SPEC CPU®2017 Integer Speed Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

Hitachi Vantara

Advanced Server DS220
(Intel Xeon Gold 6258R, 2.70 GHz)

$SPECspeed®2017\_int\_base = 11.6$

$SPECspeed®2017\_int\_peak = 11.8$

CPU2017 License: 35
Test Sponsor: Hitachi Vantara
Tested by: Hitachi Vantara

Test Date: Aug-2020
Hardware Availability: Mar-2020
Software Availability: Apr-2020

Threads	Result
600.perlbench_s 112	6.87 / 7.88
602.gcc_s 112	10.6 / 11.0
605.mcf_s 112	18.8
620.omnetpp_s 112	11.3
623.xalancbmk_s 112	14.0
625.x264_s 112	16.4 / 16.9
631.deepsjeng_s 112	5.91
641.leela_s 112	4.91
648.exchange2_s 112	16.9
657.xz_s 112	24.8

——— SPECspeed®2017_int_base (11.6)   - - - - SPECspeed®2017_int_peak (11.8)

Hardware

CPU Name: Intel Xeon Gold 6258R
 Max MHz: 4000
 Nominal: 2700
Enabled: 56 cores, 2 chips, 2 threads/core
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: 38.5 MB I+D on chip per chip
 Other: None
Memory: 384 GB (24 x 16 GB 1Rx4 PC4-2666V-R)
Storage: 1 x 1.92 TB SATA SSD
Other: None

Software

OS: Red Hat Enterprise Linux release 8.0 (Ootpa)
 4.18.0-80.el8.x86_64
Compiler: C/C++: Version 19.1.1.217 of Intel C/C++
 Compiler for Linux;
 Fortran: Version 19.1.1.217 of Intel Fortran
 Compiler for Linux
Parallel: Yes
Firmware: Version S5BH3B17.H01 released Jun-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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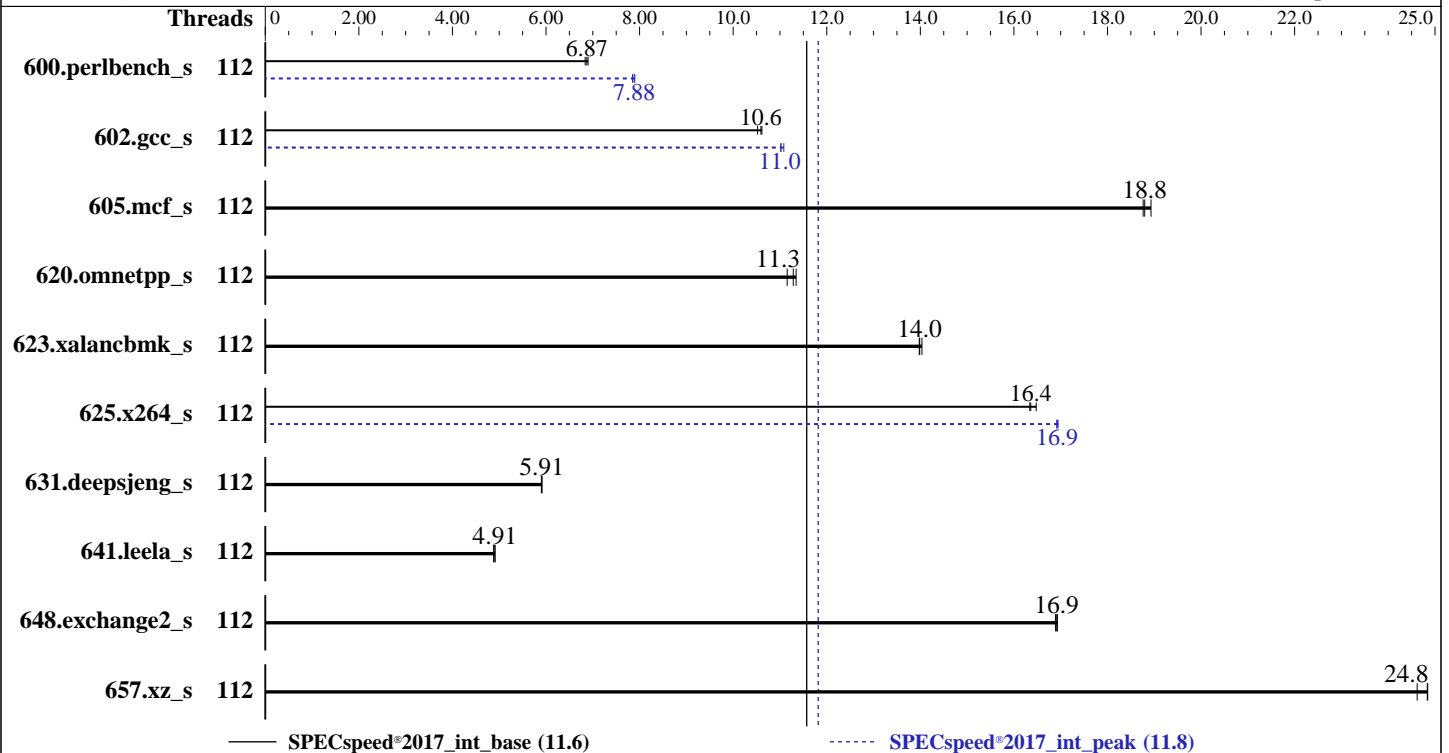
SPECspeed®2017_int_peak = 11.8

CPU2017 License: 35
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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	112	**258**	**6.87**	260	6.84	257	6.90	112	**225**	**7.88**	225	7.90	226	7.85
602.gcc_s	112	**376**	**10.6**	375	10.6	378	10.5	112	**361**	**11.0**	359	11.1	361	11.0
605.mcf_s	112	252	18.8	249	18.9	**251**	**18.8**	112	252	18.8	249	18.9	**251**	**18.8**
620.omnetpp_s	112	144	11.3	146	11.2	**145**	**11.3**	112	144	11.3	146	11.2	**145**	**11.3**
623.xalancbmk_s	112	101	14.0	**101**	**14.0**	101	14.0	112	101	14.0	**101**	**14.0**	101	14.0
625.x264_s	112	107	16.5	**108**	**16.4**	108	16.3	112	104	16.9	**104**	**16.9**	104	16.9
631.deepsjeng_s	112	**242**	**5.91**	243	5.90	242	5.91	112	**242**	**5.91**	243	5.90	242	5.91
641.leela_s	112	350	4.88	**348**	**4.91**	347	4.91	112	350	4.88	**348**	**4.91**	347	4.91
648.exchange2_s	112	**174**	**16.9**	174	16.9	174	16.9	112	**174**	**16.9**	174	16.9	174	16.9
657.xz_s	112	251	24.6	249	24.8	**249**	**24.8**	112	251	24.6	249	24.8	**249**	**24.8**
SPECspeed®2017_int_base =			**11.6**											
SPECspeed®2017_int_peak =			**11.8**											

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

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,scatter"
LD_LIBRARY_PATH = "/root/speccpu/lib/intel64:/root/speccpu/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
NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)

(Continued on next page)

Standard Performance Evaluation Corporation (info@spec.org)
https://www.spec.org/

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Hardware Availability: Mar-2020
Software Availability: Apr-2020

General Notes (Continued)

```
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 settings:
Pwr and Perf Profile set to High Performance

Sysinfo program /root/speccpu/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011
running on 192-168-159-137 Mon Aug 24 21:06:35 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) Gold 6258R CPU @ 2.70GHz
      2  "physical id"s (chips)
      112 "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 : 28
      siblings  : 56
      physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
      28 29 30
      physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
      28 29 30

From lscpu:
   Architecture:        x86_64
   CPU op-mode(s):      32-bit, 64-bit
   Byte Order:          Little Endian
   CPU(s):              112
   On-line CPU(s) list: 0-111
   Thread(s) per core:  2
   Core(s) per socket:  28
   Socket(s):           2
   NUMA node(s):        2
   Vendor ID:           GenuineIntel
```

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SPECspeed®2017_int_peak = 11.8

CPU2017 License: 35   **Test Date:** Aug-2020
Test Sponsor: Hitachi Vantara   **Hardware Availability:** Mar-2020
Tested by: Hitachi Vantara   **Software Availability:** Apr-2020

Platform Notes (Continued)

```
        CPU family:          6
        Model:               85
        Model name:          Intel(R) Xeon(R) Gold 6258R CPU @ 2.70GHz
        Stepping:            7
        CPU MHz:             1000.043
        BogoMIPS:            5400.00
        Virtualization:      VT-x
        L1d cache:           32K
        L1i cache:           32K
        L2 cache:            1024K
        L3 cache:            39424K
        NUMA node0 CPU(s):   0-27,56-83
        NUMA node1 CPU(s):   28-55,84-111
        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 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 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_epp pku ospke avx512_vnni flush_l1d
    arch_capabilities

 /proc/cpuinfo cache data
    cache size : 39424 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 26 27
    56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83
    node 0 size: 191835 MB
    node 0 free: 191039 MB
    node 1 cpus: 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
    53 54 55 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106
    107 108 109 110 111
    node 1 size: 193524 MB
    node 1 free: 192991 MB
    node distances:
    node   0   1
      0:  10  21
      1:  21  10

  From /proc/meminfo
```

(Continued on next page)

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Test Date: Aug-2020
Hardware Availability: Mar-2020
Software Availability: Apr-2020

Platform Notes (Continued)

```
    MemTotal:       394608664 kB
    HugePages_Total:        0
    Hugepagesize:        2048 kB

 From /etc/*release* /etc/*version*
    os-release:
       NAME="Red Hat Enterprise Linux"
       VERSION="8.0 (Ootpa)"
       ID="rhel"
       ID_LIKE="fedora"
       VERSION_ID="8.0"
       PLATFORM_ID="platform:el8"
       PRETTY_NAME="Red Hat Enterprise Linux 8.0 (Ootpa)"
       ANSI_COLOR="0;31"
    redhat-release: Red Hat Enterprise Linux release 8.0 (Ootpa)
    system-release: Red Hat Enterprise Linux release 8.0 (Ootpa)
    system-release-cpe: cpe:/o:redhat:enterprise_linux:8.0:ga

 uname -a:
    Linux 192-168-159-137 4.18.0-80.el8.x86_64 #1 SMP Wed Mar 13 12:02:46 UTC 2019 x86_64
    x86_64 x86_64 GNU/Linux

 Kernel self-reported vulnerability status:

 CVE-2018-3620 (L1 Terminal Fault):        Not affected
 Microarchitectural Data Sampling:         No status reported
 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: __user pointer sanitization
 CVE-2017-5715 (Spectre variant 2):        Mitigation: Enhanced IBRS, IBPB: conditional,
                                           RSB filling


 run-level 3 Aug 24 21:04

 SPEC is set to: /root/speccpu
    Filesystem      Type  Size  Used Avail Use% Mounted on
    /dev/sda4       xfs   1.8T  103G  1.7T   6% /

 From /sys/devices/virtual/dmi/id
     BIOS:    American Megatrends Inc. S5BH3B17.H01 06/30/2020
     Vendor:  Hitachi Vantara
     Product: Advanced Server DS220


 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
```

(Continued on next page)

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Platform Notes (Continued)

```
  frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.
    Memory:
      24x Samsung M393A2K40BB2-CTD 16 GB 1 rank 2666

  (End of data from sysinfo program)
```

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.
------------------------------------------------------------------------------


==============================================================================
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)
------------------------------------------------------------------------------
```

(Continued on next page)

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CPU2017 License: 35		**Test Date:**	Aug-2020
Test Sponsor:	Hitachi Vantara	**Hardware Availability:**	Mar-2020
Tested by:	Hitachi Vantara	**Software Availability:**	Apr-2020

Compiler Version Notes (Continued)

```
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

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Base Optimization Flags (Continued)

C benchmarks (continued):
```
-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
```

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`

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Peak Portability Flags (Continued)

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`

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:

(Continued on next page)

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Peak Optimization Flags (Continued)

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/HitachiVantaraPlatform-DS220-V1.html
http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.html

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

http://www.spec.org/cpu2017/flags/HitachiVantaraPlatform-DS220-V1.xml
http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.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 2020-08-24 09:06:35-0400.
Report generated on 2020-09-16 10:27:14 by CPU2017 PDF formatter v6255.
Originally published on 2020-09-15.