**SPEC CPU®2017 Floating Point Rate Result**

**NEC Corporation**
Express5800/R110j-1 (Intel Xeon E-2234)

**SPECr√2017 fp_base = 32.0**
**SPECr√2017 fp_peak = 33.8**

**CPU2017 License:** 9006  
**Test Sponsor:** NEC Corporation  
**Tested by:** NEC Corporation  
**Test Date:** Feb-2020  
**Hardware Availability:** Jan-2020  
**Software Availability:** Sep-2019

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</tbody>
</table>

**Hardware**

- **CPU Name:** Intel Xeon E-2234  
- **Max MHz:** 4800  
- **Nominal:** 3600  
- **Enabled:** 4 cores, 1 chip, 2 threads/core  
- **Orderable:** 1 chip  
- **Cache L1:** 32 KB I + 32 KB D on chip per core  
- **Cache L2:** 256 KB I+D on chip per core  
- **Cache L3:** 8 MB I+D on chip per chip  
- **Memory:** 32 GB (2 x 16 GB 2Rx8 PC4-2666V-E)  
- **Storage:** 1 x 1 TB SATA, 7200 RPM  
- **Power Management:** BIOS set to prefer performance at the cost of additional power usage

**Software**

- **OS:** Red Hat Enterprise Linux Server release 7.7 (Maipo)  
- **Kernel:** 3.10.0-1062.1.1.el7.x86_64  
- **Compiler:** C/C++: Version 19.0.4.227 of Intel C/C++ Compiler Build 20190416 for Linux; Fortran: Version 19.0.4.227 of Intel Fortran Compiler Build 20190416 for Linux  
- **Parallel:** No  
- **Firmware:** NEC BIOS Version U43 v2.12 12/06/2019 released Jan-2020  
- **File System:** ext4  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** 64-bit  
- **Power Management:** BIOS set to prefer performance at the cost of additional power usage
## NEC Corporation

**Express5800/R110j-1 (Intel Xeon E-2234)**

**CPU2017 License:** 9006  
**Test Date:** Feb-2020

**Test Sponsor:** NEC Corporation  
**Hardware Availability:** Jan-2020

**Tested by:** NEC Corporation  
**Software Availability:** Sep-2019

### Results Table

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</tbody>
</table>

**SPECrate®2017_fp_base = 32.0**  
**SPECrate®2017_fp_peak = 33.8**

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"

### Environment Variables Notes

Environment variables set by runcpu before the start of the run:  
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64"

### General Notes

Binaries compiled on a system with 1x Intel Core i9-7900X 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

(Continued on next page)
SPEC CPU®2017 Floating Point Rate Result

NEC Corporation

Express5800/R110j-1 (Intel Xeon E-2234)

**SPECrate®2017_fp_peak = 33.8**

**SPECrate®2017_fp_base = 32.0**

General Notes (Continued)

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:
- Thermal Configuration: Maximum Cooling
- Intel Virtualization Technology (Intel VT): Disabled

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed1b1e6e464a485a0011
running on r110j1 Wed Feb 19 20:20:13 2020

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-2234 CPU @ 3.60GHz
  - 1 "physical id"s (chips)
  - 8 "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: 8
  - 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): 8
- On-line CPU(s) list: 0-7
- Thread(s) per core: 2
- Core(s) per socket: 4
- Socket(s): 1
- NUMA node(s): 1
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 158

(Continued on next page)
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**Platform Notes (Continued)**

```
Model name:           Intel(R) Xeon(R) E-2234 CPU @ 3.60GHz  
Stepping:             10  
CPU MHz:              4789.160  
CPU max MHz:          4800.0000  
CPU min MHz:          800.0000  
BogoMIPS:             7200.00  
Virtualization:       VT-x  
L1d cache:            32K  
L1i cache:            32K  
L2 cache:             256K  
L3 cache:             8192K  
NUMA node0 CPU(s):    0-7  
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 arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc  
                       aperfmperf eagerfpu pni pclmulqdq dtsc64 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 epb invpcid_single intel_pt ssbd  
                       ibrs ibpb stibp tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1  
                       hle avx2 smep bmi2 ersed adx smap clflushopt xsaveopt xsavec xgetbv1 dtherm ida  
                       arat pln pts hwp hwp_notify hwp_act_window hwp_epp md_clear 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 4 5 6 7  
node 0 size: 32618 MB  
node 0 free: 31402 MB  
nodes distances:  
node 0  
0: 10
```

```
From /proc/meminfo  
MemTotal:     32791356 kB  
HugePages_Total:       0  
Hugepagesize:       2048 kB
```

```
From /etc/*release* /etc/*version*  
os-release:  
NAME="Red Hat Enterprise Linux Server"  
VERSION="7.7 (Maipo)"  
ID="rhel"  
ID_LIKE="fedora"
```

(Continued on next page)
### Platform Notes (Continued)

- **VARIANT**="Server"
- **VARIANT_ID**="server"
- **VERSION_ID**="7.7"
- **PRETTY_NAME**="Red Hat Enterprise Linux Server 7.7 (Maipo)"

```
redhat-release: Red Hat Enterprise Linux Server release 7.7 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.7 (Maipo)
system-release-cpe: cpe:/o:redhat:enterprise_linux:7.7:ga:server
```

```
uname -a:
Linux r110j1 3.10.0-1062.1.1.e17.x86_64 #1 SMP Tue Aug 13 18:39:59 UTC 2019 x86_64
x86_64 x86_64 GNU/Linux
```

#### Kernel self-reported vulnerability status:

- **CVE-2018-3620** (L1 Terminal Fault): Mitigation: PTE Inversion
- **Microarchitectural Data Sampling**: Mitigation: Clear CPU buffers; SMT vulnerable
- **CVE-2017-5754** (Meltdown): Mitigation: PTI
- **CVE-2018-3639** (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
- **CVE-2017-5753** (Spectre variant 1): Mitigation: Load fences, usercopy/swapgs barriers and __user pointer sanitization
- **CVE-2017-5715** (Spectre variant 2): Mitigation: Full retpoline, IBPB

**run-level 3 Feb 19 20:14**

```
run-level 3 Feb 19 20:14
```

**SPEC is set to**: `/home/cpu2017`

```
SPEC is set to: /home/cpu2017
```

**Filesystem** | **Type** | **Size** | **Used** | **Avail** | **Use%** | **Mounted on**
---|---|---|---|---|---|---
/dev/sda3 | ext4 | 908G | 38G | 825G | 5% | /

**From** `/sys/devices/virtual/dmi/id`

- **BIOS**: NEC U43 12/06/2019
- **Vendor**: NEC
- **Product**: Express5800/R110j-1
- **Serial**: CN69380JHR

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.

**Memory**:
- 2x UNKNOWN NOT AVAILABLE
- 2x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666

(End of data from sysinfo program)
NEC Corporation
Express5800/R110j-1 (Intel Xeon E-2234)

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CPU2017 License: 9006
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Hardware Availability: Jan-2020
Software Availability: Sep-2019

Compiler Version Notes

C
| 519.lbm_r(base, peak) 538.imagick_r(base, peak)
| 544.nab_r(base, peak)

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

C++
| 508.namd_r(base, peak) 510.parest_r(base, peak)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

C++, C
| 511.povray_r(base, peak) 526.blender_r(base, peak)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

C++, C, Fortran
| 507.cactuBSSN_r(base, peak)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Fortran
| 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
| 554.roms_r(base, peak)

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
**NEC Corporation**

**Express5800/R110j-1 (Intel Xeon E-2234)**

**SPEC CPU®2017 Floating Point Rate Result**

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**Compiler Version Notes (Continued)**

64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Fortran, C | 521.wrf_r(base, peak) 527.cam4_r(base, peak)

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 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

**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

(Continued on next page)
SPEC CPU®2017 Floating Point Rate Result

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Test Date: Feb-2020
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Base Portability Flags (Continued)

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:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

Benchmarks using both C and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

Peak Compiler Invocation

C benchmarks:
icc -m64 -std=c11

(Continued on next page)
SPEC CPU®2017 Floating Point Rate Result

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Express5800/R110j-1 (Intel Xeon E-2234)

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CPU2017 License: 9006
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Tested by: NEC Corporation

Test Date: Feb-2020
Hardware Availability: Jan-2020
Software Availability: Sep-2019

Peak Compiler Invocation (Continued)

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 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4
538.imagick_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4
544.nab_r: basepeak = yes

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=4
510.parest_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

(Continued on next page)
SPEC CPU®2017 Floating Point Rate Result

NEC Corporation

Express5800/R110j-1 (Intel Xeon E-2234)

SPECrate®2017_fp_base = 32.0
SPECrate®2017_fp_peak = 33.8

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

Test Date: Feb-2020
Hardware Availability: Jan-2020
Software Availability: Sep-2019

Fortran benchmarks:
503.bwaves_r -xCORE-AVX2 -ipo -03 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs -align array32byte

549.fotonik3d_r: Same as 503.bwaves_r

554.roms_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=4 -auto -nostandard-realloc-lhs
-align array32byte

Benchmarks using both Fortran and C:
-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -03
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

Benchmarks using both C and C++:
511.povray_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=4

526.blender_r -xCORE-AVX2 -ipo -03 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -03 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

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

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