# SPEC CPU®2017 Floating Point Speed Result

## Nettrix

**R620 G30 (Intel Xeon Silver 4210R)**

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>6138</th>
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<tbody>
<tr>
<td>Test Sponsor:</td>
<td>Nettrix</td>
</tr>
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<td>Tested by:</td>
<td>Nettrix</td>
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<td>Test Date:</td>
<td>Jul-2020</td>
</tr>
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<td>Hardware Availability:</td>
<td>May-2020</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Apr-2020</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Silver 4210R
- **Max MHz:** 3200
- **Nominal:** 2400
- **Enabled:** 20 cores, 2 chips, 2 threads/core
- **Orderable:** 1.2 Chips
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **L2:** 1 MB I+D on chip per core
- **L3:** 13.75 MB I+D on chip per chip
- **Other:** None
- **Memory:** 384 GB (24 x 16 GB 2Rx8 PC4-3200AA-R, running at 2400)
- **Storage:** 1x 960 GB SATA SSD
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux release 8.0 (Ootpa) 4.18.0-80.e18.x86_64
- **Compiler:** C/C++: Version 19.1.1.217 of Intel C/C++ Compiler for Linux Build 20200306; Fortran: Version 19.1.1.217 of Intel Fortran Compiler for Linux Build 20200306;
- **Parallel:** Yes
- **Firmware:** Nettrix BIOS Version NJGS041227 released May-2020
- **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.

### Threads

<table>
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<tr>
<th>Command</th>
<th>Threads</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
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<td>603.bwaves_s</td>
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<td>607.cactuBSSN_s</td>
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<td>638.imagick_s</td>
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<td>644.nab_s</td>
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<td>649.fotonik3d_s</td>
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## Results Table

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<thead>
<tr>
<th>Benchmark</th>
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<th>Ratio</th>
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</table>

**Compiler Notes**

The inconsistent Compiler version information under Compiler Version section is due to a discrepancy in Intel Compiler.

The correct version of C/C++ compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux

The correct version of Fortran compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux

**Operating System Notes**

Stack size set to unlimited using "ulimit -s unlimited"

Tuning Kernel Parameters:
- sched_migration_cost_ns=600000
- sched_rt_runtime_us=950000
- sched_latency_ns=24000000
- sched_min_granularity_ns=8000000
- dirty_background_ratio=10
- dirty_ratio=20
- dirty_writeback_centisecs=400
- dirty_expire_centisecs=5000
- swappiness=10
- numa_balancing=0

**Environment Variables Notes**

Environment variables set by runcpu before the start of the run:

KMP_AFFINITY = "granularity=fine,compact,1,0"

LD_LIBRARY_PATH =

"/home/admin/benchmarks/cpu2017/lib/intel64:/home/admin/benchmarks/cpu2017/je5.0.1-64"

MALLOCONF = "retain:true"
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R620 G30 (Intel Xeon Silver 4210R)

Environment Variables Notes (Continued)

OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
memory using Redhat Enterprise Linux 8.0
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.
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
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

Platform Notes

Application Performance Profile Set to Computing Latency Mode
Hyper-Threading set to Enabled
MONITOR/MWAIT set to Enabled
Autonomous Core C-State set to Enabled
SNC set to Disabled
IMC set to Auto
XPT Prefetch set to Enabled
KTI Prefetch set to Disabled
Stale AtoS set to Enabled
Patrol Scrub set to Disabled
LLC Dead Line Allocation set to Disabled
BMC Settings:
  Cooling Policy set to Manual Mode
  Fan Duty set to 95

Sysinfo program /home/admin/benchmarks/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed8b1e6e46a485a0011
running on localhost.localdomain Tue Jul 21 14:56:38 2020

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
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R620 G30 (Intel Xeon Silver 4210R)

SPECspeed®2017_fp_base = 90.1

SPECspeed®2017_fp_peak = 93.1

CPU2017 License: 6138
Test Sponsor: Nettrix
Tested by: Nettrix

Test Date: Jul-2020
Hardware Availability: May-2020
Software Availability: Apr-2020

From /proc/cpuinfo

```
model name : Intel(R) Xeon(R) Silver 4210R CPU @ 2.40GHz
  2 "physical id"s (chips)
  40 "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 : 10
siblings : 20
  physical 0: cores 0 1 2 3 4 8 9 10 11 12
  physical 1: cores 0 1 2 3 4 8 9 10 11 12
```

From lscpu:

```
Architecture:        x86_64
CPU op-mode(s):      32-bit, 64-bit
Byte Order:          Little Endian
CPU(s):              40
On-line CPU(s) list: 0-39
Thread(s) per core:  2
Core(s) per socket:  10
Socket(s):           2
NUMA node(s):        2
Vendor ID:           GenuineIntel
CPU family:          6
Model:               85
Model name:          Intel(R) Xeon(R) Silver 4210R CPU @ 2.40GHz
Stepping:            7
CPU MHz:             2763.714
CPU max MHz:         3200.0000
CPU min MHz:         1000.0000
BogoMIPS:            4800.00
Virtualization:      VT-x
L1d cache:           32K
L1i cache:           32K
L2 cache:            1024K
L3 cache:            14080K
NUMA node0 CPU(s):   0-9,20-29
NUMA node1 CPU(s):   10-19,30-39
Flags:               fpu vme de pse tsc msr pae mce 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 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 rdrnd lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_cpl
```

(Continued on next page)
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R620 G30 (Intel Xeon Silver 4210R)

**SPECspeed®2017_fp_base = 90.1**
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**Platform Notes (Continued)**

```
cqm_mbm_local dtherm ida arat pln pts pku ospke avx512_vnni flush_l1d
arch_capabilities

/proc/cpuinfo cache data
 cache size : 14080 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 20 21 22 23 24 25 26 27 28 29
 node 0 size: 191860 MB
 node 0 free: 191326 MB
 node 1 cpus: 10 11 12 13 14 15 16 17 18 19 30 31 32 33 34 35 36 37 38 39
 node 1 size: 193506 MB
 node 1 free: 192869 MB
 node distances:
   node 0   1
   0: 10 21
   1: 21 10

From /proc/meminfo
 MemTotal: 394616436 kB
 HugePages_Total: 0
 Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
 os-release:
   NAME="Red Hat Enterprise Linux"
   VERSION="8.0 (Ootpa)"
   ID="rhel"
   ID_LIKE="fedora"
   VERSION_ID="8.0"
   PLATFORM_ID="platform:el8"
   PRETTY_NAME="Red Hat Enterprise Linux 8.0 (Ootpa)"
   ANSI_COLOR="0;31"
 redhat-release: Red Hat Enterprise Linux release 8.0 (Ootpa)
 system-release: Red Hat Enterprise Linux release 8.0 (Ootpa)
 system-release-cpe: cpe:/o:redhat:enterprise_linux:8.0:ga

uname -a:
 Linux localhost.localdomain 4.18.0-80.el8.x86_64 #1 SMP Wed Mar 13 12:02:46 UTC 2019
 x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: No status reported
```

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

Nettrix
R620 G30 (Intel Xeon Silver 4210R)

SPECspeed®2017_fp_peak = 93.1
SPECspeed®2017_fp_base = 90.1

CPU2017 License: 6138
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Platform Notes (Continued)

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: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

run-level 3 Jul 21 14:54
SPEC is set to: /home/admin/benchmarks/cpu2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda5 xfs 877G 137G 740G 16% /home

From /sys/devices/virtual/dmi/id
BIOS: American Megatrends Inc. NJGS041227 05/16/2020
Vendor: Nettrix
Product: R620 G30
Product Family: Rack
Serial: 302000666

Additional information from dmidecode 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:
24x Samsung M393A2K43DB2-CWE 16 GB 2 rank 3200

(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) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C++, C, Fortran | 607.cactuBSSN_s(base, peak)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
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SPECspeed®2017_fp_base = 90.1
SPECspeed®2017_fp_peak = 93.1

CPU2017 License: 6138
Test Sponsor: Nettrix
Tested by: Nettrix

Compiler Version Notes (Continued)

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

------------------------------------------------------------------------------
==============================================================================
Fortran         | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
| 654.roms_s(base, peak)
------------------------------------------------------------------------------
==============================================================================
Fortran, C      | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
| 628.pop2_s(base, peak)
------------------------------------------------------------------------------
==============================================================================
------------------------------------------------------------------------------
------------------------------------------------------------------------------
Base Compiler Invocation

C benchmarks:
icc

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort
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R620 G30 (Intel Xeon Silver 4210R)  

| SPECspeed®2017_fp_base = 90.1 |
| SPECspeed®2017_fp_peak = 93.1 |

### Test Information

- **CPU2017 License**: 6138
- **Test Sponsor**: Nettrix
- **Tested by**: Nettrix
- **Test Date**: Jul-2020
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### 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 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch`
- `-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP`
- `-mbranches-within-32B-boundaries`

#### Fortran benchmarks:

- `-m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs`
- `-mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

#### Benchmarks using both Fortran and C:

- `-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs`
- `-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

#### Benchmarks using Fortran, C, and C++:

- `-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs`
- `-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

### Peak Compiler Invocation

#### C benchmarks:

- `icc`

(Continued on next page)
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R620 G30 (Intel Xeon Silver 4210R)

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CPU2017 License: 6138
Test Sponsor: Nettrix
Tested by: Nettrix

Test Date: Jul-2020
Hardware Availability: May-2020
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Peak Compiler Invocation (Continued)

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

Peak Portability Flags
Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

619.lbm_s: basepeak = yes
638.imagick_s: basepeak = yes
644.nab_s: -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -03
   -no-prec-div -qopt-prefetch -ffinite-math-only
   -qopt-mem-layout-trans=4 -gopenmp -DSPEC_OPENMP
   -mbranches-within-32B-boundaries
   -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Fortran benchmarks:

603.bwaves_s: -m64 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
   -DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -ipo -xCORE-AVX512
   -03 -no-prec-div -qopt-prefetch -ffinite-math-only
   -qopt-mem-layout-trans=4 -gopenmp -nostandard-realloc-lhs
   -mbranches-within-32B-boundaries
   -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
649.fotonik3d_s: basepeak = yes
654.roms_s: basepeak = yes

(Continued on next page)
Nettrix
R620 G30 (Intel Xeon Silver 4210R)

CPU2017 License: 6138
Test Sponsor: Nettrix
Tested by: Nettrix

| SPECspeed®2017_fp_base = 90.1 |
| SPECspeed®2017_fp_peak = 93.1 |

Test Date: Jul-2020
Hardware Availability: May-2020
Software Availability: Apr-2020

Peak Optimization Flags (Continued)

Benchmarks using both Fortran and C:

621.wrf_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)
-prof-use(pass 2) -ipo -xCORE-AVX512 -03 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
-mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

627.cam4_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:
http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.xml
http://www.spec.org/cpu2017/flags/Nettrix-Platform-Settings-V3.0-CLX-revB.xml

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU®2017 v1.1.0 on 2020-07-21 02:56:37-0400.
Originally published on 2020-09-01.