



SPEC CPU®2017 Integer Speed Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

Superdome Flex 280

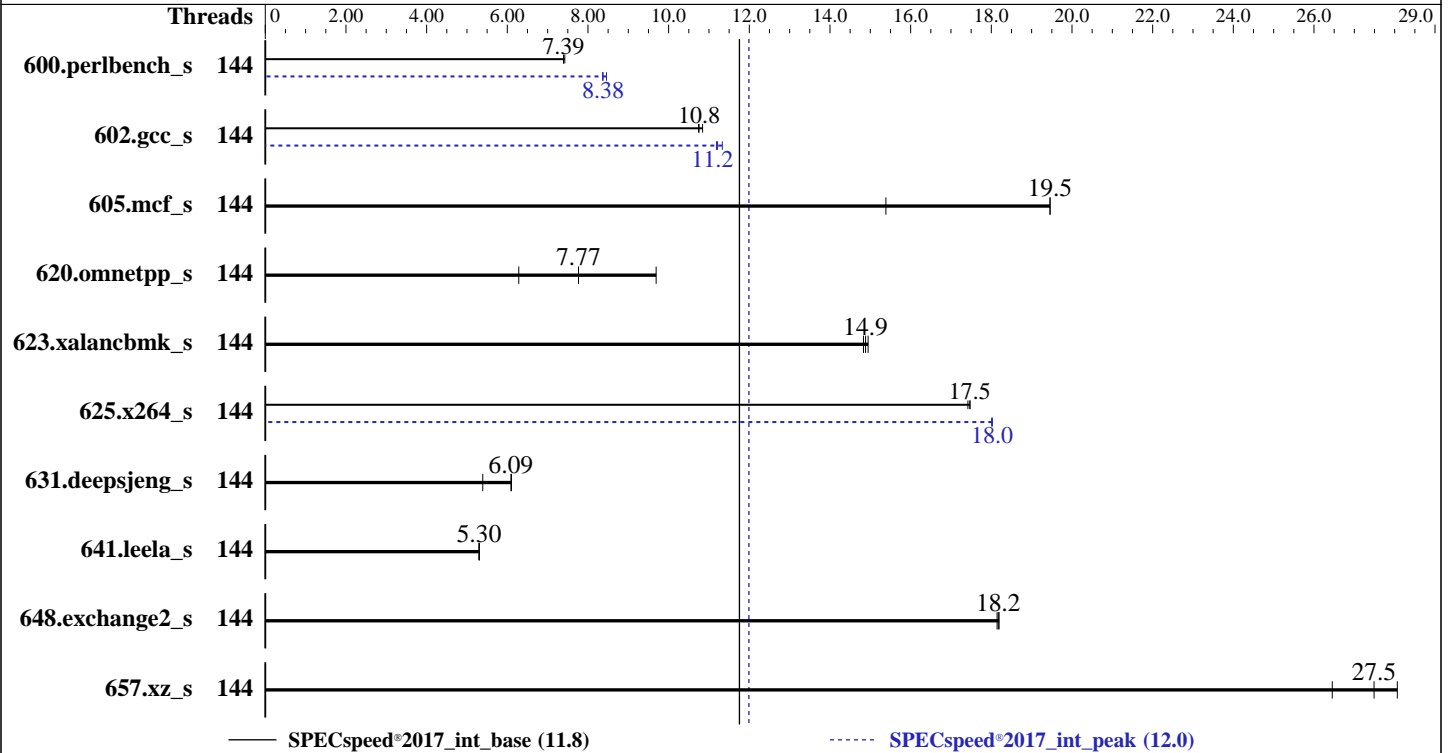
(3.10 GHz, Intel Xeon Platinum 8354H)

SPECspeed®2017_int_base = 11.8

SPECspeed®2017_int_peak = 12.0

CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

Test Date: Nov-2020
Hardware Availability: Nov-2020
Software Availability: Apr-2020



Hardware

CPU Name: Intel Xeon Platinum 8354H
Max MHz: 4300
Nominal: 3100
Enabled: 144 cores, 8 chips
Orderable: 2, 4, 8 chip(s)
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: 6 TB (48 x 128 GB 4Rx4 PC4-3200AA-L)
Storage: 2 x 480 GB SSD SATA
Other: None

Software

OS: Red Hat Enterprise Linux release 8.2 (Ootpa)
Kernel 4.18.0-193.el8.x86_64
Compiler: C/C++: Version 19.1.1.217 of Intel C/C++ Compiler Build 20200306 for Linux;
Fortran: Version 19.1.1.217 of Intel Fortran Compiler Build 20200306 for Linux;
Parallel: Yes
Firmware: HPE Firmware Bundle Version 1.0.142 released Oct-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
HPE Foundation Software 2.4,
Build 734.0820.200723T0100.a.rhel82hpe-200723T0100
Power Management: BIOS set to prefer performance at the cost of additional power usage



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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	144	240	7.39	240	7.39	239	7.43	144	210	8.46	212	8.36	212	8.38
602.gcc_s	144	371	10.7	367	10.8	370	10.8	144	351	11.3	355	11.2	356	11.2
605.mcf_s	144	243	19.5	307	15.4	243	19.5	144	243	19.5	307	15.4	243	19.5
620.omnetpp_s	144	260	6.28	210	7.77	168	9.69	144	260	6.28	210	7.77	168	9.69
623.xalancbmk_s	144	95.2	14.9	94.8	14.9	95.5	14.8	144	95.2	14.9	94.8	14.9	95.5	14.8
625.x264_s	144	101	17.5	101	17.5	101	17.4	144	98.0	18.0	97.9	18.0	97.9	18.0
631.deepsjeng_s	144	266	5.39	235	6.09	235	6.10	144	266	5.39	235	6.09	235	6.10
641.leela_s	144	322	5.30	322	5.30	322	5.30	144	322	5.30	322	5.30	322	5.30
648.exchange2_s	144	162	18.2	162	18.2	162	18.1	144	162	18.2	162	18.2	162	18.1
657.xz_s	144	234	26.5	225	27.5	220	28.1	144	234	26.5	225	27.5	220	28.1

SPECspeed®2017_int_base = **11.8**

SPECspeed®2017_int_peak = **12.0**

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

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"
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
Tuned-adm profile was set to Throughput-Performance using "tuned-adm profile throughput-performance"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,scatter"
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-64"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"



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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.

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 Configuration:

Workload Profile set to HPC

Intel Hyper-Threading set to Disabled

Workload Profile set to Custom

Minimum Processor Idle Power Core C-State set to C6 State

Minimum Processor Idle Power Package C-State set to Package C6 (non-retention) State

Sysinfo program /home/cpu2017/bin/sysinfo

Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011

running on ch-622.fchst.rdlabs.hpccorp.net Tue Nov 17 07:51:45 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) Platinum 8354H CPU @ 3.10GHZ

8 "physical id"s (chips)

144 "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

physical 2: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

physical 3: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

physical 4: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

physical 5: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

physical 6: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

physical 7: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

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Platform Notes (Continued)

From lscpu:

```

Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:             Little Endian
CPU(s):                 144
On-line CPU(s) list:   0-143
Thread(s) per core:    1
Core(s) per socket:    18
Socket(s):              8
NUMA node(s):          8
Vendor ID:              GenuineIntel
CPU family:             6
Model:                  85
Model name:             Intel(R) Xeon(R) Platinum 8354H CPU @ 3.10GHz
Stepping:               11
CPU MHz:                2468.816
CPU max MHz:           4300.0000
CPU min MHz:           1000.0000
BogoMIPS:               6199.87
Virtualization:        VT-x
L1d cache:              32K
L1i cache:              32K
L2 cache:               1024K
L3 cache:               25344K
NUMA node0 CPU(s):     0-17
NUMA node1 CPU(s):     18-35
NUMA node2 CPU(s):     36-53
NUMA node3 CPU(s):     54-71
NUMA node4 CPU(s):     72-89
NUMA node5 CPU(s):     90-107
NUMA node6 CPU(s):     108-125
NUMA node7 CPU(s):     126-143
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
aperfmpperf 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 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 avx512_bf16 dtherm ida arat pln pts pku ospke avx512_vnni md_clear
flush_lld arch_capabilities

```

/proc/cpuinfo cache data
cache size : 25344 KB

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Platform Notes (Continued)

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.

```

available: 8 nodes (0-7)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
node 0 size: 772593 MB
node 0 free: 772347 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: 774139 MB
node 1 free: 773984 MB
node 2 cpus: 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53
node 2 size: 774139 MB
node 2 free: 772946 MB
node 3 cpus: 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71
node 3 size: 774139 MB
node 3 free: 773958 MB
node 4 cpus: 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89
node 4 size: 774139 MB
node 4 free: 773858 MB
node 5 cpus: 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107
node 5 size: 774139 MB
node 5 free: 773987 MB
node 6 cpus: 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125
node 6 size: 774139 MB
node 6 free: 773989 MB
node 7 cpus: 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143
node 7 size: 773107 MB
node 7 free: 772946 MB
node distances:
node  0  1  2  3  4  5  6  7
  0: 10 16 16 24 16 16 16 16
  1: 16 10 24 16 16 16 16 16
  2: 16 24 10 16 16 16 16 16
  3: 24 16 16 10 16 16 16 16
  4: 16 16 16 16 10 16 16 24
  5: 16 16 16 16 16 10 24 16
  6: 16 16 16 16 16 24 10 16
  7: 16 16 16 16 24 16 16 10

```

```

From /proc/meminfo
MemTotal:      6339109192 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

```

/usr/bin/lsb_release -d
Red Hat Enterprise Linux release 8.2 (Ootpa)

```

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Platform Notes (Continued)

```

From /etc/*release* /etc/*version*
hpe-foundation-release: HPE Foundation Software 2.4, Build
734.0820.200723T0100.a.rhel82hpe-200723T0100
os-release:
  NAME="Red Hat Enterprise Linux"
  VERSION="8.2 (Ootpa)"
  ID="rhel"
  ID_LIKE="fedora"
  VERSION_ID="8.2"
  PLATFORM_ID="platform:el8"
  PRETTY_NAME="Red Hat Enterprise Linux 8.2 (Ootpa)"
  ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.2:ga

uname -a:
Linux ch-622.fchst.rdlabs.hpecorp.net 4.18.0-193.el8.x86_64 #1 SMP Fri Mar 27 14:35:58
UTC 2020 x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

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
tsx_async_abort:                             Not affected

run-level 3 Nov 17 07:50

SPEC is set to: /home/cpu2017
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs   392G   52G  340G  14% /home

From /sys/devices/virtual/dmi/id
BIOS:      HPE Bundle:1.0.142 SFW:008.000.189.000.2010080501 10/08/2020
Vendor:    HPE
Product:   Superdome Flex 280
Product Family: 1590PID02020001
Serial:    5UF0090539

```

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Platform Notes (Continued)

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:

48x Hynix HMABAGL7ABR4N-XN 128 GB 4 rank 3200

48x NO DIMM NO DIMM

(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)
=====
```

```
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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.
=====
```

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Compiler Version Notes (Continued)

```

=====
C++      | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak)
         | 631.deepsjeng_s(base, peak) 641.leela_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.
=====

```

```

=====
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

```




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Base Optimization Flags

C benchmarks:

```
-m64 -qnextgen -std=c11
-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.gc_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
```

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Peak Portability Flags (Continued)

648.exchange2_s: -DSPEC_LP64
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.profddata(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/HPE-Platform-Flags-Intel-V1.3-CLX-revC.html>

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

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

<http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.3-CLX-revC.xml>

http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.xml

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