## SPEC CPU®2017 Integer Speed Result

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NEC Corporation</strong></td>
<td><strong>SPEC CPU®2017 int_base = 10.7</strong></td>
</tr>
<tr>
<td><strong>NEC Corporation</strong></td>
<td><strong>SPEC CPU®2017_int_peak = 10.9</strong></td>
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<tr>
<td>Express5800/R110j-1 (Intel Xeon E-2226G)</td>
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**CPU2017 License:** 9006  
**Test Sponsor:** NEC Corporation  
**Tested by:** NEC Corporation  
**Test Date:** Jul-2020  
**Hardware Availability:** Jul-2020  
**Software Availability:** Sep-2019

### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_int_base</th>
<th>SPECspeed®2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench_s</td>
<td>6</td>
<td>7.61</td>
<td>8.59</td>
</tr>
<tr>
<td>gcc_s</td>
<td>6</td>
<td>11.8</td>
<td>15.0</td>
</tr>
<tr>
<td>mcf_s</td>
<td>6</td>
<td>7.45</td>
<td>15.3</td>
</tr>
<tr>
<td>omnetpp_s</td>
<td>6</td>
<td>7.08</td>
<td>14.7</td>
</tr>
<tr>
<td>xalancbmk_s</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>x264_s</td>
<td>6</td>
<td>17.7</td>
<td>19.1</td>
</tr>
<tr>
<td>deepsjeng_s</td>
<td>6</td>
<td>6.60</td>
<td>5.43</td>
</tr>
<tr>
<td>leela_s</td>
<td>6</td>
<td>5.43</td>
<td>5.43</td>
</tr>
<tr>
<td>exchange2_s</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>xz_s</td>
<td>6</td>
<td>11.4</td>
<td>19.1</td>
</tr>
</tbody>
</table>

**CPU Name:** Intel Xeon E-2226G  
**Max MHz:** 4700  
**Nominal:** 3400  
**Enabled:** 6 cores, 1 chip  
**Orderable:** 1 chip  
**Cache L1:** 32 KB I + 32 KB D on chip per core  
**L2:** 256 KB I+D on chip per core  
**L3:** 12 MB I+D on chip per chip  
**Other:** None  
**Memory:** 32 GB (2 x 16 GB 2Rx8 PC4-2666V-E)  
**Storage:** 1 x 1 TB SATA, 7200 RPM  
**Other:** None

**OS:** Red Hat Enterprise Linux Server release 7.7  
(Maipo)  
Kernel 3.10.0-1062.1.1.el7.x86_64

**Compiler:** 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

**Parallel:** Yes  
**Firmware:** NEC BIOS Version U43 v2.14 03/09/2020 released Jun-2020

**File System:** ext4  
**System State:** Run level 3 (multi-user)  
**Base Pointers:** 64-bit  
**Peak Pointers:** 64-bit  
**Other:** jemalloc memory allocator V5.0.1  
**Power Management:** BIOS set to prefer performance at the cost of additional power usage.
## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Seconds</th>
<th>Ratio</th>
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</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>6</td>
<td>233</td>
<td>7.61</td>
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<td>7.62</td>
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<td>602.gcc_s</td>
<td>6</td>
<td>339</td>
<td>11.7</td>
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<td>7.46</td>
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<td>7.45</td>
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<td>623.xalanchmk_s</td>
<td>6</td>
<td>96.6</td>
<td>14.7</td>
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<td>14.7</td>
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<td>95.8</td>
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<tr>
<td>625.x264_s</td>
<td>6</td>
<td>99.9</td>
<td>17.6</td>
<td>99.9</td>
<td>17.7</td>
<td>99.9</td>
<td>17.7</td>
<td>99.9</td>
<td>17.7</td>
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<td>631.deepsjeng_s</td>
<td>6</td>
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<td>6.60</td>
<td>217</td>
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<td>217</td>
<td>6.60</td>
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<tr>
<td>641.leela_s</td>
<td>6</td>
<td>314</td>
<td>5.43</td>
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<td>5.43</td>
<td>314</td>
<td>5.44</td>
<td>314</td>
<td>5.43</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>6</td>
<td>155</td>
<td>19.0</td>
<td>154</td>
<td>19.1</td>
<td>154</td>
<td>19.1</td>
<td>154</td>
<td>19.1</td>
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<tr>
<td>657.xz_s</td>
<td>6</td>
<td>533</td>
<td>11.6</td>
<td>544</td>
<td>11.4</td>
<td>544</td>
<td>11.4</td>
<td>545</td>
<td>11.3</td>
</tr>
</tbody>
</table>

### SPECspeed®2017_int_base = 10.7

### SPECspeed®2017_int_peak = 10.9

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

### 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:
- KMP_AFFINITY = "granularity=fine,scatter"
- LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-64"
- OMP_STACKSIZE = "192M"

### 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
Filesystem page cache synced and cleared with:
```
sync; echo 3 > /proc/sys/vm/drop_caches
```

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) is mitigated in the system as tested and documented.

jemalloc, a general purpose malloc implementation

(Continued on next page)
SPEC CPU®2017 Integer Speed Result
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NEC Corporation
Express5800/R110j-1 (Intel Xeon E-2226G)

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CPU2017 License: 9006
Test Sponsor: NEC Corporation
Tested by: NEC Corporation
Test Date: Jul-2020
Hardware Availability: Jul-2020
Software Availability: Sep-2019

General Notes (Continued)

built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

Platform Notes

BIOS Settings:
Thermal Configuration: Maximum Cooling
Intel Virtualization Technology (Intel VT): Disabled

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed1e6e46a485a0011
running on r110j1 Sat Jul 18 04:21:11 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) E-2226G CPU @ 3.40GHz
  1 "physical id"s (chips)
  6 "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 : 6
siblings : 6
physical 0: cores 0 2 3 4 5

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 6
On-line CPU(s) list: 0-5
Thread(s) per core: 1
Core(s) per socket: 6
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 158
Model name: Intel(R) Xeon(R) E-2226G CPU @ 3.40GHz
Stepping: 10
CPU MHz: 4666.284
CPU max MHz: 4700.0000
CPU min MHz: 800.0000
BogoMIPS: 6816.00

(Continued on next page)
SPEC CPU®2017 Integer Speed Result
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NEC Corporation
Express5800/R110j-1 (Intel Xeon E-2226G) SPECspeed®2017_int_base = 10.7
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</tr>
</tbody>
</table>

### Platform Notes (Continued)

Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 256K
L3 cache: 12288K
NUMA node0 CPU(s): 0-5
Flags: fpu vme de pse ts mtrr pae 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 apic cpuid nonstop_tsc
aperfmrperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
fma cx16 xtpr pdcm pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
xsave avx f16c rdrand lahf_lm abm 3dnowprefetch pdcm pdcm pmp tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust msr
spec_ctrl intel_stibp flush_l1d

From proc/cpuinfo cache data
cache size : 12288 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 1 nodes (0)
node 0 cpus: 0 1 2 3 4 5
node 0 size: 32617 MB
node 0 free: 31409 MB
node distances:
node 0
0: 10

From /proc/meminfo
MemTotal: 32790636 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

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

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

system-release-cpe: cpe:/o:redhat:enterprise_linux:7.7:ga:server

```
uname -a:
    Linux r110j1 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): Mitigation: PTE Inversion
- **Microarchitectural Data Sampling:** Mitigation: Clear CPU buffers; SMT disabled
- **CVE-2017-5754** (Misaligned): Mitigation: PTI
- **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
- **CVE-2017-5715** (Spectre variant 2): Mitigation: Full retpoline, IBPB

run-level 3 Jul 18 04:15

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>908G</td>
<td>47G</td>
<td>816G</td>
<td>6%</td>
<td>/</td>
</tr>
</tbody>
</table>

From /sys/devices/virtual/dmi/id

- BIOS: NEC U43 03/09/2020
- Vendor: NEC
- Product: Express5800/R110j-1
- Serial: CN69380JHR

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:
- 2x UNKNOWN NOT AVAILABLE
- 2x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666

(End of data from sysinfo program)

### Compiler Version Notes

<table>
<thead>
<tr>
<th>C</th>
<th>600.perlbench_s(base, peak) 602.gcc_s(base, peak) 605.mcf_s(base, peak) 625.x264_s(base, peak) 657.xz_s(base, peak)</th>
</tr>
</thead>
</table>

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
SPEC CPU®2017 Integer Speed Result

NEC Corporation
Express5800/R110j-1 (Intel Xeon E-2226G)

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**Compiler Version Notes (Continued)**

Version 19.0.4.227 Build 20190416

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------------------------------------------------------------------------------

| C++ | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak) 631.deepsjeng_s(base, peak) 641.leela_s(base, peak) |
------------------------------------------------------------------------------

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

Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

------------------------------------------------------------------------------

| Fortran | 648.exchange2_s(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**

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64

(Continued on next page)
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**Base Portability Flags (Continued)**

- 657.xz_s: -DSPEC_LP64

**Base Optimization Flags**

- C benchmarks:
  -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
  -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
  -L/usr/local/je5.0.1-64/lib -ljemalloc

- C++ benchmarks:
  -Wl,-z,muldefs -xCORE-AVX2 -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:
  -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4
  -nostandard-realloc-lhs

**Peak Compiler Invocation**

- C benchmarks:
  icc -m64 -std=c11

- C++ benchmarks:
  icpc -m64

- Fortran benchmarks:
  ifort -m64

**Peak Portability Flags**

Same as Base Portability Flags
SPEC CPU®2017 Integer Speed Result

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NEC Corporation

Express5800/R110j-1 (Intel Xeon E-2226G)

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CPU2017 License: 9006
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Peak Optimization Flags

C benchmarks:

600.perlbench_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2
-xCORE-AVX2 -ipo -O3
-no-prec-div -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -fno-strict-overflow
-L/usr/local/je5.0.1-64/lib -ljemalloc

602.gcc_s: basepeak = yes

605.mcf_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=4
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc

625.x264_s: basepeak = yes

657.xz_s: basepeak = yes

C++ benchmarks:

620.omnetpp_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=4
-DSPEC_SUPPRESS_OPENMP
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc

623.xalancbmk_s: -Wl,-z,muldefs -xCORE-AVX2 -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

631.deepsjeng_s: basepeak = yes

641.leela_s: Same as 623.xalancbmk_s

Fortran benchmarks:

-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs

The flags files that were used to format this result can be browsed at
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**NEC Corporation**

Express5800/R110j-1 (Intel Xeon E-2226G)  

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You can also download the XML flags sources by saving the following links:


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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU®2017 v1.1.0 on 2020-07-17 15:21:10-0400.  
Originally published on 2020-09-01.