



SPEC CPU®2017 Integer Rate Result

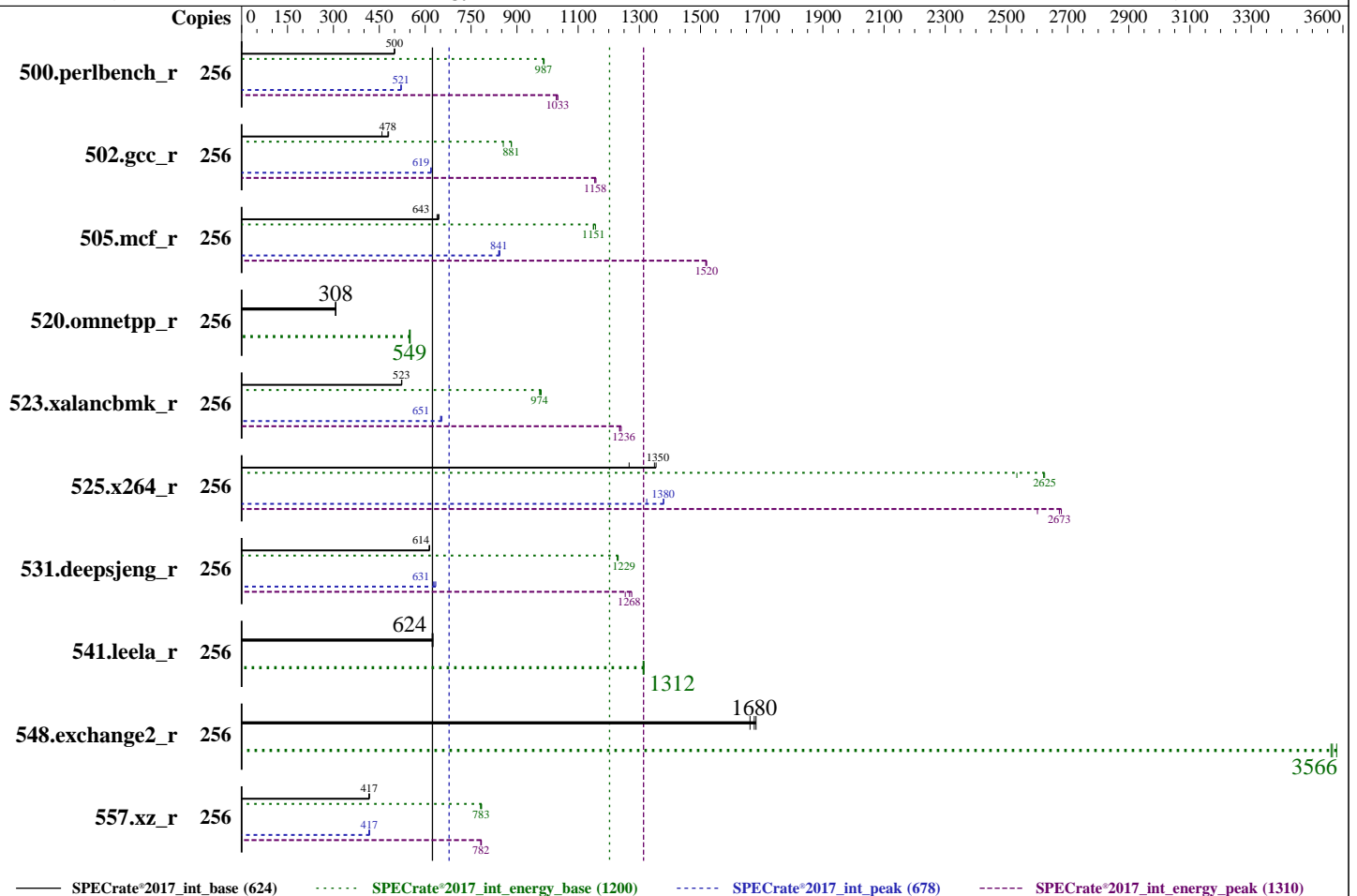
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Lenovo Global Technology ThinkSystem SR645 2.00 GHz, AMD EPYC 7702

SPECrate®2017_int_base =	624
SPECrate®2017_int_energy_base =	1200
SPECrate®2017_int_peak =	678
SPECrate®2017_int_energy_peak =	1310

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

Test Date: Apr-2020
Hardware Availability: Jun-2020
Software Availability: Dec-2019



Hardware

CPU Name: AMD EPYC 7702
 Max MHz: 3350
 Nominal: 2000
 Enabled: 128 cores, 2 chips, 2 threads/core
 Orderable: 1,2 chips
 Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 512 KB I+D on chip per core
 L3: 256 MB I+D on chip per chip,
 16 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 12 SP5 (x86_64)
 Kernel 4.12.14-120-default
 Compiler: C/C++/Fortran: Version 2.0.0 of AOCC
 Parallel: No
 Firmware: Lenovo BIOS Version D8E105F 1.00 released Mar-2020
 File System: xfs
 System State: Run level 3 (multi-user)
 Base Pointers: 64-bit
 Peak Pointers: 32/64-bit
 Other: jemalloc: jemalloc memory allocator library v5.2.0
 Power Management: BIOS set to prefer performance at the cost of additional power usage



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Power

Max. Power (W): 621.33
Idle Power (W): 118.3
Min. Temperature (C): 20.94
Elevation (m): 43
Line Standard: 220 V / 50 Hz / 1 phase / 1 wire
Provisioning: Line-powered

Power Settings

Management FW: Version 2.00 of D8BT05U
Memory Mode: Normal

Power-Relevant Hardware

Power Supply: 1 x 1100 W (non-redundant)
Details: ThinkSystem 1100W Platinum Power Supply SP57A14700
Backplane: 8 x 2.5-inch HDD back plane
Other Storage: RAID 930-8i 2GB Flash PCIe 12Gb Adapter
Storage Model #: 6FC81AB0
NICs Installed: 1 x ThinkSystem Ethernet 4-port Adaptor @ 1 Gb
NICs Enabled (FW/OS): 4 / 1
NICs Connected/Speed: 1 @ 1 Gb
Other HW Model #: 8 x High Performance fans

Power Analyzer

Power Analyzer: WIN:8888
Hardware Vendor: YOKOGAWA, Inc.
Model: YokogawaWT310E
Serial Number: C3UG05013E
Input Connection: Default
Metrology Institute: CNAS
Calibration By: China CEPREI Laboratory
Calibration Label: 1GA19013841-0005
Calibration Date: 27-Sep-2019
PTDaemon™ Version: 1.9.1 (a2d19f26; 2019-07-17)
Setup Description: Connected to PSU1
Current Ranges Used: 2.5A
Voltage Range Used: 300V

Temperature Meter

Temperature Meter: WIN:8889
Hardware Vendor: Digi International, Inc.
Model: DigiWATCHPORT_H
Serial Number: COM1
Input Connection: USB
PTDaemon Version: 1.9.1 (a2d19f26; 2019-07-17)
Setup Description: 50 mm in front of SUT main intake

Base Results Table

Benchmark	Copies	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power
500.perlbench_r	256	817	499	447	989	547	590	815	500	448	987	550	591	815	500	448	987	549	590
502.gcc_r	256	755	480	446	882	591	609	758	478	447	881	589	610	790	459	460	855	583	608
505.mcf_r	256	644	643	393	1150	611	620	648	639	394	1150	608	621	641	645	391	1160	610	621
520.omnetpp_r	256	1095	307	663	548	606	612	1092	308	662	549	606	612	1091	308	660	551	605	610
523.xalancbmk_r	256	516	524	300	976	581	589	517	523	301	974	581	591	517	523	299	979	578	589
525.x264_r	256	332	1350	185	2620	557	587	331	1350	185	2620	560	592	354	1270	192	2530	542	582
531.deepsjeng_r	256	478	614	260	1230	543	590	479	613	260	1230	543	584	477	615	259	1230	543	584
541.leela_r	256	680	624	350	1310	514	545	677	626	349	1320	515	544	681	623	349	1310	513	542
548.exchange2_r	256	400	1680	204	3570	509	517	399	1680	203	3580	509	517	404	1660	204	3560	506	517
557.xz_r	256	665	416	385	781	579	594	663	417	384	783	579	594	662	418	383	784	579	592

SPECrate®2017_int_base = 624

SPECrate®2017_int_energy_base = 1200

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



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Peak Results Table

Benchmark	Copies	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power
500.perlbench_r	256	781	522	428	1030	548	587	782	521	428	1030	547	586	783	521	430	1030	549	589
502.gcc_r	256	585	619	340	1160	581	607	586	618	341	1160	581	609	585	620	341	1150	583	610
505.mcf_r	256	492	840	298	1520	605	615	492	841	298	1520	606	615	490	844	298	1520	609	617
520.omnetpp_r	256	1095	307	663	548	606	612	1092	308	662	549	606	612	1091	308	660	551	605	610
523.xalancbmk_r	256	416	651	237	1240	570	591	415	651	237	1240	570	591	413	655	236	1240	571	591
525.x264_r	256	339	1320	187	2600	552	585	325	1380	181	2680	558	589	325	1380	182	2670	559	591
531.deepsjeng_r	256	468	626	254	1250	543	587	462	635	250	1280	541	603	465	631	251	1270	541	578
541.leela_r	256	680	624	350	1310	514	545	677	626	349	1320	515	544	681	623	349	1310	513	542
548.exchange2_r	256	400	1680	204	3570	509	517	399	1680	203	3580	509	517	404	1660	204	3560	506	517
557.xz_r	256	660	419	383	784	581	594	662	417	384	782	580	593	665	416	384	782	578	593

SPECrate®2017_int_peak = 678

SPECrate®2017_int_energy_peak = 1310

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 numactl i.e.:
numactl --interleave=all runcpu <etc>

Set dirty_ratio=8 to limit dirty cache to 8% of memory
Set swappiness=1 to swap only if necessary
Set zone_reclaim_mode=1 to free local node memory and avoid remote memory
sync then drop_caches=3 to reset caches before invoking runcpu

dirty_ratio, swappiness, zone_reclaim_mode and drop_caches were
all set using privileged echo (e.g. echo 1 > /proc/sys/vm/swappiness).

Transparent huge pages set to 'always' for this run (OS default)



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Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
 "/home/cpu2017-1.1.0-amd-rome-aocc200-C1/amd_rate_aocc200_rome_C_lib/64;
 /home/cpu2017-1.1.0-amd-rome-aocc200-C1/amd_rate_aocc200_rome_C_lib/32:"
MALLOCONF = "retain:true"

General Notes

Binaries were compiled on a system with 2x AMD EPYC 7601 CPU + 512GB Memory using Fedora 26

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.

Yes: The test sponsor attests, as of date of publication, that CVE-2018-3640 (Spectre variant 3a) is mitigated in the system as tested and documented.

Yes: The test sponsor attests, as of date of publication, that CVE-2018-3639 (Spectre variant 4) is mitigated in the system as tested and documented.

jemalloc: configured and built with GCC v9.1.0 in Ubuntu 19.04 with -O3 -znver2 -flto
jemalloc 5.2.0 is available here:
<https://github.com/jemalloc/jemalloc/releases/download/5.2.0/jemalloc-5.2.0.tar.bz2>

Platform Notes

BIOS settings:
Choose Operating Mode set to Custom Mode
Determinism Slider set to Power
cTDP set to Manual
cTDP Manual set to 200
Memory Speed set to 3200MHz
NUMA nodes per socket set to NPS4
Zero Output set to Advanced Mode
L2 Stream HW Prefetcher set to Disable

Sysinfo program /home/cpu2017-1.1.0-amd-rome-aocc200-C1/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011
running on linux-d9uk Sat Apr 4 22:09:30 2020

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

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Platform Notes (Continued)

For more information on this section, see
<https://www.spec.org/cpu2017/Docs/config.html#sysinfo>

```
From /proc/cpuinfo
model name : AMD EPYC 7702 64-Core Processor
 2 "physical id"s (chips)
256 "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 : 64
siblings  : 128
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 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
physical 1: 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 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
```

```
From lscpu:
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:             Little Endian
Address sizes:          43 bits physical, 48 bits virtual
CPU(s):                 256
On-line CPU(s) list:   0-255
Thread(s) per core:    2
Core(s) per socket:    64
Socket(s):              2
NUMA node(s):          8
Vendor ID:              AuthenticAMD
CPU family:             23
Model:                  49
Model name:             AMD EPYC 7702 64-Core Processor
Stepping:               0
CPU MHz:                2000.000
CPU max MHz:           2000.0000
CPU min MHz:           1500.0000
BogoMIPS:               3992.61
Virtualization:        AMD-V
L1d cache:              32K
L1i cache:              32K
L2 cache:               512K
L3 cache:               16384K
NUMA node0 CPU(s):     0-15,128-143
NUMA node1 CPU(s):     16-31,144-159
```

(Continued on next page)



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Platform Notes (Continued)

```
NUMA node2 CPU(s): 32-47,160-175
NUMA node3 CPU(s): 48-63,176-191
NUMA node4 CPU(s): 64-79,192-207
NUMA node5 CPU(s): 80-95,208-223
NUMA node6 CPU(s): 96-111,224-239
NUMA node7 CPU(s): 112-127,240-255
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 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_l2 mwaitx cpb
cat_l3 cdp_l3 hw_pstate sme ssbd sev ibrs ibpb stibp vmmcall fsgsbase bmi1 avx2 smep
bmi2 cqm rdt_a rdseed adx smap clflushopt clwb sha_ni xsaveopt xsavec xgetbv1 xsaves
cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local clzero irperf xsaveerptr wbnoinvd
arat npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists
pausefilter pfthreshold avic v_vmsave_vmload vgif umip 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: 8 nodes (0-7)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 128 129 130 131 132 133 134 135 136
137 138 139 140 141 142 143
node 0 size: 64309 MB
node 0 free: 64016 MB
node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 144 145 146 147 148 149
150 151 152 153 154 155 156 157 158 159
node 1 size: 64504 MB
node 1 free: 64223 MB
node 2 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 160 161 162 163 164 165
166 167 168 169 170 171 172 173 174 175
node 2 size: 64504 MB
node 2 free: 64300 MB
node 3 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 176 177 178 179 180 181
182 183 184 185 186 187 188 189 190 191
node 3 size: 64492 MB
node 3 free: 64269 MB
node 4 cpus: 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 192 193 194 195 196 197
198 199 200 201 202 203 204 205 206 207
node 4 size: 64475 MB
node 4 free: 64160 MB
```

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Platform Notes (Continued)

node 5 cpus: 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 208 209 210 211 212 213
214 215 216 217 218 219 220 221 222 223

node 5 size: 64504 MB

node 5 free: 64169 MB

node 6 cpus: 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 224 225 226
227 228 229 230 231 232 233 234 235 236 237 238 239

node 6 size: 64504 MB

node 6 free: 64243 MB

node 7 cpus: 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 240 241
242 243 244 245 246 247 248 249 250 251 252 253 254 255

node 7 size: 64502 MB

node 7 free: 64180 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: 528179156 kB

HugePages_Total: 0

Hugepagesize: 2048 kB

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

SuSE-release:

SUSE Linux Enterprise Server 12 (x86_64)

VERSION = 12

PATCHLEVEL = 5

This file is deprecated and will be removed in a future service pack or release.

Please check /etc/os-release for details about this release.

os-release:

NAME="SLES"

VERSION="12-SP5"

VERSION_ID="12.5"

PRETTY_NAME="SUSE Linux Enterprise Server 12 SP5"

ID="sles"

ANSI_COLOR="0;32"

CPE_NAME="cpe:/o:suse:sles:12:sp5"

uname -a:

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Platform Notes (Continued)

```
Linux linux-d9uk 4.12.14-120-default #1 SMP Thu Nov 7 16:39:09 UTC 2019 (fd9dc36)
x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

```
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: Full AMD retpoline, IBPB:
conditional, IBRS_FW, STIBP: conditional, RSB
filling
tsx_async_abort:               Not affected
```

run-level 3 Apr 4 22:04

```
SPEC is set to: /home/cpu2017-1.1.0-amd-rome-aocc200-C1
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sdb3       xfs   889G   85G  805G  10% /
```

```
From /sys/devices/virtual/dmi/id
BIOS:      Lenovo D8E105F-1.00 03/19/2020
Vendor:    Lenovo
Product:   ThinkSystem SR645 MB
Product Family: ThinkSystem
Serial:    1234567890
```

Additional information from dmidecode follows. **WARNING:** Use caution when you interpret this section. The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

```
Memory:
16x Samsung M393A4K40DB3-CWE 32 kB 2 rank 3200
16x Unknown Unknown
```

(End of data from sysinfo program)



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Compiler Version Notes

=====
C | 502.gcc_r(peak)

AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin

=====
C | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak)
525.x264_r(base, peak) 557.xz_r(base, peak)

AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin

=====
C | 502.gcc_r(peak)

AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin

=====
C | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak)
525.x264_r(base, peak) 557.xz_r(base, peak)

AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin

=====
C++ | 523.xalancbmk_r(peak)

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Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin

=====
C++ | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base)
| 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)

AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin

=====
C++ | 523.xalancbmk_r(peak)

AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin

=====
C++ | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base)
| 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)

AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin

=====
Fortran | 548.exchange2_r(base, peak)

AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
Target: x86_64-unknown-linux-gnu

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SPEC CPU®2017 Integer Rate Result

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Lenovo Global Technology
ThinkSystem SR645
2.00 GHz, AMD EPYC 7702

SPECrate®2017_int_base = 624
SPECrate®2017_int_energy_base = 1200
SPECrate®2017_int_peak = 678
SPECrate®2017_int_energy_peak = 1310

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

Test Date: Apr-2020
Hardware Availability: Jun-2020
Software Availability: Dec-2019

Compiler Version Notes (Continued)

Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin

Base Compiler Invocation

C benchmarks:

clang

C++ benchmarks:

clang++

Fortran benchmarks:

flang

Base Portability Flags

500.perlbench_r: -DSPEC_LINUX_X64 -DSPEC_LP64
502.gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LINUX -DSPEC_LP64
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:

-flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=znver2 -fstruct-layout=3 -mllvm -unroll-threshold=50
-fremap-arrays -mllvm -function-specialize -mllvm -enable-gvn-hoist
-mllvm -reduce-array-computations=3 -mllvm -global-vectorize-slp
-mllvm -vector-library=LIBMVEC -mllvm -inline-threshold=1000
-flv-function-specialization -z muldefs -lmvec -lamdlibm -ljemalloc

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Base Optimization Flags (Continued)

C benchmarks (continued):
-lflang

C++ benchmarks:

```
-flto -Wl,-mllvm -Wl,-function-specialize  
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC  
-Wl,-mllvm -Wl,-reduce-array-computations=3  
-Wl,-mllvm -Wl,-suppress-fmas -O3 -ffast-math -march=znver2  
-mllvm -loop-unswitch-threshold=200000 -mllvm -vector-library=LIBMVEC  
-mllvm -unroll-threshold=100 -flv-function-specialization  
-mllvm -enable-partial-unswitch -z muldefs -lmvec -lamdlibm  
-ljemalloc -lflang
```

Fortran benchmarks:

```
-flto -Wl,-mllvm -Wl,-function-specialize  
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC  
-Wl,-mllvm -Wl,-reduce-array-computations=3 -ffast-math  
-Wl,-mllvm -Wl,-inline-recursion=4 -Wl,-mllvm -Wl,-lsr-in-nested-loop  
-Wl,-mllvm -Wl,-enable-iv-split -O3 -march=znver2 -funroll-loops  
-Mrecursive -mllvm -vector-library=LIBMVEC -z muldefs  
-mllvm -disable-indvar-simplify -mllvm -unroll-aggressive  
-mllvm -unroll-threshold=150 -lmvec -lamdlibm -ljemalloc -lflang
```

Peak Compiler Invocation

C benchmarks:
clang

C++ benchmarks:
clang++

Fortran benchmarks:
flang

Peak Portability Flags

```
500.perlbench_r: -DSPEC_LINUX_X64 -DSPEC_LP64  
502.gcc_r: -D_FILE_OFFSET_BITS=64
```

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Peak Portability Flags (Continued)

505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LINUX -D_FILE_OFFSET_BITS=64
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Peak Optimization Flags

C benchmarks:

500.perlbench_r: -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3
-fprofile-instr-generate(pass 1)
-fprofile-instr-use(pass 2) -Ofast -march=znver2
-mno-sse4a -fstruct-layout=5
-mllvm -vectorize-memory-aggressively
-mllvm -function-specialize -mllvm -enable-gvn-hoist
-mllvm -unroll-threshold=50 -fremap-arrays
-mllvm -vector-library=LIBMVEC
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp -mllvm -inline-threshold=1000
-flv-function-specialization -lmvec -lamdlibm -ljemalloc
-lflang

502 gcc_r: -m32 -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver2 -mno-sse4a -fstruct-layout=5
-mllvm -vectorize-memory-aggressively
-mllvm -function-specialize -mllvm -enable-gvn-hoist
-mllvm -unroll-threshold=50 -fremap-arrays
-mllvm -vector-library=LIBMVEC
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp -mllvm -inline-threshold=1000
-flv-function-specialization -fgnu89-inline -ljemalloc

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Software Availability: Dec-2019

Peak Optimization Flags (Continued)

```
505.mcf_r: -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver2 -mno-sse4a -fstruct-layout=5
-mllvm -vectorize-memory-aggressively
-mllvm -function-specialize -mllvm -enable-gvn-hoist
-mllvm -unroll-threshold=50 -fremap-arrays
-mllvm -vector-library=LIBMVEC
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp -mllvm -inline-threshold=1000
-flv-function-specialization -lmvec -lamdlibm -ljemalloc
-lflang
```

525.x264_r: Same as 500.perlbench_r

557.xz_r: Same as 505.mcf_r

C++ benchmarks:

520.omnetpp_r: basepeak = yes

```
523.xalancbmk_r: -m32 -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver2 -flv-function-specialization
-mllvm -unroll-threshold=100
-mllvm -enable-partial-unswitch
-mllvm -loop-unswitch-threshold=200000
-mllvm -vector-library=LIBMVEC
-mllvm -inline-threshold=1000 -ljemalloc
```

```
531.deepsjeng_r: -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver2 -flv-function-specialization
-mllvm -unroll-threshold=100
-mllvm -enable-partial-unswitch
-mllvm -loop-unswitch-threshold=200000
-mllvm -vector-library=LIBMVEC
-mllvm -inline-threshold=1000 -lmvec -lamdlibm -ljemalloc
-lflang
```

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Software Availability: Dec-2019

Peak Optimization Flags (Continued)

541.leela_r: basepeak = yes

Fortran benchmarks:

548.exchange2_r: basepeak = yes

Peak Other Flags

C benchmarks:

502 gcc_r: -L/sppo/dev/cpu2017/v110/amd_rate_aocc200_rome_C_lib/32

C++ benchmarks:

523.xalancbmk_r: -L/sppo/dev/cpu2017/v110/amd_rate_aocc200_rome_C_lib/32

The flags files that were used to format this result can be browsed at

<http://www.spec.org/cpu2017/flags/aocc200-flags-B1-1.html>

<http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Rome2P-J.html>

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2017/flags/aocc200-flags-B1-1.xml>

<http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Rome2P-J.xml>

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