# SPEC CPU®2017 Integer Speed Result

**NEC Corporation**

**Express5800/R120h-1M (Intel Xeon Gold 5220R)**

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## SPECspeed®2017_int_base = 10.2

## SPECspeed®2017_int_peak = 10.4

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<table>
<thead>
<tr>
<th>Test Date</th>
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<tbody>
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### CPU2017 License:
9006

**Test Sponsor:** NEC Corporation

**Tested by:** NEC Corporation

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### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
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<th>SPECspeed®2017_int_peak (10.4)</th>
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<tr>
<td>600.perlbench_s</td>
<td>7.52</td>
<td>10.4</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>9.48</td>
<td>10.2</td>
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<td>9.12</td>
<td>12.3</td>
</tr>
<tr>
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<td>12.2</td>
<td>12.3</td>
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<tr>
<td>625.x264_s</td>
<td>14.4</td>
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</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>5.48</td>
<td>5.48</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>4.68</td>
<td>4.68</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>16.0</td>
<td>16.0</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>24.1</td>
<td>24.1</td>
</tr>
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### Hardware

**CPU Name:** Intel Xeon Gold 5220R

**Max MHz:** 4000

**Nominal:** 2200

**Enabled:** 48 cores, 2 chips, 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:** 35.75 MB I+D on chip per chip

**Other:** None

**Memory:** 384 GB (24 x 16 GB 2Rx8 PC4-2933Y-R)

**Storage:** 1 x 1 TB SATA, 7200 RPM, RAID 0

**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:** Yes

**Firmware:** NEC BIOS Version U32 v2.32 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>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<td>600.perlbench_s</td>
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<td>602.gcc_s</td>
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<td>4.67</td>
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<td>15.9</td>
<td>184</td>
<td>16.0</td>
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<td>96</td>
<td>256</td>
<td>24.1</td>
<td>259</td>
<td>23.9</td>
<td>256</td>
<td>24.1</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"

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
Files system page cache synced and cleared with:
sync; echo 3 > /proc/sys/vm/drop_caches

NA: 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)
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**NEC Corporation**

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

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### 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  
  - Workload Profile: General Peak Frequency Compute  
  - Memory Patrol Scrubbing: Disabled  
  - LLC Dead Line Allocation: Disabled  
  - LLC Prefetch: Enabled  
  - Enhanced Processor Performance: Enabled  
  - Workload Profile: Custom  
  - NUMA Group Size Optimization: Flat

- **Sysinfo program** /home/cpu2017/bin/sysinfo  
  **Rev:** r6365 of 2019-08-21 295195f888a3d7edbble6e46a485a0011  
  **running on r120h1m Sat Oct 17 17:28:36 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](https://www.spec.org/cpu2017/Docs/config.html#sysinfo)

- **From /proc/cpuinfo**
  - **model name:** Intel(R) Xeon(R) Gold 5220R CPU @ 2.20GHz  
  - **physical id**s (chips)  
  - **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:** 24  
  - **siblings:** 48  
  - **physical 0:** cores 0 1 2 3 4 5 6 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29  
  - **physical 1:** cores 0 1 2 3 4 5 6 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29

- **From lscpu:**
  - **Architecture:** x86_64  
  - **CPU op-mode(s):** 32-bit, 64-bit  
  - **Byte Order:** Little Endian  
  - **CPU(s):** 96  
  - **On-line CPU(s) list:** 0-95  
  - **Thread(s) per core:** 2  
  - **Core(s) per socket:** 24  
  - **Socket(s):** 2  
  - **NUMA node(s):** 2  
  - **Vendor ID:** GenuineIntel  
  - **CPU family:** 6

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SPECspeed®2017_int_base = 10.2
SPECspeed®2017_int_peak = 10.4

Platform Notes (Continued)

Model: 85
Model name: Intel(R) Xeon(R) Gold 5220R CPU @ 2.20GHz
Stepping: 7
CPU MHz: 2200.000
BogoMIPS: 4400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 36608K
NUMA node0 CPU(s): 0-23,48-71
NUMA node1 CPU(s): 24-47,72-95
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 xtopology nonstop_tsc
aperfmprefl eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
xsave avx f16c rdrand lahf_lm abm 3nowprefetch epb cat_13 cdp_l3 invpcid_single
intel_pinn intel_pt ssbd mba ibrs ibpb stibp ibrs Enhanced tpr_shadow vnumi
flexpriority ept vpid fsgsbase tsc_adjust bni hle avx2 smep bmi2 erms invpcid rtm
cqm mpx rdt_a avx512f avx512dq rdseed adx clflushopt clwb avx512cd avx512bw
avx512vl xsaveopt xsaveav1 cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
dtherm ida arat pin pts pkup ospe avx512_vnni md_clear spec_ctrl intel_stibp
flush_l1d arch_capabilities

/proc/cpuinfo cache data
  cache size : 36608 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 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 48 49 50 51
  52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71
  node 0 size: 196264 MB
  node 0 free: 191622 MB
  node 1 cpus: 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 72
  73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95
  node 1 size: 196607 MB
  node 1 free: 191878 MB
  node distances:
    node 0 1
    0: 10 21
    1: 21 10

From /proc/meminfo
  MemTotal: 395914376 kB
  HugePages_Total: 0

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Platform Notes (Continued)

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)"
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 r120h1m 3.10.0-1062.1.1.el7.x86_64 #1 SMP Tue Aug 13 18:39:59 UTC 2019 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Not affected
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 Oct 17 17:22

SPEC is set to: /home/cpu2017
   Filesystem  Type      Size  Used  Avail Use% Mounted on
   /dev/sda3    ext4      908G  183G  680G  22% /

From /sys/devices/virtual/dmi/id
   BIOS: NEC U32 03/09/2020
   Vendor: NEC
   Product: Express5800/R120h-1M
   Serial: JPN0084094

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.

(Continued on next page)
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Platform Notes (Continued)

Memory:
24x HPE P03050-091 16 GB 2 rank 2933

(End of data from sysinfo program)

Compiler Version Notes

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

Base Compiler Invocation
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### 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
- 657.xz_s: -DSPEC_LP64

### Base Optimization Flags

**C benchmarks:**
- -Wl,-z,muldefs -xCORE-AVX512 -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-AVX512 -ipo -O3 -no-prec-div
- -ipo
- -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
- -lqkmalloc

**Fortran benchmarks:**
- -xCORE-AVX512 -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
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### Peak Portability Flags

Same as Base Portability Flags

### Peak Optimization Flags

**C benchmarks:**

600.perlbench_s: -Wl,-z,muldefs, -prof-gen(pass 1) -prof-use(pass 2) -O2  
-xCORE-AVX512 -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: basepeak = yes

605.mcf_s: -Wl,-z,muldefs, -prof-gen(pass 1) -prof-use(pass 2) -ipo  
-xCORE-AVX512 -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: -Wl,-z,muldefs, -xCORE-AVX512 -ipo -O3 -no-prec-div  
-qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP  
-L/usr/local/je5.0.1-64/lib -ljemalloc

657.xz_s: basepeak = yes

**C++ benchmarks:**

620.omnetpp_s: basepeak = yes

623.xalancbmk_s: -Wl,-z,muldefs, -xCORE-AVX512 -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-AVX512 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4  
-nostandard-realloc-lhs
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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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