**Lenovo Global Technology**  
ThinkSystem SR590  
(1.70 GHz, Intel Xeon Bronze 3106)  

**SPECrater2017_int_base = 45.1**  
**SPECrater2017_int_peak = 46.3**

<table>
<thead>
<tr>
<th>Test Sponsor</th>
<th>Lenovo Global Technology</th>
<th>Hardware Availability</th>
<th>Test Date:</th>
<th>Dec-2017</th>
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<tbody>
<tr>
<td>Tested by</td>
<td>Lenovo Global Technology</td>
<td>Software Availability</td>
<td></td>
<td>Sep-2017</td>
</tr>
</tbody>
</table>

| Software     | OS: SUSE Linux Enterprise Server 12 SP3 (x86_64)  
|--------------|Kernel 4.4.73-5-default  
| Compiler:    | C/C++: Version 18.0.0.128 of Intel C/C++  
|              | Compiler for Linux: Fortran: Version 18.0.0.128 of Intel Fortran  
|              | Compiler for Linux  
| Parallel:    | No  
| Firmware:    | Lenovo BIOS Version TEE119J 1.20 released Sep-2017  
| File System: | btrfs  
| System State | Run level 3 (multi-user)  
| Base Pointers | 64-bit  
| Peak Pointers | 32/64-bit  
| Other:       | jemalloc: jemalloc memory allocator library  
|              | jemalloc configured and built at default for 32bit (i686) and 64bit (x86_64) targets;  
|              | jemalloc: built with the RedHat Enterprise 7.4;  
|              | and the system compiler gcc 4.8.5;  
|              | jemalloc: sources available from jemalloc.net or releases  

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<th>CPU Name:</th>
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</thead>
<tbody>
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<td>Enabled:</td>
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<td>Cache L1:</td>
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<tr>
<th>500.perlbench_r</th>
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| Compiler: | C/C++: Version 18.0.0.128 of Intel C/C++  
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Lenovo Global Technology
ThinkSystem SR590
(1.70 GHz, Intel Xeon Bronze 3106)

SPECrate2017_int_base = 45.1
SPECrate2017_int_peak = 46.3

Results Table

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<thead>
<tr>
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<th>Seconds</th>
<th>Ratio</th>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

SPECrate2017_int_base = 45.1
SPECrate2017_int_peak = 46.3

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

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/cpu2017.1.0.2.ic18.0/lib/ia32:/home/cpu2017.1.0.2.ic18.0/lib/intel64"
LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/home/cpu2017.1.0.2.ic18.0/je5.0.1-32:/home/cpu2017.1.0.2.ic18.0/je5.0.1-64"
Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.4
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>
No: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
No: 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.
No: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2)

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR590
(1.70 GHz, Intel Xeon Bronze 3106)

SPECrate2017_int_base = 45.1
SPECrate2017_int_peak = 46.3

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: Dec-2017
Tested by: Lenovo Global Technology
Hardware Availability: Nov-2017
Software Availability: Sep-2017

General Notes (Continued)

is mitigated in the system as tested and documented.

This benchmark result is intended to provide perspective on past performance using the historical hardware and/or software described on this result page.

The system as described on this result page was formerly generally available. At the time of this publication, it may not be shipping, and/or may not be supported, and/or may fail to meet other tests of General Availability described in the SPEC OSG Policy document, http://www.spec.org/osg/policy.html

This measured result may not be representative of the result that would be measured were this benchmark run with hardware and software available as of the publication date.

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance
DCU Streamer Prefetcher set to Disable
MONITORMWAIT set to Enable
XPT Prefetcher set to Enable
Stale AtoS set to Enable
LLC Deadline Alloc set to Disable
Sysinfo program /home/cpu2017.1.0.2.ic18.0/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcb091c0f running on SR590-2 Tue Dec 26 13:53:02 2017

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) Bronze 3106 CPU @ 1.70GHz
  2 "physical id"s (chips)
  16 "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 : 8
  siblings : 8
  physical 0: cores 0 1 2 3 4 5 6 7
  physical 1: cores 0 1 2 3 4 5 6 7

From lscpu:
  Architecture: x86_64

(Continued on next page)
SPEC CPU2017 Integer Rate Result

Lenovo Global Technology
ThinkSystem SR590
(1.70 GHz, Intel Xeon Bronze 3106)

SPECrate2017_int_base = 45.1
SPECrate2017_int_peak = 46.3

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: Dec-2017
Tested by: Lenovo Global Technology
Hardware Availability: Nov-2017
Software Availability: Sep-2017

Platform Notes (Continued)

CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 16
On-line CPU(s) list: 0-15
Thread(s) per core: 1
Core(s) per socket: 8
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Bronze 3106 CPU @ 1.70GHz
Stepping: 4
CPU MHz: 1696.010
BogoMIPS: 3392.02
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 11264K
NUMA node0 CPU(s): 0-7
NUMA node1 CPU(s): 8-15
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 apic cpuid
smp tsc tsc_adjust tm mts mvb ms save mxsr mp pe pme mce cx16 xtpr dca
pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
xsave avx f16c rdrand lahf_lm abm 3dnowprefetch arat epb pln pts dtherm intel_pstate
tp_batching vmtors flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2
erms invpcid rtm cqm mpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd
avx512bw avx512v1 xsaveopt xsavec xgetbv1 cqm_llc cqm_occupancy l1c

/cache data
  cache size: 11264 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
available: 2 nodes (0-1)
node 0 cpus: 0 1 2 3 4 5 6 7
node 0 size: 192986 MB
node 0 free: 192550 MB
node 1 cpus: 8 9 10 11 12 13 14 15
node 1 size: 193517 MB
node 1 free: 193185 MB
distance:
node 0 1
  0: 10 21

(Continued on next page)
## Lenovo Global Technology

ThinkSystem SR590  
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**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology  
**Software Availability:** Sep-2017

### Platform Notes (Continued)

1. 21 10

- From `/proc/meminfo`
  - MemTotal: 395780800 kB
  - HugePages_Total: 0
  - Hugepagesize: 2048 kB

- From `/etc/*release` /`/etc/*version`:
  - SuSE-release:
    - SUSE Linux Enterprise Server 12 (x86_64)  
    - VERSION = 12  
    - PATCHLEVEL = 3  
    - # 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-SP3"  
    - VERSION_ID="12.3"  
    - PRETTY_NAME="SUSE Linux Enterprise Server 12 SP3"  
    - ID="sles"  
    - ANSI_COLOR="0;32"  
    - CPE_NAME="cpe:/o:suse:sles:12:sp3"

- `uname -a`:
  - Linux SR590-2 4.4.73-5-default #1 SMP Tue Jul 4 15:33:39 UTC 2017 (b7ce4e4) x86_64  
  - x86_64 x86_64 GNU/Linux  
  - run-level 3 Dec 26 13:52

- SPEC is set to: `/home/cpu2017.1.0.2.ic18.0`  
- Filesystem Type Size Used Avail Use% Mounted on  
  - /dev/sdb2 btrfs 744G 88G 655G 12% /home

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 -[TEE119J-1.20]- 09/06/2017  
- Memory:
  - 12x Hynix HMA84GR7AFR4N-VK 32 GB 2 rank 2666, configured at 2133  
  - 4x NO DIMM NO DIMM

(End of data from sysinfo program)
Lenovo Global Technology  
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Compiler Version Notes

==============================================================================
CC  500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)  
   525.x264_r(base, peak) 557.xz_r(base, peak)  
ICC (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
==============================================================================

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icpc (ICC) 18.0.0 20170811  
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icpc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
==============================================================================

==============================================================================
FC  548.exchange2_r(base, peak)  
ifort (IFORT) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
==============================================================================

Base Compiler Invocation

C benchmarks:
	icc

C++ benchmarks:
	icpc

(Continued on next page)
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Base Compiler Invocation (Continued)

Fortran benchmarks:
ifort

Base Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
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:
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc

C++ benchmarks:
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc

Fortran benchmarks:
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte
-L/usr/local/je5.0.1-64/lib -ljemalloc

Base Other Flags

C benchmarks:
-m64 -std=c11

C++ benchmarks:
-m64

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR590
(1.70 GHz, Intel Xeon Bronze 3106)

SPECrate2017_int_base = 45.1
SPECrate2017_int_peak = 46.3

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology
Test Date: Dec-2017
Hardware Availability: Nov-2017
Software Availability: Sep-2017

Base Other Flags (Continued)

Fortran benchmarks:
-m64

Peak Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

Peak Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -D_FILE_OFFSET_BITS=64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -D_FILE_OFFSET_BITS=64 -DSPEC_LINUX
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: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3
-fno-strict-overflow -L/usr/local/je5.0.1-64/lib
-ljemalloc

502.gcc_r: -L/opt/intel/compilers_and_libraries_2018/linux/lib/ia32
-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3
-L/usr/local/je5.0.1-32/lib -ljemalloc

(Continued on next page)
**Lenovo Global Technology**  
ThinkSystem SR590  
(1.70 GHz, Intel Xeon Bronze 3106)  

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### Peak Optimization Flags (Continued)

**505.mcf_r**:
- `-Wl,-z,muldefs`  
- `-xCORE-AVX512`  
- `-ipo -O3 -no-prec-div`  
- `-qopt-mem-layout-trans=3`  
- `-L/usr/local/je5.0.1-64/lib`  
- `-ljemalloc`  

**525.x264_r**:
- `-Wl,-z,muldefs`  
- `-xCORE-AVX512`  
- `-ipo -O3 -no-prec-div`  
- `-qopt-mem-layout-trans=3`  
- `-fno-alias`  
- `-L/usr/local/je5.0.1-64/lib`  
- `-ljemalloc`  

**557.xz_r**:
- Same as 505.mcf_r

**C++ benchmarks**:

**520.omnetpp_r**:
- `-Wl,-z,muldefs`  
- `-prof-gen(pass 1)`  
- `-prof-use(pass 2)`  
- `-ipo`  
- `-xCORE-AVX512`  
- `-O3 -no-prec-div -qopt-mem-layout-trans=3`  
- `-L/usr/local/je5.0.1-64/lib`  
- `-ljemalloc`  

**523.xalancbmk_r**:
- `-L/opt/intel/compilers_and_libraries_2018/linux/lib/ia32`  
- `-Wl,-z,muldefs`  
- `-prof-gen(pass 1)`  
- `-prof-use(pass 2)`  
- `-ipo`  
- `-xCORE-AVX512`  
- `-O3 -no-prec-div -qopt-mem-layout-trans=3`  
- `-L/usr/local/je5.0.1-32/lib`  
- `-ljemalloc`  

**531.deepsjeng_r**:
- Same as 520.omnetpp_r

**541.leela_r**:
- Same as 520.omnetpp_r

**Fortran benchmarks**:

- `-Wl,-z,muldefs`  
- `-xCORE-AVX512`  
- `-ipo -O3 -no-prec-div`  
- `-qopt-mem-layout-trans=3`  
- `-nostandard-realloc-lhs -align array32byte`  
- `-L/usr/local/je5.0.1-64/lib`  
- `-ljemalloc`

### Peak Other Flags

**C benchmarks (except as noted below)**:
- `-m64 -std=c11`

**502.gcc_r**:
- `-m32 -std=c11`

**C++ benchmarks (except as noted below)**:
- `-m64`

**523.xalancbmk_r**:
- `-m32`

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

ThinkSystem SR590
(1.70 GHz, Intel Xeon Bronze 3106)

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**SPECrate2017_int_base** = 45.1
**SPECrate2017_int_peak** = 46.3

#### Peak Other Flags (Continued)

Fortran benchmarks:

- `-m64`

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

- [Intel-ic18.0-official-linux64.html](http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.html)

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

- [Intel-ic18.0-official-linux64.xml](http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.xml)
- [Lenovo-Platform-SPECcpu2017-Flags-V1.2-SKL-A.xml](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-SKL-A.xml)

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