SPEC CPU®2017 Integer Speed Result

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NEC Corporation

$SPECspeed^{®}2017\_int\_base = 9.73$

Express5800/R120h-2M (Intel Xeon Gold 6226R)

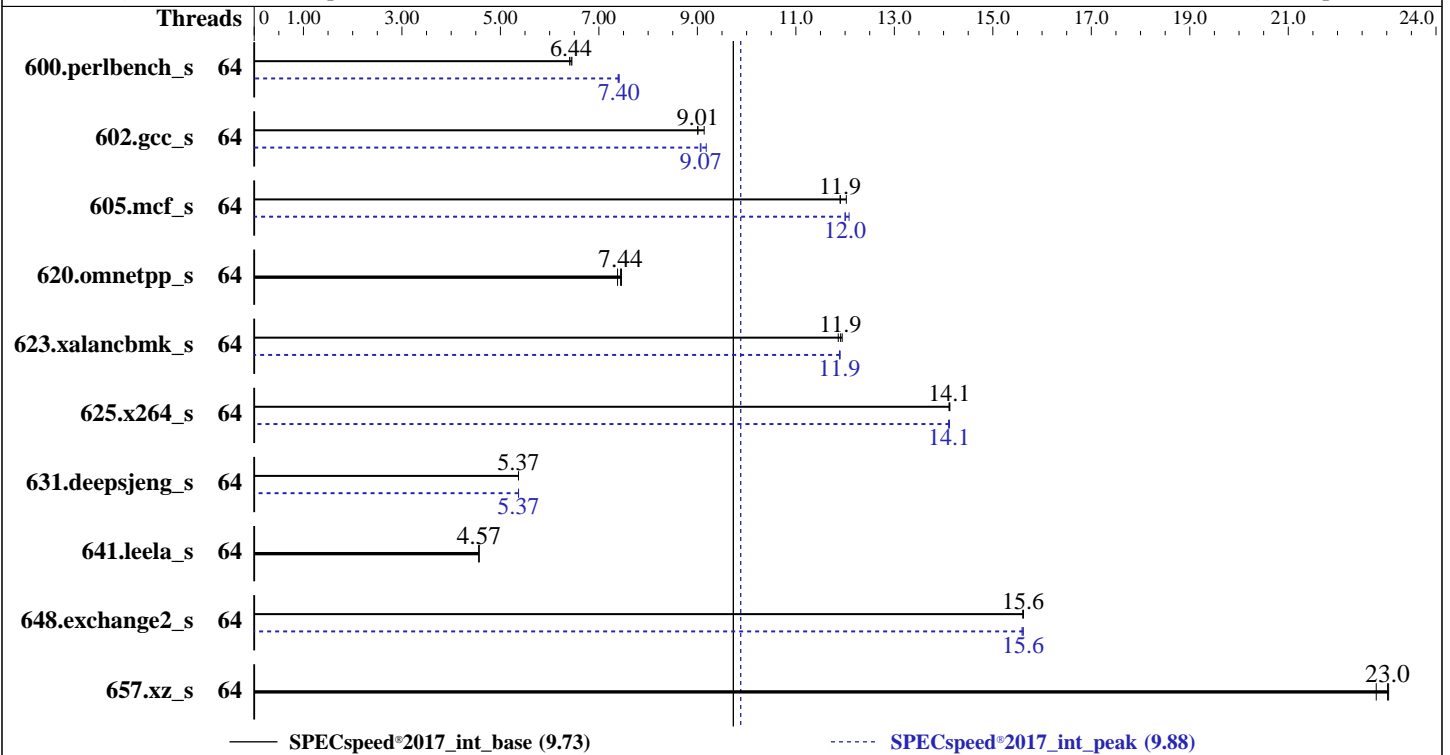$SPECspeed^{®}2017\_int\_peak = 9.88$

CPU2017 License: 9006 **Test Date:** Jan-2021
Test Sponsor: NEC Corporation **Hardware Availability:** May-2020
Tested by: NEC Corporation **Software Availability:** Sep-2019

Threads

Benchmark	Threads	base	peak
600.perlbench_s	64	6.44	7.40
602.gcc_s	64	9.01	9.07
605.mcf_s	64	11.9	12.0
620.omnetpp_s	64	7.44	
623.xalancbmk_s	64	11.9	11.9
625.x264_s	64	14.1	14.1
631.deepsjeng_s	64	5.37	5.37
641.leela_s	64	4.57	
648.exchange2_s	64	15.6	15.6
657.xz_s	64	23.0	

SPECspeed®2017_int_base (9.73)   SPECspeed®2017_int_peak (9.88)

Hardware

CPU Name: Intel Xeon Gold 6226R
 Max MHz: 3900
 Nominal: 2900
Enabled: 32 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: 22 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 U30 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.

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Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
600.perlbench_s	64	277	6.41	**276**	**6.44**	275	6.45	64	239	7.41	**240**	**7.40**	240	7.39
602.gcc_s	64	442	9.01	**442**	**9.01**	436	9.14	64	440	9.06	434	9.18	**439**	**9.07**
605.mcf_s	64	397	11.9	**397**	**11.9**	393	12.0	64	393	12.0	**393**	**12.0**	391	12.1
620.omnetpp_s	64	221	7.38	**219**	**7.44**	219	7.46	64	221	7.38	**219**	**7.44**	219	7.46
623.xalancbmk_s	64	119	11.9	119	11.9	**119**	**11.9**	64	**119**	**11.9**	119	11.9	119	11.9
625.x264_s	64	125	14.1	125	14.1	**125**	**14.1**	64	125	14.1	125	14.1	**125**	**14.1**
631.deepsjeng_s	64	267	5.37	267	5.37	**267**	**5.37**	64	267	5.37	**267**	**5.37**	267	5.37
641.leela_s	64	374	4.56	**374**	**4.57**	374	4.57	64	374	4.56	**374**	**4.57**	374	4.57
648.exchange2_s	64	188	15.6	188	15.6	**188**	**15.6**	64	**188**	**15.6**	188	15.6	189	15.6
657.xz_s	64	271	22.8	**269**	**23.0**	268	23.0	64	271	22.8	**269**	**23.0**	268	23.0

SPECspeed®2017_int_base =	**9.73**
SPECspeed®2017_int_peak =	**9.88**

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
 Filesystem 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
```

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General Notes (Continued)

```
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
sources available from jemalloc.net or https://github.com/jemalloc/jemalloc/releases
```

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: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on r120h2m Tue Jan 12 15:29:35 2021

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 6226R CPU @ 2.90GHz
      2  "physical id"s (chips)
      64 "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 : 16
      siblings  : 32
      physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
      physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

From lscpu:
     Architecture:          x86_64
     CPU op-mode(s):        32-bit, 64-bit
     Byte Order:            Little Endian
     CPU(s):                64
     On-line CPU(s) list:   0-63
     Thread(s) per core:    2
     Core(s) per socket:    16
     Socket(s):             2
     NUMA node(s):          2
     Vendor ID:             GenuineIntel
     CPU family:            6
```

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

Test Date: Jan-2021
Hardware Availability: May-2020
Software Availability: Sep-2019

Platform Notes (Continued)

```
          Model:                 85
          Model name:            Intel(R) Xeon(R) Gold 6226R CPU @ 2.90GHz
          Stepping:              7
          CPU MHz:               2900.000
          BogoMIPS:              5800.00
          Virtualization:        VT-x
          L1d cache:             32K
          L1i cache:             32K
          L2 cache:              1024K
          L3 cache:              22528K
          NUMA node0 CPU(s):     0-15,32-47
          NUMA node1 CPU(s):     16-31,48-63
          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 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_ppin intel_pt ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi
     flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms 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 pku ospke avx512_vnni md_clear spec_ctrl intel_stibp
     flush_l1d arch_capabilities

 /proc/cpuinfo cache data
   cache size : 22528 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 32 33 34 35 36 37 38 39 40 41 42 43
   44 45 46 47
   node 0 size: 196265 MB
   node 0 free: 191552 MB
   node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 48 49 50 51 52 53 54 55 56
   57 58 59 60 61 62 63
   node 1 size: 196607 MB
   node 1 free: 192052 MB
   node distances:
   node   0   1
     0:  10  21
     1:  21  10

 From /proc/meminfo
   MemTotal:       395919776 kB
   HugePages_Total:        0
```

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CPU2017 License: 9006
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Test Date: Jan-2021
Hardware Availability: May-2020
Software Availability: Sep-2019

Platform Notes (Continued)

```
     Hugepagesize:        2048 kB

 /sbin/tuned-adm active
     Current active profile: throughput-performance

 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-2018-12207 (iTLB Multihit):                    No status reported
 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
 CVE-2020-0543 (Special Register Buffer Data Sampling): No status reported
 CVE-2019-11135 (TSX Asynchronous Abort):           No status reported

 run-level 3 Jan 12 15:23

 SPEC is set to: /home/cpu2017
    Filesystem      Type  Size  Used Avail Use% Mounted on
    /dev/sda3       ext4  908G  260G  603G  31% /

 From /sys/devices/virtual/dmi/id
    Vendor:          NEC
```

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Platform Notes (Continued)

```
        Product:          Express5800/R120h-2M
        Serial:           JPNLMCR0VF

 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 HPE P03050-091 16 GB 2 rank 2933

 BIOS:
   BIOS Vendor:       NEC
   BIOS Version:      U30
   BIOS Date:         03/09/2020
   BIOS Revision:     2.32
   Firmware Revision: 2.14

 (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,
  Version 19.0.4.227 Build 20190416
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.
------------------------------------------------------------------------------
```

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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`
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
-qopt-mem-layout-trans=4
-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
```

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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
```

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: -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
-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-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:

(Continued on next page)

Standard Performance Evaluation Corporation (info@spec.org)   https://www.spec.org/

NEC Corporation

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Peak Optimization Flags (Continued)

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`

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic19.0u1-official-linux64.2019-07-09.html
http://www.spec.org/cpu2017/flags/NEC-Platform-Settings-V1.2-R120h-RevE.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic19.0u1-official-linux64.2019-07-09.xml
http://www.spec.org/cpu2017/flags/NEC-Platform-Settings-V1.2-R120h-RevE.xml

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

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