SPEC® CFP2006 Result

Dell Inc.

PowerEdge FC640 (Intel Xeon Silver 4114, 2.20 GHz)

SPECfp®2006 = 117
SPECfp_base2006 = 112

CPU2006 license: 55
Test date: Jun-2017
Test sponsor: Dell Inc.
Hardware Availability: Sep-2017
Tested by: Dell Inc.
Software Availability: Apr-2017

Hardware
CPU Name: Intel Xeon Silver 4114
CPU Characteristics: Intel Turbo Boost Technology up to 3.00 GHz
CPU MHz: 2200
FPU: Integrated
CPU(s) enabled: 20 cores, 2 chips, 10 cores/chip, 2 threads/core
CPU(s) orderable: 1.2 chip
Primary Cache: 32 KB I + 32 KB D on chip per core
Secondary Cache: 1 MB I+D on chip per core

Software
Operating System: SUSE Linux Enterprise Server 12 SP2 4.4.16-56-default
Compiler: C/C++: Version 17.0.3.191 of Intel C/C++ Compiler for Linux;
Fortran: Version 17.0.3.191 of Intel Fortran Compiler for Linux
Auto Parallel: Yes
File System: btrfs
System State: Run level 3 (multi-user)
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L3 Cache: 13.75 MB I+D on chip per chip
Other Cache: None
Memory: 192 GB (12 x 16 GB 2Rx8 PC4-2666V-R, running at 2400 MT/s)
Disk Subsystem: 1 x 960 GB SATA SSD
Other Hardware: None
L3 Cache: 13.75 MB I+D on chip per chip
Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other Software: None

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds Base</th>
<th>Ratio Base</th>
<th>Seconds Base</th>
<th>Ratio Base</th>
<th>Seconds Peak</th>
<th>Ratio Peak</th>
<th>Seconds Peak</th>
<th>Ratio Peak</th>
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</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>20.0</td>
<td>681</td>
<td>20.6</td>
<td>660</td>
<td><strong>20.2</strong></td>
<td><strong>673</strong></td>
<td><strong>20.2</strong></td>
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<td><strong>39.4</strong></td>
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<td>459.GemsFDTD</td>
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<td>333</td>
<td>58.5</td>
<td><strong>333</strong></td>
<td><strong>58.5</strong></td>
</tr>
</tbody>
</table>

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"

Platform Notes

BIOS settings:
Sub NUMA Cluster disabled
Virtualization Technology disabled
System Profile set to Custom
CPU Performance set to Maximum Performance
C States set to Autonomous
C1E disabled
Energy Efficient Turbo disabled
Uncore Frequency set to Dynamic

Continued on next page
Dell Inc.  
PowerEdge FC640 (Intel Xeon Silver 4114, 2.20 GHz)  

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**Platform Notes (Continued)**

Energy Efficiency Policy set to Performance  
Memory Patrol Scrub disabled  
Logical Processor enabled  
CPU Interconnect Bus Link Power Management disabled  
PCI ASPM L1 Link Power Management disabled  
Sysinfo program /root/cpu2006-1.2_ic17u3/config/sysinfo.rev6993  
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)  
running on linux-u8yg Mon Jun 5 19:44:15 2017

This section contains SUT (System Under Test) info as seen by some common utilities. To remove or add to this section, see:  
http://www.spec.org/cpu2006/Docs/config.html#sysinfo

From /proc/cpuinfo  
- **model name:** Intel(R) Xeon(R) Silver 4114 CPU @ 2.20GHz  
- **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  
- **cache size:** 14080 KB

From /proc/meminfo  
- **MemTotal:** 196687636 kB  
- **HugePages_Total:** 0  
- **Hugepagesize:** 2048 kB

From /etc/*release* /etc/*version*  
- **SuSE-release:**  
  - SUSE Linux Enterprise Server 12 (x86_64)  
  - VERSION = 12  
  - PATCHLEVEL = 2  
  - # This file is deprecated and will be removed in a future service pack or release.  
  - # Please check /etc/os-release for details about this release.  
- **os-release:**  
  - NAME="SLES"  
  - VERSION="12-SP2"  
  - VERSION_ID="12.2"  
  - PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"  
  - ID="sles"  
  - ANSI_COLOR="0;32"  
  - CPE_NAME="cpe:/o:suse:sles:12:sp2"

**uname -a:**  
Linux linux-u8yg 4.4.16-56-default #1 SMP Mon Aug 8 14:24:26 UTC 2016  
(5b281a8) x86_64 x86_64 x86_64 GNU/Linux

Continued on next page
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Platform Notes (Continued)

run-level 3 Jun 5 14:10
SPEC is set to: /root/cpu2006-1.2_ic17u3
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda1 btrfs 921G 232G 686G 26% /
Additional information from dmidecode:

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 Dell Inc. 0.3.9 04/26/2017
Memory:
12x 00AD00B300AD HMA82GR7AFR8N-VK 16 GB 2 rank 2666 MHz, configured at 2400
MHz
4x Not Specified Not Specified

(End of data from sysinfo program)

General Notes

Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact,1,0"
LD_LIBRARY_PATH = "/root/cpu2006-1.2_ic17u3/lib/ia32:/root/cpu2006-1.2_ic17u3/lib/intel64:/root/cpu2006-1.2_ic17u3/sh10.2"
OMP_NUM_THREADS = "20"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.2
Transparent Huge Pages enabled by default.
Filesystem page cache cleared with:
shell invocation of 'sync; echo 3 > /proc/sys/vm/drop_caches' prior to run

Base Compiler Invocation

C benchmarks:
  icc -m64

C++ benchmarks:
  icpc -m64

Fortran benchmarks:
  ifort -m64

Benchmarks using both Fortran and C:
  icc -m64 ifort -m64
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### Base Portability Flags

410. bwaves: \(-\text{DSPEC\_CPU\_LP64}\)
416. game5s: \(-\text{DSPEC\_CPU\_LP64}\)
433. milc: \(-\text{DSPEC\_CPU\_LP64}\)
434. zeusmp: \(-\text{DSPEC\_CPU\_LP64}\)
435. gromacs: \(-\text{DSPEC\_CPU\_LP64} \ - \text{nofor\_main}\)
436. cactusADM: \(-\text{DSPEC\_CPU\_LP64} \ - \text{nofor\_main}\)
437. leshe3d: \(-\text{DSPEC\_CPU\_LP64}\)
444. namd: \(-\text{DSPEC\_CPU\_LP64} \ - \text{nofor\_main}\)
447. dealII: \(-\text{DSPEC\_CPU\_LP64}\)
450. soplex: \(-\text{DSPEC\_CPU\_LP64}\)
453. povray: \(-\text{DSPEC\_CPU\_LP64}\)
454. calculix: \(-\text{DSPEC\_CPU\_LP64} \ - \text{nofor\_main}\)
459. GemsFDTD: \(-\text{DSPEC\_CPU\_LP64}\)
465. tonto: \(-\text{DSPEC\_CPU\_LP64}\)
470. lbm: \(-\text{DSPEC\_CPU\_LP64}\)
481. wrf: \(-\text{DSPEC\_CPU\_LP64} \ - \text{DSPEC\_CPU\_CASE\_FLAG} \ - \text{DSPEC\_CPU\_LINUX}\)
482. sphinx3: \(-\text{DSPEC\_CPU\_LP64}\)

### Base Optimization Flags

**C benchmarks:**
\(-\text{xCORE\-AVX2} \ - \text{ipo} \ - \text{O3} \ - \text{no-prec-div} \ - \text{parallel} \ - \text{qopt-prefetch}\)

**C++ benchmarks:**
\(-\text{xCORE\-AVX2} \ - \text{ipo} \ - \text{O3} \ - \text{no-prec-div} \ - \text{qopt-prefetch}\)

**Fortran benchmarks:**
\(-\text{xCORE\-AVX2} \ - \text{ipo} \ - \text{O3} \ - \text{no-prec-div} \ - \text{parallel} \ - \text{qopt-prefetch}\)

**Benchmarks using both Fortran and C:**
\(-\text{xCORE\-AVX2} \ - \text{ipo} \ - \text{O3} \ - \text{no-prec-div} \ - \text{parallel} \ - \text{qopt-prefetch}\)

### Peak Compiler Invocation

**C benchmarks:**
\texttt{icc} \ -m64

**C++ benchmarks:**
\texttt{icpc} \ -m64

**Fortran benchmarks:**
\texttt{ifort} \ -m64

**Benchmarks using both Fortran and C:**
\texttt{icc} \ -m64 \ \texttt{ifort} \ -m64
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**Peak Portability Flags**

Same as Base Portability Flags

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**Peak Optimization Flags**

C benchmarks:

433.milc: basepeak = yes

470.lbm: basepeak = yes

482.sphinx3: basepeak = yes

C++ benchmarks:

444.namd: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)
-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
-no-prec-div(pass 2) -fno-alias -auto-iipt32

447.dealII: basepeak = yes

450.soplex: basepeak = yes

453.povray: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)
-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
-no-prec-div(pass 2) -unroll4 -ansi-alias

Fortran benchmarks:

410.bwaves: basepeak = yes

416.gamess: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)
-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
-no-prec-div(pass 2) -unroll2 -inline-level=0 -scalar-rep-

434.zeusmp: basepeak = yes

437.leslie3d: basepeak = yes

459.GemsFDTD: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)
-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
-no-prec-div(pass 2) -unroll2 -inline-level=0
-qopt-prefetch -parallel

465.tonto: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)
-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
-no-prec-div(pass 2) -inline-calloc -qopt-malloc-options=3
-auto -unroll4

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Continued on next page
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Peak Optimization Flags (Continued)

Benchmarks using both Fortran and C:

435.gromacs: basepeak = yes

436.cactusADM: basepeak = yes

454.calculix: -xCORE-AVX2 -ipo -O3 -no-prec-div -auto-ilp32

481.wrf: basepeak = yes

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/Intel-ic17.0-official-linux64-revF.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic17.0-official-linux64-revF.xml

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For other inquiries, please contact webmaster@spec.org.

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