SPEC® CPU2017 Floating Point Rate Result
Copyright 2017-2018 Standard Performance Evaluation Corporation

NEC Corporation
Express5800/D120h (Intel Xeon Gold 5120)

SPECrater2017_fp_base = 71.0
SPECrater2017_fp_peak = 72.7

CPU2017 License: 9006
Test Sponsor: NEC Corporation
Tested by: NEC Corporation

Test Date: Aug-2018
Hardware Availability: Jan-2018
Software Availability: Mar-2018

Hardware
CPU Name: Intel Xeon Gold 5120
Max MHz.: 3200
Nominal: 2200
Enabled: 14 cores, 1 chip, 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: 19.25 MB I+D on chip per chip
Other: None
Memory: 192 GB (6 x 32 GB 2Rx4 PC4-2666V-R, running at 2400)
Storage: 1 x 1 TB SATA, 7200 RPM
Other: None

Software
OS: Red Hat Enterprise Linux Server release 7.4 (Maipo)
Compiler: C/C++: Version 18.0.0.128 of Intel C/C++ Compiler for Linux;
Fortran: Version 18.0.0.128 of Intel Fortran Compiler for Linux
Parallel: No
Firmware: Version F21 02/22/2018 released Apr-2018
File System: ext4
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
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Results Table

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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"

General Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32:/home/cpu2017/je5.0.1-64"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.4
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>

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)

(Continued on next page)
General Notes (Continued)

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:
   ENERGY_PERF_BIAS_CFG mode: Performance
   SNC: Enable
   IMC Interleaving: 1-way Interleave
   LLC dead line alloc: Disable
   Patrol Scrub: Disable
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618b0cc091c0f
running on d120h Fri Aug 10 02:37:54 2018

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) Gold 5120 CPU @ 2.20GHz
   1 "physical id"s (chips)
   28 "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 : 14
   siblings : 28
   physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14

From lscpu:
   Architecture:          x86_64
   CPU op-mode(s):        32-bit, 64-bit
   Byte Order:            Little Endian
   CPU(s):                28
   On-line CPU(s) list:   0-27
   Thread(s) per core:    2
   Core(s) per socket:    14
   Socket(s):             1
   NUMA node(s):          2
   Vendor ID:             GenuineIntel
   CPU family:            6
   Model:                 85
## NEC Corporation

**Express5800/D120h (Intel Xeon Gold 5120)**

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**CPU2017 License:** 9006  
**Test Sponsor:** NEC Corporation  
**Test Date:** Aug-2018  
**Hardware Availability:** Jan-2018  
**Tested by:** NEC Corporation  
**Software Availability:** Mar-2018

### Platform Notes (Continued)

- **Model name:** Intel(R) Xeon(R) Gold 5120 CPU @ 2.20GHz  
- **Stepping:** 4  
- **CPU MHz:** 2480.242  
- **CPU max MHz:** 3200.0000  
- **CPU min MHz:** 1000.0000  
- **BogoMIPS:** 4400.00  
- **Virtualization:** VT-x  
- **L1d cache:** 32K  
- **L1i cache:** 32K  
- **L2 cache:** 1024K  
- **L3 cache:** 19712K  
- **NUMA node0 CPU(s):** 0-3,7-9,14-17,21-23  
- **NUMA node1 CPU(s):** 4-6,10-13,18-20,24-27

**Flags:**  
- fpu vme de pse 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 aperfmperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx fl64 rdrand lahf_lm abm 3dnowprefetch ebtcat13 cmp_l3 invpcid_single intel_pt spec_ctrl ibpb_support tpr_shadow vmmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 
cqm_llc cqm_occum_llc cqm_mmb_total cqm_mmb_local dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req

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 7 8 9 14 15 16 17 21 22 23  
  - node 0 size: 96932 MB  
  - node 0 free: 94235 MB  
  - node 1 cpus: 4 5 6 10 11 12 13 18 19 20 24 25 26 27  
  - node 1 size: 98304 MB  
  - node 1 free: 95767 MB  

From /proc/meminfo

- **MemTotal:** 196476064 kB  
- **HugePages_Total:** 0  
- **Hugepagesize:** 2048 kB

(Continued on next page)
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Platform Notes (Continued)

From /etc/*release* /etc/*version*
  os-release:
    NAME="Red Hat Enterprise Linux Server"
    VERSION="7.4 (Maipo)"
    ID="rhel"
    ID_LIKE="fedora"
    VARIANT="Server"
    VARIANT_ID="server"
    VERSION_ID="7.4"
    PRETTY_NAME="Red Hat Enterprise Linux Server 7.4 (Maipo)"
redhat-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
system-release-cpe: cpe:/o:redhat:enterprise_linux:7.4:ga:server

uname -a:
  Linux d120h 3.10.0-693.21.1.el7.x86_64 #1 SMP Fri Feb 23 18:54:16 UTC 2018 x86_64
  x86_64 x86_64 GNU/Linux
run-level 3 Aug 10 02:32

SPEC is set to: /home/cpu2017
  Filesystem     Type  Size  Used Avail Use% Mounted on
  /dev/sda3      ext4  909G  420G  443G  49% /

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.

BIOS GIGABYTE F21 02/22/2018
Memory:
  10x NO DIMM NO DIMM
  6x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666, configured at 2400

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
 CC  519.lbm_r(base) 538.imagick_r(base, peak) 544.nab_r(base)
==============================================================================

icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

==============================================================================
 CC  519.lbm_r(peak) 544.nab_r(peak)
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### NEC Corporation

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Base Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using both C and C++:
icpc icc

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

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
519.1bm_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:
-xCORE-AVX2 -ipo -03 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

C++ benchmarks:
-xCORE-AVX2 -ipo -03 -no-prec-div -qopt-prefetch -ffinite-math-only

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Base Optimization Flags (Continued)

C++ benchmarks (continued):
-qopt-mem-layout-trans=3

Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte

Benchmarks using both C and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte

Base Other Flags

C benchmarks:
-m64 -std=c11

C++ benchmarks:
-m64

Fortran benchmarks:
-m64

Benchmarks using both Fortran and C:
-m64 -std=c11

Benchmarks using both C and C++:
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Benchmarks using Fortran, C, and C++:
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**Peak Compiler Invocation**

- **C benchmarks:**
  - `icc`

- **C++ benchmarks:**
  - `icpc`

- **Fortran benchmarks:**
  - `ifort`

- **Benchmarks using both Fortran and C:**
  - `ifort icc`

- **Benchmarks using both C and C++:**
  - `icpc icc`

- **Benchmarks using Fortran, C, and C++:**
  - `icpc icc ifort`

**Peak Portability Flags**

Same as Base Portability Flags

**Peak Optimization Flags**

- **C benchmarks:**
  - `519.lbm_r `-prof-gen(pass 1) `-prof-use(pass 2) `-ipo `-xCORE-AVX2 `-O3 `-no-prec-div `-qopt-prefetch `-ffinite-math-only `-qopt-mem-layout-trans=3`
  - `538.imagick_r `-xCORE-AVX2 `-ipo `-O3 `-no-prec-div `-qopt-prefetch `-ffinite-math-only `-qopt-mem-layout-trans=3`
  - `544.nab_r` Same as `519.lbm_r`

- **C++ benchmarks:**
  - `-prof-gen(pass 1) `-prof-use(pass 2) `-ipo `-xCORE-AVX2 `-O3 `-no-prec-div `-qopt-prefetch `-ffinite-math-only `-qopt-mem-layout-trans=3`

- **Fortran benchmarks:**

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

503.bwaves_r: basepeak = yes

549.fotonik3d_r: basepeak = yes

554.roms_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs
-align array32byte

Benchmarks using both Fortran and C:

521.wrf_r: basepeak = yes

527.cam4_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs
-align array32byte

Benchmarks using both C and C++:
- prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: basepeak = yes

Peak Other Flags

C benchmarks:
-m64 -std=c11

C++ benchmarks:
-m64

Fortran benchmarks:
-m64

Benchmarks using both Fortran and C:
-m64 -std=c11

Benchmarks using both C and C++:
-m64 -std=c11
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<tr>
<th>NEC Corporation</th>
<th>SPEC CPU2017 Floating Point Rate Result</th>
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<tr>
<td>Express5800/D120h (Intel Xeon Gold 5120)</td>
<td>SPECrate2017_fp_base = 71.0</td>
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<tr>
<td>SPECrate2017_fp_peak = 72.7</td>
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<tr>
<td>CPU2017 License: 9006</td>
<td>Test Date: Aug-2018</td>
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<tr>
<td>Test Sponsor: NEC Corporation</td>
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<td>Tested by: NEC Corporation</td>
<td>Software Availability: Mar-2018</td>
</tr>
</tbody>
</table>

**Peak Other Flags (Continued)**

Benchmarks using Fortran, C, and C++:
- `-m64` `-std=c11`

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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Tested with SPEC CPU2017 v1.0.2 on 2018-08-09 13:37:53-0400.
Originally published on 2018-09-04.