SPEC CPU®2017 Floating Point Speed Result

Supermicro
SuperServer SYS-221H-TN24R
(X13DEM, Intel Xeon Platinum 8490H)

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

SPECspeed®2017_fp_base = 332
SPECspeed®2017_fp_peak = 332

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

Threads

<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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<tr>
<td>603.bwaves_s</td>
<td>120</td>
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<tr>
<td>607.cactuBSSN_s</td>
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<tr>
<td>628.pop2_s</td>
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<td>638.imagick_s</td>
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<td>644.nab_s</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>120</td>
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</tr>
<tr>
<td>654.roms_s</td>
<td>120</td>
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</tbody>
</table>

---

**Hardware**

CPU Name: Intel Xeon Platinum 8490H
Max MHz: 3500
Nominal: 1900
Enabled: 120 cores, 2 chips
Orderable: 1.2 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 (16 x 64 GB 2Rx4 PC5-4800B-R)
Storage: 1 x 1.92 TB NVMe SSD
Other: None

**Software**

OS: SUSE Linux Enterprise High Performance Computing 15 SP4 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: Yes
Firmware: Version 1.0b released Dec-2022
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.
**Results Table**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<td>34.2</td>
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</tr>
</tbody>
</table>

**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>

(Continued on next page)
Supermicro
SuperServer SYS-221H-TN24R
(X13DEM, Intel Xeon Platinum 8490H)

| SPECspeed®2017_fp_base = 332 |
| SPECspeed®2017_fp_peak = 332 |

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

General Notes (Continued)

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:
Hyper-Threading = Disable
Power Technology = Custom
Power Performance Tuning = BIOS Controls EPB
ENERGY_PERF_BIAS_CFG mode = Performance

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca6d64d
running on 165-76 Wed Nov 30 22:20:06 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
  2 "physical id"s (chips)
  120 "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 53 54 55 56 57 58 59
physical 1: 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 53 54 55 56 57 58 59

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

(Continued on next page)
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**CPU2017 License:** 001176  
**Test Sponsor:** Supermicro  
**Tested by:** Supermicro

---

**SPECspeed®2017_fp_base = 332**  
**SPECspeed®2017_fp_peak = 332**

---

### Platform Notes (Continued)

Byte Order: Little Endian  
CPU(s): 120  
On-line CPU(s) list: 0-119  
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): 2  
Stepping: 6  
Frequency boost: enabled  
CPU max MHz: 1901.0000  
CPU min MHz: 800.0000  
BogoMIPS: 3800.00  

Flags:  
- fpu vme de pse tsc msr mcr mxe abm smep svm setmmx pdflush nonstop_tsc cpuid arch_capabilities

Virtualization: VT-x

L1d cache: 5.6 MiB (120 instances)  
L1i cache: 3.8 MiB (120 instances)  
L2 cache: 240 MiB (120 instances)  
L3 cache: 225 MiB (2 instances)  
NUMA node(s): 2  
NUMA node0 CPU(s): 0-59  
NUMA node1 CPU(s): 60-119  

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

(Continued on next page)
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Tested by: Supermicro

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 5.6M 12 Data 1 64 1 64
L1i 32K 3.8M 8 Instruction 1 64 1 64
L2 2M 240M 16 Unified 2 2048 1 64
L3 112.5M 225M 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: 2 nodes (0-1)
  node 0 cpus: 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 53 54 55 56 57 58 59
  node 0 size: 515612 MB
  node 0 free: 506106 MB
  node 1 cpus: 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119
  node 1 size: 515731 MB
  node 1 free: 515180 MB
  node distances:
    node   0   1
    0: 10 21
    1: 21 10

From /proc/meminfo
  MemTotal:       1056096352 kB
  HugePages_Total:       0
  Hugepagesize:       2048 kB

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

From /etc/*release* /etc/*version*
  os-release:
    NAME="SLE_HPC"
    VERSION="15-SP4"
    VERSION_ID="15.4"
    PRETTY_NAME="SUSE Linux Enterprise High Performance Computing 15 SP4"

(Continued on next page)
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Test Date: Nov-2022
Hardware Availability: Jan-2023
Software Availability: Jun-2022

Platform Notes (Continued)

ID="sle_hpc"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sle_hpc:15:sp4"

uname -a:
Linux 165-76 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/swapgs 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 Nov 30 18:44
SPEC is set to: /home/cpu2017

From /sys/devices/virtual/dmi/id
Vendor: Supermicro
Product: Super Server
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:
11x Samsung M321R8GA0BB0-CQKDG 64 GB 2 rank 4800
5x Samsung M321R8GA0BB0-CQKEG 64 GB 2 rank 4800

BIOS:

(Continued on next page)
Platform Notes (Continued)

BIOS Vendor: American Megatrends International, LLC.
BIOS Version: 1.0b
BIOS Date: 11/30/2022
BIOS Revision: 5.29

(End of data from sysinfo program)

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 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

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

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 | 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 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

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

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version

(Continued on next page)
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Compiler Version Notes (Continued)

```
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.
```

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 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto
  -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
  -DSPEC_OPENMP -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

(Continued on next page)
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<tbody>
<tr>
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</table>

### 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

---

Base Optimization Flags (Continued)

Fortran benchmarks:
- -m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX512 -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 -xCORE-AVX512 -Ofast -ffast-math -flto
- mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
- DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte -auto
- L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

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


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


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