SPEC CPU®2017 Integer Rate Result

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Lenovo Global Technology

SPECrate®2017_int_base =   773

ThinkSystem SR650 V3
(2.40 GHz, Intel Xeon Platinum 8468V)

SPECrate®2017_int_peak = Not Run

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

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

Benchmark	Copies	Result
500.perlbench_r	192	552
502.gcc_r	192	605
505.mcf_r	192	1180
520.omnetpp_r	192	479
523.xalancbmk_r	192	1370
525.x264_r	192	1590
531.deepsjeng_r	192	587
541.leela_r	192	555
548.exchange2_r	192	1460
557.xz_r	192	388

SPECrate®2017_int_base (773)

Hardware

CPU Name: Intel Xeon Platinum 8468V
 Max MHz: 3800
 Nominal: 2400
Enabled: 96 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: 97.5 MB I+D on chip per chip
 Other: None
Memory: 512 GB (16 x 32 GB 2Rx8 PC5-4800B-R)
Storage: 1 x 960 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: None
Power Management: BIOS and OS set to prefer performance at the cost of additional power usage

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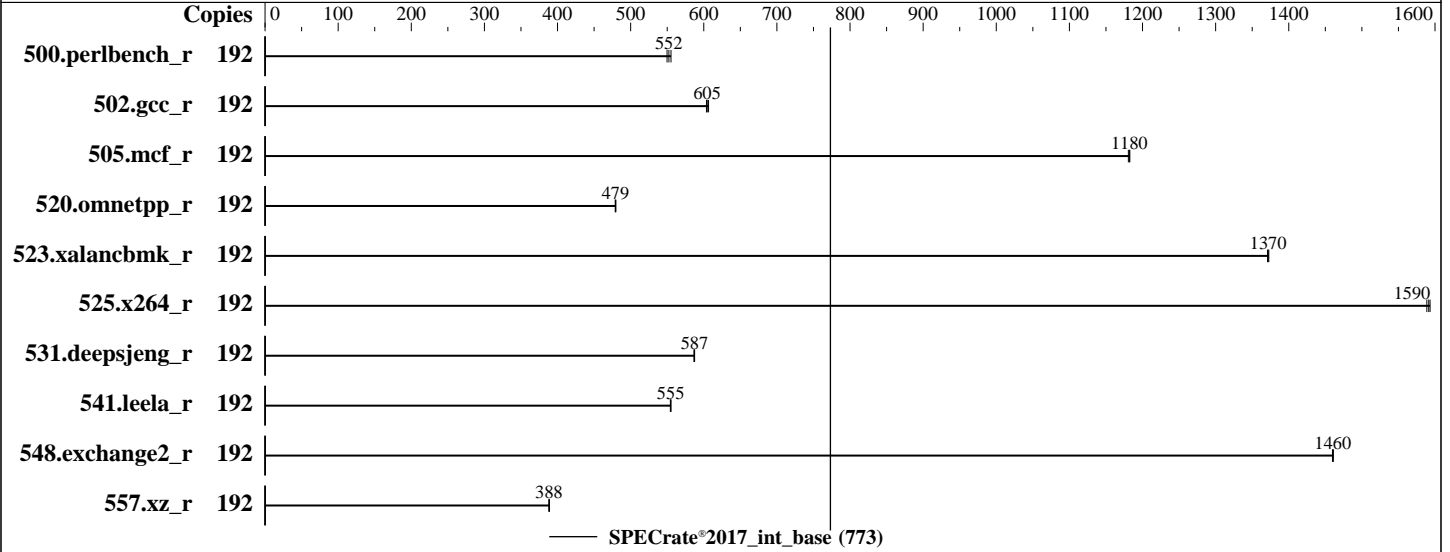SPECrate®2017_int_peak = Not Run

CPU2017 License: 9017		**Test Date:** Jan-2023
Test Sponsor: Lenovo Global Technology		**Hardware Availability:** Feb-2023
Tested by: Lenovo Global Technology		**Software Availability:** Jun-2022

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	192	551	555	**553**	**552**	556	550							
502.gcc_r	192	**450**	**605**	448	607	450	604							
505.mcf_r	192	262	1180	**262**	**1180**	263	1180							
520.omnetpp_r	192	526	479	525	480	**526**	**479**							
523.xalancbmk_r	192	148	1370	**148**	**1370**	148	1370							
525.x264_r	192	211	1590	**211**	**1590**	212	1590							
531.deepsjeng_r	192	**375**	**587**	375	586	375	587							
541.leela_r	192	**573**	**555**	574	554	573	555							
548.exchange2_r	192	344	1460	345	1460	**344**	**1460**							
557.xz_r	192	**534**	**388**	533	389	534	388							
SPECrate®2017_int_base =	**773**													
SPECrate®2017_int_peak =	**Not Run**													

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

Compiler Notes

```
SPEC has ruled that the compiler used for this result was performing a compilation
that specifically improves the performance of the 523.xalancbmk_r / 623.xalancbmk_s
benchmarks using a priori knowledge of the SPEC code and dataset to perform a
transformation that has narrow applicability.

In order to encourage optimizations that have wide applicability (see rule 1.4
https://www.spec.org/cpu2017/Docs/runrules.html#rule_1.4), SPEC will no longer
publish results using this optimization.

This result is left in the SPEC results database for historical reference.
```

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/lib/ia32:/home/cpu2017-1.1.8-ic
     2022.1/je5.0.1-32"
MALLOC_CONF = "retain:true"
```

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

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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
  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.
```

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 SNC4
LLC Prefetch set to Disabled
UPI Link Disable set to Disabled 1 Link

 Sysinfo program /home/cpu2017-1.1.8-ic2022.1/bin/sysinfo
 Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
 running on localhost Wed Jan 11 20:26:20 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 8468V
       2  "physical id"s (chips)
       192 "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 : 48
       siblings  : 96
       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 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
       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 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47

 From lscpu from util-linux 2.37.2:
     Architecture:              x86_64
     CPU op-mode(s):            32-bit, 64-bit
     Address sizes:             46 bits physical, 57 bits virtual
     Byte Order:                Little Endian
     CPU(s):                    192
     On-line CPU(s) list:       0-191
     Vendor ID:                 GenuineIntel
     Model name:                Intel(R) Xeon(R) Platinum 8468V
     CPU family:                6
     Model:                     143
     Thread(s) per core:        2
     Core(s) per socket:        48
     Socket(s):                 2
```

(Continued on next page)

Lenovo Global Technology

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(2.40 GHz, Intel Xeon Platinum 8468V)

SPECrate®2017_int_base =   773

SPECrate®2017_int_peak = Not Run

CPU2017 License: 9017

Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Jan-2023

Hardware Availability: Feb-2023

Software Availability: Jun-2022

Platform Notes (Continued)

```
    Stepping:                      8
    BogoMIPS:                      4800.00
    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 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_ppin cdp_l2 ssbd mba ibrs ibpb stibp
  ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1
  hle avx2 smep bmi2 erms invpcid rtm cqm rdt_a avx512f avx512dq rdseed adx smap
  avx512ifma clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl xsaveopt
  xsavec xgetbv1 xsaves cqm_llc cqm_occup_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_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg
  tme avx512_vpopcntdq la57 rdpid bus_lock_detect cldemote movdiri movdir64b enqcmd
  fsrm md_clear serialize tsxldtrk pconfig arch_lbr avx512_fp16 amx_tile flush_l1d
  arch_capabilities
    Virtualization:                VT-x
    L1d cache:                     4.5 MiB (96 instances)
    L1i cache:                     3 MiB (96 instances)
    L2 cache:                      192 MiB (96 instances)
    L3 cache:                      195 MiB (2 instances)
    NUMA node(s):                  8
    NUMA node0 CPU(s):             0-11,96-107
    NUMA node1 CPU(s):             12-23,108-119
    NUMA node2 CPU(s):             24-35,120-131
    NUMA node3 CPU(s):             36-47,132-143
    NUMA node4 CPU(s):             48-59,144-155
    NUMA node5 CPU(s):             60-71,156-167
    NUMA node6 CPU(s):             72-83,168-179
    NUMA node7 CPU(s):             84-95,180-191
    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
    Vulnerability Spectre v1:      Mitigation; usercopy/swapgs barriers and __user
    pointer sanitization
    Vulnerability Spectre v2:      Mitigation; Enhanced IBRS, IBPB conditional, RSB
    filling
    Vulnerability Srbds:           Not affected
    Vulnerability Tsx async abort: Not affected

  From lscpu --cache:
      NAME ONE-SIZE ALL-SIZE WAYS TYPE          LEVEL    SETS PHY-LINE COHERENCY-SIZE
      L1d       48K     4.5M   12 Data              1      64        1             64
      L1i       32K       3M    8 Instruction       1      64        1             64
      L2         2M     192M   16 Unified           2    2048        1             64
      L3      97.5M     195M   15 Unified           3  106496        1             64

  /proc/cpuinfo cache data
     cache size : 99840 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 4 5 6 7 8 9 10 11 96 97 98 99 100 101 102 103 104 105 106 107
    node 0 size: 64169 MB
```

(Continued on next page)

Lenovo Global Technology

ThinkSystem SR650 V3
(2.40 GHz, Intel Xeon Platinum 8468V)

SPECrate®2017_int_base = 773

SPECrate®2017_int_peak = Not Run

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

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

Platform Notes (Continued)

```
   node 0 free: 63454 MB
   node 1 cpus: 12 13 14 15 16 17 18 19 20 21 22 23 108 109 110 111 112 113 114 115 116
   117 118 119
   node 1 size: 64505 MB
   node 1 free: 64159 MB
   node 2 cpus: 24 25 26 27 28 29 30 31 32 33 34 35 120 121 122 123 124 125 126 127 128
   129 130 131
   node 2 size: 64471 MB
   node 2 free: 64111 MB
   node 3 cpus: 36 37 38 39 40 41 42 43 44 45 46 47 132 133 134 135 136 137 138 139 140
   141 142 143
   node 3 size: 64505 MB
   node 3 free: 64257 MB
   node 4 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 144 145 146 147 148 149 150 151 152
   153 154 155
   node 4 size: 64505 MB
   node 4 free: 64183 MB
   node 5 cpus: 60 61 62 63 64 65 66 67 68 69 70 71 156 157 158 159 160 161 162 163 164
   165 166 167
   node 5 size: 64505 MB
   node 5 free: 64190 MB
   node 6 cpus: 72 73 74 75 76 77 78 79 80 81 82 83 168 169 170 171 172 173 174 175 176
   177 178 179
   node 6 size: 64505 MB
   node 6 free: 64000 MB
   node 7 cpus: 84 85 86 87 88 89 90 91 92 93 94 95 180 181 182 183 184 185 186 187 188
   189 190 191
   node 7 size: 64459 MB
   node 7 free: 64125 MB
   node distances:
   node   0   1   2   3   4   5   6   7
     0:  10  12  12  12  21  21  21  21
     1:  12  10  12  12  21  21  21  21
     2:  12  12  10  12  21  21  21  21
     3:  12  12  12  10  21  21  21  21
     4:  21  21  21  21  10  12  12  12
     5:  21  21  21  21  12  10  12  12
     6:  21  21  21  21  12  12  10  12
     7:  21  21  21  21  12  12  12  10

 From /proc/meminfo
    MemTotal:       528004012 kB
    HugePages_Total:        0
    Hugepagesize:        2048 kB

 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
```

(Continued on next page)

Lenovo Global Technology

ThinkSystem SR650 V3
(2.40 GHz, Intel Xeon Platinum 8468V)

SPECrate®2017_int_base =   773

SPECrate®2017_int_peak = Not Run

Platform Notes (Continued)

```
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):                       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
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort):        Not affected

run-level 3 Jan 11 20:23

SPEC is set to: /home/cpu2017-1.1.8-ic2022.1
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/sda3      xfs   889G   24G  865G   3% /

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
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:
    16x 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        | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base) 557.xz_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++      | 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base) 541.leela_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.
```

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Hardware Availability: Feb-2023
Software Availability: Jun-2022

Compiler Version Notes (Continued)

```
------------------------------------------------------------------------------

==============================================================================
Fortran | 548.exchange2_r(base)
------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
`icx`

C++ benchmarks:
`icpx`

Fortran benchmarks:
`ifx`

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:
`-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX2 -O3 -ffast-math -flto`
`-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`
`-L/usr/local/intel/compiler/2022.1.0/linux/compiler/lib/intel64_lin`
`-lqkmalloc`

C++ benchmarks:
`-w -m64 -Wl,-z,muldefs -xCORE-AVX2 -O3 -ffast-math -flto`

(Continued on next page)

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Base Optimization Flags (Continued)

C++ benchmarks (continued):

```
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/intel/compiler/2022.1.0/linux/compiler/lib/intel64_lin
-lqkmalloc
```

Fortran benchmarks:

```
-w -m64 -Wl,-z,muldefs -xCORE-AVX2 -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/intel/compiler/2022.1.0/linux/compiler/lib/intel64_lin
-lqkmalloc
```

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

http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Eaglestream-N.html
http://www.spec.org/cpu2017/flags/Intel-ic2022-official-linux64_revA.html

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
http://www.spec.org/cpu2017/flags/Intel-ic2022-official-linux64_revA.xml

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

Tested with SPEC CPU®2017 v1.1.8 on 2023-01-11 07:26:19-0500.
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