SPEC CPU®2017 Floating Point Speed Result

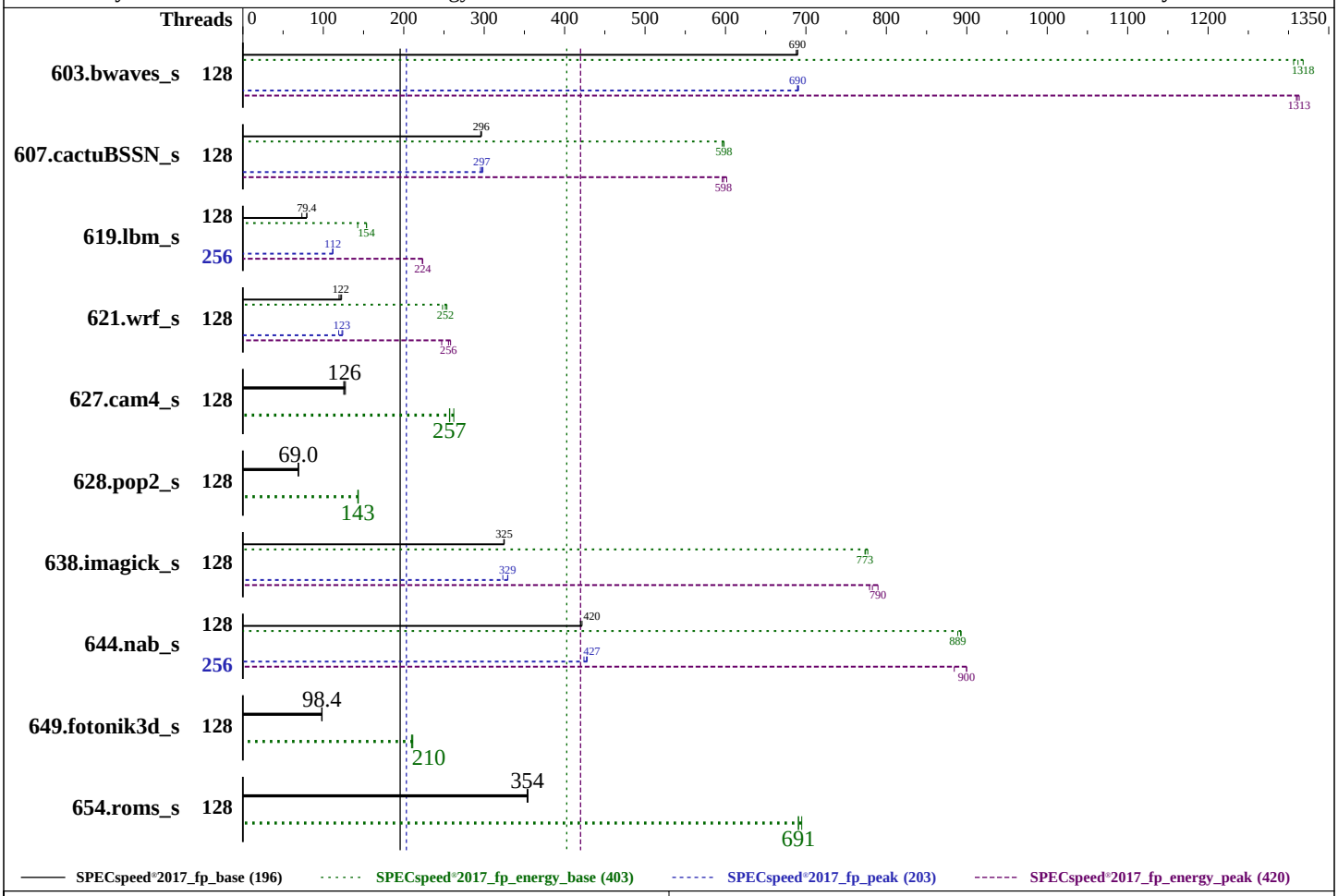
Lenovo Global Technology

ThinkSystem SR645
2.00 GHz, AMD EPYC 7702

SPECspeed®2017_fp_base =	196
SPECspeed®2017_fp_energy_base =	403
SPECspeed®2017_fp_peak =	203
SPECspeed®2017_fp_energy_peak =	420

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:	Yes
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:	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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Power

Max. Power (W): 604.9
Idle Power (W): 282.07
Min. Temperature (C): 20.63
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 #s: 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 #s: 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	Threads	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
603.bwaves_s	128	**85.6**	**690**	**48.8**	**1320**	**571**	**585**	85.5	690	49.3	1310	576	586	85.8	688	49.1	1310	572	585
607.cactuBSSN_s	128	56.4	296	30.6	596	543	559	56.2	296	30.5	598	543	561	**56.2**	**296**	**30.5**	**598**	**542**	**560**
619.lbm_s	128	**65.9**	**79.4**	**38.7**	**154**	**587**	**605**	65.9	79.4	38.7	154	587	605	71.4	73.4	41.7	143	584	597
621.wrf_s	128	**109**	**122**	**57.4**	**252**	**528**	**533**	108	123	56.9	254	528	534	111	120	58.2	248	526	531
627.cam4_s	128	70.7	125	37.5	257	531	567	**70.2**	**126**	**37.5**	**257**	**535**	**568**	69.5	127	36.8	262	529	564
628.pop2_s	128	172	69.2	90.9	144	530	536	**172**	**69.0**	**91.3**	**143**	**530**	**539**	173	68.8	91.2	143	528	535
638.imagick_s	128	44.4	325	20.3	774	457	522	**44.4**	**325**	**20.3**	**773**	**458**	**522**	44.5	324	20.2	777	455	522
644.nab_s	128	41.4	422	21.3	893	514	527	41.6	420	21.3	892	512	526	**41.6**	**420**	**21.4**	**889**	**514**	**525**
649.fotonik3d_s	128	92.6	98.5	48.5	211	524	582	93.1	98.0	48.8	210	525	579	**92.7**	**98.4**	**48.7**	**210**	**525**	**581**
654.roms_s	128	44.4	354	25.3	695	570	585	44.6	353	25.5	691	572	582	**44.5**	**354**	**25.5**	**691**	**572**	**584**

SPECspeed®2017_fp_base = 196

SPECspeed®2017_fp_energy_base = 403

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

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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

Peak Results Table

Benchmark	Threads	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
603.bwaves_s	128	**85.5**	**690**	**49.0**	**1310**	**573**	**585**	85.6	689	49.1	1310	574	587	85.4	691	49.1	1310	575	588
607.cactuBSSN_s	128	56.4	295	30.6	596	542	559	55.9	298	30.3	602	543	557	**56.1**	**297**	**30.5**	**598**	**544**	**559**
619.lbm_s	256	46.9	112	26.7	223	568	591	46.8	112	26.7	223	569	590	**46.8**	**112**	**26.6**	**224**	**568**	**591**
621.wrf_s	128	111	119	58.4	247	526	530	**107**	**123**	**56.5**	**256**	**526**	**532**	107	124	55.9	258	525	532
627.cam4_s	128	70.7	125	37.5	257	531	567	**70.2**	**126**	**37.5**	**257**	**535**	**568**	69.5	127	36.8	262	529	564
628.pop2_s	128	172	69.2	90.9	144	530	536	**172**	**69.0**	**91.3**	**143**	**530**	**539**	173	68.8	91.2	143	528	535
638.imagick_s	128	43.8	329	20.1	783	459	526	**43.8**	**329**	**19.9**	**790**	**454**	**517**	44.6	323	20.2	779	452	514
644.nab_s	256	41.2	424	21.5	884	522	538	40.8	428	21.1	900	518	538	**40.9**	**427**	**21.1**	**900**	**517**	**537**
649.fotonik3d_s	128	92.6	98.5	48.5	211	524	582	93.1	98.0	48.8	210	525	579	**92.7**	**98.4**	**48.7**	**210**	**525**	**581**
654.roms_s	128	44.4	354	25.3	695	570	585	44.6	353	25.5	691	572	582	**44.5**	**354**	**25.5**	**691**	**572**	**584**

SPECspeed®2017_fp_peak = **203**

SPECspeed®2017_fp_energy_peak = **420**

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)
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-255"
LD_LIBRARY_PATH =
      "/home/cpu2017-1.1.0-amd-rome-aocc200-C3/amd_speed_aocc200_rome_C_lib/64
      ;/home/cpu2017-1.1.0-amd-rome-aocc200-C3/amd_speed_aocc200_rome_C_lib/32
      :"
MALLOC_CONF = "retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "256"

Environment variables set by runcpu during the 603.bwaves_s peak run:
GOMP_CPU_AFFINITY = "0-127"

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:
GOMP_CPU_AFFINITY = "0-127"

Environment variables set by runcpu during the 619.lbm_s peak run:
GOMP_CPU_AFFINITY = "0 128 1 129 2 130 3 131 4 132 5 133 6 134 7 135 8 136 9
      137 10 138 11 139 12 140 13 141 14 142 15 143 16 144 17 145 18 146 19
      147 20 148 21 149 22 150 23 151 24 152 25 153 26 154 27 155 28 156 29
      157 30 158 31 159 32 160 33 161 34 162 35 163 36 164 37 165 38 166 39
      167 40 168 41 169 42 170 43 171 44 172 45 173 46 174 47 175 48 176 49
      177 50 178 51 179 52 180 53 181 54 182 55 183 56 184 57 185 58 186 59
      187 60 188 61 189 62 190 63 191 64 192 65 193 66 194 67 195 68 196 69
      197 70 198 71 199 72 200 73 201 74 202 75 203 76 204 77 205 78 206 79
      207 80 208 81 209 82 210 83 211 84 212 85 213 86 214 87 215 88 216 89
      217 90 218 91 219 92 220 93 221 94 222 95 223 96 224 97 225 98 226 99
      227 100 228 101 229 102 230 103 231 104 232 105 233 106 234 107 235 108
      236 109 237 110 238 111 239 112 240 113 241 114 242 115 243 116 244 117
      245 118 246 119 247 120 248 121 249 122 250 123 251 124 252 125 253 126
      254 127 255"

Environment variables set by runcpu during the 621.wrf_s peak run:
GOMP_CPU_AFFINITY = "0-127"

Environment variables set by runcpu during the 638.imagick_s peak run:
GOMP_CPU_AFFINITY = "0-127"

Environment variables set by runcpu during the 644.nab_s peak run:
GOMP_CPU_AFFINITY = "0 128 1 129 2 130 3 131 4 132 5 133 6 134 7 135 8 136 9
      137 10 138 11 139 12 140 13 141 14 142 15 143 16 144 17 145 18 146 19
      147 20 148 21 149 22 150 23 151 24 152 25 153 26 154 27 155 28 156 29
      157 30 158 31 159 32 160 33 161 34 162 35 163 36 164 37 165 38 166 39
```

(Continued on next page)

Environment Variables Notes (Continued)

```
167 40 168 41 169 42 170 43 171 44 172 45 173 46 174 47 175 48 176 49
177 50 178 51 179 52 180 53 181 54 182 55 183 56 184 57 185 58 186 59
187 60 188 61 189 62 190 63 191 64 192 65 193 66 194 67 195 68 196 69
197 70 198 71 199 72 200 73 201 74 202 75 203 76 204 77 205 78 206 79
207 80 208 81 209 82 210 83 211 84 212 85 213 86 214 87 215 88 216 89
217 90 218 91 219 92 220 93 221 94 222 95 223 96 224 97 225 98 226 99
227 100 228 101 229 102 230 103 231 104 232 105 233 106 234 107 235 108
236 109 237 110 238 111 239 112 240 113 241 114 242 115 243 116 244 117
245 118 246 119 247 120 248 121 249 122 250 123 251 124 252 125 253 126
254 127 255"
```

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 5.1.0 is available here:
https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.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
 Efficiency Mode set to Auto
 NUMA nodes per socket set to NPS2
 Zero Output set to Advanced Mode
```

(Continued on next page)

Platform Notes (Continued)

```
SOC C-state Control set to P0
Global C-state Control set to Disable

Sysinfo program /home/cpu2017-1.1.0-amd-rome-aocc200-C3/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011
running on linux-d9uk Sat Apr  4 05:34:43 2020

SUT (System Under Test) info as seen by some common utilities.
For more information on this section, see
   https://www.spec.org/cpu2017/Docs/config.html#sysinfo

From /proc/cpuinfo
   model name : AMD EPYC 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):        4
     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
```

(Continued on next page)

Platform Notes (Continued)

```
      BogoMIPS:            3992.51
      Virtualization:      AMD-V
      L1d cache:           32K
      L1i cache:           32K
      L2 cache:            512K
      L3 cache:            16384K
      NUMA node0 CPU(s):   0-31,128-159
      NUMA node1 CPU(s):   32-63,160-191
      NUMA node2 CPU(s):   64-95,192-223
      NUMA node3 CPU(s):   96-127,224-255
      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: 4 nodes (0-3)
    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 31 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146
    147 148 149 150 151 152 153 154 155 156 157 158 159
    node 0 size: 128814 MB
    node 0 free: 128257 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 63 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175
    176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191
    node 1 size: 128998 MB
    node 1 free: 128436 MB
    node 2 cpus: 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 95 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207
    208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223
    node 2 size: 128980 MB
    node 2 free: 128607 MB
    node 3 cpus: 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114
```

(Continued on next page)

Platform Notes (Continued)

```
  115 116 117 118 119 120 121 122 123 124 125 126 127 224 225 226 227 228 229 230 231 232
  233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254
  255
  node 3 size: 129007 MB
  node 3 free: 128687 MB
  node distances:
  node   0   1   2   3
    0:  10  12  32  32
    1:  12  10  32  32
    2:  32  32  10  12
    3:  32  32  12  10

From /proc/meminfo
   MemTotal:       528179876 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:
   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
```

(Continued on next page)

Platform Notes (Continued)

```
 CVE-2017-5753 (Spectre variant 1):       Mitigation: usercopy/swapgs 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 05:29

 SPEC is set to: /home/cpu2017-1.1.0-amd-rome-aocc200-C3
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/sdb3      xfs   889G  125G  765G  14% /

 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)
```

Compiler Version Notes

```
==============================================================================
C               | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
                | 644.nab_s(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
------------------------------------------------------------------------------

==============================================================================
```

(Continued on next page)

Compiler Version Notes (Continued)

```
C++, C, Fortran | 607.cactuBSSN_s(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
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
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         | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
                | 654.roms_s(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, C      | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
                | 628.pop2_s(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
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
------------------------------------------------------------------------------
```

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:
-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 -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm -ljemalloc
-lflang

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Base Optimization Flags (Continued)

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 -O3 -march=znver2
-funroll-loops -Mrecursive -mllvm -vector-library=LIBMVEC -z muldefs
-Kieee -fno-finite-math-only -DSPEC_OPENMP -fopenmp -fopenmp=libomp
-lomp -lpthread -ldl -lmvec -lamdlibm -ljemalloc -lflang

Benchmarks using both Fortran and C:
-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 -funroll-loops -Mrecursive -z muldefs
-Kieee -fno-finite-math-only -DSPEC_OPENMP -fopenmp -fopenmp=libomp
-lomp -lpthread -ldl -lmvec -lamdlibm -ljemalloc -lflang

Benchmarks using Fortran, C, and C++:
-std=c++98 -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
-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 -mllvm -loop-unswitch-threshold=200000
-mllvm -unroll-threshold=100 -mllvm -enable-partial-unswitch
-funroll-loops -Mrecursive -z muldefs -Kieee -fno-finite-math-only
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lpthread -ldl -lmvec
-lamdlibm -ljemalloc -lflang

Base Other Flags

C benchmarks:
-Wno-return-type

Fortran benchmarks:
-Wno-return-type

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Base Other Flags (Continued)

Benchmarks using both Fortran and C:
`-Wno-return-type`

Benchmarks using Fortran, C, and C++:
`-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`

Peak Portability Flags

`Same as Base Portability Flags`

Peak 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 -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
```

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Peak Optimization Flags (Continued)

C benchmarks (continued):
-flv-function-specialization -DSPEC_OPENMP -fopenmp -lmvec -lamdlibm
-fopenmp=libomp -lomp -lpthread -ldl -ljemalloc -lflang

Fortran benchmarks:

603.bwaves_s: -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
-march=znver2 -funroll-loops -Mrecursive
-mllvm -vector-library=LIBMVEC -Kieee
-fno-finite-math-only -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm
-ljemalloc -lflang

649.fotonik3d_s: basepeak = yes

654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

621.wrf_s: -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 -O3 -funroll-loops
-Mrecursive -Kieee -fno-finite-math-only -DSPEC_OPENMP
-fopenmp -fopenmp=libomp -lomp -lpthread -ldl -lmvec
-lamdlibm -ljemalloc -lflang

627.cam4_s: basepeak = yes

628.pop2_s: basepeak = yes

Benchmarks using Fortran, C, and C++:
-std=c++98 -flto -Wl,-mllvm -Wl,-function-specialize

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Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
-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 -mllvm -unroll-threshold=100
-mllvm -enable-partial-unswitch -mllvm -loop-unswitch-threshold=200000
-O3 -funroll-loops -Mrecursive -Kieee -fno-finite-math-only
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lpthread -ldl -lmvec
-lamdlibm -ljemalloc -lflang

Peak Other Flags

C benchmarks:
-Wno-return-type

Fortran benchmarks:
-Wno-return-type

Benchmarks using both Fortran and C:
-Wno-return-type

Benchmarks using Fortran, C, and C++:
-Wno-return-type

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/aocc200-flags-C3.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-C3.xml
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Rome2P-J.xml

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

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