64, 128</td>
<td>132</td>
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<tr>
<td>621.wrf_s</td>
<td>64, 128</td>
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<tr>
<td>627.cam4_s</td>
<td>64</td>
<td>185</td>
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<tr>
<td>628.pop2_s</td>
<td>64</td>
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<tr>
<td>638.imagick_s</td>
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<tr>
<td>644.nab_s</td>
<td>64, 128</td>
<td>461</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>64</td>
<td>510</td>
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</tr>
<tr>
<td>654.roms_s</td>
<td>64</td>
<td>357</td>
<td></td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** AMD EPYC 75F3  
- **Max MHz:** 4000  
- **Nominal:** 2950  
- **Enabled:** 64 cores, 2 chips, 2 threads/core  
- **Orderable:** 1.2 chips  
- **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:** 512 GB (16 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 D8E115G 2.02 released Mar-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 set to prefer performance at the cost of additional power usage

---

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# SPEC CPU®2017 Floating Point Speed Result

## Lenovo Global Technology

**ThinkSystem SR645**

2.95 GHz, AMD EPYC 75F3

---

**SPECspeed®2017_fp_base = 231**

**SPECspeed®2017_fp_peak = 241**

---

**Results Table**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<td>607.cactuBSSN_s</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

**SPECSpec2017_fp_base = 231**

**SPECSpec2017_fp_peak = 241**

---

**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 numacl 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/transient_hugepage/enable' and

(Continued on next page)
Operating System Notes (Continued)

'echo always > /sys/kernel/mm/transparent_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/transparent_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/transparent_hugepage/enabled' run as root.

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-127"
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 = "128"

Environment variables set by runcpu during the 603.bwaves_s peak run:
GOMP_CPU_AFFINITY = "0 64 1 65 2 66 3 67 4 68 5 69 6 70 7 71 8 72 9 73 10 74
   11 75 12 76 13 77 14 78 15 79 16 80 17 81 18 82 19 83 20 84 21 85 22 86
   23 87 24 88 25 89 26 90 27 91 28 92 29 93 30 94 31 95 32 96 33 97 34 98
   35 99 36 100 37 101 38 102 39 103 40 104 41 105 42 106 43 107 44 108 45
   109 46 110 47 111 48 112 49 113 50 114 51 115 52 116 53 117 54 118 55
   119 56 120 57 121 58 122 59 123 60 124 61 125 62 126 63 127"

Environment variables set by runcpu during the 619.lbm_s peak run:
GOMP_CPU_AFFINITY = "0 64 1 65 2 66 3 67 4 68 5 69 6 70 7 71 8 72 9 73 10 74
   11 75 12 76 13 77 14 78 15 79 16 80 17 81 18 82 19 83 20 84 21 85 22 86
   23 87 24 88 25 89 26 90 27 91 28 92 29 93 30 94 31 95 32 96 33 97 34 98
   35 99 36 100 37 101 38 102 39 103 40 104 41 105 42 106 43 107 44 108 45
   109 46 110 47 111 48 112 49 113 50 114 51 115 52 116 53 117 54 118 55
   119 56 120 57 121 58 122 59 123 60 124 61 125 62 126 63 127"

Environment variables set by runcpu during the 621.wrf_s peak run:
GOMP_CPU_AFFINITY = "0-63"

Environment variables set by runcpu during the 644.nab_s peak run:
GOMP_CPU_AFFINITY = "0 64 1 65 2 66 3 67 4 68 5 69 6 70 7 71 8 72 9 73 10 74
   11 75 12 76 13 77 14 78 15 79 16 80 17 81 18 82 19 83 20 84 21 85 22 86
   23 87 24 88 25 89 26 90 27 91 28 92 29 93 30 94 31 95 32 96 33 97 34 98
   35 99 36 100 37 101 38 102 39 103 40 104 41 105 42 106 43 107 44 108 45
   109 46 110 47 111 48 112 49 113 50 114 51 115 52 116 53 117 54 118 55
   119 56 120 57 121 58 122 59 123 60 124 61 125 62 126 63 127"

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR645
2.95 GHz, AMD EPYC 75F3

SPEC CPU® 2017 Floating Point Speed Result
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Environment Variables Notes (Continued)

Environment variables set by runcpu during the 654.roms_s peak run:
GOMP_CPU_AFFINITY = "0-63"

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:
Operating Mode set to Maximum Performance and then set it to Custom Mode
4-Link xGMI Max Speed set to 16Gbps
SOC P-States set to P0
DLWM Support set to Disabled

Sysinfo program /home/cpu2017-1.1.8-amd-aocc300-milan-B1/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafec64d
running on localhost Sun May 9 18:20:46 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 75F3 32-Core Processor
      2 "physical id"s (chips)
      128 "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

(Specification continues on next page)
Lenovo Global Technology
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SPECspeed®2017_fp_base = 231
SPECspeed®2017_fp_peak = 241

**Platform Notes (Continued)**

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): 128
On-line CPU(s) list: 0-127
Thread(s) per core: 2
Core(s) per socket: 32
Socket(s): 2
NUMA node(s): 2
Vendor ID: AuthenticAMD
CPU family: 25
Model: 1
Model name: AMD EPYC 75F3 32-Core Processor
Stepping: 1
CPU MHz: 1820.110
CPU max MHz: 2950.0000
CPU min MHz: 1500.0000
BogoMIPS: 5888.88
Virtualization: AMD-V
L1d cache: 32K
L1i cache: 32K
L2 cache: 512K
L3 cache: 32768K
NUMA node0 CPU(s): 0-31,64-95
NUMA node1 CPU(s): 32-63,96-127
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pse3 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 aperfmpref 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 smp xmce xtpr expeertr wp viridian arat npt lbv svm_lock nrp_save tsc_scale
vmcb_clean flushbyasid decodeassist pfflush pfthreshold v_vmsave_vmload vgif
umip pku ospke vaes vpcmremq vpcmflush vpcmcopy

```
From numactl --hardware
```

```
/proc/cpuinfo cache data
  cache size : 512 KB
```

(Continued on next page)
Platform Notes (Continued)

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 16 17 18 19 20 21 22 23 24 25 26 27
  28 29 30 31 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88
  89 90 91 92 93 94 95
  node 0 size: 257797 MB
  node 0 free: 256773 MB
  node 1 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56
  57 58 59 60 61 62 63 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112
  113 114 115 116 117 118 119 120 121 122 123 124 125 126 127
  node 1 size: 258027 MB
  node 1 free: 257475 MB
  node distances:
    node 0 1
    0:  10  32
    1:  32  10

From /proc/meminfo
  MemTotal:    528204796 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"
    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

(Continued on next page)
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SPECspeed®2017_fp_base = 231
SPECspeed®2017_fp_peak = 241

Platform Notes (Continued)

CVE-2017-5753 (Spectre variant 1):
Bypass disabled via prctl and seccomp
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 9 17:06

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

Filesystem Type Size Used Avail Use% Mounted on
/dev/sdb3 xfs 889G 106G 784G 12% /

From /sys/devices/virtual/dmi/id
Vendor: Lenovo
Product: ThinkSystem SR645 MB
Product Family: ThinkSystem
Serial: 1234567890

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:
16x Samsung M393A4K40DB3-CWE 32 GB 2 rank 3200
16x Unknown Unknown

BIOS:
BIOS Vendor: Lenovo
BIOS Version: D8E115G-2.02
BIOS Date: 03/25/2021
BIOS Revision: 2.2
Firmware Revision: 3.1

(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)
==============================================================================

(Continued on next page)
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Test Date: May-2021
Tested by: Lenovo Global Technology
Hardware Availability: Apr-2021
Software Availability: Mar-2021

Compiler Version Notes (Continued)

AMD clang version 12.0.0 (CLANG: AOCCT_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)

Fortran         |  603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
|  654.roms_s(base, peak)

Fortran, C      |  621.wrf_s(base, peak) 627.cam4_s(base, peak)
|  628.pop2_s(base, peak)

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**SPECspeed®2017_fp_base = 231**

**SPECspeed®2017_fp_peak = 241**

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### Compiler Version Notes (Continued)

AMD clang version 12.0.0 (CLANG: A0CC_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

---

### 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-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3

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

C benchmarks (continued):
- fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
- ml1vm -unroll-threshold=50 -ml1vm -inline-threshold=1000
- fremap-arrays -ml1vm -function-specialize -flv-function-specialization
- ml1vm -enable-gvn-hoist -ml1vm -global-vectorize-slp=true
- ml1vm -enable-l1icm-vrp -ml1vm -reduce-array-computations=3 -z muldefs
- DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
- $flang -flangrti$

Fortran benchmarks:
- m64 -mno-adx -mno-sse4a -Wl,-m11vm -Wl,-enable-X86-prefetching
- Wl,-m11vm -Wl,-enable-l1icm-vrp -Wl,-m11vm -Wl,-region-vectorize
- Wl,-m11vm -Wl,-function-specialize
- Wl,-m11vm -Wl,-align-all-nofallthru-blocks=6
- Wl,-m11vm -Wl,-reduce-array-computations=3 -Hz,1,0x1 -O3
- march=znver3 -fveclib=AMDLIBM -ffast-math -Mrecursive
- ml1vm -fuse-tile-inner-loop -funroll-loops
- ml1vm -extra-vectorizer-passes -ml1vm -lsr-in-nested-loop
- ml1vm -enable-l1icm-vrp -ml1vm -reduce-array-computations=3
- ml1vm -global-vectorize-slp=true -z muldefs -DSPEC_OPENMP -fopenmp
- fopenmp=libomp -lomp -lamdlibm -ljemalloc -flang -flangrti

Benchmarks using both Fortran and C:
- m64 -mno-adx -mno-sse4a -Wl,-m11vm -Wl,-enable-X86-prefetching
- Wl,-m11vm -Wl,-enable-l1icm-vrp -Wl,-m11vm -Wl,-region-vectorize
- Wl,-m11vm -Wl,-function-specialize
- Wl,-m11vm -Wl,-align-all-nofallthru-blocks=6
- Wl,-m11vm -Wl,-reduce-array-computations=3 -O3 -march=znver3
- fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
- ml1vm -unroll-threshold=50 -ml1vm -inline-threshold=1000
- fremap-arrays -ml1vm -function-specialize -flv-function-specialization
- ml1vm -enable-gvn-hoist -ml1vm -global-vectorize-slp=true
- ml1vm -enable-l1icm-vrp -ml1vm -reduce-array-computations=3 -Hz,1,0x1
- Mrecursive -ml1vm -fuse-tile-inner-loop -funroll-loops
- ml1vm -extra-vectorizer-passes -ml1vm -lsr-in-nested-loop -z muldefs
- DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
- flang -flangrti

Benchmarks using Fortran, C, and C++:
- m64 -mno-adx -mno-sse4a -std=c++98
- Wl,-m11vm -Wl,-x86-use-vzeroupper=false
- Wl,-m11vm -Wl,-region-vectorize -Wl,-m11vm -Wl,-function-specialize
- Wl,-m11vm -Wl,-align-all-nofallthru-blocks=6
- Wl,-m11vm -Wl,-reduce-array-computations=3 -O3 -march=znver3
- fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
- ml1vm -unroll-threshold=50 -ml1vm -inline-threshold=1000

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Lenovo Global Technology
ThinkSystem SR645
2.95 GHz, AMD EPYC 75F3

SPECspeed®2017_fp_base = 231
SPECspeed®2017_fp_peak = 241

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

Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
- 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 -lflangrti

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

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
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Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

619.lbm_s: -m64 -mno-adx -mno-sse4a
-W1,-ml1vm -W1,-function-specialize
-W1,-ml1vm -W1,-align-all-nofallthru-blocks=6
-W1,-ml1vm -W1,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math -flto
-fstruct-layout=5 -ml1vm -unroll-threshold=50
-fremap-arrays -flv-function-specialization
-ml1vm -inline-threshold=1000 -ml1vm -enable-gvn-hoist
-ml1vm -global-vectorize-slp=true
-ml1vm -function-specialize -ml1vm -enable-lcm-vrp
-ml1vm -reduce-array-computations=3 -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang

638.imagick_s: basepeak = yes

644.nab_s: -m64 -mno-adx -mno-sse4a -W1,-ml1vm -W1,-region-vectorize
-W1,-ml1vm -W1,-function-specialize -Ofast -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
-ml1vm -unroll-threshold=50 -fremap-arrays
-flv-function-specialization -ml1vm -inline-threshold=1000
-ml1vm -enable-gvn-hoist -ml1vm -global-vectorize-slp=true
-ml1vm -function-specialize -ml1vm -enable-lcm-vrp
-ml1vm -reduce-array-computations=3 -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang

Fortran benchmarks:

603.bwaves_s: -m64 -mno-adx -mno-sse4a
-W1,-ml1vm -W1,-enable-X86-prefetching
-W1,-ml1vm -W1,-enable-lcm-vrp
-W1,-ml1vm -W1,-function-specialize
-W1,-ml1vm -W1,-align-all-nofallthru-blocks=6
-W1,-ml1vm -W1,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math -Mrecursive
-ml1vm -reduce-array-computations=3
-ml1vm -global-vectorize-slp=true -ml1vm -enable-lcm-vrp
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm
-ljemalloc -lflang

(Continued on next page)
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Test Date: May-2021
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Peak Optimization Flags (Continued)

649.fotonik3d_s: basepeak = yes
654.roms_s: Same as 603.bwaves_s

Benchmarks using both Fortran and C:

621.wrf_s: 
   -m64 -mno-adx -mno-sse4a
   -Wl,-m64 -Wl, -enable-X86-prefetching
   -Wl, -m64 -Wl, -enable-licm-vrp
   -Wl,-m64 -Wl, -function-specialize
   -Wl,-m64 -Wl, -align-all-nofallthru-blocks=6
   -Wl,-m64 -Wl, -reduce-array-computations=3 -Ofast
   -march=znerver3 -fveclib=AMDLIBM -ffast-math -flto
   -fstruct-layout=5 -m64 -unroll-threshold=50
   -fremap-arrays -flv-function-specialization
   -m64 -inline-threshold=1000 -m64 -enable-gvn-hoist
   -mlvm -global-vectorize-slp=true
   -mlvm -function-specialize -mlvm -enable-licm-vrp
   -mlvm -reduce-array-computations=3 -Hz,1,0x1 -O3
   -Mrecursive -mlvm -fuse-tile-inner-loop -funroll-loops
   -mlvm -extra-vectorizer-passes -mlvm -lsr-in-nested-loop
   -DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm
   -ljemalloc -lflang

627.cam4_s: basepeak = yes
628.pop2_s: basepeak = yes

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: basepeak = yes

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

(Continued on next page)
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Peak Other Flags (Continued)

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

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-Milan-E.xml

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