# SPEC CPU®2017 Floating Point Rate Result

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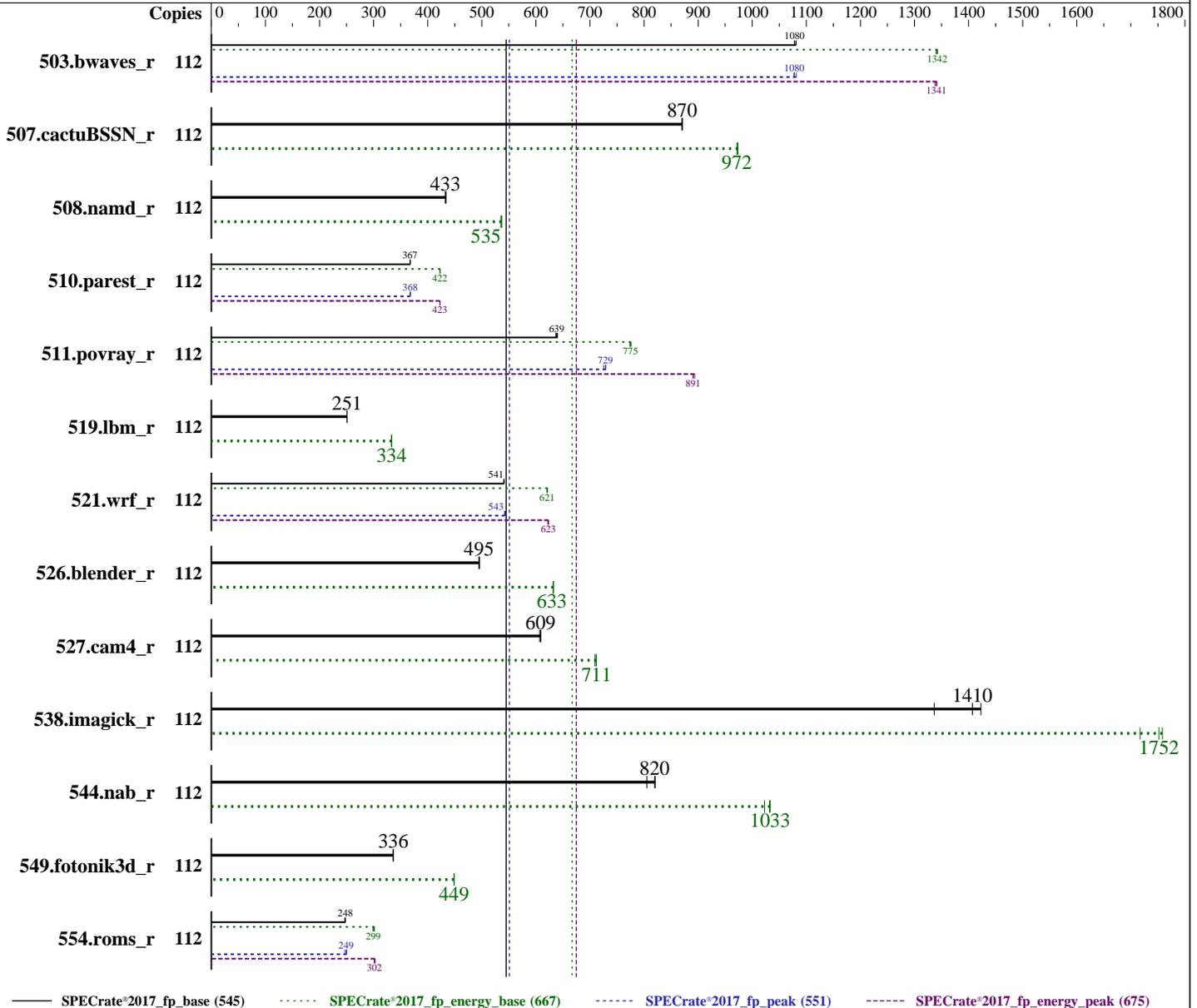
## Lenovo Global Technology

ThinkSystem SR860 V2
(2.60 GHz, Intel Xeon Platinum 8376HL)

SPECrate®2017_fp_base =         545
SPECrate®2017_fp_energy_base = 667
SPECrate®2017_fp_peak =         551
SPECrate®2017_fp_energy_peak = 675

**CPU2017 License:** 9017
**Test Sponsor:** Lenovo Global Technology
**Tested by:** Lenovo Global Technology
**Test Date:** Oct-2020
**Hardware Availability:** Nov-2020
**Software Availability:** Apr-2020



| Benchmark | Copies | Values |
|---|---|---|
| 503.bwaves_r | 112 | 1080 / 1342 / 1080 / 1341 |
| 507.cactuBSSN_r | 112 | 870 / 972 |
| 508.namd_r | 112 | 433 / 535 |
| 510.parest_r | 112 | 367 / 422 / 368 / 423 |
| 511.povray_r | 112 | 639 / 775 / 729 / 891 |
| 519.lbm_r | 112 | 251 / 334 |
| 521.wrf_r | 112 | 541 / 621 / 543 / 623 |
| 526.blender_r | 112 | 495 / 633 |
| 527.cam4_r | 112 | 609 / 711 |
| 538.imagick_r | 112 | 1410 / 1752 |
| 544.nab_r | 112 | 820 / 1033 |
| 549.fotonik3d_r | 112 | 336 / 449 |
| 554.roms_r | 112 | 248 / 299 / 249 / 302 |

SPECrate®2017_fp_base (545) ········ SPECrate®2017_fp_energy_base (667) ------ SPECrate®2017_fp_peak (551) ------ SPECrate®2017_fp_energy_peak (675)

## Hardware

CPU Name: Intel Xeon Platinum 8376HL
 Max MHz: 4300
 Nominal: 2600
 Enabled: 112 cores, 4 chips
 Orderable: 2,4 chips

**(Continued on next page)**

## Software

OS: Red Hat Enterprise Linux release 8.2 (Ootpa)
 Kernel 4.18.0-193.el8.x86_64

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## Hardware (Continued)

Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 38.5 MB I+D on chip per chip
 Other: None
Memory: 384 GB (24 x 16 GB 2Rx8 PC4-3200AA-R)
Storage: 1 x 960 GB SATA SSD
Other: None

## Software (Continued)

Compiler: C/C++: Version 19.1.1.217 of Intel C/C++ Compiler for Linux; Fortran: Version 19.1.1.217 of Intel Fortran Compiler for Linux
Parallel: No
Firmware: Lenovo BIOS Version M5E107D 1.00 released Sep-2020
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: jemalloc memory allocator V5.0.1
Power Management: BIOS set to prefer performance at the cost of additional power usage

## Power

Max. Power (W): 1024.9
Idle Power (W): 158.92
Min. Temperature (C): 21.31
Elevation (m): 43
Line Standard: 220 V / 50 Hz / 1 phase / 3 wires
Provisioning: Line-powered

## Power Settings

Management FW: Version 1.00 of TGBT07M
Memory Mode: Normal

## Power-Relevant Hardware

Power Supply: 1 x 1800 W (non-redundant)
 Details: ThinkSystem 1800W Platinum Power Supply 4P57A26294
Backplane: 8 x 2.5-inch HDD back plane
Other Storage: None
Storage Model #s: 4XB7A17089
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: 1 x ThinkSystem SR860 V2 Performance Fan Upgrade Kit

## Power Analyzer

Power Analyzer: WIN:9888
Hardware Vendor: YOKOGAWA, Inc.
Model: YokogawaWT310E
Serial Number: C3UD17023E
Input Connection: Default
Metrology Institute: CNAS
Calibration By: China CEPREI Laboratory
Calibration Label: J202009040176A-0001
Calibration Date: 25-Sep-2020
PTDaemon™ Version: 1.9.1 (a2d19f26; 2019-07-17)
Setup Description: Connected to PSU1

## Temperature Meter

Temperature Meter: WIN:9889
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

**(Continued on next page)**

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### Power Analyzer (Continued)

Current Ranges Used: 5A
Voltage Range Used: 300V

## 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 503.bwaves_r | 112 | **1042** | **1080** | **912** | **1340** | **876** | **883** | 1039 | 1080 | 912 | 1340 | 878 | 884 | 1042 | 1080 | 914 | 1340 | 877 | 884 |
| 507.cactuBSSN_r | 112 | 163 | 870 | 160 | 973 | 983 | 1000 | **163** | **870** | **160** | **972** | **984** | **998** | 163 | 871 | 160 | 973 | 984 | 998 |
| 508.namd_r | 112 | **246** | **433** | **217** | **535** | **882** | **905** | 245 | 434 | 216 | 537 | 882 | 904 | 246 | 433 | 216 | 536 | 879 | 904 |
| 510.parest_r | 112 | 796 | 368 | 753 | 423 | 946 | 1020 | 798 | 367 | 755 | 422 | 946 | 1020 | **797** | **367** | **755** | **422** | **946** | **1020** |
| 511.povray_r | 112 | **410** | **639** | **366** | **775** | **894** | **934** | 409 | 640 | 366 | 776 | 895 | 932 | 411 | 637 | 367 | 774 | 893 | 936 |
| 519.lbm_r | 112 | 470 | 251 | 402 | 333 | 855 | 862 | 471 | 251 | 402 | 333 | 855 | 862 | **470** | **251** | **402** | **334** | **855** | **861** |
| 521.wrf_r | 112 | 463 | 541 | 441 | 621 | 951 | 991 | **463** | **541** | **441** | **621** | **952** | **990** | 464 | 541 | 441 | 621 | 951 | 993 |
| 526.blender_r | 112 | 345 | 495 | 292 | 632 | 848 | 898 | **345** | **495** | **292** | **633** | **847** | **900** | 344 | 496 | 292 | 633 | 848 | 920 |
| 527.cam4_r | 112 | 322 | 609 | 300 | 712 | 932 | 1010 | 323 | 607 | 301 | 709 | 932 | 1000 | **322** | **609** | **300** | **711** | **932** | **1010** |
| 538.imagick_r | 112 | 208 | 1340 | 176 | 1720 | 843 | 1010 | 196 | 1420 | 172 | 1760 | 876 | 1010 | **198** | **1410** | **172** | **1750** | **870** | **1020** |
| 544.nab_r | 112 | 234 | 805 | 200 | 1020 | 853 | 911 | **230** | **820** | **198** | **1030** | **860** | **912** | 230 | 821 | 198 | 1030 | 862 | 911 |
| 549.fotonik3d_r | 112 | 1298 | 336 | 1080 | 449 | 835 | 847 | **1297** | **336** | **1080** | **449** | **835** | **843** | 1297 | 336 | 1080 | 449 | 835 | 843 |
| 554.roms_r | 112 | **718** | **248** | **655** | **299** | **913** | **948** | 718 | 248 | 651 | 302 | 907 | 947 | 721 | 247 | 656 | 299 | 910 | 946 |

| | |
|---|---|
| **SPECrate®2017_fp_base =** | 545 |
| **SPECrate®2017_fp_energy_base =** | 667 |

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

## 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 503.bwaves_r | 112 | 1039 | 1080 | 913 | 1340 | 879 | 895 | **1042** | **1080** | **913** | **1340** | **876** | **892** | 1043 | 1080 | 915 | 1340 | 878 | 893 |
| 507.cactuBSSN_r | 112 | 163 | 870 | 160 | 973 | 983 | 1000 | **163** | **870** | **160** | **972** | **984** | **998** | 163 | 871 | 160 | 973 | 984 | 998 |
| 508.namd_r | 112 | **246** | **433** | **217** | **535** | **882** | **905** | 245 | 434 | 216 | 537 | 882 | 904 | 246 | 433 | 216 | 536 | 879 | 904 |
| 510.parest_r | 112 | **797** | **368** | **754** | **423** | **947** | **1020** | 797 | 368 | 754 | 423 | 946 | 1020 | 797 | 368 | 754 | 423 | 947 | 1020 |
| 511.povray_r | 112 | 361 | 725 | 319 | 891 | 883 | 916 | **359** | **729** | **319** | **891** | **888** | **917** | 359 | 729 | 318 | 894 | 886 | 918 |
| 519.lbm_r | 112 | 470 | 251 | 402 | 333 | 855 | 862 | 471 | 251 | 402 | 333 | 855 | 862 | **470** | **251** | **402** | **334** | **855** | **861** |
| 521.wrf_r | 112 | 462 | 543 | 439 | 624 | 951 | 984 | 463 | 542 | 440 | 622 | 952 | 989 | **462** | **543** | **440** | **623** | **951** | **988** |
| 526.blender_r | 112 | 345 | 495 | 292 | 632 | 848 | 898 | **345** | **495** | **292** | **633** | **847** | **900** | 344 | 496 | 292 | 633 | 848 | 920 |
| 527.cam4_r | 112 | 322 | 609 | 300 | 712 | 932 | 1010 | 323 | 607 | 301 | 709 | 932 | 1000 | **322** | **609** | **300** | **711** | **932** | **1010** |
| 538.imagick_r | 112 | 208 | 1340 | 176 | 1720 | 843 | 1010 | 196 | 1420 | 172 | 1760 | 876 | 1010 | **198** | **1410** | **172** | **1750** | **870** | **1020** |
| 544.nab_r | 112 | 234 | 805 | 200 | 1020 | 853 | 911 | **230** | **820** | **198** | **1030** | **860** | **912** | 230 | 821 | 198 | 1030 | 862 | 911 |
| 549.fotonik3d_r | 112 | 1298 | 336 | 1080 | 449 | 835 | 847 | **1297** | **336** | **1080** | **449** | **835** | **843** | 1297 | 336 | 1080 | 449 | 835 | 843 |
| 554.roms_r | 112 | 711 | 250 | 649 | 303 | 912 | 949 | **714** | **249** | **651** | **302** | **912** | **950** | 721 | 247 | 652 | 301 | 904 | 948 |

| | |
|---|---|
| **SPECrate®2017_fp_peak =** | 551 |
| **SPECrate®2017_fp_energy_peak =** | 675 |

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

## Compiler Notes

```
The inconsistent Compiler version information under Compiler Version section is due to a discrepancy in Intel Compiler.
The correct version of C/C++ compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux
The correct version of Fortran compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux
```

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## Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

## Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

## Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
     "/home/cpu2017-1.1.0-ic19.1.1/lib/intel64:/home/cpu2017-1.1.0-ic19.1.1/j
     e5.0.1-64"
MALLOC_CONF = "retain:true"
```

## General Notes

```
 Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
 memory using Redhat Enterprise Linux 8.0
 Transparent Huge Pages enabled by default
 Prior to runcpu invocation
 Filesystem page cache synced and cleared with:
 sync; echo 3>         /proc/sys/vm/drop_caches
 runcpu command invoked through numactl i.e.:
 numactl --interleave=all runcpu <etc>
NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2)
is mitigated in the system as tested and documented.
 jemalloc, a general purpose malloc implementation
 built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
 sources available from jemalloc.net or https://github.com/jemalloc/jemalloc/releases
```

## Platform Notes

```
 BIOS settings:
 Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
 Turbo Mode set to Disabled
```

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Standard Performance Evaluation Corporation (info@spec.org)          https://www.spec.org/

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## Platform Notes (Continued)

```
CPU P-state Control set to Cooperative with Legacy
C-States set to Legacy
Memory Power Management set to Automatic
UPI Link Disable set to Disabled 1 Link
Platform Controlled Type set to Minimal Power
Hyper-Threading set to Disabled
SNC set to Enabled
C1 Enhanced Mode set to Enabled
LLC dead line alloc set to Disable

Sysinfo program /home/cpu2017-1.1.0-ic19.1.1/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011
running on localhost.localdomain Sat Oct 24 03:16:49 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 : Intel(R) Xeon(R) Platinum 8376HL CPU @ 2.60GHz
      4  "physical id"s (chips)
      112 "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 : 28
      siblings  : 28
      physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
      28 29 30
      physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
      28 29 30
      physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
      28 29 30
      physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
      28 29 30

From lscpu:
   Architecture:        x86_64
   CPU op-mode(s):      32-bit, 64-bit
   Byte Order:          Little Endian
   CPU(s):              112
   On-line CPU(s) list: 0-111
   Thread(s) per core:  1
   Core(s) per socket:  28
   Socket(s):           4
   NUMA node(s):        8
```

**(Continued on next page)**

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## Platform Notes (Continued)

```
            Vendor ID:               GenuineIntel
            CPU family:              6
            Model:                   85
            Model name:              Intel(R) Xeon(R) Platinum 8376HL CPU @ 2.60GHz
            Stepping:                11
            CPU MHz:                 1000.025
            BogoMIPS:                5200.00
            Virtualization:          VT-x
            L1d cache:               32K
            L1i cache:               32K
            L2 cache:                1024K
            L3 cache:                39424K
            NUMA node0 CPU(s):       0-3,7-9,14-17,21-23
            NUMA node1 CPU(s):       4-6,10-13,18-20,24-27
            NUMA node2 CPU(s):       28-31,35-37,42-45,49-51
            NUMA node3 CPU(s):       32-34,38-41,46-48,52-55
            NUMA node4 CPU(s):       56-59,63-65,70-73,77-79
            NUMA node5 CPU(s):       60-62,66-69,74-76,80-83
            NUMA node6 CPU(s):       84-87,91-93,98-101,105-107
            NUMA node7 CPU(s):       88-90,94-97,102-104,108-111
            Flags:                   fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
    pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
    lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
    aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
    xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave
    avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3
    invpcid_single intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi
    flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm
    cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
    avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
    cqm_mbm_local avx512_bf16 dtherm arat pln pts hwp_epp pku ospke avx512_vnni md_clear
    flush_l1d arch_capabilities

 /proc/cpuinfo cache data
    cache size : 39424 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 7 8 9 14 15 16 17 21 22 23
    node 0 size: 47970 MB
    node 0 free: 47758 MB
    node 1 cpus: 4 5 6 10 11 12 13 18 19 20 24 25 26 27
    node 1 size: 48380 MB
    node 1 free: 48259 MB
```

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## Platform Notes (Continued)

```
   node 2 cpus: 28 29 30 31 35 36 37 42 43 44 45 49 50 51
   node 2 size: 48353 MB
   node 2 free: 48256 MB
   node 3 cpus: 32 33 34 38 39 40 41 46 47 48 52 53 54 55
   node 3 size: 48380 MB
   node 3 free: 48283 MB
   node 4 cpus: 56 57 58 59 63 64 65 70 71 72 73 77 78 79
   node 4 size: 48380 MB
   node 4 free: 48070 MB
   node 5 cpus: 60 61 62 66 67 68 69 74 75 76 80 81 82 83
   node 5 size: 48380 MB
   node 5 free: 48217 MB
   node 6 cpus: 84 85 86 87 91 92 93 98 99 100 101 105 106 107
   node 6 size: 48380 MB
   node 6 free: 48251 MB
   node 7 cpus: 88 89 90 94 95 96 97 102 103 104 108 109 110 111
   node 7 size: 48380 MB
   node 7 free: 48282 MB
   node distances:
   node   0   1   2   3   4   5   6   7
     0:  10  11  20  20  20  20  30  30
     1:  11  10  20  20  20  20  30  30
     2:  20  20  10  11  30  30  20  20
     3:  20  20  11  10  30  30  20  20
     4:  20  20  30  30  10  11  20  20
     5:  20  20  30  30  11  10  20  20
     6:  30  30  20  20  20  20  10  11
     7:  30  30  20  20  20  20  11  10

 From /proc/meminfo
    MemTotal:       395885732 kB
    HugePages_Total:        0
    Hugepagesize:        2048 kB

 /usr/bin/lsb_release -d
    Red Hat Enterprise Linux release 8.2 (Ootpa)

 From /etc/*release* /etc/*version*
    os-release:
       NAME="Red Hat Enterprise Linux"
       VERSION="8.2 (Ootpa)"
       ID="rhel"
       ID_LIKE="fedora"
       VERSION_ID="8.2"
       PLATFORM_ID="platform:el8"
```

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## Platform Notes (Continued)

```
     PRETTY_NAME="Red Hat Enterprise Linux 8.2 (Ootpa)"
     ANSI_COLOR="0;31"
   redhat-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
   system-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
   system-release-cpe: cpe:/o:redhat:enterprise_linux:8.2:ga

 uname -a:
    Linux localhost.localdomain 4.18.0-193.el8.x86_64 #1 SMP Fri Mar 27 14:35:58 UTC 2020
    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/swapgs barriers and __user
                                      pointer sanitization
 CVE-2017-5715 (Spectre variant 2):    Mitigation: Enhanced IBRS, IBPB: conditional,
                                      RSB filling
 tsx_async_abort:                     Not affected

 run-level 3 Oct 24 03:10

 SPEC is set to: /home/cpu2017-1.1.0-ic19.1.1
    Filesystem      Type  Size  Used Avail Use% Mounted on
    /dev/sda3       xfs   892G   43G  850G   5% /

 From /sys/devices/virtual/dmi/id
    BIOS:    Lenovo M5E107D-1.00 09/16/2020
    Vendor:  Lenovo
    Product: ThinkSystem SR860 V2
    Product Family: ThinkSystem
    Serial:  none

 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:
    24x NO DIMM NO DIMM
    24x SK Hynix HMA82GR7CJR8N-XN 16 GB 2 rank 3200
```

**(Continued on next page)**

## Lenovo Global Technology

ThinkSystem SR860 V2
(2.60 GHz, Intel Xeon Platinum 8376HL)

SPECrate®2017_fp_base =           545

SPECrate®2017_fp_energy_base = 667

SPECrate®2017_fp_peak =           551

SPECrate®2017_fp_energy_peak = 675

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

**Test Date:**              Oct-2020
**Hardware Availability:** Nov-2020
**Software Availability:**  Apr-2020

## Platform Notes (Continued)

```
  (End of data from sysinfo program)
```

## Compiler Version Notes

```
==============================================================================
C                  | 519.lbm_r(base, peak) 538.imagick_r(base, peak)
                   | 544.nab_r(base, peak)
------------------------------------------------------------------------------
Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
C++                | 508.namd_r(base, peak) 510.parest_r(base, peak)
------------------------------------------------------------------------------
Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
C++, C             | 511.povray_r(base) 526.blender_r(base, peak)
------------------------------------------------------------------------------
Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
C++, C             | 511.povray_r(peak)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------


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

**(Continued on next page)**

# SPEC CPU®2017 Floating Point Rate Result

## Lenovo Global Technology

ThinkSystem SR860 V2
(2.60 GHz, Intel Xeon Platinum 8376HL)

SPECrate®2017_fp_base =           545
SPECrate®2017_fp_energy_base = 667
SPECrate®2017_fp_peak =           551
SPECrate®2017_fp_energy_peak = 675

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

**Test Date:** Oct-2020
**Hardware Availability:** Nov-2020
**Software Availability:** Apr-2020

## Compiler Version Notes (Continued)

```
C++, C          | 511.povray_r(base) 526.blender_r(base, peak)
------------------------------------------------------------------------
Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------


========================================================================
C++, C          | 511.povray_r(peak)
------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------


========================================================================
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
------------------------------------------------------------------------
Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------


========================================================================
Fortran         | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
                | 554.roms_r(base, peak)
------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------


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

**(Continued on next page)**

## Lenovo Global Technology

ThinkSystem SR860 V2
(2.60 GHz, Intel Xeon Platinum 8376HL)

SPECrate®2017_fp_base = 545
SPECrate®2017_fp_energy_base = 667
SPECrate®2017_fp_peak = 551
SPECrate®2017_fp_energy_peak = 675

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

**Test Date:** Oct-2020
**Hardware Availability:** Nov-2020
**Software Availability:** Apr-2020

## Compiler Version Notes (Continued)

```
Fortran, C    | 521.wrf_r(base) 527.cam4_r(base, peak)
------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------


==========================================================================
Fortran, C    | 521.wrf_r(peak)
------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------


==========================================================================
Fortran, C    | 521.wrf_r(base) 527.cam4_r(base, peak)
------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------


==========================================================================
Fortran, C    | 521.wrf_r(peak)
------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------
```

## Lenovo Global Technology

ThinkSystem SR860 V2
(2.60 GHz, Intel Xeon Platinum 8376HL)

SPECrate®2017_fp_base = 545
SPECrate®2017_fp_energy_base = 667
SPECrate®2017_fp_peak = 551
SPECrate®2017_fp_energy_peak = 675

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

**Test Date:** Oct-2020
**Hardware Availability:** Nov-2020
**Software Availability:** Apr-2020

# Base Compiler Invocation

C benchmarks:
`icc`

C++ benchmarks:
`icpc`

Fortran benchmarks:
`ifort`

Benchmarks using both Fortran and C:
`ifort icc`

Benchmarks using both C and C++:
`icpc icc`

Benchmarks using Fortran, C, and C++:
`icpc icc ifort`

# Base Portability Flags

503.bwaves_r: `-DSPEC_LP64`
507.cactuBSSN_r: `-DSPEC_LP64`
508.namd_r: `-DSPEC_LP64`
510.parest_r: `-DSPEC_LP64`
511.povray_r: `-DSPEC_LP64`
519.lbm_r: `-DSPEC_LP64`
521.wrf_r: `-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian`
526.blender_r: `-DSPEC_LP64 -DSPEC_LINUX -funsigned-char`
527.cam4_r: `-DSPEC_LP64 -DSPEC_CASE_FLAG`
538.imagick_r: `-DSPEC_LP64`
544.nab_r: `-DSPEC_LP64`
549.fotonik3d_r: `-DSPEC_LP64`
554.roms_r: `-DSPEC_LP64`

# Base Optimization Flags

C benchmarks:
`-m64 -qnextgen -std=c11`
`-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs`

**(Continued on next page)**

## Lenovo Global Technology

ThinkSystem SR860 V2
(2.60 GHz, Intel Xeon Platinum 8376HL)

SPECrate®2017_fp_base = 545
SPECrate®2017_fp_energy_base = 667
SPECrate®2017_fp_peak = 551
SPECrate®2017_fp_energy_peak = 675

**CPU2017 License:** 9017
**Test Sponsor:** Lenovo Global Technology
**Tested by:** Lenovo Global Technology
**Test Date:** Oct-2020
**Hardware Availability:** Nov-2020
**Software Availability:** Apr-2020

# Base Optimization Flags (Continued)

C benchmarks (continued):
```
-fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

C++ benchmarks:
```
-m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Fortran benchmarks:
```
-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld=gold -xCORE-AVX512 -O3 -ipo -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
-auto -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Benchmarks using both Fortran and C:
```
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo -no-prec-div
-qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles -nostandard-realloc-lhs
-align array32byte -auto -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Benchmarks using both C and C++:
```
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Benchmarks using Fortran, C, and C++:
```
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo -no-prec-div
-qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles -nostandard-realloc-lhs
-align array32byte -auto -mbranches-within-32B-boundaries
```

# SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

## Lenovo Global Technology

ThinkSystem SR860 V2
(2.60 GHz, Intel Xeon Platinum 8376HL)

| | |
|---|---|
| SPECrate®2017_fp_base = | 545 |
| SPECrate®2017_fp_energy_base = 667 | |
| SPECrate®2017_fp_peak = | 551 |
| SPECrate®2017_fp_energy_peak = 675 | |

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

**Test Date:** Oct-2020
**Hardware Availability:** Nov-2020
**Software Availability:** Apr-2020

## Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
`-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

## Peak Compiler Invocation

C benchmarks:
`icc`

C++ benchmarks:
`icpc`

Fortran benchmarks:
`ifort`

Benchmarks using both Fortran and C:
`ifort icc`

Benchmarks using both C and C++:
`icpc icc`

Benchmarks using Fortran, C, and C++:
`icpc icc ifort`

## Peak Portability Flags

`Same as Base Portability Flags`

## Peak Optimization Flags

C benchmarks:

519.lbm_r: `basepeak = yes`

538.imagick_r: `basepeak = yes`

544.nab_r: `basepeak = yes`

**(Continued on next page)**

## Lenovo Global Technology

ThinkSystem SR860 V2
(2.60 GHz, Intel Xeon Platinum 8376HL)

SPECrate®2017_fp_base = 545
SPECrate®2017_fp_energy_base = 667
SPECrate®2017_fp_peak = 551
SPECrate®2017_fp_energy_peak = 675

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

**Test Date:** Oct-2020
**Hardware Availability:** Nov-2020
**Software Availability:** Apr-2020

# Peak Optimization Flags (Continued)

C++ benchmarks:

508.namd_r: basepeak = yes

510.parest_r: -m64 -qnextgen
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -fuse-ld=gold -xCORE-AVX512 -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -L/usr/local/jemalloc64-5.0.1/lib
-ljemalloc

Fortran benchmarks:

503.bwaves_r: -m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -fuse-ld=gold -xCORE-AVX512 -O3 -ipo
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs
-align array32byte -auto -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

549.fotonik3d_r: basepeak = yes

554.roms_r: Same as 503.bwaves_r

Benchmarks using both Fortran and C:

521.wrf_r: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512 -O3
-ipo -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

527.cam4_r: basepeak = yes

Benchmarks using both C and C++:

511.povray_r: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512 -O3
-ipo -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

**(Continued on next page)**

## Lenovo Global Technology

ThinkSystem SR860 V2
(2.60 GHz, Intel Xeon Platinum 8376HL)

| | |
|---|---|
| SPECrate®2017_fp_base = | 545 |
| SPECrate®2017_fp_energy_base = | 667 |
| SPECrate®2017_fp_peak = | 551 |
| SPECrate®2017_fp_energy_peak = | 675 |

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

**Test Date:** Oct-2020
**Hardware Availability:** Nov-2020
**Software Availability:** Apr-2020

# Peak Optimization Flags (Continued)

526.blender_r: `basepeak = yes`

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: `basepeak = yes`

The flags files that were used to format this result can be browsed at
`http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.html`
`http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Cooperlake-A.html`

You can also download the XML flags sources by saving the following links:
`http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.xml`
`http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Cooperlake-A.xml`

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

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