



SPEC CPU®2017 Integer Speed Result

Copyright 2017-2023 Standard Performance Evaluation Corporation

Lenovo Global Technology

ThinkSystem SR665 V3
(3.25 GHz,AMD EPYC 9354)

SPECspeed®2017_int_base = 14.3

SPECspeed®2017_int_peak = 14.5

CPU2017 License: 9017

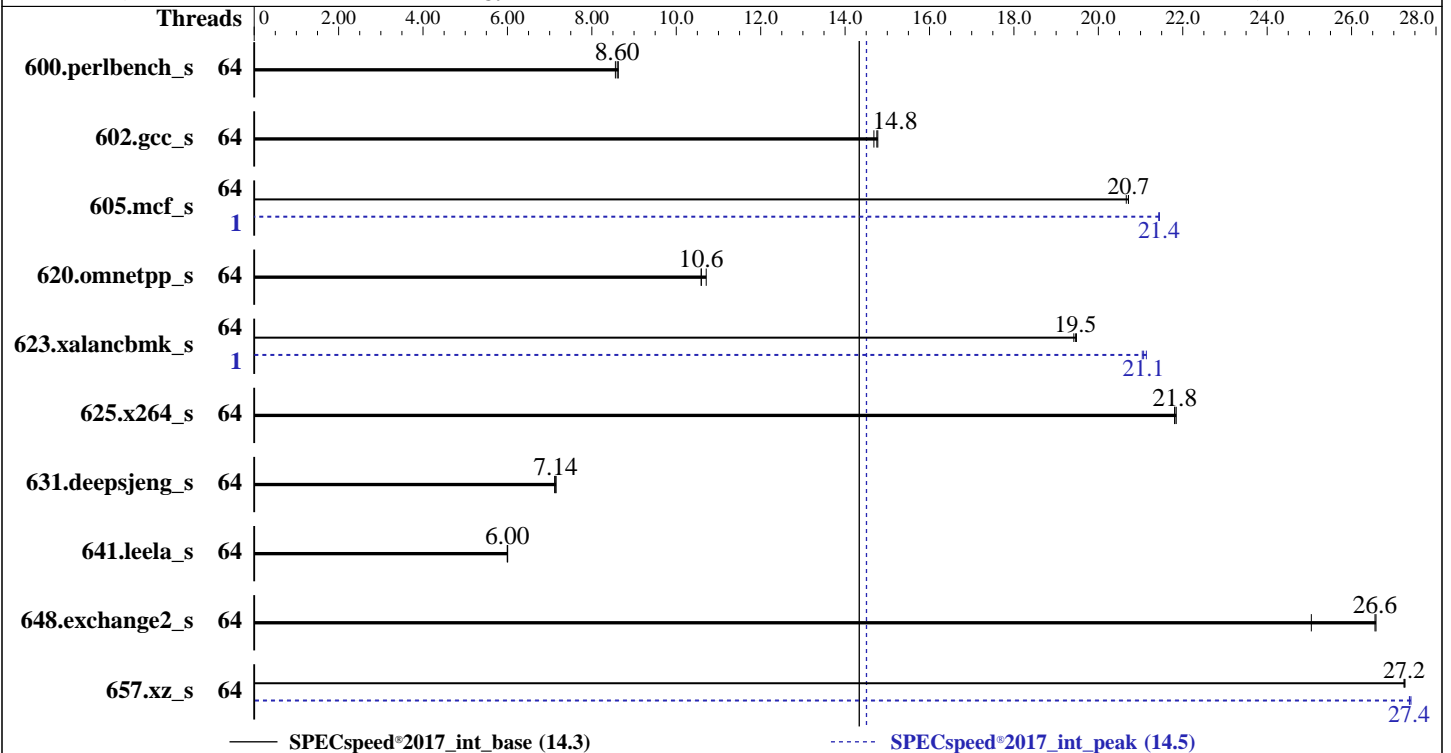
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Dec-2022

Hardware Availability: Feb-2023

Software Availability: Nov-2022



Hardware

CPU Name: AMD EPYC 9354
 Max MHz: 3800
 Nominal: 3250
 Enabled: 64 cores, 2 chips
 Orderable: 1,2 chips
 Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 256 MB I+D on chip per chip,
 32 MB shared / 4 cores
 Other: None
 Memory: 768 GB (24 x 32 GB 2Rx8 PC5-4800B-R)
 Storage: 1 x 480 GB SATA SSD
 Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP4 (x86_64)
 Kernel 5.14.21-150400.22-default
 Compiler: C/C++/Fortran: Version 4.0.0 of AOCC
 Parallel: Yes
 Firmware: Lenovo BIOS Version KAE105F 1.20 released Dec-2022
 File System: xfs
 System State: Run level 3 (multi-user)
 Base Pointers: 64-bit
 Peak Pointers: 64-bit
 Other: None
 Power Management: BIOS and OS set to prefer performance at the cost of additional power usage



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Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
600.perlbench_s	64	206	8.63	207	8.56	206	8.60	64	206	8.63	207	8.56	206	8.60
602.gcc_s	64	270	14.8	271	14.7	269	14.8	64	270	14.8	271	14.7	269	14.8
605.mcf_s	64	228	20.7	228	20.7	228	20.7	1	220	21.4	220	21.4	220	21.4
620.omnetpp_s	64	154	10.6	152	10.7	154	10.6	64	154	10.6	152	10.7	154	10.6
623.xalancbmk_s	64	72.7	19.5	72.8	19.5	73.0	19.4	1	67.0	21.1	67.3	21.0	67.2	21.1
625.x264_s	64	80.7	21.8	80.9	21.8	80.9	21.8	64	80.7	21.8	80.9	21.8	80.9	21.8
631.deepsjeng_s	64	201	7.14	200	7.15	201	7.12	64	201	7.14	200	7.15	201	7.12
641.leela_s	64	285	6.00	284	6.01	284	6.00	64	285	6.00	284	6.01	284	6.00
648.exchange2_s	64	111	26.6	111	26.6	117	25.0	64	111	26.6	111	26.6	117	25.0
657.xz_s	64	227	27.3	227	27.2	227	27.2	64	226	27.4	226	27.4	226	27.4

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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 limit
'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>

To limit dirty cache to 8% of memory, 'sysctl -w vm.dirty_ratio=8' run as root.
To limit swap usage to minimum necessary, 'sysctl -w vm.swappiness=1' run as root.
To free node-local memory and avoid remote memory usage,
'sysctl -w vm.zone_reclaim_mode=1' run as root.
To clear filesystem caches, 'sync; sysctl -w vm.drop_caches=3' run as root.
To disable address space layout randomization (ASLR) to reduce run-to-run
variability, 'sysctl -w kernel.randomize_va_space=0' run as root.

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Operating System Notes (Continued)

To enable Transparent Hugepages (THP) for all allocations,
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'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-aocc400-genoa-B1b/amd_speed_aocc400_genoa_B_lib
/lib:"

LIBOMP_NUM_HIDDEN_HELPER_THREADS = "0"

MALLOC_CONF = "oversize_threshold:0,retain:true"

OMP_DYNAMIC = "false"

OMP_SCHEDULE = "static"

OMP_STACKSIZE = "128M"

OMP_THREAD_LIMIT = "64"

Environment variables set by runcpu during the 605.mcf_s peak run:

GOMP_CPU_AFFINITY = "15"

Environment variables set by runcpu during the 623.xalancbmk_s peak run:

GOMP_CPU_AFFINITY = "15"

Environment variables set by runcpu during the 657.xz_s peak run:

GOMP_CPU_AFFINITY = "0-63"

LIBOMP_NUM_HIDDEN_HELPER_THREADS = "8"

General Notes

Binaries were compiled on a system with 2x AMD EPYC 9174F CPU + 1.5TiB Memory using RHEL 8.6

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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Platform Notes

BIOS configuration:
Operating Mode set to Maximum Performance and then set it to Custom Mode
NUMA Nodes per Socket set to NPS4
SMT Mode set to Disabled

Sysinfo program /home/cpu2017-1.1.8-amd-aocc400-genoa-Blb/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on localhost Fri Dec 30 07:47:10 2022

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 9354 32-Core Processor
 2 "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  : 32
 physical 0: cores 0 1 2 3 16 17 18 19 32 33 34 35 48 49 50 51 64 65 66 67 80 81 82
 83 96 97 98 99 112 113 114 115
 physical 1: cores 0 1 2 3 16 17 18 19 32 33 34 35 48 49 50 51 64 65 66 67 80 81 82
 83 96 97 98 99 112 113 114 115
```

```
From lscpu from util-linux 2.37.2:
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Address sizes:         52 bits physical, 57 bits virtual
Byte Order:            Little Endian
CPU(s):                64
On-line CPU(s) list:   0-63
Vendor ID:              AuthenticAMD
Model name:             AMD EPYC 9354 32-Core Processor
CPU family:             25
Model:                  17
Thread(s) per core:    1
Core(s) per socket:    32
Socket(s):              2
Stepping:               1
Frequency boost:       enabled
CPU max MHz:           3799.0720
CPU min MHz:           1500.0000
BogoMIPS:               6490.19
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
```

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Platform Notes (Continued)

```

pdpelgb rdtscp lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid
aperfmpperf rapl pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic 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 erms invpcid cqm rdt_a avx512f
avx512dq rdseed adx smap avx512ifma clflushopt clwb avx512cd sha_ni avx512bw
avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
cqm_mbm_local avx512_bf16 clzero irperf xsaveerptr rdpru wbnoinvd amd_ppin arat npt
lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter
pfthreshold avic v_vmsave_vmload vgif v_spec_ctrl avx512vbmi umip pku ospke
avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg avx512_vpopcntdq la57
rdpid overflow_recov succor smca fsrm flush_lld

```

```

Virtualization: AMD-V
L1d cache: 2 MiB (64 instances)
L1i cache: 2 MiB (64 instances)
L2 cache: 64 MiB (64 instances)
L3 cache: 512 MiB (16 instances)
NUMA node(s): 8
NUMA node0 CPU(s): 0-7
NUMA node1 CPU(s): 8-15
NUMA node2 CPU(s): 16-23
NUMA node3 CPU(s): 24-31
NUMA node4 CPU(s): 32-39
NUMA node5 CPU(s): 40-47
NUMA node6 CPU(s): 48-55
NUMA node7 CPU(s): 56-63
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Retpolines, IBPB conditional, IBRS_FW, STIBP disabled, RSB filling
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected

```

From lscpu --cache:

NAME	ONE-SIZE	ALL-SIZE	WAYS	TYPE	LEVEL	SETS	PHY-LINE	COHERENCY-SIZE
L1d	32K	2M	8	Data	1	64	1	64
L1i	32K	2M	8	Instruction	1	64	1	64
L2	1M	64M	8	Unified	2	2048	1	64
L3	32M	512M	16	Unified	3	32768	1	64

(Continued on next page)



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Platform Notes (Continued)

```
/proc/cpuinfo cache data
cache size : 1024 KB
```

From numactl --hardware

WARNING: a numactl 'node' might or might not correspond to a physical chip.

```
available: 8 nodes (0-7)
node 0 cpus: 0 1 2 3 4 5 6 7
node 0 size: 96344 MB
node 0 free: 95326 MB
node 1 cpus: 8 9 10 11 12 13 14 15
node 1 size: 96752 MB
node 1 free: 96487 MB
node 2 cpus: 16 17 18 19 20 21 22 23
node 2 size: 96752 MB
node 2 free: 96465 MB
node 3 cpus: 24 25 26 27 28 29 30 31
node 3 size: 96752 MB
node 3 free: 96415 MB
node 4 cpus: 32 33 34 35 36 37 38 39
node 4 size: 96752 MB
node 4 free: 96557 MB
node 5 cpus: 40 41 42 43 44 45 46 47
node 5 size: 96752 MB
node 5 free: 96606 MB
node 6 cpus: 48 49 50 51 52 53 54 55
node 6 size: 96752 MB
node 6 free: 96587 MB
node 7 cpus: 56 57 58 59 60 61 62 63
node 7 size: 96553 MB
node 7 free: 96417 MB
```

```
node distances:
node  0  1  2  3  4  5  6  7
 0:  10 12 12 12 32 32 32 32
 1:  12 10 12 12 32 32 32 32
 2:  12 12 10 12 32 32 32 32
 3:  12 12 12 10 32 32 32 32
 4:  32 32 32 32 10 12 12 12
 5:  32 32 32 32 12 10 12 12
 6:  32 32 32 32 12 12 10 12
 7:  32 32 32 32 12 12 12 10
```

From /proc/meminfo

```
MemTotal: 791972508 kB
HugePages_Total: 0
Hugepagesize: 2048 kB
```

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

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Platform Notes (Continued)

performance

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

```
os-release:
  NAME="SLES"
  VERSION="15-SP4"
  VERSION_ID="15.4"
  PRETTY_NAME="SUSE Linux Enterprise Server 15 SP4"
  ID="sles"
  ID_LIKE="suse"
  ANSI_COLOR="0;32"
  CPE_NAME="cpe:/o:suse:sles:15:sp4"
```

uname -a:

```
Linux localhost 5.14.21-150400.22-default #1 SMP PREEMPT_DYNAMIC Wed May 11 06:57:18
UTC 2022 (49db222) 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/swaps barriers and __user pointer sanitization
CVE-2017-5715 (Spectre variant 2):	Mitigation: Retpolines, IBPB: conditional, IBRS_FW, STIBP: disabled, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling):	Not affected
CVE-2019-11135 (TSX Asynchronous Abort):	Not affected

run-level 3 Dec 30 04:28

SPEC is set to: /home/cpu2017-1.1.8-amd-aocc400-genoa-B1b

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/sda2	xf	446G	31G	415G	7%	/

From /sys/devices/virtual/dmi/id

Vendor:	Lenovo
Product:	ThinkSystem SR665 V3 MB,Genoa,Kauai,DDR5,Kauai,2U
Product Family:	ThinkSystem
Serial:	1234567890

(Continued on next page)



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Platform Notes (Continued)

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:

5x SK Hynix HMC88AE168N 32 GB 2 rank 4800
19x SK Hynix HMC88AE168N 32 GB 2 rank 4800

BIOS:

BIOS Vendor: Lenovo
BIOS Version: KAE105F-1.20
BIOS Date: 12/01/2022
BIOS Revision: 1.20
Firmware Revision: 1.20

(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 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/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 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
=====

=====
Fortran | 648.exchange2_s(base, peak)
=====

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
LLVM Mirror.Version.14.0.6)

(Continued on next page)



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Compiler Version Notes (Continued)

Target: x86_64-unknown-linux-gnu

Thread model: posix

InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/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 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6

-Wl,-mllvm -Wl,-reduce-array-computations=3

-Wl,-allow-multiple-definition -O3 -march=znver4 -fveclib=AMDLIBM

-ffast-math -fopenmp -flto -fstruct-layout=7

-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000

-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3

-DSPEC_OPENMP -zopt -fopenmp=libomp -lomp -lamdlibm -lflang

-lamdalloc

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Base Optimization Flags (Continued)

C++ benchmarks:

```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto
-mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-fvirtual-function-elimination -fvisibility=hidden -fopenmp=libomp
-lomp -lamdlibm -lflang -lamdalloc-ext
```

Fortran benchmarks:

```
-m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-inline-recursion=4 -Wl,-mllvm -Wl,-lsr-in-nested-loop
-Wl,-mllvm -Wl,-enable-iv-split -O3 -march=znver4 -fveclib=AMDLIBM
-ffast-math -fopenmp -flto -mllvm -optimize-strided-mem-cost
-mllvm -unroll-aggressive -mllvm -unroll-threshold=150 -fopenmp=libomp
-lomp -lamdlibm -lflang -lamdalloc
```

Base Other Flags

C benchmarks:

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

C++ benchmarks:

```
-Wno-unused-command-line-argument
```

Fortran benchmarks:

```
-Wno-unused-command-line-argument
```

Peak Compiler Invocation

C benchmarks:

```
clang
```

C++ benchmarks:

```
clang++
```

Fortran benchmarks:

```
flang
```



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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: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-allow-multiple-definition -Ofast -march=znver4
-fveclib=AMDLIBM -ffast-math -fopenmp -flto
-fstruct-layout=9 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang

625.x264_s: basepeak = yes

657.xz_s: Same as 605.mcf_s

C++ benchmarks:

620.omnetpp_s: basepeak = yes

623.xalancbmk_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-do-block-reorder=aggressive -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -finline-aggressive -mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-mllvm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden
-fopenmp=libomp -lomp -lamdlibm -lamdalloc-ext -lflang

631.deepsjeng_s: basepeak = yes

641.leela_s: basepeak = yes

Fortran benchmarks:

(Continued on next page)



SPEC CPU®2017 Integer Speed Result

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Lenovo Global Technology

ThinkSystem SR665 V3
(3.25 GHz,AMD EPYC 9354)

SPECspeed®2017_int_base = 14.3

SPECspeed®2017_int_peak = 14.5

CPU2017 License: 9017

Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Dec-2022

Hardware Availability: Feb-2023

Software Availability: Nov-2022

Peak Optimization Flags (Continued)

648.exchange2_s:basepeak = yes

Peak Other Flags

C benchmarks:

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

C++ benchmarks:

-Wno-unused-command-line-argument

Fortran benchmarks:

-Wno-unused-command-line-argument

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-Genoa-0.html>

<http://www.spec.org/cpu2017/flags/aocc400-flags.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-Genoa-0.xml>

<http://www.spec.org/cpu2017/flags/aocc400-flags.xml>

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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