Dell Inc.

PowerEdge R730 (Intel Xeon E5-2650L v4, 1.70 GHz)

SPECfp®2006 = 92.3
SPECfp_base2006 = 87.4

CPU2006 license: 55
Test sponsor: Dell Inc.
Tested by: Dell Inc.
Test date: Dec-2015
Hardware Availability: Mar-2016
Software Availability: Mar-2016

Hardware

CPU Name: Intel Xeon E5-2650L v4
CPU Characteristics: Intel Turbo Boost Technology up to 2.50 GHz
CPU MHz: 1700
FPU: Integrated
CPU(s) enabled: 28 cores, 2 chips, 14 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: Red Hat Enterprise Linux Server release 7.1 (Maipo) 3.10.0-229.el7.x86_64
Compiler: C/C++: Version 16.0.0.101 of Intel C++ Studio XE for Linux;
Fortran: Version 16.0.0.101 of Intel Fortran Studio XE for Linux
Auto Parallel: Yes
File System: xfs

Continued on next page
### SPEC CFP2006 Result

**Dell Inc.**

PowerEdge R730 (Intel Xeon E5-2650L v4, 1.70 GHz)

**SPECfp2006** = 92.3

**SPECfp_base2006** = 87.4

---

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

<table>
<thead>
<tr>
<th>L3 Cache:</th>
<th>35 MB I+D on chip per chip</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Cache:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>512 GB (16 x 32 GB 2Rx4 PC4-2400T-R)</td>
</tr>
<tr>
<td>Disk Subsystem:</td>
<td>1 x 120 GB SATA SSD</td>
</tr>
<tr>
<td>Other Hardware:</td>
<td>None</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>32/64-bit</td>
</tr>
<tr>
<td>Other Software:</td>
<td>None</td>
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**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>
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</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>26.1</td>
<td>520</td>
<td>26.8</td>
<td>506</td>
<td>27.2</td>
<td>499</td>
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<tr>
<td>416.gamess</td>
<td>837</td>
<td>23.4</td>
<td>839</td>
<td>23.3</td>
<td>837</td>
<td>23.4</td>
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<tr>
<td>433.milc</td>
<td>149</td>
<td>61.7</td>
<td>152</td>
<td>60.3</td>
<td>151</td>
<td>60.6</td>
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<tr>
<td>434.zeusmp</td>
<td>54.7</td>
<td>166</td>
<td>55.4</td>
<td>164</td>
<td>55.2</td>
<td>165</td>
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<tr>
<td>435.gromacs</td>
<td>226</td>
<td>31.6</td>
<td>229</td>
<td>31.2</td>
<td>224</td>
<td>31.9</td>
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<tr>
<td>436.cactusADM</td>
<td>16.3</td>
<td>735</td>
<td>16.4</td>
<td>726</td>
<td>16.2</td>
<td>737</td>
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<tr>
<td>437.leslie3d</td>
<td>32.8</td>
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<td>30.5</td>
<td>308</td>
<td>32.1</td>
<td>293</td>
</tr>
<tr>
<td>444.namd</td>
<td>364</td>
<td>22.0</td>
<td>370</td>
<td>21.7</td>
<td>364</td>
<td>22.0</td>
</tr>
<tr>
<td>447.dealII</td>
<td>233</td>
<td>49.0</td>
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<td>48.8</td>
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<td>450.soplex</td>
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<td>38.8</td>
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<td>453.povray</td>
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<td>454.calculix</td>
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<td>40.0</td>
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<tr>
<td>459.GemsFDTD</td>
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<td>203</td>
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<td>222</td>
<td>49.3</td>
<td>215</td>
</tr>
<tr>
<td>465.tonto</td>
<td>346</td>
<td>28.4</td>
<td>347</td>
<td>28.4</td>
<td>347</td>
<td>28.3</td>
</tr>
<tr>
<td>470.lbm</td>
<td>18.7</td>
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<td>19.9</td>
<td>691</td>
<td>18.2</td>
<td>756</td>
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<tr>
<td>481.wrf</td>
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<td>85.6</td>
<td>129</td>
<td>86.9</td>
<td>129</td>
<td>86.8</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>402</td>
<td>48.4</td>
<td>396</td>
<td>49.3</td>
<td>402</td>
<td>48.5</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 Performance  
Memory Patrol Scrub disabled  
C1E/Cstates enabled  
Sysinfo program /root/cpu2006-1.2/config/sysinfo.rev6914  
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1  
running on localhost.localdomain Thu Dec 10 20:59:59 2015

Continued on next page
Dell Inc.

PowerEdge R730 (Intel Xeon E5-2650L v4, 1.70 GHz)

SPECfp2006 = 92.3
SPECfp_base2006 = 87.4

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

Test date: Dec-2015
Hardware Availability: Mar-2016
Software Availability: Mar-2016

Platform Notes (Continued)

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 E5-2650L v4@ 1.70GHz
2 "physical id"s (chips)
56 "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 : 14
siblings : 28
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
cache size : 35840 KB

From /proc/meminfo
MemTotal: 528283084 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
os-release:
NAME="Red Hat Enterprise Linux Server"
VERSION="7.1 (Maipo)"
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="7.1"
PRETTY_NAME="Red Hat Enterprise Linux Server 7.1 (Maipo)"
ANSI_COLOR="0;31"
CPE_NAME="cpe:/o:redhat:enterprise_linux:7.1:GA:server"
redhat-release: Red Hat Enterprise Linux Server release 7.1 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.1 (Maipo)

uname -a:
Linux localhost.localdomain 3.10.0-229.1.el7.x86_64 #1 SMP Thu Jan 29 18:37:38 EST 2015 x86_64 x86_64 x86_64 GNU/Linux
run-level 3 Dec 10 14:30

SPEC is set to: /root/cpu2006-1.2
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 xfs 102G 8.7G 93G 9% /

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.

Continued on next page
Dell Inc.  
PowerEdge R730 (Intel Xeon E5-2650L v4, 1.70 GHz)  

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

Test date: Dec-2015  
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Platform Notes (Continued)

- BIOS Dell Inc. 1.7.11 12/04/2015
- Memory: 16x 00CE00B300CE M393A4K40BB1-CRC 32 GB 2 rank 2400 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,compact,1,0"
  - LD_LIBRARY_PATH = "/root/cpu2006-1.2/libs/32:/root/cpu2006-1.2/libs/64:/root/cpu2006-1.2/sh"
  - OMP_NUM_THREADS = "28"

- Binaries compiled on a system with 1x Intel Core i5-4670K CPU + 32GB memory using RedHat EL 7.1

- Transparent Huge Pages enabled with:
  - echo always > /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

Base Portability Flags

- 410.bwaves: -DSPEC_CPU_LP64
- 416.gamess: -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
### Base Portability Flags (Continued)

- 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 -opt-prefetch
- -ansi-alias

**C++ benchmarks:**
- -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -ansi-alias

**Fortran benchmarks:**
- -xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch

**Benchmarks using both Fortran and C:**
- -xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch
- -ansi-alias

### 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
Dell Inc.

PowerEdge R730 (Intel Xeon E5-2650L v4, 1.70 GHz)

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

CPU2006 = 55
Test date: Dec-2015
Hardware Availability: Mar-2016
Software Availability: Mar-2016

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) -prof-use(pass 2) -fno-alias
-auto-ipl32

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) -prof-use(pass 2) -unroll4
-ansi-alias

Fortran benchmarks:

410.bwaves: basepeak = yes
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: -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 -opt-prefetch -parallel

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) -inline-calloc
-opt-malloc-options=3 -auto -unroll4

Benchmarks using both Fortran and C:

Continued on next page
SPEC CFP2006 Result

Dell Inc.
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Test date: Dec-2015
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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 -ansi-alias
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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Tested with SPEC CPU2006 v1.2.
Report generated on Tue Apr 5 14:53:40 2016 by SPEC CPU2006 PS/PDF formatter v6932.
Originally published on 5 April 2016.