Lenovo Global Technology
ThinkSystem SR650 V3
(2.80 GHz, Intel Xeon Platinum 8462Y+)

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

SPECrater®2017_fp_base = 737
SPECrater®2017_fp_peak = Not Run

Test Date: Jan-2023
Hardware Availability: Feb-2023
Software Availability: Jun-2022

Copies

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--- SPECrater®2017_fp_base (737) ---

Hardware

CPU Name: Intel Xeon Platinum 8462Y+
Max MHz: 4100
Nominal: 2800
Enabled: 64 cores, 2 chips, 2 threads/core
Orderable: 1,2 chips
Cache L1: 32 KB I + 48 KB D on chip per core
L2: 2 MB I+D on chip per core
L3: 60 MB I+D on chip per chip
Other: None
Memory: 512 GB (16 x 32 GB 2Rx8 PC5-4800B-R)
Storage: 1 x 480 GB SATA SSD
Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP4 (x86_64)
Kernel 5.14.21-150400.22-default
Compiler: C/C++: Version 2022.1 of Intel oneAPI DPC++/C++ Compiler for Linux;
Fortran: Version 2022.1 of Intel Fortran Compiler for Linux;
Parallel: No
Firmware: Lenovo BIOS Version ESE109L 1.10 released Jan-2023
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: jemalloc memory allocator V5.0.1
Power Management: BIOS and OS set to prefer performance at the cost of additional power usage
SPEC CPU®2017 Floating Point Rate Result

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Lenovo Global Technology

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Test Date: Jan-2023
Hardware Availability: Feb-2023
Software Availability: Jun-2022

Results Table

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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"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
"/home/cpu2017-1.1.8-ic2022.1/lib/intel64:/home/cpu2017-1.1.8-ic2022.1/j
e5.0.1-64"
MALLOC_CONF = "retain:true"

General Notes

Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM
memory using Red Hat Enterprise Linux 8.4
Transparent Huge Pages enabled by default

(Continued on next page)
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SPECrater®2017_fp_base =  737
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General Notes (Continued)

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)
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

Platform Notes

BIOS configuration:
Operating Mode set to Maximum Performance and then set it to Custom Mode
MONITOR/MWAIT set to Enabled
SNC set to SNC2
LLC Prefetch set to Disabled
XPT Prefetcher set to Disabled

Sysinfo program /home/cpu2017-1.1.8-ic2022.1/bin/sysinfo
Rev: r6622 of 2021-04-07 982a616c0915b55891ef0e16acaf64d
running on localhost Fri Jan 20 19:50:34 2023

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 8462Y+
   2 "physical id"s (chips)
   128 "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 : 32
siblings : 64
   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
   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
From lscpu from util-linux 2.37.2:

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

**ThinkSystem SR650 V3**

(2.80 GHz, Intel Xeon Platinum 8462Y+)

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**SPEC CPU®2017 Floating Point Rate Result**

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**SPECrate®2017_fp_base = 737**

**SPECrate®2017_fp_peak = Not Run**

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**Platform Notes (Continued)**

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**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 cpuid aperfmperf tsc_known_freq 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 cat_l2 cdp_l3 invpcid_single intel_pni cdq_l2 ssbd mba ibrs ibpb stibp
ibr_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad fsqbase tsc_adjust bm1
hle avx2 smep bmi2 erms invpcid rtm cmov rd肢体 rmov pmov pnov punp碌 pmovms wtmov
avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsavesopt
xsavex xgetbv1 xsaves cqm_llc cqm_occum_llc cqm_mbm_total cqm_mbm_local
split_lock_detect avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pln pts avx512vbmi
umip pku ospke waitpkg avx512_vmbi qfni vaes vpclmulqdq avx512_vnni avx512_bitalg
tme avx512_vpopcntdq l157 rdpid bus_lock_detect cldemote movdir movdir64b enqcmd
fsm md_clear serialize tsxldtrk pconfig arch_lbr avx512_fp16 amx_tile flush_l1d
arch_capabilities

**Virtualization:**

VT-x

| L1d cache: | 3 MiB (64 instances) |
| L1i cache: | 2 MiB (64 instances) |
| L2 cache: | 128 MiB (64 instances) |
| L3 cache: | 120 MiB (2 instances) |

| NUMA node(s): | 4 |
| NUMA node0 CPU(s): | 0-15, 64-79 |
| NUMA node1 CPU(s): | 16-31, 80-95 |
| NUMA node2 CPU(s): | 32-47, 96-111 |
| NUMA node3 CPU(s): | 48-63, 112-127 |

**Vulnerability Itlb multihit:**

Not affected

**Vulnerability L1tf:**

Not affected

**Vulnerability Mds:**

Not affected

**Vulnerability Meltdown:**

Not affected

**Vulnerability Spec store bypass:**

Mitigation; Speculative Store Bypass disabled via prctl and seccomp

(Continued on next page)
## Platform Notes (Continued)

- **Vulnerability Spectre v1**: Mitigation; usercopy/swapgs barriers and __user pointer sanitation
- **Vulnerability Spectre v2**: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling
- **Vulnerability Srbdx**: Not affected
- **Vulnerability Tsx async abort**: Not affected

### From `lscpu --cache`

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<th>WAYS</th>
<th>TYPE</th>
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<th>SETS</th>
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/proc/cpuinfo cache data

- cache size: 61440 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 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 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79
  - node 0 size: 128679 MB
  - node 0 free: 127529 MB
  - node 1 cpus: 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 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79
  - node 1 size: 128891 MB
  - node 1 free: 128719 MB
  - node 2 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 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79
  - node 2 size: 129015 MB
  - node 2 free: 128138 MB
  - node 3 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79
  - node 3 size: 128969 MB
  - node 3 free: 128060 MB
  - node distances:
    - node 0 distances:
      - 0: 10 12 21 21
      - 1: 12 10 21 21
      - 2: 21 21 10 12
      - 3: 21 21 12 10

From `/proc/meminfo`

- MemTotal: 528021756 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

(Continued on next page)
Lenovo Global Technology

ThinkSystem SR650 V3
(2.80 GHz, Intel Xeon Platinum 8462Y+)

<table>
<thead>
<tr>
<th>CPU2017 License: 9017</th>
<th>Test Date: Jan-2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor: Lenovo Global Technology</td>
<td>Hardware Availability: Feb-2023</td>
</tr>
<tr>
<td>Tested by: Lenovo Global Technology</td>
<td>Software Availability: Jun-2022</td>
</tr>
</tbody>
</table>

**Platform Notes (Continued)**

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

```
    os-release:
        NAME="SLES"
        VERSION="15-SP4"
        VERSION_ID="15.4"
        PRETTY_NAME="SUSE Linux Enterprise Server 15 SP4"
        ID="sles"
        ID_LIKE="suse"
        ANSI_COLOR="0;32"
        CPE_NAME="cpe:/o:suse:sles:15:sp4"
```

```
    uname -a:
    Linux localhost 5.14.21-150400.22-default #1 SMP PREEMPT_DYNAMIC Wed May 11 06:57:18 UTC 2022 (49db222) x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

- **CVE-2018-12207 (iTLB Multihit):** Not affected
- **CVE-2018-3620 (L1 Terminal Fault):** Not affected
- **Microarchitectural Data Sampling:** Not affected
- **CVE-2017-5754 (Meltdown):** Mitigation: Speculative Store Bypass disabled via prctl and seccomp
- **CVE-2018-3639 (Speculative Store Bypass):** Mitigation: usrcopy/swapgs barriers and __user pointer sanitization
- **CVE-2017-5753 (Spectre variant 1):** Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
- **CVE-2017-5715 (Spectre variant 2):** Not affected
- **CVE-2020-0543 (Special Register Buffer Data Sampling):** Not affected
- **CVE-2019-11135 (TSX Asynchronous Abort):** Not affected

**run-level 3 Jan 18 16:51**

```
    SPEC is set to: /home/cpu2017-1.1.8-ic2022.1
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/sda3      xfs   446G   29G  418G   7% /
```

From /sys/devices/virtual/dmi/id

```
    Vendor:       Lenovo
    Product:      ThinkSystem SR650 V3 MB,EGS,DDR5,SH,2U
    Product Family: ThinkSystem
    Serial:       1234567890
```

Additional information from dmidecode 3.2 follows. WARNING: Use caution when you interpret this section. The 'dmidecode' program reads system data which is "intended to
Platform Notes (Continued)

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:
9x Samsung M321R4GA3BB0-CQKEG 32 GB 2 rank 4800
7x Samsung M321R4GA3BB0-CQKVG 32 GB 2 rank 4800

BIOS:
BIOS Vendor: Lenovo
BIOS Version: ESE109L-1.10
BIOS Date: 01/07/2023
BIOS Revision: 1.10
Firmware Revision: 1.0

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C       | 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,   
Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
==============================================================================

C++     | 508.namd_r(base) 510.parest_r(base)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,   
Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

C++, C  | 511.povray_r(base) 526.blender_r(base)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,   
Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,   
Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

C++, C, Fortran | 507.cactuBSSN_r(base)

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR650 V3
(2.80 GHz, Intel Xeon Platinum 8462Y+)

SPECrated®2017_fp_base = 737
SPECrated®2017_fp_peak = Not Run

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

Compiler Version Notes (Continued)

Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifix

Benchmarks using both Fortran and C:
ifix icx
**Base Compiler Invocation (Continued)**

Benchmarks using both C and C++:

- icpx icx

Benchmarks using Fortran, C, and C++:

- icpx icx ifx

**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
-w -std=gnu11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

**C++ benchmarks:**

```bash
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

**Fortran benchmarks:**

```bash
```

**Benchmarks using both Fortran and C:**

```bash
-w -m64 -std=gnu11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
```

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR650 V3
(2.80 GHz, Intel Xeon Platinum 8462Y+)

**SPECrate®2017_fp_base = 737**

**SPECrate®2017_fp_peak = Not Run**

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**Base Optimization Flags (Continued)**

Benchmarks using both Fortran and C (continued):
- `-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`
- `-nostandard-realloc-lhs -align array32byte -auto -ljemalloc`
- `-L/usr/local/jemalloc64-5.0.1/lib`

Benchmarks using both C and C++:
- `-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math`
- `-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -ljemalloc`
- `-L/usr/local/jemalloc64-5.0.1/lib`

Benchmarks using Fortran, C, and C++:
- `-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math`
- `-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`
- `-nostandard-realloc-lhs -align array32byte -auto -ljemalloc`
- `-L/usr/local/jemalloc64-5.0.1/lib`

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

You can also download the XML flags sources by saving the following links:
- http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Eaglestream-N.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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