Lenovo Global Technology
ThinkSystem ST550
(2.60 GHz, Intel Xeon Silver 4112)

SPECraten2017_int_base = 43.6
SPECraten2017_int_peak = 46.2

Hardware
CPU Name: Intel Xeon Silver 4112
Max MHz.: 3000
Nominal: 2600
Enabled: 8 cores, 2 chips, 2 threads/core
Orderable: 1.2 chips
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 1 MB I+D on chip per core
L3: 8.25 MB I+D on chip per chip
Other: None
Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2666V-R, running at 2400)
Storage: 1 x 800 GB SAS SSD
Other: None

Software
OS: SUSE Linux Enterprise Server 12 SP2 (x86_64)
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 OOE107W 1.01 released Aug-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 V5.0.1;
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
## Results Table

<table>
<thead>
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<th>Ratio</th>
<th>Seconds</th>
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<td>31.4</td>
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</tbody>
</table>

**SPECrate2017_int_base =** 43.6  
**SPECrate2017_int_peak =** 46.2

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>
```

---

Lenovo Global Technology  
ThinkSystem ST550  
(2.60 GHz, Intel Xeon Silver 4112)
Lenovo Global Technology
ThinkSystem ST550
(2.60 GHz, Intel Xeon Silver 4112)

SPECrate2017_int_base = 43.6
SPECrate2017_int_peak = 46.2

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

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance
DCU Streamer Prefetcher set to Disable
MONITORMWAIT set to Enable
SNC 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 96c45e4568ad54c135fd618bce091c0f
running on ST550 Thu Nov 23 02:51:27 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) Silver 4112 CPU @ 2.60GHz
   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 : 4
   siblings : 8
   physical 0: cores 1 2 3 4
   physical 1: cores 1 2 4 5

From lscpu:
   Architecture: x86_64
   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: 2
   Core(s) per socket: 4
   Socket(s): 2
   NUMA node(s): 2
   Vendor ID: GenuineIntel
   CPU family: 6
   Model: 85
   Model name: Intel(R) Xeon(R) Silver 4112 CPU @ 2.60GHz
   Stepping: 4
   CPU MHz: 2593.910
   BogoMIPS: 5187.82
   Virtualization: VT-x
   L1d cache: 32K
   L1i cache: 32K

(Continued on next page)
Platform Notes (Continued)

L2 cache: 1024K
L3 cache: 8448K
NUMA node0 CPU(s): 0-3,8-11
NUMA node1 CPU(s): 4-7,12-15
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 arch_perfmon pebs bts rep_good ntopology nonstop_tsc
aperfmpref eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
fma cx16 xtpr pdcm pid cd8064a sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
xsave avx f16c rdrand lahf_lm abm 3nowprefetch ida arat epb pln pts dtherm intel_pt
tpr_shadow vmmflexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2
erms invpcid rtm cmov avx512f avx512d avx512dq rdseed adx smap clflushopt clwb avx512cd
avx512bw avx512vl xsaveopt xsavec xgetbv1 cmovi11c qim102dc

From /proc/cpuinfo cache data

cache size: 8448 KB

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

node: 0 cpus: 0 1 2 3 8 9 10 11
node: 0 size: 19311 MB
node: 0 free: 192390 MB
node: 1 cpus: 4 5 6 7 12 13 14 15
node: 1 size: 193504 MB
node: 1 free: 192826 MB
node distances:

node distances:

node 0 1 2 3 4 5 6 7 8 9 10 11
node 0 0 0 0 0 0 0 0 0 0 0 0
node 1 0 0 0 0 0 0 0 0 0 0 0
node 2 0 0 0 0 0 0 0 0 0 0 0
node 3 0 0 0 0 0 0 0 0 0 0 0
node 4 0 0 0 0 0 0 0 0 0 0 0
node 5 0 0 0 0 0 0 0 0 0 0 0
node 6 0 0 0 0 0 0 0 0 0 0 0
node 7 0 0 0 0 0 0 0 0 0 0 0
node 8 0 0 0 0 0 0 0 0 0 0 0
node 9 0 0 0 0 0 0 0 0 0 0 0
node 10 0 0 0 0 0 0 0 0 0 0 0
node 11 0 0 0 0 0 0 0 0 0 0 0

From /proc/meminfo

MemTotal: 395894372 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

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

SuSE-release:

SUSE Linux Enterprise Server 12 (x86_64)
VERSION = 12
PATCHLEVEL = 2

# 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-SP2"
VERSION_ID="12.2"
Lenovo Global Technology (2.60 GHz, Intel Xeon Silver 4112)

SPECrate2017_int_base = 43.6
SPECrate2017_int_peak = 46.2

Platform Notes (Continued)

PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp2"

uname -a:
    Linux ST550 4.4.21-69-default #1 SMP Tue Oct 25 10:58:20 UTC 2016 (9464f67) x86_64
    x86_64 x86_64 GNU/Linux

run-level 3 Nov 23 02:51

SPEC is set to: /home/cpu2017.1.0.2.ic18.0

Filesysten Type Size Used Avail Use% Mounted on
/dev/sda2 btrfs 744G 113G 631G 16% /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 -[00E107W-1.01]- 08/11/2017
Memory:
    12x Hynix HMA84GR7AFR4N-VK 32 GB 2 rank 2666, configured at 2400

(End of data from sysinfo program)

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.
==============================================================================

CC  500.perlbench_r(peak) 502.gcc_r(peak)
==============================================================================

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

CXXC 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)
    541.leela_r(base)
==============================================================================

(Continued on next page)
Lenovo Global Technology
ThinkSystem ST550
(2.60 GHz, Intel Xeon Silver 4112)

SPECratio2017_int_base = 43.6
SPECratio2017_int_peak = 46.2

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

Test Date: Nov-2017
Hardware Availability: Aug-2017
Software Availability: Sep-2017

Compiler Version Notes (Continued)

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

CXXC 520.omnetpp_r(peak) 523.xalancbmk_r(peak) 531.deepsjeng_r(peak)
541.leela_r(peak)

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

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
**SPEC CPU2017 Integer Rate Result**

Lenovo Global Technology
ThinkSystem ST550
(2.60 GHz, Intel Xeon Silver 4112)

<table>
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<tr>
<th>SPECrate2017_int_base</th>
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<tr>
<td>SPECrate2017_int_peak</td>
<td>46.2</td>
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</tbody>
</table>

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

**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`

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`

(Continued on next page)
Lenovo Global Technology
ThinkSystem ST550
(2.60 GHz, Intel Xeon Silver 4112)

SPECrate2017_int_base = 43.6
SPECrate2017_int_peak = 46.2

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

Peak Portability Flags (Continued)

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

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

(Continued on next page)
# SPEC CPU2017 Integer Rate Result

**Lenovo Global Technology**

ThinkSystem ST550  
(2.60 GHz, Intel Xeon Silver 4112)  

<table>
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<tr>
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<th>9017</th>
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**SPECrate2017_int_base** = 43.6  
**SPECrate2017_int_peak** = 46.2

**Test Date:** Nov-2017  
**Hardware Availability:** Aug-2017  
**Software Availability:** Sep-2017

## Peak Optimization Flags (Continued)

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`

**Fortran benchmarks:**

- `-m64`

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

- [http://www.spec.org/cpu2017/flags/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:

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

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

**Tested with SPEC CPU2017 v1.0.2 on 2017-11-22 13:51:26-0500.**  
**Report generated on 2018-10-31 15:08:59 by CPU2017 PDF formatter v6067.**  
**Originally published on 2017-12-15.**