Dell Inc.
PowerEdge R930 (Intel Xeon E7-8891 v4, 2.80 GHz)

<table>
<thead>
<tr>
<th>Program</th>
<th>Copies</th>
<th>SPECfp_rate2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>80</td>
<td>1850</td>
</tr>
<tr>
<td>416.gamess</td>
<td>80</td>
<td>1800</td>
</tr>
<tr>
<td>433.milc</td>
<td>80</td>
<td>1530</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>80</td>
<td>1900</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>80</td>
<td>2210</td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>80</td>
<td>1900</td>
</tr>
<tr>
<td>437.leslie3d</td>
<td>80</td>
<td>903</td>
</tr>
<tr>
<td>444.namd</td>
<td>80</td>
<td>1490</td>
</tr>
<tr>
<td>447.dealII</td>
<td>80</td>
<td>1480</td>
</tr>
<tr>
<td>450.soplex</td>
<td>80</td>
<td>1090</td>
</tr>
<tr>
<td>453.povray</td>
<td>80</td>
<td>2300</td>
</tr>
<tr>
<td>454.calculix</td>
<td>80</td>
<td>2660</td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td>80</td>
<td>773</td>
</tr>
<tr>
<td>465.tonto</td>
<td>80</td>
<td>2150</td>
</tr>
<tr>
<td>470.lbm</td>
<td>80</td>
<td>1530</td>
</tr>
<tr>
<td>481.wrf</td>
<td>80</td>
<td>1790</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>80</td>
<td>1880</td>
</tr>
</tbody>
</table>

**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: xfs
- System State: Run level 3 (multi-user)
**SPEC CFP2006 Result**

**Dell Inc.**

PowerEdge R930 (Intel Xeon E7-8891 v4, 2.80 GHz)

**SPECfp_rate2006 = 1710**

**SPECfp_rate_base2006 = 1680**

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

L3 Cache: 60 MB I+D on chip per chip
Other Cache: None
Memory: 512 GB (32 x 16 GB 2Rx4 PC4-2133P-R, running at 1600 MHz)
Disk Subsystem: 1 x 480 GB SAS SSD
Other Hardware: None

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

| Benchmark     | Copies | Seconds | Ratio | Base Pointers | Seconds | Ratio | Peak Pointers | Seconds | Ratio | Base | Seconds | Ratio | Peak | Seconds | Ratio |
|---------------|--------|---------|-------|---------------|---------|-------|---------------|---------|-------| Base | Seconds | Ratio | Peak | Seconds | Ratio |
| 410.bwaves    | 80     | 666     | 1630  | 666           | 1630    | 666   |               |         |       | 80   | 666     | 1630  | 666  | 1630    | 666   |
| 416.gamess    | 80     | 873     | 1800  | 872           | 1800    | 875   |               |         |       | 80   | 847     | 1850  | 859  | 1820    | 847   |
| 433.milc      | 80     | 481     | 1530  | 481           | 1530    | 480   |               |         |       | 80   | 481     | 1530  | 481  | 1530    | 480   |
| 434.zeusmp    | 80     | 383     | 1900  | 384           | 1900    | 384   |               |         |       | 80   | 383     | 1900  | 383  | 1900    | 384   |
| 435.gromacs   | 80     | 272     | 2100  | 272           | 2100    | 272   |               |         |       | 80   | 258     | 2220  | 258  | 2210    | 258   |
| 436.cactusADM | 80     | 504     | 1900  | 505           | 1900    | 505   |               |         |       | 80   | 504     | 1900  | 504  | 1900    | 504   |
| 437.leslie3d  | 80     | 836     | 900   | 829           | 907     | 833   |               |         |       | 80   | 836     | 900   | 829  | 907     | 833   |
| 444.namd      | 80     | 434     | 1480  | 435           | 1480    | 435   |               |         |       | 80   | 430     | 1490  | 431  | 1490    | 433   |
| 447.dealII    | 80     | 323     | 2830  | 324           | 2820    | 323   |               |         |       | 80   | 323     | 2830  | 324  | 2820    | 323   |
| 450.soplex    | 80     | 611     | 1090  | 613           | 1090    | 611   |               |         |       | 80   | 611     | 1090  | 611  | 1090    | 611   |
| 453.povray    | 80     | 185     | 2300  | 185           | 2300    | 185   |               |         |       | 80   | 157     | 2710  | 155  | 2750    | 155   |
| 454.calculix  | 80     | 248     | 2660  | 248           | 2660    | 248   |               |         |       | 80   | 248     | 2660  | 248  | 2660    | 248   |
| 459.GemsFDTD   | 80     | 1099    | 772   | 1098          | 773     | 1098  |               |         |       | 80   | 1099    | 772   | 1098| 773     | 1098  |
| 465.tonto     | 80     | 392     | 2010  | 393           | 2000    | 395   |               |         |       | 80   | 366     | 2150  | 366  | 2150    | 366   |
| 470.lbm       | 80     | 717     | 1530  | 717           | 1530    | 717   |               |         |       | 80   | 717     | 1530  | 717  | 1530    | 717   |
| 481.wrf       | 80     | 500     | 1790  | 495           | 1800    | 500   |               |         |       | 80   | 500     | 1790  | 495  | 1800    | 500   |
| 482.sphinx3   | 80     | 831     | 1880  | 824           | 1890    | 829   |               |         |       | 80   | 831     | 1880  | 824  | 1880    | 829   |

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"

**Platform Notes**

BIOS settings:
Snoop Mode set to Home Snoop
Virtualization Technology disabled
Dell Inc.

PowerEdge R930 (Intel Xeon E7-8891 v4, 2.80 GHz)

SPECfp_rate2006 = 1710
SPECfp_rate_base2006 = 1680

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

Platform Notes (Continued)

System Profile set to custom
CPU Performance 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/ic16.0_Sept12_2015/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on bdx-perfspeed Thu Apr 28 10:13:29 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 E7-8891 v4 @ 2.80GHz
4 "physical id"s (chips)
80 "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 5 9 10 11 13 18 24 26 28 29
physical 1: cores 5 9 10 11 13 18 24 26 28 29
physical 2: cores 5 9 10 11 13 18 24 26 28 29
physical 3: cores 5 9 10 11 13 18 24 26 28 29
cache size : 30720 KB

From /proc/meminfo

MemTotal: 529317712 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

/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"
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP1"

Continued on next page
## Platform Notes (Continued)

ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp1"

uname -a:
    (8d714a0) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Apr 27 12:06

SPEC is set to: /root/ic16.0_Sept12_2015
Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda3      xfs   368G  8.0G  360G   3% /

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 04/20/2016
Memory: 32x 00AD00B300AD HMA42GR7MFR4N-TF 16 GB 2 rank 2133 MHz, configured at 1600
MHz
64x Not Specified Not Specified

(End of data from sysinfo program)

## General Notes

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

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
runcpec command invoked through numactl i.e.:
numactl --interleave=all runspec <etc>

## Base Compiler Invocation

C benchmarks:
    icc  -m64

C++ benchmarks:
    icpc  -m64
Dell Inc.  

PowerEdge R930 (Intel Xeon E7-8891 v4, 2.80 GHz)  

**SPEC CFP2006 Result**  

---

**Dell Inc.**

**PowerEdge R930 (Intel Xeon E7-8891 v4, 2.80 GHz)**

<table>
<thead>
<tr>
<th>SPECfp_rate2006</th>
<th>SPECfp_rate_base2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>1710</td>
<td>1680</td>
</tr>
</tbody>
</table>

**CPU2006 license:** 55  
**Test sponsor:** Dell Inc.  
**Test date:** Apr-2016  
**Tested by:** Dell Inc.  
**Hardware Availability:** Jun-2016  
**Software Availability:** Mar-2016  

---

**Base Compiler Invocation (Continued)**

Fortran benchmarks:

```plaintext
ifort -m64
```

Benchmarks using both Fortran and C:

```plaintext
icc   -m64 ifort -m64
```

---

**Base Portability Flags**

- 410.bwaves: -DSPEC_CPU_LP64
- 416.gams: -DSPEC_CPU_LP64
- 433.milc: -DSPEC_CPU_LP64
- 434.zeusmp: -DSPEC_CPU_LP64
- 435.gromacs: -DSPEC_CPU_LP64 -nofor_main
- 436.cactusADM: -DSPEC_CPU_LP64 -nofor_main
- 437.leslie3d: -DSPEC_CPU_LP64
- 444.namd: -DSPEC_CPU_LP64
- 447.dealII: -DSPEC_CPU_LP64
- 450.soplex: -DSPEC_CPU_LP64
- 453.povray: -DSPEC_CPU_LP64
- 454.calculix: -DSPEC_CPU_LP64 -nofor_main
- 459.GemsFDTD: -DSPEC_CPU_LP64
- 465.tonto: -DSPEC_CPU_LP64
- 470.lbm: -DSPEC_CPU_LP64
- 481.wrf: -DSPEC_CPU_LP64 -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX
- 482.sphinx3: -DSPEC_CPU_LP64

---

**Base Optimization Flags**

**C benchmarks:**

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

**C++ benchmarks:**

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

**Fortran benchmarks:**

```plaintext
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch
```

**Benchmarks using both Fortran and C:**

```plaintext
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
-ansi-alias -opt-mem-layout-trans=3
```
Dell Inc.  
PowerEdge R930 (Intel Xeon E7-8891 v4, 2.80 GHz)  

| SPECfp_rate2006 | 1710 |
| SPECfp_rate_base2006 | 1680 |

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

**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
- 453.povray:  
  `-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) -unroll4 -ansi-alias`

Fortran benchmarks:

- 410.bwaves: basepeak = yes

Continued on next page
Dell Inc.

PowerEdge R930 (Intel Xeon E7-8891 v4, 2.80 GHz)

SPECfp_rate2006 = 1710
SPECfp_rate_base2006 = 1680

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

Test date: Apr-2016
Hardware Availability: Jun-2016
Software Availability: Mar-2016

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-callc -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

SPEC and SPECfp are registered trademarks of the Standard Performance
Evaluation Corporation. All other brand and product names appearing in
this result are trademarks or registered trademarks of their respective
holders.

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

Tested with SPEC CPU2006 v1.2.
Originally published on 28 June 2016.