SPEC® CPU2017 Floating Point Speed Result

NEC Corporation

Express5800/T110j-S (Intel Xeon E-2134)

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

SPECspeed2017_fp_base = 24.7
SPECspeed2017_fp_peak = 25.9

Threads

603.bwaves_s 4
607.cactuBSSN_s 4
619.lbm_s 4
621.wrf_s 4
627.cam4_s 4
628.pop2_s 4
638.imagick_s 4
644.nab_s 4
649.fotonik3d_s 4
654.roms_s 4

--- SPECspeed2017_fp_base (24.7) ---
--- SPECspeed2017_fp_peak (25.9) ---

Hardware

CPU Name: Intel Xeon E-2134
Max MHz.: 4500
Nominal: 3500
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
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: Yes
Firmware: Version F07 10/31/2018 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
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<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>24.7</td>
<td>25.9</td>
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**Tested by:** NEC Corporation  
**Test Date:** Nov-2018  
**Hardware Availability:** Dec-2018  
**Software Availability:** Aug-2018

### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>4</td>
<td>744</td>
<td>79.3</td>
<td>746</td>
<td>79.1</td>
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<td>745</td>
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<tr>
<td>607.cactuBSSN_s</td>
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<td>399</td>
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<td>41.6</td>
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<td>4</td>
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<td>41.8</td>
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<td>41.6</td>
<td>402</td>
<td>41.5</td>
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<tr>
<td>619.lbm_s</td>
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<td>7.20</td>
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<td>7.20</td>
<td>728</td>
<td>7.20</td>
<td>728</td>
<td>7.20</td>
<td></td>
<td></td>
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<tr>
<td>621.wrf_s</td>
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<td>424</td>
<td>31.2</td>
<td>419</td>
<td>31.6</td>
<td>425</td>
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<td>398</td>
<td>33.2</td>
<td>397</td>
<td>33.3</td>
<td>400</td>
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<tr>
<td>627.cam4_s</td>
<td>4</td>
<td>487</td>
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<td>487</td>
<td>18.2</td>
<td>486</td>
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<td>8</td>
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<td>22.7</td>
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<td>391</td>
<td>22.6</td>
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<tr>
<td>628.pop2_s</td>
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<td>390</td>
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<td>390</td>
<td>30.4</td>
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<td>30.4</td>
<td>390</td>
<td>30.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>638.imagick_s</td>
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<td>722</td>
<td>20.0</td>
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<td>20.0</td>
<td>727</td>
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<tr>
<td>644.nab_s</td>
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<td>46.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>4</td>
<td>511</td>
<td>17.8</td>
<td>512</td>
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<td>17.7</td>
<td>511</td>
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<tr>
<td>654.roms_s</td>
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<td>1025</td>
<td>15.4</td>
<td>1026</td>
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<td>15.4</td>
<td>1022</td>
<td>15.4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Results**

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

**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.

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| SPECspeed2017_fp_base = 24.7 | SPECspeed2017_fp_peak = 25.9 |

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Hardware Availability: Dec-2018
Software Availability: Aug-2018

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 9bcede8f2999c33d61f64985e45859ea9
running on t110js Thu Nov 29 22:50:06 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-2134 CPU @ 3.50GHz
  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
Model name: Intel(R) Xeon(R) E-2134 CPU @ 3.50GHz
Stepping: 10
CPU MHz: 3453.857
CPU max MHz: 4500.0000
CPU min MHz: 800.0000
BogoMIPS: 7008.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 256K
L3 cache: 8192K
NUMA node0 CPU(s): 0-7

(Continued on next page)
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Express5800/T110j-S (Intel Xeon E-2134)

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Platform Notes (Continued)

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 pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
xsave avx f16c rdrand lahf_lm abtm 3dnowprefetch intel_pt ssbd ibrs ibpb stibp
tpr_shadow vmmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2
ermrs invpcid rtm mpx rdseed adx smap clflushopt xsaveopt xsaac 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 : 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: 65455 MB
    node 0 free: 63577 MB
    node distances:
        node   0
            0:  10

From /proc/meminfo
    MemTotal:       65895068 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 t110js 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:

(Continued on next page)
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Platform Notes (Continued)

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 29 22:44

SPEC is set to: /home/cpu2017

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sda3</td>
<td>ext4</td>
<td>909G</td>
<td>39G</td>
<td>824G</td>
<td>5%</td>
<td>/</td>
</tr>
</tbody>
</table>

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. F07 10/31/2018
Memory:
4x Samsung M391A2K43BB1-CTD 16 GB 2 rank 2667

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.
==============================================================================

CC 619.lbm_s(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
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

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Compiler Version Notes (Continued)

==============================================================================
FC 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base, peak)
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
==============================================================================
FC 603.bwaves_s(peak) 649.fotonik3d_s(peak)
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)
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
icc (ICC) 18.0.2 20180210
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==============================================================================
CC 621.wrf_s(peak) 628.pop2_s(peak)
ifort (IFORT) 18.0.2 20180210
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icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

Fortran benchmarks:
ifort -m64

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

(Continued on next page)
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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:
-Wl,-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:
-Wl,-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:
-Wl,-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++:
-Wl,-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
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### Peak Compiler Invocation

<table>
<thead>
<tr>
<th>C benchmarks:</th>
<th>icc -m64 -std=c11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fortran benchmarks:</td>
<td>ifort -m64</td>
</tr>
<tr>
<td>Benchmarks using both Fortran and C:</td>
<td>ifort -m64 icc -m64 -std=c11</td>
</tr>
<tr>
<td>Benchmarks using Fortran, C, and C++:</td>
<td>icpc -m64 icc -m64 -std=c11 ifort -m64</td>
</tr>
</tbody>
</table>

### Peak Portability Flags

Same as Base Portability Flags

### Peak Optimization Flags

<table>
<thead>
<tr>
<th>C benchmarks:</th>
</tr>
</thead>
<tbody>
<tr>
<td>619.lbm_s: basepeak = yes</td>
</tr>
<tr>
<td>638.imagick_s: basepeak = yes</td>
</tr>
<tr>
<td>644.nab_s: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fortran benchmarks:</th>
</tr>
</thead>
<tbody>
<tr>
<td>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</td>
</tr>
<tr>
<td>649.fotonik3d_s: Same as 603.bwaves_s</td>
</tr>
<tr>
<td>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</td>
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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  
- ffinitmath-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  
- ffinitmath-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

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

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