



SPEC CPU®2017 Floating Point Rate Result

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Supermicro

GPU SuperServer SYS-221GE-TNHT-LCC
(X13DEG-R, Intel Xeon Platinum 8558)

SPECrate®2017_fp_base = 986

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 001176

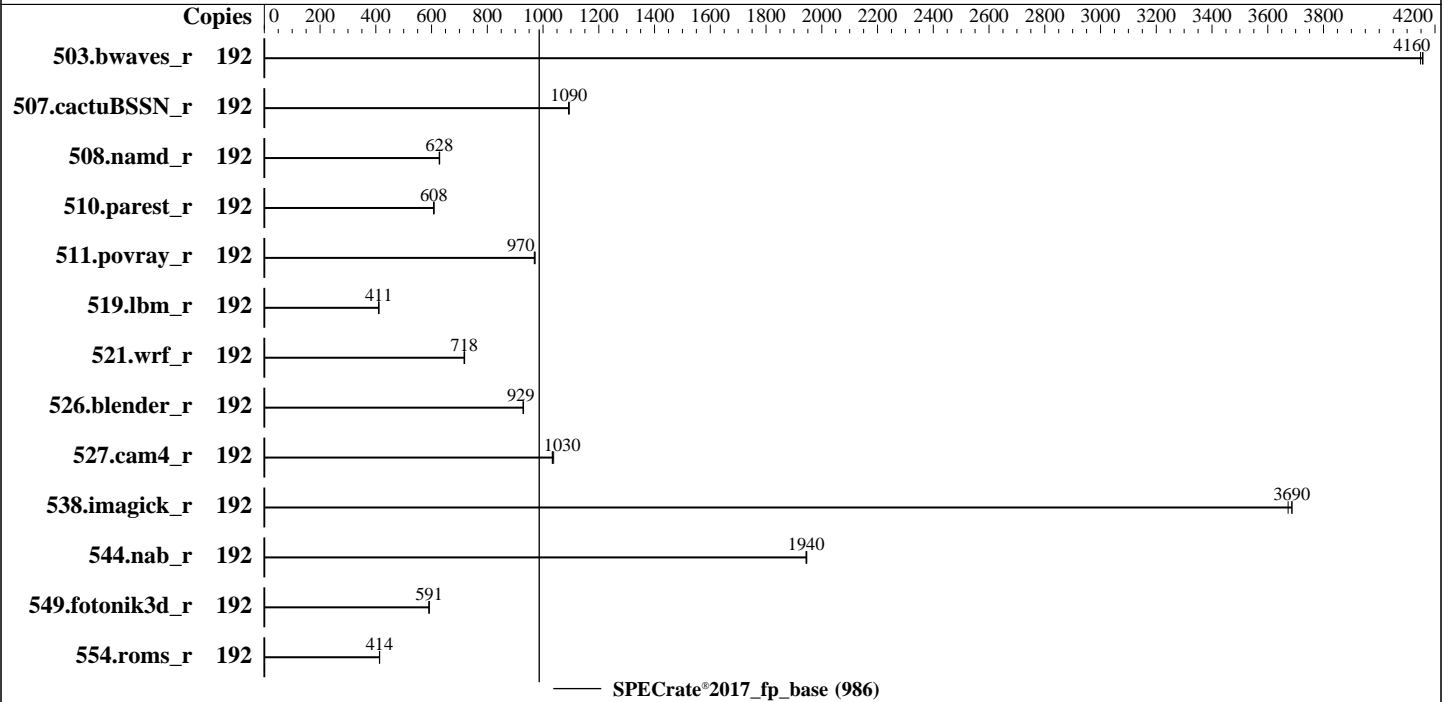
Test Sponsor: Supermicro

Tested by: Supermicro

Test Date: Dec-2024

Hardware Availability: Dec-2024

Software Availability: Dec-2024



Hardware

CPU Name: Intel Xeon Platinum 8558
 Max MHz: 4000
 Nominal: 2100
 Enabled: 96 cores, 2 chips, 2 threads/core
 Orderable: 2 chips
 Cache L1: 32 KB I + 48 KB D on chip per core
 L2: 2 MB I+D on chip per core
 L3: 260 MB I+D on chip per chip
 Other: None
 Memory: 1 TB (16 x 64 GB 2Rx4 PC5-5600B-R, running at 5200)
 Storage: 1x 480 GB M.2 NVMe SSD
 Other: CPU Cooling: DLC

Software

OS: Rocky Linux 9.4 (Blue Onyx)
 Kernel 5.14.0-427.13.1.el9_4.x86_64
 Compiler: C/C++: Version 2024.1 of Intel oneAPI DPC++/C++ Compiler for Linux;
 Fortran: Version 2024.1 of Intel Fortran Compiler for Linux;
 Parallel: No
 Firmware: Version 2.4 released Oct-2024
 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

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	192	463	4160	463	4160	464	4150							
507.cactuBSSN_r	192	223	1090	222	1090	222	1090							
508.namd_r	192	291	628	290	629	290	628							
510.parest_r	192	826	608	827	607	825	609							
511.povray_r	192	463	969	462	971	462	970							
519.lbm_r	192	493	411	493	411	493	411							
521.wrf_r	192	598	719	599	718	600	717							
526.blender_r	192	314	930	315	929	315	928							
527.cam4_r	192	325	1030	325	1030	324	1040							
538.imagick_r	192	130	3690	130	3690	130	3670							
544.nab_r	192	166	1950	166	1940	166	1940							
549.fotonik3d_r	192	1265	591	1266	591	1266	591							
554.roms_r	192	738	414	738	414	739	413							

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Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/root/cpu2017-1.1.9/lib/intel64:/root/cpu2017-1.1.9/je5.0.1-64"
MALLOC_CONF = "retain:true"

General Notes

Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM memory using Red Hat Enterprise Linux 8.4
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>

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)

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General Notes (Continued)

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:
Power Technology = Custom
Power Performance Tuning = BIOS Controls EPB
ENERGY_PERF_BIAS_CFG mode = Extreme Performance
Adjacent Cache Prefetch = Disabled
DCU Streamer Prefetcher = Disable
SNC = Enable SNC2 (2-clusters)
LLC Dead Line Alloc = Disable
KTI Prefetch = Enable
Stale AtoS = Disable
Patrol Scrub = Disable
VT-d = Disabled
SR-IOV Support = Disabled

Sysinfo program /root/cpu2017-1.1.9/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on qh008 Thu Dec 12 18:50:31 2024

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

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Platform Notes (Continued)

1. `uname -a`
Linux qh008 5.14.0-427.13.1.el9_4.x86_64 #1 SMP PREEMPT_DYNAMIC Wed May 1 19:11:28 UTC 2024 x86_64 x86_64 x86_64 GNU/Linux

2. `w`
18:50:31 up 3:23, 0 users, load average: 148.85, 182.01, 187.44
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) 4124660
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) 4124660
virtual memory (kbytes, -v) unlimited
file locks (-x) unlimited

5. `sysinfo process ancestry`
/usr/lib/systemd/systemd --switched-root --system --deserialize 31
SCREEN
/bin/bash
/bin/bash
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=192 -c
ic2024.1-lin-sapphirerapids-rate-20240308.cfg --define smt-on --define cores=96 --define physicalfirst
--define invoke_with_interleave --define drop_caches --tune base -o all fprate
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=192 --configfile
ic2024.1-lin-sapphirerapids-rate-20240308.cfg --define smt-on --define cores=96 --define physicalfirst
--define invoke_with_interleave --define drop_caches --tune base --output_format all --nopower --runmode
rate --tune base --size refrate fprate --nopreenv --note-preenv --logfile
\$SPEC/tmp/CPU2017.004/templogs/preenv.fprate.004.0.log --lognum 004.0 --from_runcpu 2
specperl \$SPEC/bin/sysinfo
\$SPEC = /root/cpu2017-1.1.9

6. `/proc/cpuinfo`
model name : INTEL(R) XEON(R) PLATINUM 8558
vendor_id : GenuineIntel
cpu family : 6
model : 207
stepping : 2
microcode : 0x21000283

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Platform Notes (Continued)

```
bugs           : spectre_v1 spectre_v2 spec_store_bypass swapgs eibrs_pbrsb
cpu cores      : 48
siblings       : 96
2 physical ids (chips)
192 processors (hardware threads)
physical id 0: core ids 0-47
physical id 1: core ids 0-47
physical id 0: apicids 0-95
physical id 1: apicids 128-223
```

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, 57 bits virtual
Byte Order:            Little Endian
CPU(s):                192
On-line CPU(s) list:   0-191
Vendor ID:             GenuineIntel
BIOS Vendor ID:       Intel(R) Corporation
Model name:            INTEL(R) XEON(R) PLATINUM 8558
BIOS Model name:      INTEL(R) XEON(R) PLATINUM 8558
CPU family:            6
Model:                207
Thread(s) per core:   2
Core(s) per socket:   48
Socket(s):             2
Stepping:              2
Frequency boost:       enabled
CPU(s) scaling MHz:   100%
CPU max MHz:          2101.0000
CPU min MHz:          800.0000
BogoMIPS:              4200.00
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 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 cat_l2
                        cdp_l3 intel_ppin cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced
                        tpr_shadow flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 avx2
                        smep bmi2 erms invpcid 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 vnmi 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 ibt amx_bf16 avx512_fp16
                        amx_tile amx_int8 flush_l1d arch_capabilities
Virtualization:        VT-x
L1d cache:             4.5 MiB (96 instances)
L1i cache:             3 MiB (96 instances)
L2 cache:              192 MiB (96 instances)
L3 cache:              520 MiB (2 instances)
```

(Continued on next page)



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Platform Notes (Continued)

```

NUMA node(s): 4
NUMA node0 CPU(s): 0-23,96-119
NUMA node1 CPU(s): 24-47,120-143
NUMA node2 CPU(s): 48-71,144-167
NUMA node3 CPU(s): 72-95,168-191
Vulnerability Gather data sampling: Not affected
Vulnerability Itlb multihit: Not affected
Vulnerability Lltf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Mmio stale data: Not affected
Vulnerability Retbleed: Not affected
Vulnerability Spec rstack overflow: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl
Vulnerability Spectre v1: Mitigation; usercopy/swaggs barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced / Automatic IBRS, IBPB conditional, RSB filling,
PBR SB-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	4.5M	12	Data	1	64	1	64
L1i	32K	3M	8	Instruction	1	64	1	64
L2	2M	192M	16	Unified	2	2048	1	64
L3	260M	520M	20	Unified	3	212992	1	64

8. numactl --hardware

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

```

available: 4 nodes (0-3)
node 0 cpus: 0-23,96-119
node 0 size: 257156 MB
node 0 free: 243870 MB
node 1 cpus: 24-47,120-143
node 1 size: 258035 MB
node 1 free: 246891 MB
node 2 cpus: 48-71,144-167
node 2 size: 258035 MB
node 2 free: 247278 MB
node 3 cpus: 72-95,168-191
node 3 size: 257978 MB
node 3 free: 247400 MB
node distances:
node  0  1  2  3
0:  10  12  21  21
1:  12  10  21  21
2:  21  21  10  12
3:  21  21  12  10

```

9. /proc/meminfo

MemTotal: 1055956072 kB

10. who -r

run-level 3 Dec 12 15:27

11. Systemd service manager version: systemd 252 (252-32.el9_4)

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Platform Notes (Continued)

Default Target Status
multi-user degraded

12. Failed units, from systemctl list-units --state=failed

UNIT	LOAD	ACTIVE	SUB	DESCRIPTION
* beegfs-client.service	loaded	failed	failed	Start BeeGFS Client
* beegfs-meta.service	loaded	failed	failed	BeeGFS Metadata Server
* beegfs-mgmt.service	loaded	failed	failed	BeeGFS Management Server
* beegfs-storage.service	loaded	failed	failed	BeeGFS Storage Server

13. Services, from systemctl list-unit-files

STATE	UNIT FILES
enabled	NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd beegfs-client beegfs-helperd beegfs-meta beegfs-mgmtd beegfs-storage chronyd crond dbus-broker getty@ irqbalance kdump low-memory-monitor mdmonitor microcode nis-domainname nvidia-hibernate nvidia-powerd nvidia-resume nvidia-suspend nvme-fc-boot-connections openibd pbs rpcbind rsyslog rtkit-daemon sd5 selinux-autorelabel-mark sshd sssd systemd-boot-update systemd-network-generator udisks2 upower
enabled-runtime	rc-local rpc-statd systemd-remount-fs
disabled	beegfs-client@ beegfs-eventlistener beegfs-helperd@ beegfs-meta@ beegfs-mgmtd@ beegfs-storage@ canberra-system-bootup canberra-system-shutdown canberra-system-shutdown-reboot chrony-wait chronyd-restricted console-getty cpupower debug-shell dkms dnf-system-upgrade firewallld gssproxy hpl ibacm kvm_stat man-db-restart-cache-update nfs-blkmap nfs-server nftables nvidia-persistenced nvme-autoconnect opensmd opensmd@ pbs@ pesign rdisc rpmdb-rebuild rshim selinux-check-proper-disable serial-getty@ srp_daemon srp_daemon_port@ 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

14. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=(hd2,gpt2)/vmlinuz-5.14.0-427.13.1.el9_4.x86_64
root=UUID=86a350bc-0c9e-4605-9cb3-9c3bb1ffe147
ro
crashkernel=1G-4G:192M,4G-64G:256M,64G-:512M
resume=UUID=babd21ac-1e02-4609-b64a-6df97bc2b450
rd.driver.blacklist=nouveau
modprobe.blacklist=nouveau
selinux=0

15. cpupower frequency-info
analyzing CPU 102:
current policy: frequency should be within 800 MHz and 2.10 GHz.
The governor "performance" may decide which speed to use within this range.
boost state support:
Supported: yes
Active: yes

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

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Platform Notes (Continued)

```

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

```

```

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

```

```

-----
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          Rocky Linux 9.4 (Blue Onyx)
redhat-release      Rocky Linux release 9.4 (Blue Onyx)
rocky-release       Rocky Linux release 9.4 (Blue Onyx)
system-release      Rocky Linux release 9.4 (Blue Onyx)

```

```

-----
20. Disk information
SPEC is set to: /root/cpu2017-1.1.9
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/nvme2n1p3  xfs   216G   73G  144G  34% /

```

```

-----
21. /sys/devices/virtual/dmi/id
Vendor:          Supermicro
Product:         SYS-221GE-TNHT-LC2-ST036
Product Family:  SMC X13
Serial:          A919390X4903248

```

```

-----
22. dmidecode
Additional information from dmidecode 3.5 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:

```

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Platform Notes (Continued)

10x Micron Technology MTC40F2046S1RC56BD1 MLCC 64 GB 2 rank 5600, configured at 5200
6x Micron Technology MTC40F2046S1RC56BD1 MMCC 64 GB 2 rank 5600, configured at 5200

23. BIOS

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

BIOS Vendor: American Megatrends International, LLC.
BIOS Version: 2.4
BIOS Date: 10/25/2024
BIOS Revision: 5.32

Compiler Version Notes

=====
C | 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
=====

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.
=====

=====
C++ | 508.namd_r(base) 510.parest_r(base)
=====

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.
=====

=====
C++, C | 511.povray_r(base) 526.blender_r(base)
=====

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.
=====

=====
C++, C, Fortran | 507.cactuBSSN_r(base)
=====

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.
=====

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

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.
=====

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

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
=====

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

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Supermicro

GPU SuperServer SYS-221GE-TNHT-LCC
(X13DEG-R, Intel Xeon Platinum 8558)

SPECrate®2017_fp_base = 986

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 001176
Test Sponsor: Supermicro
Tested by: Supermicro

Test Date: Dec-2024
Hardware Availability: Dec-2024
Software Availability: Dec-2024

Compiler Version Notes (Continued)

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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
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Base Compiler Invocation

C benchmarks:

icx

C++ benchmarks:

icpx

Fortran benchmarks:

ifx

Benchmarks using both Fortran and C:

ifx icx

Benchmarks using both C and C++:

icpx icx

Benchmarks using Fortran, C, and C++:

icpx icx ifx

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



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Base Optimization Flags

C benchmarks:

```
-w -std=c11 -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-Wno-implicit-int -mprefer-vector-width=512 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

C++ benchmarks:

```
-w -std=c++14 -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -mprefer-vector-width=512 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

Fortran benchmarks:

```
-w -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

Benchmarks using both Fortran and C:

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

Benchmarks using both C and C++:

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

Benchmarks using Fortran, C, and C++:

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

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

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

<http://www.spec.org/cpu2017/flags/Supermicro-Platform-Settings-V1.2-EMR-revE.html>

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

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

<http://www.spec.org/cpu2017/flags/Supermicro-Platform-Settings-V1.2-EMR-revE.xml>



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