## SPEC® CPU2017 Integer Speed Result

### NEC Corporation

Express5800/R120h-1E (Intel Xeon Gold 5122)

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<tr>
<th>benchmark</th>
<th>Threads</th>
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<tbody>
<tr>
<td>perlbench</td>
<td>8</td>
<td>6.19</td>
<td>7.35</td>
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<tr>
<td>gcc</td>
<td>8</td>
<td>8.61</td>
<td>10.9</td>
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<tr>
<td>mcf</td>
<td>8</td>
<td>5.34</td>
<td>5.23</td>
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<tr>
<td>omnetpp</td>
<td>8</td>
<td>9.14</td>
<td>9.85</td>
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<tr>
<td>xalancbmk</td>
<td>8</td>
<td>5.09</td>
<td>11.4</td>
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<tr>
<td>x264</td>
<td>8</td>
<td>5.34</td>
<td>5.23</td>
</tr>
<tr>
<td>deepsjeng</td>
<td>8</td>
<td>13.3</td>
<td>13.5</td>
</tr>
<tr>
<td>leela</td>
<td>8</td>
<td>13.4</td>
<td>13.7</td>
</tr>
<tr>
<td>exchange2</td>
<td>8</td>
<td>13.3</td>
<td>13.5</td>
</tr>
<tr>
<td>xz</td>
<td>8</td>
<td>13.4</td>
<td>13.7</td>
</tr>
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</table>

### Hardware

- **CPU Name:** Intel Xeon Gold 5122
- **Max MHz.:** 3700
- **Nominal:** 3600
- **Enabled:** 8 cores, 2 chips
- **Orderable:** 1.2 chips
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **Cache L2:** 1 MB I+D on chip per core
- **Cache L3:** 16.5 MB I+D on chip per chip
- **Other:** None
- **Memory:** 192 GB (12 x 16 GB 2Rx8 PC4-2666V-R)
- **Storage:** 1 x 1 TB SATA, 7200 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:** Yes
- **Firmware:** NEC BIOS Version U31 06/20/2018 released Sep-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
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base</th>
<th></th>
<th>Peak</th>
<th></th>
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<tr>
<td></td>
<td>Threads</td>
<td>Seconds</td>
<td>Ratio</td>
<td>Seconds</td>
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<td>600.perlbench_s</td>
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<td>290</td>
<td>6.12</td>
<td>287</td>
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<td>602.gcc_s</td>
<td>8</td>
<td>472</td>
<td>8.44</td>
<td>462</td>
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<td>605.mcf_s</td>
<td>8</td>
<td>433</td>
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<td>620.omnetpp_s</td>
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<td>305</td>
<td>5.34</td>
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<td>8</td>
<td>155</td>
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<td>155</td>
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<td>8</td>
<td>282</td>
<td>5.09</td>
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<td>641.leela_s</td>
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<td>391</td>
<td>4.36</td>
<td>391</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>8</td>
<td>221</td>
<td>13.3</td>
<td>222</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>8</td>
<td>462</td>
<td>13.4</td>
<td>461</td>
</tr>
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</table>

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"

General Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32:/home/cpu2017/je5.0.1-64"
OMP_STACKSIZE = "192M"

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

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
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Test Date: Dec-2018
Hardware Availability: Nov-2017
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Platform Notes

BIOS Settings:
Thermal Configuration: Maximum Cooling
Workload Profile: General Peak Frequency Compute
Intel Hyper-Threading: Disabled
Memory Patrol Scrubbing: Disabled
Energy/Performance Bias: Maximum Performance
LLC Dead Line Allocation: Disabled
LLC Prefetch: Enabled
Workload Profile: Custom
NUMA Group Size Optimization: Flat
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcede8f2999c33d61f64985e45859ea9
running on r120h1e Wed Dec 5 19:42:46 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 5122 CPU @ 3.60GHz
  2 "physical id"s (chips)
  8 "processors"
core(s), siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)
cpu cores : 4
siblings : 4
physical 0: cores 2 3 4 10
physical 1: cores 0 5 9 13

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 8
On-line CPU(s) list: 0-7
Thread(s) per core: 1
Core(s) per socket: 4
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5122 CPU @ 3.60GHz
Stepping: 4
CPU MHz: 3600.000
BogoMIPS: 7200.00
Virtualization: VT-x

(Continued on next page)
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Platform Notes (Continued)

- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 1024K
- L3 cache: 16896K
- NUMA node0 CPU(s): 0-3
- NUMA node1 CPU(s): 4-7
- Flags: fpu vme de pse tsc msr 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 xtopology nonstop_tsc aperfmperf 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 f16c rdrand lahf_lm abm 3dnowprefetch epb cat_l3 cdp_l3 invpcid_single intel_pt spec_ctrl ibpb_support tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erts invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts

From /proc/cpuinfo cache data
- cache size : 16896 KB

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 3
- node 0 size: 97953 MB
- node 0 free: 95496 MB
- node 1 cpus: 4 5 6 7
- node 1 size: 98303 MB
- node 1 free: 95962 MB
- node distances:
  - node 0 1
    - 0: 10 21
    - 1: 21 10

From /proc/meminfo
- MemTotal: 197740608 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

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"

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**SPECspeed2017_int_peak = 8.41**

**Platform Notes (Continued)**

```plaintext
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
```

```plaintext
uname -a:
Linux r120h1e 3.10.0-693.21.1.el7.x86_64 #1 SMP Fri Feb 23 18:54:16 UTC 2018 x86_64
gx86_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 Dec 5 19:37

SPEC is set to: /home/cpu2017

```plaintext
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 ext4 909G 193G 670G 23% /
```

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 06/20/2018
- Memory:
  - 4x UNKNOWN NOT AVAILABLE
  - 12x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666

(End of data from sysinfo program)

---

**Compiler Version Notes**

```
CC 600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base) 625.x264_s(base, peak) 657.xz_s(base)
```

```
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

```
CC 600.perlbench_s(peak) 602.gcc_s(peak) 605.mcf_s(peak) 657.xz_s(peak)
```

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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

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### Base Portability Flags (Continued)

- 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
- 657.xz_s: -DSPEC_LP64

### Base Optimization Flags

**C benchmarks:**

- `-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`
- `-qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP`
- `-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`
- `-L/usr/local/je5.0.1-64/lib -ljemalloc`

### Peak Compiler Invocation

**C benchmarks:**

- `icc -m64 -std=c11`

**C++ benchmarks (except as noted below):**

- `icpc -m64`

- `623.xalancbmk_s: icpc -m32 -L/home/prasadj/specdev/IC18u2_Internal/lin_18_0_20180210/compiler/lib/ia32_lin`

**Fortran benchmarks:**

- `ifort -m64`
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Peak 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: -D_FILE_OFFSET_BITS=64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

Peak Optimization Flags

C benchmarks:

600.perlbench_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2
-xCORE-AVX512 -qopt-prefetch -ipo -O3
-qopt-mem-layout-trans=3 -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-AVX512 -qopt-prefetch -ipo -O3
-qopt-mem-layout-trans=3 -no-prec-div
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_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-AVX512 -O3 -no-prec-div -qopt-prefetch
-qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc

625.x264_s: basepeak = yes

657.xz_s: Same as 602.gcc_s

C++ benchmarks:

620.omnetpp_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -O3 -no-prec-div -qopt-prefetch
-qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc

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**Peak Optimization Flags (Continued)**

623.xalancbmk_s: Wl, -z, muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512 -O3 -no-prec-div -qopt-prefetch -qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -L/usr/local/je5.0.1-32/lib -ljemalloc

631.deepsjeng_s: basepeak = yes

641.leela_s: basepeak = yes

Fortran benchmarks:

The flags files that were used to format this result can be browsed at:

- [Intel.ic18.0-official-linux64.2017-12-21.html](http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-12-21.html)
- [NEC-Platform-Settings-V1.2-R120h-RevB.html](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:

- [Intel.ic18.0-official-linux64.2017-12-21.xml](http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-12-21.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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