



# SPEC® CPU2017 Integer Rate Result

Copyright 2017-2018 Standard Performance Evaluation Corporation

## NEC Corporation

SPECrate2017\_int\_base = 117

Express5800/D120h (Intel Xeon Platinum 8160)

SPECrate2017\_int\_peak = 125

CPU2017 License: 9006

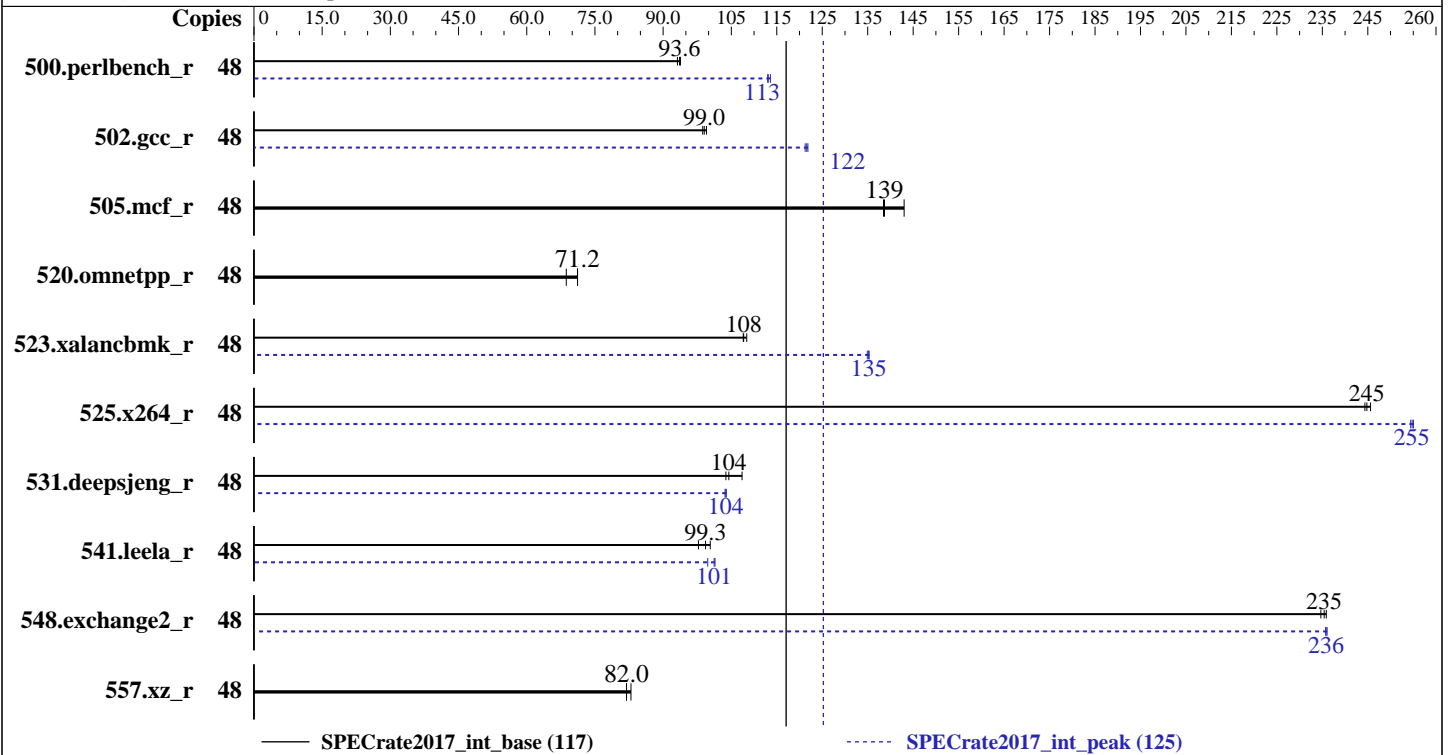
Test Date: Jul-2018

Test Sponsor: NEC Corporation

Hardware Availability: Jan-2018

Tested by: NEC Corporation

Software Availability: Mar-2018



### Hardware

CPU Name: Intel Xeon Platinum 8160  
 Max MHz.: 3700  
 Nominal: 2100  
 Enabled: 24 cores, 1 chip, 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: 33 MB I+D on chip per chip  
 Other: None  
 Memory: 192 GB (6 x 32 GB 2Rx4 PC4-2666V-R)  
 Storage: 1 x 1 TB SATA, 7200 RPM  
 Other: None

### Software

OS: Red Hat Enterprise Linux Server release 7.4 (Maipo)  
 Kernel 3.10.0-693.21.1.el7.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: Version F21 02/22/2018 released Apr-2018  
 File System: ext4  
 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	48	<b>816</b>	<b>93.6</b>	815	93.8	820	93.2	48	673	114	676	113	<b>676</b>	<b>113</b>
502.gcc_r	48	689	98.7	683	99.5	<b>686</b>	<b>99.0</b>	48	558	122	<b>559</b>	<b>122</b>	561	121
505.mcf_r	48	542	143	<b>559</b>	<b>139</b>	560	138	48	542	143	<b>559</b>	<b>139</b>	560	138
520.omnetpp_r	48	885	71.2	<b>885</b>	<b>71.2</b>	917	68.7	48	885	71.2	<b>885</b>	<b>71.2</b>	917	68.7
523.xalancbmk_r	48	468	108	471	108	<b>471</b>	<b>108</b>	48	375	135	376	135	<b>375</b>	<b>135</b>
525.x264_r	48	<b>343</b>	<b>245</b>	344	244	342	246	48	330	254	<b>330</b>	<b>255</b>	330	255
531.deepsjeng_r	48	512	107	<b>527</b>	<b>104</b>	530	104	48	<b>530</b>	<b>104</b>	531	104	530	104
541.leela_r	48	813	97.8	792	100	<b>800</b>	<b>99.3</b>	48	796	99.8	784	101	<b>785</b>	<b>101</b>
548.exchange2_r	48	<b>534</b>	<b>235</b>	533	236	536	235	48	534	236	<b>533</b>	<b>236</b>	533	236
557.xz_r	48	625	82.9	633	81.9	<b>633</b>	<b>82.0</b>	48	625	82.9	633	81.9	<b>633</b>	<b>82.0</b>

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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"

## General Notes

Environment variables set by runcpu before the start of the run:

```
LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32:/home/cpu2017/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;

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)

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### General Notes (Continued)

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:

ENERGY\_PERF\_BIAS\_CFG mode: Performance  
SNC: Enable  
IMC Interleaving: 1-way Interleave  
LLC dead line alloc: Disable  
Patrol Scrub: Disable

Sysinfo program /home/cpu2017/bin/sysinfo  
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f  
running on d120h Wed Jul 25 17:15:21 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) Platinum 8160 CPU @ 2.10GHz
 1 "physical id"s (chips)
 48 "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 : 24
siblings : 48
physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
```

From lscpu:

```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 48
On-line CPU(s) list: 0-47
Thread(s) per core: 2
Core(s) per socket: 24
Socket(s): 1
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
```

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### Platform Notes (Continued)

```

Model name: Intel(R) Xeon(R) Platinum 8160 CPU @ 2.10GHz
Stepping: 4
CPU MHz: 2876.015
CPU max MHz: 3700.0000
CPU min MHz: 1000.0000
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 33792K
NUMA node0 CPU(s): 0-2,6-8,12-14,18-20,24-26,30-32,36-38,42-44
NUMA node1 CPU(s): 3-5,9-11,15-17,21-23,27-29,33-35,39-41,45-47
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
aperfmpperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 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 epb cat_l3 cdp_l3 invpcid_single
intel_pt spec_ctrl ibpb_support tpr_shadow vnmi flexpriority ept vpid fsgsbase
tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512f avx512dq
rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1
cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts hwp
hwp_act_window hwp_epp hwp_pkg_req

```

```

/proc/cpuinfo cache data
cache size : 33792 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 6 7 8 12 13 14 18 19 20 24 25 26 30 31 32 36 37 38 42 43 44
node 0 size: 96932 MB
node 0 free: 94196 MB
node 1 cpus: 3 4 5 9 10 11 15 16 17 21 22 23 27 28 29 33 34 35 39 40 41 45 46 47
node 1 size: 98304 MB
node 1 free: 95657 MB
node distances:
node  0  1
 0:  10  11
 1:  11  10

```

```

From /proc/meminfo
MemTotal: 196475904 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

```

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### Platform Notes (Continued)

```

From /etc/*release* /etc/*version*
os-release:
  NAME="Red Hat Enterprise Linux Server"
  VERSION="7.4 (Maipo)"
  ID="rhel"
  ID_LIKE="fedora"
  VARIANT="Server"
  VARIANT_ID="server"
  VERSION_ID="7.4"
  PRETTY_NAME="Red Hat Enterprise Linux Server 7.4 (Maipo)"
redhat-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
system-release-cpe: cpe:/o:redhat:enterprise_linux:7.4:ga:server

uname -a:
Linux d120h 3.10.0-693.21.1.el7.x86_64 #1 SMP Fri Feb 23 18:54:16 UTC 2018 x86_64
x86_64 x86_64 GNU/Linux

run-level 3 Jul 25 17:09

SPEC is set to: /home/cpu2017
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda3       ext4  909G  404G  459G  47% /

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 GIGABYTE F21 02/22/2018
Memory:
  10x NO DIMM NO DIMM
  6x 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.
=====

```

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## Compiler Version Notes (Continued)

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)

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

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## Base Portability Flags (Continued)

```
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
```

Fortran benchmarks:

```
-m64
```

## Peak Compiler Invocation

C benchmarks:

```
icc
```

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## Peak Compiler Invocation (Continued)

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

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
```

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## Peak Optimization Flags (Continued)

557.xz\_r: basepeak = yes

C++ benchmarks:

520.omnetpp\_r: basepeak = yes

```
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: -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
```

541.leela\_r: Same as 531.deepsjeng\_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-linux64.2017-10-19.html>

<http://www.spec.org/cpu2017/flags/NEC-Platform-Settings-V1.2-D120h-RevA.html>



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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-V1.2-D120h-RevA.xml>

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