NEC Corporation

Express5800/R120h-2M (Intel Xeon Silver 4108)

SPECrater2017_int_base = 65.5
SPECrater2017_int_peak = 68.9

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

Hardware
CPU Name: Intel Xeon Silver 4108
Max MHz.: 3000
Nominal: 1800
Enabled: 16 cores, 2 chips, 2 threads/core
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: 11 MB I+D on chip per chip
Other: None
Memory: 192 GB (24 x 8 GB 2Rx8 PC4-2666V-R, running at 2400)
Storage: 1 x 1 TB SATA, 7200 RPM, RAID 0
Other: None

Software
OS: Red Hat Enterprise Linux Server release 7.4 (Maipo)
Kernel 3.10.0-693.21.1.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: No
Firmware: NEC BIOS Version U30 02/15/2018 released Mar-2018
File System: ext4
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other: jemalloc memory allocator V5.0.1
SPEC CPU2017 Integer Rate Result

NEC Corporation

Express5800/R120h-2M (Intel Xeon Silver 4108)

SPECrate2017_int_base = 65.5

SPECrate2017_int_peak = 68.9

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>32</td>
<td>1039</td>
<td>49.1</td>
<td>1036</td>
<td>49.2</td>
<td>1037</td>
<td>49.1</td>
</tr>
<tr>
<td>500.perlbench_r Peak</td>
<td>32</td>
<td>844</td>
<td>60.3</td>
<td>856</td>
<td>59.5</td>
<td>854</td>
<td>59.7</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>32</td>
<td>756</td>
<td>59.9</td>
<td>760</td>
<td>59.6</td>
<td>769</td>
<td>58.9</td>
</tr>
<tr>
<td>502.gcc_r Peak</td>
<td>32</td>
<td>661</td>
<td>68.6</td>
<td>661</td>
<td>68.5</td>
<td>662</td>
<td>68.5</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>32</td>
<td>626</td>
<td>82.6</td>
<td>628</td>
<td>82.3</td>
<td>634</td>
<td>81.5</td>
</tr>
<tr>
<td>505.mcf_r Peak</td>
<td>32</td>
<td>626</td>
<td>82.6</td>
<td>628</td>
<td>82.3</td>
<td>634</td>
<td>81.5</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>32</td>
<td>887</td>
<td>47.3</td>
<td>879</td>
<td>47.8</td>
<td>883</td>
<td>47.6</td>
</tr>
<tr>
<td>520.omnetpp_r Peak</td>
<td>32</td>
<td>887</td>
<td>47.3</td>
<td>879</td>
<td>47.8</td>
<td>883</td>
<td>47.6</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>32</td>
<td>484</td>
<td>69.8</td>
<td>484</td>
<td>69.8</td>
<td>486</td>
<td>69.5</td>
</tr>
<tr>
<td>523.xalancbmk_r Peak</td>
<td>32</td>
<td>404</td>
<td>83.6</td>
<td>405</td>
<td>83.4</td>
<td>404</td>
<td>83.6</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>32</td>
<td>465</td>
<td>121</td>
<td>466</td>
<td>120</td>
<td>471</td>
<td>119</td>
</tr>
<tr>
<td>525.x264_r Peak</td>
<td>32</td>
<td>469</td>
<td>120</td>
<td>469</td>
<td>120</td>
<td>454</td>
<td>123</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>32</td>
<td>659</td>
<td>55.6</td>
<td>670</td>
<td>54.7</td>
<td>671</td>
<td>54.7</td>
</tr>
<tr>
<td>531.deepsjeng_r Peak</td>
<td>32</td>
<td>659</td>
<td>55.6</td>
<td>670</td>
<td>54.7</td>
<td>671</td>
<td>54.7</td>
</tr>
<tr>
<td>541.leela_r</td>
<td>32</td>
<td>1045</td>
<td>50.7</td>
<td>1049</td>
<td>50.5</td>
<td>1044</td>
<td>50.7</td>
</tr>
<tr>
<td>541.leela_r Peak</td>
<td>32</td>
<td>1035</td>
<td>51.2</td>
<td>1032</td>
<td>51.4</td>
<td>1041</td>
<td>50.9</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>32</td>
<td>707</td>
<td>119</td>
<td>707</td>
<td>119</td>
<td>710</td>
<td>118</td>
</tr>
<tr>
<td>548.exchange2_r Peak</td>
<td>32</td>
<td>707</td>
<td>119</td>
<td>707</td>
<td>119</td>
<td>710</td>
<td>118</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>32</td>
<td>696</td>
<td>49.6</td>
<td>760</td>
<td>45.5</td>
<td>756</td>
<td>45.7</td>
</tr>
<tr>
<td>557.xz_r Peak</td>
<td>32</td>
<td>696</td>
<td>49.6</td>
<td>760</td>
<td>45.5</td>
<td>756</td>
<td>45.7</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:
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
runcpu command invoked through numacli i.e.:
  numacli --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)

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

**NEC Corporation**

Express5800/R120h-2M (Intel Xeon Silver 4108)

<table>
<thead>
<tr>
<th>SPECrate2017_int_base</th>
<th>65.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_int_peak</td>
<td>68.9</td>
</tr>
</tbody>
</table>

**CPU2017 License**: 9006  
**Test Sponsor**: NEC Corporation  
**Test Date**: Jul-2018  
**Tested by**: NEC Corporation

**Hardware Availability**: Jun-2018  
**Software Availability**: Mar-2018

---

**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 Thu Jul 26 16:42:25 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 4108 CPU @ 1.80GHz
  2 "physical id"s (chips)
  32 "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 : 8
siblings : 16
  physical 0: cores 0 1 2 3 4 5 6 7
  physical 1: cores 0 1 2 3 4 5 6 7
```

From lscpu:

```
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                32
On-line CPU(s) list:   0-31
Thread(s) per core:    2
Core(s) per socket:    8
Socket(s):             2
NUMA node(s):          2
Vendor ID:             Genuine Intel
```

(Continued on next page)
NEC Corporation

Express5800/R120h-2M (Intel Xeon Silver 4108)

SPEC CPU2017 Integer Rate Result

Copyright 2017-2018 Standard Performance Evaluation Corporation

SPECrate2017_int_base = 65.5

SPECrate2017_int_peak = 68.9

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

Platform Notes (Continued)

CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4108 CPU @ 1.80GHz
Stepping: 4
CPU MHz: 1800.000
BogoMIPS: 3600.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 11264K
NUMA node0 CPU(s): 0-7,16-23
NUMA node1 CPU(s): 8-15,24-31
 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
        aperfmperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx est tm2 ssse3 fma
        cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popup tsc_deadline_timer aes
        xsave avx f16c rdrand lahf_lm abm 3dnowprefetch ept cat_13 cdp_l3 invpcid_single
        intel_pt spec_ctrl ibpb_support tpr_shadow vmi flexpriority ept vpid fsgrsbaf
        tsc_adjust bmi1 hle avx2 smep bmi2 ertm invpcid rdt_a avx512f avx512dq
        rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec
        xgetbv1
        cmq_llc cmq_occip_llc cmq_mbbm_total cmq_mbbm_local dtherm ida arat pln pts

/cache/cpuinfo.cache data
size: 11264 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 16 17 18 19 20 21 22 23
node 0 size: 97964 MB
node 0 free: 95483 MB
node 1 cpus: 8 9 10 11 12 13 14 15 24 25 26 27 28 29 30 31
node 1 size: 98303 MB
node 1 free: 95951 MB
node distances:
node 0 1
0: 10 21
1: 21 10

From /proc/meminfo
MemTotal: 197749152 KB
HugePages_Total: 0
Hugepagesize: 2048 KB

From /etc/*release* /etc/*version*

(Continued on next page)
SPEC CPU2017 Integer Rate Result

Copyright 2017-2018 Standard Performance Evaluation Corporation

NEC Corporation
Express5800/R120h-2M (Intel Xeon Silver 4108)

SPECrate2017_int_base = 65.5
SPECrate2017_int_peak = 68.9

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

Test Date: Jul-2018
Hardware Availability: Jun-2018
Software Availability: Mar-2018

Platform Notes (Continued)

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 26 16:36

SPEC is set to: /home/cpu2017
  Filesystem Type Size Used Avail Use% Mounted on
  /dev/sda3 ext4 909G 332G 531G 39% /

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)
### 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)

```plaintext
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)

```plaintext
icpc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

FC  548.exchange2_r(base)

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

### Base Compiler Invocation

C benchmarks:
```
icc -m64 -std=c11
```
**SPEC CPU2017 Integer Rate Result**

| NEC Corporation | SPECrate2017_int_base = 65.5 |
| Express5800/R120h-2M (Intel Xeon Silver 4108) | SPECrate2017_int_peak = 68.9 |

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

### Base Compiler Invocation (Continued)

C++ benchmarks:
```bash
icpc -m64
```

Fortran benchmarks:
```bash
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:
```bash
-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:
```bash
-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:
```bash
-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):
```bash
icc -m64 -std=c11
```

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

**NEC Corporation**

**Express5800/R120h-2M (Intel Xeon Silver 4108)**

<table>
<thead>
<tr>
<th>SPECrate2017_int_base</th>
<th>SPECrate2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>65.5</td>
<td>68.9</td>
</tr>
</tbody>
</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):
    icpc -m64

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

Fortran benchmarks:
    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.xalanchmk_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:

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

502.gcc_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

505.mcf_r: basepeak = yes

525.x264_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3
-fno-alias -L/usr/local/je5.0.1-64/lib -ljemalloc

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

557.xz_r: basepeak = yes

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

---

SPEC is a registered trademark of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

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 2018-07-26 03:42:24-0400.
Originally published on 2018-09-04.