Supermicro
SuperServer SYS-F511E2-RT
(X13SEFR-A, Intel Xeon Platinum 8490H)

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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:** 256 GB (8 x 32 GB 2Rx8 PC5-4800B-R)
- **Storage:** 1 x 120 GB NVMe SSD
- **Other:** None

### Software

- **OS:** SUSE Linux Enterprise Server 15 SP4
  Kernel 5.14.21-150400.22-default
- **Compiler:**
  C/C++: Version 2022.1 of Intel oneAPI DPC++/C++ Compiler for Linux;
  Fortran: Version 2022.1 of Intel Fortran Compiler for Linux;
- **Parallel:** No
- **Firmware:** Version 1.0a released Nov-2022
- **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 set to prefer performance at the cost of additional power usage.
SPEC CPU®2017 Floating Point Rate Result

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Tested by: Supermicro

SPECrate®2017_fp_base = 464
SPECrate®2017_fp_peak = Not Run

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

Results Table

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<td>176</td>
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</tbody>
</table>

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"
MALLOCONF = "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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Tested by: Supermicro

SPECrater®2017_fp_base = 464
SPECrater®2017_fp_peak = Not Run

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

General Notes (Continued)

sync; echo 3> /proc/sys/vm/drop_caches
runcpu command invoked through numacl 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.

Platform Notes

BIOS Settings:
Power Technology = Custom
Power Performance Tuning = BIOS Controls EPB
ENERGY_PERF_BIAS_CFG mode = Performance
DCU Streamer Prefetcher = Disable
SNC = Enable SNC4 (4-clusters)
LLC Dead Line Alloc = Disable
KT1 Prefetch = Enable
Stale AtoS = Disable
Patrol Scrub = Disable
Hyper-Threading [ALL]= Disable

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 9b2a6daec0915b55891ef0e16a9fc6d4
running on localhost Fri Dec 2 14:06:27 2022

SUT (System Under Test) info as seen by some common utilities.
For more information on this section, see
https://www.spec.org/cpu2017/Docs/config.html#sysinfo

From /proc/cpuinfo
model name : Intel(R) Xeon(R) Platinum 8490H
 1 "physical id"s (chips)
 60 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)
cpu cores : 60
siblings : 60
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52

(Continued on next page)
**Supermicro**  
SuperServer SYS-F511E2-RT  
(X13SEFR-A , Intel Xeon Platinum 8490H)

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<td>Software Availability:</td>
<td>Jun-2022</td>
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</table>

### SPEC CPU 2017 Floating Point Rate Result

**SPECrate®2017_fp_base =**  464  
**SPECrate®2017_fp_peak =** Not Run

---

**Platform Notes (Continued)**

```plaintext
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: 1901.000
CPU min MHz: 800.000
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 fsxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc 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 ebpx_cat_l3 cat_l2 cat_l1 cdp镉_single cdp_l2 ssbd mba ibrs ibpb stibp ibrs enhanced tpr_shadow vnni 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_fp16 wbnoinvd dtcmtm ida arat pln pts avx512v bmi umip pkpu ospke waitpkg avx512_vbmi gfnl vaes vclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid bus_lock_detect cldemote movdirmovdir64b enqcmd fsrcmd md_clear serialize tsxldtrk pconfig arch_lbr avx512_fp16 amx_til flush_l1d arch_capabilities 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
```

(Continued on next page)
SPEC CPU®2017 Floating Point Rate Result

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Supermicro
SuperServer SYS-F511E2-RT
(X13SEFR-A , Intel Xeon Platinum 8490H)

CPU2017 License: 001176
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Tested by: Supermicro

Specrate®2017_fp_base = 464
Specrate®2017_fp_peak = Not Run

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

Platform Notes (Continued)

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 Srbd: 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

/proc/cpuinfo cache data
  cache size : 115200 KB

From numactl --hardware
  WARNING: a numactl 'node' might or might not correspond to a physical chip.
  available: 4 nodes (0-3)
  node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
  node 0 size: 64147 MB
  node 0 free: 63561 MB
  node 1 cpus: 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29
  node 1 size: 64508 MB
  node 1 free: 64177 MB
  node 2 cpus: 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44
  node 2 size: 64508 MB
  node 2 free: 64228 MB
  node 3 cpus: 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59
  node 3 size: 64444 MB
  node 3 free: 64126 MB
  node distances:
    node 0  1  2  3
    0: 10 12 12 12
    1: 12 10 12 12
    2: 12 12 10 12
    3: 12 12 12 10

From /proc/meminfo
  MemTotal: 263791304 kB

(Continued on next page)
Supermicro
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Test Sponsor: Supermicro

CPU2017 License: 001176

SPECrate®2017_fp_base = 464
SPECrate®2017_fp_peak = Not Run

Platform Notes (Continued)

HugePages_Total:       0
Hugepagesize:       2048 kB

/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has ondemand

From /etc/*release*/etc/*version*

os-release:
NAME="SLES"
VERSION="15-SP4"
VERSION_ID="15.4"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP4"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp4"

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

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit): Not affected
CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Not affected
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1): Mitigation: usercopy/swaps barriers and __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Dec 2 14:06

SPEC is set to: /home/cpu2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/nvme0n1p2 xfs 117G 32G 86G 27% /

From /sys/devices/virtual/dmi/id
Vendor: Supermicro
Product: Super Server

(Continued on next page)
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Platform Notes (Continued)

Product Family: Family
Serial: 0123456789

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 Samsung M321R4GA3BB6-CQKEG 32 GB 2 rank 4800

BIOS:
BIOS Vendor: American Megatrends International, LLC.
BIOS Version: 1.0a
BIOS Date: 11/24/2022
BIOS Revision: 5.29

(End of data from sysinfo program)

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 2022.1.0 Build 20220316
Copyright (C) 1985-2022 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 2022.1.0 Build 20220316
Copyright (C) 1985-2022 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 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
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Test Date: Dec-2022
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Compiler Version Notes (Continued)

==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(base)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version
2022.1.0 Build 20220316
Copyright (C) 1985-2022 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
2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
==============================================================================
Fortran, C      | 521.wrf_r(base) 527.cam4_r(base)
------------------------------------------------------------------------------
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2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2022.1.0 Build 20220316
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------------------------------------------------------------------------------

Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifx

(Continued on next page)
SPEC CPU®2017 Floating Point Rate Result
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Test Sponsor: Supermicro
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---

### Base Compiler Invocation (Continued)

**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

---

### Base Optimization Flags

#### C benchmarks:
```
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

#### C++ benchmarks:
```
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

#### Fortran benchmarks:
```
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -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
```

(Continued on next page)
Base Optimization Flags (Continued)

Benchmarks using both Fortran and C:
-\texttt{w} -m64 -\texttt{-std=c11} -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-\texttt{-flto} -\texttt{-mfpmath=sse} -\texttt{-funroll-loops} -\texttt{-qopt-mem-layout-trans=4}
-\texttt{-nostandard-realloc-lhs} -\texttt{-align array32byte} -\texttt{-auto} -\texttt{-ljemalloc}
-\texttt{-L/usr/local/jemalloc64-5.0.1/lib}

Benchmarks using both C and C++:
-\texttt{w} -m64 -\texttt{-std=c11} -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-\texttt{-flto} -\texttt{-mfpmath=sse} -\texttt{-funroll-loops} -\texttt{-qopt-mem-layout-trans=4} -\texttt{-ljemalloc}
-\texttt{-L/usr/local/jemalloc64-5.0.1/lib}

Benchmarks using Fortran, C, and C++:
-\texttt{w} -m64 -\texttt{-std=c11} -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-\texttt{-flto} -\texttt{-mfpmath=sse} -\texttt{-funroll-loops} -\texttt{-qopt-mem-layout-trans=4}
-\texttt{-nostandard-realloc-lhs} -\texttt{-align array32byte} -\texttt{-auto} -\texttt{-ljemalloc}
-\texttt{-L/usr/local/jemalloc64-5.0.1/lib}

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

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Supermicro-Platform-Settings-V1.2-SPR-revC.xml

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