# SPEC CPU®2017 Floating Point Rate Result

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## Hewlett Packard Enterprise

(Test Sponsor: HPE)

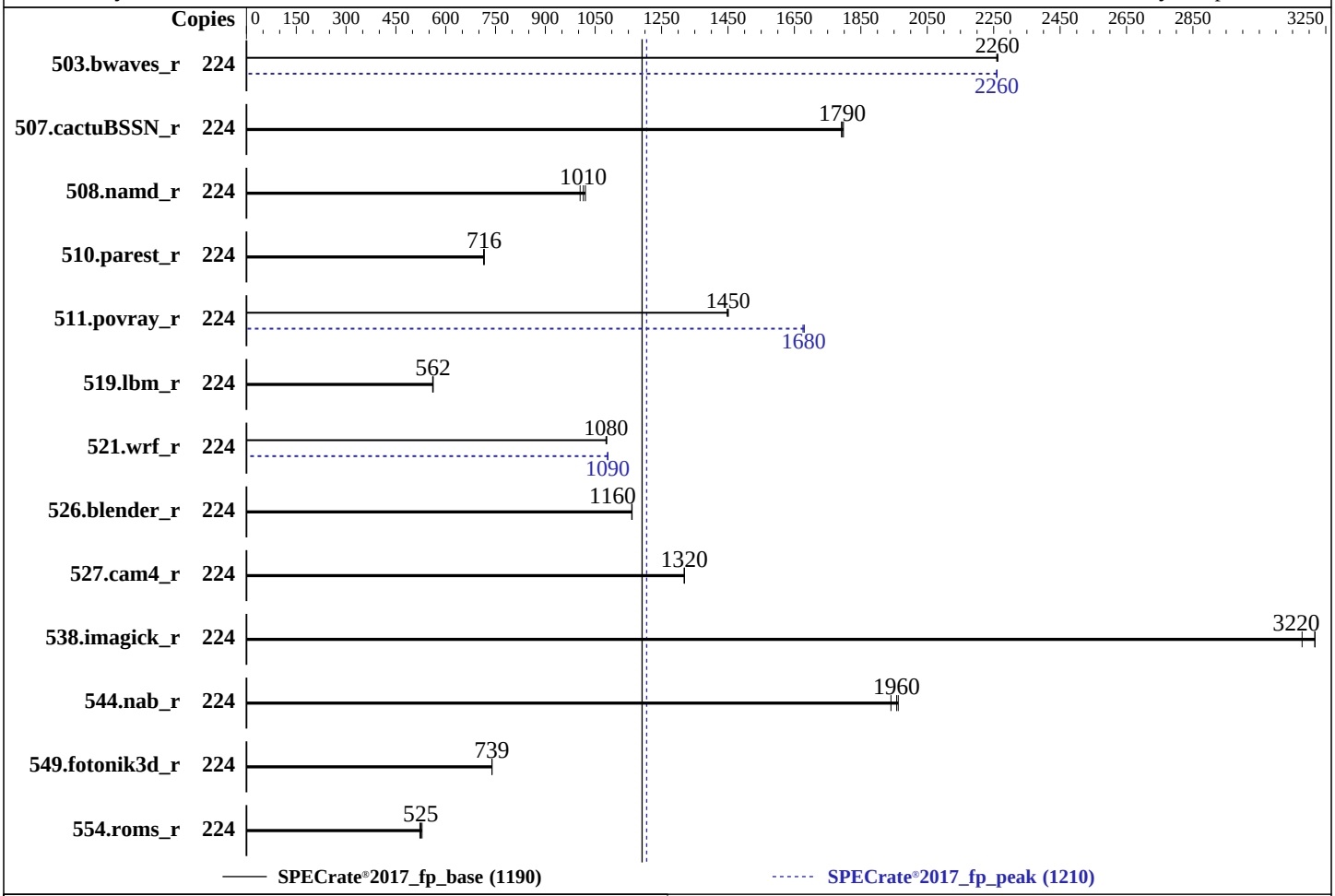
Superdome Flex 280
(2.60 GHz, Intel Xeon Platinum 8376H)

**SPECrate®2017_fp_base = 1190**

**SPECrate®2017_fp_peak = 1210**

**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 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)<br>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;<br>Fortran: Version 19.1.1.217 of Intel Fortran Compiler Build 20200306 for Linux; |
| Parallel: | No |
| 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<br>HPE Foundation Software 2.4,<br>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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**CPU2017 License:** 3
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**Test Date:** Nov-2020
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## Results Table

| Benchmark | Base | | | | | | | Peak | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 503.bwaves_r | 224 | 993 | 2260 | **994** | **2260** | 994 | 2260 | 224 | 994 | 2260 | **994** | **2260** | 995 | 2260 |
| 507.cactuBSSN_r | 224 | 158 | 1800 | 158 | 1790 | **158** | **1790** | 224 | 158 | 1800 | 158 | 1790 | **158** | **1790** |
| 508.namd_r | 224 | **210** | **1010** | 212 | 1000 | 208 | 1020 | 224 | **210** | **1010** | 212 | 1000 | 208 | 1020 |
| 510.parest_r | 224 | **819** | **716** | 819 | 716 | 821 | 714 | 224 | **819** | **716** | 819 | 716 | 821 | 714 |
| 511.povray_r | 224 | 361 | 1450 | **361** | **1450** | 361 | 1450 | 224 | 312 | 1680 | 311 | 1680 | **312** | **1680** |
| 519.lbm_r | 224 | 421 | 561 | **420** | **562** | 420 | 562 | 224 | 421 | 561 | **420** | **562** | 420 | 562 |
| 521.wrf_r | 224 | 462 | 1080 | 463 | 1080 | **463** | **1080** | 224 | 462 | 1090 | 461 | 1090 | **461** | **1090** |
| 526.blender_r | 224 | 294 | 1160 | 294 | 1160 | **294** | **1160** | 224 | 294 | 1160 | 294 | 1160 | **294** | **1160** |
| 527.cam4_r | 224 | 297 | 1320 | 297 | 1320 | **297** | **1320** | 224 | 297 | 1320 | 297 | 1320 | **297** | **1320** |
| 538.imagick_r | 224 | **173** | **3220** | 173 | 3220 | 175 | 3180 | 224 | **173** | **3220** | 173 | 3220 | 175 | 3180 |
| 544.nab_r | 224 | 194 | 1940 | **193** | **1960** | 192 | 1960 | 224 | 194 | 1940 | **193** | **1960** | 192 | 1960 |
| 549.fotonik3d_r | 224 | **1181** | **739** | 1181 | 739 | 1181 | 739 | 224 | **1181** | **739** | 1181 | 739 | 1181 | 739 |
| 554.roms_r | 224 | **678** | **525** | 673 | 529 | 682 | 522 | 224 | **678** | **525** | 673 | 529 | 682 | 522 |

**SPECrate®2017_fp_base = 1190**

**SPECrate®2017_fp_peak = 1210**

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
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>
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:
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-64"
MALLOC_CONF = "retain:true"
```

## 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
  Sub-NUMA Clustering set to Enabled

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011
running on ch-622.fchst.rdlabs.hpecorp.net Sat Oct 31 17:13:21 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
```

**(Continued on next page)**

## Platform Notes (Continued)

```
      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
      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):        16
      Vendor ID:           GenuineIntel
      CPU family:          6
      Model:               85
      Model name:          Intel(R) Xeon(R) Platinum 8376H CPU @ 2.60GHz
      Stepping:            11
      CPU MHz:             3842.043
      CPU max MHz:         4300.0000
      CPU min MHz:         1000.0000
      BogoMIPS:            5199.79
      Virtualization:      VT-x
      L1d cache:           32K
      L1i cache:           32K
      L2 cache:            1024K
      L3 cache:            39424K
      NUMA node0 CPU(s):   0-3,7-9,14-17,21-23
      NUMA node1 CPU(s):   4-6,10-13,18-20,24-27
      NUMA node2 CPU(s):   28-31,35-37,42-45,49-51
      NUMA node3 CPU(s):   32-34,38-41,46-48,52-55
      NUMA node4 CPU(s):   56-59,63-65,70-73,77-79
      NUMA node5 CPU(s):   60-62,66-69,74-76,80-83
      NUMA node6 CPU(s):   84-87,91-93,98-101,105-107
      NUMA node7 CPU(s):   88-90,94-97,102-104,108-111
```

**(Continued on next page)**

## Platform Notes (Continued)

```
      NUMA node8 CPU(s):   112-115,119-121,126-129,133-135
      NUMA node9 CPU(s):   116-118,122-125,130-132,136-139
      NUMA node10 CPU(s):  140-143,147-149,154-157,161-163
      NUMA node11 CPU(s):  144-146,150-153,158-160,164-167
      NUMA node12 CPU(s):  168-171,175-177,182-185,189-191
      NUMA node13 CPU(s):  172-174,178-181,186-188,192-195
      NUMA node14 CPU(s):  196-199,203-205,210-213,217-219
      NUMA node15 CPU(s):  200-202,206-209,214-216,220-223
      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
      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 avx512_bf16 dtherm ida arat pln pts pku ospke avx512_vnni md_clear
      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: 16 nodes (0-15)
    node 0 cpus: 0 1 2 3 7 8 9 14 15 16 17 21 22 23
    node 0 size: 385509 MB
    node 0 free: 384802 MB
    node 1 cpus: 4 5 6 10 11 12 13 18 19 20 24 25 26 27
    node 1 size: 387068 MB
    node 1 free: 386765 MB
    node 2 cpus: 28 29 30 31 35 36 37 42 43 44 45 49 50 51
    node 2 size: 387068 MB
    node 2 free: 386933 MB
    node 3 cpus: 32 33 34 38 39 40 41 46 47 48 52 53 54 55
    node 3 size: 387068 MB
    node 3 free: 386983 MB
    node 4 cpus: 56 57 58 59 63 64 65 70 71 72 73 77 78 79
    node 4 size: 387068 MB
    node 4 free: 386704 MB
    node 5 cpus: 60 61 62 66 67 68 69 74 75 76 80 81 82 83
    node 5 size: 387068 MB
    node 5 free: 386955 MB
    node 6 cpus: 84 85 86 87 91 92 93 98 99 100 101 105 106 107
    node 6 size: 387068 MB
```

**(Continued on next page)**

## Platform Notes (Continued)

```
node 6 free: 386976 MB
node 7 cpus: 88 89 90 94 95 96 97 102 103 104 108 109 110 111
node 7 size: 387068 MB
node 7 free: 386984 MB
node 8 cpus: 112 113 114 115 119 120 121 126 127 128 129 133 134 135
node 8 size: 387068 MB
node 8 free: 386966 MB
node 9 cpus: 116 117 118 122 123 124 125 130 131 132 136 137 138 139
node 9 size: 387068 MB
node 9 free: 386982 MB
node 10 cpus: 140 141 142 143 147 148 149 154 155 156 157 161 162 163
node 10 size: 387040 MB
node 10 free: 386954 MB
node 11 cpus: 144 145 146 150 151 152 153 158 159 160 164 165 166 167
node 11 size: 387068 MB
node 11 free: 386976 MB
node 12 cpus: 168 169 170 171 175 176 177 182 183 184 185 189 190 191
node 12 size: 387068 MB
node 12 free: 386944 MB
node 13 cpus: 172 173 174 178 179 180 181 186 187 188 192 193 194 195
node 13 size: 387068 MB
node 13 free: 386947 MB
node 14 cpus: 196 197 198 199 203 204 205 210 211 212 213 217 218 219
node 14 size: 387068 MB
node 14 free: 386979 MB
node 15 cpus: 200 201 202 206 207 208 209 214 215 216 220 221 222 223
node 15 size: 386036 MB
node 15 free: 385943 MB
node distances:
node   0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
  0:  10  13  16  16  16  16  24  24  16  16  16  16  16  16  16  16
  1:  13  10  16  16  16  16  24  24  16  16  16  16  16  16  16  16
  2:  16  16  10  13  24  24  16  16  16  16  16  16  16  16  16  16
  3:  16  16  13  10  24  24  16  16  16  16  16  16  16  16  16  16
  4:  16  16  24  24  10  13  16  16  16  16  16  16  16  16  16  16
  5:  16  16  24  24  13  10  16  16  16  16  16  16  16  16  16  16
  6:  24  24  16  16  16  16  10  13  16  16  16  16  16  16  16  16
  7:  24  24  16  16  16  16  13  10  16  16  16  16  16  16  16  16
  8:  16  16  16  16  16  16  16  16  10  13  16  16  16  16  24  24
  9:  16  16  16  16  16  16  16  16  13  10  16  16  16  16  24  24
 10:  16  16  16  16  16  16  16  16  16  16  10  13  24  24  16  16
 11:  16  16  16  16  16  16  16  16  16  16  13  10  24  24  16  16
 12:  16  16  16  16  16  16  16  16  16  16  24  24  10  13  16  16
 13:  16  16  16  16  16  16  16  16  16  16  24  24  13  10  16  16
 14:  16  16  16  16  16  16  16  16  24  24  16  16  16  16  10  13
 15:  16  16  16  16  16  16  16  16  24  24  16  16  16  16  13  10
```

**(Continued on next page)**

## Platform Notes (Continued)

```
From /proc/meminfo
   MemTotal:       6339047120 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/swapgs 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 Oct 31 17:11

SPEC is set to: /home/cpu2017
   Filesystem            Type  Size  Used Avail Use% Mounted on
   /dev/mapper/rhel-home xfs   392G  262G  130G  67% /home
```

**(Continued on next page)**

## Platform Notes (Continued)

```
 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               | 519.lbm_r(base, peak) 538.imagick_r(base, peak)
                | 544.nab_r(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++             | 508.namd_r(base, peak) 510.parest_r(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++, C          | 511.povray_r(base) 526.blender_r(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.
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.
```

**(Continued on next page)**

## Compiler Version Notes (Continued)

```
------------------------------------------------------------------------------

==============================================================================
C++, C          | 511.povray_r(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.
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++, C          | 511.povray_r(base) 526.blender_r(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.
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++, C          | 511.povray_r(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.
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++, C, Fortran | 507.cactuBSSN_r(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.
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.
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.
```

**(Continued on next page)**

## Compiler Version Notes (Continued)

```
------------------------------------------------------------------------------

==============================================================================
Fortran         | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
                | 554.roms_r(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.
------------------------------------------------------------------------------

==============================================================================
Fortran, C      | 521.wrf_r(base) 527.cam4_r(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.
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, C      | 521.wrf_r(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.
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.
------------------------------------------------------------------------------

==============================================================================
Fortran, C      | 521.wrf_r(base) 527.cam4_r(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.
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, C      | 521.wrf_r(peak)
------------------------------------------------------------------------------
```

**(Continued on next page)**

## Compiler Version Notes (Continued)

```
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.
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.
------------------------------------------------------------------------------
```

## Base Compiler Invocation

C benchmarks:
`icc`

C++ benchmarks:
`icpc`

Fortran benchmarks:
`ifort`

Benchmarks using both Fortran and C:
`ifort icc`

Benchmarks using both C and C++:
`icpc icc`

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

## Base Portability Flags

503.bwaves_r: `-DSPEC_LP64`
507.cactuBSSN_r: `-DSPEC_LP64`
508.namd_r: `-DSPEC_LP64`
510.parest_r: `-DSPEC_LP64`
511.povray_r: `-DSPEC_LP64`
519.lbm_r: `-DSPEC_LP64`
521.wrf_r: `-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian`
526.blender_r: `-DSPEC_LP64 -DSPEC_LINUX -funsigned-char`
527.cam4_r: `-DSPEC_LP64 -DSPEC_CASE_FLAG`
538.imagick_r: `-DSPEC_LP64`
544.nab_r: `-DSPEC_LP64`
549.fotonik3d_r: `-DSPEC_LP64`
554.roms_r: `-DSPEC_LP64`

## Base Optimization Flags

C benchmarks:
```
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

C++ benchmarks:
```
-m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Fortran benchmarks:
```
-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld=gold -xCORE-AVX512 -O3 -ipo -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
-auto -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Benchmarks using both Fortran and C:
```
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo -no-prec-div
-qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles -nostandard-realloc-lhs
-align array32byte -auto -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Benchmarks using both C and C++:
```
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Benchmarks using Fortran, C, and C++:
```
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo -no-prec-div
-qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles -nostandard-realloc-lhs
-align array32byte -auto -mbranches-within-32B-boundaries
```

**(Continued on next page)**

## Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
`-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

## Peak Compiler Invocation

C benchmarks:
`icc`

C++ benchmarks:
`icpc`

Fortran benchmarks:
`ifort`

Benchmarks using both Fortran and C:
`ifort icc`

Benchmarks using both C and C++:
`icpc icc`

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

## Peak Portability Flags

`Same as Base Portability Flags`

## Peak Optimization Flags

C benchmarks:

519.lbm_r: `basepeak = yes`

538.imagick_r: `basepeak = yes`

544.nab_r: `basepeak = yes`

C++ benchmarks:

**(Continued on next page)**

## Peak Optimization Flags (Continued)

508.namd_r: `basepeak = yes`

510.parest_r: `basepeak = yes`

Fortran benchmarks:

503.bwaves_r: `-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs -fuse-ld=gold -xCORE-AVX512 -O3 -ipo -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-multiple-gather-scatter-by-shuffles -qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte -auto -mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

549.fotonik3d_r: `basepeak = yes`

554.roms_r: `basepeak = yes`

Benchmarks using both Fortran and C:

521.wrf_r: `-prof-gen`(pass 1) `-prof-use`(pass 2) `-xCORE-AVX512 -O3 -ipo -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-multiple-gather-scatter-by-shuffles -qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries -nostandard-realloc-lhs -align array32byte -auto -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

527.cam4_r: `basepeak = yes`

Benchmarks using both C and C++:

511.povray_r: `-prof-gen`(pass 1) `-prof-use`(pass 2) `-xCORE-AVX512 -O3 -ipo -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-multiple-gather-scatter-by-shuffles -qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

526.blender_r: `basepeak = yes`

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: `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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