## NEC Corporation

**Express5800/R120h-2M (Intel Xeon Silver 4216)**

### SPEC CPU®2017 Integer Rate Result

<table>
<thead>
<tr>
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<th>9006</th>
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<tbody>
<tr>
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**SPECrade®2017_int_base = 171**

**SPECrade®2017_int_peak = 177**

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPU Name:</strong> Intel Xeon Silver 4216</td>
<td><strong>OS:</strong> Red Hat Enterprise Linux Server release 7.7 (Maipo)</td>
</tr>
<tr>
<td><strong>Max MHz:</strong> 3200</td>
<td><strong>Kernel 3.10.0-1062.1.1.el7.x86_64</strong></td>
</tr>
<tr>
<td><strong>Nominal:</strong> 2100</td>
<td><strong>Compiler:</strong> C/C++: Version 19.0.4.227 of Intel C/C++ Compiler Build 20190416 for Linux; Fortran: Version 19.0.4.227 of Intel Fortran Compiler Build 20190416 for Linux</td>
</tr>
<tr>
<td><strong>Enabled:</strong> 32 cores, 2 chips, 2 threads/core</td>
<td><strong>Parallel:</strong> No</td>
</tr>
<tr>
<td><strong>Orderable:</strong> 1.2 chips</td>
<td><strong>Firmware:</strong> NEC BIOS Version U30 v2.22 11/13/2019 released Mar-2020</td>
</tr>
<tr>
<td><strong>Cache L1:</strong> 32 KB I + 32 KB D on chip per core</td>
<td><strong>File System:</strong> ext4</td>
</tr>
<tr>
<td><strong>L2:</strong> 1 MB I+D on chip per core</td>
<td><strong>System State:</strong> Run level 3 (multi-user)</td>
</tr>
<tr>
<td><strong>L3:</strong> 22 MB I+D on chip per chip</td>
<td><strong>Base Pointers:</strong> 64-bit</td>
</tr>
<tr>
<td><strong>Other:</strong> None</td>
<td><strong>Peak Pointers:</strong> 32/64-bit</td>
</tr>
<tr>
<td><strong>Memory:</strong> 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R, running at 2400)</td>
<td><strong>Other:</strong> jemalloc memory allocator V5.0.1</td>
</tr>
<tr>
<td><strong>Storage:</strong> 1 x 1 TB SATA, 7200 RPM, RAID 0</td>
<td><strong>Power Management:</strong> BIOS set to prefer performance at the cost of additional power usage</td>
</tr>
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</table>

### Copies

<table>
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<tr>
<th>Spec Benchmark</th>
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<td>146</td>
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<td>193</td>
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<td>64</td>
<td>119</td>
<td>119</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>64</td>
<td>192</td>
<td>219</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>64</td>
<td>331</td>
<td>344</td>
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<tr>
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<td>64</td>
<td>143</td>
<td>143</td>
</tr>
<tr>
<td>541.leela_r</td>
<td>64</td>
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<td>131</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>64</td>
<td></td>
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<tr>
<td>557.xz_r</td>
<td>64</td>
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**Test Date:** Mar-2020

**Hardware Availability:** Dec-2019

**Software Availability:** Sep-2019
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<td>605</td>
<td>114</td>
<td>606</td>
<td>114</td>
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### 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"

### Environment Variables Notes

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

```
LD_LIBRARY_PATH = 
"/home/cpu2017/lib/intel64:/home/cpu2017/lib/ia32:/home/cpu2017/je5.0.1-32"
```

### General Notes

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesyste page cache synced and cleared with:

```
sync; echo 3 > /proc/sys/vm/drop_caches
```

runcpu command invoked through numaclt i.e.:
NEC Corporation

Express5800/R120h-2M (Intel Xeon Silver 4216)

SPECrate®2017_int_base = 171

SPECrate®2017_int_peak = 177

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

General Notes (Continued)

numactl --interleave=all runcpu <etc>

NA: 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.


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
Enhanced Processor Performance: Enabled
Workload Profile: Custom
Advanced Memory Protection: Advanced ECC Support

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed5be6e46a485a0011
running on r120h2m Tue Mar 17 12:31:45 2020

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 4216 CPU @ 2.10GHz
2  "physical id"s (chips)
64 "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 : 16
siblings : 32
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

From lscpu:

    Architecture: x86_64

(Continued on next page)
Platform Notes (Continued)

CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 64
On-line CPU(s) list: 0-63
Thread(s) per core: 2
Core(s) per socket: 16
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4216 CPU @ 2.10GHz
Stepping: 6
CPU MHz: 2100.000
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 22528K
NUMA node0 CPU(s): 0-7,32-39
NUMA node1 CPU(s): 8-15,40-47
NUMA node2 CPU(s): 16-23,48-55
NUMA node3 CPU(s): 24-31,56-63
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 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_13 cdp_13 invpcid_single
intel_ppin intel_pt ssbd mba ibrs ibpb stibp ibrs_enhanced trp_shadow vmmi
flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erts invpcid rtm
cqm mxpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw
avx512vl xsaveopt xsavec xgetbv1 cmq_llc cmq_occurs_llc cmq_mbm_total cmq_mbm_local
dtherm ida arat pin pts pku osppe avx512_vnni md_clear spec_ctrl intel_stibp
flush_l1d arch_capabilities

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
available: 4 nodes (0-3)
node 0 cpus: 0 1 2 3 4 5 6 7 32 33 34 35 36 37 38 39
node 0 size: 196265 MB
node 0 free: 191718 MB
node 1 cpus: 8 9 10 11 12 13 14 15 40 41 42 43 44 45 46 47

(Continued on next page)
SPEC CPU®2017 Integer Rate Result

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SPECrates®2017_int_base = 171
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CPU2017 License: 9006
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Test Date: Mar-2020
Hardware Availability: Dec-2019
Software Availability: Sep-2019

Platform Notes (Continued)

node 1 size: 196608 MB
node 1 free: 192095 MB
node 2 cpus: 16 17 18 19 20 21 22 23 48 49 50 51 52 53 54 55
node 2 size: 196608 MB
node 2 free: 192255 MB
node 3 cpus: 24 25 26 27 28 29 30 31 56 57 58 59 60 61 62 63
node 3 size: 196607 MB
node 3 free: 192250 MB
node distances:
  node 0  1   2   3
  0: 10  21  31  31
  1: 21  10  31  31
  2: 31  31  10  21
  3: 31  31  21  10

From /proc/meminfo
MemTotal: 792280804 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
  os-release:
    NAME="Red Hat Enterprise Linux Server"
    VERSION="7.7 (Maipo)"
    ID="rhel"
    ID_LIKE="fedora"
    VARIANT="Server"
    VARIANT_ID="server"
    VERSION_ID="7.7"
    PRETTY_NAME="Red Hat Enterprise Linux Server 7.7 (Maipo)"
  redhat-release: Red Hat Enterprise Linux Server release 7.7 (Maipo)
  system-release: Red Hat Enterprise Linux Server release 7.7 (Maipo)
  system-release-cpe: cpe:/o:redhat:enterprise_linux:7.7:ga:server

uname -a:
  Linux r120h2m 3.10.0-1062.1.1.el7.x86_64 #1 SMP Tue Aug 13 18:39:59 UTC 2019 x86_64
  x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Not affected
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1): Mitigation: Load fences, usercopy/swapgs barriers and __user pointer sanitization

(Continued on next page)
### Platform Notes (Continued)

CVE-2017-5715 (Spectre variant 2): Mitigation: Full retpoline, IBPB

run-level 3 Mar 17 12:26

SPEC is set to: /home/cpu2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 ext4 908G 12G 851G 2% /

From /sys/devices/virtual/dmi/id
BIOS: NEC U30 11/13/2019
Vendor: NEC
Product: Express5800/R120h-2M
Serial: JPNLMCR0UF

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.

Memory:
24x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2933

(End of data from sysinfo program)

Regarding the sysinfo display about the memory speed, the correct configured memory speed is 2400 MT/s. The dmidecode description should be as follows: 24x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2933, configured at 2400

### Compiler Version Notes

```
C | 502gcc_r(peak)
```

---

Intel(R) C Intel(R) 64 Compiler for applications running on IA-32, Version 19.0.4.227 Build 20190416
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---

```
C | 500perlbench_r(base, peak) 502gcc_r(base) 505mcf_r(base, peak)
 | 525x264_r(base, peak) 557xz_r(base, peak)
```

---

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
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### NEC Corporation

**Express5800/R120h-2M (Intel Xeon Silver 4216)**

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Compiler Version Notes (Continued)

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Fortran | 548.exchange2_r(base, peak)

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
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Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

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:
-W1, -z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64

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### Base Optimization Flags (Continued)

**C benchmarks** (continued):
- -lqkmalloc

**C++ benchmarks**:
- -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
- -qopt-mem-layout=trans=4
- -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
- -lqkmalloc

**Fortran benchmarks**:
- -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
- -qopt-mem-layout=trans=4 -nostandard-realloc-lhs -align array32byte
- -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
- -lqkmalloc

### Peak Compiler Invocation

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

**C++ benchmarks** (except as noted below):
- icpc -m64

**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.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

(Continued on next page)
SPEC CPU®2017 Integer Rate Result

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NEC Corporation

Express5800/R120h-2M (Intel Xeon Silver 4216)

SPECrate®2017_int_base = 171
SPECrate®2017_int_peak = 177

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

Test Date: Mar-2020
Hardware Availability: Dec-2019
Software Availability: Sep-2019

Peak Portability Flags (Continued)

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=4
-fno-strict-overflow
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc

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=4
-L/usr/local/je5.0.1-32/lib -ljemalloc

505.mcf_r: basepeak = yes

525.x264_r: -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -fno-alias
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc

557.xz_r: -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc

C++ benchmarks:

520.omnetpp_r: -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc

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=4
-L/usr/local/je5.0.1-32/lib -ljemalloc

531.deepsjeng_r: Same as 520.omnetpp_r

541.leela_r: Same as 520.omnetpp_r

(Continued on next page)
## NEC Corporation

**Express5800/R120h-2M (Intel Xeon Silver 4216)**

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<tr>
<th>SPECrate®2017_int_base</th>
<th>SPECrate®2017_int_peak</th>
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<tr>
<td>171</td>
<td>177</td>
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</tbody>
</table>

### CPU2017 License:
- 9006

### Test Sponsor:
- NEC Corporation

### Tested by:
- NEC Corporation

### Test Date:
- Mar-2020

### Hardware Availability:
- Dec-2019

### Software Availability:
- Sep-2019

### Peak Optimization Flags (Continued)

**Fortran benchmarks:**

- `548.exchange2_r: 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:


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