# SPEC® CFP2006 Result

**Dell Inc.**

**PowerEdge R730xd (Intel Xeon E5-2609 v4, 1.70 GHz)**

---

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

---

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Time (s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>22.2</td>
</tr>
<tr>
<td>416.games</td>
<td>21.5</td>
</tr>
<tr>
<td>433.milc</td>
<td>47.9</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>149</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>31.5</td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>572</td>
</tr>
<tr>
<td>437.leslie3d</td>
<td>269</td>
</tr>
<tr>
<td>444.namd</td>
<td>15.4</td>
</tr>
<tr>
<td>447.dealII</td>
<td>34.9</td>
</tr>
<tr>
<td>450.soplex</td>
<td>28.7</td>
</tr>
<tr>
<td>453.povray</td>
<td>34.5</td>
</tr>
<tr>
<td>454.calculix</td>
<td>33.5</td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td>210</td>
</tr>
<tr>
<td>465.tonto</td>
<td>30.1</td>
</tr>
<tr>
<td>470.lbm</td>
<td>28.3</td>
</tr>
<tr>
<td>481.wrf</td>
<td>85.8</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>50.2</td>
</tr>
</tbody>
</table>

**SPECfp®2006 = 77.1**  
**SPECfp_base2006 = 75.0**

---

**Hardware**

- **CPU Name:** Intel Xeon E5-2609 v4  
- **CPU Characteristics:**  
- **CPU MHz:** 1700  
- **FPU:** Integrated  
- **CPU(s) enabled:** 16 cores, 2 chips, 8 cores/chip  
- **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  
- **Compiler:**  
  - **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  
- **Auto Parallel:** Yes  
- **File System:** ext4  
- **System State:** Run level 3 (multi user)

---

**Continued on next page**
Dell Inc.

PowerEdge R730xd (Intel Xeon E5-2609 v4, 1.70 GHz)

SPECfp2006 = 77.1
SPECfp_base2006 = 75.0

CPU2006 license: 55
Test sponsor: Dell Inc.
Tested by: Dell Inc.
L3 Cache: 20 MB I+D on chip per chip
Other Cache: None
Memory: 256 GB (16 x 16 GB 2Rx8 PC4-2400T-R, running at 1866 MHz)
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

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>27.1</td>
<td>502</td>
<td>26.9</td>
<td>506</td>
<td>26.7</td>
<td>509</td>
<td>27.1</td>
<td>502</td>
<td>26.9</td>
<td>506</td>
<td>26.7</td>
<td>509</td>
</tr>
<tr>
<td>416.game6s</td>
<td>909</td>
<td>21.6</td>
<td>909</td>
<td>21.5</td>
<td>910</td>
<td>21.5</td>
<td>879</td>
<td>22.3</td>
<td>881</td>
<td>22.2</td>
<td>880</td>
<td>22.2</td>
</tr>
<tr>
<td>433.milc</td>
<td>192</td>
<td>47.9</td>
<td>192</td>
<td>47.9</td>
<td>192</td>
<td>47.9</td>
<td>192</td>
<td>47.9</td>
<td>192</td>
<td>47.9</td>
<td>192</td>
<td>47.9</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>61.2</td>
<td>149</td>
<td>61.4</td>
<td>148</td>
<td>61.2</td>
<td>149</td>
<td>61.2</td>
<td>149</td>
<td>61.4</td>
<td>148</td>
<td>61.2</td>
<td>149</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>227</td>
<td>31.5</td>
<td>227</td>
<td>31.5</td>
<td>226</td>
<td>31.6</td>
<td>227</td>
<td>31.5</td>
<td>229</td>
<td>31.2</td>
<td>226</td>
<td>31.6</td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>20.9</td>
<td>572</td>
<td>20.8</td>
<td>573</td>
<td>21.0</td>
<td>568</td>
<td>20.9</td>
<td>572</td>
<td>20.8</td>
<td>573</td>
<td>21.0</td>
<td>568</td>
</tr>
<tr>
<td>437.leslie3d</td>
<td>35.0</td>
<td>260</td>
<td>35.2</td>
<td>267</td>
<td>34.7</td>
<td>271</td>
<td>35.0</td>
<td>269</td>
<td>35.2</td>
<td>267</td>
<td>34.7</td>
<td>271</td>
</tr>
<tr>
<td>444.namd</td>
<td>334</td>
<td>15.0</td>
<td>334</td>
<td>15.0</td>
<td>334</td>
<td>15.0</td>
<td>328</td>
<td>15.4</td>
<td>334</td>
<td>15.0</td>
<td>328</td>
<td>15.4</td>
</tr>
<tr>
<td>447.dealII</td>
<td>281</td>
<td>34.9</td>
<td>281</td>
<td>34.9</td>
<td>281</td>
<td>34.8</td>
<td>328</td>
<td>34.9</td>
<td>328</td>
<td>34.9</td>
<td>328</td>
<td>34.8</td>
</tr>
<tr>
<td>450.soplex</td>
<td>291</td>
<td>34.6</td>
<td>291</td>
<td>34.6</td>
<td>291</td>
<td>34.6</td>
<td>291</td>
<td>34.6</td>
<td>291</td>
<td>34.6</td>
<td>291</td>
<td>34.6</td>
</tr>
<tr>
<td>453.povray</td>
<td>187</td>
<td>85.3</td>
<td>187</td>
<td>85.3</td>
<td>187</td>
<td>85.3</td>
<td>187</td>
<td>85.3</td>
<td>187</td>
<td>85.3</td>
<td>187</td>
<td>85.3</td>
</tr>
<tr>
<td>454.calcui</td>
<td>246</td>
<td>33.5</td>
<td>246</td>
<td>33.5</td>
<td>246</td>
<td>33.5</td>
<td>251</td>
<td>32.9</td>
<td>251</td>
<td>32.9</td>
<td>251</td>
<td>32.9</td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td>59.0</td>
<td>180</td>
<td>58.9</td>
<td>180</td>
<td>58.0</td>
<td>183</td>
<td>50.3</td>
<td>211</td>
<td>50.7</td>
<td>209</td>
<td>50.6</td>
<td>210</td>
</tr>
<tr>
<td>465.tonto</td>
<td>348</td>
<td>28.3</td>
<td>347</td>
<td>28.4</td>
<td>347</td>
<td>28.3</td>
<td>327</td>
<td>30.1</td>
<td>327</td>
<td>30.1</td>
<td>328</td>
<td>30.0</td>
</tr>
<tr>
<td>481.wrf</td>
<td>131</td>
<td>85.3</td>
<td>128</td>
<td>87.1</td>
<td>130</td>
<td>85.8</td>
<td>131</td>
<td>85.3</td>
<td>128</td>
<td>87.1</td>
<td>130</td>
<td>85.8</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>388</td>
<td>50.3</td>
<td>389</td>
<td>50.1</td>
<td>388</td>
<td>50.2</td>
<td>388</td>
<td>50.3</td>
<td>389</td>
<td>50.1</td>
<td>388</td>
<td>50.2</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

Next page
Dell Inc.

PowerEdge R730xd (Intel Xeon E5-2609 v4, 1.70 GHz)

SPECfp2006 = 77.1
SPECfp_base2006 = 75.0

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)

Energy Efficiency Policy set to Performance
Memory Patrol Scrub disabled
Sysinfo program /root/previous-cpu2006-1.2/config/sysinfo.rev6993
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
running on linux-0171 Tue Feb 28 01:04:56 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 E5-2609 v4@ 1.70GHz
  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 : 8
    siblings : 8
    physical 0: cores 0 1 2 3 4 5 6 7
    physical 1: cores 0 1 2 3 4 5 6 7
    cache size : 20480 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 release.
  # 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
Dell Inc.
PowerEdge R730xd (Intel Xeon E5-2609 v4, 1.70 GHz)

SPECfp2006 = 77.1
SPECfp_base2006 = 75.0

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

Platform Notes (Continued)

run-level 3 Feb 27 14:02

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 HMA82GR7MF8N-UH 16 GB 2 rank 2400 MHz, configured at 1866
MHz
9x 00CE00B300CE M393A2K43BB1-CRC 16 GB 2 rank 2400 MHz, configured at 1866
MHz
8x 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,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 = "16"
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/transparent_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 R730xd (Intel Xeon E5-2609 v4, 1.70 GHz)

SPECfp2006 = 77.1
SPECfp_base2006 = 75.0

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

Base Portability Flags

410.bwaves: -DSPEC_CPU_LP64
416.games: -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
SPEC CFP2006 Result

Dell Inc.  
PowerEdge R730xd (Intel Xeon E5-2609 v4, 1.70 GHz)  

SPECfp2006 = 77.1  
SPECfp_base2006 = 75.0

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

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-ipp32
- 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
Dell Inc.

PowerEdge R730xd (Intel Xeon E5-2609 v4, 1.70 GHz)

SPECfp2006 = 77.1
SPECfp_base2006 = 75.0

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