## SPEC® CPU2017 Floating Point Rate Result

**NEC Corporation**

**Express5800/T110j (Intel Xeon E-2124G)**

- **CPU2017 License:** 9006
- **Test Sponsor:** NEC Corporation
- **Tested by:** NEC Corporation
- **Test Date:** Apr-2019
- **Hardware Availability:** Dec-2018
- **Software Availability:** Aug-2018

### SPECrate2017_fp_base = 30.4

### SPECrate2017_fp_peak = 30.9

### Hardware

| Benchmark | Copies | 0 | 4.00 | 8.00 | 12.0 | 16.0 | 20.0 | 24.0 | 28.0 | 32.0 | 36.0 | 40.0 | 44.0 | 48.0 | 52.0 | 56.0 | 60.0 | 64.0 | 68.0 | 72.0 | 76.0 |
|-----------|--------|---|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| 503.bwaves_r | 4      |   |      |      |      |      | 25.6 |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 75.6 |
| 507.cactuBSSN_r | 4      |   |      |      |      |      | 21.1 |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 75.6 |
| 508.namd_r | 4      |   |      |      |      |      | 21.3 |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 75.6 |
| 510.parest_r | 4      |   |      |      |      |      | 19.5 |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 75.6 |
| 511.povray_r | 4      |   |      |      |      |      | 19.7 |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 75.6 |
| 519.blas_r | 4      |   |      |      |      |      | 18.2 |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 75.6 |
| 521.wrf_r | 4      |   |      |      |      |      | 18.3 |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 75.6 |
| 526.blender_r | 4      |   |      |      |      |      | 28.3 |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 75.6 |
| 527.cam4_r | 4      |   |      |      |      |      | 28.3 |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 75.6 |
| 538.imagick_r | 4      |   |      |      |      |      | 33.9 |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 75.6 |
| 544.nab_r | 4      |   |      |      |      |      | 42.1 |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 75.6 |
| 549.fotonik3d_r | 4      |   |      |      |      |      | 22.9 |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 75.6 |
| 554.roms_r | 4      |   |      |      |      |      | 15.4 |      |      |      |      |      |      |      |      |      |      |      |      |      |      | 75.6 |

### Software

- **OS:** Red Hat Enterprise Linux Server 7.5 (Maipo)
- **Compiler:** C/C++: Version 18.0.2.199 of Intel C/C++ Compiler for Linux; Fortran: Version 18.0.2.199 of Intel Fortran Compiler for Linux
- **Parallel:** No
- **File System:** ext4
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Other:** None

**CPU Name:** Intel Xeon E-2124G  
**Max MHz.:** 4500  
**Nominal:** 3400  
**Enabled:** 4 cores, 1 chip  
**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:** 8 MB I+D on chip per chip  
**Other:** None  
**Memory:** 64 GB (4 x 16 GB 2Rx8 PC4-2666V-E)  
**Storage:** 1 x 4 TB SATA, 7200 RPM  
**Other:** None
## NEC Corporation

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### Results Table

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<td>15.8</td>
<td>403</td>
<td>15.8</td>
</tr>
</tbody>
</table>

### 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 i7-6700K CPU + 32GB RAM  
memory using Redhat Enterprise Linux 7.5  
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) (Continued on next page)
**SPEC CPU2017 Floating Point Rate Result**

**NEC Corporation**

Express5800/T110j (Intel Xeon E-2124G)

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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:**  
VT-x: Disabled  
Energy Efficient P-state: Disabled  
Energy Efficient Turbo: Disabled  
Sysinfo program /home/cpu2017/bin/sysinfo  
Rev: r5974 of 2018-05-19 9bcd8f2999c33d61f64985e45859ea9  
running on t110j Mon Apr 15 16:34:28 2019

**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) E-2124G CPU @ 3.40GHz  
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 : 4  
siblings : 4  
physical 0: cores 0 1 2 3

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: 1  
Core(s) per socket: 4  
Socket(s): 1  
NUMA node(s): 1  
Vendor ID: GenuineIntel  
CPU family: 6  
Model: 158  
Model name: Intel(R) Xeon(R) E-2124G CPU @ 3.40GHz  
Stepping: 10

(Continued on next page)
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<td>NEC Corporation</td>
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---

**SPECrate2017_fp_peak = 30.9**  
**SPECrate2017_fp_base = 30.4**

**CPU MHz:** 4409.375  
**CPU max MHz:** 4500.0000  
**CPU min MHz:** 800.0000  
**BogoMIPS:** 6816.00  
**Virtualization:** VT-x

**L1d cache:** 32K  
**L1i cache:** 32K  
**L2 cache:** 256K  
**L3 cache:** 8192K  
**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  
aperfmpref eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg  
fma cx16 xtpr pdcm pcdi sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes  
xsafe avx f16c rdrand lahf_lm abm 3dnowprefetch intel_pt ssbd ibp bts mce cmov  
tpr_shadow vmxvol flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2  
erms invpcid rtm mpx rdseed adx smap clflushopt xsaveopt xsavec xgetbv1 dtherm ida  
arat pin pts hwp hwp_notify hwp_act_window hwp-epp spec_ctrl intel_stibp flush_l1d

/proc/cpuinfo cache data  
**cache size : 8192 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: | 63587 MB |

From /proc/meminfo  
**MemTotal:** 65895300 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"

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**Platform Notes (Continued)**

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)
system-release-cpe: cpe:/o:redhat:enterprise_linux:7.5:ga:server

uname -a:
Linux t110j 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

Kernel self-reported vulnerability status:
CVE-2017-5754 (Meltdown): Mitigation: PTI
CVE-2017-5753 (Spectre variant 1): Mitigation: Load fences, __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: IBRS (kernel)

run-level 3 Apr 15 16:28

SPEC is set to: /home/cpu2017

```
Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda3      ext4  3.6T  100G  3.3T   3% /
```

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. F09 12/04/2018
Memory:
4x Samsung M391A2K43BB1-CTD 16 GB 2 rank 2667

(End of data from sysinfo program)

**Compiler Version Notes**

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

```
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

(Continued on next page)
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Compiler Version Notes (Continued)

==============================================================================
CXXC 508.namd_r(base) 510.parest_r(base, peak)
icpc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
==============================================================================
CXXC 508.namd_r(peak)
icpc (ICC) 18.0.2 20180210
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==============================================================================
CC  511.povray_r(base) 526.blender_r(base, peak)
icpc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
==============================================================================
CC   511.povray_r(peak)
icpc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
==============================================================================
FC  507.cactuBSSN_r(base, peak)
icpc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
==============================================================================
FC  503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base)
icpc (ICC) 18.0.2 20180210
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icc (ICC) 18.0.2 20180210
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Compiler Version Notes (Continued)

ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---------------------------------------------------------------------
FC  554.roms_r(peak)

---------------------------------------------------------------------
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---------------------------------------------------------------------

CC  521.wrf_r(base)  527.cam4_r(base)

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ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---------------------------------------------------------------------

CC  521.wrf_r(peak)  527.cam4_r(peak)

---------------------------------------------------------------------
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 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

Benchmarks using both C and C++:
icpc -m64 icc -m64 -std=c11

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**Base Compiler Invocation (Continued)**

Benchmarks using Fortran, C, and C++:

```bash
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:**

```bash
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=3
```

**C++ benchmarks:**

```bash
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=3
```

**Fortran benchmarks:**

```bash
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs
```

**Benchmarks using both Fortran and C:**

```bash
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs
```

**Benchmarks using both C and C++:**

```bash
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=3
```
SPEC CPU2017 Floating Point Rate Result

NEC Corporation
Express5800/T110j (Intel Xeon E-2124G)

SPECrate2017_fp_base = 30.4
SPECrate2017_fp_peak = 30.9

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

Test Date: Apr-2019
Hardware Availability: Dec-2018
Software Availability: Aug-2018

Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -03 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs

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 -xCORE-AVX2 -03
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

538.imagick_r: basepeak = yes

544.nab_r: basepeak = yes

(Continued on next page)
PEC CPU2017 Floating Point Rate Result

NEC Corporation

Express5800/T110j (Intel Xeon E-2124G)

SPECrate2017_fp_base = 30.4
SPECrate2017_fp_peak = 30.9

CPU2017 License: 9006
Test Sponsor: NEC Corporation
Hardware Availability: Dec-2018
Tested by: NEC Corporation
Software Availability: Aug-2018
Test Date: Apr-2019

Peak Optimization Flags (Continued)

C++ benchmarks:

508.namd_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

510.parest_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3

Fortran benchmarks:

503.bwaves_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -auto
-nostandard-realloc-lhs

549.fotonik3d_r: Same as 503.bwaves_r

554.roms_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs

Benchmarks using both Fortran and C:

521.wrf_r: basepeak = yes

527.cam4_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs

Benchmarks using both C and C++:

511.povray_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

526.blender_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3

Benchmarks using Fortran, C, and C++:

-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs

The flags files that were used to format this result can be browsed at
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You can also download the XML flags sources by saving the following links:

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