



# SPEC® CPU2017 Floating Point Rate Result

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## NEC Corporation

SPECrate2017\_fp\_base = 15.3

Express5800/T110j-S (Intel Pentium Gold G5400)

SPECrate2017\_fp\_peak = 15.6

CPU2017 License: 9006

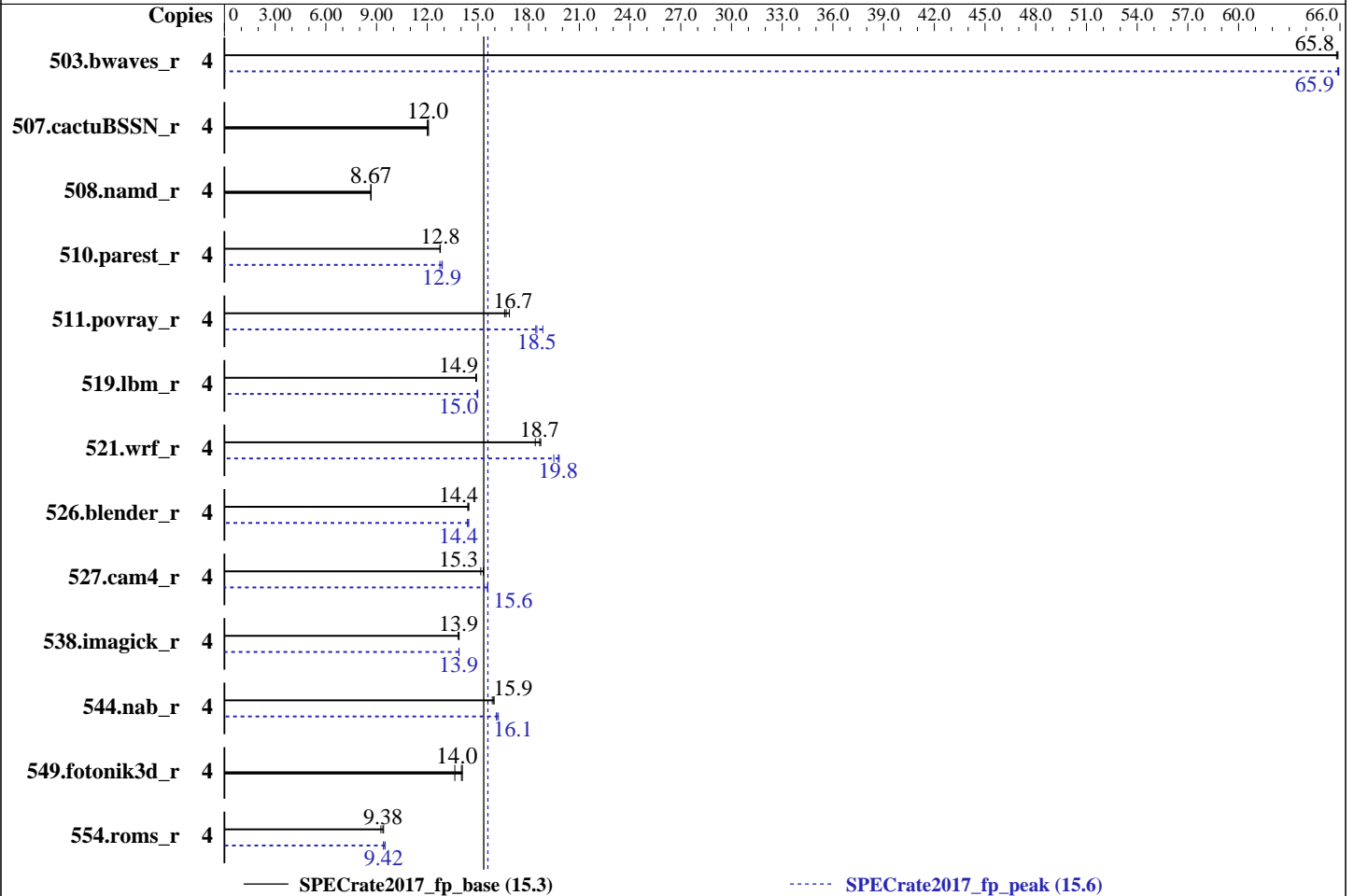
Test Date: Dec-2018

Test Sponsor: NEC Corporation

Hardware Availability: Dec-2018

Tested by: NEC Corporation

Software Availability: Aug-2018



### Hardware

CPU Name: Intel Pentium Gold G5400  
 Max MHz.: 3700  
 Nominal: 3700  
 Enabled: 2 cores, 1 chip, 2 threads/core  
 Orderable: 1 chip  
 Cache L1: 32 KB I + 32 KB D on chip per core  
 L2: 256 KB I+D on chip per core  
 L3: 4 MB I+D on chip per chip  
 Other: None  
 Memory: 64 GB (4 x 16 GB 2Rx8 PC4-2666V-E, running at 2400)  
 Storage: 1 x 1 TB SATA, 7200 RPM  
 Other: None

### Software

OS: Red Hat Enterprise Linux Server release 7.5 (Maipo)  
 Kernel 3.10.0-862.11.6.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: NEC BIOS Version F07 10/31/2018 released Dec-2018  
 File System: ext4  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: 64-bit  
 Other: None



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## Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	4	<b>609</b>	<b>65.8</b>	610	65.8	609	65.9	4	608	65.9	<b>609</b>	<b>65.9</b>	609	65.9
507.cactuBSSN_r	4	422	12.0	<b>421</b>	<b>12.0</b>	419	12.1	4	422	12.0	<b>421</b>	<b>12.0</b>	419	12.1
508.namd_r	4	<b>438</b>	<b>8.67</b>	439	8.67	438	8.67	4	<b>438</b>	<b>8.67</b>	439	8.67	438	8.67
510.parest_r	4	<b>820</b>	<b>12.8</b>	821	12.7	819	12.8	4	<b>813</b>	<b>12.9</b>	821	12.7	812	12.9
511.povray_r	4	<b>560</b>	<b>16.7</b>	554	16.9	563	16.6	4	496	18.8	507	18.4	<b>505</b>	<b>18.5</b>
519.lbm_r	4	284	14.9	283	14.9	<b>283</b>	<b>14.9</b>	4	281	15.0	282	14.9	<b>282</b>	<b>15.0</b>
521.wrf_r	4	487	18.4	479	18.7	<b>480</b>	<b>18.7</b>	4	460	19.5	<b>454</b>	<b>19.8</b>	452	19.8
526.blender_r	4	423	14.4	421	14.5	<b>423</b>	<b>14.4</b>	4	<b>423</b>	<b>14.4</b>	424	14.4	421	14.5
527.cam4_r	4	456	15.3	461	15.2	<b>457</b>	<b>15.3</b>	4	<b>449</b>	<b>15.6</b>	455	15.4	449	15.6
538.imagick_r	4	719	13.8	716	13.9	<b>717</b>	<b>13.9</b>	4	<b>717</b>	<b>13.9</b>	717	13.9	717	13.9
544.nab_r	4	425	15.8	<b>422</b>	<b>15.9</b>	422	15.9	4	415	16.2	<b>418</b>	<b>16.1</b>	418	16.1
549.fotonik3d_r	4	1143	13.6	1107	14.1	<b>1112</b>	<b>14.0</b>	4	1143	13.6	1107	14.1	<b>1112</b>	<b>14.0</b>
554.roms_r	4	686	9.26	675	9.42	<b>678</b>	<b>9.38</b>	4	<b>675</b>	<b>9.42</b>	668	9.51	675	9.41

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

## Submit Notes

The taskset mechanism was used to bind copies to processors. The config file option 'submit' was used to generate taskset 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"  
IRQ balance service was stopped using "systemctl stop irqbalance.service"

## General Notes

Environment variables set by runcpu before the start of the run:  
LD\_LIBRARY\_PATH = "/home/cpu2017/lib/intel64"

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

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

(Continued on next page)



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### General Notes (Continued)

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:

VT-x: Disabled

Sysinfo program /home/cpu2017/bin/sysinfo

Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f

running on t110js Mon Dec 17 18:39:00 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) Pentium(R) Gold G5400 CPU @ 3.70GHz

1 "physical id"s (chips)

4 "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 : 2

siblings : 4

physical 0: cores 0 1

From lscpu:

Architecture: x86\_64

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

Byte Order: Little Endian

CPU(s): 4

On-line CPU(s) list: 0-3

Thread(s) per core: 2

Core(s) per socket: 2

Socket(s): 1

NUMA node(s): 1

Vendor ID: GenuineIntel

CPU family: 6

Model: 158

Model name: Intel(R) Pentium(R) Gold G5400 CPU @ 3.70GHz

Stepping: 11

CPU MHz: 3219.885

CPU max MHz: 3700.0000

CPU min MHz: 800.0000

(Continued on next page)



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### Platform Notes (Continued)

```

BogoMIPS:          7392.00
Virtualization:    VT-x
L1d cache:         32K
L1i cache:         32K
L2 cache:          256K
L3 cache:          4096K
NUMA node0 CPU(s): 0-3
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 est tm2 ssse3 sdbg cx16
xtpr pdcm pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave rdrand
lahf_lm abm 3dnowprefetch epb intel_pt ssbd ibrs ibpb stibp tpr_shadow vnmi
flexpriority ept vpid fsgsbase tsc_adjust smep erms invpcid mpx rdseed smap
clflushopt xsaveopt xsavec xgetbv1 dtherm arat pln pts hwp hwp_notify hwp_act_window
hwp_epp spec_ctrl intel_stibp flush_lld

```

```

/proc/cpuinfo cache data
cache size : 4096 KB

```

```

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
available: 1 nodes (0)
node 0 cpus: 0 1 2 3
node 0 size: 65455 MB
node 0 free: 63581 MB
node distances:
node 0
0: 10

```

```

From /proc/meminfo
MemTotal:      65895716 kB
HugePages_Total:      0
Hugepagesize:   2048 kB

```

```

From /etc/*release* /etc/*version*
os-release:
NAME="Red Hat Enterprise Linux Server"
VERSION="7.5 (Maipo)"
ID="rhel"
ID_LIKE="fedora"
VARIANT="Server"
VARIANT_ID="server"
VERSION_ID="7.5"
PRETTY_NAME="Red Hat Enterprise Linux Server 7.5 (Maipo)"
redhat-release: Red Hat Enterprise Linux Server release 7.5 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.5 (Maipo)

```

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### Platform Notes (Continued)

system-release-cpe: cpe:/o:redhat:enterprise\_linux:7.5:ga:server

uname -a:

```
Linux t110js 3.10.0-862.11.6.el7.x86_64 #1 SMP Fri Aug 10 16:55:11 UTC 2018 x86_64
x86_64 x86_64 GNU/Linux
```

run-level 3 Dec 17 18:33

SPEC is set to: /home/cpu2017

```
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda3        ext4  909G   91G  772G  11% /
```

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. F07 10/31/2018

Memory:

4x Samsung M391A2K43BB1-CTD 16 GB 2 rank 2667, configured at 2400

(End of data from sysinfo program)

### Compiler Version Notes

```
=====
CC 519.lbm_r(base) 538.imagick_r(base, peak) 544.nab_r(base)
-----
```

icc (ICC) 18.0.0 20170811

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

```
=====
CC 519.lbm_r(peak) 544.nab_r(peak)
-----
```

icc (ICC) 18.0.0 20170811

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

```
=====
CXXC 508.namd_r(base) 510.parest_r(base)
-----
```

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(Continued on next page)



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### Compiler Version Notes (Continued)

CXXC 508.namd\_r(peak) 510.parest\_r(peak)

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

=====  
CC 511.povray\_r(base) 526.blender\_r(base)

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

=====  
CC 511.povray\_r(peak) 526.blender\_r(peak)

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

=====  
FC 507.cactuBSSN\_r(base)

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

=====  
FC 507.cactuBSSN\_r(peak)

icpc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
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### Compiler Version Notes (Continued)

FC 503.bwaves\_r(base, peak) 549.fotonik3d\_r(base, peak) 554.roms\_r(base)

-----  
ifort (IFORT) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
-----

=====

FC 554.roms\_r(peak)  
-----  
ifort (IFORT) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
-----

=====

CC 521.wrf\_r(base) 527.cam4\_r(base)  
-----  
ifort (IFORT) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
icc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
-----

=====

CC 521.wrf\_r(peak) 527.cam4\_r(peak)  
-----  
ifort (IFORT) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
icc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
-----

### Base Compiler Invocation

C benchmarks:

icc -m64 -std=c11

C++ benchmarks:

icpc -m64

Fortran benchmarks:

ifort -m64

Benchmarks using both Fortran and C:

ifort -m64 icc -m64 -std=c11

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## Base Compiler Invocation (Continued)

Benchmarks using both C and C++:

```
icpc -m64 icc -m64 -std=c11
```

Benchmarks using Fortran, C, and C++:

```
icpc -m64 icc -m64 -std=c11 ifort -m64
```

## 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:

```
-xSSE4.2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3
```

C++ benchmarks:

```
-xSSE4.2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3
```

Fortran benchmarks:

```
-xSSE4.2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte
```

Benchmarks using both Fortran and C:

```
-xSSE4.2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte
```

Benchmarks using both C and C++:

```
-xSSE4.2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
```

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## Base Optimization Flags (Continued)

Benchmarks using both C and C++ (continued):

`-qopt-mem-layout-trans=3`

Benchmarks using Fortran, C, and C++:

`-xSSE4.2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte`

## Peak Compiler Invocation

C benchmarks:

`icc -m64 -std=c11`

C++ benchmarks:

`icpc -m64`

Fortran benchmarks:

`ifort -m64`

Benchmarks using both Fortran and C:

`ifort -m64 icc -m64 -std=c11`

Benchmarks using both C and C++:

`icpc -m64 icc -m64 -std=c11`

Benchmarks using Fortran, C, and C++:

`icpc -m64 icc -m64 -std=c11 ifort -m64`

## Peak Portability Flags

Same as Base Portability Flags

## Peak Optimization Flags

C benchmarks:

`519.lbm_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xSSE4.2 -O3  
-no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=3`

(Continued on next page)



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## Peak Optimization Flags (Continued)

538.imagick\_r: -xSSE4.2 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=3

544.nab\_r: Same as 519.lbm\_r

C++ benchmarks:

508.namd\_r: basepeak = yes

510.parest\_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xSSE4.2 -O3  
-no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=3

Fortran benchmarks:

503.bwaves\_r: -xSSE4.2 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=3  
-nostandard-realloc-lhs -align array32byte

549.fotonik3d\_r: basepeak = yes

554.roms\_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xSSE4.2 -O3  
-no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs  
-align array32byte

Benchmarks using both Fortran and C:

-prof-gen(pass 1) -prof-use(pass 2) -ipo -xSSE4.2 -O3 -no-prec-div  
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3  
-nostandard-realloc-lhs -align array32byte

Benchmarks using both C and C++:

-prof-gen(pass 1) -prof-use(pass 2) -ipo -xSSE4.2 -O3 -no-prec-div  
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3

Benchmarks using Fortran, C, and C++:

507.cactuBSSN\_r: basepeak = yes

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

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-12-21.html>

<http://www.spec.org/cpu2017/flags/NEC-Platform-Settings-T110j-RevB.html>

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

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-12-21.xml>

<http://www.spec.org/cpu2017/flags/NEC-Platform-Settings-T110j-RevB.xml>



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