SPEC® CPU2017 Integer Rate Result

NEC Corporation

Express5800/D120h (Intel Xeon Gold 6140)

SPECrate2017_int_base = 95.5
SPECrate2017_int_peak = 102

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

Test Date: Jul-2018
Hardware Availability: Jan-2018

Hardware

CPU Name: Intel Xeon Gold 6140
Max MHz.: 3700
Nominal: 2300
Enabled: 18 cores, 1 chip, 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: 24.75 MB I+D on chip per chip
Other: None
Memory: 192 GB (6 x 32 GB 2Rx4 PC4-2666V-R)
Storage: 1 x 1 TB SATA, 7200 RPM
Other: None

Software

OS: Red Hat Enterprise Linux Server release 7.4 (Maipo)
Compiler: C/C++: Version 18.0.0.128 of Intel C/C++
Compiler for Linux: Fortran: Version 18.0.0.128 of Intel Fortran
Compiler for Linux
Parallel: No
Firmware: Version F21 02/22/2018 released Apr-2018
File System: ext4
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other: jemalloc memory allocator library V5.0.1
SPEC CPU2017 Integer Rate Result

NEC Corporation
Express5800/D120h (Intel Xeon Gold 6140)

 SPECrate2017_int_base = 95.5
 SPECrate2017_int_peak = 102

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>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>36</td>
<td>768</td>
<td>74.6</td>
<td>772</td>
<td>74.2</td>
<td>770</td>
<td>74.4</td>
<td>36</td>
<td>632</td>
<td>90.7</td>
<td>640</td>
<td>89.5</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>36</td>
<td>619</td>
<td>82.4</td>
<td>620</td>
<td>82.3</td>
<td>625</td>
<td>81.5</td>
<td>36</td>
<td>516</td>
<td>98.8</td>
<td>516</td>
<td>98.8</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>36</td>
<td>487</td>
<td>119</td>
<td>509</td>
<td>114</td>
<td>504</td>
<td>115</td>
<td>36</td>
<td>487</td>
<td>119</td>
<td>509</td>
<td>114</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>36</td>
<td>793</td>
<td>59.5</td>
<td>793</td>
<td>59.6</td>
<td>795</td>
<td>59.4</td>
<td>36</td>
<td>793</td>
<td>59.5</td>
<td>793</td>
<td>59.6</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>36</td>
<td>402</td>
<td>94.5</td>
<td>404</td>
<td>94.0</td>
<td>405</td>
<td>93.9</td>
<td>36</td>
<td>334</td>
<td>114</td>
<td>331</td>
<td>115</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>36</td>
<td>329</td>
<td>191</td>
<td>328</td>
<td>192</td>
<td>323</td>
<td>195</td>
<td>36</td>
<td>316</td>
<td>199</td>
<td>316</td>
<td>200</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>36</td>
<td>478</td>
<td>86.4</td>
<td>489</td>
<td>84.3</td>
<td>491</td>
<td>84.1</td>
<td>36</td>
<td>478</td>
<td>86.4</td>
<td>489</td>
<td>84.3</td>
</tr>
<tr>
<td>541.leela_r</td>
<td>36</td>
<td>753</td>
<td>79.2</td>
<td>736</td>
<td>81.0</td>
<td>757</td>
<td>78.7</td>
<td>36</td>
<td>741</td>
<td>80.4</td>
<td>744</td>
<td>80.1</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>36</td>
<td>497</td>
<td>190</td>
<td>498</td>
<td>189</td>
<td>497</td>
<td>190</td>
<td>36</td>
<td>497</td>
<td>190</td>
<td>498</td>
<td>189</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>36</td>
<td>550</td>
<td>70.7</td>
<td>597</td>
<td>65.1</td>
<td>598</td>
<td>65.0</td>
<td>36</td>
<td>550</td>
<td>70.7</td>
<td>597</td>
<td>65.1</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 i7-4790 CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.4
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.:
umactl --interleave=all runcpu <etc>

jemalloc: configured and built at default for 32bit (i686) and 64bit (x86_64) targets;
jemalloc: built with the RedHat Enterprise 7.4, and the system compiler gcc 4.8.5;

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)

(Continued on next page)
SPEC CPU2017 Integer Rate Result

NEC Corporation

Express5800/D120h (Intel Xeon Gold 6140)  

SPECrate2017_int_base = 95.5  
SPECrate2017_int_peak = 102  

General Notes (Continued)

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:
- ENERGY_PERF_BIAS_CFG mode: Performance
- SNC: Enable
- IMC Interleaving: 1-way Interleave
- LLC dead line alloc: Disable
- Patrol Scrub: Disable

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bccc091c0f
running on d120h Mon Jul 2 18:01:27 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 6140 CPU @ 2.30GHz
- 1 "physical id"s (chips)
  36 "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 : 18
  siblings : 36
  physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

From lscpu:
- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- CPU(s): 36
- On-line CPU(s) list: 0-35
- Thread(s) per core: 2
- Core(s) per socket: 18
- Socket(s): 1
- NUMA node(s): 2
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 85

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

**NEC Corporation**

**Express5800/D120h (Intel Xeon Gold 6140)**

**SPECrate2017_int_base = 95.5**

**SPECrate2017_int_peak = 102**

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>Test Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>9006</td>
<td>Jul-2018</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test Sponsor:</th>
<th>Hardware Availability:</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEC Corporation</td>
<td>Jan-2018</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tested by:</th>
<th>Software Availability:</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEC Corporation</td>
<td>Mar-2018</td>
</tr>
</tbody>
</table>

**Platform Notes (Continued)**

- Model name: Intel(R) Xeon(R) Gold 6140 CPU @ 2.30GHz
- Stepping: 4
- CPU MHz: 2253.281
- CPU max MHz: 3700.0000
- CPU min MHz: 1000.0000
- BogoMIPS: 4600.00
- Virtualization: VT-x
- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 1024K
- L3 cache: 25344K
- NUMA node0 CPU(s): 0-2,5,6,9,10,14,15,18-20,23,24,27,28,32,33
- NUMA node1 CPU(s): 3,4,7,8,11-13,16,17,21,22,25,26,29-31,34,35

**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 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 fl64 rdrand lahf_lm abm 3dnowprefetch epb cat_13 cdp_13 invpcid_single intel_pt spec_ctrl ibpb_support tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512v1 xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req

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 5 6 9 10 14 15 18 19 20 23 24 27 28 32 33
- node 0 size: 96932 MB
- node 0 free: 94077 MB
- node 1 cpus: 3 4 7 8 11 12 13 16 17 21 22 25 26 29 30 31 34 35
- node 1 size: 98304 MB
- node 1 free: 95855 MB

From /proc/meminfo

- MemTotal: 196476000 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

(Continued on next page)
SPEC CPU2017 Integer Rate Result

NEC Corporation

Express5800/D120h (Intel Xeon Gold 6140)

SPECrate2017_int_base = 95.5
SPECrate2017_int_peak = 102

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

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

Platform Notes (Continued)

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

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 d120h 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
run-level 3 Jul 2 17:55

SPEC is set to: /home/cpu2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 ext4 909G 389G 473G 46% /

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 GIGABYTE F21 02/22/2018
Memory:
10x NO DIMM NO DIMM
6x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
CC 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
  525.x264_r(base, peak) 557.xz_r(base, peak)
==============================================================================

icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

==============================================================================

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

**NEC Corporation**

Express5800/D120h (Intel Xeon Gold 6140)

<table>
<thead>
<tr>
<th>SPECrate2017_int_base</th>
<th>SPECrate2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>95.5</td>
<td>102</td>
</tr>
</tbody>
</table>

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

### Compiler Version Notes (Continued)

```
CC  500.perlbench_r(peak) 502.gcc_r(peak)

icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

CXXC 520.omnetpp_r(base) 523.xalanchmk_r(base) 531.deepsjeng_r(base)
      541.leela_r(base)

icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

CXXC 520.omnetpp_r(peak) 523.xalanchmk_r(peak) 531.deepsjeng_r(peak)
      541.leela_r(peak)

icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

FC  548.exchange2_r(base, peak)

ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

### Base Compiler Invocation

- **C benchmarks:** icc
- **C++ benchmarks:** icpc
- **Fortran benchmarks:** ifort

### Base Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64

(Continued on next page)
SPEC CPU2017 Integer Rate Result

NEC Corporation
Express5800/D120h (Intel Xeon Gold 6140)

<table>
<thead>
<tr>
<th>SPECrate2017_int_base</th>
<th>95.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_int_peak</td>
<td>102</td>
</tr>
</tbody>
</table>

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

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

Base Portability Flags (Continued)

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 -align array32byte
-L/usr/local/je5.0.1-64/lib -ljemalloc

Base Other Flags

C benchmarks:
-m64 -std=c11

C++ benchmarks:
-m64

Fortran benchmarks:
-m64

Peak Compiler Invocation

C benchmarks:
icc

(Continued on next page)
SPEC CPU2017 Integer Rate Result

NEC Corporation
Express5800/D120h (Intel Xeon Gold 6140)

| SPECrate2017_int_base = 95.5 |
| SPECrate2017_int_peak = 102 |

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

Peak Compiler Invocation (Continued)

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

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:
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: -L/opt/intel/compilers_and_libraries_2018/linux/lib/ia32
-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 -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -fno-alias
-L/usr/local/je5.0.1-64/lib -ljemalloc

(Continued on next page)
SPEC CPU2017 Integer Rate Result

NEC Corporation
Express5800/D120h (Intel Xeon Gold 6140)

SPECrate2017_int_base = 95.5
SPECrate2017_int_peak = 102

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

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

Peak Optimization Flags (Continued)

557.xz_r: basepeak = yes

C++ benchmarks:
520.omnetpp_r: basepeak = yes
523.xalancbmk_r: -L/opt/intel/compilers_and_libraries_2018/linux/lib/ia32
-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

Peak Other Flags

C benchmarks (except as noted below):
-m64 -std=c11
502.gcc_r: -m32 -std=c11

C++ benchmarks (except as noted below):
-m64
523.xalancbmk_r: -m32

Fortran benchmarks:
-m64

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-D120h-RevA.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/NEC-Platform-Settings-V1.2-D120h-RevA.xml
<table>
<thead>
<tr>
<th></th>
<th>NEC Corporation</th>
<th>SPECrate2017_int_base = 95.5</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Express5800/D120h (Intel Xeon Gold 6140)</td>
<td>SPECrate2017_int_peak = 102</td>
</tr>
<tr>
<td>CPU2017 License:</td>
<td>9006</td>
<td></td>
</tr>
<tr>
<td>Test Sponsor:</td>
<td>NEC Corporation</td>
<td></td>
</tr>
<tr>
<td>Tested by:</td>
<td>NEC Corporation</td>
<td></td>
</tr>
<tr>
<td>Test Date:</td>
<td>Jul-2018</td>
<td></td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Jan-2018</td>
<td></td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Mar-2018</td>
<td></td>
</tr>
</tbody>
</table>

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 v1.0.2 on 2018-07-02 05:01:26-0400.
Report generated on 2018-10-31 18:45:26 by CPU2017 PDF formatter v6067.