New H3C Technologies Co., Ltd.

H3C UniServer R4900 G3 (Intel Xeon Platinum 8160)

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_int_base</th>
<th>SPECspeed2017_int_peak</th>
</tr>
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<tbody>
<tr>
<td>48</td>
<td>9.62</td>
<td>9.89</td>
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</table>

CPU2017 License: 9066
Test Date: Apr-2019
Test Sponsor: New H3C Technologies Co., Ltd.
Hardware Availability: Jul-2017
Tested by: New H3C Technologies Co., Ltd.
Software Availability: Mar-2019

CPU Name: Intel Xeon Platinum 8160
Max MHz.: 3700
Nominal: 2100
Enabled: 48 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: 33 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

OS: Red Hat Enterprise Linux Server release 7.5 (Maipo)
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
## 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>
<th>Ratio</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
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<th>Ratio</th>
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<tbody>
<tr>
<td>600.perlbmch_s</td>
<td>48</td>
<td>278</td>
<td>6.38</td>
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<td>6.46</td>
<td>276</td>
<td>6.44</td>
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<td>7.61</td>
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<tr>
<td>605.mcf_s</td>
<td>48</td>
<td>393</td>
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<td>391</td>
<td>12.1</td>
<td>389</td>
<td>12.1</td>
<td>48</td>
<td>390</td>
<td>12.1</td>
<td>387</td>
<td>12.2</td>
<td>390</td>
<td>12.1</td>
<td></td>
<td></td>
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<tr>
<td>620.omnetpp_s</td>
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<td>8.22</td>
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<td>8.57</td>
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<tr>
<td>623.xalchnmk_s</td>
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<td>120</td>
<td>11.8</td>
<td>120</td>
<td>11.8</td>
<td>119</td>
<td>11.9</td>
<td>48</td>
<td>121</td>
<td>11.7</td>
<td>120</td>
<td>11.8</td>
<td>120</td>
<td>11.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>625.x264_s</td>
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<td>129</td>
<td>13.7</td>
<td>128</td>
<td>13.8</td>
<td>128</td>
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<td>128</td>
<td>13.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>48</td>
<td>276</td>
<td>5.20</td>
<td>275</td>
<td>5.22</td>
<td>275</td>
<td>5.22</td>
<td>48</td>
<td>275</td>
<td>5.20</td>
<td>276</td>
<td>5.20</td>
<td>275</td>
<td>5.22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>641.leela_s</td>
<td>48</td>
<td>380</td>
<td>4.49</td>
<td>378</td>
<td>4.51</td>
<td>378</td>
<td>4.52</td>
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<td>378</td>
<td>4.52</td>
<td>378</td>
<td>4.51</td>
<td></td>
<td></td>
</tr>
<tr>
<td>648.exchange2_s</td>
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<td>13.2</td>
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<td>13.2</td>
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<td>13.2</td>
<td>222</td>
<td>13.3</td>
<td>222</td>
<td>13.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>657.xz_s</td>
<td>48</td>
<td>272</td>
<td>22.7</td>
<td>274</td>
<td>22.6</td>
<td>275</td>
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<td>48</td>
<td>271</td>
<td>22.8</td>
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<td>22.6</td>
<td>274</td>
<td>22.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</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"

## 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.

<table>
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<td>Software Availability: Mar-2019</td>
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</table>

**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 9bce8f2999c33d61f64985e45859ea9
running on localhost.localdomain Wed Apr 10 20:07:36 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) Platinum 8160 CPU @ 2.10GHz
- 2 "physical id"s (chips)
- 48 "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: 24
- siblings: 24
- physical 0: cores 0 1 2 3 4 5 8 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 8 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): 48
- On-line CPU(s) list: 0-47
- Thread(s) per core: 1
- Core(s) per socket: 24
- Socket(s): 2
- NUMA node(s): 2
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 85
- Model name: Intel(R) Xeon(R) Platinum 8160 CPU @ 2.10GHz
- Stepping: 4
- CPU MHz: 1827.630
- CPU max MHz: 3700.0000
- CPU min MHz: 1000.0000
- BogoMIPS: 4200.00
- Virtualization: VT-x
- L1d cache: 32K

(Continued on next page)
SPEC CPU2017 Integer Speed Result

New H3C Technologies Co., Ltd.
H3C UniServer R4900 G3 (Intel Xeon Platinum 8160)

SPECspeed2017_int_base = 9.62
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Platform Notes (Continued)

L1i cache: 32K
L2 cache: 1024K
L3 cache: 33792K
NUMA node0 CPU(s): 0-23
NUMA node1 CPU(s): 24-47
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 x87nop mmx exterp npx mpx
smbx stp mpxrdime npgcv mpmx spl mvm mpxc mpxp mpxr mpxi mpxm mpxv mpxpc
mlcot pm xsaveopt xsavec xgetbv1 intel_pt ssbd mba ibrs ibpt stibp tpr_shadow vmmi
flexpriority ept vpid fsgsbase tsc_adjust bm1 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_mbb_total cqm_mbb_local
dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req pku ospke spec_ctrl
intel_stibp flush_l1d

/proc/cpuinfo cache data
  cache size: 33792 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
  node 0 size: 195224 MB
  node 0 free: 183965 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
  node 1 size: 196608 MB
  node 1 free: 191979 MB
  node distances:
    node 0 1
    0: 10 21
    1: 21 10

From /proc/meminfo
  MemTotal: 394623680 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"

(Continued on next page)
New H3C Technologies Co., Ltd. H3C UniServer R4900 G3 (Intel Xeon Platinum 8160)

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**SPEC CPU2017 Integer Speed Result**

**SPECspeed2017_int_base = 9.62**  
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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 10 20:06

SPEC is set to: /home/speccpu
```
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 xfs 293G 20G 274G 7% /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)
```

(Continued on next page)
New H3C Technologies Co., Ltd.  
H3C UniServer R4900 G3 (Intel Xeon Platinum 8160)

SPEC CPU2017 Integer Speed Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

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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.

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.

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
### SPEC CPU2017 Integer Speed Result

New H3C Technologies Co., Ltd.

H3C UniServer R4900 G3 (Intel Xeon Platinum 8160)

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**Software Availability:** Mar-2019

### 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`
New H3C Technologies Co., Ltd.  
H3C UniServer R4900 G3 (Intel Xeon Platinum 8160)

SPECspeed2017_int_base = 9.62
SPECspeed2017_int_peak = 9.89

CPU2017 License: 9066
Test Sponsor: New H3C Technologies Co., Ltd.
Tested by: New H3C Technologies Co., Ltd.

Test Date: Apr-2019
Hardware Availability: Jul-2017
Software Availability: Mar-2019

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: -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 -L/usr/local/je5.0.1-64/lib -ljemalloc

C++ benchmarks:

620.omnetpp_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
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64
-lqkmalloc

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_2019.1.144/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-RevD.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-RevD.xml

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

Tested with SPEC CPU2017 v1.0.5 on 2019-04-10 08:07:36-0400.