New H3C Technologies Co., Ltd.  
(Test Sponsor: New H3C Technologies Co., Ltd.)

H3C UniServer R4900 G3 (Intel Xeon Platinum 8160)

<table>
<thead>
<tr>
<th>Software</th>
<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name: Intel Xeon Platinum 8160</td>
<td>OS: SUSE Linux Enterprise Server 12 SP4</td>
</tr>
<tr>
<td>Max MHz: 3700</td>
<td>4.12.14-94.41-default</td>
</tr>
<tr>
<td>Nominal: 2100</td>
<td>Compiler: C/C++: Version 19.0.4.227 of Intel C/C++</td>
</tr>
<tr>
<td>Enabled: 48 cores, 2 chips, 2 threads/core</td>
<td>Compiler Build 20190416 for Linux:</td>
</tr>
<tr>
<td>Orderable: 1.2 chips</td>
<td>Fortran: Version 19.0.4.227 of Intel Fortran</td>
</tr>
<tr>
<td>Cache L1: 32 KB I + 32 KB D on chip per core</td>
<td>Compiler Build 20190416 for Linux:</td>
</tr>
<tr>
<td>L2: 1 MB I+D on chip per core</td>
<td>Parallel: No</td>
</tr>
<tr>
<td>L3: 33 MB I+D on chip per chip</td>
<td>Firmware: Version 2.00.41 released Jun-2020 BIOS</td>
</tr>
<tr>
<td>Other: None</td>
<td>File System: btrfs</td>
</tr>
<tr>
<td>Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2933V-R, running at 2666)</td>
<td>System State: Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Storage: 1 x 480 GB SATA SSD</td>
<td>Base Pointers: 64-bit</td>
</tr>
<tr>
<td>Other: None</td>
<td>Peak Pointers: 32/64-bit</td>
</tr>
<tr>
<td></td>
<td>Other: jemalloc memory allocator V5.0.1</td>
</tr>
<tr>
<td></td>
<td>Power Management: BIOS set to prefer performance at the cost of additional power usage</td>
</tr>
</tbody>
</table>
New H3C Technologies Co., Ltd.
(Test Sponsor: New H3C Technologies Co., Ltd.)

H3C UniServer R4900 G3 (Intel Xeon Platinum 8160)

SPEC CPU®2017 Integer Rate Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

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

Test Date: Jun-2020
Hardware Availability: Mar-2019
Software Availability: May-2019

Results Table

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<th>Benchmark</th>
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<th>Ratio</th>
<th>Seconds</th>
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<th>Ratio</th>
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<td>848</td>
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<td>181</td>
<td>847</td>
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<td>505.mcf_r</td>
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<td>295</td>
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<td>527</td>
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<tr>
<td>520.omnetpp_r</td>
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<td>523.xalancbmk_r</td>
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<td>531.deepsjeng_r</td>
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<td>195</td>
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<td>548.exchange2_r</td>
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<td>160</td>
<td>648</td>
<td>160</td>
<td>647</td>
<td>160</td>
</tr>
</tbody>
</table>

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/speccpu/lib/intel64:/home/speccpu/lib/ia32:/home/speccpu/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.:

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

(Continued on next page)
New H3C Technologies Co., Ltd.  
(Test Sponsor: New H3C Technologies Co., Ltd.)

H3C UniServer R4900 G3 (Intel Xeon Platinum 8160)

SPEC®2017 Integer Rate Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

SPECrater®2017_int_base = 239
SPECrater®2017_int_peak = 249

CPU2017 License: 9066  
Test Date: Jun-2020

Test Sponsor: New H3C Technologies Co., Ltd.  
Hardware Availability: Mar-2019

Tested by: New H3C Technologies Co., Ltd.  
Software Availability: May-2019

General Notes (Continued)

numactl --interleave=all runcpu <etc>

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.


Platform Notes

BIOS Settings:
Set SNC to Enabled
Set IMC Interleaving to 1-way Interleave
Set XPT Prefetcher to Enabled
Set Patrol Scrub to Disabled
Set Autonomous Core C-State to Enabled

Sysinfo program /home/speccpu/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed6be6e46e485a0011

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)
  96 "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 : 48
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): 96
On-line CPU(s) list: 0-95
Thread(s) per core: 2

(Continued on next page)
**SPEC CPU®2017 Integer Rate Result**

New H3C Technologies Co., Ltd.
(Test Sponsor: New H3C Technologies Co., Ltd.)

H3C UniServer R4900 G3 (Intel Xeon Platinum 8160)

| SPECrate®2017_int_base = 239 |
| SPECrate®2017_int_peak = 249 |

**CPU2017 License:** 9066  
**Test Date:** Jun-2020  
**Test Sponsor:** New H3C Technologies Co., Ltd.  
**Hardware Availability:** Mar-2019  
**Tested by:** New H3C Technologies Co., Ltd.  
**Software Availability:** May-2019

**Platform Notes (Continued)**

- Core(s) per socket: 24
- Socket(s): 2
- NUMA node(s): 4
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 85
- Model name: Intel(R) Xeon(R) Platinum 8160 CPU @ 2.10GHz
- Stepping: 4
- CPU MHz: 2100.000
- CPU max MHz: 3700.0000
- CPU min MHz: 1000.0000
- BogoMIPS: 4200.00
- Virtualization: VT-x
- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 1024K
- L3 cache: 33792K
- NUMA node0 CPU(s): 0-2, 6-8, 12-14, 18-20, 48-50, 54-56, 60-62, 66-68
- NUMA node1 CPU(s): 3-5, 9-11, 15-17, 21-23, 51-53, 57-59, 63-65, 69-71
- NUMA node2 CPU(s): 24-26, 30-32, 36-38, 42-44, 72-74, 78-80, 84-86, 90-92
- NUMA node3 CPU(s): 27-29, 33-35, 39-41, 45-47, 75-77, 81-83, 87-89, 93-95
- 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 aperffmaperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1 mce sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abtm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single pti intel_pmlin 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 intel_pt avx512cd avx512bw avx512vl xsaveopt xsaves xsavec xgetbv1 xsave cs cachesize : 33792 KB

/proc/cpuinfo
cache size : 33792 KB

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 6 7 8 12 13 14 18 19 20 48 49 50 54 55 56 60 61 62 66 67 68
- node 0 size: 95257 MB
- node 0 free: 94615 MB
- node 1 cpus: 3 4 5 9 10 11 15 16 17 21 22 23 51 52 53 57 58 59 63 64 65 69 70 71
- node 1 size: 96753 MB
- node 1 free: 94640 MB
- node 2 cpus: 24 25 26 30 31 32 36 37 38 42 43 44 72 73 74 78 79 80 84 85 86 90 91 92
- node 2 size: 96753 MB

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

**SPEC CPU®2017 Integer Rate Result**

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
<th>239</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_int_peak</td>
<td>249</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9066  
**Test Date:** Jun-2020  
**Test Sponsor:** New H3C Technologies Co., Ltd.  
**Tested by:** New H3C Technologies Co., Ltd.

**H3C UniServer R4900 G3 (Intel Xeon Platinum 8160)**

**Node Information:**

- **node 2 free:** 96493 MB  
- **node 3 cpus:** 27 28 29 33 34 35 39 40 41 45 46 47 75 76 77 81 82 83 87 88 89 93 94 95
- **node 3 size:** 96519 MB  
- **node 3 free:** 96265 MB  
- **node distances:**
  - 0: 10 11 21 21  
  - 1: 11 10 21 21  
  - 2: 21 21 10 11  
  - 3: 21 21 11 10

**Platform Notes (Continued)**

From /proc/meminfo

```
MemTotal:       394530568 kB  
HugePages_Total:       0  
Hugepagesize:       2048 kB
```

From /usr/bin/lsb_release -d

```
SUSE Linux Enterprise Server 12 SP4
```

From /etc/*release* /etc/*version*

SuSE-release:

- VERSION = 12  
- PATCHLEVEL = 4  

# This file is deprecated and will be removed in a future service pack or release.  
# Please check /etc/os-release for details about this release.

os-release:

NAME="SLES"  
VERSION="12-SP4"  
VERSION_ID="12.4"  
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP4"  
ID="sles"  
ANSI_COLOR="0;32"  
CPE_NAME="cpe:/o:suse:sles:12:sp4"

uname -a:

```
x86_64 x86_64 x86_64 GNU/Linux
```

**Kernel self-reported vulnerability status:**

- **CVE-2018-3620 (L1 Terminal Fault):** Mitigation: PTE Inversion; VMX: conditional cache flushes, SMT vulnerable
- **Microarchitectural Data Sampling:** No status reported
- **CVE-2017-5754 (Meltdown):** Mitigation: PTI
- **CVE-2018-3639 (Speculative Store Bypass):** Mitigation: Speculative Store Bypass disabled via prctl and seccomp

(Continued on next page)
SPEC CPU®2017 Integer Rate Result

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

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Test Date: Jun-2020
Hardware Availability: Mar-2019
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Platform Notes (Continued)

CVE-2017-5753 (Spectre variant 1):
Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2):
Mitigation: Indirect Branch Restricted Speculation, IBPB, IBRS_FW

run-level 3 Jun 24 11:10
SPECCPU is set to: /home/speccpu
Filesystem Type Size Used Avail Use% Mounted on
/dev/md126p1 btrfs 401G 11G 389G 3% /home

From /sys/devices/virtual/dmi/id
BIOS: American Megatrends Inc. 2.00.41 06/09/2020
Vendor: New H3C Technologies Co., Ltd.
Product: UniServer R4900 G3
Product Family: Rack
Serial: 210231A6T3H19B000065

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:
12x Micron 36ASF4G72PZ-2G9E2 32 GB 2 rank 2933, configured at 2666
12x NO DIMM NO DIMM

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================================================
C        | 502.gcc_r(peak)
==============================================================================================================
Intel® C Intel® 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® C Intel® 64 Compiler for applications running on Intel® 64, Version 19.0.4.227 Build 20190416
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(Continued on next page)
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H3C UniServer R4900 G3 (Intel Xeon Platinum 8160)

SPEC®2017 Integer Rate Result
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New H3C Technologies Co., Ltd. SPECrate®2017_int_base = 239

H3C UniServer R4900 G3 (Intel Xeon Platinum 8160) SPECrate®2017_int_peak = 249

CPU2017 License: 9066
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Compiler Version Notes (Continued)

==============================================================================
| 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++  | 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, |
| (Continued on next page) |
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CPU2017 License: 9066
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Hardware Availability: Mar-2019
Software Availability: May-2019

Compiler Version Notes (Continued)

Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

==============================================================================
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

(Continued on next page)
New H3C Technologies Co., Ltd.  
(Test Sponsor: New H3C Technologies Co., Ltd.)

H3C UniServer R4900 G3 (Intel Xeon Platinum 8160)

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CPU2017 License: 9066
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Test Date: Jun-2020
Hardware Availability: Mar-2019
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Software Availability: May-2019

Base Optimization Flags (Continued)

C benchmarks (continued):
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc

C++ benchmarks:
-W1,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-quitopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc

Fortran benchmarks:
-W1,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-quitopt-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

502.gcc_r ICC -m32 -std=c11 -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/ia32_lin

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

(Continued on next page)
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H3C UniServer R4900 G3 (Intel Xeon Platinum 8160)

SPEC CPU®2017 Integer Rate Result

SPECrate®2017_int_base = 239
SPECrate®2017_int_peak = 249

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

Test Date: Jun-2020
Hardware Availability: Mar-2019
Software Availability: May-2019

Peak Portability Flags (Continued)

548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

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

541.leela_r: Same as 520.omnetpp_r

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H3C UniServer R4900 G3 (Intel Xeon Platinum 8160)

SPECrate®2017_int_base = 239
SPECrate®2017_int_peak = 249

CPU2017 License: 9066
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Peak Optimization Flags (Continued)

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

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-RevE.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-RevE.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 CPU®2017 v1.1.0 on 2020-06-23 23:13:24-0400.
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