**SPEC® CFP2006 Result**

**Dell Inc.**

PowerEdge R940 (Intel Xeon Gold 6146, 3.20 GHz)

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**SPECfp®2006 = 147**  
**SPECfp_base2006 = 142**

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**Hardware**

- **CPU Name:** Intel Xeon Gold 6146  
- **CPU Characteristics:** Intel Turbo Boost Technology up to 4.20 GHz  
- **CPU MHz:** 3200  
- **FPU:** Integrated  
- **CPU(s) enabled:** 48 cores, 4 chips, 12 cores/chip, 2 threads/core  
- **CPU(s) orderable:** 2,4 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  
  4.4.21-69-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:** xfs  
- **System State:** Run level 3 (multi-user)

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SPEC CFP2006 Result
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CPU2006 license: 55
Test sponsor: Dell Inc.
Tested by: Dell Inc.

Test date: Jul-2017
Hardware Availability: Sep-2017
Software Availability: Apr-2017

L3 Cache: 24.75 MB I+D on chip per chip
Other Cache: None
Memory: 768 GB (48 x 16 GB 2Rx8 PC4-2666V-R)
Disk Subsystem: 1 x 960 GB SATA SSD
Other Hardware: None

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 Peak</th>
<th>Ratio Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>9.56</td>
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<td>1400</td>
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<tr>
<td>416.gamess</td>
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<td>53.6</td>
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<td>53.9</td>
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<tr>
<td>433.milc</td>
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<td>75.4</td>
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<td>434.zeusmp</td>
<td>40.3</td>
<td>226</td>
<td>40.0</td>
<td>227</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>117</td>
<td>60.9</td>
<td>116</td>
<td>61.4</td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>17.8</td>
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<td>19.7</td>
<td>608</td>
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<tr>
<td>437.leslie3d</td>
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<td>26.4</td>
<td>356</td>
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<tr>
<td>444.namd</td>
<td>200</td>
<td>40.1</td>
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<td>40.2</td>
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<tr>
<td>447.dealII</td>
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<td>77.6</td>
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<td>450.soplex</td>
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<td>51.6</td>
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<td>453.povray</td>
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<td>78.6</td>
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<td>454.calculix</td>
<td>109</td>
<td>75.7</td>
<td>108</td>
<td>76.1</td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td>56.4</td>
<td>188</td>
<td>60.0</td>
<td>177</td>
</tr>
<tr>
<td>465.tonto</td>
<td>188</td>
<td>52.3</td>
<td>176</td>
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<tr>
<td>470.lbm</td>
<td>6.38</td>
<td>2150</td>
<td>6.26</td>
<td>2190</td>
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<tr>
<td>481.wrf</td>
<td>85.4</td>
<td>131</td>
<td>83.9</td>
<td>133</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>243</td>
<td>80.2</td>
<td>242</td>
<td>80.6</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
Energy Efficiency Policy set to Performance

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Dell Inc.  
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Platform Notes (Continued)

Memory Patrol Scrub disabled 
Logical Processor enabled 
CPU Interconnect Bus Link Power Management disabled 
PCI ASPM Li Link Power Management disabled 
Sysinfo program /home/_cpu2006/config/sysinfo.rev6993 
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1) 
running on linux-r2ls Wed Jul 12 14:06:29 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) Gold 6146 CPU @ 3.20GHz 
4 "physical id"s (chips) 
96 "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 : 12 
siblings : 24
physical 0: cores 0 1 2 3 4 9 10 16 18 19 25 26
physical 1: cores 0 1 2 3 8 9 10 11 18 19 24 27
physical 2: cores 0 1 2 3 4 8 9 11 17 18 19 20
physical 3: cores 0 1 2 3 4 8 10 11 18 24 25 27

From /proc/meminfo
MemTotal: 791225340 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 12 SP2

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"

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**Platform Notes (Continued)**

```
uname -a:
    Linux linux-r2ls 4.4.21-69-default #1 SMP Tue Oct 25 10:58:20 UTC 2016
    (9464f67) x86_64 x86_64 x86_64 GNU/Linux

rund-level 3 Jul 12 09:59

SPEC is set to: /home/_cpu2006
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 796G 13G 783G 2% /home
```

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. 1.0.3 05/30/2017
Memory:
    13x 00AD00B300AD HMA82GR7AFR8N-VK 16 GB 2 rank 2666 MHz
    35x 00CE063200CE M393A2K43BB1-CTD 16 GB 2 rank 2666 MHz
```

(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 = "/home/_cpu2006/lib/ia32:/home/_cpu2006/lib/intel64:/home/_cpu2006/sh10.2"
OMP_NUM_THREADS = "48"
```

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  
```
**SPEC CFP2006 Result**

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### Base Portability Flags

- 410.bwaves: -DSPEC_CPU_LP64
- 416.game5: -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:**

-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -qopt-prefetch

**C++ benchmarks:**

-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch

**Fortran benchmarks:**

-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -qopt-prefetch

**Benchmarks using both Fortran and C:**

-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -qopt-prefetch

### 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
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**Software Availability:** Apr-2017

### 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: `-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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## SPEC CFP2006 Result

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</tbody>
</table>

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### Peak Optimization Flags (Continued)

- **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:


You can also download the XML flags sources by saving the following links:


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