# SPEC CPU®2017 Floating Point Speed Result

**Supermicro**

SuperServer SYS-211E-FRDN2T  
(X13SEM-TF, Intel Xeon Platinum 8490H)

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**SPECspeed®2017_fp_base = 239**  
**SPECspeed®2017_fp_peak = 239**

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**CPU2017 License:** 001176  
**Test Date:** Feb-2023  
**Test Sponsor:** Supermicro  
**Hardware Availability:** Jan-2023  
**Tested by:** Supermicro  
**Software Availability:** Dec-2022

---

### Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
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<tr>
<td>607.cactuBSSN_s</td>
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<td>649.fotonik3d_s</td>
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<tr>
<td>654.roms_s</td>
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</tbody>
</table>

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### Hardware

- **CPU Name:** Intel Xeon Platinum 8490H  
- **Max MHz:** 3500  
- **Nominal:** 1900  
- **Enabled:** 60 cores, 1 chip  
- **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:** 112.5 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 512 GB  
  
  (8 x 64 GB 2Rx4 PC5-4800B-R)  
- **Storage:** 1 x 600 GB SATA III 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;  
  - C/C++: Version 2023.0 of Intel C/C++ Compiler for Linux

- **Parallel:** Yes

- **Firmware:** Version 1.1 released Jan-2023

- **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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SuperServer SYS-211E-FRDN2T (X13SEM-TF, Intel Xeon Platinum 8490H)

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Results Table

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<th>Benchmark</th>
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</table>

SPECspeed®2017_fp_base = 239
SPECspeed®2017_fp_peak = 239

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/cpu2017-1.1.9-2/lib/intel64:/root/cpu2017-1.1.9-2/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
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.
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.
NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
jemalloc, a general purpose malloc implementation

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General Notes (Continued)

built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

Platform Notes

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

Sysinfo program /root/cpu2017-1.1.9-2/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on 139-164 Sat Feb 11 18:45:44 2023

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

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## Platform Notes (Continued)

1. `uname -a`
   ```
   Linux 139-164 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`
   ```
   18:45:44 up 1 day, 8:43, 1 user, load average: 6.33, 6.08, 3.62
   USER     TTY      FROM           LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1     -              07:40    3:31m  1.07s  0.01s -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         (-l) 2062517
   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) 2062517
   virtual memory          (kbytes, -v) unlimited
   file locks              (-x) unlimited
   ```

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 -c
   ic2023.0-lin-sapphirerapids-speed-20221201.cfg --define cores=60 --tune base,peak -o all --define
   drop_caches fpspeed
   runcpu --nobuild --action validate --define default-platform-flags --configfile
   ic2023.0-lin-sapphirerapids-speed-20221201.cfg --define cores=60 --tune base,peak --output_format all
   ```

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Platform Notes (Continued)

--define drop_caches --nopower --runmode speed --tune base:peak --size refspeed fpspeed --no-preenv
--note-preenv --logfile $SPEC/tmp/CPu2017.017/templogs/preenv.fpspeed.017.0.log --lognum 017.0
--from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /root/cpu2017-1.1.9-2

6. /proc/cpuinfo

   model name : Intel(R) Xeon(R) Platinum 8490H
   vendor_id  : GenuineIntel
   cpu family : 6
   model      : 143
   stepping   : 6
   microcode  : 0x2b000161
   bugs       : spectre_v1 spectre_v2 spec_store_bypass swapgs
   cpu cores  : 60
   siblings  : 60
   1 physical ids (chips)
   60 processors (hardware threads)
   physical id 0: core ids 0-59
   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
   ,74,76,78,80,82,84,86,88,90,92,94,96,98,100,102,104,106,108,110,112,114,116,118
   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: 46 bits physical, 57 bits virtual
   Byte Order: Little Endian
   CPU(s): 60
   On-line CPU(s) list: 0-59
   Vendor ID: GenuineIntel
   Model name: Intel(R) Xeon(R) Platinum 8490H
   CPU family: 6
   Model: 143
   Thread(s) per core: 1
   Core(s) per socket: 60
   Socket(s): 1
   Stepping: 6
   Frequency boost: enabled
   CPU max MHz: 1901.0000
   CPU min MHz: 800.0000

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Platform Notes (Continued)

BogoMIPS: 3800.00
Flags:

Virtualization: VT-x
L1d cache: 2.8 MiB (60 instances)
L1i cache: 1.9 MiB (60 instances)
L2 cache: 120 MiB (60 instances)
L3 cache: 112.5 MiB (1 instance)
NUMA node(s): 4
NUMA node0 CPU(s): 0-14
NUMA node1 CPU(s): 15-29
NUMA node2 CPU(s): 30-44
NUMA node3 CPU(s): 45-59
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 2.8M 12 Data 1 64 1 64
L1i 32K 1.9M 8 Instruction 1 64 1 64
L2 2M 120M 16 Unified 2 2048 1 64
L3 112.5M 112.5M 15 Unified 3 122880 1 64

8. numactl --hardware

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

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

available: 4 nodes (0-3)

node 0 cpus: 0-14
node 0 size: 128656 MB
node 0 free: 126963 MB
node 1 cpus: 15-29
node 1 size: 128985 MB
node 1 free: 123008 MB
node 2 cpus: 30-44
node 2 size: 129020 MB
node 2 free: 120134 MB
node 3 cpus: 45-59
node 3 size: 128991 MB
node 3 free: 128645 MB
node distances:

node 0: 10 12 12 12
node 1: 12 10 12 12
node 2: 12 12 10 12
node 3: 12 12 12 10

9. /proc/meminfo

MemTotal: 528029332 kB

10. who -r

run-level 3 Feb 10 10:02

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 auditd cron display-manager getty@ haveged irqbalance
issue-generator kbdsettings klog lvm2-monitor nscd postfix purge-kernels rollback rsyslog
smartd sshd wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
matter
disabled apparmor autosf autoyast-initscripts blk-availability boot-sysctl ca-certificates
cron chronyd console-getty cups cups-browsed debug-shell ebtables
exchange-bmc-os-info firewalld gpm grub2-once haveged-switch-root ipmi ipmierv
issue-add-ssh-keys kexec-load lunmask man-db-create multipathd munge nfs nfs-bkmap
ntp-wait ntpd rdispc rpcbind rpmconfigcheck rayncd salt-minion serial-getty@ slurmd
smartd_generate_opts snmpd snmptrapd svnservice systemd-boot-check-no-failures
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Platform Notes (Continued)

systemd-network-generator systemd-sysext systemd-time-wait-sync systemd-timesyncd udisks2
ypbind
wickedd

13. Linux kernel boot-time arguments, from /proc/cmdline
   BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
   root=UUID=2d678d2d-7c7c-4447-9a76-01d4d4bc98fa
   splash=silent
   mitigations=auto
   quiet
   security=apparmor

14. cpupower frequency-info
   analyzing CPU 0:
   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.extrfq_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

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### Platform Notes (Continued)

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<td>always within_size advise [never] deny force</td>
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</tbody>
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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 SUSE Linux Enterprise Server 15 SP4

---

19. Disk information
   - SPEC is set to: `/root/cpu2017-1.1.9-2`
   - Filesystem    | Type       | Size  | Used  | Avail | Use%   | Mounted on |
   - /dev/sda2     | btrfs      | 559G  | 444G  | 116G  | 80%    | /root      |

---

20. `/sys/devices/virtual/dmi/id`
   - Vendor: Supermicro
   - Product: Super Server
   - Product Family: Family
   - Serial: 0123456789

---

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:
     - 8x Micron Technology MTC40F2046S1RC48BA1 64 GB 2 rank 4800

---

22. BIOS
   - (This section combines info from `/sys/devices` and `dmidecode.`)
     - BIOS Vendor: American Megatrends International, LLC.

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### Platform Notes (Continued)

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<th>BIOS Version</th>
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### Compiler Version Notes

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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.

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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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<table>
<thead>
<tr>
<th>Fortran</th>
<th>603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak) 654.roms_s(base, peak)</th>
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</thead>
</table>

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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<table>
<thead>
<tr>
<th>Fortran, C</th>
<th>621.wrf_s(base, peak) 627.cam4_s(base, peak) 628.pop2_s(base, peak)</th>
</tr>
</thead>
</table>

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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(Continued on next page)
Supermicro
SuperServer SYS-211E-FRDN2T (X13SEM-TF, Intel Xeon Platinum 8490H)

Compiler Version Notes (Continued)

Version 2023.0.0 Build 20221201
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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 -W1,-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

(Continued on next page)
Supermicro
SuperServer SYS-211E-FRDN2T (X13SEM-TF, Intel Xeon Platinum 8490H)

SPECspeed®2017_fp_base = 239
SPECspeed®2017_fp_peak = 239

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

Base Optimization Flags (Continued)

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
-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

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
Supermicro
SuperServer SYS-211E-FRDN2T
(X13SEM-TF, Intel Xeon Platinum 8490H)

SPECspeed®2017_fp_base = 239
SPECspeed®2017_fp_peak = 239

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

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

Peak Optimization Flags

C benchmarks:

619.lbm_s: basepeak = yes
638.imagick_s: basepeak = yes
644.nab_s: basepeak = yes

Fortran benchmarks:

649.fotonik3d_s: basepeak = yes
654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

621.wrf_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/Intel-ic2023-official-linux64.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
Supermicro
SuperServer SYS-211E-FRDN2T
(X13SEM-TF, Intel Xeon Platinum 8490H)

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

SPECspeed®2017_fp_base = 239
SPECspeed®2017_fp_peak = 239

Test Date: Feb-2023
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Originally published on 2023-03-14.
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