SPEC CPU®2017 Floating Point Speed Result

Quanta Cloud Technology
(Test Sponsor: Quanta Computer Inc.)

D54Q-2U (Intel Xeon Platinum 8480+, 2.0GHz)

SPECspeed®2017_fp_base = 347
SPECspeed®2017_fp_peak = Not Run

CPU2017 License: 9050
Test Sponsor: Quanta Computer Inc.
Tested by: Quanta Computer Inc.

Test Date: Jan-2023
Hardware Availability: Nov-2022
Software Availability: Aug-2022

Threads

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base (347)</th>
</tr>
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<tbody>
<tr>
<td>603.bwaves_s 112</td>
</tr>
<tr>
<td>607.cactuBSSN_s 112</td>
</tr>
<tr>
<td>619.lbm_s 112</td>
</tr>
<tr>
<td>621.wrf_s 112</td>
</tr>
<tr>
<td>627.cam4_s 112</td>
</tr>
<tr>
<td>628.pop2_s 112</td>
</tr>
<tr>
<td>638.imagick_s 112</td>
</tr>
<tr>
<td>644.nab_s 112</td>
</tr>
<tr>
<td>649.fotonik3d_s 112</td>
</tr>
<tr>
<td>654.roms_s 112</td>
</tr>
</tbody>
</table>

Hardware

CPU Name: Intel Xeon Platinum 8480+
Max MHz: 3800
Nominal: 2000
Enabled: 112 cores, 2 chips
Orderable: 1.2 chips
Cache L1: 32 KB I + 48 KB D on chip per core
L2: 2 MB I+D on chip per core
L3: 105 MB I+D on chip per chip
Other: None
Memory: 1 TB (16 x 64 GB 2Rx4 PC5-4800B-R)
Storage: 1 x 7.68 TB PCIe 4.0x4 NVMe SSD
Other: None

Software

OS: Red Hat Enterprise Linux release 9.0 (Plow)
Kernel 5.14.0-70.22.1.el9_0.x86_64
Compiler: C/C++: Version 2022.1 of Intel oneAPI DPC++/C++ Compiler for Linux;
Fortran: Version 2022.1 of Intel Fortran Compiler for Linux;
Parallel: Yes
Firmware: Version 3A11 released Dec-2022
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
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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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>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>112</td>
<td>55.4</td>
<td>1060</td>
<td>55.2</td>
<td>1070</td>
<td>55.0</td>
<td>1070</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>112</td>
<td>39.7</td>
<td>420</td>
<td>39.9</td>
<td>418</td>
<td>39.7</td>
<td>420</td>
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<tr>
<td>619.lbm_s</td>
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<td>18.9</td>
<td>277</td>
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<td>621.wrf_s</td>
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<td>65.1</td>
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<td>203</td>
<td>65.0</td>
<td>204</td>
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<td>627.cam4_s</td>
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<td>42.9</td>
<td>207</td>
<td>44.0</td>
<td>201</td>
<td>42.5</td>
<td>209</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>112</td>
<td>127</td>
<td>93.4</td>
<td>128</td>
<td>93.0</td>
<td>127</td>
<td>93.2</td>
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<tr>
<td>638.imagick_s</td>
<td>112</td>
<td>19.0</td>
<td>760</td>
<td>18.9</td>
<td>763</td>
<td>18.9</td>
<td>764</td>
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<tr>
<td>644.nab_s</td>
<td>112</td>
<td>21.9</td>
<td>797</td>
<td>22.0</td>
<td>796</td>
<td>21.8</td>
<td>800</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>112</td>
<td>53.6</td>
<td>170</td>
<td>53.2</td>
<td>172</td>
<td>53.9</td>
<td>169</td>
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<tr>
<td>654.roms_s</td>
<td>112</td>
<td>31.1</td>
<td>507</td>
<td>31.8</td>
<td>495</td>
<td>31.6</td>
<td>498</td>
</tr>
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</table>

SPECspeed®2017_fp_base = 347
SPECspeed®2017_fp_peak = Not Run

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 = "/root/cpu2017/lib/intel64:/root/cpu2017/je5.0.1-64"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB 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) 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

(Continued on next page)
General Notes (Continued)


Platform Notes

BIOS Configuration
Enable LP [Global] set to Single LP
Patrol Scrub set to Disabled
SNC set to Disabled
LLC dead line alloc set to Disabled
Hardware P-States set to Disable

Sysinfo program /root/cpu2017/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Fri Feb 10 20:52:20 2023

SUT (System Under Test) info as seen by some common utilities.

Table of contents
1. uname -a
2. w
3. Username
4. ulimit -a
5. sysinfo process ancestry
6. /proc/cpupinfo
7. lscpu
8. numactl --hardware
9. /proc/meminfo
10. who -r
11. Systemd service manager version: systemd 250 (250-6.el9_0)
12. Services, from systemctl list-unit-files
13. Linux kernel boot-time arguments, from /proc/cmdline
14. cpupower frequency-info
15. sysctl
16. /sys/kernel/mm/transparent_hugepage
17. /sys/kernel/mm/transparent_hugepage/klhugepaged
18. OS release
19. Disk information
20. /sys/devices/virtual/dmi/id
21. dmidecode
22. BIOS

(Continued on next page)
Platform Notes (Continued)

2. w

20:52:20 up 26 min, 1 user, load average: 86.24, 97.23, 80.32

USER TTY LOGIN@ IDLE JCPU PCPU WHAT
root tty1 20:26 26:13 0.89s 0.02s /bin/bash ./S6Qtest.sh

3. Username

From environment variable $USER: root

4. ulimit -a

real-time non-blocking time (microseconds, -R) unlimited
core file size (blocks, -c) 0
data seg size (kbytes, -d) unlimited
 scheduling priority (-e) 0
file size (blocks, -f) unlimited
 pending signals (-i) 4124314
max locked memory (kbytes, -l) unlimited
max memory size (kbytes, -m) unlimited
open files (-n) 1024
pipe size (512 bytes, -p) 8
POSIX message queues (bytes, -q) 819200
real-time priority (-r) 0
stack size (kbytes, -s) unlimited
cpu time (seconds, -t) unlimited
max user processes (-u) 4124314
virtual memory (kbytes, -v) unlimited
file locks (-x) unlimited

5. sysinfo process ancestry

/usr/lib/systemd/systemd rhgb --switched-root --system --deserialize 31
login -- root
- bash
/bin/bash ./S6Qtest.sh

(Continued on next page)
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**SPECspeed®2017_fp_base = 347**

**SPECspeed®2017_fp_peak = Not Run**

---

**Platform Notes (Continued)**

```
specperl $SPEC/bin/sysinfo
$SPEC = /root/cpu2017
```

6. `/proc/cpuinfo`

- `model name`: Intel(R) Xeon(R) Platinum 8480+
- `vendor_id`: GenuineIntel
- `cpu family`: 6
- `model`: 143
- `stepping`: 8
- `microcode`: 0x2b000111
- `bugs`: spectre_v1 spectre_v2 spec_store_bypass swapgs
- `cpu cores`: 56
- `siblings`: 56

2 physical ids (chips)
112 processors (hardware threads)
physical id 0: core ids 0-55
physical id 1: core ids 0-55
physical id 0: apicids
0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52,54,56,58,60,62,64,66,68,70,72,
74,76,78,80,82,84,86,88,90,92,94,96,98,100,102,104,106,108,110
physical id 1: apicids
80,182,184,186,188,190,192,194,196,198,200,202,204,206,208,210,212,214,216,218,220,222,224,226,228,230,23
2,234,236,238

Caution: `/proc/cpuinfo` data regarding chips, cores, and threads is not necessarily reliable, especially for virtualized systems. Use the above data carefully.

7. `lscpu`

From `lscpu` from util-linux 2.37.4:

- `Architecture`: x86_64
- `CPU op-mode(s)`: 32-bit, 64-bit
- `Address sizes`: 52 bits physical, 57 bits virtual
- `Byte Order`: Little Endian
- `CPU(s)`: 112
- `On-line CPU(s) list`: 0-111
- `Vendor ID`: GenuineIntel
- `BIOS Vendor ID`: Intel(R) Corporation
- `Model name`: Intel(R) Xeon(R) Platinum 8480+
- `BIOS Model name`: Intel(R) Xeon(R) Platinum 8480+
- `CPU family`: 6
- `Model`: 143
- `Thread(s) per core`: 1
- `Core(s) per socket`: 56
- `Socket(s)`: 2

(Continued on next page)
Platform Notes (Continued)

Virtualization: VT-x
L1d cache: 5.3 MiB (112 instances)
L1i cache: 3.5 MiB (112 instances)
L2 cache: 224 MiB (112 instances)
L3 cache: 210 MiB (2 instances)
NUMA node(s): 2
NUMA node0 CPU(s): 0-55
NUMA node1 CPU(s): 56-111
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl
Vulnerability Spectre v1: Mitigation; usercopy/swaps barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected

From lscpu --cache:

<table>
<thead>
<tr>
<th>NAME</th>
<th>ONE-SIZE</th>
<th>ALL-SIZE</th>
<th>WAYS</th>
<th>TYPE</th>
<th>LEVEL</th>
<th>SETS</th>
<th>PHY-LINE</th>
<th>COHERENCY-SIZE</th>
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<tbody>
<tr>
<td>L1d</td>
<td>48K</td>
<td>5.3M</td>
<td>12</td>
<td>Data</td>
<td>1</td>
<td>64</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L1i</td>
<td>32K</td>
<td>3.5M</td>
<td>8</td>
<td>Instruction</td>
<td>1</td>
<td>64</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L2</td>
<td>2M</td>
<td>224M</td>
<td>16</td>
<td>Unified</td>
<td>2</td>
<td>2048</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L3</td>
<td>105M</td>
<td>210M</td>
<td>15</td>
<td>Unified</td>
<td>3</td>
<td>114688</td>
<td>1</td>
<td>64</td>
</tr>
</tbody>
</table>

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| SPECspeed®2017_fp_base = 347 |
| SPECspeed®2017_fp_peak = Not Run |

CPU2017 License: 9050
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Tested by: Quanta Computer Inc.

Platform Notes (Continued)

8. numactl --hardware  
NOTE: a numactl 'node' might or might not correspond to a physical chip.
   available: 2 nodes (0-1)
   node 0 cpus: 0-55
   node 0 size: 515099 MB
   node 0 free: 512161 MB
   node 1 cpus: 56-111
   node 1 size: 516036 MB
   node 1 free: 514867 MB
   node distances:
   node   0   1
   0:  10  21
   1:  21  10

9. /proc/meminfo
   MemTotal:       1055883784 kB

10. who -r
    run-level 3 Feb 10 20:26

11. Systemd service manager version: systemd 250 (250-6.el9_0)
    Default Target:  
    multi-user    running

12. Services, from systemctl list-unit-files
    STATE UNIT FILES
    enabled  
    ModemManager NetworkManager NetworkManager-dispatcher NetworkManager-wait-online
    accounts-daemon atd auditd avahi-daemon bluetooth chrony cron dbus-broker gdm
    getty@ insights-client-boot irqbalance iscsi iscsi-onboot kdump libstoragegmnt
    low-memory-monitor lvm2-monitor mcelog mdmonitor microcode multipathd nis-domainname
    nvme-san-boot-connections ostree-remount power-profiles-daemon qemu-guest-agent rhamcertd
    rpcbind rsyslog rtkit-daemon selinux-autorelabel-mark smartd sshd sssd switcheroo-control
    systemd-network-generator udisks2 upower vgauthd vmtoolsd
    enabled-runtime rc-local systemd-remount-fs
    disabled  
    arp-ethers blk-availability brttv brttv0 canberra-system-bootstrap canberra-system-shutdown
    canberra-system-shutdown-reboot chrony-wait cni-dhcp console-getty cpupower cups-browsed
    dbus-daemon debug-shell dnsmasq firewalld gssproxy iprdump iprinit iprupdate ipsec iscsi
    iscsiuio kpatch kvm_stat ledmon man-db-restart-cache-update nfs-bkmap nfs-server nftables
    nvme-autoconnect podman podman-auto-update podman-restart psacct ras-mc-ctl rasdaemon
    rdisc rchd rham rham-facts rpdmb-rebuild serial-getty@ speech-dispatcher sshd-keystore
    systemd-boot-check-no-failures systemd-pstore systemd-systemd sysmax wpa_supplicant
    indirect  
    spice-vdagentd ssd-autofs ssd-kcm ssd-nss ssd-pac sshd-pam sshd-ssn sshd-sudo

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Platform Notes (Continued)

13. Linux kernel boot-time arguments, from /proc/cmdline
   
   BOOT_IMAGE=(hd4,gpt2)/vmlinuz-5.14.0-70.22.1.el9_0.x86_64
   root=UUID=3224807a-bb12-4011-9c08-e4342403c547
   ro
   crashkernel=1G-4G:192M,4G-64G:256M,64G--:512M
   resume=UUID=ffab002c-001d-4ca9-b552-95895861c71a
   nomodeset
   rhgb
   quiet
   selinux=0
   default_hugepagesz=1G
   hugepagesz=1G

14. cpupower frequency-info
   analyzing CPU 0:
   current policy: frequency should be within 800 MHz and 2.00 GHz.
   The governor "performance" may decide which speed to use
   within this range.
   boost state support:
   Supported: yes
   Active: yes

15. sysctl
   kernel.numa_balancing   1
   kernel.randomize_va_space 2
   vm.compaction_proactiveness 20
   vm.dirty_background_bytes 0
   vm.dirty_background_ratio 10
   vm.dirty_bytes 0
   vm.dirty_expire_centisecs 3000
   vm.dirty_ratio 20
   vm.dirty_writeback_centisecs 500
   vm.dirtytime_expire_seconds 432000
   vm.extfrag_threshold 500
   vm.min_unmapped_ratio 1
   vm.nr_hugepages 0
   vm.nr_hugepages_mempolicy 0
   vm.nr_overcommit_hugepages 0
   vm.swappiness 60
   vm.watermark_boost_factor 15000
   vm.watermark_scale_factor 10
   vm.zone_reclaim_mode 0

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

16. /sys/kernel/mm/transparent_hugepage
   - defrag: always defer defer+madvise [madvise] never
   - enabled: [always] madvise never
   - hpage_pmd_size: 2097152
   - shmem_enabled: always within_size advise [never] deny force

17. /sys/kernel/mm/transparent_hugepage/khugepaged
   - alloc_sleep_millisecs: 60000
   - defrag: 1
   - max_ptes_none: 511
   - max_ptes_shared: 256
   - max_ptes_swap: 64
   - pages_to_scan: 4096
   - scan_sleep_millisecs: 10000

18. OS release
   - From /etc/*-release /etc/*-version
     - os-release: Red Hat Enterprise Linux 9.0 (Plow)
     - redhat-release: Red Hat Enterprise Linux release 9.0 (Plow)
     - system-release: Red Hat Enterprise Linux release 9.0 (Plow)

19. Disk information
   - SPEC is set to: /root/cpu2017
     - Filesystem: Type Size Used Avail Use% Mounted on
       - /dev/nvme0n1p6: xfs 310G 21G 290G 7% /

20. /sys/devices/virtual/dmi/id
    - Vendor: Quanta Cloud Technology Inc.
    - Product: QuantaGrid D54Q-2U

21. dmidecode
   - Additional information from dmidecode 3.3 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:
     - 16x Micron MTC40F2046S1RC48BA1 64 GB 2 rank 4800

22. BIOS

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**Platform Notes (Continued)**

(This section combines info from /sys/devices and dmidecode.)

- **BIOS Vendor:** American Megatrends International, LLC.  
- **BIOS Version:** 3A11  
- **BIOS Date:** 12/02/2022  
- **BIOS Revision:** 5.29  
- **Firmware Revision:** 3.8

---

**Compiler Version Notes**

```
C               | 619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)
------------------------
```

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2022.1.0 Build 20220316  
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

```
C++, C, Fortran | 607.cactuBSSN_s(base)
------------------------
```

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2022.1.0 Build 20220316  
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

```
Fortran         | 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
------------------------
```

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version  
2022.1.0 Build 20220316  
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

```
Fortran, C      | 621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)
------------------------
```

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version  
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Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

**Compiler Version Notes**

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**Compiler Version Notes (Continued)**

Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

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**Base Compiler Invocation**

C benchmarks:
icx

Fortran benchmarks:
ifx

Benchmarks using both Fortran and C:
ifx icx

Benchmarks using Fortran, C, and C++:
icpx icx ifx

**Base Portability Flags**

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian -assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

**Base Optimization Flags**

C benchmarks:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Fortran benchmarks:
-m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX512 -Ofast -ffast-math

(Continued on next page)
Quanta Cloud Technology
(Test Sponsor: Quanta Computer Inc.)

D54Q-2U (Intel Xeon Platinum 8480+, 2.0GHz)

| SPECspeed®2017_fp_base = 347 |
| SPECspeed®2017_fp_peak = Not Run |

| CPU2017 License: 9050 | Test Date: Jan-2023 |
| Test Sponsor: Quanta Computer Inc. | Hardware Availability: Nov-2022 |
| Tested by: Quanta Computer Inc. | Software Availability: Aug-2022 |

**Base Optimization Flags (Continued)**

Fortran benchmarks (continued):
- `-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp`  
- `-nostandard-realloc-lhs -align array32byte -auto`  
- `-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

Benchmarks using both Fortran and C:
- `-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto`  
- `-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp`  
- `-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte -auto`  
- `-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

Benchmarks using Fortran, C, and C++:
- `-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto`  
- `-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp`  
- `-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte -auto`  
- `-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

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

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Quanta-Computer-Inc-Eagle_Stream-Platform-Settings-V1.0.xml

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