### SPEC CPU®2017 Integer Rate Result

**NEC Corporation**

**Express5800/R120h-2M (Intel Xeon Gold 6248)**

- **SPECrate®2017_int_base = 237**
- **SPECrate®2017_int_peak = 247**

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

| 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 U30 v2.22 11/13/2019 released Mar-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.  

| Hardware | CPU Name: Intel Xeon Gold 6248  
Max MHz: 3900  
Nominal: 2500  
Enabled: 40 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: 27.5 MB I+D on chip per chip  
Other: None  
Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)  
Storage: 1 x 1 TB SATA, 7200 RPM, RAID 0  
Other: None |

<table>
<thead>
<tr>
<th>Copies</th>
<th>perlbench_r</th>
<th>gcc_r</th>
<th>mcf_r</th>
<th>omnetpp_r</th>
<th>xalancbmk_r</th>
<th>x264_r</th>
<th>deepsjeng_r</th>
<th>leela_r</th>
<th>exchange2_r</th>
<th>xz_r</th>
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|                  | SPECrate®2017_int_base (237) | SPECrate®2017_int_peak (247) | 0 | 30.0 | 60.0 | 90.0 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | 360 | 390 | 420 | 450 | 480 | 510 | 540 | 570 | 600 |
|------------------|-------------------------------|-------------------------------|---|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| perlbench_r      |                               |                               | 203| 190  | 177  | 133  | 104 | 80  | 67  | 56  | 47  | 42  | 37  | 32  | 28  | 24  | 20  | 17  | 14  | 12  | 10  | 8   | 5   | 3   | 2   |
| gcc_r            |                               |                               | 210| 158  | 117  | 92   | 72  | 53  | 44  | 36  | 30  | 26  | 23  | 21  | 19  | 17  | 16  | 14  | 12  | 10  | 9   | 7   | 6   | 5   | 4   |
| mcf_r            |                               |                               | 177| 157  | 133  | 111  | 92  | 74  | 60  | 49  | 40  | 36  | 32  | 29  | 25  | 22  | 19  | 17  | 15  | 13  | 11  | 9   | 7   | 6   | 5   |
| omnetpp_r        |                               |                               | 157| 157  | 133  | 111  | 92  | 74  | 60  | 49  | 40  | 36  | 32  | 29  | 25  | 22  | 19  | 17  | 15  | 13  | 11  | 9   | 7   | 6   | 5   |
| xalancbmk_r      |                               |                               | 157| 157  | 133  | 111  | 92  | 74  | 60  | 49  | 40  | 36  | 32  | 29  | 25  | 22  | 19  | 17  | 15  | 13  | 11  | 9   | 7   | 6   | 5   |
| x264_r           |                               |                               | 157| 157  | 133  | 111  | 92  | 74  | 60  | 49  | 40  | 36  | 32  | 29  | 25  | 22  | 19  | 17  | 15  | 13  | 11  | 9   | 7   | 6   | 5   |
| deepsjeng_r      |                               |                               | 157| 157  | 133  | 111  | 92  | 74  | 60  | 49  | 40  | 36  | 32  | 29  | 25  | 22  | 19  | 17  | 15  | 13  | 11  | 9   | 7   | 6   | 5   |
| leela_r          |                               |                               | 157| 157  | 133  | 111  | 92  | 74  | 60  | 49  | 40  | 36  | 32  | 29  | 25  | 22  | 19  | 17  | 15  | 13  | 11  | 9   | 7   | 6   | 5   |
| exchange2_r      |                               |                               | 157| 157  | 133  | 111  | 92  | 74  | 60  | 49  | 40  | 36  | 32  | 29  | 25  | 22  | 19  | 17  | 15  | 13  | 11  | 9   | 7   | 6   | 5   |
| xz_r             |                               |                               | 155| 155  | 133  | 111  | 92  | 74  | 60  | 49  | 40  | 36  | 32  | 29  | 25  | 22  | 19  | 17  | 15  | 13  | 11  | 9   | 7   | 6   | 5   |

**Hardware Information:**

- **CPU Name:** Intel Xeon Gold 6248  
- **Max MHz:** 3900  
- **Nominal:** 2500  
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- **Orderable:** 1.2 chips  
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<th>Ratio</th>
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<td>600</td>
<td>189</td>
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<tr>
<td>mcf_r</td>
<td>80</td>
<td>431</td>
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<td>556</td>
<td>155</td>
</tr>
</tbody>
</table>

Results Table

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

**Submit Notes**

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl 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
```

runcpu command invoked through numactl i.e.:

```
(Continued on next page)"
pec CPU®2017 Integer Rate Result

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| SPECrate®2017_int_peak = 247 |

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

General Notes (Continued)

numactl --interleave=all runcpu <etc>

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.


Platform Notes

BIOS Settings:
Thermal Configuration: Maximum Cooling
Workload Profile: General Throughput Compute
Memory Patrol Scrubbing: Disabled
LLC Dead Line Allocation: Disabled
LLC Prefetch: Enabled
Enhanced Processor Performance: Enabled
Workload Profile: Custom
Advanced Memory Protection: Advanced ECC Support

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed1e6e46a485a0011
running on r120h2m Thu Mar 19 08:15:53 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) Gold 6248 CPU @ 2.50GHz
  2 "physical id"s (chips)
  80 "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 : 20
siblings : 40
physical 0: cores 0 1 2 3 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
physical 1: cores 0 1 2 3 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28

From lscpu:
Architecture: x86_64

(Continued on next page)
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Hardware Availability: Dec-2019
Software Availability: Sep-2019

Platform Notes (Continued)

CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 80
On-line CPU(s) list: 0-79
Thread(s) per core: 2
Core(s) per socket: 20
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6248 CPU @ 2.50GHz
Stepping: 6
CPU MHz: 2500.000
BogoMIPS: 5000.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 28160K
NUMA node0 CPU(s): 0-9, 40-49
NUMA node1 CPU(s): 10-19, 50-59
NUMA node2 CPU(s): 20-29, 60-69
NUMA node3 CPU(s): 30-39, 70-79
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 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 xptr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3nowprefetch epb cat_l3 cdp_l3 invpcid_single intel_ppini intel_pt ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmmi flexpriori ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ertm invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pin pts pku ospke avx512_vnni md_clear spec_ctrl intel_stibp flush_l1d arch_capabilities

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.

Available: 4 nodes (0-3)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9 40 41 42 43 44 45 46 47 48 49
node 0 size: 196264 MB
node 0 free: 191654 MB
node 1 cpus: 10 11 12 13 14 15 16 17 18 19 50 51 52 53 54 55 56 57 58 59

(Continued on next page)
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Platform Notes (Continued)

node 1 size: 196608 MB
node 1 free: 192129 MB
node 2 cpus: 20 21 22 23 24 25 26 27 28 29 60 61 62 63 64 65 66 67 68 69
node 2 size: 196608 MB
node 2 free: 192227 MB
node 3 cpus: 30 31 32 33 34 35 36 37 38 39 70 71 72 73 74 75 76 77 78 79
node 3 size: 196607 MB
node 3 free: 192228 MB
node distances:
  node 0 1 2 3
0:  10  21  31  31
1:  21  10  31  31
2:  31  31  10  21
3:  31  31  21  10

From /proc/meminfo
MemTotal: 792277856 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)"
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 r120h2m 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): 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

(Continued on next page)
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Platform Notes (Continued)
CVE-2017-5715 (Spectre variant 2): Mitigation: Full retpoline, IBPB
run-level 3 Mar 19 08:10
SPEC is set to: /home/cpu2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 ext4 908G 40G 823G 5% /

From /sys/devices/virtual/dmi/id
BIOS: NEC U30 11/13/2019
Vendor: NEC
Product: Express5800/R120h-2M
Serial: JPNLMCR0UF

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:
24x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2933

(End of data from sysinfo program)

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
NEC Corporation

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

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Software Availability: Sep-2019

Compiler Version Notes (Continued)

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
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-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

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Base Optimization Flags (Continued)

C++ benchmarks:
-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

Fortran benchmarks:
-Wl,-z,muldefs -xCORE-AVX512 -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

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
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</tbody>
</table>

**Peak Optimization Flags**

C benchmarks:

500.perlbench_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -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-AVX512 -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-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

525.x264_r: -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-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

C++ benchmarks:

520.omnetpp_r: -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

523.xalancbmk_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -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
# SPEC CPU®2017 Integer Rate Result

**NEC Corporation**

**Express5800/R120h-2M (Intel Xeon Gold 6248)**

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<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tr>
<td>SPECrate®2017_int_peak</td>
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**CPU2017 License:** 9006  
**Test Sponsor:** NEC Corporation  
**Tested by:** NEC Corporation  
**Test Date:** Mar-2020  
**Hardware Availability:** Dec-2019  
**Software Availability:** Sep-2019

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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