NEC Corporation
Express5800/T110j (Intel Xeon E-2246G)

SPECrate®2017 fp_base = 36.6
SPECrate®2017 fp_peak = 39.2

Hardware
CPU Name: Intel Xeon E-2246G
Max MHz: 4800
Nominal: 3600
Enabled: 6 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: 12 MB I+D on chip per chip
Other: None
Memory: 64 GB (4 x 16 GB 2Rx8 PC4-2666V-E)
Storage: 1 x 2 TB SATA, 7200 RPM
Other: None

Software
OS: Red Hat Enterprise Linux Server release 7.7 (Maipo)
Compiler: 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 F01 08/21/2019 released Nov-2019
File System: ext4
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
Power Management: --
NEC Corporation
Express5800/T110j (Intel Xeon E-2246G)

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

**CPU2017 License:** 9006  
**Test Sponsor:** NEC Corporation  
**Tested by:** NEC Corporation  
**Hardware Availability:** Nov-2019  
**Software Availability:** Aug-2019

**Results Table**

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</tbody>
</table>

**SPECrate®2017_fp_base = 36.6**  
**SPECrate®2017_fp_peak = 39.2**

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"

**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 i9-799X 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)
## NEC Corporation

**Express5800/T110j (Intel Xeon E-2246G)**

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base</th>
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**CPU2017 License:** 9006  
**Test Sponsor:** NEC Corporation  
**Tested by:** NEC Corporation  
**Test Date:** Nov-2019  
**Hardware Availability:** Nov-2019  
**Software Availability:** Aug-2019

### 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:**
- VT-x: Disabled
- Energy Efficient P-state: Disabled
- Energy Efficient Turbo: Disabled

Sysinfo program `/home/cpu2017/bin/sysinfo`
Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011
running on t110j Tue Nov 12 21:18:54 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-2246G CPU @ 3.60GHz`
- `1 "physical id"s (chips)`
- `12 "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 : 6`
  - `siblings : 12`
  - `physical 0: cores 0 1 2 3 4 5`

From `lscpu`:
- `Architecture: x86_64`
- `CPU op-mode(s): 32-bit, 64-bit`
- `Byte Order: Little Endian`
- `CPU(s): 12`
- `On-line CPU(s) list: 0-11`
- `Thread(s) per core: 2`
- `Core(s) per socket: 6`
- `Socket(s): 1`
- `NUMA node(s): 1`
- `Vendor ID: GenuineIntel`
- `CPU family: 6`
SPEC CPU®2017 Floating Point Rate Result

NEC Corporation

Express5800/T110j (Intel Xeon E-2246G)

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

SPECrater®2017_fp_base = 36.6
SPECrater®2017_fp_peak = 39.2

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Platform Notes (Continued)

Model: 158
Model name: Intel(R) Xeon(R) E-2246G CPU @ 3.60GHz
Stepping: 10
CPU MHz: 4699.951
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: 12288K
NUMA node0 CPU(s): 0-11
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush dts acp1 mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good nstop_tsc aperfmpref 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 intel_pt ssbd ibbs ibpb stibp tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm rtm rdseed adx smap clflushopt xsaveopt xsavec xgetbv1 dtherm ida arat pni pts hwp hwp_notify hwp_act_window hwp_epp md_clear spec_ctrl intel_stibp flush_l1d

/proc/cpuinfo cache data
  cache size: 12288 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 8 9 10 11
  node 0 size: 65440 MB
  node 0 free: 63533 MB
  node distances:
    node 0
    0: 10

From /proc/meminfo
  MemTotal: 65878596 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"

(Continued on next page)
NEC Corporation

Express5800/T110j (Intel Xeon E-2246G)  

**SPECRate®2017_fp_base = 36.6**  
**SPECRate®2017_fp_peak = 39.2**

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

**Platform Notes (Continued)**

```plaintext
ID_LIKE="fedora"
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 t110j 3.10.0-1062.el7.x86_64 #1 SMP Thu Jul 18 20:25:13 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, __user pointer
    sanitization
CVE-2017-5715 (Spectre variant 2):    Mitigation: Full retpoline, IBPB

run-level 3 Nov 12 21:13

SPEC is set to: /home/cpu2017
    Filesystem  Type  Size  Used  Avail  Use%  Mounted on
    /dev/sda3  ext4  1.8T  76G  1.7T  5%  /

From /sys/devices/virtual/dmi/id
    BIOS: American Megatrends Inc. F01 08/21/2019
    Vendor: NEC
    Product: Express5800/T110j [N8100-2818Y]
    Serial: 0000001

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:
    4x Samsung M391A2K43BB1-CTD 16 GB 2 rank 2667

(End of data from sysinfo program)
## NEC Corporation

### Express5800/T110j (Intel Xeon E-2246G)

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**CPU2017 License:** 9006  
**Test Date:** Nov-2019

### SPECrate®2017 fp_base = 36.6

### SPECrate®2017 fp_peak = 39.2

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## Compiler Version Notes

<table>
<thead>
<tr>
<th>Compiler</th>
<th>Version</th>
<th>Notes</th>
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</table>
| 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.  
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.  
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.  
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. |
| 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)  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved. |

(Continued on next page)
NEC Corporation

Express5800/T110j (Intel Xeon E-2246G)

SPECrate\textsuperscript{\textregistered}2017\_fp\_base = 36.6

SPECrate\textsuperscript{\textregistered}2017\_fp\_peak = 39.2

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

Test Date: Nov-2019
Hardware Availability: Nov-2019
Software Availability: Aug-2019

Compiler Version Notes (Continued)

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

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## NEC Corporation

**Expression5800/T110j (Intel Xeon E-2246G)**

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### Base Portability Flags (Continued)

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<td>527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG</td>
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<td></td>
</tr>
<tr>
<td>554.roms_r: -DSPEC_LP64</td>
<td></td>
</tr>
</tbody>
</table>

### 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)
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: Same as 538.imagick_r

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/T110j (Intel Xeon E-2246G)

SPECrate®2017_fp_base = 36.6

SPECrate®2017_fp_peak = 39.2

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

Test Date: Nov-2019
Hardware Availability: Nov-2019
Software Availability: Aug-2019

Peak Optimization Flags (Continued)

Fortran benchmarks:

503.bwaves_r: -xCORE-AVX2 -ipo -O3 -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 -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:

-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 -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 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

526.blender_r: -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

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:
## SPEC CPU®2017 Floating Point Rate Result

<table>
<thead>
<tr>
<th>NEC Corporation</th>
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</tr>
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Tested with SPEC CPU®2017 v1.1.0 on 2019-11-12 07:18:53-0500.  
Report generated on 2019-12-10 14:57:38 by CPU2017 PDF formatter v6255.  
Originally published on 2019-12-10.