## NEC Corporation

**Express5800/T110j (Intel Xeon E-2226G)**

| SPEC Speed®2017 Int Base = 11.2 |
| SPEC Speed®2017 Int Peak = 11.5 |

**CPU2017 License:** 9006  
**Test Date:** Nov-2019  
**Hardware Availability:** Nov-2019  
**Software Availability:** Aug-2019

### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>SPEC Speed®2017 Int Peak (11.5)</th>
<th>SPEC Speed®2017 Int Base (11.2)</th>
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</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>9.37</td>
<td>7.47</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>7.44</td>
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</tr>
<tr>
<td>605.mcf_s</td>
<td>6.75</td>
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</tr>
<tr>
<td>620.omnetpp_s</td>
<td>15.3</td>
<td>15.4</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>17.9</td>
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</tr>
<tr>
<td>625.x264_s</td>
<td>11.8</td>
<td>12.2</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>20.7</td>
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</tr>
<tr>
<td>641.leela_s</td>
<td>21.0</td>
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</tr>
<tr>
<td>648.exchange2_s</td>
<td>22.0</td>
<td>22.0</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>23.0</td>
<td>23.0</td>
</tr>
</tbody>
</table>

### Hardware

- **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  
- **Memory:** 64 GB (4 x 16 GB 2Rx8 PC4-2666V-E)  
- **Storage:** 1 x 2 TB SATA, 7200 RPM  
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux Server release 7.7 (Maipo)  
  Kernel 3.10.0-1062.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 F01 08/21/2019 released Nov-2019  
- **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:** --
Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<td>12.2</td>
<td>507</td>
<td>12.2</td>
</tr>
</tbody>
</table>

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 i9-799X 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)
NEC Corporation
Express5800/T110j (Intel Xeon E-2226G)

SPECspeed®2017_int_base = 11.2
SPECspeed®2017_int_peak = 11.5

General Notes (Continued)
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

Platform Notes

BIOS Settings:
VT-x: Disabled
Energy Efficient P-state: Disabled
Energy Efficient Turbo: Disabled

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed1be6a46a485a0011
running on t110j Fri Nov 15 04:04:54 2019

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 1 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: 4496.118
CPU max MHz: 4700.0000
CPU min MHz: 800.0000

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

**NEC Corporation**

**Express5800/T110j (Intel Xeon E-2226G)**

<table>
<thead>
<tr>
<th>SPECsplevel®2017_int_base</th>
<th>SPECsplevel®2017_int_peak</th>
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<tbody>
<tr>
<td>11.2</td>
<td>11.5</td>
</tr>
</tbody>
</table>

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

**Test Date:** Nov-2019  
**Hardware Availability:** Nov-2019  
**Software Availability:** Aug-2019

## Platform Notes (Continued)

```
BogoMIPS:                  6816.00
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 tsc msr pae mca cmov 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 sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch intel_pt ssbd ibpb stibp tpr_shadow vnumi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2  
```

```
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: 65441 MB  
    node 0 free: 63552 MB  
    node 0 distances:  
    node 0  
        0: 10
```

```
From /proc/meminfo  
    MemoryTotal: 65879700 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)"
```

(Continued on next page)
Platform Notes (Continued)

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 t110j 3.10.0-1062.el7.x86_64 #1 SMP Thu Jul 18 20:25:13 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 (Meltdown): 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, __user pointer
  sanitation
CVE-2017-5715 (Spectre variant 2): Mitigation: Full retpoline, IBPB

run-level 3 Nov 15 03:59

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>1.8T</td>
<td>78G</td>
<td>1.7T</td>
<td>5%</td>
<td>/</td>
</tr>
</tbody>
</table>

From /sys/devices/virtual/dmi/id
BIOS: American Megatrends Inc. F01 08/21/2019
Vendor: NEC
Product: Express5800/T110j [N8100-2816Y]
Serial: 0000001

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 SM BIOS" standard.
Memory:
  4x Samsung M391A2K43BB1-CTD 16 GB 2 rank 2667

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C       | 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)
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
NEC Corporation
Express5800/T110j (Intel Xeon E-2226G)

SPECspeed®2017_int_base = 11.2
SPECspeed®2017_int_peak = 11.5

Compiler Version Notes (Continued)

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

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

Base Compiler Invocation

C benchmarks:
```bash
icc -m64 -std=c11
```

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

Fortran benchmarks:
```bash
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)
SPEC CPU®2017 Integer Speed Result

NEC Corporation
Express5800/T110j (Intel Xeon E-2226G)

SPECspeed®2017_int_base = 11.2
SPECspeed®2017_int_peak = 11.5

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

Test Date: Nov-2019
Hardware Availability: Nov-2019
Software Availability: Aug-2019

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
-qkmalloc

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

NEC Corporation

Express5800/T110j (Intel Xeon E-2226G)

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SPECspeed®2017_int_base = 11.2
SPECspeed®2017_int_peak = 11.5

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

Test Date: Nov-2019
Hardware Availability: Nov-2019
Software Availability: Aug-2019

Peak Optimization Flags

C benchmarks:

600.perlbench_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2
-xCORE-AVX2 -qopt-mem-layout-trans=4 -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: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2
-xCORE-AVX2 -qopt-mem-layout-trans=4 -ipo -O3
-no-prec-div -DSPEC_SUPPRESS_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc

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 -gopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc

625.x264_s: -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -gopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc

657.xz_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2
-xCORE-AVX2 -qopt-mem-layout-trans=4 -ipo -O3
-no-prec-div -DSPEC_SUPPRESS_OPENMP -gopenmp
-DSPEC_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc

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: Same as 623.xalancbmk_s

641.leela_s: basepeak = yes

Fortran benchmarks:

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

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

NEC Corporation
Express5800/T110j (Intel Xeon E-2226G)

SPECspeed®2017_int_base = 11.2
SPECspeed®2017_int_peak = 11.5

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

Test Date: Nov-2019
Hardware Availability: Nov-2019
Software Availability: Aug-2019

Peak Optimization Flags (Continued)

Fortran benchmarks (continued):
-nostandard-realloc-lhs

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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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 2019-11-14 14:04:54-0500.
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