



# SPEC CPU®2017 Floating Point Rate Result

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## Supermicro

SuperServer SYS-241H-TNRTTP  
(X13QEH+, Intel Xeon Platinum 8490H)

SPECrate®2017\_fp\_base = 1900

SPECrate®2017\_fp\_peak = 2010

CPU2017 License: 001176

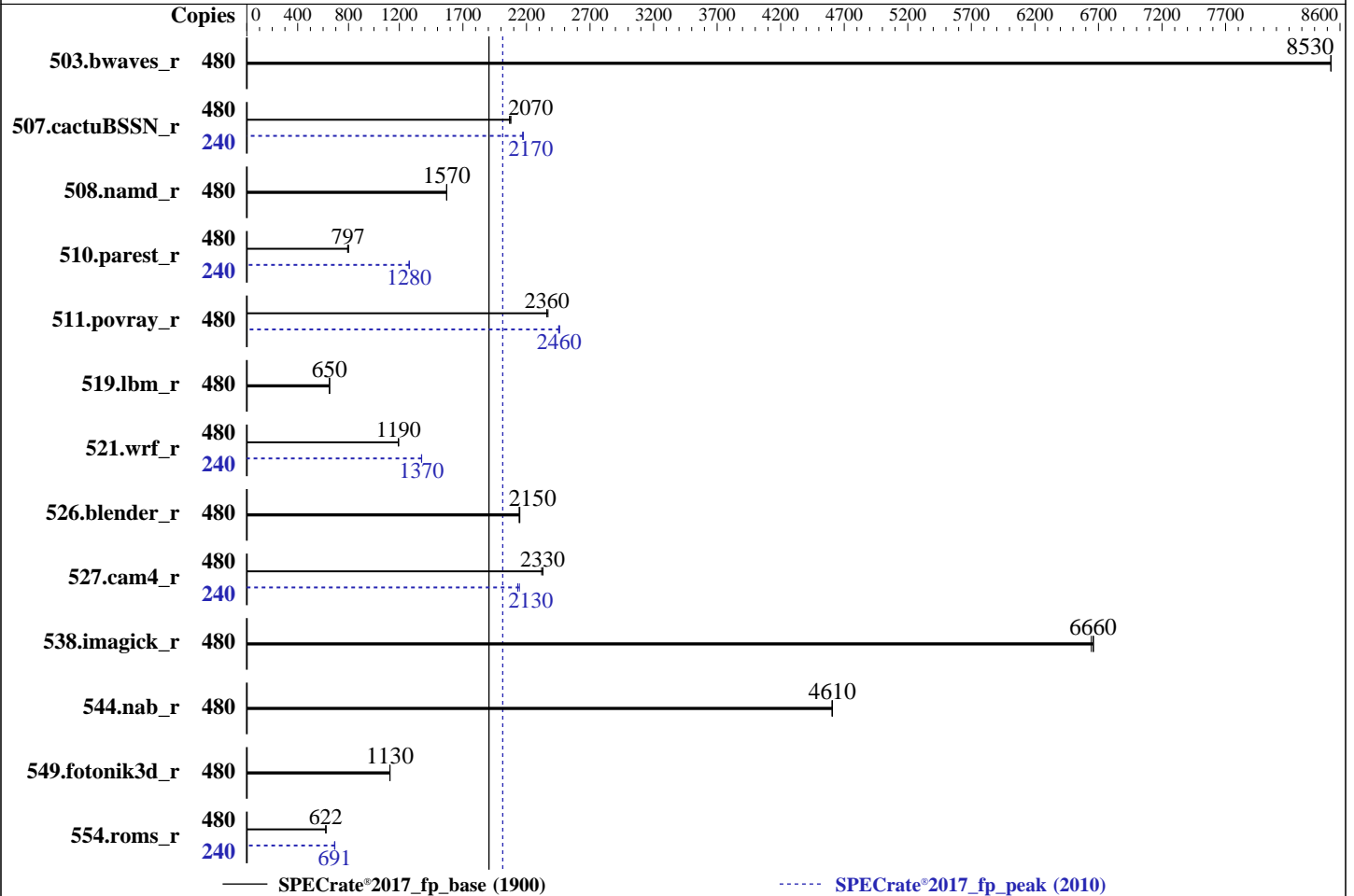
Test Sponsor: Supermicro

Tested by: Supermicro

Test Date: Mar-2023

Hardware Availability: Mar-2023

Software Availability: Jun-2022



### Hardware

CPU Name: Intel Xeon Platinum 8490H  
 Max MHz: 3500  
 Nominal: 1900  
 Enabled: 240 cores, 4 chips, 2 threads/core  
 Orderable: 4 chips  
 Cache L1: 32 KB I + 48 KB D on chip per core  
 L2: 2 MB I+D on chip per core  
 L3: 112.5 MB I+D on chip per chip  
 Other: None  
 Memory: 1 TB (32 x 32 GB 2Rx8 PC5-4800B-R)  
 Storage: 1 x 1.90 TB 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  
 for Linux;  
 Parallel: No  
 Firmware: Version 1.2 released Mar-2023  
 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						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	480	564	8530	<b>564</b>	<b>8530</b>	564	8530	480	564	8530	<b>564</b>	<b>8530</b>	564	8530
507.cactuBSSN_r	480	294	2070	292	2080	<b>293</b>	<b>2070</b>	240	140	2170	<b>140</b>	<b>2170</b>	140	2180
508.namd_r	480	290	1570	<b>290</b>	<b>1570</b>	290	1570	480	290	1570	<b>290</b>	<b>1570</b>	290	1570
510.parest_r	480	<b>1575</b>	<b>797</b>	1583	793	1568	801	240	492	1280	<b>491</b>	<b>1280</b>	491	1280
511.povray_r	480	<b>475</b>	<b>2360</b>	473	2370	475	2360	480	<b>456</b>	<b>2460</b>	455	2460	457	2450
519.lbm_r	480	778	650	778	650	<b>778</b>	<b>650</b>	480	778	650	778	650	<b>778</b>	<b>650</b>
521.wrf_r	480	<b>901</b>	<b>1190</b>	902	1190	900	1190	240	391	1370	391	1380	<b>391</b>	<b>1370</b>
526.blender_r	480	<b>341</b>	<b>2150</b>	341	2140	340	2150	480	<b>341</b>	<b>2150</b>	341	2140	340	2150
527.cam4_r	480	362	2320	360	2330	<b>361</b>	<b>2330</b>	240	<b>197</b>	<b>2130</b>	197	2130	196	2140
538.imagick_r	480	179	6660	<b>179</b>	<b>6660</b>	180	6640	480	179	6660	<b>179</b>	<b>6660</b>	180	6640
544.nab_r	480	175	4600	<b>175</b>	<b>4610</b>	175	4610	480	175	4600	<b>175</b>	<b>4610</b>	175	4610
549.fotonik3d_r	480	1661	1130	1662	1130	<b>1661</b>	<b>1130</b>	480	1661	1130	1662	1130	<b>1661</b>	<b>1130</b>
554.roms_r	480	1225	623	1228	621	<b>1226</b>	<b>622</b>	240	551	693	<b>552</b>	<b>691</b>	553	690

SPECrate®2017\_fp\_base = **1900**

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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 = "/home/cpu2017/lib/intel64:/home/cpu2017/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:

(Continued on next page)



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### General Notes (Continued)

```
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) 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 Settings:

```
Hyper-Threading [ALL] = Enable
Power Technology = Custom
Power Performance Tuning = BIOS Controls EPB
ENERGY_PERF_BIAS_CFG mode = Extreme Performance
DCU Streamer Prefetcher = Disable
KTI Prefetch = Enable
SNC = Enable SNC4 (4-clusters)
LLC Dead Line Alloc = Disable
```

```
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on 156-144 Tue Mar 21 22:15:48 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/cpuinfo
7. lscpu
8. numactl --hardware
9. /proc/meminfo
10. who -r
11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)

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### Platform Notes (Continued)

- 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/khugepaged
- 18. OS release
- 19. Disk information
- 20. /sys/devices/virtual/dmi/id
- 21. dmidecode
- 22. BIOS

```
1. uname -a
Linux 156-144 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
 22:15:48 up 7:05, 1 user, load average: 328.96, 442.11, 461.78
USER      TTY      FROM          LOGIN@      IDLE        JCPU      PCPU WHAT
root      tty1     -             15:11      6:56m     1.50s    0.06s -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) 4124690
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) 4124690
virtual memory          (kbytes, -v) unlimited
file locks              (-x) unlimited
```

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### Platform Notes (Continued)

```

-----
5. sysinfo process ancestry
/usr/lib/systemd/systemd --switched-root --system --deserialize 30
login -- root
-bash
-bash
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=480 -c
ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=240 --define physicalfirst
--define invoke_with_interleave --define drop_caches --tune base,peak -o all fprate
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=480 --configfile
ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=240 --define physicalfirst
--define invoke_with_interleave --define drop_caches --tune base,peak --output_format all --nopower
--runmode rate --tune base:peak --size refrate fprate --nopreenv --note-preenv --logfile
$SPEC/tmp/CPU2017.002/templogs/preenv.fprate.002.0.log --lognum 002.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017

```

```

-----
6. /proc/cpuinfo
model name      : Intel(R) Xeon(R) Platinum 8490H
vendor_id      : GenuineIntel
cpu family     : 6
model          : 143
stepping       : 8
microcode      : 0x2b0001b0
bugs           : spectre_v1 spectre_v2 spec_store_bypass swapgs
cpu cores      : 60
siblings       : 120
4 physical ids (chips)
480 processors (hardware threads)
physical id 0: core ids 0-59
physical id 1: core ids 0-59
physical id 2: core ids 0-59
physical id 3: core ids 0-59
physical id 0: apicids 0-119
physical id 1: apicids 128-247
physical id 2: apicids 256-375
physical id 3: apicids 384-503

```

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

```

(Continued on next page)



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### Platform Notes (Continued)

Address sizes: 46 bits physical, 57 bits virtual  
 Byte Order: Little Endian  
 CPU(s): 480  
 On-line CPU(s) list: 0-479  
 Vendor ID: GenuineIntel  
 Model name: Intel(R) Xeon(R) Platinum 8490H  
 CPU family: 6  
 Model: 143  
 Thread(s) per core: 2  
 Core(s) per socket: 60  
 Socket(s): 4  
 Stepping: 8  
 Frequency boost: enabled  
 CPU max MHz: 1901.0000  
 CPU min MHz: 800.0000  
 BogomIPS: 3800.00

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 invpcid\_single 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 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\_lld arch\_capabilities

Virtualization: VT-x  
 L1d cache: 11.3 MiB (240 instances)  
 L1i cache: 7.5 MiB (240 instances)  
 L2 cache: 480 MiB (240 instances)  
 L3 cache: 450 MiB (4 instances)  
 NUMA node(s): 16  
 NUMA node0 CPU(s): 0-14,240-254  
 NUMA node1 CPU(s): 15-29,255-269  
 NUMA node2 CPU(s): 30-44,270-284  
 NUMA node3 CPU(s): 45-59,285-299  
 NUMA node4 CPU(s): 60-74,300-314  
 NUMA node5 CPU(s): 75-89,315-329  
 NUMA node6 CPU(s): 90-104,330-344  
 NUMA node7 CPU(s): 105-119,345-359

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### Platform Notes (Continued)

NUMA node8 CPU(s): 120-134,360-374  
 NUMA node9 CPU(s): 135-149,375-389  
 NUMA node10 CPU(s): 150-164,390-404  
 NUMA node11 CPU(s): 165-179,405-419  
 NUMA node12 CPU(s): 180-194,420-434  
 NUMA node13 CPU(s): 195-209,435-449  
 NUMA node14 CPU(s): 210-224,450-464  
 NUMA node15 CPU(s): 225-239,465-479  
 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/swapgs 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	11.3M	12	Data	1	64	1	64
L1i	32K	7.5M	8	Instruction	1	64	1	64
L2	2M	480M	16	Unified	2	2048	1	64
L3	112.5M	450M	15	Unified	3	122880	1	64

8. numactl --hardware

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

```

available: 16 nodes (0-15)
node 0 cpus: 0-14,240-254
node 0 size: 64069 MB
node 0 free: 45143 MB
node 1 cpus: 15-29,255-269
node 1 size: 64504 MB
node 1 free: 51314 MB
node 2 cpus: 30-44,270-284
node 2 size: 64504 MB
node 2 free: 52313 MB
node 3 cpus: 45-59,285-299
node 3 size: 64504 MB
node 3 free: 52542 MB
node 4 cpus: 60-74,300-314
node 4 size: 64504 MB
node 4 free: 52459 MB
node 5 cpus: 75-89,315-329
node 5 size: 64504 MB
node 5 free: 52557 MB
  
```

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### Platform Notes (Continued)

```

node 6 cpus: 90-104,330-344
node 6 size: 64504 MB
node 6 free: 52546 MB
node 7 cpus: 105-119,345-359
node 7 size: 64504 MB
node 7 free: 52540 MB
node 8 cpus: 120-134,360-374
node 8 size: 64504 MB
node 8 free: 52544 MB
node 9 cpus: 135-149,375-389
node 9 size: 64504 MB
node 9 free: 52549 MB
node 10 cpus: 150-164,390-404
node 10 size: 64504 MB
node 10 free: 52553 MB
node 11 cpus: 165-179,405-419
node 11 size: 64504 MB
node 11 free: 52536 MB
node 12 cpus: 180-194,420-434
node 12 size: 64504 MB
node 12 free: 52546 MB
node 13 cpus: 195-209,435-449
node 13 size: 64504 MB
node 13 free: 52565 MB
node 14 cpus: 210-224,450-464
node 14 size: 64504 MB
node 14 free: 52536 MB
node 15 cpus: 225-239,465-479
node 15 size: 64065 MB
node 15 free: 52125 MB

```

node distances:

node	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0:	10	12	12	12	21	21	21	21	21	21	21	21	21	21	21	21
1:	12	10	12	12	21	21	21	21	21	21	21	21	21	21	21	21
2:	12	12	10	12	21	21	21	21	21	21	21	21	21	21	21	21
3:	12	12	12	10	21	21	21	21	21	21	21	21	21	21	21	21
4:	21	21	21	21	10	12	12	12	21	21	21	21	21	21	21	21
5:	21	21	21	21	12	10	12	12	21	21	21	21	21	21	21	21
6:	21	21	21	21	12	12	10	12	21	21	21	21	21	21	21	21
7:	21	21	21	21	12	12	12	10	21	21	21	21	21	21	21	21
8:	21	21	21	21	21	21	21	21	10	12	12	12	21	21	21	21
9:	21	21	21	21	21	21	21	21	12	10	12	12	21	21	21	21
10:	21	21	21	21	21	21	21	21	12	12	10	12	21	21	21	21
11:	21	21	21	21	21	21	21	21	12	12	10	12	21	21	21	21
12:	21	21	21	21	21	21	21	21	21	21	21	10	12	12	12	12
13:	21	21	21	21	21	21	21	21	21	21	21	12	10	12	12	12
14:	21	21	21	21	21	21	21	21	21	21	21	12	12	10	12	12

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### Platform Notes (Continued)

15: 21 21 21 21 21 21 21 21 21 21 21 21 21 12 12 12 10

9. /proc/meminfo  
MemTotal: 1055945504 kB

10. who -r  
run-level 3 Mar 21 15:11

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	YaST2-Firstboot YaST2-Second-Stage apparmor auditd bluetooth cron display-manager firewalld getty@ haveged irqbalance iscsi issue-generator kbdsettings kdump kdump-early klog lvm2-monitor nscd nvme-fc-boot-connections postfix purge-kernels rollback rsyslog smartd sshd wickd wickedd wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
enabled-runtime	systemd-remount-fs
disabled	accounts-daemon appstream-sync-cache autofs autoyast-initscripts blk-availability bluetooth-mesh boot-sysctl ca-certificates chrony-wait chronyd console-getty cups cups-browsed debug-shell ebttables exchange-bmc-os-info gpm grub2-once haveged-switch-root ipmi ipmievd iscsi-init iscsid iscsiui issue-add-ssh-keys kexec-load lunmask man-db-create multipathd nfs nfs-blkmap nmb nvme-fc-autoconnect ostree-remount rdisc rpcbind rpmconfigcheck rsyncd rtkit-daemon serial-getty@ smartd_generate_opts smb snmpd snmptrapd speech-dispatcherd systemd-boot-check-no-failures systemd-network-generator systemd-sysext systemd-time-wait-sync systemd-timesyncd udisks2 upower
indirect	wickedd

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

BOOT\_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default  
root=UUID=2b95edbf-a8ba-4a27-b211-c1f03f86601f  
splash=silent  
mitigations=auto  
quiet  
security=apparmor  
crashkernel=321M,high  
crashkernel=72M,low

14. cpupower frequency-info  
analyzing CPU 0:

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## Supermicro

SuperServer SYS-241H-TNRTP  
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### Platform Notes (Continued)

current policy: frequency should be within 800 MHz and 1.90 GHz.  
The governor "ondemand" 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	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

-----  
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

-----

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## Supermicro

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

**Test Date:** Mar-2023  
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**Software Availability:** Jun-2022

### Platform Notes (Continued)

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

-----  
19. Disk information  
SPEC is set to: /home/cpu2017  
Filesystem Type Size Used Avail Use% Mounted on  
/dev/nvme0nlp3 xfs 1.1T 180G 947G 16% /home

-----  
20. /sys/devices/virtual/dmi/id  
Vendor: Supermicro  
Product: Super Server  
Product Family: Family

-----  
21. 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:  
32x Samsung M321R4GA3BB6-CQKMG 32 GB 2 rank 4800

-----  
22. BIOS  
(This section combines info from /sys/devices and dmidecode.)  
BIOS Vendor: American Megatrends International, LLC.  
BIOS Version: 1.2  
BIOS Date: 03/17/2023  
BIOS Revision: 5.29

### Compiler Version Notes

=====  
C | 519.lbm\_r(base, peak) 538.imagick\_r(base, peak)  
| 544.nab\_r(base, peak)  
=====

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2023.0.0 Build 20221201  
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=====

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### Compiler Version Notes (Continued)

C++ | 508.namd\_r(base, peak) 510.parest\_r(base, peak)

-----  
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
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-----

=====  
C++, C | 511.povray\_r(base, peak) 526.blender\_r(base, peak)

-----  
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Version 2023.0.0 Build 20221201  
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-----

=====  
C++, C, Fortran | 507.cactuBSSN\_r(base, peak)

-----  
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Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version  
2023.0.0 Build 20221201  
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-----

=====  
Fortran | 503.bwaves\_r(base, peak) 549.fotonik3d\_r(base, peak)  
| 554.roms\_r(base, peak)

-----  
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version  
2023.0.0 Build 20221201  
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-----

=====  
Fortran, C | 521.wrf\_r(base, peak) 527.cam4\_r(base, peak)

-----  
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version  
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### Compiler Version Notes (Continued)

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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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**Software Availability:** Jun-2022

## 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
```

## Peak Compiler Invocation

### C benchmarks:

icx

### C++ benchmarks:

icpx

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Tested by: Supermicro

Test Date: Mar-2023  
Hardware Availability: Mar-2023  
Software Availability: Jun-2022

## Peak Compiler Invocation (Continued)

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

## 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:

508.namd\_r: basepeak = yes

510.parest\_r: -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:

503.bwaves\_r: basepeak = yes

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## Peak Optimization Flags (Continued)

549.fotonik3d\_r: basepeak = yes

```
554.roms_r: -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++:

```
511.povray_r: -w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs
-fprofile-generate(pass 1)
-fprofile-use=default.profddata(pass 2) -xCORE-AVX2(pass 1)
-flto -Ofast -xCORE-AVX512 -ffast-math -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
```

526.blender\_r: basepeak = yes

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-ic2023-official-linux64.html>

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





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