SPEC CPU®2017 Integer Speed Result

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Inspur Corporation

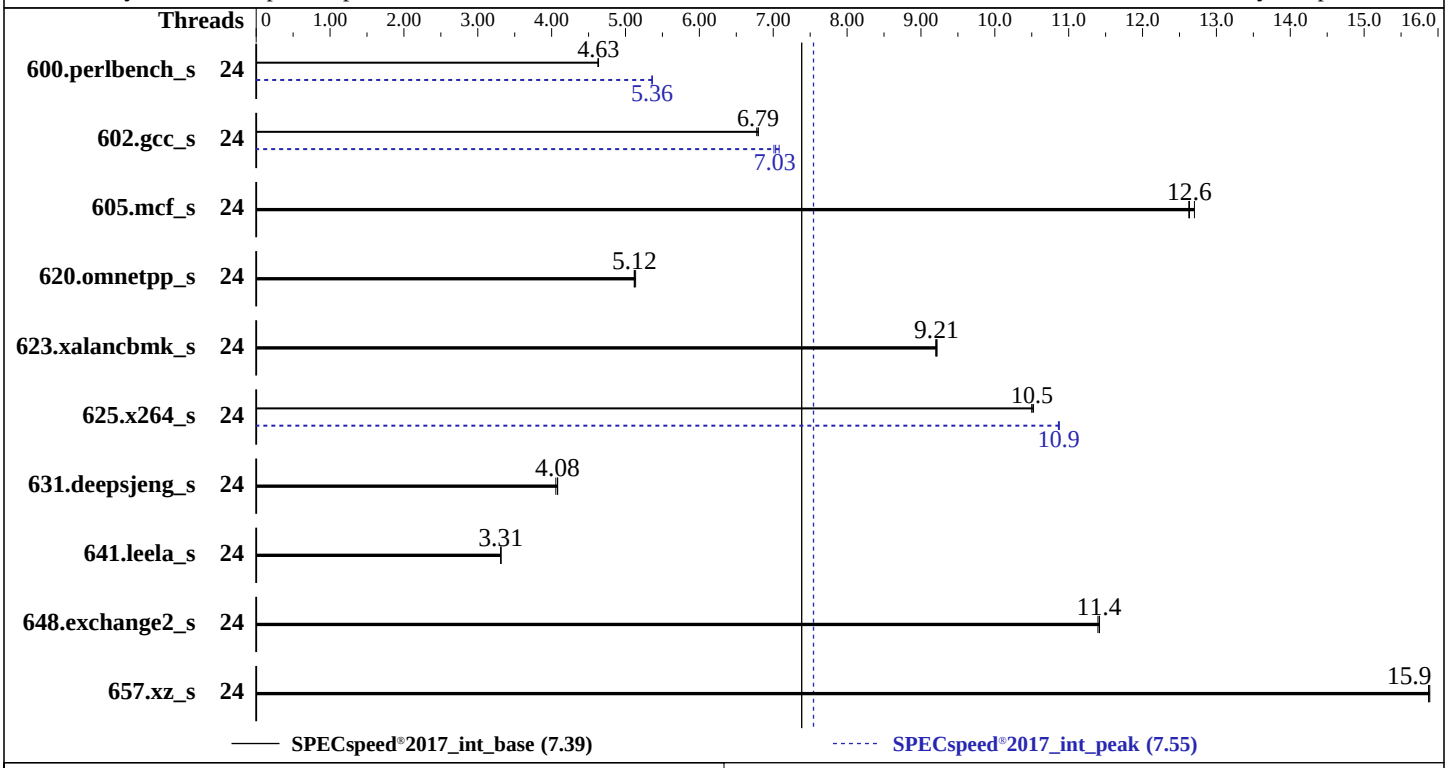
Inspur NF5466M5 (Intel Xeon Silver 4214)

SPECspeed®2017_int_base = 7.39

SPECspeed®2017_int_peak = 7.55

CPU2017 License: 3358
Test Sponsor: Inspur Corporation
Tested by: Inspur Corporation

Test Date: Oct-2020
Hardware Availability: Apr-2019
Software Availability: Apr-2020



Hardware

CPU Name:	Intel Xeon Silver 4214
Max MHz:	3200
Nominal:	2200
Enabled:	24 cores, 2 chips
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:	16.5 MB I+D on chip per chip
Other:	None
Memory:	768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R, running at 2400)
Storage:	1 x 400 GB SATA SSD
Other:	None

Software

OS:	Red Hat Enterprise Linux release 8.2 (Ootpa) 4.18.0-193.el8.x86_64
Compiler:	C/C++: Version 19.1.1.217 of Intel C/C++ Compiler Build 20200306 for Linux; Fortran: Version 19.1.1.217 of Intel Fortran Compiler Build 20200306 for Linux
Parallel:	Yes
Firmware:	Version 4.1.13 released Jan-2020
File System:	xfs
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 and OS 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	24	384	4.63	**383**	**4.63**	383	4.63	24	331	5.36	**331**	**5.36**	331	5.36
602.gcc_s	24	586	6.80	**586**	**6.79**	588	6.78	24	562	7.08	**566**	**7.03**	568	7.01
605.mcf_s	24	**374**	**12.6**	374	12.6	372	12.7	24	**374**	**12.6**	374	12.6	372	12.7
620.omnetpp_s	24	318	5.14	319	5.12	**318**	**5.12**	24	318	5.14	319	5.12	**318**	**5.12**
623.xalancbmk_s	24	154	9.20	154	9.22	**154**	**9.21**	24	154	9.20	154	9.22	**154**	**9.21**
625.x264_s	24	**168**	**10.5**	168	10.5	168	10.5	24	162	10.9	**162**	**10.9**	162	10.9
631.deepsjeng_s	24	351	4.08	353	4.06	**351**	**4.08**	24	351	4.08	353	4.06	**351**	**4.08**
641.leela_s	24	515	3.31	**515**	**3.31**	515	3.31	24	515	3.31	**515**	**3.31**	515	3.31
648.exchange2_s	24	258	11.4	**258**	**11.4**	257	11.4	24	258	11.4	**258**	**11.4**	257	11.4
657.xz_s	24	389	15.9	389	15.9	**389**	**15.9**	24	389	15.9	389	15.9	**389**	**15.9**

SPECspeed®2017_int_base = 7.39

SPECspeed®2017_int_peak = 7.55

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

Compiler Notes

```
The inconsistent Compiler version information under Compiler Version section is due to a discrepancy in Intel Compiler.
The correct version of C/C++ compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux
The correct version of Fortran compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux
```

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"
SCALING_GOVERNOR set to Performance
```

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"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"
```

General Notes

```
Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
memory using Redhat Enterprise Linux 8.0
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.:
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.

jemalloc, a general purpose malloc implementation
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 configuration:
ENERGY_PERF_BIAS_CFG mode set to Performance
Hardware Prefetch set to Disable
VT Support set to Disable
C1E Support set to Disable
IMC (Integrated memory controller) Interleaving set to 1-way
Sub NUMA Cluster (SNC) set to Enable
Intel Hyper Threading Technology set to Disable

Sysinfo program /home/CPU2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011
running on localhost.localdomain Thu Oct 29 10:59:40 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) Silver 4214 CPU @ 2.20GHz
      2  "physical id"s (chips)
      24 "processors"
   cores, siblings (Caution: counting these is hw and system dependent. The following
```

(Continued on next page)

Platform Notes (Continued)

```
    excerpts from /proc/cpuinfo might not be reliable.  Use with caution.)
       cpu cores : 12
       siblings  : 12
       physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13
       physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13

  From lscpu:
       Architecture:          x86_64
       CPU op-mode(s):        32-bit, 64-bit
       Byte Order:            Little Endian
       CPU(s):                24
       On-line CPU(s) list:   0-23
       Thread(s) per core:    1
       Core(s) per socket:    12
       Socket(s):             2
       NUMA node(s):          2
       Vendor ID:             GenuineIntel
       CPU family:            6
       Model:                 85
       Model name:            Intel(R) Xeon(R) Silver 4214 CPU @ 2.20GHz
       Stepping:              7
       CPU MHz:               2700.136
       CPU max MHz:           3200.0000
       CPU min MHz:           1000.0000
       BogoMIPS:              4400.00
       Virtualization:        VT-x
       L1d cache:             32K
       L1i cache:             32K
       L2 cache:              1024K
       L3 cache:              16896K
       NUMA node0 CPU(s):     0-11
       NUMA node1 CPU(s):     12-23
       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 cpuid
       aperfmperf pni pclmulqdq dtes64 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 cpuid_fault epb cat_l3 cdp_l3 invpcid_single
       intel_ppin 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 intel_pt avx512cd avx512bw avx512vl
       xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
       dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req pku ospke avx512_vnni
       md_clear flush_l1d arch_capabilities

  /proc/cpuinfo cache data
     cache size : 16896 KB
```


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Platform Notes (Continued)

```
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
  node 0 size: 385621 MB
  node 0 free: 384938 MB
  node 1 cpus: 12 13 14 15 16 17 18 19 20 21 22 23
  node 1 size: 387068 MB
  node 1 free: 386717 MB
  node distances:
  node   0   1
    0:  10  21
    1:  21  10

From /proc/meminfo
   MemTotal:       791234324 kB
   HugePages_Total:       0
   Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
   os-release:
      NAME="Red Hat Enterprise Linux"
      VERSION="8.2 (Ootpa)"
      ID="rhel"
      ID_LIKE="fedora"
      VERSION_ID="8.2"
      PLATFORM_ID="platform:el8"
      PRETTY_NAME="Red Hat Enterprise Linux 8.2 (Ootpa)"
      ANSI_COLOR="0;31"
   redhat-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
   system-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
   system-release-cpe: cpe:/o:redhat:enterprise_linux:8.2:ga

uname -a:
   Linux localhost.localdomain 4.18.0-193.el8.x86_64 #1 SMP Fri Mar 27 14:35:58 UTC 2020
   x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

itlb_multihit:                          KVM: Mitigation: Split huge pages
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: usercopy/swapgs barriers and __user
```

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Platform Notes (Continued)

```
                                        pointer sanitization
 CVE-2017-5715 (Spectre variant 2):     Mitigation: Enhanced IBRS, IBPB: conditional,
                                        RSB filling
 tsx_async_abort:                       Mitigation: Clear CPU buffers; SMT disabled

 run-level 3 Oct 29 10:58

 SPEC is set to: /home/CPU2017
    Filesystem            Type  Size  Used Avail Use% Mounted on
    /dev/mapper/rhel-home xfs   392G   42G  350G  11% /home

 From /sys/devices/virtual/dmi/id
     BIOS:    American Megatrends Inc. 4.1.13 01/16/2020
     Vendor:  Inspur
     Product: NF5466M5
     Serial:  220692011

 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 Samsung M393A4G43AB3-CVF 32 GB 2 rank 2933

 (End of data from sysinfo program)
This system support 12 DIMMs per processor, total 24 DIMMs.
24 DIMM slots installed with 32 GB DIMM for this run,
and running at 2400 due to CPU limitation.
```

Compiler Version Notes

```
==============================================================================
C       | 600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak)
        | 625.x264_s(base, peak) 657.xz_s(base, peak)
------------------------------------------------------------------------------
Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C       | 600.perlbench_s(peak)
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
```

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Compiler Version Notes (Continued)

```
------------------------------------------------------------------------------

==============================================================================
C       | 600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak)
        | 625.x264_s(base, peak) 657.xz_s(base, peak)
------------------------------------------------------------------------------
Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C       | 600.perlbench_s(peak)
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 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++ Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
Copyright (C) 1985-2020 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 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

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:
`-m64 -qnextgen -std=c11`
`-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs`
`-xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse -funroll-loops`
`-fuse-ld=gold -qopt-mem-layout-trans=4 -fopenmp -DSPEC_OPENMP`
`-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

C++ benchmarks:
`-m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries`
`-Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse`
`-funroll-loops -fuse-ld=gold -qopt-mem-layout-trans=4`
`-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin`
`-lqkmalloc`

Fortran benchmarks:
`-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -xCORE-AVX512`
`-O3 -ipo -no-prec-div -qopt-mem-layout-trans=4`
`-nostandard-realloc-lhs -align array32byte`
`-mbranches-within-32B-boundaries`

Peak Compiler Invocation

C benchmarks:
`icc`

C++ benchmarks:
`icpc`

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Peak Compiler Invocation (Continued)

Fortran benchmarks:
ifort

Peak Portability Flags

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64(*) -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

(*) Indicates a portability flag that was found in a non-portability variable.

Peak Optimization Flags

C benchmarks:

600.perlbench_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -fno-strict-overflow
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

602.gcc_s: -m64 -qnextgen -std=c11 -fuse-ld=gold
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto
-Ofast(pass 1) -O3 -ffast-math -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

605.mcf_s: basepeak = yes

625.x264_s: -m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -xCORE-AVX512 -flto -O3 -ffast-math
-fuse-ld=gold -qopt-mem-layout-trans=4 -fno-alias
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

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Peak Optimization Flags (Continued)

657.xz_s: `basepeak = yes`

C++ benchmarks:

620.omnetpp_s: `basepeak = yes`

623.xalancbmk_s: `basepeak = yes`

631.deepsjeng_s: `basepeak = yes`

641.leela_s: `basepeak = yes`

Fortran benchmarks:

648.exchange2_s: `basepeak = yes`

The flags files that were used to format this result can be browsed at
`http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.html`
`http://www.spec.org/cpu2017/flags/Inspur-Platform-Settings-V1.9.html`

You can also download the XML flags sources by saving the following links:
`http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.xml`
`http://www.spec.org/cpu2017/flags/Inspur-Platform-Settings-V1.9.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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