Huawei
Huawei CH225 V5 (Intel Xeon Gold 6128)

CPU2017 License: 3175
Test Sponsor: Huawei
Test Date: Sep-2018
Hardware Availability: Jul-2017

Tested by: Huawei
Software Availability: Mar-2018

SPECspeed2017_fp_base = 73.4
SPECspeed2017_fp_peak = 74.5

<table>
<thead>
<tr>
<th>Threads</th>
<th>603.bwaves_s</th>
<th>607.cactuBSSN_s</th>
<th>619.lbm_s</th>
<th>621.wrf_s</th>
<th>627.cam4_s</th>
<th>628.pop2_s</th>
<th>638.imagick_s</th>
<th>644.nab_s</th>
<th>649.fotonik3d_s</th>
<th>654.roms_s</th>
</tr>
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<tbody>
<tr>
<td>12</td>
<td>85.5</td>
<td></td>
<td>39.2</td>
<td>56.3</td>
<td>42.1</td>
<td>57.8</td>
<td>49.0</td>
<td>97.4</td>
<td>73.0</td>
<td>79.6</td>
</tr>
</tbody>
</table>

spec

Hardware

CPU Name: Intel Xeon Gold 6128
Max MHz.: 3700
Nominal: 3400
Enabled: 12 cores, 2 chips
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 core
Other: None
Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2666V-R)
Storage: 1 x 1200 GB SAS, 10000 RPM
Other: None

Software

OS: Red Hat Enterprise Linux Server release 7.4 (Maipo) 3.10.0-693.11.6.el7.x86_64
Compiler: C/C++: Version 18.0.2.199 of Intel C/C++ Compiler for Linux;
Fortran: Version 18.0.2.199 of Intel Fortran Compiler for Linux
Parallel: Yes
Firmware: Version 0.80 Released Jun-2018
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
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Results Table

<table>
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<th>Benchmark</th>
<th>Base Threads</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Peak Threads</th>
<th>Peak Seconds</th>
<th>Peak Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>12</td>
<td>229 258</td>
<td></td>
<td>12</td>
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<td></td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>12</td>
<td>195 85.5</td>
<td></td>
<td>12</td>
<td>195 85.5</td>
<td></td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>12</td>
<td>210 42.1</td>
<td></td>
<td>12</td>
<td>210 42.1</td>
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<tr>
<td>621.wrf_s</td>
<td>12</td>
<td>205 57.8</td>
<td></td>
<td>12</td>
<td>205 57.8</td>
<td></td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>12</td>
<td>296 48.7</td>
<td></td>
<td>12</td>
<td>296 48.7</td>
<td></td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>12</td>
<td>179 97.4</td>
<td></td>
<td>12</td>
<td>179 97.4</td>
<td></td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>12</td>
<td>198 79.5</td>
<td></td>
<td>12</td>
<td>198 79.5</td>
<td></td>
</tr>
</tbody>
</table>

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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"

General Notes
Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i7-6700K CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.5
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-2017-5754 (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.
jemalloc, a general purpose malloc implementation built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
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**Platform Notes**

BIOS configuration:
- Power Policy Set to Load Balance
- Hyper-Threading Set to Disable
- XPT Prefetch Set to Enabled

Sysinfo program /spec2017/bin/sysinfo
- Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bccc091c0f
- running on localhost.localdomain Thu Sep 6 21:34:16 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 6128 CPU @ 3.40GHz
- 2 "physical id"s (chips)
- 12 "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: 6
  - siblings: 6
  - physical 0: cores 0 6 9 10 11 13
  - physical 1: cores 0 6 9 10 11 13

From lscpu:
- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- CPU(s): 12
- On-line CPU(s) list: 0-11
- Thread(s) per core: 1
- Core(s) per socket: 6
- Socket(s): 2
- NUMA node(s): 2
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 85
- Model name: Intel(R) Xeon(R) Gold 6128 CPU @ 3.40GHz
- Stepping: 4
- CPU MHz: 3401.000
- CPU max MHz: 3401.0000
- CPU min MHz: 1200.0000
- BogoMIPS: 6800.00
- Virtualization: VT-x
- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 1024K
- L3 cache: 19712K

(Continued on next page)
SPEC CPU2017 Floating Point Speed Result

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Platform Notes (Continued)

NUMA node0 CPU(s): 0-5
NUMA node1 CPU(s): 6-11
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 ntopology nonstop_tsc
       aperfmrperf eagerfpu pni pclmulqdq dtes64 ms_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
       f16c rdrand lahf_lm abm 3dnowprefetch epb cat_l3 cdp_l3 invpcid_single intel_pt
       spec_ctrl ibpb_support tpr_shadow vmx flexpriority ept vpid fsgsbase tsc_adjust
       bmi1 hle avx2 smep bmi2 ibrms invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx
       smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_llc
       cqm_occup_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts

From /proc/cpuinfo cache data
cache size : 19712 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
node 0 size: 391349 MB
node 0 free: 380482 MB
node 1 cpus: 6 7 8 9 10 11
node 1 size: 393216 MB
node 1 free: 376348 MB
node distances:
node   0   1
0:  10  21
1:  21  10

From /proc/meminfo
MemTotal: 790510872 kB
HugePages_Total: 0
Hugepagesize: 2048 KB

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)

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Platform Notes (Continued)

system-release-cpe: cpe:/o:redhat:enterprise_linux:7.4:ga:server

uname -a:
    Linux localhost.localdomain 3.10.0-693.11.6.el7.x86_64 #1 SMP Thu Dec 28 14:23:39 EST
    2017 x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Sep 6 16:08

SPEC is set to: /spec2017

Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda2      xfs   720G   64G  657G   9% /

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 INSYDE Corp. 0.80 06/27/2018
    Memory:
        24x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
    CC  619.lbm_s(base) 638.imagick_s(base, peak) 644.nab_s(base, peak)
    icc (ICC) 18.0.2 20180210
    Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
    ----------------------------------------------------------------------

==============================================================================
    CC   619.lbm_s(peak)
    icc (ICC) 18.0.2 20180210
    Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
    ----------------------------------------------------------------------

==============================================================================
    FC  607.cactuBSSN_s(base, peak)
    icpc (ICC) 18.0.2 20180210
    Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
    icc (ICC) 18.0.2 20180210
    Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
    ifort (IFORT) 18.0.2 20180210

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## SPEC CPU2017 Floating Point Speed Result

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### Compiler Version Notes (Continued)

```markdown
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

```markdown
FC  603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base, peak)
```

```markdown
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

```markdown
FC  603.bwaves_s(peak) 649.fotonik3d_s(peak)
```

```markdown
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

```markdown
CC  621.wrf_s(base) 627.cam4_s(base, peak) 628.pop2_s(base)
```

```markdown
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

```markdown
CC  621.wrf_s(peak) 628.pop2_s(peak)
```

```markdown
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

### Base Compiler Invocation

**C benchmarks:**

```bash
icc -m64 -std=c11
```

**Fortran benchmarks:**

```bash
ifort -m64
```

**Benchmarks using both Fortran and C:**

```bash
ifort -m64 icc -m64 -std=c11
```

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Base Compiler Invocation (Continued)

Benchmarks using Fortran, C, and C++:
icpc -m64 icc -m64 -std=c11 ifort -m64

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:
-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc

Fortran benchmarks:
-Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc

Benchmarks using both Fortran and C:
-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc

Benchmarks using Fortran, C, and C++:
-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc
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Peak Compiler Invocation

C benchmarks:
icc -m64 -std=c11

Fortran benchmarks:
ifort -m64

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

Benchmarks using Fortran, C, and C++:
icpc -m64 icc -m64 -std=c11 ifort -m64

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
619.lbm_s: basepeak = yes
638.imagick_s: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-DSPEC_OPENMP
644.nab_s: basepeak = yes

Fortran benchmarks:
603.bwaves_s: basepeak = yes
649.fotonik3d_s: basepeak = yes
654.roms_s: -DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3
-qopenmp -nostandard-realloc-lhs

Benchmarks using both Fortran and C:
621.wrf_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div

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SPECspeed2017_fp_peak = 74.5
SPECspeed2017_fp_base = 73.4

Peak Optimization Flags (Continued)

621.wrf_s (continued):
-qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs

627.cam4_s: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs

628.pop2_s: Same as 621.wrf_s

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-ic18.0-official-linux64.2017-12-21.xml
http://www.spec.org/cpu2017/flags/Huawei-Platform-Settings-SKL-V1.9-revC.xml