



SPEC® CPU2017 Integer Rate Result

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NEC Corporation

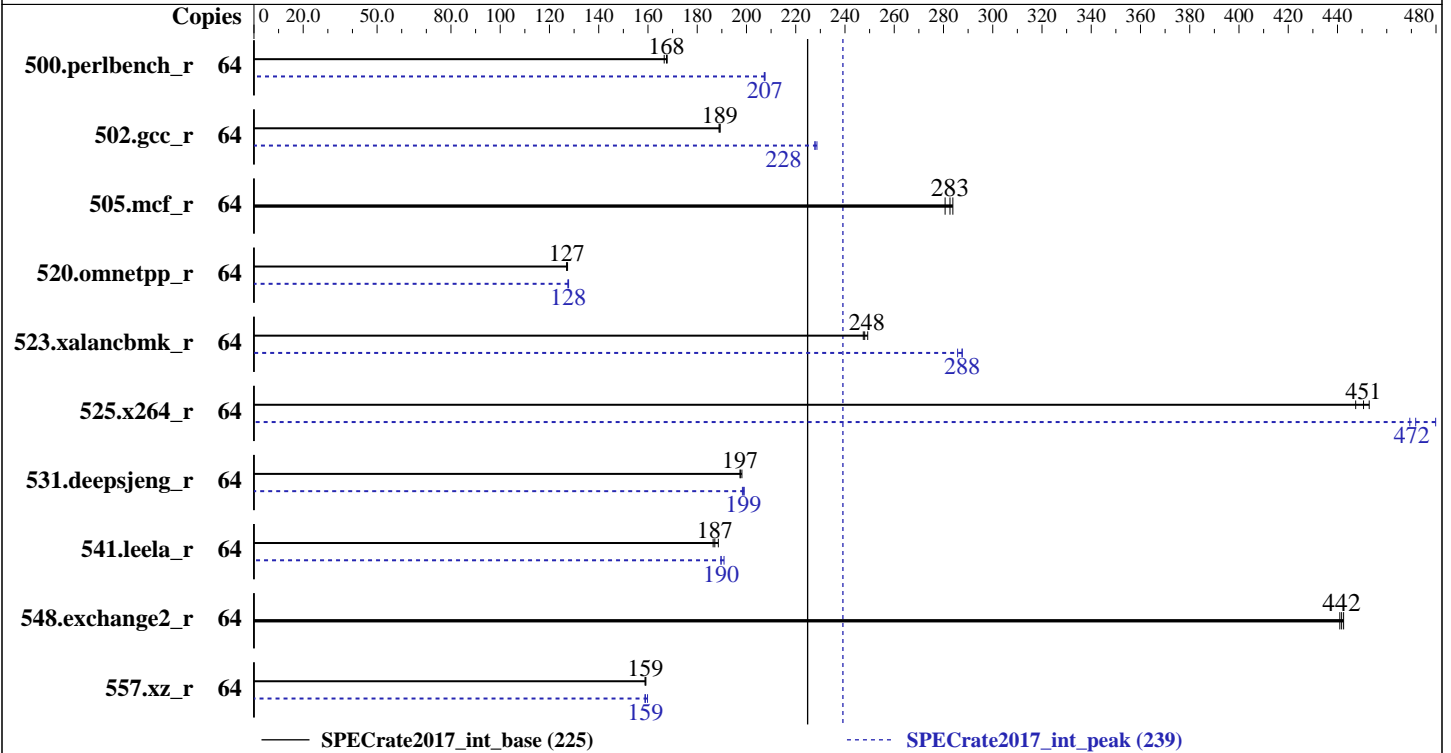
Express5800/A2040e
(3.50 GHz, Intel Xeon Gold 6144)

SPECrate2017_int_base = 225

SPECrate2017_int_peak = 239

CPU2017 License: 9006
Test Sponsor: NEC Corporation
Tested by: NEC Corporation

Test Date: Jun-2018
Hardware Availability: Jun-2018
Software Availability: Mar-2018



Hardware

CPU Name: Intel Xeon Gold 6144
Max MHz.: 4200
Nominal: 3500
Enabled: 32 cores, 4 chips, 2 threads/core
Orderable: 2,4 chips
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 1 MB I+D on chip per core
L3: 24.75 MB I+D on chip per chip
Other: None
Memory: 1536 GB (48 x 32 GB 2Rx4 PC4-2666V-R)
Storage: 800 GB tmpfs
Other: None

Software

OS: SUSE Linux Enterprise Server 12 SP3 (x86_64)
kernel 4.4.120-94.17-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: Version 5.7.0115 04/17/2018 released Jun-2018
File System: tmpfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other: jemalloc memory allocator library V5.0.1



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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	64	608	168	612	167	607	168	64	491	208	491	207	492	207
502.gcc_r	64	479	189	479	189	480	189	64	398	228	398	228	396	229
505.mcf_r	64	364	284	366	283	369	281	64	364	284	366	283	369	281
520.omnetpp_r	64	661	127	659	127	661	127	64	658	128	658	128	657	128
523.xalancbmk_r	64	271	249	273	247	273	248	64	237	286	235	288	235	288
525.x264_r	64	247	453	249	451	250	447	64	234	480	238	472	239	469
531.deepsjeng_r	64	371	197	370	198	371	197	64	370	198	368	199	369	199
541.leela_r	64	566	187	562	189	568	186	64	559	190	555	191	559	190
548.exchange2_r	64	380	442	379	442	380	441	64	380	442	379	442	380	441
557.xz_r	64	435	159	434	159	435	159	64	432	160	435	159	435	159

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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"
Tmpfs filesystem can be set with:
mount -t tmpfs -o size=800g tmpfs /home

General Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/SPEC/lib/ia32:/home/SPEC/lib/intel64:/home/SPEC/je5.0.1-32:/home/SPEC/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>

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;

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General Notes (Continued)

jemalloc: sources available from jemalloc.net or <https://github.com/jemalloc/jemalloc/releases>

Yes: 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 Settings:

Memory RAS Mode: SDDC mode
VT-x : Disabled
Processor C6 Report : Disabled
OS Performance Tuning : Disabled
Energy Performance : Performance
Patrol Scrub : Disabled
DCU Streamer Prefetcher : Disabled
Memory P.E. Retry : Disabled
Sub NUMA Clustering : Enabled
Dead Line LLC Allocation : Disabled
Sysinfo program /home/SPEC/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on linux-37c1 Thu Jun 21 01:24:24 2018

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) Gold 6144 CPU @ 3.50GHz
 4 "physical id"s (chips)
 64 "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 : 16
physical 0: cores 0 2 3 9 16 19 26 27
physical 1: cores 0 2 3 9 16 19 26 27
physical 2: cores 0 2 3 9 16 19 26 27
physical 3: cores 0 2 3 9 16 19 26 27
```

From lscpu:

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

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Platform Notes (Continued)

```

Byte Order:                Little Endian
CPU(s):                    64
On-line CPU(s) list:      0-63
Thread(s) per core:       2
Core(s) per socket:       8
Socket(s):                 4
NUMA node(s):             8
Vendor ID:                 GenuineIntel
CPU family:                6
Model:                     85
Model name:               Intel(R) Xeon(R) Gold 6144 CPU @ 3.50GHz
Stepping:                 4
CPU MHz:                   3501.000
CPU max MHz:              3501.0000
CPU min MHz:              1200.0000
BogoMIPS:                 6983.29
Virtualization:           VT-x
L1d cache:                32K
L1i cache:                32K
L2 cache:                 1024K
L3 cache:                 25344K
NUMA node0 CPU(s):       0,1,3,4,32,33,35,36
NUMA node1 CPU(s):       2,5-7,34,37-39
NUMA node2 CPU(s):       8,9,11,12,40,41,43,44
NUMA node3 CPU(s):       10,13-15,42,45-47
NUMA node4 CPU(s):       16,17,19,20,48,49,51,52
NUMA node5 CPU(s):       18,21-23,50,53-55
NUMA node6 CPU(s):       24,25,27,28,56,57,59,60
NUMA node7 CPU(s):       26,29-31,58,61-63

```

```

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
aperfperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
fma cx16 xtpr pdcm pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
xsave avx f16c rdrand lahf_lm abm 3dnowprefetch ida arat epb invpcid_single pln pts
dtherm intel_pt rsb_ctxsw spec_ctrl stibp retpoline kaiser tpr_shadow vnmi
flexpriority ept vpid fsgsbase tsc_adjust bmil hle avx2 smep bmi2 erms invpcid rtm
cqm mpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl
xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc pku ospke

```

/proc/cpuinfo cache data
cache size : 25344 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 3 4 32 33 35 36

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Platform Notes (Continued)

```

node 0 size: 192005 MB
node 0 free: 191328 MB
node 1 cpus: 2 5 6 7 34 37 38 39
node 1 size: 193534 MB
node 1 free: 193241 MB
node 2 cpus: 8 9 11 12 40 41 43 44
node 2 size: 193534 MB
node 2 free: 193390 MB
node 3 cpus: 10 13 14 15 42 45 46 47
node 3 size: 193534 MB
node 3 free: 193052 MB
node 4 cpus: 16 17 19 20 48 49 51 52
node 4 size: 193534 MB
node 4 free: 191234 MB
node 5 cpus: 18 21 22 23 50 53 54 55
node 5 size: 193534 MB
node 5 free: 189318 MB
node 6 cpus: 24 25 27 28 56 57 59 60
node 6 size: 193534 MB
node 6 free: 192143 MB
node 7 cpus: 26 29 30 31 58 61 62 63
node 7 size: 193389 MB
node 7 free: 192593 MB
node distances:
node  0  1  2  3  4  5  6  7
  0:  10 11 15 15 15 15 15 15
  1:  11 10 15 15 15 15 15 15
  2:  15 15 10 11 15 15 15 15
  3:  15 15 11 10 15 15 15 15
  4:  15 15 15 15 10 11 15 15
  5:  15 15 15 15 11 10 15 15
  6:  15 15 15 15 15 15 10 11
  7:  15 15 15 15 15 15 11 10

```

```

From /proc/meminfo
MemTotal:      1583722284 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

```

/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 12 SP3

```

```

From /etc/*release* /etc/*version*
SuSE-release:
SUSE Linux Enterprise Server 12 (x86_64)
VERSION = 12
PATCHLEVEL = 3

```

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Platform Notes (Continued)

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 linux-37c1 4.4.120-94.17-default #1 SMP Wed Mar 14 17:23:00 UTC 2018 (cf3a7bb)
x86_64 x86_64 x86_64 GNU/Linux
```

```
run-level 3 Jun 21 01:10
```

```
SPEC is set to: /home/SPEC
Filesystem      Type      Size      Used Avail Use% Mounted on
tmpfs            tmpfs     800G      9.1G   791G    2% /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 American Megatrends Inc. 5.7.0115 04/17/2018

Memory:
48x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666

(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.
```

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Compiler Version Notes (Continued)

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

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

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Base Portability Flags (Continued)

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

Fortran benchmarks:

-m64

Peak Compiler Invocation

C benchmarks:

icc

C++ benchmarks:

icpc

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Peak Compiler Invocation (Continued)

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

505.mcf_r: basepeak = yes

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: -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:

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Peak Optimization Flags (Continued)

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:

548.exchange2_r: basepeak = yes

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-linux64.2017-10-19.html>

<http://www.spec.org/cpu2017/flags/NEC-Platform-Settings-SPECcpu2017-Flags-V1.2-SKL-A2040e-RevA.html>

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

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-10-19.xml>

<http://www.spec.org/cpu2017/flags/NEC-Platform-Settings-SPECcpu2017-Flags-V1.2-SKL-A2040e-RevA.xml>



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