



SPEC CPU®2017 Floating Point Speed Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant MicroServer Gen11

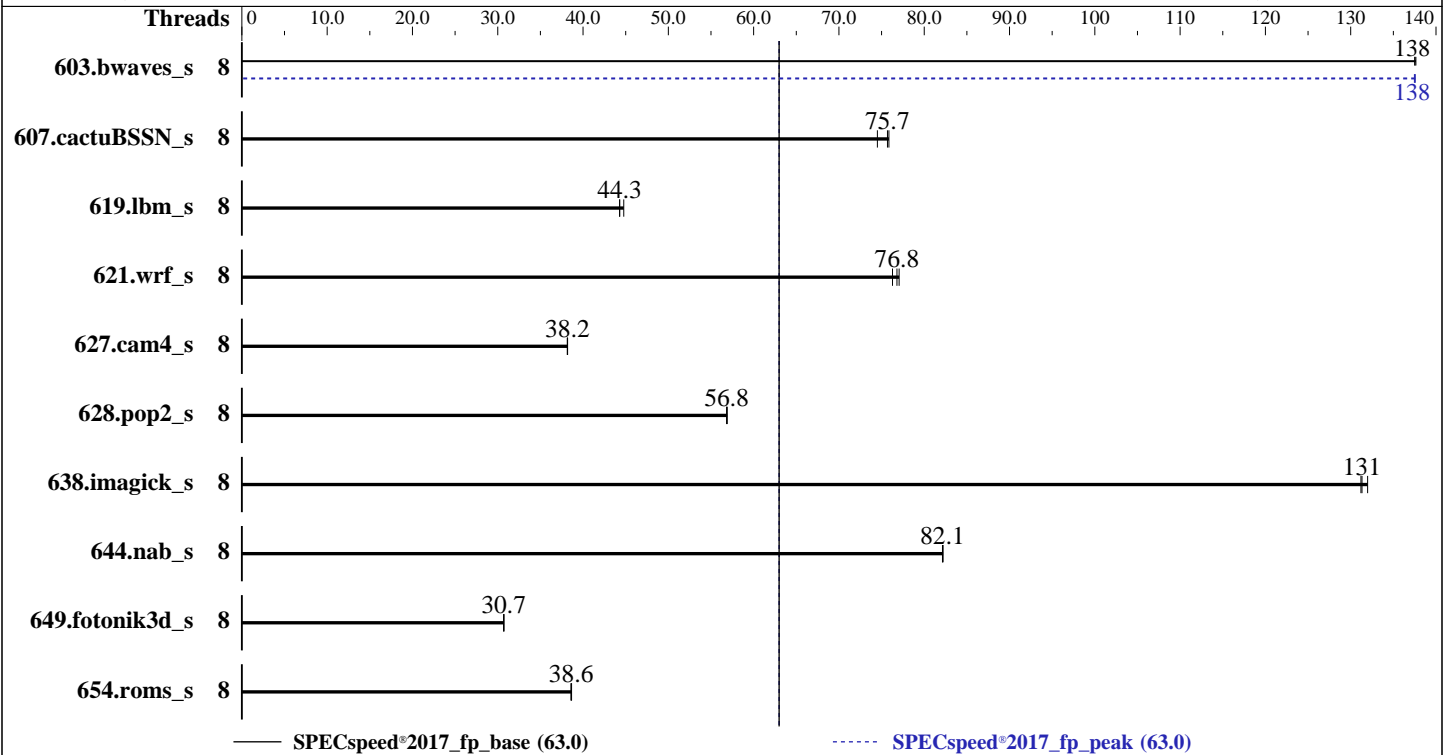
(3.40 Ghz, Intel Xeon E-2434)

SPECspeed®2017_fp_base = 63.0

SPECspeed®2017_fp_peak = 63.0

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

Test Date: Apr-2024
Hardware Availability: Jun-2024
Software Availability: Dec-2023



Hardware

CPU Name: Intel Xeon E-2434
 Max MHz: 5000
 Nominal: 3400
 Enabled: 4 cores, 1 chip, 2 threads/core
 Orderable: 1 chip
 Cache L1: 32 KB I + 48 KB D on chip per core
 L2: 2 MB I+D on chip per core
 L3: 12 MB I+D on chip per chip
 Other: None
 Memory: 64 GB (2 x 32 GB 2Rx8 PC5-5600B-R, running at 4400), orderable using HPE part# P64339-B21
 Storage: 1 x 1 TB 7.2 K SATA HDD
 Other: CPU Cooling: Air

Software

OS: Red Hat Enterprise Linux 9.2 (Plow)
 Kernel 5.14.0-284.11.1.el9_2.x86_64
 Compiler: C/C++: Version 2024.0.2 of Intel oneAPI DPC++/C++ Compiler for Linux;
 Fortran: Version 2024.0.2 of Intel Fortran Compiler for Linux;
 Parallel: Yes
 Firmware: HPE BIOS Version v1.48 03/14/2024 released Mar-2024
 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
 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 |
| 603.bwaves_s | 8 | 429 | 138 | 429 | 138 | 429 | 138 | 8 | 429 | 138 | 429 | 137 | 429 | 138 |
| 607.cactuBSSN_s | 8 | 224 | 74.5 | 220 | 75.7 | 220 | 75.9 | 8 | 224 | 74.5 | 220 | 75.7 | 220 | 75.9 |
| 619.lbm_s | 8 | 118 | 44.3 | 118 | 44.3 | 117 | 44.8 | 8 | 118 | 44.3 | 118 | 44.3 | 117 | 44.8 |
| 621.wrf_s | 8 | 172 | 77.1 | 173 | 76.3 | 172 | 76.8 | 8 | 172 | 77.1 | 173 | 76.3 | 172 | 76.8 |
| 627.cam4_s | 8 | 232 | 38.2 | 232 | 38.2 | 232 | 38.2 | 8 | 232 | 38.2 | 232 | 38.2 | 232 | 38.2 |
| 628.pop2_s | 8 | 209 | 56.8 | 209 | 56.8 | 209 | 56.9 | 8 | 209 | 56.8 | 209 | 56.8 | 209 | 56.9 |
| 638.imagick_s | 8 | 109 | 132 | 110 | 131 | 110 | 131 | 8 | 109 | 132 | 110 | 131 | 110 | 131 |
| 644.nab_s | 8 | 213 | 82.1 | 213 | 82.2 | 213 | 82.1 | 8 | 213 | 82.1 | 213 | 82.2 | 213 | 82.1 |
| 649.fotonik3d_s | 8 | 297 | 30.7 | 297 | 30.7 | 297 | 30.7 | 8 | 297 | 30.7 | 297 | 30.7 | 297 | 30.7 |
| 654.roms_s | 8 | 407 | 38.7 | 408 | 38.6 | 408 | 38.6 | 8 | 407 | 38.7 | 408 | 38.6 | 408 | 38.6 |

SPECspeed®2017_fp_base = **63.0**

SPECspeed®2017_fp_peak = **63.0**

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"
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
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/CPU2017/lib/intel64:/home/CPU2017/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 Red Hat Enterprise Linux 8.4
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
```



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Platform Notes

BIOS Configuration:

Workload Profile set to General Peak Frequency Compute
Thermal Configuration set to Maximum Cooling
Enhanced Processor Performance Profile set to Enabled

Sysinfo program /home/CPU2017/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Sun Apr 14 14:58:53 2024

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

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17. /sys/kernel/mm/transparent_hugepage/khugepaged
18. OS release
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20. /sys/devices/virtual/dmi/id
21. dmidecode
22. BIOS

```
1. uname -a
Linux localhost.localdomain 5.14.0-284.11.1.e19_2.x86_64 #1 SMP PREEMPT_DYNAMIC Wed Apr 12 10:45:03 EDT
2023 x86_64 x86_64 x86_64 GNU/Linux
```

```
2. w
14:58:53 up 1 min, 0 users, load average: 0.28, 0.16, 0.06
USER      TTY      LOGIN@  IDLE   JCPU   PCPU   WHAT
```

```
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) 256675
```

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Platform Notes (Continued)

```

max locked memory      (kbytes, -l) 8192
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) 256675
virtual memory         (kbytes, -v) unlimited
file locks             (-x) unlimited

```

5. sysinfo process ancestry

```

/usr/lib/systemd/systemd --switched-root --system --deserialize 31
sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
sshd: root [priv]
sshd: root@notty
bash -c cd $SPEC/ && $SPEC/fpspeed.sh
runcpu --nobuild --action validate --define default-platform-flags -c
  ic2024.0.2-lin-core-avx2-speed-20231213.cfg --define cores=8 --tune base,peak -o all --define drop_caches
  fpspeed
runcpu --nobuild --action validate --define default-platform-flags --configfile
  ic2024.0.2-lin-core-avx2-speed-20231213.cfg --define cores=8 --tune base,peak --output_format all --define
  drop_caches --nopower --runmode speed --tune base:peak --size refspeed fpspeed --nopreenv --note-preenv
  --logfile $SPEC/tmp/CPU2017.001/templogs/preenv.fpspeed.001.0.log --lognum 001.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/CPU2017

```

6. /proc/cpuinfo

```

model name      : Intel(R) Xeon(R) E E-2434
vendor_id      : GenuineIntel
cpu family     : 6
model          : 183
stepping       : 1
microcode      : 0x121
bugs           : spectre_v1 spectre_v2 spec_store_bypass swapgs eibrs_pbrsb
cpu cores      : 4
siblings       : 8
1 physical ids (chips)
8 processors (hardware threads)
physical id 0: core ids 0-3
physical id 0: apicids 0-7

```

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:      46 bits physical, 48 bits virtual
Byte Order:         Little Endian
CPU(s):            8
On-line CPU(s) list: 0-7
Vendor ID:          GenuineIntel
BIOS Vendor ID:    Intel(R) Corporation
Model name:         Intel(R) Xeon(R) E E-2434

```

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Platform Notes (Continued)

```

BIOS Model name: Intel(R) Xeon(R) E E-2434
CPU family: 6
Model: 183
Thread(s) per core: 2
Core(s) per socket: 4
Socket(s): 1
Stepping: 1
BogoMIPS: 6835.20
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 monitor
        ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid sse4_1 sse4_2
        x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm
        abm 3dnowprefetch cpuid_fault epb invpcid_single ssbd ibrs ibpb stibp
        ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase
        tsc_adjust bmi1 avx2 smep bmi2 erms invpcid rdseed adx smap clflushopt
        clwb intel_pt sha_ni xsaveopt xsavec xgetbv1 xsaves split_lock_detect
        avx_vnni dtherm ida arat pln pts hfi umip pku ospke waitpkg gfni vaes
        vpclmulqdq tme rdpid movdiri movdir64b fsrm md_clear serialize pconfig
        arch_lbr ibt flush_lld arch_capabilities

Virtualization: VT-x
L1d cache: 192 KiB (4 instances)
L1i cache: 128 KiB (4 instances)
L2 cache: 8 MiB (4 instances)
L3 cache: 12 MiB (1 instance)
NUMA node(s): 1
NUMA node0 CPU(s): 0-7
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Mmio stale data: Not affected
Vulnerability Retbleed: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl
Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling, PBRSE-eIBRS SW
sequence
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 192K 12 Data 1 64 1 64
L1i 32K 128K 8 Instruction 1 64 1 64
L2 2M 8M 16 Unified 2 2048 1 64
L3 12M 12M 6 Unified 3 32768 1 64

```

```

-----
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
available: 1 nodes (0)
node 0 cpus: 0-7
node 0 size: 64210 MB
node 0 free: 63592 MB
node distances:
node 0
0: 10
-----

```

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Platform Notes (Continued)

9. /proc/meminfo

MemTotal: 65751676 kB

10. who -r

run-level 3 Apr 14 14:57

11. Systemd service manager version: systemd 252 (252-13.el9_2)

Default Target Status
multi-user running

12. Services, from systemctl list-unit-files

| STATE | UNIT FILES |
|-----------------|---|
| enabled | NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd crond dbus-broker firewalld getty@ insights-client-boot irqbalance kdump lvm2-monitor mdmonitor microcode nis-domainname rhsmcertd rsyslog selinux-autorelabel-mark sshd sssd systemd-boot-update systemd-network-generator udisks2 |
| enabled-runtime | systemd-remount-fs |
| disabled | blk-availability chrony-wait chronyd console-getty cpupower debug-shell dnf-system-upgrade hwloc-dump-hwdata kvm_stat man-db-restart-cache-update nftables rdisc rhcd rhsm rhsm-facts rpmdb-rebuild selinux-check-proper-disable serial-getty@ sshd-keygen@ systemd-boot-check-no-failures systemd-pstore systemd-sysext |
| indirect | sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo systemd-sysupdate systemd-sysupdate-reboot |

13. Linux kernel boot-time arguments, from /proc/cmdline

BOOT_IMAGE=(hd0,gpt2)/vmlinuz-5.14.0-284.11.1.el9_2.x86_64
root=/dev/mapper/rhel-root
ro
resume=/dev/mapper/rhel-swap
rd.lvm.lv=rhel/root
rd.lvm.lv=rhel/swap

14. cpupower frequency-info

analyzing CPU 0:
Unable to determine current policy
boost state support:
Supported: yes
Active: yes

15. sysctl

| | |
|------------------------------|-------|
| kernel.numa_balancing | 0 |
| 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 |

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Platform Notes (Continued)

```

vm.nr_overcommit_hugepages      0
vm.swappiness                    60
vm.watermark_boost_factor       15000
vm.watermark_scale_factor       10
vm.zone_reclaim_mode            0

```

```

-----
16. /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

```

```

-----
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 9.2 (Plow)
redhat-release Red Hat Enterprise Linux release 9.2 (Plow)
system-release Red Hat Enterprise Linux release 9.2 (Plow)

```

```

-----
19. Disk information
SPEC is set to: /home/CPU2017
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs  829G   94G  735G  12% /home

```

```

-----
20. /sys/devices/virtual/dmi/id
Vendor:          HPE
Product:         ProLiant MicroServer Gen11
Product Family: ProLiant
Serial:          JRT31JQXTD

```

```

-----
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:
  2x Hynix HMC88AGBEA084N 32 GB 2 rank 5600, configured at 4400

```

```

-----
22. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor:      HPE
BIOS Version:     1.48
BIOS Date:        03/14/2024
BIOS Revision:    1.48

```

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Platform Notes (Continued)

Firmware Revision: 1.56

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 2024.0.2 Build 20231213
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=====

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

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
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Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
Copyright (C) 1985-2023 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 2024.0.2 Build 20231213
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
=====

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

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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
=====

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



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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:

```

-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX2 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -Wno-implicit-int -L/usr/local/jemalloc64-5.0.1/lib
-ljemalloc

```

Fortran benchmarks:

```

-w -m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX2 -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:

```

-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -Wno-implicit-int -nostandard-realloc-lhs
-align array32byte -auto -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

```

Benchmarks using Fortran, C, and C++:

```

-w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP -Wno-implicit-int
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

```



SPEC CPU®2017 Floating Point Speed Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant MicroServer Gen11

(3.40 Ghz, Intel Xeon E-2434)

SPECspeed®2017_fp_base = 63.0

SPECspeed®2017_fp_peak = 63.0

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Apr-2024

Hardware Availability: Jun-2024

Software Availability: Dec-2023

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

644.nab_s: basepeak = yes

Fortran benchmarks:

603.bwaves_s: -w -m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX2 -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

(Continued on next page)



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Peak Optimization Flags (Continued)

627.cam4_s: basepeak = yes

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/HPE-Platform-Flags-Intel-RPL-rev2.0.html>

<http://www.spec.org/cpu2017/flags/Intel-ic2024-official-linux64.html>

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

<http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-RPL-rev2.0.xml>

<http://www.spec.org/cpu2017/flags/Intel-ic2024-official-linux64.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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