



SPEC CPU®2017 Floating Point Speed Result

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Nettrix

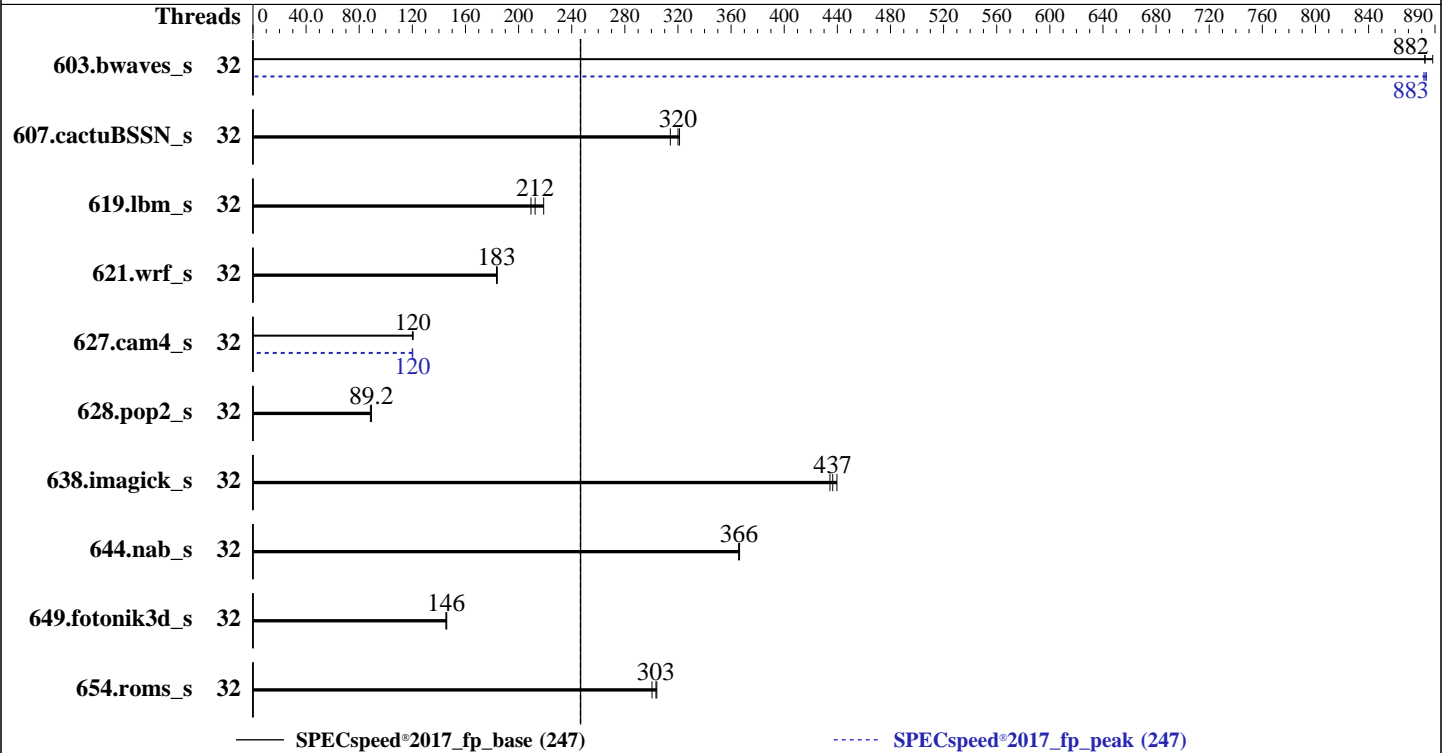
SPECspeed®2017_fp_base = 247

R620 G50 (Intel Xeon Gold 6426Y, 2.50 GHz)

SPECspeed®2017_fp_peak = 247

CPU2017 License: 6138
Test Sponsor: Nettrix
Tested by: Nettrix

Test Date: Mar-2023
Hardware Availability: Jan-2023
Software Availability: Dec-2022



Hardware

CPU Name: Intel Xeon Gold 6426Y
Max MHz: 4100
Nominal: 2500
Enabled: 32 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: 37.5 MB I+D on chip per chip
Other: None
Memory: 1 TB (16 x 64 GB 2Rx4 PC5-4800B-R)
Storage: 1 x 960 GB NVME SSD
Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP4
5.14.21-150400.22-default
Compiler: C/C++: Version 2023.0 of Intel oneAPI DPC++/C++
Compiler for Linux;
Fortran: Version 2023.0 of Intel Fortran Compiler
Classic for Linux;
C/C++: Version 2023.0 of Intel C/C++ Compiler
Classic for Linux
Parallel: Yes
Firmware: Nettrix BIOS Version NNH1041018-U00-1 released
Nov-2022
File System: btrfs
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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Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	32	66.9	882	66.4	888	66.9	882	32	66.9	882	66.8	883	66.8	884
607.cactuBSSN_s	32	53.0	314	52.1	320	51.9	321	32	53.0	314	52.1	320	51.9	321
619.lbm_s	32	24.7	212	23.9	219	25.0	209	32	24.7	212	23.9	219	25.0	209
621.wrf_s	32	72.1	183	72.1	183	71.9	184	32	72.1	183	72.1	183	71.9	184
627.cam4_s	32	73.5	121	73.8	120	73.7	120	32	73.9	120	73.8	120	73.7	120
628.pop2_s	32	134	88.4	133	89.2	133	89.2	32	134	88.4	133	89.2	133	89.2
638.imagick_s	32	32.8	440	33.2	434	33.0	437	32	32.8	440	33.2	434	33.0	437
644.nab_s	32	47.7	366	47.7	366	47.8	366	32	47.7	366	47.7	366	47.8	366
649.fotonik3d_s	32	62.6	146	62.5	146	62.7	145	32	62.6	146	62.5	146	62.7	145
654.roms_s	32	51.9	303	51.8	304	52.4	300	32	51.9	303	51.8	304	52.4	300

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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 = "/home/lijq/lib/intel64:/home/lijq/je5.0.1-64"
MALLOCONF = "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
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.
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
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

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General Notes (Continued)

sources available from jemalloc.net or <https://github.com/jemalloc/jemalloc/releases>

Platform Notes

BIOS Configuration:

Enable LP [Global] set to Single LP
LLC Prefetch set to Enabled
SNC (Sub NUMA) set to Disabled
Patrol Scrub set to Disabled
LLC dead line alloc set to Disabled
XPT Prefetch set to Enabled
KTI Prefetch set to Disabled
DCU Streamer Prefetcher set to Disabled
Hardware P-States set to Native Mode

Sysinfo program /home/lijq/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Fri Apr 29 20:21:35 2022

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

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Platform Notes (Continued)

23. BIOS

1. `uname -a`

```
Linux localhost 5.14.21-150400.22-default #1 SMP PREEMPT_DYNAMIC Wed May 11 06:57:18 UTC 2022 (49db222)
x86_64 x86_64 x86_64 GNU/Linux
```

2. `w`

```
20:21:35 up 21 min, 1 user, load average: 0.06, 7.53, 9.86
USER      TTY      FROM          LOGIN@   IDLE   JCPU   PCPU WHAT
root     pts/0    10.2.48.216   20:03   39.00s  0.91s  0.00s -bash
```

3. Username

```
From environment variable $USER: root
```

4. `ulimit -a`

```
core file size          (blocks, -c) unlimited
data seg size           (kbytes, -d) unlimited
scheduling priority     (-e) 0
file size                (blocks, -f) unlimited
pending signals         (-i) 4125309
max locked memory       (kbytes, -l) 64
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) 4125309
virtual memory          (kbytes, -v) unlimited
file locks              (-x) unlimited
```

5. `sysinfo process ancestry`

```
/usr/lib/systemd/systemd --switched-root --system --deserialize 29
sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
sshd: root@pts/0
-bash
-bash
runcpu --nobuild --reportable --iterations 3 --define default-platform-flags -c
ic2023.0-lin-sapphirerapids-speed-20221201.cfg --define cores=32 --tune base,peak -o all --define
drop_caches fpspeed
```

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Platform Notes (Continued)

```
runcpu --nobuild --reportable --iterations 3 --define default-platform-flags --configfile
ic2023.0-lin-sapphirerapids-speed-20221201.cfg --define cores=32 --tune base,peak --output_format all
--define drop_caches --nopower --runmode speed --tune base:peak --size refspeed fpspeed --nopreenv
--note-preenv --logfile $SPEC/tmp/CPU2017.111/temlogs/preenv.fpspeed.111.0.log --lognum 111.0
--from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/lijq
```

6. /proc/cpuinfo

```
model name      : Intel(R) Xeon(R) Gold 6426Y
vendor_id       : GenuineIntel
cpu family      : 6
model           : 143
stepping        : 8
microcode       : 0x2b000111
bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
cpu cores       : 16
siblings        : 16
2 physical ids (chips)
32 processors (hardware threads)
physical id 0:  core ids 0-15
physical id 1:  core ids 0-15
physical id 0:  apicids 0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30
physical id 1:  apicids 128,130,132,134,136,138,140,142,144,146,148,150,152,154,156,158
```

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 2.37.2:

```
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):                32
On-line CPU(s) list:   0-31
Vendor ID:             GenuineIntel
Model name:            Intel(R) Xeon(R) Gold 6426Y
CPU family:            6
Model:                 143
Thread(s) per core:    1
Core(s) per socket:    16
Socket(s):              2
Stepping:               8
CPU max MHz:           4100.0000
```

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Platform Notes (Continued)

```

CPU min MHz:                800.0000
BogoMIPS:                   5000.00
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 tsc_known_freq pni pclmulqdq dtes64 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 cat_l2 cdp_l3 invpcid_single
                                intel_ppin cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi
                                flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2
                                erms invpcid rtm cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma
                                clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl xsaveopt xsavec
                                xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
                                split_lock_detect avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pln pts
                                hwp hwp_act_window hwp_epp hwp_pkg_req avx512vbmi umip pku ospke waitpkg
                                avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg tme
                                avx512_vpopcntdq la57 rdpid bus_lock_detect cldemote movdiri movdir64b
                                enqcmd fsrm md_clear serialize tsxldtrk pconfig arch_lbr avx512_fp16
                                amx_tile flush_llc arch_capabilities

Virtualization:              VT-x
L1d cache:                   1.5 MiB (32 instances)
L1i cache:                   1 MiB (32 instances)
L2 cache:                    64 MiB (32 instances)
L3 cache:                    75 MiB (2 instances)
NUMA node(s):                2
NUMA node0 CPU(s):           0-15
NUMA node1 CPU(s):           16-31
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 and seccomp
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:

NAME	ONE-SIZE	ALL-SIZE	WAYS	TYPE	LEVEL	SETS	PHY-LINE	COHERENCY-SIZE
L1d	48K	1.5M	12	Data	1	64	1	64
L1i	32K	1M	8	Instruction	1	64	1	64
L2	2M	64M	16	Unified	2	2048	1	64
L3	37.5M	75M	15	Unified	3	40960	1	64

8. numactl --hardware

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Platform Notes (Continued)

NOTE: a numactl 'node' might or might not correspond to a physical chip.

```
available: 2 nodes (0-1)
node 0 cpus: 0-15
node 0 size: 515577 MB
node 0 free: 511551 MB
node 1 cpus: 16-31
node 1 size: 515771 MB
node 1 free: 515210 MB
node distances:
node  0  1
  0:  10  21
  1:  21  10
```

9. /proc/meminfo
MemTotal: 1056101592 kB

10. who -r
run-level 3 Apr 29 20:00

11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
Default Target Status
multi-user running

12. Services, from systemctl list-unit-files
STATE UNIT FILES
enabled apparmor auditd cron getty@ haveged irqbalance issue-generator kbdsettings kdump
kdump-early nvme-fc-boot-connections postfix purge-kernels rollback sshd wicked
wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
enabled-runtime systemd-remount-fs
disabled boot-sysctl ca-certificates chrony-wait chronyd console-getty debug-shell
exchange-bmc-os-info grub2-once haveged-switch-root ipmievd issue-add-ssh-keys kexec-load
nfs nfs-blkmap nvme-fc-autoconnect rpcbind rpmconfigcheck serial-getty@
systemd-boot-check-no-failures systemd-network-generator systemd-sysext
systemd-time-wait-sync systemd-timesyncd tuned
indirect wickedd

13. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
root=UUID=9e7d079b-be10-4779-89e1-79f870e2ca09
splash=silent
mitigations=auto
quiet

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Platform Notes (Continued)

```
security=apparmor
crashkernel=300M,high
crashkernel=72M,low
```

14. cpupower frequency-info

```
analyzing CPU 0:
  current policy: frequency should be within 800 MHz and 4.10 GHz.
                  The governor "performance" may decide which speed to use
                  within this range.

  boost state support:
    Supported: yes
    Active: yes
```

15. tuned-adm active

```
Current active profile: throughput-performance
```

16. 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    43200
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                   10
vm.watermark_boost_factor      15000
vm.watermark_scale_factor      10
vm.zone_reclaim_mode           0
```

17. /sys/kernel/mm/transparent_hugepage

```
defrag          always defer defer+madvice [madvice] never
enabled         [always] madvice never
hpage_pmd_size  2097152
shmem_enabled   always within_size advise [never] deny force
```

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Platform Notes (Continued)

```

-----
18. /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

```

```

-----
19. OS release
   From /etc/*-release /etc/*-version
   os-release SUSE Linux Enterprise Server 15 SP4

```

```

-----
20. Disk information
   SPEC is set to: /home/lijq
   Filesystem      Type      Size    Used Avail Use% Mounted on
   /dev/nvme0n1p3 btrfs    854G    190G  663G  23% /home

```

```

-----
21. /sys/devices/virtual/dmi/id
   Vendor:          Nettrix
   Product:         R620 G50
   Product Family: Rack
   Serial:          6101810603447822

```

```

-----
22. dmidecode
   Additional information from dmidecode 3.2 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:
     11x Samsung M321R8GA0BB0-CQKEG 64 GB 2 rank 4800
     5x Samsung M321R8GA0BB0-CQKVG 64 GB 2 rank 4800

```

```

-----
23. BIOS
   (This section combines info from /sys/devices and dmidecode.)
   BIOS Vendor:      American Megatrends International, LLC.
   BIOS Version:     NNH1041018-U00-1
   BIOS Date:        11/01/2022
   BIOS Revision:    5.29

```



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Compiler Version Notes

=====
C | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
| 644.nab_s(base, peak)
=====

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

=====
C++, C, Fortran | 607.cactuBSSN_s(base, peak)
=====

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version
2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

=====
Fortran | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
| 654.roms_s(base, peak)
=====

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version
2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

=====
Fortran, C | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
| 628.pop2_s(base, peak)
=====

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version
2023.0.0 Build 20221201
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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
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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 -xsapphirerapids -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -Wno-implicit-int -mprefer-vector-width=512
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Fortran benchmarks:

```
-m64 -Wl,-z,muldefs -DSPEC_OPENMP -xsapphirerapids -Ofast
-ffast-math -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 -xsapphirerapids -Ofast -ffast-math
```

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SPEC CPU®2017 Floating Point Speed Result

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Nettrix

SPECspeed®2017_fp_base = 247

R620 G50 (Intel Xeon Gold 6426Y, 2.50 GHz)

SPECspeed®2017_fp_peak = 247

CPU2017 License: 6138
Test Sponsor: Nettrix
Tested by: Nettrix

Test Date: Mar-2023
Hardware Availability: Jan-2023
Software Availability: Dec-2022

Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):

```
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -Wno-implicit-int -mprefer-vector-width=512
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Benchmarks using Fortran, C, and C++:

```
-m64 -std=c++14 -std=c11 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP -Wno-implicit-int
-mprefer-vector-width=512 -nostandard-realloc-lhs -align array32byte
-auto -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Peak 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

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

619.lbm_s: basepeak = yes

638.imagick_s: basepeak = yes

(Continued on next page)



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CPU2017 License: 6138

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Test Date: Mar-2023

Hardware Availability: Jan-2023

Software Availability: Dec-2022

Peak Optimization Flags (Continued)

644.nab_s: basepeak = yes

Fortran benchmarks:

```
603.bwaves_s: -m64 -Wl,-z,muldefs -DSPEC_OPENMP -xsapphirerapids
-Ofast -ffast-math -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
```

649.fotonik3d_s: basepeak = yes

654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

621.wrf_s: basepeak = yes

```
627.cam4_s: -m64 -std=c11 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP
-Wno-implicit-int -mprefer-vector-width=512
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

628.pop2_s: basepeak = yes

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: basepeak = yes

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

<http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.html>

<http://www.spec.org/cpu2017/flags/Nettrix-Platform-Settings-V1.3-SPR-revA.html>

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

<http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.xml>

<http://www.spec.org/cpu2017/flags/Nettrix-Platform-Settings-V1.3-SPR-revA.xml>

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