# NEC Corporation

**Express5800/R110j-1 (Intel Xeon E-2144G)**

**SPECspeed2017_fp_base = 24.7**

**SPECspeed2017_fp_peak = 26.0**

## Hardware

<table>
<thead>
<tr>
<th>Threaded</th>
<th>SPECspeed2017_fp_base (24.7)</th>
<th>SPECspeed2017_fp_peak (26.0)</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
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<tr>
<td>607.cactuBSSN_s</td>
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<td>24.7</td>
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<tr>
<td>619.lbm_s</td>
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<td>621.wrf_s</td>
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<td>33.2</td>
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<td>627.cam4_s</td>
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<td>22.7</td>
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<tr>
<td>628.pop2_s</td>
<td>4</td>
<td>30.5</td>
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<td>638.imagick_s</td>
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<tr>
<td>644.nab_s</td>
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<tr>
<td>649.fotonik3d_s</td>
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<td>46.3</td>
</tr>
<tr>
<td>654.roms_s</td>
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<td>15.4</td>
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</table>

### Threads

- **SPECspeed2017_fp_base**: 24.7
- **SPECspeed2017_fp_peak**: 26.0

### CPU Name: Intel Xeon E-2144G
- **Max MHz.**: 4500
- **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
- **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 1 TB SATA, 7200 RPM, RAID 0
- **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 18.0.2.199 of Intel C/C++ Compiler for Linux:
- Fortran: Version 18.0.2.199 of Intel Fortran Compiler for Linux

### Parallel:
- Yes

### 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:
- jemalloc memory allocator V5.0.1
## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<td>1023</td>
<td>15.4</td>
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</tr>
</tbody>
</table>

### Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

### General Notes

Environment variables set by runcpu before the start of the run:

- `KMP_AFFINITY = "granularity=fine,compact,1,0"`
- `LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32:/home/cpu2017/je5.0.1-64"`
- `OMP_STACKSIZE = "192M"`

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.

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.

jemalloc, a general purpose malloc implementation built with the Redhat Enterprise 7.5, and the system compiler gcc 4.8.5

SPEC CPU2017 Floating Point Speed Result

NEC Corporation

Express5800/R110j-1 (Intel Xeon E-2144G)

**SPECspeed2017_fp_base = 24.7**

**SPECspeed2017_fp_peak = 26.0**

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<td>Tested by:</td>
<td>NEC Corporation</td>
</tr>
<tr>
<td>Test Date:</td>
<td>Nov-2018</td>
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<td>Hardware Availability:</td>
<td>Jan-2019</td>
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<tr>
<td>Software Availability:</td>
<td>Aug-2018</td>
</tr>
</tbody>
</table>

**Platform Notes**

BIOS Settings:
- Thermal Configuration: Maximum Cooling
- Workload Profile: Custom
- Intel Virtualization Technology (Intel VT): Disabled
- Energy Efficient Turbo: Disabled

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcede8f2999c33d61f64985e45859ea9
running on r110j Sat Nov 17 12:53:56 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-2144G CPU @ 3.60GHz
- "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
- Model name: Intel(R) Xeon(R) E-2144G CPU @ 3.60GHz
- Stepping: 10
- CPU MHz: 4334.765
- CPU max MHz: 4500.0000
- CPU min MHz: 800.0000
- BogoMIPS: 7200.00
- Virtualization: VT-x
- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 256K
- L3 cache: 8192K

(Continued on next page)
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Express5800/R110j-1 (Intel Xeon E-2144G)

SPEC CPU2017 Floating Point Speed Result

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Platform Notes (Continued)

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 rdtsscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology 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 lm 3dmrovStraight epb intel_pt ssbd ibrs ibpb stibp
tpr_shadow vmmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2
ermns invpcid rtm mpx rdseed 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

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: 65386 MB
node 0 free: 63480 MB
node distances:
node 0
0: 10

From /proc/meminfo
MemTotal: 65821576 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)
system-release-cpe: cpe:/o:redhat:enterprise_linux:7.5:ga:server

uname -a:
Linux r110j 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

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Platform Notes (Continued)

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 17 12:48

SPEC is set to: /home/cpu2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 ext4 909G 85G 778G 10% /

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:
4x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666, configured at 2667

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
CC 619.lbm_s(base) 638.imagick_s(base, peak) 644.nab_s(base, peak)
==============================================================================
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
==============================================================================

==============================================================================
FC 607.cactuBSSN_s(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

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

Expression5800/R110j-1 (Intel Xeon E-2144G)

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**Test Sponsor:** NEC Corporation  
**Tested by:** NEC Corporation  
**Test Date:** Nov-2018  
**Hardware Availability:** Jan-2019  
**Software Availability:** Aug-2018

**Compiler Version Notes (Continued)**

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

==============================================================================

FC  603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base, peak)

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

==============================================================================

FC  603.bwaves_s(peak) 649.fotonik3d_s(peak)

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

==============================================================================

CC  621.wrf_s(base) 627.cam4_s(base, peak) 628.pop2_s(base)

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

==============================================================================

CC  621.wrf_s(peak) 628.pop2_s(peak)

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

**Base Compiler Invocation**

C benchmarks:  
```bash
icc -m64 -std=c11
```

Fortran benchmarks:  
```bash
ifort -m64
```

Benchmarks using both Fortran and C:  
```bash
ifort -m64 icc -m64 -std=c11
```

(Continued on next page)
SPEC CPU2017 Floating Point Speed Result

NEC Corporation
Express5800/R110j-1 (Intel Xeon E-2144G)

SPECspeed2017_fp_base = 24.7
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CPU2017 License: 9006
Test Sponsor: NEC Corporation
Test Date: Nov-2018
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Tested by: NEC Corporation
Software Availability: Aug-2018

Base Compiler Invocation (Continued)
Benchmarks using Fortran, C, and C++:
icpc -m64 icc -m64 -std=c11 ifort -m64

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
-assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-W1,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout Trans=3 -qopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc

Fortran benchmarks:
-W1,-z,muldefs -DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout Trans=3 -qopenmp
-nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc

Benchmarks using both Fortran and C:
-W1,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout Trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc

Benchmarks using Fortran, C, and C++:
-W1,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout Trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc
SPEC CPU2017 Floating Point Speed Result

NEC Corporation
Express5800/R110j-1 (Intel Xeon E-2144G)

| SPECspeed2017_fp_base | 24.7 |
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CPU2017 License: 9006
Test Sponsor: NEC Corporation
Tested by: NEC Corporation

Test Date: Nov-2018
Hardware Availability: Jan-2019
Software Availability: Aug-2018

Peak Compiler Invocation

C benchmarks:
icc -m64 -std=c11

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
ifort -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:
619.lbm_s: basepeak = yes
638.imagick_s: basepeak = yes
644.nab_s: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
603.bwaves_s: -prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -O2 -xCORE-AVX2 -qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div -qopt-mem-layout-trans=3 -qopenmp -nostandard-realloc-lhs
649.fotonik3d_s: Same as 603.bwaves_s
654.roms_s: -DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -nostandard-realloc-lhs

(Continued on next page)
SPEC CPU2017 Floating Point Speed Result
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Peak Optimization Flags (Continued)

Benchmarks using both Fortran and C:

621.wrf_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs

627.cam4_s: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs

628.pop2_s: basepeak = yes

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: basepeak = yes

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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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU2017 v1.0.5 on 2018-11-16 22:53:55-0500.
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