## NEC Corporation

**Express5800/T120h (Intel Xeon Silver 4114)**

<table>
<thead>
<tr>
<th>Ability</th>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
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<td>Test Sponsor</td>
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<td>NEC Corporation</td>
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<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_fp_base</th>
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<tr>
<td>603.bwaves_s</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>20</td>
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<td>619.lbm_s</td>
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<td>627.cam4_s</td>
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<td>628.pop2_s</td>
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<td>638.imagick_s</td>
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</tr>
<tr>
<td>644.nab_s</td>
<td>20</td>
<td>68.6</td>
</tr>
</tbody>
</table>

### Software

- **OS:** Red Hat Enterprise Linux Server release 7.6 (Maipo)
- **Kernel:** 3.10.0-957.5.1.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 U41 v2.02 03/19/2019 released May-2019
- **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

### Hardware

- **CPU Name:** Intel Xeon Silver 4114
- **Max MHz.:** 3000
- **Nominal:** 2200
- **Enabled:** 20 cores, 2 chips
- **Orderable:** 1,2 chips
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **L2:** 1 MB I+D on chip per core
- **L3:** 13.75 MB I+D on chip per chip
- **Other:** None
- **Memory:** 384 GB (24 x 16 GB 2Rx8 PC4-2666V-R, running at 2400)
- **Storage:** 1 x 1 TB SATA, 7200 RPM, RAID 0
- **Other:** None
NEC Corporation
Express5800/T120h (Intel Xeon Silver 4114)

SPECspeed2017_fp_base = 70.8
SPECspeed2017_fp_peak = 71.5

Results Table

<table>
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<tr>
<th>Benchmark</th>
<th>Threads</th>
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<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>229</td>
</tr>
</tbody>
</table>

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"
LD_LIBRARY_PATH = "/$home/cpu2017/lib/intel64:/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/T120h (Intel Xeon Silver 4114)  

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**CPU2017 License:** 9006  
**Test Sponsor:** NEC Corporation  
**Test Date:** Apr-2019  
**Hardware Availability:** Nov-2017  
**Tested by:** NEC Corporation  
**Software Availability:** Jan-2019

### Platform Notes

**BIOS Settings:**
- Thermal Configuration: Maximum Cooling
- Workload Profile: General Peak Frequency Compute
- Intel Hyper-Threading: Disabled
- Memory Patrol Scrubbing: Disabled
- Energy/Performance Bias: Maximum Performance
- LLC Dead Line Allocation: Disabled
- Workload Profile: Custom
- NUMA Group Size Optimization: Flat
-Adjacent Sector Prefetch: Disabled
- DCU Stream Prefetcher: Disabled
- Sysinfo program /home/cpu2017/bin/sysinfo

**Rev:** r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9  
**Running on t120h Thu Apr 18 07:24:12 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) Silver 4114 CPU @ 2.20GHz  
- 2 "physical id"s (chips)  
- 20 "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: 10  
  - siblings: 10  
  - physical 0: cores 0 1 2 3 4 8 9 10 11 12  
  - physical 1: cores 0 1 2 3 4 8 9 10 11 12

**From lscpu:**

- Architecture: x86_64  
- CPU op-mode(s): 32-bit, 64-bit  
- Byte Order: Little Endian  
- CPU(s): 20  
- On-line CPU(s) list: 0-19  
- Thread(s) per core: 1  
- Core(s) per socket: 10  
- Socket(s): 2  
- NUMA node(s): 2  
- Vendor ID: GenuineIntel  
- CPU family: 6  
- Model: 85  
- Model name: Intel(R) Xeon(R) Silver 4114 CPU @ 2.20GHz  
- Stepping: 4  
- CPU MHz: 2200.000  
- BogoMIPS: 4400.00

(Continued on next page)
NEC Corporation

Express5800/T120h (Intel Xeon Silver 4114)

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**CPU2017 License:** 9006
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**Platform Notes (Continued)**

Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 14080K
NUMA node0 CPU(s): 0-9
NUMA node1 CPU(s): 10-19
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
aperf perf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
xsave avx f16c rdrand lahf_lm abm 3nowprefetch epb cat lg _l3 cd p_l3 intel_p Wilderness
intel_pt ssbd mba ibrs ibpb stibp tpr_shadow vnmi flexpriority ept vpid fsgsbase
tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cmq mpx rdt_a avx512f avx512dq
rdspe ed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsave xgetbv1
ccm_l1c cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts pku ospke
spec_ctrl intel_stibp flush_l1d

/proc/cpuinfo cache data
        cache size : 14080 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
    available: 2 nodes (0-1)
    node 0 cpus: 0 1 2 3 4 5 6 7 8 9
    node 0 size: 196257 MB
    node 0 free: 191562 MB
    node 1 cpus: 10 11 12 13 14 15 16 17 18 19
    node 1 size: 196607 MB
    node 1 free: 191982 MB
    node distances:
        node 0 1
        0: 10 21
        1: 21 10

From /proc/meminfo
    MemTotal: 395918636 kB
    HugePages_Total: 0
    Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
    os-release:
        NAME="Red Hat Enterprise Linux Server"
        VERSION="7.6 (Maipo)"
        ID="rhel"
        ID-_LIKE="fedora"

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

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CPU2017 License: 9006
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Platform Notes (Continued)

```
VARIANT="Server"
VARIANT_ID="server"
VERSION_ID="7.6"
PRETTY_NAME="Red Hat Enterprise Linux Server 7.6 (Maipo)"
redhat-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)

uname -a:
  Linux t120h 3.10.0-957.5.1.el7.x86_64 #1 SMP Wed Dec 19 10:46:58 EST 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 Apr 18 07:18

SPEC is set to: /home/cpu2017
  Filesystem   Type  Size  Used Avail Use% Mounted on
  /dev/sda3     ext4  909G   75G  788G   9% /

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 U41 03/19/2019
  Memory:
    6x HPE 840756-091 16 GB 2 rank 2666, configured at 2400
    18x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666, configured at 2400

(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.

CC  619.lbm_s(peak)
```

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<table>
<thead>
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<td>ifort (IFORT) 18.0.2 20180210</td>
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## SPEC CPU2017 Floating Point Speed Result

### NEC Corporation

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**CPU2017 License:** 9006  
**Test Sponsor:** NEC Corporation  
**Tested by:** NEC Corporation  
**Test Date:** Apr-2019  
**Hardware Availability:** Nov-2017  
**Software Availability:** Jan-2019

### Base Compiler Invocation

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

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

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

- **Benchmarks using Fortran, C, and C++:**
  ```bash```
  icpc -m64 icc -m64 -std=c11 ifort -m64
  ```bash```

### 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
- 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:**
  ```bash```
  -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
  -ffinite-math-only -qopt-mem-layout-trans=3 -gopenmp -DSPEC_OPENMP
  -L/usr/local/je5.0.1-64/lib -ljemalloc
  ```bash```

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

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

(Continued on next page)
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**Test Date:** Apr-2019  
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#### Base Optimization Flags (Continued)

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`

#### 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: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP`
- `644.nab_s: basepeak = yes`

Fortran benchmarks:

(Continued on next page)
NEC Corporation
Express5800/T120h (Intel Xeon Silver 4114)

SPEC CPU2017 Floating Point Speed Result
Copyright 2017-2019 Standard Performance Evaluation Corporation

SPECspeed2017_fp_base = 70.8
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CPU2017 License: 9006
Test Sponsor: NEC Corporation
Tested by: NEC Corporation
Test Date: Apr-2019
Hardware Availability: Nov-2017
Software Availability: Jan-2019

Peak Optimization Flags (Continued)

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: basepeak = yes
654.roms_s: basepeak = yes

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: Same as 621.wrf_s

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
http://www.spec.org/cpu2017/flags/NEC-Platform-Settings-V1.2-R120h-RevB.html

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
http://www.spec.org/cpu2017/flags/NEC-Platform-Settings-V1.2-R120h-RevB.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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