# SPEC® CFP2006 Result

## Dell Inc.

PowerEdge R730 (Intel Xeon E5-2695 v4, 2.10 GHz)

<table>
<thead>
<tr>
<th>SPECfp®2006</th>
<th>117</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECfp_base2006</td>
<td>111</td>
</tr>
</tbody>
</table>

**CPU2006 license:** 55  
**Test date:** Feb-2017  
**Test sponsor:** Dell Inc.  
**Hardware Availability:** Oct-2016  
**Tested by:** Dell Inc.  
**Software Availability:** Sep-2016

### Hardware

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>Intel Xeon E5-2695 v4</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Characteristics:</td>
<td>Intel Turbo Boost Technology up to 3.30 GHz</td>
</tr>
<tr>
<td>CPU MHz:</td>
<td>2100</td>
</tr>
<tr>
<td>FPU:</td>
<td>Integrated</td>
</tr>
<tr>
<td>CPU(s) enabled:</td>
<td>36 cores, 2 chips, 18 cores/chip</td>
</tr>
<tr>
<td>CPU(s) orderable:</td>
<td>1.2 chip</td>
</tr>
<tr>
<td>Primary Cache:</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>Secondary Cache:</td>
<td>256 KB I+D on chip per core</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>Operating System:</th>
<th>SUSE Linux Enterprise Server 12 3.12.28-4-default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler:</td>
<td>C/C++: Version 17.0.0.098 of Intel C/C++ Compiler for Linux; Fortran: Version 17.0.0.098 of Intel Fortran Compiler for Linux</td>
</tr>
<tr>
<td>Auto Parallel:</td>
<td>Yes</td>
</tr>
<tr>
<td>File System:</td>
<td>ext4</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi user)</td>
</tr>
</tbody>
</table>

---

Continued on next page
Dell Inc.
PowerEdge R730 (Intel Xeon E5-2695 v4, 2.10 GHz)

SPECfp2006 = 117
SPECfp_base2006 = 111

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

L3 Cache: 45 MB I+D on chip per chip
Other Cache: None
Memory: 256 GB (16 x 16 GB 2Rx8 PC4-2400T-R)
Disk Subsystem: 2 x 2000 GB 7200 RPM SAS RAID 0
Other Hardware: None

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

Test date: Feb-2017
Hardware Availability: Oct-2016
Software Availability: Sep-2016

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Peak Seconds</th>
<th>Peak Ratio</th>
<th>Peak Seconds</th>
<th>Peak Ratio</th>
<th>Peak Seconds</th>
<th>Peak Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>21.1</td>
<td>645</td>
<td>21.0</td>
<td>649</td>
<td>20.9</td>
<td>649</td>
<td>21.1</td>
<td>645</td>
<td>21.0</td>
<td>649</td>
<td>20.9</td>
<td>649</td>
<td></td>
<td></td>
</tr>
<tr>
<td>416.gameess</td>
<td>538</td>
<td>36.4</td>
<td>537</td>
<td>36.4</td>
<td>538</td>
<td>36.4</td>
<td>479</td>
<td>40.9</td>
<td>479</td>
<td>40.9</td>
<td>480</td>
<td>40.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>433.milc</td>
<td>131</td>
<td>70.2</td>
<td>130</td>
<td>70.6</td>
<td>131</td>
<td>70.2</td>
<td>131</td>
<td>70.2</td>
<td>130</td>
<td>70.6</td>
<td>131</td>
<td>70.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>47.8</td>
<td>191</td>
<td>47.9</td>
<td>190</td>
<td>47.4</td>
<td>192</td>
<td>47.8</td>
<td>191</td>
<td>47.9</td>
<td>190</td>
<td>47.4</td>
<td>192</td>
<td></td>
<td></td>
</tr>
<tr>
<td>435.gromacs</td>
<td>163</td>
<td>43.8</td>
<td>163</td>
<td>43.7</td>
<td>163</td>
<td>43.8</td>
<td>163</td>
<td>43.8</td>
<td>163</td>
<td>43.8</td>
<td>163</td>
<td>43.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>12.6</td>
<td>950</td>
<td>12.6</td>
<td>951</td>
<td>12.6</td>
<td>948</td>
<td>12.6</td>
<td>950</td>
<td>12.6</td>
<td>951</td>
<td>12.6</td>
<td>948</td>
<td></td>
<td></td>
</tr>
<tr>
<td>437.leslie3d</td>
<td>27.7</td>
<td>339</td>
<td>27.8</td>
<td>338</td>
<td>27.7</td>
<td>339</td>
<td>27.7</td>
<td>339</td>
<td>27.8</td>
<td>338</td>
<td>27.7</td>
<td>339</td>
<td></td>
<td></td>
</tr>
<tr>
<td>444.namd</td>
<td>276</td>
<td>29.1</td>
<td>276</td>
<td>29.1</td>
<td>276</td>
<td>29.1</td>
<td>269</td>
<td>29.8</td>
<td>269</td>
<td>29.8</td>
<td>269</td>
<td>29.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>447.dealII</td>
<td>186</td>
<td>61.6</td>
<td>186</td>
<td>61.5</td>
<td>186</td>
<td>61.6</td>
<td>186</td>
<td>61.6</td>
<td>186</td>
<td>61.5</td>
<td>186</td>
<td>61.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>450.soplex</td>
<td>176</td>
<td>47.3</td>
<td>176</td>
<td>47.3</td>
<td>177</td>
<td>47.2</td>
<td>176</td>
<td>47.3</td>
<td>176</td>
<td>47.3</td>
<td>177</td>
<td>47.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>453.povray</td>
<td>106</td>
<td>50.1</td>
<td>105</td>
<td>50.8</td>
<td>103</td>
<td>51.7</td>
<td>85.6</td>
<td>62.2</td>
<td>85.7</td>
<td>62.1</td>
<td>86.8</td>
<td>61.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>454.calculix</td>
<td>155</td>
<td>53.4</td>
<td>155</td>
<td>53.4</td>
<td>155</td>
<td>53.2</td>
<td>145</td>
<td>56.7</td>
<td>146</td>
<td>56.7</td>
<td>146</td>
<td>56.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td>48.6</td>
<td>218</td>
<td>49.3</td>
<td>215</td>
<td>49.6</td>
<td>214</td>
<td>40.6</td>
<td>261</td>
<td>41.0</td>
<td>259</td>
<td>140</td>
<td>261</td>
<td></td>
<td></td>
</tr>
<tr>
<td>465.tonto</td>
<td>257</td>
<td>38.3</td>
<td>259</td>
<td>38.0</td>
<td>255</td>
<td>38.5</td>
<td>187</td>
<td>52.7</td>
<td>187</td>
<td>52.6</td>
<td>188</td>
<td>52.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>470.lbm</td>
<td>14.6</td>
<td>940</td>
<td>14.6</td>
<td>942</td>
<td>14.6</td>
<td>942</td>
<td>14.6</td>
<td>940</td>
<td>14.6</td>
<td>942</td>
<td>14.6</td>
<td>942</td>
<td></td>
<td></td>
</tr>
<tr>
<td>481.wrf</td>
<td>98.7</td>
<td>113</td>
<td>98.4</td>
<td>114</td>
<td>98.6</td>
<td>113</td>
<td>98.7</td>
<td>113</td>
<td>98.4</td>
<td>114</td>
<td>98.6</td>
<td>113</td>
<td></td>
<td></td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>299</td>
<td>65.2</td>
<td>298</td>
<td>65.4</td>
<td>298</td>
<td>65.3</td>
<td>299</td>
<td>65.2</td>
<td>298</td>
<td>65.4</td>
<td>298</td>
<td>65.3</td>
<td></td>
<td></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:
 Snoop Mode set to Opportunistic Snoop Broadcast
 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

Continued on next page
Dell Inc.
PowerEdge R730 (Intel Xeon E5-2695 v4, 2.10 GHz)

SPECfp2006 = 117
SPECfp_base2006 = 111

CPU2006 license: 55
Test sponsor: Dell Inc.
Tested by: Dell Inc.
Test date: Feb-2017
Hardware Availability: Oct-2016
Software Availability: Sep-2016

Platform Notes (Continued)

Memory Patrol Scrub disabled
Logical Processor disabled
Sysinfo program /root/previous-cpu2006-1.2/config/sysinfo.rev6993
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
running on linux-0171 Fri Feb 24 20:33:36 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) CPU E5-2695 v4 @ 2.10GHz
  2 "physical id"s (chips)
  36 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The
following excerpts from /proc/cpuinfo might not be reliable. Use with
cautions.)
  cpu cores : 18
  siblings  : 18
  physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
  physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
  cache size : 46080 KB

From /proc/meminfo
MemTotal:       264567484 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

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

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

uname -a:
  Linux linux-0171 3.12.28-4-default #1 SMP Thu Sep 25 17:02:34 UTC 2014
  (9879bd4) x86_64 x86_64 x86_64 GNU/Linux

Continued on next page
SPEC CFP2006 Result

Dell Inc.

PowerEdge R730 (Intel Xeon E5-2695 v4, 2.10 GHz)

SPECfp2006 = 117
SPECfp_base2006 = 111

CPU2006 license: 55
Test sponsor: Dell Inc.
Test date: Feb-2017
Tested by: Dell Inc.
Hardware Availability: Oct-2016
Software Availability: Sep-2016

Platform Notes (Continued)

run-level 3 Feb 24 14:45

SPEC is set to: /root/previous-cpu2006-1.2
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 ext4 246G 19G 226G 8% /

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. 2.3.4 11/08/2016
Memory:
7x 00AD063200AD HMA82GR7MFR8N-UH 16 GB 2 rank 2400 MHz
9x 00CE0B300CE M393A2K43BB1-CRC 16 GB 2 rank 2400 MHz
8x Not Specified Not Specified

General Notes

Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,scatter"
LD_LIBRARY_PATH = "/root/previous-cpu2006-1.2/libs/32:/root/previous-cpu2006-1.2/libs/64:/root/previous-cpu2006-1.2/sh10.2"
OMP_NUM_THREADS = "36"
The Dell PowerEdge R730 and the PowerEdge R730xd models are electronically equivalent. The results have been measured on a Dell PowerEdge R730xd model.
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 with:
echo never > /sys/kernel/mm/transient_hugepage/enabled

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

Dell Inc.

PowerEdge R730 (Intel Xeon E5-2695 v4, 2.10 GHz)

SPECfp2006 = 117
SPECfp_base2006 = 111

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

Test date: Feb-2017
Hardware Availability: Oct-2016
Software Availability: Sep-2016

Base Portability Flags

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>416.gamess</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>433.milc</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>-DSPEC_CPU_LP64 -nofor_main</td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>-DSPEC_CPU_LP64 -nofor_main</td>
</tr>
<tr>
<td>437.leslie3d</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>444.namd</td>
<td>-DSPEC_CPU_LP64 -nofor_main</td>
</tr>
<tr>
<td>447.dealII</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>450.soplex</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>453.povray</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>454.calculix</td>
<td>-DSPEC_CPU_LP64 -nofor_main</td>
</tr>
<tr>
<td>459.GemsFD</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>465.tonto</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>470.lbm</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>481.wrf</td>
<td>-DSPEC_CPU_LP64 -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
</tbody>
</table>

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
## 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-ilp32
- 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

Continued on next page
SPEC CFP2006 Result

Dell Inc.

PowerEdge R730 (Intel Xeon E5-2695 v4, 2.10 GHz)

SPECfp2006 = 117
SPECfp_base2006 = 111

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

Test date: Feb-2017
Hardware Availability: Oct-2016
Software Availability: Sep-2016

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.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.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.