## SPEC CPU®2017 Floating Point Speed Result

### New H3C Technologies Co., Ltd.

H3C UniServer R4900 G5 (Intel Xeon Gold 5320)

<table>
<thead>
<tr>
<th>Test Sponsor:</th>
<th>New H3C Technologies Co., Ltd.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tested by:</td>
<td>New H3C Technologies Co., Ltd.</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9066  
**Test Date:** May-2021

**Software**

- OS: Red Hat Enterprise Linux release 8.3 (Ootpa) 4.18.0-240.el8.x86_64
- Compiler: C/C++: Version 2021.1 of Intel oneAPI DPC++/C++  
  Compiler Build 20201113 for Linux; Fortran: Version 2021.1 of Intel Fortran Compiler  
  Classic Build 20201112 for Linux;
- Parallel: Yes
- Firmware: Version 5.23 released Apr-2021
- System State: Run level 3 (multi-user)
- Base Pointers: 64-bit
- Peak Pointers: 64-bit
- Power Management: BIOS set to prefer performance at the cost of additional power usage

### Hardware

<table>
<thead>
<tr>
<th>Thread</th>
<th>SPECspeed®2017_fp_base (172)</th>
<th>SPECspeed®2017_fp_peak (176)</th>
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<tbody>
<tr>
<td>603.bwaves_s 52</td>
<td>0</td>
<td>643</td>
</tr>
<tr>
<td>607.cactuBSSN_s 52</td>
<td>0</td>
<td>643</td>
</tr>
<tr>
<td>619.lbm_s 52</td>
<td>0</td>
<td>643</td>
</tr>
<tr>
<td>621.wrf_s 52</td>
<td>0</td>
<td>643</td>
</tr>
<tr>
<td>627.cam4_s 52</td>
<td>0</td>
<td>643</td>
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<tr>
<td>628.pop2_s 52</td>
<td>0</td>
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<tr>
<td>638.imagick_s 52</td>
<td>0</td>
<td>643</td>
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<tr>
<td>644.nab_s 52</td>
<td>0</td>
<td>643</td>
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<tr>
<td>649.fotonik3d_s 52</td>
<td>0</td>
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</tr>
<tr>
<td>654.roms_s 52</td>
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<thead>
<tr>
<th>Hardware</th>
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<tr>
<td>CPU Name: Intel Xeon Gold 5320</td>
<td>OS: Red Hat Enterprise Linux release 8.3 (Ootpa) 4.18.0-240.el8.x86_64</td>
</tr>
</tbody>
</table>
| Max MHz: 3400  | Compiler: C/C++: Version 2021.1 of Intel oneAPI  
  DPC++/C++  
  Compiler Build 20201113 for Linux; Fortran: Version 2021.1 of Intel Fortran Compiler  
  Classic Build 20201112 for Linux; |
| Nominal: 2200  | Parallel: Yes |
| Enabled: 52 cores, 2 chips  | Firmware: Version 5.23 released Apr-2021 |
| Orderable: 1.2 chips  | System State: Run level 3 (multi-user) |
| Cache L1: 32 KB I + 48 KB D on chip per core  | Base Pointers: 64-bit |
| L2: 1.25 MB I+D on chip per core  | Peak Pointers: 64-bit |
| L3: 39 MB I+D on chip per chip  | Other: jemalloc memory allocator V5.0.1 |
| Other: None  | Power Management: BIOS set to prefer performance at the cost of additional power usage |
| Memory: 1 TB (32 x 32 GB 2Rx8 PC4-3200V-R, running at 2933)  | |
| Storage: 1 x 480 GB SATA SSD  | |

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**SPECspeed®2017_fp_base = 172**  
**SPECspeed®2017_fp_peak = 176**
New H3C Technologies Co., Ltd. H3C UniServer R4900 G5 (Intel Xeon Gold 5320)

CPU2017 License: 9066
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SPECspeed®2017_fp_base = 172
SPECspeed®2017_fp_peak = 176

Test Date: May-2021
Hardware Availability: Jun-2021
Software Availability: Dec-2020

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>
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<td>621.wrf_s</td>
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<tr>
<td>627.cam4_s</td>
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<td>68.8</td>
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<td>129</td>
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<tr>
<td>628.pop2_s</td>
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<td>76.5</td>
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<tr>
<td>638.imagick_s</td>
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<td>644.nab_s</td>
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<tr>
<td>649.fotonik3d_s</td>
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<td>97.0</td>
<td>95.1</td>
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<td>80.5</td>
<td>196</td>
<td>81.1</td>
<td>194</td>
<td>80.8</td>
<td>195</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"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/spec2017/lib/intel64:/home/spec2017/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
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.
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
jemalloc, a general purpose malloc implementation built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

(Continued on next page)
## General Notes (Continued)

Sources available from jemalloc.net or https://github.com/jemalloc/jemalloc/releases

## Platform Notes

**BIOS Settings:**
- Set Hyper-Threading to Disabled
- Set Patrol Scrub to Disabled

**Sysinfo program** /home/spec2017/bin/sysinfo

Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acaf6d4
running on localhost.localdomain Sat May 22 19:22:49 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 5320 CPU @ 2.20GHz
  2 "physical id"s (chips)
  52 "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 : 26
  siblings  : 26
  physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
  physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25

From lscpu from util-linux 2.32.1:
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                52
On-line CPU(s) list:   0-51
Thread(s) per core:    1
Core(s) per socket:    26
Socket(s):             2
NUMA node(s):          2
Vendor ID:             GenuineIntel
CPU family:            6
Model:                 106
Model name:            Intel(R) Xeon(R) Gold 5320 CPU @ 2.20GHz
Stepping:              6
CPU MHz:               2800.000
CPU max MHz:           3400.000
```

(Continued on next page)
## Platform Notes (Continued)

```plaintext
CPU min MHz: 800.0000  
BogoMIPS: 4400.00  
Virtualization: VT-x  
L1d cache: 48K  
L1i cache: 32K  
L2 cache: 1280K  
L3 cache: 39936K  
NUMA node0 CPU(s): 0-25  
NUMA node1 CPU(s): 26-51  
Flags: fpu vme de pse tsc msr pae mca cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf 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 cpuid_fault epb cat_l3 invpcid_single intel_pni ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2  erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaves xsaved xsaveopt xsavec xgetbv1 xsave xsaves cqm_llc cqm_occmap llc cqm_mbb_total cqm_mbb_local split_lock_detect wbnoinvd dtherm ida arat pfn pts avx512vd掩 umip pku ospke avx512_vbmi2 gfn vaes vpcmuserdq avx512_vni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_lld arch_capabilities

```/proc/cpuinfo cache data
  cache size : 39936 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 24 25
  node 0 size: 494924 MB
  node 0 free: 513565 MB
  node 1 cpus: 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51
  node 1 size: 496659 MB
  node 1 free: 509255 MB
  node distances:
    node 0 1
    0: 10 20
    1: 20 10
```

From /proc/meminfo
  MemTotal:  1056229364 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

/sbin/tuned-adm active

(Continued on next page)
New H3C Technologies Co., Ltd. | SPECspeed®2017_fp_peak = 176
---|---
H3C UniServer R4900 G5 (Intel Xeon Gold 5320) | SPECspeed®2017_fp_base = 172

<table>
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<th>Test Date: May-2021</th>
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<td>Hardware Availability: Jun-2021</td>
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<tr>
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<td>Software Availability: Dec-2020</td>
</tr>
</tbody>
</table>

### Platform Notes (Continued)

It seems that tuned daemon is not running, preset profile is not activated.

Preset profile: throughput-performance

```
/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has performance
```

From `/etc/*release*` and `/etc/*version*`:

```
NAME="Red Hat Enterprise Linux"
VERSION="8.3 (Ootpa)"
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="8.3"
PLATFORM_ID="platform:el8"
PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
ANSI_COLOR="0;31"
```

```
redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
```

```
system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
```

```
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga
```

```
uname -a:
Linux localhost.localdomain 4.18.0-240.el8.x86_64 #1 SMP Wed Sep 23 05:13:10 EDT 2020
x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

| CVE-2018-12207 (iTLB Multihit): | Not affected |
| 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/swaps barriers and __user pointer sanitization |
| CVE-2017-5715 (Spectre variant 2): | Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling |
| CVE-2020-0543 (Special Register Buffer Data Sampling): | Not affected |
| CVE-2019-11135 (TSX Asynchronous Abort): | Not affected |

run-level 3 May 22 14:39

SPEC is set to: /home/spec2017

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/mapper/rhel-home</td>
<td>xfs</td>
<td>372G</td>
<td>95G</td>
<td>278G</td>
<td>26%</td>
<td>/home</td>
</tr>
</tbody>
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New H3C Technologies Co., Ltd.  
H3C UniServer R4900 G5 (Intel Xeon Gold 5320)  

| SPECspeed®2017_fp_base = 172 |
| SPECspeed®2017_fp_peak = 176 |

**CPU2017 License:** 9066

**Test Sponsor:** New H3C Technologies Co., Ltd.

**Tested by:** New H3C Technologies Co., Ltd.

**Test Date:** May-2021

**Hardware Availability:** Jun-2021

**Software Availability:** Dec-2020

---

### Platform Notes (Continued)

From `/sys/devices/virtual/dmi/id`

- **Vendor:** New H3C Technologies Co., Ltd.
- **Product:** H3C UniServer R4900 G5
- **Product Family:** Rack
- **Serial:** 210235A2R8214000004

Additional information from `dmidecode` 3.2 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:**
- 32x Micron 36ASF4G72PZ-3G2E7 32 GB 2 rank 3200, configured at 2933

**BIOS:**
- **BIOS Vendor:** American Megatrends International, LLC.
- **BIOS Version:** 5.23
- **BIOS Date:** 04/23/2021
- **BIOS Revision:** 5.21

(End of data from sysinfo program)

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### Compiler Version Notes

| C | 619.lbm_s(base, peak) 638.imagick_s(base, peak) |
| 644.nab_s(base) |

Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000

Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

---

| C | 644.nab_s(peak) |

---

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113

Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

---

| C | 619.lbm_s(base, peak) 638.imagick_s(base, peak) |
| 644.nab_s(base) |

Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000

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H3C UniServer R4900 G5 (Intel Xeon Gold 5320)

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Compiler Version Notes (Continued)

Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

C       | 644.nab_s(peak)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

C++, C, Fortran | 607.cactuBSSN_s(base, peak)

---------------------------------------------------------------

Intel(R) C++ Intel(R) 64 Compiler Classic for applications running on  
Intel(R) 64, Version 2021.1 Build 20201112_000000  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)  
64, Version 2021.1 Build 20201112_000000  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on  
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Fortran, C       | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)  
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Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on  
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Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on  
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### Base Compiler Invocation

C benchmarks: 
```sh```
	icc
```sh```

Fortran benchmarks: 
```sh```
	ifort
```sh```

Benchmarks using both Fortran and C: 
```sh```
	ifort icc
```sh```

Benchmarks using Fortran, C, and C++: 
```sh```
	icpc icc ifort

### Base Portability Flags

C benchmarks:
```sh```
	-std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch 

Fortran benchmarks:
```sh```
	-std=c11 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 
-no-prec-div -qopt-prefetch -ffinite-math-only 
-qopt-mem-layout-trans=4 -gopenmp -nostandard-realloc-lhs 
-mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib 
-ljemalloc

### Base Optimization Flags

C benchmarks:
```sh```
	-m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch 
-ffinite-math-only -qopt-mem-layout-trans=4 -gopenmp -DSPEC_CASE_FLAG 
-assume byterecl

Fortran benchmarks:
```sh```
	-m64 -Wl,-z,muldefs -DSPEC_CASE_FLAG -convert big_endian 

Benchmarks using both Fortran and C:
```sh```
	-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div

(Continued on next page)
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Base Optimization Flags (Continued):

Benchmarks using both Fortran and C (continued):
- qopt-prefetch   -ffinite-math-only   -qopt-mem-layout-trans=4   -qopenmp
- DSPEC_OPENMP   -mbranches-within-32B-boundaries   -nostandard-realloc-lhs
- L/usr/local/jemalloc64-5.0.1/lib   -ljemalloc

Benchmarks using Fortran, C, and C++:
- m64   -std=c11   -Wl,-z,muldefs   -xCORE-AVX512   -ipo   -O3   -no-prec-div
- qopt-prefetch   -ffinite-math-only   -qopt-mem-layout-trans=4   -qopenmp
- DSPEC_OPENMP   -mbranches-within-32B-boundaries   -nostandard-realloc-lhs
- L/usr/local/jemalloc64-5.0.1/lib   -ljemalloc

Peak Compiler Invocation

C benchmarks (except as noted below):
icc
644.nab_s: icx

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
619.lbm_s: basepeak = yes
638.imagick_s: basepeak = yes

(Continued on next page)
New H3C Technologies Co., Ltd.  
H3C UniServer R4900 G5 (Intel Xeon Gold 5320)

**SPECspeed®2017_fp_base = 172**

**SPECspeed®2017_fp_peak = 176**

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**CPU2017 License:** 9066  
**Test Sponsor:** New H3C Technologies Co., Ltd.  
**Test Date:** May-2021  
**Hardware Availability:** Jun-2021  
**Tested by:** New H3C Technologies Co., Ltd.  
**Test Sponsor:** New H3C Technologies Co., Ltd.  
**Software Availability:** Dec-2020

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**Peak Optimization Flags (Continued)**

644.nab_s: -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math  
-flto -mfpmath=sse -funroll-loops -fopenmp  
-DSPEC_OPENMP -qopt-mem-layout-trans=4  
-fimf-accuracy-bits=14:sqrt  
-mbranches-within-32B-boundaries  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Fortran benchmarks:

603.bwaves_s: -m64 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)  
-DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -ipo -xCORE-AVX512  
-03 -no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs  
-mbranches-within-32B-boundaries  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

649.fotonik3d_s: Same as 603.bwaves_s

654.rome_s: basepeak = yes

Benchmarks using both Fortran and C:

621.wrf_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)  
-prof-use(pass 2) -ipo -xCORE-AVX512 -03 -no-prec-div  
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4  
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP  
-mbranches-within-32B-boundaries -nostandard-realloc-lhs  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

627.cam4_s: basepeak = yes

628.pop2_s: basepeak = yes

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: basepeak = yes

---

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

http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml
http://www.spec.org/cpu2017/flags/New_H3C-Platform-Settings-V1.0-CPX-RevC.xml

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The flags files that were used to format this result can be browsed at


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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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