Dell Inc.

PowerEdge R430 (Intel Xeon E5-2637 v4, 3.50 GHz)

SPECfp® _rate2006 = 437
SPECfp_rate_base2006 = 429

CPU2006 license: 55
Test sponsor: Dell Inc.
Tested by: Dell Inc.

Test date: Jul-2016
Hardware Availability: Jun-2016
Software Availability: Dec-2015

Hardware

CPU Name: Intel Xeon E5-2637 v4
CPU Characteristics: Intel Turbo Boost Technology up to 3.70 GHz
CPU MHz: 3500
FPU: Integrated
CPU(s) enabled: 8 cores, 2 chips, 4 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: 256 KB I+D on chip per core

Software

Operating System: SUSE Linux Enterprise Server 12 SP1 3.12.49-11-default
Compiler: C/C++: Version 16.0.2.181 of Intel C++ Studio XE for Linux;
Fortran: Version 16.0.2.181 of Intel Fortran Studio XE for Linux
Auto Parallel: No
File System: ext4
System State: Run level 3 (multi-user)
SPEC CFP2006 Result

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L3 Cache: 15 MB I+D on chip per chip
Other Cache: None
Memory: 128 GB (8 x 16 GB 2Rx8 PC4-2400T-R)
Disk Subsystem: 1 x 250 GB 7200 RPM SATA HDD
Other Hardware: None

Base Pointers: 32/64-bit
Peak Pointers: 32/64-bit
Other Software: None

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>459.GemsFDTD</td>
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<td>481.wrf</td>
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<td>382</td>
<td>815</td>
<td>382</td>
<td>815</td>
<td>382</td>
</tr>
</tbody>
</table>

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"

Platform Notes

BIOS settings:
Snoop Mode set to Opportunistic Snoop Broadcast
Virtualization Technology disabled
### Platform Notes (Continued)

System Profile set to custom  
CPU Power Management set to Hardware P States  
C States set to Autonomous  
C1E disabled  
Energy Efficient Turbo disabled  
Uncore Frequency set to Dynamic  
Energy Efficiency Policy set to Balanced Performance  
Memory Patrol Scrub disabled  
Sysinfo program /root/cpu2006-1.2/config/sysinfo.rev6914  
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1  
runtime on linux-n1xa Wed Jul 6 19:00:40 2016

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) CPU E5-2637 v4 @ 3.50GHz  
  2 "physical id"s (chips)  
  16 "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 : 4  
siblings : 8  
physical 0: cores 0 1 2 3  
physical 1: cores 0 1 2 3  
cache size : 15360 KB
```

From /proc/meminfo  
```
MemTotal: 132054416 kB  
HugePages_Total: 0  
Hugepagesize: 2048 kB
```

From /usr/bin/lsb_release -d  
```
SUSE Linux Enterprise Server 12 SP1
```

From /etc/*release* /etc/*version*  
```
SuSE-release:  
SUSE Linux Enterprise Server 12 (x86_64)  
VERSION = 12  
PATCHLEVEL = 1  
# 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-SP1"  
VERSION_ID="12.1"  
PARENT_NAME="SUSE Linux Enterprise Server 12 SP1"  
ID="sles"  
ANSI_COLOR="0;32"
```
Dell Inc.

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| SPECfp_rate2006 = | 437 |
| SPECfp_rate_base2006 = | 429 |

CPU2006 license: 55  
Test sponsor: Dell Inc.  
Tested by: Dell Inc.

**Platform Notes (Continued)**

```
CPE_NAME="cpe:/o:suse:sles:12:sp1"
```

```
uname -a:
Linux linux-n1xa 3.12.49-11-default #1 SMP Wed Nov 11 20:52:43 UTC 2015
(8d714a0) x86_64 x86_64 x86_64 GNU/Linux
```

```
run-level 3 Jul 6 10:44
```

```
SPEC is set to: /root/cpu2006-1.2
```

```
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 ext4 221G 8.9G 211G 5% /
```

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. 2.0.1 04/11/2016
```

```
Memory:
4x 00AD063200AD HMA82GR7MFR8N-UH 16 GB 2 rank 2400 MHz
4x 00CE00B300CE M393A2K43BB1-CRC 16 GB 2 rank 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:
LD_LIBRARY_PATH = "/root/cpu2006-1.2/libs/32:/root/cpu2006-1.2/libs/64:/root/cpu2006-1.2/sh"
```

```
Binaries compiled on a system with 1x Intel Core i7-4790K CPU + 32GB memory using RedHat EL 7.2 glibc 2.17
Transparent Huge Pages enabled with:
echo always > /sys/kernel/mm/transparent_hugepage/enabled
Filesystem page cache cleared with:
echo 1> /proc/sys/vm/drop_caches
runspec command invoked through numactl i.e.:
numactl --interleave=all runspec <etc>
```

**Base Compiler Invocation**

```
C benchmarks:
  icc -m64
```

```
C++ benchmarks:
  icpc -m64
```

Continued on next page
Dell Inc.  
PowerEdge R430 (Intel Xeon E5-2637 v4, 3.50 GHz)  

<table>
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CPU2006 license: 55  
Test date: Jul-2016  
Test sponsor: Dell Inc.  
Hardware Availability: Jun-2016  
Tested by: Dell Inc.  
Software Availability: Dec-2015  

### Base Compiler Invocation (Continued)

Fortran benchmarks:
```bash
ifort -m64
```

Benchmarks using both Fortran and C:
```bash
icc -m64 ifort -m64
```

### Base Portability Flags

<table>
<thead>
<tr>
<th>Fortran benchmarks</th>
<th>C benchmarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves: -DSPEC_CPU_LP64</td>
<td>-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32</td>
</tr>
<tr>
<td>416.games: -DSPEC_CPU_LP64</td>
<td>-ansi-alias -opt-mem-layout-trans=3</td>
</tr>
<tr>
<td>433.milc: -DSPEC_CPU_LP64</td>
<td></td>
</tr>
<tr>
<td>434.zeusmp: -DSPEC_CPU_LP64</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>470.lbm: -DSPEC_CPU_LP64</td>
<td></td>
</tr>
<tr>
<td>481.wrf: -DSPEC_CPU_LP64 -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX</td>
<td></td>
</tr>
<tr>
<td>482.sphinx3: -DSPEC_CPU_LP64</td>
<td></td>
</tr>
</tbody>
</table>

### Base Optimization Flags

C benchmarks:
```bash
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
-ansi-alias -opt-mem-layout-trans=3
```

C++ benchmarks:
```bash
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
-ansi-alias -opt-mem-layout-trans=3
```

Fortran benchmarks:
```bash
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch
```

Benchmarks using both Fortran and C:
```bash
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
-ansi-alias -opt-mem-layout-trans=3
```
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Tested by: Dell Inc.
Software Availability: Dec-2015

Peak Compiler Invocation

C benchmarks:
   icc  -m64

C++ benchmarks:
   icpc -m64

Fortran benchmarks:
   ifort -m64

Benchmarks using both Fortran and C:
   icc  -m64 ifort -m64

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
   433.milc: basepeak = yes
   470.lbm: basepeak = yes
   482.sphinx3: basepeak = yes

C++ benchmarks:
   444.namd: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
              -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
              -par-num-threads=1(pass 1) -opt-mem-layout-trans=3(pass 2)
              -prof-use(pass 2) -fno-alias -auto-ilp32

   447.dealII: basepeak = yes
   450.soplex: basepeak = yes

Fortran benchmarks:
   410.bwaves: basepeak = yes

Continued on next page
Dell Inc. 

PowerEdge R430 (Intel Xeon E5-2637 v4, 3.50 GHz) 

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Peak Optimization Flags (Continued) 

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

434.zeusmp: basepeak = yes 
437.leslie3d: basepeak = yes 
459.GemsFDTD: basepeak = yes 
465.tonto: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1) -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -par-num-threads=1(pass 1) -prof-use(pass 2) -unroll4 -auto -inline-calloc -opt-malloc-options=3 

Benchmarks using both Fortran and C: 

435.gromacs: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1) -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -par-num-threads=1(pass 1) -opt-mem-layout-trans=3(pass 2) -prof-use(pass 2) -opt-prefetch -auto-ilp32 

436.cactusADM: basepeak = yes 
454.calculix: basepeak = yes 
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-ic16.0-official-linux64.html 

You can also download the XML flags sources by saving the following links: 
http://www.spec.org/cpu2006/flags/Intel-ic16.0-official-linux64.xml 
http://www.spec.org/cpu2006/flags/Dell-Platform-Settings-V1.2-revD.20151006.xml 

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