## Lenovo Global Technology

**ThinkSystem SR650 (2.70 GHz, Intel Xeon Platinum 8270)**

<table>
<thead>
<tr>
<th>SPECrate2017_fp_base =</th>
<th>271</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_fp_peak =</td>
<td>Not Run</td>
</tr>
</tbody>
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**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>Intel Xeon Platinum 8270</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz.:</td>
<td>4000</td>
</tr>
<tr>
<td>Nominal:</td>
<td>2700</td>
</tr>
<tr>
<td>Enabled:</td>
<td>52 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td>Orderable:</td>
<td>1.2 chips</td>
</tr>
<tr>
<td>Cache L1:</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2:</td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td>L3:</td>
<td>35.75 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)</td>
</tr>
<tr>
<td>Storage:</td>
<td>1 x 800 GB SATA SSD</td>
</tr>
<tr>
<td>Other:</td>
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<table>
<thead>
<tr>
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<tr>
<td>OS:</td>
</tr>
<tr>
<td>Compiler</td>
</tr>
<tr>
<td>Compiler Build</td>
</tr>
<tr>
<td>Compiler Build</td>
</tr>
<tr>
<td>Parallel:</td>
</tr>
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<tr>
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</tr>
<tr>
<td>Base Pointers:</td>
</tr>
<tr>
<td>Peak Pointers:</td>
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<tr>
<td>Other:</td>
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</table>

### Specrate2017_fp_base (271)

<table>
<thead>
<tr>
<th>Copies</th>
<th>SPECrate2017_fp_base</th>
</tr>
</thead>
<tbody>
<tr>
<td>503.bwaves_r</td>
<td>104</td>
</tr>
<tr>
<td>507.cactuBSSN_r</td>
<td>104</td>
</tr>
<tr>
<td>508.namd_r</td>
<td>104</td>
</tr>
<tr>
<td>510.parest_r</td>
<td>104</td>
</tr>
<tr>
<td>511.povray_r</td>
<td>104</td>
</tr>
<tr>
<td>519.lbm_r</td>
<td>104</td>
</tr>
<tr>
<td>521.wrf_r</td>
<td>104</td>
</tr>
<tr>
<td>526.blender_r</td>
<td>104</td>
</tr>
<tr>
<td>527.cam4_r</td>
<td>104</td>
</tr>
<tr>
<td>538.imagick_r</td>
<td>104</td>
</tr>
<tr>
<td>544.nab_r</td>
<td>104</td>
</tr>
<tr>
<td>549.fotonik3d_r</td>
<td>104</td>
</tr>
<tr>
<td>554.roms_r</td>
<td>104</td>
</tr>
</tbody>
</table>

**Test Date:** May-2019  
**Hardware Availability:** Apr-2019  
**Software Availability:** Nov-2018
**SPEC CPU2017 Floating Point Rate Result**

**Lenovo Global Technology**

ThinkSystem SR650  
(2.70 GHz, Intel Xeon Platinum 8270)

---

**SPECrate2017_fp_base = 271**  
**SPECrate2017_fp_peak = Not Run**

---

**Results Table**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>503.bwaves_r</td>
<td>104</td>
<td>1964</td>
<td>531</td>
<td>1965</td>
<td>531</td>
<td>1967</td>
<td>530</td>
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<td>250</td>
<td>525</td>
<td>251</td>
<td>524</td>
<td>251</td>
</tr>
<tr>
<td>508.namd_r</td>
<td>104</td>
<td>413</td>
<td>239</td>
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<td>241</td>
<td>410</td>
<td>241</td>
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<td>2101</td>
<td>130</td>
<td>2114</td>
<td>129</td>
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<tr>
<td>511.povray_r</td>
<td>104</td>
<td>646</td>
<td>376</td>
<td>649</td>
<td>374</td>
<td>648</td>
<td>375</td>
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<tr>
<td>519.lbm_r</td>
<td>104</td>
<td>851</td>
<td>129</td>
<td>851</td>
<td>129</td>
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<td>129</td>
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<tr>
<td>521.wrf_r</td>
<td>104</td>
<td>1002</td>
<td>232</td>
<td>1011</td>
<td>230</td>
<td>1013</td>
<td>230</td>
</tr>
<tr>
<td>526.blender_r</td>
<td>104</td>
<td>449</td>
<td>353</td>
<td>450</td>
<td>352</td>
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<td>352</td>
</tr>
<tr>
<td>527.cam4_r</td>
<td>104</td>
<td>521</td>
<td>349</td>
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<td>521</td>
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<tr>
<td>538.imagick_r</td>
<td>104</td>
<td>330</td>
<td>784</td>
<td>345</td>
<td>749</td>
<td>342</td>
<td>757</td>
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<td>544.nab_r</td>
<td>104</td>
<td>309</td>
<td>566</td>
<td>311</td>
<td>563</td>
<td>309</td>
<td>566</td>
</tr>
<tr>
<td>549.fotonik3d_r</td>
<td>104</td>
<td>2334</td>
<td>174</td>
<td>2337</td>
<td>173</td>
<td>2336</td>
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<tr>
<td>554.roms_r</td>
<td>104</td>
<td>1649</td>
<td>100</td>
<td>1649</td>
<td>100</td>
<td>1640</td>
<td>101</td>
</tr>
</tbody>
</table>

---

**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"

---

**General Notes**

Environment variables set by runcpu before the start of the run:

LD_LIBRARY_PATH = "/home/cpu2017-1.0.5-ic19.0u1/lib/intel64"

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5

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.:

```
umactl --interleave=all runcpu <etc>
```

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)

---

(Continued on next page)
### Lenovo Global Technology

**ThinkSystem SR650**  
(2.70 GHz, Intel Xeon Platinum 8270)

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</thead>
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<td>Hardware Availability: Apr-2019</td>
</tr>
<tr>
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<td>Software Availability: Nov-2018</td>
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**SPEC CPU2017 Floating Point Rate Result**

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<tbody>
<tr>
<td>SPECrate2017_fp_peak = Not Run</td>
</tr>
</tbody>
</table>

**General Notes (Continued)**

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.

**Platform Notes**

**BIOS configuration:**
Choose Operating Mode set to Maximum Performance  
Choose Operating Mode set to Custom Mode  
C-states set to Legacy  
SNC set to Enable  
DCU Streamer Prefetcher set to Disable  
Trusted Execution Technology set to Enable  
Stale AtoS set to Enable  
LLC dead line alloc set to Disable  
Patrol Scrub set to Disable  
Sysinfo program /home/cpu2017-1.0.5-ic19.0u1/bin/sysinfo  
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9  
runtime on localhost.localdomain Mon May 13 17:29:02 2019

**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

```plaintext
model name : Intel(R) Xeon(R) Platinum 8270 CPU @ 2.70GHz  
  2 "physical id"s (chips)  
  104 "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 : 26  
siblings : 52  
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  
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
```

From lscpu:

```plaintext
Architecture: x86_64  
CPU op-mode(s): 32-bit, 64-bit
```

(Continued on next page)
SPEC CPU2017 Floating Point Rate Result

Lenovo Global Technology
ThinkSystem SR650
(2.70 GHz, Intel Xeon Platinum 8270)

SPECrater2017_fp_base = 271
SPECrater2017_fp_peak = Not Run

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: May-2019
Tested by: Lenovo Global Technology
Hardware Availability: Apr-2019
Software Availability: Nov-2018

Platform Notes (Continued)

Byte Order: Little Endian
CPU(s): 104
On-line CPU(s) list: 0-103
Thread(s) per core: 2
Core(s) per socket: 26
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Platinum 8270 CPU @ 2.70GHz
Stepping: 6
CPU MHz: 2700.000
BogoMIPS: 5400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 36608K
NUMA node1 CPU(s): 4-6,10-12,16-18,23-25,56-58,62-64,68-70,73-74,77-79,82-84,87-90,93-95,98-100

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 arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc aperfmpref eagerfpu 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 epb cat_l3 cdp_l3 intel_pt ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnni flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erts invpcid rtm cqm mpx rd_t_a avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsaves xsavec xgetbv1 cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts pku ospke avx512_vnni spec_ctrl intel_stibp flush_lld arch_capabilities

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

node 0 cpus: 0 1 2 3 7 8 9 13 14 15 20 21 22 52 53 54 55 59 60 61 65 66 67 72 73 74
data size: 196220 MB
node 0 free: 191598 MB
node 1 cpus: 4 5 6 10 11 12 16 17 18 19 23 24 25 56 57 58 62 63 64 68 69 70 71 75 76 77
data size: 196608 MB
node 1 free: 191683 MB

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR650
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<thead>
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<tr>
<td>Hardware Availability:</td>
<td>Apr-2019</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Nov-2018</td>
</tr>
</tbody>
</table>

**Platform Notes (Continued)**

```plaintext
node 2 cpus: 26 27 28 29 33 34 35 39 40 41 46 47 48 78 79 80 81 85 86 87 91 92 93 98 99 100
node 2 size: 196608 MB
node 2 free: 192146 MB
node 3 cpus: 30 31 32 36 37 38 42 43 44 45 49 50 51 82 83 84 88 89 90 94 95 96 97 101 102 103
node 3 size: 196608 MB
node 3 free: 192096 MB
node distances:
node 0 distances: 10 11 21 21
node 1 distances: 11 10 21 21
node 2 distances: 21 21 10 11
node 3 distances: 21 21 11 10

From /proc/meminfo
MemTotal: 792178240 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

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

```plaintext
NAME="Red Hat Enterprise Linux Server"
VERSION="7.6 (Maipo)"
ID="rhel"
ID_LIKE="fedora"
VARIANT="Server"
VARIANT_ID="server"
VERSION_ID="7.6"
PRETTY_NAME="Red Hat Enterprise Linux Server 7.6 (Maipo)"
redhat-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)
```

```plaintext
uname -a:
Linux localhost.localdomain 3.10.0-957.el7.x86_64 #1 SMP Thu Oct 4 20:48:51 UTC 2018
x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

- **CVE-2017-5754 (Meltdown):** Not affected
- **CVE-2017-5753 (Spectre variant 1):** Mitigation: Load fences, __user pointer sanitization
- **CVE-2017-5715 (Spectre variant 2):** Mitigation: Enhanced IBRS

```
run-level 3 May 13 17:24
```

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u1

(Continued on next page)
**SPEC CPU2017 Floating Point Rate Result**

**Lenovo Global Technology**

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</table>

**Platform Notes (Continued)**

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sdb2</td>
<td>xfs</td>
<td>689G</td>
<td>116G</td>
<td>573G</td>
<td>17%</td>
<td>/home</td>
</tr>
</tbody>
</table>

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.

- BIOS Lenovo -[IVE135R-2.10]- 02/27/2019
- Memory:  
  24x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)

**Compiler Version Notes**

```
---
CC  519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
---
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
---
CXXC 508.namd_r(base) 510.parest_r(base)
---
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
---
CC  511.povray_r(base) 526.blender_r(base)
---
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.1.144 Build 20181018  
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---
FC  507.cactuBSSN_r(base)
---
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
```

(Continued on next page)
## Lenovo Global Technology

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<td>May-2019</td>
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### SPECrate2017_fp_base = 271

### SPECrate2017_fp_peak = Not Run

---

## Compiler Version Notes (Continued)

Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

**Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,**  
Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

**Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,**  
Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---

**FC 503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)**

---

**Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,**  
Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---

**CC 521.wrf_r(base) 527.cam4_r(base)**

---

**Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,**  
Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---

**Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,**  
Version 19.0.1.144 Build 20181018  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---

### Base Compiler Invocation

**C benchmarks:**

`icc -m64 -std=c11`

**C++ benchmarks:**

`icpc -m64`

**Fortran benchmarks:**

`ifort -m64`

**Benchmarks using both Fortran and C:**

`ifort -m64 icc -m64 -std=c11`

**Benchmarks using both C and C++:**

`icpc -m64 icc -m64 -std=c11`

(Continued on next page)
**SPEC CPU2017 Floating Point Rate Result**

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**Base Compiler Invocation (Continued)**

Benchmarks using Fortran, C, and C++:

```bash
icpc -m64 icc -m64 -std=c11 ifort -m64
```

**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:

```bash
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4
```

C++ benchmarks:

```bash
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4
```

Fortran benchmarks:

```bash
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte
```

Benchmarks using both Fortran and C:

```bash
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte
```

Benchmarks using both C and C++:

```bash
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4
```

(Continued on next page)
### Lenovo Global Technology

**ThinkSystem SR650**  
(2.70 GHz, Intel Xeon Platinum 8270)

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**SPECrate2017_fp_base** = 271  
**SPECrate2017_fp_peak** = Not Run

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#### Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2
-ipo
-O3
-no-prec-div
-qopt-prefetch
-ffinite-math-only
-qopt-mem-layout-trans=4
-auto
-nostandard-realloc-lhs
-align array32byte

The flags files that were used to format this result can be browsed at:
- [Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-A.html](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-A.html)

You can also download the XML flags sources by saving the following links:
- [Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-A.xml](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-A.xml)

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

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