



SPEC CPU®2017 Integer Speed Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

Superdome Flex 280

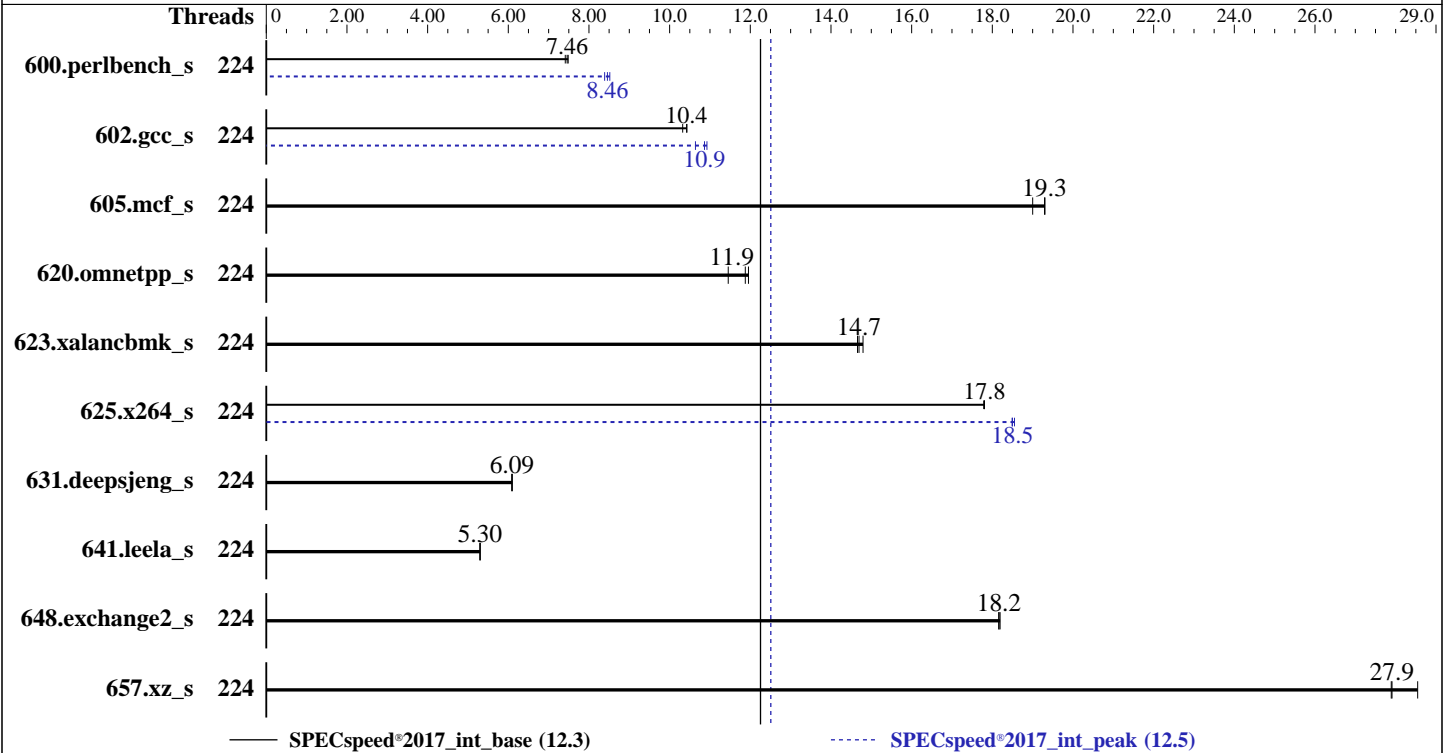
(2.60 GHz, Intel Xeon Platinum 8376H)

SPECspeed®2017_int_base = 12.3

SPECspeed®2017_int_peak = 12.5

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

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



Hardware

CPU Name: Intel Xeon Platinum 8376H
Max MHz: 4300
Nominal: 2600
Enabled: 224 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: 38.5 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	224	238	7.46	239	7.41	237	7.48	224	210	8.46	208	8.52	212	8.39
602.gcc_s	224	382	10.4	386	10.3	382	10.4	224	364	10.9	367	10.9	374	10.6
605.mcf_s	224	245	19.3	245	19.3	248	19.0	224	245	19.3	245	19.3	248	19.0
620.omnetpp_s	224	136	12.0	137	11.9	142	11.5	224	136	12.0	137	11.9	142	11.5
623.xalancbmk_s	224	96.4	14.7	96.7	14.7	95.8	14.8	224	96.4	14.7	96.7	14.7	95.8	14.8
625.x264_s	224	99.1	17.8	99.2	17.8	99.1	17.8	224	95.4	18.5	95.3	18.5	95.1	18.5
631.deepsjeng_s	224	235	6.09	235	6.09	235	6.10	224	235	6.09	235	6.09	235	6.10
641.leela_s	224	322	5.30	322	5.30	322	5.30	224	322	5.30	322	5.30	322	5.30
648.exchange2_s	224	162	18.2	162	18.2	162	18.2	224	162	18.2	162	18.2	162	18.2
657.xz_s	224	222	27.9	217	28.5	222	27.9	224	222	27.9	217	28.5	222	27.9

SPECspeed®2017_int_base = **12.3**

SPECspeed®2017_int_peak = **12.5**

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"
MALLOCONF = "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 Thu Oct 29 11:36:17 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 8376H CPU @ 2.60GHz

8 "physical id"s (chips)

224 "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 : 28

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

physical 2: 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 3: 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 4: 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

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Platform Notes (Continued)

```
28 29 30
physical 5: 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 6: 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 7: 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):                224
On-line CPU(s) list:  0-223
Thread(s) per core:    1
Core(s) per socket:   28
Socket(s):             8
NUMA node(s):         8
Vendor ID:             GenuineIntel
CPU family:            6
Model:                85
Model name:            Intel(R) Xeon(R) Platinum 8376H CPU @ 2.60GHz
Stepping:              11
CPU MHz:               2020.636
CPU max MHz:           4300.0000
CPU min MHz:           1000.0000
BogoMIPS:              5199.78
Virtualization:       VT-x
L1d cache:             32K
L1i cache:             32K
L2 cache:              1024K
L3 cache:              39424K
NUMA node0 CPU(s):    0-27
NUMA node1 CPU(s):    28-55
NUMA node2 CPU(s):    56-83
NUMA node3 CPU(s):    84-111
NUMA node4 CPU(s):    112-139
NUMA node5 CPU(s):    140-167
NUMA node6 CPU(s):    168-195
NUMA node7 CPU(s):    196-223
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 pdc_m 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
```

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Platform Notes (Continued)

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 : 39424 KB
```

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 18 19 20 21 22 23 24 25 26 27
node 0 size: 772577 MB
node 0 free: 772301 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
node 1 size: 774137 MB
node 1 free: 772743 MB
node 2 cpus: 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 2 size: 774137 MB
node 2 free: 773997 MB
node 3 cpus: 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 3 size: 774109 MB
node 3 free: 773965 MB
node 4 cpus: 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129
130 131 132 133 134 135 136 137 138 139
node 4 size: 774137 MB
node 4 free: 773991 MB
node 5 cpus: 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157
158 159 160 161 162 163 164 165 166 167
node 5 size: 774137 MB
node 5 free: 773988 MB
node 6 cpus: 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185
186 187 188 189 190 191 192 193 194 195
node 6 size: 774137 MB
node 6 free: 773972 MB
node 7 cpus: 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213
214 215 216 217 218 219 220 221 222 223
node 7 size: 773105 MB
node 7 free: 772930 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
```

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Platform Notes (Continued)

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: 6339049980 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

/usr/bin/lsb_release -d

Red Hat Enterprise Linux release 8.2 (Ootpa)

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

(Continued on next page)



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Platform Notes (Continued)

tsx_async_abort: Not affected

run-level 3 Oct 29 11:26

SPEC is set to: /home/cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/mapper/rhel-home	xfs	392G	32G	360G	9%	/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

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)
=====

```

(Continued on next page)



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| 625.x264_s(base, peak) 657.xz_s(base, peak)

Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
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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.

=====
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



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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
-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

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Peak Compiler Invocation (Continued)

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
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

```

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Peak Optimization Flags (Continued)

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:

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-ic19.1ul-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-ic19.1ul-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.

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