## NEC Corporation

**Express5800/R120h-2M (Intel Xeon Silver 4114)**

### SPECrate2017_int_base = 93.2

### SPECrate2017_int_peak = 98.8

<table>
<thead>
<tr>
<th>CPU2017 License</th>
<th>NEC Corporation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor</td>
<td>NEC Corporation</td>
</tr>
<tr>
<td>Tested by</td>
<td>NEC Corporation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name: Intel Xeon Silver 4114</td>
<td>OS: Red Hat Enterprise Linux Server release 7.4 (Maipo)</td>
</tr>
<tr>
<td>Max MHz.: 3000</td>
<td>Kernel 3.10.0-693.21.1.el7.x86_64</td>
</tr>
<tr>
<td>Nominal: 2200</td>
<td>Compiler: C/C++: Version 18.0.2.199 of Intel C/C++</td>
</tr>
<tr>
<td>Enabled: 20 cores, 2 chips, 2 threads/core</td>
<td>Compiler for Linux: Fortran Version 18.0.2.199 of Intel Fortran</td>
</tr>
<tr>
<td>Orderable: 1.2 chips</td>
<td>Compiler for Linux</td>
</tr>
<tr>
<td>Cache L1: 32 KB I + 32 KB D on chip per core</td>
<td>Parallel: No</td>
</tr>
<tr>
<td>L2: 1 MB I+D on chip per core</td>
<td>Firmware: NEC BIOS Version U30 02/15/2018 released Mar-2018</td>
</tr>
<tr>
<td>L3: 13.75 MB I+D on chip per chip</td>
<td>File System: ext4</td>
</tr>
<tr>
<td>Other: None</td>
<td>System State: Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Memory: 192 GB (24 x 8 GB 2Rx8 PC4-2666V-R, running at 2400)</td>
<td>Base Pointers: 64-bit</td>
</tr>
<tr>
<td>Storage: 1 x 1 TB SATA, 7200 RPM, RAID 0</td>
<td>Peak Pointers: 32/64-bit</td>
</tr>
<tr>
<td>Other: None</td>
<td>Other: jemalloc memory allocator V5.0.1</td>
</tr>
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</table>
SPEC CPU2017 Integer Rate Result

NEC Corporation

Express5800/R120h-2M (Intel Xeon Silver 4114)

SPECrate2017_int_base = 93.2
SPECrate2017_int_peak = 98.8

Results Table

<table>
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<tr>
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<th>Seconds</th>
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<tbody>
<tr>
<td>500.perlbench_r</td>
<td>40</td>
<td>892</td>
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<td>887</td>
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<td>86.8</td>
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<td>502.gcc_r</td>
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<td>828</td>
<td>63.4</td>
<td>826</td>
<td>63.5</td>
<td>40</td>
<td>824</td>
<td>63.7</td>
<td>828</td>
<td>63.4</td>
<td>826</td>
<td>63.5</td>
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<tr>
<td>503.mcf_r</td>
<td>40</td>
<td>540</td>
<td>120</td>
<td>558</td>
<td>116</td>
<td>556</td>
<td>116</td>
<td>40</td>
<td>540</td>
<td>120</td>
<td>558</td>
<td>116</td>
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<td>116</td>
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<tr>
<td>520.omnetpp_r</td>
<td>40</td>
<td>824</td>
<td>63.7</td>
<td>828</td>
<td>63.4</td>
<td>826</td>
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<td>824</td>
<td>63.7</td>
<td>828</td>
<td>63.4</td>
<td>826</td>
<td>63.5</td>
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<td>523.xalancbmk_r</td>
<td>40</td>
<td>443</td>
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<td>525.x264_r</td>
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<td>181</td>
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<td>177</td>
<td>392</td>
<td>179</td>
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<td>388</td>
<td>181</td>
<td>395</td>
<td>177</td>
<td>392</td>
<td>179</td>
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<tr>
<td>531.deepsjeng_r</td>
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<td>559</td>
<td>82.0</td>
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<td>80.1</td>
<td>575</td>
<td>79.7</td>
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<td>82.0</td>
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<tr>
<td>557.zxr</td>
<td>40</td>
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<td>675</td>
<td>64.0</td>
<td>676</td>
<td>63.9</td>
<td>40</td>
<td>616</td>
<td>70.1</td>
<td>675</td>
<td>64.0</td>
<td>676</td>
<td>63.9</td>
</tr>
</tbody>
</table>

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

Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl 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"

General Notes

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

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
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>

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)
SPEC CPU2017 Integer Rate Result

NEC Corporation

Express5800/R120h-2M (Intel Xeon Silver 4114)

SPECrate2017_int_base = 93.2
SPECrate2017_int_peak = 98.8

General Notes (Continued)

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

Platform Notes

BIOS Settings:
- Thermal Configuration: Maximum Cooling
- Workload Profile: General Throughput Compute
- Memory Patrol Scrubbing: Disabled
- LLC Dead Line Allocation: Disabled
- LLC Prefetch: Enabled
- Workload Profile: Custom
- Sub-NUMA Clustering: Disabled

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on r120h2m Mon Jul 30 09:52:52 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) Silver 4114 CPU @ 2.20GHz
- 2 "physical id"s (chips)
- 40 "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 : 20
- 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): 40
- On-line CPU(s) list: 0-39
- Thread(s) per core: 2
- Core(s) per socket: 10
- Socket(s): 2
- NUMA node(s): 2
- Vendor ID: GenuineIntel

(Continued on next page)
SPEC CPU2017 Integer Rate Result

NEC Corporation

Express5800/R120h-2M (Intel Xeon Silver 4114)

SPECrate2017_int_base = 93.2
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CPU2017 License: 9006
Test Sponsor: NEC Corporation
Hardware Availability: Jun-2018
Test Date: Jul-2018
Tested by: NEC Corporation
Software Availability: Mar-2018

Platform Notes (Continued)

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
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 14080K
NUMA node0 CPU(s): 0-9,20-29
NUMA node1 CPU(s): 10-19,30-39
Flags: fpu vme de pse tsc msr pae mce 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 fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch ebpxcat_13 cdp_13 invpcid_single intel_pt spec_ctrl ibpb_support tpr_shadow vmi flexpriority ept vpid fsgsbase tsc_adjust bmil hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm local dtherm ida arat pln pts

/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 20 21 22 23 24 25 26 27 28 29
node 0 size: 97964 MB
node 0 free: 95484 MB
node 1 cpus: 10 11 12 13 14 15 16 17 18 19 30 31 32 33 34 35 36 37 38 39
node 1 size: 98303 MB
node 1 free: 95929 MB
node distances:
node 0 1
0: 10 21
1: 21 10

From /proc/meminfo
MemTotal: 197747508 kB
 HugePages_Total:  0
 Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
**SPEC CPU2017 Integer Rate Result**

**NEC Corporation**

Express5800/R120h-2M (Intel Xeon Silver 4114)

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<th>Test Date:</th>
<th>Jul-2018</th>
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</tr>
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</table>

**SPECrate2017_int_base = 93.2**

**SPECrate2017_int_peak = 98.8**

---

**Platform Notes (Continued)**

```plaintext
os-release:
   NAME="Red Hat Enterprise Linux Server"
   VERSION="7.4 (Maipo)"
   ID="rhel"
   ID_LIKE="fedora"
   VARIANT="Server"
   VARIANT_ID="server"
   VERSION_ID="7.4"
   PRETTY_NAME="Red Hat Enterprise Linux Server 7.4 (Maipo)"

redhat-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
system-release-cpe: cpe:/o:redhat:enterprise_linux:7.4:ga:server

uname -a:
   Linux r120h2m 3.10.0-693.21.1.el7.x86_64 #1 SMP Fri Feb 23 18:54:16 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
CVE-2017-5715 (Spectre variant 2): Mitigation: IBRS (kernel)

run-level 3 Jul 30 09:47

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>332G</td>
<td>531G</td>
<td>39%</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 NEC U30 02/15/2018

Memory:
   24x HPE 876319-081 8 GB 2 rank 2666, configured at 2400

(End of data from sysinfo program)

---

**Compiler Version Notes**

```
CC  500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base)
    557.xz_r(base)
```

```
icc (ICC) 18.0.2 20180210
```

(Continued on next page)
 SPEC CPU2017 Integer Rate Result

NEC Corporation

Express5800/R120h-2M (Intel Xeon Silver 4114)

<table>
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<th>CPU2017 License: 9006</th>
<th>Test Date:    Jul-2018</th>
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<td>Software Availability: Mar-2018</td>
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</tbody>
</table>

**SPECrate2017_int_base = 93.2**

**SPECrate2017_int_peak = 98.8**

**Compiler Version Notes (Continued)**

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

```
CC  500.perlbench_r(peak) 502.gcc_r(peak) 505.mcf_r(peak) 525.x264_r(peak)
    557.xz_r(peak)
    icc (ICC) 18.0.2 20180210
    Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

```
CXXC 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)
    541.leela_r(base)
    icpc (ICC) 18.0.2 20180210
    Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

```
CXXC 520.omnetpp_r(peak) 523.xalancbmk_r(peak) 531.deepsjeng_r(peak)
    541.leela_r(peak)
    icpc (ICC) 18.0.2 20180210
    Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

```
FC  548.exchange2_r(base)
    ifort (IFORT) 18.0.2 20180210
    Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

```
FC  548.exchange2_r(peak)
    ifort (IFORT) 18.0.2 20180210
    Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

**Base Compiler Invocation**

C benchmarks:

```
icc -m64 -std=c11
```

(Continued on next page)
## NEC Corporation

**Express5800/R120h-2M (Intel Xeon Silver 4114)**

<table>
<thead>
<tr>
<th>Spec CPU2017 Integer Rate Result</th>
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<tr>
<td>Tested by: NEC Corporation</td>
<td>Software Availability: Mar-2018</td>
<td></td>
</tr>
</tbody>
</table>

### Base Compiler Invocation (Continued)

C++ benchmarks:
- icpc -m64

Fortran benchmarks:
- ifort -m64

### Base Portability Flags

- 500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
- 502.gcc_r: -DSPEC_LP64
- 505.mcf_r: -DSPEC_LP64
- 520.omnetpp_r: -DSPEC_LP64
- 523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
- 525.x264_r: -DSPEC_LP64
- 531.deepsjeng_r: -DSPEC_LP64
- 541.leela_r: -DSPEC_LP64
- 548.exchange2_r: -DSPEC_LP64
- 557.xz_r: -DSPEC_LP64

### Base Optimization Flags

#### C benchmarks:
- -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
- -qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc

#### C++ benchmarks:
- -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
- -qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc

#### Fortran benchmarks:
- -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
- -qopt-mem-layout-trans=3 -nostandard-realloc-lhs
- -L/usr/local/je5.0.1-64/lib -ljemalloc

### Peak Compiler Invocation

C benchmarks (except as noted below):
- icc -m64 -std=c11

(Continued on next page)
### SPEC CPU2017 Integer Rate Result

**NEC Corporation**

Express5800/R120h-2M (Intel Xeon Silver 4114)

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<tr>
<td>SPECrate2017_int_peak</td>
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</table>

**CPU2017 License:** 9006  
**Test Sponsor:** NEC Corporation  
**Tested by:** NEC Corporation  
**Test Date:** Jul-2018  
**Hardware Availability:** Jun-2018  
**Software Availability:** Mar-2018

---

#### Peak Compiler Invocation (Continued)

502.gcc_r:icc -m32 -std=c11 -L/home/prasadj/specdev/IC18u2_Internal/lin_18_0_20180210/compiler/lib/ia32_lin

C++ benchmarks (except as noted below):

```sh
icpc -m64
```

523.xalancbmk_r: icpc -m32 -L/home/prasadj/specdev/IC18u2_Internal/lin_18_0_20180210/compiler/lib/ia32_lin

Fortran benchmarks:

```sh
ifort -m64
```

---

#### Peak Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -D_FILE_OFFSET_BITS=64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -D_FILE_OFFSET_BITS=64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

---

#### Peak Optimization Flags

C benchmarks:

```sh
500.perlbench_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512 -03 -no-prec-div -qopt-mem-layout-trans=3 -fno-strict-overflow -L/usr/local/je5.0.1-64/lib -ljemalloc
```

```sh
502.gcc_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512 -03 -no-prec-div -qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-32/lib -ljemalloc
```

505.mcf_r: basepeak = yes
525.x264_r: basepeak = yes
557.xz_r: basepeak = yes

(Continued on next page)
Peak Optimization Flags (Continued)

C++ benchmarks:

520.omnetpp_r: basepeak = yes

523.xalancbmk_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout=trans=3 -L/usr/local/je5.0.1-32/lib -ljemalloc

531.deepsjeng_r: basepeak = yes

541.leela_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout=trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc

Fortran benchmarks:

548.exchange2_r: 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.