



# SPEC® CPU2017 Integer Speed Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

New H3C Technologies Co., Ltd.

SPECspeed2017\_int\_base = 9.48

H3C UniServer R4900 G3 (Intel Xeon Gold 6150)

SPECspeed2017\_int\_peak = 9.73

CPU2017 License: 9066

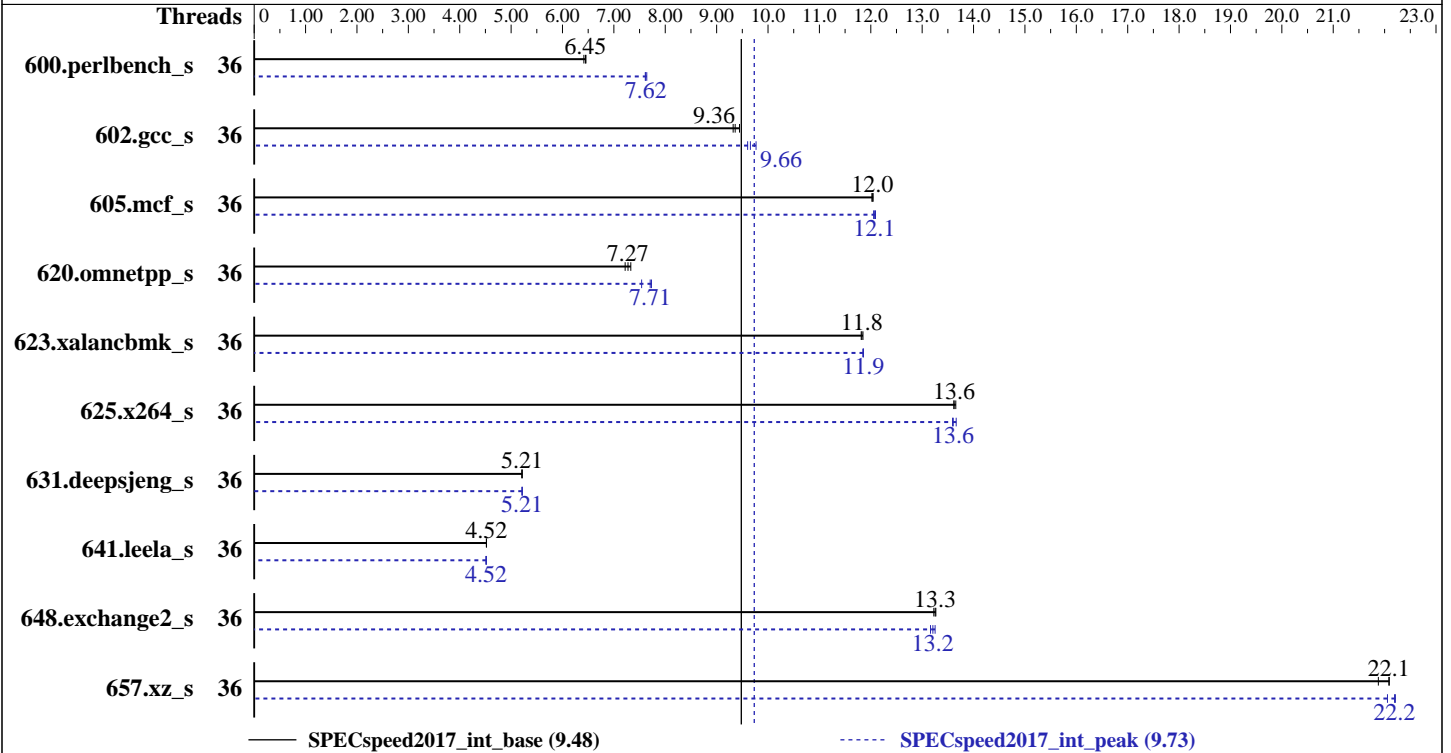
Test Date: Apr-2019

Test Sponsor: New H3C Technologies Co., Ltd.

Hardware Availability: Dec-2018

Tested by: New H3C Technologies Co., Ltd.

Software Availability: Mar-2019



## Hardware

CPU Name: Intel Xeon Gold 6150  
 Max MHz.: 3700  
 Nominal: 2700  
 Enabled: 36 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: 24.75 MB I+D on chip per chip  
 Other: None  
 Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2666V-R)  
 Storage: 1 x 1 TB 7200RPM SATA HDD  
 Other: None

## Software

OS: Red Hat Enterprise Linux Server release 7.5 (Maipo)  
 3.10.0-957.el7.x86\_64  
 Compiler: C/C++: Version 19.0.1.144 of Intel C/C++ Compiler Build 20181018 for Linux;  
 Fortran: Version 19.0.1.144 of Intel Fortran Compiler Build 20181018 for Linux  
 Parallel: Yes  
 Firmware: Version 2.00.24 released Mar-2019 BIOS  
 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



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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 | 36      | 277               | 6.42               | <b><u>275</u></b> | <b><u>6.45</u></b> | 275               | 6.46               | 36      | <b><u>233</u></b> | <b><u>7.62</u></b> | 232               | 7.64               | 233               | 7.61               |
| 602.gcc_s       | 36      | 427               | 9.32               | 422               | 9.44               | <b><u>425</u></b> | <b><u>9.36</u></b> | 36      | <b><u>412</u></b> | <b><u>9.66</u></b> | 415               | 9.60               | 408               | 9.77               |
| 605.mcf_s       | 36      | 393               | 12.0               | 392               | 12.0               | <b><u>392</u></b> | <b><u>12.0</u></b> | 36      | <b><u>391</u></b> | <b><u>12.1</u></b> | 390               | 12.1               | 392               | 12.1               |
| 620.omnetpp_s   | 36      | 223               | 7.33               | 226               | 7.22               | <b><u>224</u></b> | <b><u>7.27</u></b> | 36      | 211               | 7.73               | 216               | 7.54               | <b><u>212</u></b> | <b><u>7.71</u></b> |
| 623.xalancbmk_s | 36      | <b><u>120</u></b> | <b><u>11.8</u></b> | 120               | 11.8               | 120               | 11.8               | 36      | 120               | 11.8               | <b><u>120</u></b> | <b><u>11.9</u></b> | 119               | 11.9               |
| 625.x264_s      | 36      | <b><u>130</u></b> | <b><u>13.6</u></b> | 129               | 13.7               | 130               | 13.6               | 36      | <b><u>130</u></b> | <b><u>13.6</u></b> | 130               | 13.6               | 129               | 13.7               |
| 631.deepsjeng_s | 36      | 275               | 5.21               | 275               | 5.21               | <b><u>275</u></b> | <b><u>5.21</u></b> | 36      | 275               | 5.22               | 275               | 5.21               | <b><u>275</u></b> | <b><u>5.21</u></b> |
| 641.leela_s     | 36      | 377               | 4.52               | 377               | 4.52               | <b><u>377</u></b> | <b><u>4.52</u></b> | 36      | 378               | 4.52               | <b><u>378</u></b> | <b><u>4.52</u></b> | 378               | 4.51               |
| 648.exchange2_s | 36      | 222               | 13.2               | <b><u>222</u></b> | <b><u>13.3</u></b> | 222               | 13.3               | 36      | 223               | 13.2               | <b><u>223</u></b> | <b><u>13.2</u></b> | 222               | 13.3               |
| 657.xz_s        | 36      | <b><u>280</u></b> | <b><u>22.1</u></b> | 283               | 21.9               | 280               | 22.1               | 36      | 278               | 22.2               | <b><u>279</u></b> | <b><u>22.2</u></b> | 280               | 22.1               |

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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,scatter"

LD\_LIBRARY\_PATH = "/home/speccpu/lib/ia32:/home/speccpu/lib/intel64:/home/speccpu/je5.0.1-32:/home/speccpu/je5.0.1-64"

OMP\_STACKSIZE = "192M"

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
```

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

sources available from jemalloc.net or <https://github.com/jemalloc/jemalloc/releases>



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## Platform Notes

### BIOS Settings:

```

Set SNC to Disabled
Set Hyper-Threading to Disabled
Set Autonomous Core C-State to Enabled
Set Stale Atos to Enabled
Set LLC Deadline Alloc to Disabled
Set Intel VT for Directed I/O (VT-d) to Disabled
Sysinfo program /home/speccpu/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on localhost.localdomain Mon Apr 1 16:19:46 2019

```

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 6150 CPU @ 2.70GHz
 2 "physical id"s (chips)
 36 "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      : 18
siblings       : 18
physical 0:    cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 1:    cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

```

### From lscpu:

```

Architecture:      x86_64
CPU op-mode(s):    32-bit, 64-bit
Byte Order:        Little Endian
CPU(s):            36
On-line CPU(s) list: 0-35
Thread(s) per core: 1
Core(s) per socket: 18
Socket(s):         2
NUMA node(s):     2
Vendor ID:         GenuineIntel
CPU family:        6
Model:             85
Model name:        Intel(R) Xeon(R) Gold 6150 CPU @ 2.70GHz
Stepping:          4
CPU MHz:           1199.871
CPU max MHz:       3700.0000
CPU min MHz:       1200.0000
BogoMIPS:          5400.00
Virtualization:    VT-x
L1d cache:         32K

```

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## Platform Notes (Continued)

```

L1i cache:          32K
L2 cache:           1024K
L3 cache:           25344K
NUMA node0 CPU(s): 0-17
NUMA node1 CPU(s): 18-35
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
aperfperf 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 fl6c rdrand lahf_lm abm 3dnowprefetch epb cat_l3 cdp_l3 intel_pt ssbd mba
ibrs ibpb stibp 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 hwp hwp_act_window
hwp_epp hwp_pkg_req pku ospke spec_ctrl intel_stibp flush_lld

```

```

/proc/cpuinfo cache data
cache size : 25344 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
node 0 size: 195224 MB
node 0 free: 184152 MB
node 1 cpus: 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
node 1 size: 196608 MB
node 1 free: 191901 MB
node distances:
node  0  1
 0:  10  21
 1:  21  10

```

```

From /proc/meminfo
MemTotal:      394623728 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

```

From /etc/*release* /etc/*version*
os-release:
NAME="Red Hat Enterprise Linux Server"
VERSION="7.5 (Maipo)"
ID="rhel"
ID_LIKE="fedora"
VARIANT="Server"
VARIANT_ID="server"

```

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## Platform Notes (Continued)

```

VERSION_ID="7.5"
PRETTY_NAME="OpenShift Enterprise"
redhat-release: Red Hat Enterprise Linux Server release 7.5 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.5 (Maipo)
system-release-cpe: cpe:/o:redhat:enterprise_linux:7.5:ga:server

```

```

uname -a:
Linux localhost.localdomain 3.10.0-957.el7.x86_64 #1 SMP Thu Oct 4 20:48:51 UTC 2018
x86_64 x86_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, __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: IBRS (kernel)

```

run-level 3 Apr 1 16:17

```

SPEC is set to: /home/speccpu
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda2       xfs   293G  7.3G  286G   3% /home

```

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 American Megatrends Inc. 2.00.24 03/08/2019
Memory:
12x Micron 36ASF4G72PZ-2G6D1 32 GB 2 rank 2666
12x NO DIMM NO DIMM

```

(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)
-----

```

```

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
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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## Compiler Version Notes (Continued)

```
-----
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
-----
```

```
=====
CXXC 620.omnetpp_s(base) 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 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
-----
```

```
=====
CXXC 620.omnetpp_s(peak)
-----
```

```
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
-----
```

```
=====
FC 648.exchange2_s(base, peak)
-----
```

```
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
-----
```

## Base Compiler Invocation

C benchmarks:

icc -m64 -std=c11

C++ benchmarks:

icpc -m64

Fortran benchmarks:

ifort -m64



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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
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/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: -w1,-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: -w1,-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: -w1,-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: -w1,-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: -w1,-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 -L/usr/local/je5.0.1-64/lib -ljemalloc
```

C++ benchmarks:

```
620.omnetpp_s: -w1,-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
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64
-lqkmalloc
```

```
623.xalancbmk_s: -w1,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64
-lqkmalloc
```

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## Peak Optimization Flags (Continued)

631.deepsjeng\_s: Same as 623.xalancbmk\_s

641.leela\_s: Same as 623.xalancbmk\_s

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/New\\_H3C-Platform-Settings-V1.3-SKL-RevC.html](http://www.spec.org/cpu2017/flags/New_H3C-Platform-Settings-V1.3-SKL-RevC.html)

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2019-04-02.html>

You can also download the XML flags sources by saving the following links:

[http://www.spec.org/cpu2017/flags/New\\_H3C-Platform-Settings-V1.3-SKL-RevC.xml](http://www.spec.org/cpu2017/flags/New_H3C-Platform-Settings-V1.3-SKL-RevC.xml)

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2019-04-02.xml>

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