SPEC CPU®2017 Integer Rate Result

NEC Corporation

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

SPECrate®2017_int_base = 38.8
SPECrate®2017_int_peak = 40.0

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

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
Other: None
Memory: 32 GB (2 x 16 GB 2Rx8 PC4-2666V-E)
Storage: 1 x 1 TB SATA, 7200 RPM
Other: None

Software
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: No
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: 32/64-bit
Other: jemalloc memory allocator V5.0.1
Power Management: BIOS set to prefer performance at the cost of additional power usage.

Test Date: Jul-2020
Hardware Availability: Jul-2020
Software Availability: Sep-2019

### Copies

<table>
<thead>
<tr>
<th>Benchmark</th>
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<tr>
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<td>6</td>
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</tr>
<tr>
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### SPECrate®2017_int_base (38.8) SpecRate®2017_int_peak (40.0)
Results Table

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<td>557.xz_r</td>
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<td>316</td>
<td>20.5</td>
</tr>
</tbody>
</table>

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

Submit Notes

The taskset mechanism was used to bind copies to processors. The config file option 'submit' was used to generate taskset 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
Filesystem page cache synced and cleared with:
sync; echo 3 > /proc/sys/vm/drop_caches

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

**NEC Corporation**

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

**SPECrate®2017_int_base = 38.8**  
**SPECrate®2017_int_peak = 40.0**

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**General Notes (Continued)**

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  
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 295195f888a3d7eddb1e6e46a485a0011  
running on r110j1 Fri Jul 17 14:33:54 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  
- 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

(Continued on next page)
SPEC CPU®2017 Integer Rate Result
Copyright 2017-2020 Standard Performance Evaluation Corporation

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Platform Notes (Continued)

CPU family: 6
Model: 158
Model name: Intel(R) Xeon(R) E-2226G CPU @ 3.40GHz
Stepping: 10
CPU MHz: 4697.204
CPU max MHz: 4700.0000
CPU min MHz: 800.0000
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 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 arch_perfmon pebs bts rep_good nopl xtpm mce cx16 xtpr pdcm pcid sse4_1 sse4_2
 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch epb
 invpcid_single intel_pt ssbd ibrs ibpb tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1
 hle avx2 smep bmi2 ets invpcid rdtscp dtes64 monitor ds_cpl vmx smx smx2 ssse3 sdbg
 fma cx16 f16c r颧and lahf_lm abm 3dnowprefetch epb invpcid_single intel_pt ssbd
 ibrs ibpb tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle
 avx2 smep bmi2 ets invpcid rdtscp dtes64 monitor ds_cpl vmx smx smx2 ssse3 sdbg
 fma cx16 f16c r颧and lahf_lm abm 3dnowprefetch epb invpcid_single intel_pt ssbd
 ibrs ibpb tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle
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 ibrs ibpb tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle
 avx2 smep bmi2 ets invpcid rdtscp dtes64 monitor ds_cpl vmx smx smx2 ssse3 sdbg

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: 31401 MB

From /proc/meminfo
MemTotal: 32790636 kB
MemFree: 31401 MB
Buffers: 2048 kB

From /etc/*release* /etc/*version*
NAME="Red Hat Enterprise Linux Server"
VERSION="7.7 (Maipo)"

(Continued on next page)
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Platform Notes (Continued)

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 r110j1 3.10.0-1062.1.1.e17.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 (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, usercopy/swapgs barriers and __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Full retpoline, IBPB

run-level 3 Jul 17 14:28

SPEC is set to: /home/cpu2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 ext4 908G 47G 816G 6% /

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)
## NEC Corporation

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

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### Compiler Version Notes

#### C

```
| 502.gcc_r(peak) |
```

Intel(R) C Intel(R) 64 Compiler for applications running on IA-32, Version 19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

#### C

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

#### C

```
| 502.gcc_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

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

#### C++

```
| 523.xalancbmk_r(peak) |
```

Intel(R) C++ Intel(R) 64 Compiler for applications running on IA-32, Version 19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

#### C++

```
| 520.omnetpp_r(base, peak) 523.xalancbmk_r(base)  
| 531.deepsjeng_r(base, peak) 541.leela_r(base, peak) |
```

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,

(Continued on next page)
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### Compiler Version Notes (Continued)

```
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
```

```
C++ | 523.xalancbmk_r(peak)
```

Intel(R) C++ Intel(R) 64 Compiler for applications running on IA-32, Version 19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

```
C++ | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base)
    | 531.deepsjeng_r(base, peak) 541.leela_r(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 | 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  
Copyright (C) 1985-2019 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

*(Continued on next page)*
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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:
-W1,-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

C++ benchmarks:
-W1,-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:
-W1,-z,muldefs -xCORE-AVX2 -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

523.xalancbmk_r: icpc -m32 -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/ia32_lin
Peak Compiler Invocation (Continued)

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
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-AVX2 -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-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=4
-L/usr/local/je5.0.1-32/lib -ljemalloc

505.mcf_r: -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-ipo -qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc

525.x264_r: -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-ipo -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: Same as 505.mcf_r

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

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

SPECrates®2017_int_base = 38.8
SPECrates®2017_int_peak = 40.0

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

Peak Optimization Flags (Continued)

C++ benchmarks:

520.omnetpp_r: -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

523.xalancbmk_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX2 -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

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

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