NEC Corporation

Express5800/R110j-1 (Intel Xeon E-2136)

SPECrate2017_fp_base = 38.0
SPECrate2017_fp_peak = 38.7

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

Test Date: Nov-2018
Hardware Availability: Dec-2018
Software Availability: Aug-2018

Hardware

CPU Name: Intel Xeon E-2136
Max MHz.: 4500
Nominal: 3300
Enabled: 6 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: 12 MB I+D on chip per chip
Other: None
Memory: 64 GB (4 x 16 GB 2Rx8 PC4-2666V-E)
Storage: 1 x 600 GB SAS, 15000 RPM, RAID 0
Other: None

Software

OS: Red Hat Enterprise Linux Server release 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
Firmware: NEC BIOS Version U43 10/02/2018 released Dec-2018
File System: ext4
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
Results Table

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</tbody>
</table>

SPECrate2017_fp_base = 38.0
SPECrate2017_fp_peak = 38.7

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/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 i7-6700K 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) is mitigated in the system as tested and documented.

(Continued on next page)
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:
  Thermal Configuration: Maximum Cooling
  Workload Profile: Custom
  Intel Hyper-Threading: Disabled
  Intel Virtualization Technology (Intel VT): Disabled
  Energy Efficient Turbo: Disabled

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on r110j1 Fri Nov 9 23:16:48 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) E-2136 CPU @ 3.30GHz
  1 "physical id"s (chips)
  6 "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 : 6
  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): 6
  On-line CPU(s) list: 0-5
  Thread(s) per core: 1
  Core(s) per socket: 6
  Socket(s): 1
  NUMA node(s): 1
  Vendor ID: GenuineIntel
  CPU family: 6
  Model: 158
  Model name: Intel(R) Xeon(R) E-2136 CPU @ 3.30GHz
Platform Notes (Continued)

Stepping: 10
CPU MHz: 4311.914
CPU max MHz: 4500.0000
CPU min MHz: 800.0000
BogoMIPS: 6624.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 256K
L3 cache: 12288K
NUMA node0 CPU(s): 0-5
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 ntopology nonstop_tsc
aperfmperf 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 epb intel_pt ssbd ibpb stibp
tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2
erms invpcid rtm rtm rseed adx smap clflushopt xsaveopt xsavec xgetbv1 dtherm ida
arat pln pts hwp hwp_notify hwp_act_window hwp_epp 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
  node 0 size: 65385 MB
  node 0 free: 63362 MB
  node distances:
    node 0
  0: 10

From /proc/meminfo
  MemTotal: 65820832 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"
NEC Corporation
Express5800/R110j-1 (Intel Xeon E-2136)

SPECrate2017_fp_base = 38.0
SPECrate2017_fp_peak = 38.7

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

Test Date: Nov-2018
Hardware Availability: Dec-2018
Software Availability: Aug-2018

Platform Notes (Continued)

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

uname -a:
Linux r110j1 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 Nov 9 23:11

SPEC is set to: /home/cpu2017

```
Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda3      ext4  542G   85G  430G  17% /
```

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 NEC U43 10/02/2018
Memory:
2x HPE 879527-091 16 GB 2 rank 2666, configured at 2667
2x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666, configured at 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.
------------------------------------------------------------------------------

 CC 519.lbm_r(peak)
------------------------------------------------------------------------------
icc (ICC) 18.0.2 20180210
```

(Continued on next page)
NEC Corporation

Express5800/R110j-1 (Intel Xeon E-2136)

SPEC CPU2017 Floating Point Rate Result

SPECrate2017_fp_base = 38.0
SPECrate2017_fp_peak = 38.7

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

Test Date: Nov-2018
Hardware Availability: Dec-2018
Software Availability: Aug-2018

Compiler Version Notes (Continued)

Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

------------------------------------------------------------------------------
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
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

------------------------------------------------------------------------------
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.

(Continued on next page)
NEC Corporation
Express5800/R110j-1 (Intel Xeon E-2136)

SPEC CPU2017 Floating Point Rate Result
Copyright 2017-2018 Standard Performance Evaluation Corporation

SPEC CPU2017 Floating Point Rate Result

NEC Corporation
Express5800/R110j-1 (Intel Xeon E-2136)

SPECrate2017_fp_base = 38.0
SPECrate2017_fp_peak = 38.7

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

CPU2017 License: 9006
test-20180210
Software Availability: Aug-2018

Test Date: Nov-2018
Hardware Availability: Dec-2018

Compiler Version Notes (Continued)

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

(Continued on next page)
## SPEC CPU2017 Floating Point Rate Result

**NEC Corporation**

**Express5800/R110j-1 (Intel Xeon E-2136)**

**SPECrate2017_fp_base = 38.0**

**SPECrate2017_fp_peak = 38.7**

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**Test Date:** Nov-2018

**Hardware Availability:** Dec-2018

**Software Availability:** Aug-2018

### Base Compiler Invocation (Continued)

#### Benchmarks using both C and C++:

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

#### Benchmarks using Fortran, C, and C++:

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

### Base Portability Flags

- `503.bwaves_r`:
  - `-DSPEC_LP64`

- `507.cactusBSSN_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
```

(Continued on next page)
**NEC Corporation**

Express5800/R110j-1 (Intel Xeon E-2136)

| SPECrate2017_fp_base | 38.0 |
| SPECrate2017_fp_peak | 38.7 |

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

**Base Optimization Flags (Continued)**

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

**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 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3`

(Continued on next page)
## NEC Corporation

**Express5800/R110j-1 (Intel Xeon E-2136)**

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### CPU2017 License: 9006

- **Test Sponsor:** NEC Corporation
- **Test Date:** Nov-2018
- **Tested by:** NEC Corporation
- **Hardware Availability:** Dec-2018
- **Software Availability:** Aug-2018

### Peak Optimization Flags (Continued)

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

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=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:**

- `-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++:**

507.cactuBSSN_r: basepeak = yes
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<th>SPECrate2017_fp_base = 38.0</th>
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<td>Software Availability: Aug-2018</td>
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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:
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-12-21.xml

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