Lenovo Global Technology
ThinkEdge SE455 V3
(2.50 GHz, AMD EPYC 8434P)

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

SPECspeed®2017_int_base = 11.2
SPECspeed®2017_int_peak = 11.4

Threaded SPEC CPU®2017 Integer Speed Result

**Hardware**
- CPU Name: AMD EPYC 8434P
- Max MHz: 3100
- Nominal: 2500
- Enabled: 48 cores, 1 chip, 2 threads/core
- Orderable: 1 chip
- Cache L1: 32 KB I + 32 KB D on chip per core
- L2: 1 MB I+D on chip per core
- L3: 128 MB I+D on chip per chip, 16 MB shared / 6 cores
- Other: None
- Memory: 192 GB (6 x 32 GB 2Rx8 PC5-4800B-R)
- Storage: 1 x 480 GB M.2 NVME SSD
- Other: None

**Software**
- OS: SUSE Linux Enterprise Server 15 SP4
- Kernel 5.14.21-150400.22-default
- Compiler: C/C++/Fortran: Version 4.0.0 of AOCC
- Parallel: Yes
- Firmware: Lenovo BIOS Version MBE103I 1.10 released Sep-2023
- 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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SPECspeed®2017_int_base = 11.2
SPECspeed®2017_int_peak = 11.4

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>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>48</td>
<td>255</td>
<td>6.96</td>
<td>257</td>
<td>6.92</td>
<td>257</td>
<td>6.91</td>
<td>257</td>
<td>6.91</td>
<td>257</td>
<td>6.91</td>
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<tr>
<td>602.gcc_s</td>
<td>48</td>
<td>341</td>
<td>11.7</td>
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<td>17.1</td>
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<td>17.8</td>
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<td>623.xalanchmk_s</td>
<td>48</td>
<td>89.6</td>
<td>15.8</td>
<td>89.8</td>
<td>15.8</td>
<td>90.6</td>
<td>15.6</td>
<td>83.1</td>
<td>17.0</td>
<td>82.9</td>
<td>17.1</td>
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<tr>
<td>625.x264_s</td>
<td>48</td>
<td>101</td>
<td>17.4</td>
<td>101</td>
<td>17.4</td>
<td>102</td>
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<td>101</td>
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<td>101</td>
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<tr>
<td>631.deepsjeng_s</td>
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<td>242</td>
<td>5.91</td>
<td>240</td>
<td>5.96</td>
<td>242</td>
<td>5.93</td>
<td>242</td>
<td>5.93</td>
<td>242</td>
<td>5.92</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>48</td>
<td>349</td>
<td>4.89</td>
<td>349</td>
<td>4.89</td>
<td>350</td>
<td>4.88</td>
<td>349</td>
<td>4.89</td>
<td>350</td>
<td>4.88</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>48</td>
<td>142</td>
<td>20.7</td>
<td>138</td>
<td>21.2</td>
<td>137</td>
<td>21.4</td>
<td>138</td>
<td>21.3</td>
<td>138</td>
<td>21.3</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>48</td>
<td>286</td>
<td>21.6</td>
<td>286</td>
<td>21.6</td>
<td>285</td>
<td>21.7</td>
<td>282</td>
<td>22.1</td>
<td>279</td>
<td>22.1</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 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.

To enable Transparent Hugepages (THP) for all allocations, 'echo always > /sys/kernel/mm/transparent_hugepage/defrag' 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 = "0-95"
- LD_LIBRARY_PATH = "/home/cpu2017-1.1.9-amd-aocc400-znver4-A1.2/amd_speed_aocc400_znver4_A_lib/lib;"
- MALLOC_CONF = "oversize_threshold:0,retain:true"
- OMP_DYNAMIC = "false"
- OMP_SCHEDULE = "static"
- OMP_STACKSIZE = "128M"
- OMP_THREAD_LIMIT = "96"

Environment variables set by runcpu during the 602.gcc_s peak run:
- GOMP_CPU_AFFINITY = "15"

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 625.x264_s peak run:
- GOMP_CPU_AFFINITY = "15"

Environment variables set by runcpu during the 631.deepsjeng_s peak run:
- GOMP_CPU_AFFINITY = "15"

Environment variables set by runcpu during the 648.exchange2_s peak run:
- GOMP_CPU_AFFINITY = "15"

Environment variables set by runcpu during the 657.xz_s peak run:
- GOMP_CPU_AFFINITY = "0-95"
- 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.

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
NUMA Nodes per Socket set to NPS2

Sysinfo program /home/cpu2017-1.1.9-amd-aocc400-znver4-A1.2/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c6ae2c92cc097bec197
running on localhost Tue Oct 24 02:09:13 2023

SUT (System Under Test) info as seen by some common utilities.

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3. `ulimit -a`
4. `sysinfo process ancestry`
5. `/proc/cpufreq`
6. `lscpu`
7. `numactl --hardware`
8. `/proc/meminfo`
9. `who -r`
10. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
11. Services, from systemctl list-unit-files
12. Linux kernel boot-time arguments, from `/proc/cmdline`
13. `cpupower frequency-info`
14. `sysctl`
15. `/sys/kernel/mm/transparent_hugepage`
16. `/sys/kernel/mm/transparent_hugepage/khugepaged`
17. OS release
18. Disk information
19. `/sys/devices/virtual/dmi/id`
20. `dmidecode`
21. `BIOS`

### Platform Notes (Continued)

1. `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
   ```

2. `w`
   ```
   02:09:13 up 14:40,  1 user,  load average: 5.33, 19.07, 37.16
   USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1     -                29Apr22 14:15m  1.48s  0.11s /bin/bash ./amd_speed_aocc400_znver4_A1.sh
   ```

3. `Username`
   ```
   From environment variable $USER: root
   ```

4. `ulimit -a`
   ```
   core file size          (blocks, -c) unlimited
   data seg size           (kbytes, -d) unlimited
   scheduling priority     (-e) 0
   file size               (blocks, -f) unlimited
   pending signals         (-l) 772517
   max locked memory       (kbytes, -l) 2097152
   max memory size         (kbytes, -m) unlimited
   open files              (-n) 1024
   pipe size               (512 bytes, -p) 8
   POSIX message queues    (bytes, -q) 819200
   real-time priority      (-r) 0
   stack size              (kbytes, -s) unlimited
   cpu time                (seconds, -t) unlimited
   max user processes      (max) 772517
   virtual memory          (kbytes, -v) unlimited
   file locks              (-x) unlimited
   ```

(Continued on next page)
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SPECs\(\text{\textregistered}2017\)\(_{\text{int\_peak}}\) = 11.4

---
5. sysinfo process ancestry
/usr/lib/systemd/systemd --switched-root --system --deserialize 30
login -- root
-bash
/bin/bash ./Run034-compliant-amd-speed.sh
python3 ./run_amd_speed_aocc400_znver4_A1.py
/bin/bash ./amdc2017-specspeed_aocc400_znver4_A1.sh
runcpu --config amd_speed_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 intspeed
runcpu --configfile amd_speed_aocc400_znver4_A1.cfg --tune all --reportable --iterations 3 --nopower
--runmode speed --tune base:peak --size test:train:refspeed intspeed --nopreenv --note-preenv --logfile
$SPEC/tmp/CPU2017.003/tempslogs/preenv.intspeed.003.0.log --lognum 003.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017-1.1.9-amd-aocc400-znver4-A1.2
---
6. /proc/cpuinfo

---
7. lscpu
From lscpu from util-linux 2.37.2:

---
(Continued on next page)
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**SPEC®2017_int_base = 11.2**

**SPEC®2017_int_peak = 11.4**

**CPU2017 License:** 9017
**Test Date:** Oct-2023
**Test Sponsor:** Lenovo Global Technology
**Hardware Availability:** Nov-2023
**Tested by:** Lenovo Global Technology
**Software Availability:** Nov-2022

---

**Platform Notes (Continued)**

popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy
abm sse4a misalign霏ase 3dnop prefetch osw lbs skinit wdt tce topoext
perfctr_core perfctr_nb bprext perfctr_l1c mwaitx cpb cat_13 cdp_l3
invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsgsbase hmi1
avx2 amep bmi2 erms invpcid cqm rdt_a avx512f avx512dq rdseed adx mmap
avx512ifma clflushopt clwb avx512cd sha ni avx512bw avx512vl xsaveopt
xsavec xgetbv1 xsave csq cqm LLC csq _occup LLC cqm _mbm_total cqm _mbm_local
avx512_bf16 clzero irperf xsaveprtr rdr64 vnoinovd amd_pcri arat npt lbrv
svm_lock nrip_save tsc _scale vmb _clean flushbyasid decodeassist
pauserfilter pft hreshold avic v_vmsave_vmlread qvif v_spec _ctrl avx512vbmi
umip pku ospe avx512_vbmi2 gfnv vaes vpcmulqdq avx512_vnni avx512_bitalg
avx512_vpopcntdq la57 rdpid overflow _recov succor smca fcrm flush_lld

**Virtualization:**
**L1d cache:** 1.5 MiB (48 instances)
**L1i cache:** 1.5 MiB (48 instances)
**L2 cache:** 48 MiB (48 instances)
**L3 cache:** 128 MiB (8 instances)
**NUMA node(s):** 2
**NUMA node CPU(s):** 0-23,48-71
**NUMA node CPU(s):** 24-47,72-95

**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; userscopy/swapgs barriers and __user pointer sanitization
**Vulnerability Spectre v2:** Mitigation; Retpolines, IBPB conditional, IBRS_FW, STIBP always-on, RSB

**Vulnerability Srbds:** Not affected
**Vulnerability Tsx async abort:** Not affected

From lscpu --cache:

<table>
<thead>
<tr>
<th>NAME</th>
<th>ONE-SIZE</th>
<th>ALL-SIZE</th>
<th>WAYS</th>
<th>TYPE</th>
<th>LEVEL</th>
<th>SETS</th>
<th>PHY-LINE</th>
<th>COHERENCY-SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1d</td>
<td>32K</td>
<td>1.5M</td>
<td>8</td>
<td>Data</td>
<td>1</td>
<td>64</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L1i</td>
<td>32K</td>
<td>1.5M</td>
<td>8</td>
<td>Instruction</td>
<td>1</td>
<td>64</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L2</td>
<td>1M</td>
<td>48M</td>
<td>8</td>
<td>Unified</td>
<td>2</td>
<td>2048</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L3</td>
<td>16M</td>
<td>128M</td>
<td>16</td>
<td>Unified</td>
<td>3</td>
<td>16384</td>
<td>1</td>
<td>64</td>
</tr>
</tbody>
</table>

---

8. numacll --hardware

**NOTE:** a numacll 'node' might or might not correspond to a physical chip.

available: 2 nodes (0-1)
node 0 cpus: 0-23,48-71
node 0 size: 96499 MB
node 0 free: 95417 MB
node 1 cpus: 24-47,72-95
node 1 size: 96653 MB
node 1 free: 96099 MB
node distances:
node 0: 0 1
0: 10 12
1: 12 10

---

9. /proc/meminfo

MemTotal: 197789036 kB

---

10. who -r

run-level 3 Apr 29 20:00

(Continued on next page)
Platform Notes (Continued)

11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
Default Target Status
multi-user running

12. Services, from systemctl list-unit-files

<table>
<thead>
<tr>
<th>STATE</th>
<th>UNIT FILES</th>
</tr>
</thead>
<tbody>
<tr>
<td>enabled</td>
<td>YaST2-Firstboot YaST2-Second-Stage apparmor auditd cron getty@ haveged irqbalance</td>
</tr>
<tr>
<td>issue-generator</td>
<td>kbdnetsettings lvm2-monitor nsd nvmefc-boot-connections postfix</td>
</tr>
<tr>
<td>purge-kernels</td>
<td>rollback rsyslog smartd sshd wicked wickedd-auto4 wickedd-dhcp4</td>
</tr>
<tr>
<td></td>
<td>wickedd-dhcp6 wickedd-nanny</td>
</tr>
<tr>
<td>enabled-runtime</td>
<td>systemd-remount-fs</td>
</tr>
<tr>
<td>disabled</td>
<td>autosys autoyast-initscripts blk-availability boot-sysctl ca-certificates chrony-wait</td>
</tr>
<tr>
<td></td>
<td>chronyd console-getty cups cups-browsed debug-shell ebtables exchange-bmc-os-info</td>
</tr>
</tbody>
</table>
|                | firewall gpm grub2-ocse once haveged-switch-root hwloc-dump-hwdata ipmi ipmi
|                | libvnmf ssd-keys kexec-load lunmask man-db-create multipathd nfs nfs-bkmap     |
|                | nvmf-autoconnect rdisc rpicbind rpmconfcheck rsyncd serial-getty@ smartd_generate_opts |
|                | snmpd snmptrapd systemd-boot-check-no-failures systemd-network-generator systemd-sysvext |
|                | systemd-time-wait-sync systemd-timesync                                     |
| generated      | ntp_sync                                                                    |
| indirect       | wickedd                                                                    |

13. Linux kernel boot-time arguments, from /proc/cmdline

BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
root=UUID=16cfcc2a-78c0-4035-9fc3-1137fe6f296c
splash=silent
mitigations=auto
quiet
security=apparmor

14. cpupower frequency-info

analyzing CPU 0:
current policy: frequency should be within 1.50 GHz and 2.50 GHz.
The governor "performance" may decide which speed to use within this range.

boost state support:
Supported: yes
Active: yes

15. sysctl

kernel.nice_balancing 1
kernel.randomize_va_space 0
vm.compaction_proactiveness 20
vm.dirty_background_bytes 0
vm.dirty_background_ratio 10
vm.dirty_bytes 0
vm.dirty_expire_centisecs 3000
vm.dirty_ratio 8
vm.dirty_writeback_centisecs 500
vm.dirtytime_expire_seconds 43200
vm.extrabuf_threshold 500
vm.min_unmapped_ratio 1
vm.nr_hugepages 0
vm.nr_hugepages_mempolicy 0
vm.nr_overcommit_hugepages 0

(Continued on next page)
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spec

SPEC CPU®2017 Integer Speed Result
Copyright 2017-2023 Standard Performance Evaluation Corporation

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Platform Notes (Continued)

vm.swappiness                       1
vm.watermark_boost_factor       15000
vm.watermark_scale_factor          10
vm.zone_reclaim_mode                1

------------------------------------------------------------
16. /sys/kernel/mm/transparent_hugepage
  defrag [always] defer defer+madvise madvise never
  enabled [always] madvise never
  hpage_pmd_size  2097152
  shmem_enabled   always within_size advise [never] deny force

------------------------------------------------------------
17. /sys/kernel/mm/transparent_hugepage/khugepaged
  alloc_sleep_millisecs  60000
  defrag 1
  max_ptes_none  511
  max_ptes_shared  256
  max_ptes_swap  64
  pages_to_scan  4096
  scan_sleep_millisecs  10000

------------------------------------------------------------
18. OS release
  From /etc/*-release /etc/*-version
  os-release SUSE Linux Enterprise Server 15 SP4

------------------------------------------------------------
19. Disk information
  SPEC is set to: /home/cpu2017-1.1.9-amd-aocc400-znver4-A1.2
  Filesystem Type Size  Used Avail Use% Mounted on
  /dev/nvme0n1p2 xfs   447G   42G  405G  10% /

------------------------------------------------------------
20. /sys/devices/virtual/dmi/id
  Vendor: Lenovo
  Product: ThinkEdge SE455 V3 Planar
  Product Family: ThinkSystem
  Serial: 1234567890

------------------------------------------------------------
21. dmidecode
  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:
  3x SK Hynix HMCG88AEBA115N 32 GB 2 rank 4800
  3x SK Hynix HMCG88AEBA173N 32 GB 2 rank 4800

------------------------------------------------------------
22. BIOS
  (This section combines info from /sys/devices and dmidecode.)
  BIOS Vendor: Lenovo
  BIOS Version: MBE103I-1.10
  BIOS Date: 09/07/2023
  BIOS Revision: 1.10
  Firmware Revision: 1.10
Lenovo Global Technology
ThinkEdge SE455 V3
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<table>
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<tr>
<th>CPU2017 License: 9017</th>
<th>Test Date: Oct-2023</th>
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<tr>
<td>Test Sponsor: Lenovo Global Technology</td>
<td>Hardware Availability: Nov-2023</td>
</tr>
<tr>
<td>Tested by: Lenovo Global Technology</td>
<td>Software Availability: Nov-2022</td>
</tr>
</tbody>
</table>

**Compiler Version Notes**

---

**C**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base Invocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s(base, peak)</td>
<td>602.gcc_s(base, peak)</td>
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<td>625.x264_s(base, peak)</td>
</tr>
<tr>
<td>657.xz_s(base, peak)</td>
<td></td>
</tr>
</tbody>
</table>

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin

---

**C++**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base Invocation</th>
</tr>
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<tbody>
<tr>
<td>620.omnetpp_s(base, peak)</td>
<td>623.xalancbmk_s(base, peak)</td>
</tr>
<tr>
<td>631.deepsjeng_s(base, peak)</td>
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</tbody>
</table>

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/bin

---

**Fortran**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base Invocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>648.exchange2_s(base, peak)</td>
<td></td>
</tr>
</tbody>
</table>

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#434 2022_10_28) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-4.0.0/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

(Continued on next page)
Lenovo Global Technology
ThinkEdge SE455 V3 (2.50 GHz, AMD EPYC 8434P)

SPECspeed®2017_int_base = 11.2
SPECspeed®2017_int_peak = 11.4

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

Test Date: Oct-2023
Hardware Availability: Nov-2023
Software Availability: Nov-2022

Base Portability Flags (Continued)
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
  -freemap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
  -DSPEC_OPENMP -zopt -fopenmp=libomp -lomp -lamdlibm -lflang
  -lamdalloc

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,-lsl-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

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

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

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:
600.perlbench_s: basepeak = yes
602.gcc_s: -m64 -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-allow-multiple-definition -z muldefs -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-flto -fstruct-layout=9 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mlvm -inline-threshold=1000
-mlvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-fopenmp -llbomp -lomp -lamdlibm -lamdalloc -lflang

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

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

605.mcf_s (continued):
-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: Same as 605.mcf_s

657.xz_s: Same as 605.mcf_s

C++ benchmarks:

620.omnetpp_s: basepeak = yes

623.xalancbmk_s: -m64 -W1,-mllvm -W1,-align-all-nofallthru-blocks=6
-W1,-mllvm -W1,-reduce-array-computations=3
-W1,-mllvm -W1,-do-block-reorder=aggressive -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-fflto -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: -m64 -W1,-mllvm -W1,-align-all-nofallthru-blocks=6
-W1,-mllvm -W1,-reduce-array-computations=3 -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -fopenmp
-fflto -finline-aggressive -mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -zopt
-fvirtual-function-elimination -fvisibility=hidden
-fopenmp=libomp -lomp -lamdlibm -lamdalloc -lflang

641.leela_s: basepeak = yes

Fortran benchmarks:

-m64 -W1,-mllvm -W1,-align-all-nofallthru-blocks=6
-W1,-mllvm -W1,-reduce-array-computations=3
-W1,-mllvm -W1,-inline-recursion=4 -W1,-mllvm -W1,-lsr-in-nested-loop
-W1,-mllvm -W1,-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 -lamdalloc -lflang
**Lenovo Global Technology**

ThinkEdge SE455 V3  
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**SPECspeed®2017_int_base = 11.2**  
**SPECspeed®2017_int_peak = 11.4**

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**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

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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-T.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-T.xml  

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