### NEC Corporation

**Express5800/R120h-2E (Intel Xeon Gold 6148)**

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<tr>
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<tr>
<td>CPU2017 License:</td>
<td>9006</td>
</tr>
<tr>
<td>Test Date:</td>
<td>Aug-2018</td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Nov-2017</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Mar-2018</td>
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#### SPEC-rate2017

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>SPECrate2017_int_base</th>
<th>SPECrate2017_int_peak</th>
</tr>
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<tbody>
<tr>
<td>perlbench_r</td>
<td>188</td>
<td>201</td>
</tr>
<tr>
<td>gcc_r</td>
<td>188</td>
<td>201</td>
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<tr>
<td>mcf_r</td>
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<tr>
<td>omnetpp_r</td>
<td>188</td>
<td>201</td>
</tr>
<tr>
<td>xalancbmk_r</td>
<td>188</td>
<td>201</td>
</tr>
<tr>
<td>x264_r</td>
<td>188</td>
<td>201</td>
</tr>
<tr>
<td>deepsjeng_r</td>
<td>188</td>
<td>201</td>
</tr>
<tr>
<td>leela_r</td>
<td>188</td>
<td>201</td>
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<tr>
<td>exchange2_r</td>
<td>188</td>
<td>201</td>
</tr>
<tr>
<td>xz_r</td>
<td>188</td>
<td>201</td>
</tr>
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</table>

#### Hardware

- **CPU Name:** Intel Xeon Gold 6148
- **Max MHz.:** 3700
- **Nominal:** 2400
- **Enabled:** 40 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:** 27.5 MB I+D on chip per chip
- **Memory:** 192 GB (12 x 16 GB 2Rx8 PC4-2666V-R)
- **Storage:** 1 x 600 GB SAS, 15000 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 U31 02/14/2018 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-2E (Intel Xeon Gold 6148)

SPECrates2017_int_base = 188

SPECrates2017_int_peak = 201

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<thead>
<tr>
<th>Benchmark</th>
<th>Base</th>
<th>Peak</th>
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<tr>
<td></td>
<td>Copies</td>
<td>Seconds</td>
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<tr>
<td>500.perlbench_r</td>
<td>80</td>
<td>851</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>80</td>
<td>720</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>80</td>
<td>571</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>80</td>
<td>881</td>
</tr>
<tr>
<td>523.xalanbmkr</td>
<td>80</td>
<td>475</td>
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<tr>
<td>525.x264_r</td>
<td>80</td>
<td>353</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>80</td>
<td>541</td>
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<tr>
<td>541.leela_r</td>
<td>80</td>
<td>803</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>80</td>
<td>558</td>
</tr>
<tr>
<td>557.zx_r</td>
<td>80</td>
<td>657</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 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.

(Continued on next page)
SPEC CPU2017 Integer Rate Result

NEC Corporation

Express5800/R120h-2E (Intel Xeon Gold 6148)

SPECrate2017_int_base = 188
SPECrate2017_int_peak = 201

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

General Notes (Continued)

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: Increased Cooling
Workload Profile: General Throughput Compute
Memory Patrol Scrubbing: Disabled
LLC Dead Line Allocation: Disabled
LLC Prefetch: Enabled
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on r120h2e Thu Aug 30 14:23:41 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) Gold 6148 CPU @ 2.40GHz
  2 "physical id"s (chips)
  80 "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 : 20
siblings : 40
physical 0: cores 0 1 2 3 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
physical 1: cores 0 1 2 3 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 80
On-line CPU(s) list: 0-79
Thread(s) per core: 2
Core(s) per socket: 20
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6

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

## NEC Corporation

**Express5800/R120h-2E (Intel Xeon Gold 6148)**

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**SPECrate2017_int_base** = 188

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### Platform Notes (Continued)

<table>
<thead>
<tr>
<th>Model:</th>
<th>85</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model name:</td>
<td>Intel(R) Xeon(R) Gold 6148 CPU @ 2.40GHz</td>
</tr>
<tr>
<td>Stepping:</td>
<td>4</td>
</tr>
<tr>
<td>CPU MHz:</td>
<td>2400.000</td>
</tr>
<tr>
<td>BogoMIPS:</td>
<td>4800.00</td>
</tr>
<tr>
<td>Virtualization:</td>
<td>VT-x</td>
</tr>
<tr>
<td>L1d cache:</td>
<td>32K</td>
</tr>
<tr>
<td>L1i cache:</td>
<td>32K</td>
</tr>
<tr>
<td>L2 cache:</td>
<td>1024K</td>
</tr>
<tr>
<td>L3 cache:</td>
<td>28160K</td>
</tr>
<tr>
<td>NUMA node0 CPU(s):</td>
<td>0-9,40-49</td>
</tr>
<tr>
<td>NUMA node1 CPU(s):</td>
<td>10-19,50-59</td>
</tr>
<tr>
<td>NUMA node2 CPU(s):</td>
<td>20-29,60-69</td>
</tr>
<tr>
<td>NUMA node3 CPU(s):</td>
<td>30-39,70-79</td>
</tr>
</tbody>
</table>

Flags:  
  fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov  
  pat pse36 clflush dts acpi mmxf xsr 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 monit ds_cpl vmx smx est tm2 ssse3 fma  
  cx16 xmr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes  
  xsave avx fl64c rdrand lahf_lm abm 3nowprefetch epb cat_l3 cdp_l3 invpcid_single  
  intel_pt spec_ctrl ibpb_support tpr_shadow vmmi flexpriority ept vpid fsgsbase  
  tsc_adjust bmi1 hle avx2 smep bmi2  erms invpcid rtm cqm mpx rdt_a avx512f avx512dq  
  rsseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsaveopt xgetbv1  
  cqm_llc cqm_occip_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts

From numactl --hardware  
WARNING: a numactl 'node' might or might not correspond to a physical chip.

<table>
<thead>
<tr>
<th>available:</th>
<th>4 nodes (0-3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>node 0 cpus:</td>
<td>0 1 2 3 4 5 6 7 8 9 40 41 42 43 44 45 46 47 48 49</td>
</tr>
<tr>
<td>node 0 size:</td>
<td>48811 MB</td>
</tr>
<tr>
<td>node 0 free:</td>
<td>47419 MB</td>
</tr>
<tr>
<td>node 1 cpus:</td>
<td>10 11 12 13 14 15 16 17 18 19 50 51 52 53 54 55 56 57 58 59</td>
</tr>
<tr>
<td>node 1 size:</td>
<td>49152 MB</td>
</tr>
<tr>
<td>node 1 free:</td>
<td>47531 MB</td>
</tr>
<tr>
<td>node 2 cpus:</td>
<td>20 21 22 23 24 25 26 27 28 29 60 61 62 63 64 65 66 67 68 69</td>
</tr>
<tr>
<td>node 2 size:</td>
<td>49152 MB</td>
</tr>
<tr>
<td>node 2 free:</td>
<td>48004 MB</td>
</tr>
<tr>
<td>node 3 cpus:</td>
<td>30 31 32 33 34 35 36 37 38 39 70 71 72 73 74 75 76 77 78 79</td>
</tr>
<tr>
<td>node 3 size:</td>
<td>49151 MB</td>
</tr>
<tr>
<td>node 3 free:</td>
<td>48000 MB</td>
</tr>
<tr>
<td>node distances:</td>
<td></td>
</tr>
<tr>
<td>node 0 1 2 3</td>
<td></td>
</tr>
<tr>
<td>0: 10 21 31 31</td>
<td></td>
</tr>
<tr>
<td>1: 21 10 31 31</td>
<td></td>
</tr>
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CPU2017 License: 9006
Test Sponsor: NEC Corporation
Test Date: Aug-2018
Hardware Availability: Nov-2017
Tested by: NEC Corporation
Software Availability: Mar-2018

Platform Notes (Continued)

2: 31 31 10 21
3: 31 31 21 10

From /proc/meminfo
MemTotal: 197741252 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

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

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 r120h2e 3.10.0-693.21.1.el7.x86_64 #1 SMP Fri Feb 23 18:54:16 UTC 2018 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 Aug 30 14:18

SPEC is set to: /home/cpu2017

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 U31 02/14/2018
Memory:
4x UNKNOWN NOT AVAILABLE
12x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666
NEC Corporation
Express5800/R120h-2E (Intel Xeon Gold 6148)

SPECrate2017_int_base = 188
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Platform Notes (Continued)
(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
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)

(Continued on next page)
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Express5800/R120h-2E (Intel Xeon Gold 6148)

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Compiler Version Notes (Continued)

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

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=3 -L/usr/local/je5.0.1-64/lib -ljemalloc

C++ benchmarks:
-W1, -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:
-W1, -z, muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs

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### Base Optimization Flags (Continued)

Fortran benchmarks (continued):
- `-L/usr/local/je5.0.1-64/lib -ljemalloc`

### Peak Compiler Invocation

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

- `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

### Peak Optimization Flags

C benchmarks:
- `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`

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Peak Optimization Flags (Continued)

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: basepeak = yes
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: -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
541.leela_r: Same as 531.deepsjeng_r
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.

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