## Dell Inc.

PowerEdge FC430 (Intel Xeon E5-2650 v4, 2.20 GHz)

<table>
<thead>
<tr>
<th>SPECint®2006</th>
<th>59.6</th>
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<tbody>
<tr>
<td>SPECint_base2006</td>
<td>56.8</td>
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</table>

CPU2006 license: 55  
Test sponsor: Dell Inc.  
Tested by: Dell Inc.  
Hardware Availability: Jun-2016  
Software Availability: Nov-2015

<table>
<thead>
<tr>
<th>Test date:</th>
<th>Jun-2016</th>
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<tbody>
<tr>
<td>Hardware</td>
<td></td>
</tr>
<tr>
<td>Software</td>
<td></td>
</tr>
</tbody>
</table>

### Hardware

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>Intel Xeon E5-2650 v4</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Characteristics:</td>
<td>Intel Turbo Boost Technology up to 2.90 GHz</td>
</tr>
<tr>
<td>CPU MHZ:</td>
<td>2200</td>
</tr>
<tr>
<td>FPU:</td>
<td>Integrated</td>
</tr>
<tr>
<td>CPU(s) enabled:</td>
<td>24 cores, 2 chips, 12 cores/chip, 2 threads/core</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>
<tr>
<td>L3 Cache:</td>
<td>None</td>
</tr>
<tr>
<td>Other Cache:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>256 GB (8 x 32 GB 2Rx4 PC4-2400T-R)</td>
</tr>
<tr>
<td>Disk Subsystem:</td>
<td>1 x 240 GB SATA SSD</td>
</tr>
<tr>
<td>Other Hardware:</td>
<td>None</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>Operating System:</th>
<th>Red Hat Enterprise Linux Server release 7.2 (Maipo) 3.10.0-327.el7.x86_64</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler:</td>
<td>C/C++: Version 16.0.0.101 of Intel C++ Studio XE for Linux</td>
</tr>
<tr>
<td>Auto Parallel:</td>
<td>Yes</td>
</tr>
<tr>
<td>File System:</td>
<td>xfs</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>32/64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>32/64-bit</td>
</tr>
<tr>
<td>Other Software:</td>
<td>Microquill SmartHeap V10.2</td>
</tr>
</tbody>
</table>
Dell Inc.

PowerEdge FC430 (Intel Xeon E5-2650 v4, 2.20 GHz)

**SPECint2006 =** 59.6

**SPECint_base2006 =** 56.8

---

**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>
</tr>
</thead>
<tbody>
<tr>
<td>400.perlbench</td>
<td>289</td>
<td>33.8</td>
<td>288</td>
<td>33.9</td>
<td>287</td>
<td>34.0</td>
<td>263</td>
<td>37.1</td>
<td>263</td>
<td>37.1</td>
</tr>
<tr>
<td>401.bzip2</td>
<td>465</td>
<td><strong>20.7</strong></td>
<td>470</td>
<td>20.5</td>
<td>465</td>
<td>20.8</td>
<td>453</td>
<td>21.3</td>
<td>453</td>
<td>21.3</td>
</tr>
<tr>
<td>403.gcc</td>
<td>249</td>
<td><strong>32.3</strong></td>
<td>249</td>
<td>32.3</td>
<td>249</td>
<td>32.3</td>
<td>249</td>
<td>32.3</td>
<td>249</td>
<td>32.3</td>
</tr>
<tr>
<td>429.mcf</td>
<td>168</td>
<td>54.4</td>
<td>164</td>
<td>55.5</td>
<td>164</td>
<td><strong>55.5</strong></td>
<td>162</td>
<td>56.3</td>
<td>163</td>
<td><strong>56.0</strong></td>
</tr>
<tr>
<td>445.gobmk</td>
<td><strong>420</strong></td>
<td>25.0</td>
<td>419</td>
<td>25.0</td>
<td>420</td>
<td>25.0</td>
<td><strong>420</strong></td>
<td>25.0</td>
<td>419</td>
<td>25.0</td>
</tr>
<tr>
<td>456.hmmer</td>
<td>132</td>
<td>70.8</td>
<td>132</td>
<td>70.5</td>
<td>132</td>
<td><strong>70.7</strong></td>
<td>132</td>
<td>70.8</td>
<td>132</td>
<td><strong>70.7</strong></td>
</tr>
<tr>
<td>458.sjeng</td>
<td>417</td>
<td>29.0</td>
<td><strong>418</strong></td>
<td><strong>29.0</strong></td>
<td>418</td>
<td>29.0</td>
<td>412</td>
<td>29.4</td>
<td>412</td>
<td><strong>29.4</strong></td>
</tr>
<tr>
<td>462.libquantum</td>
<td>3.74</td>
<td>5540</td>
<td><strong>3.75</strong></td>
<td><strong>5530</strong></td>
<td>3.76</td>
<td>5500</td>
<td>3.74</td>
<td>5540</td>
<td><strong>3.75</strong></td>
<td><strong>5530</strong></td>
</tr>
<tr>
<td>464.h264ref</td>
<td><strong>459</strong></td>
<td>48.2</td>
<td>458</td>
<td>48.3</td>
<td>460</td>
<td>48.1</td>
<td><strong>459</strong></td>
<td><strong>48.2</strong></td>
<td>458</td>
<td>48.3</td>
</tr>
<tr>
<td>471.omnetpp</td>
<td><strong>173</strong></td>
<td>36.1</td>
<td>173</td>
<td>36.2</td>
<td>173</td>
<td>36.1</td>
<td><strong>135</strong></td>
<td>46.2</td>
<td><strong>135</strong></td>
<td><strong>46.4</strong></td>
</tr>
<tr>
<td>473.astar</td>
<td>233</td>
<td>30.1</td>
<td>232</td>
<td>30.2</td>
<td><strong>232</strong></td>
<td><strong>30.2</strong></td>
<td><strong>228</strong></td>
<td><strong>30.8</strong></td>
<td>229</td>
<td>30.7</td>
</tr>
<tr>
<td>483.xalancbmk</td>
<td><strong>114</strong></td>
<td><strong>60.3</strong></td>
<td>107</td>
<td>64.4</td>
<td>114</td>
<td><strong>60.3</strong></td>
<td><strong>96.4</strong></td>
<td><strong>71.6</strong></td>
<td>96.0</td>
<td><strong>71.9</strong></td>
</tr>
</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

---

**Submit Notes**

The config file option 'submit' was used.

---

**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
- System Profile set to custom
- CPU Power Management 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
- Memory Patrol Scrub disabled
- Sysinfo program /root/cpu2006-1.2/config/sysinfo.rev6914

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

Continued on next page
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Platform Notes (Continued)

From /proc/cpuinfo

```plaintext
model name : Intel(R) Xeon(R) CPU E5-2650 v4@ 2.20GHz
  2 "physical id"s (chips)
  48 "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 5 8 9 10 11 12 13
  physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13
cache size : 30720 KB
```

From /proc/meminfo

```plaintext
MemTotal:       264039396 kB
HugePages_Total:       0
Hugepagesize:       2048 kB
```

From /etc/*release*/etc/*version*

```
os-release:
  NAME="Red Hat Enterprise Linux Server"
  VERSION="7.2 (Maipo)"
  ID="rhel"
  ID_LIKE="fedora"
  VERSION_ID="7.2"
  PRETTY_NAME="Red Hat Enterprise Linux Server 7.2 (Maipo)"
  ANSI_COLOR="0;31"
  CPE_NAME="cpe:/o:redhat:enterprise_linux:7.2:GA:server"
redhat-release: Red Hat Enterprise Linux Server release 7.2 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.2 (Maipo)
```

```
uname -a:
  Linux localhost.localdomain 3.10.0-327.el7.x86_64 #1 SMP Thu Oct 29 17:29:29
  EDT 2015 x86_64 x86_64 x86_64 GNU/Linux
run-level 3 Jun 30 22:02
```

```
SPEC is set to: /root/cpu2006-1.2
```

```
Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda2      xfs  234G  8.2G  226G  4% /
```

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. 2.2.1 06/07/2016
Memory:
  8x 00CE00B300CE M393A4K40BB1-CRC 32 GB 2 rank 2400 MHz
```

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Platform Notes (Continued)
(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/cpu2006-1.2/libs/32:/root/cpu2006-1.2/libs/64:/root/cpu2006-1.2/sh"
OMP_NUM_THREADS = "24"

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

Base Portability Flags

400.perlbench: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX_X64
401.bzip2: -DSPEC_CPU_LP64
403.gcc: -DSPEC_CPU_LP64
429.mcf: -DSPEC_CPU_LP64
445.gobmk: -DSPEC_CPU_LP64
456.hmmer: -DSPEC_CPU_LP64
458.sjeng: -DSPEC_CPU_LP64
462.libquantum: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX
464.h264ref: -DSPEC_CPU_LP64
471.omnetpp: -DSPEC_CPU_LP64
473.astar: -DSPEC_CPU_LP64
483.xalancbmk: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX

Base Optimization Flags

C benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch -auto-p32

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
-Wl,-z,muldefs -L/sh -lsmartheap64
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Base Other Flags

C benchmarks:

403.gcc: -Dalloca=_alloca

Peak Compiler Invocation

C benchmarks (except as noted below):

icc -m64

400.perlbench: icc -m32 -L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin

C++ benchmarks (except as noted below):

icpc -m32 -L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin

473.astar: icpc -m64

Peak Portability Flags

400.perlbench: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX_IA32
401.bzip2: -DSPEC_CPU_LP64
403.gcc: -DSPEC_CPU_LP64
429.mcf: -DSPEC_CPU_LP64
445.gobmk: -DSPEC_CPU_LP64
456.hmmer: -DSPEC_CPU_LP64
458.sjeng: -DSPEC_CPU_LP64
462.libquantum: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX
464.h264ref: -DSPEC_CPU_LP64
471.omnetpp: -D_FILE_OFFSET_BITS=64
473.astar: -DSPEC_CPU_LP64
483.xalancbmk: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX

Peak Optimization Flags

C benchmarks:

400.perlbench: -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) -opt-prefetch
-ansi-alias

401.bzip2: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
-ipo(pass 2) -O3(pass 2) -no-prec-div
-par-num-threads=1(pass 1) -prof-use(pass 2) -auto-ilp32
-opt-prefetch -ansi-alias
SPEC CINT2006 Result

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Peak Optimization Flags (Continued)

403.gcc: basepeak = yes
429.mcf: -xCORE-AVX2 -ipo -O3 -no-prec-div -parallel
-opt-prefetch -auto-p32
445.gobmk: basepeak = yes
456.hmmer: basepeak = yes
458.sjeng: -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
462.libquantum: basepeak = yes
464.h264ref: basepeak = yes

C++ benchmarks:

471.omnetpp: -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)
-opt-ra-region-strategy=block -ansi-alias
-Wl,-z,muldefs -L/sh -lsmartheap

473.astar: -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch
-auto-p32 -Wl,-z,muldefs -L/sh -lsmartheap64

483.xalancbmk: -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch
-ansi-alias -Wl,-z,muldefs -L/sh -lsmartheap

Peak Other Flags

403.gcc: -Dalloca=_alloca

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

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