Dell Inc.

PowerEdge C6420 (Intel Xeon Bronze 3104, 1.70 GHz)

**SPECint®2006** = 33.7
**SPECint_base2006** = 33.8

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPU Name:</strong> Intel Xeon Bronze 3104</td>
<td><strong>Operating System:</strong> SUSE Linux Enterprise Server 12 SP2 (x86_64) 4.4.21-69-default</td>
</tr>
<tr>
<td><strong>CPU Characteristics:</strong></td>
<td><strong>Compiler:</strong> C/C++: Version 17.0.3.191 of Intel C/C++ Compiler for Linux</td>
</tr>
<tr>
<td><strong>CPU MHz:</strong> 1700</td>
<td><strong>Auto Parallel:</strong> Yes</td>
</tr>
<tr>
<td><strong>FPU:</strong> Integrated</td>
<td><strong>File System:</strong> ext4</td>
</tr>
<tr>
<td><strong>CPU(s) enabled:</strong> 12 cores, 2 chips, 6 cores/chip</td>
<td><strong>System State:</strong> Run level 3 (multi-user)</td>
</tr>
<tr>
<td><strong>CPU(s) orderable:</strong> 1.2 chip</td>
<td><strong>Base Pointers:</strong> 32/64-bit</td>
</tr>
<tr>
<td><strong>Primary Cache:</strong> 32 KB I + 32 KB D on chip per core</td>
<td><strong>Peak Pointers:</strong> 32/64-bit</td>
</tr>
<tr>
<td><strong>Secondary Cache:</strong> 1 MB I+D on chip per core</td>
<td><strong>Other Software:</strong> Microquill SmartHeap V10.2</td>
</tr>
<tr>
<td><strong>L3 Cache:</strong> 8.25 MB I+D on chip per chip</td>
<td></td>
</tr>
<tr>
<td><strong>Other Cache:</strong> None</td>
<td></td>
</tr>
<tr>
<td><strong>Memory:</strong> 192 GB (12 x 16 GB 2Rx8 PC4-2666V-R, running at 2133 MT/s)</td>
<td></td>
</tr>
<tr>
<td><strong>Disk Subsystem:</strong> 1 x 960 GB SATA SSD</td>
<td></td>
</tr>
<tr>
<td><strong>Other Hardware:</strong> None</td>
<td></td>
</tr>
</tbody>
</table>

**Test date:** Jun-2017
**Hardware Availability:** Jul-2017
**Software Availability:** Nov-2016
Dell Inc.

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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>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>400.perlbench</td>
<td>453</td>
<td>21.6</td>
<td>453</td>
<td>21.6</td>
<td>452</td>
<td>21.6</td>
<td>397</td>
<td>24.6</td>
<td>394</td>
<td>24.8</td>
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<tr>
<td>401.bzip2</td>
<td>706</td>
<td>13.7</td>
<td>709</td>
<td>13.6</td>
<td>708</td>
<td>13.6</td>
<td>700</td>
<td>13.8</td>
<td>700</td>
<td>13.8</td>
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<tr>
<td>403.gcc</td>
<td>365</td>
<td>22.0</td>
<td>365</td>
<td>22.0</td>
<td>368</td>
<td>21.9</td>
<td>585</td>
<td>13.8</td>
<td>623</td>
<td>12.9</td>
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<tr>
<td>429.mcf</td>
<td>214</td>
<td>42.6</td>
<td>216</td>
<td>42.2</td>
<td>213</td>
<td>42.8</td>
<td>212</td>
<td>43.0</td>
<td>211</td>
<td>43.2</td>
</tr>
<tr>
<td>445.gobmk</td>
<td>691</td>
<td>15.2</td>
<td>691</td>
<td>15.2</td>
<td>691</td>
<td>15.2</td>
<td>683</td>
<td>15.4</td>
<td>683</td>
<td>15.4</td>
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<tr>
<td>456.hmmer</td>
<td>207</td>
<td>45.1</td>
<td>207</td>
<td>45.0</td>
<td>208</td>
<td>45.0</td>
<td>207</td>
<td>45.1</td>
<td>207</td>
<td>45.0</td>
</tr>
<tr>
<td>458.sjeng</td>
<td>684</td>
<td>17.7</td>
<td>684</td>
<td>17.7</td>
<td>684</td>
<td>17.7</td>
<td>671</td>
<td>18.0</td>
<td>670</td>
<td>18.1</td>
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<tr>
<td>462.libquantum</td>
<td>12.6</td>
<td>1640</td>
<td>12.4</td>
<td>1670</td>
<td>12.0</td>
<td>1720</td>
<td>12.6</td>
<td>1640</td>
<td>12.4</td>
<td>1670</td>
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<tr>
<td>464.h264ref</td>
<td>695</td>
<td>31.9</td>
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<td>31.8</td>
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<td>31.9</td>
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<td>31.8</td>
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<tr>
<td>471.omnetpp</td>
<td>361</td>
<td>31.7</td>
<td>365</td>
<td>31.7</td>
<td>362</td>
<td>31.7</td>
<td>304</td>
<td>20.6</td>
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<td>21.1</td>
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<tr>
<td>473.astar</td>
<td>389</td>
<td>18.1</td>
<td>387</td>
<td>18.1</td>
<td>388</td>
<td>18.1</td>
<td>388</td>
<td>18.1</td>
<td>387</td>
<td>18.1</td>
</tr>
<tr>
<td>483.xalancbmk</td>
<td>171</td>
<td>40.3</td>
<td>171</td>
<td>40.4</td>
<td>170</td>
<td>40.5</td>
<td>160</td>
<td>43.0</td>
<td>162</td>
<td>42.5</td>
</tr>
</tbody>
</table>

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

### Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

### 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
Memory Patrol Scrub disabled
CPU Interconnect Bus Link Power Management disabled
PCI ASPM Li Link Power Management disabled
Sysinfo program /root/cpu2006-1.2_ic17u3/config/sysinfo.rev6993
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
running on linux-38mh Wed Jun 7 06:49:22 2017
## 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) Bronze 3104 CPU @ 1.70GHz
- **2 "physical id"s (chips)**
- **12 "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**: 6
  - **siblings**: 6
  - **physical 0: cores**: 0 1 2 3 4 5
  - **physical 1: cores**: 0 1 2 3 4 5
- **cache size**: 8448 KB

From `/proc/meminfo`

- **MemTotal**: 197654280 kB
- **HugePages_Total**: 0
- **Hugepagesize**: 2048 kB

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.

From `/etc/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"

`uname -a`:

```
(9464f67) x86_64 x86_64 x86_64 GNU/Linux
```

run-level 3 Jun 7 06:48

SPEC is set to: `/root/cpu2006-1.2_ic17u3`

Filesystem | Type | Size | Used | Avail | Use% | Mounted on
---|---|---|---|---|---|---
/dev/sda2 | ext4 | 915G | 8.4G | 906G | 1% | /

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...

Continued on next page
SPEC CINT2006 Result

Dell Inc.

PowerEdge C6420 (Intel Xeon Bronze 3104, 1.70 GHz)

SPECint2006 = 33.7
SPECint_base2006 = 33.8

<table>
<thead>
<tr>
<th>CPU2006 license: 55</th>
<th>Test date:</th>
</tr>
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<tr>
<td>Test sponsor:</td>
<td>Hardware Availability:</td>
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<td>Dell Inc.</td>
<td>Jul-2017</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Software Availability:</td>
</tr>
<tr>
<td>Dell Inc.</td>
<td>Nov-2016</td>
</tr>
</tbody>
</table>

Platform Notes (Continued)

determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

BIOS Dell Inc. 1.1.1 06/05/2017
Memory:
12x 002C00B30002C 18ASF2G72PDZ-2G6D1 16 GB 2 rank 2666 MHz, configured at 2133 MHz
4x 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/cpu2006-1.2_ic17u3/lib/ia32:/root/cpu2006-1.2_ic17u3/lib/intel64:/root/cpu2006-1.2_ic17u3/sh10.2"
OMP_NUM_THREADS = "6"

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

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
Dell Inc. PowerEdge C6420 (Intel Xeon Bronze 3104, 1.70 GHz)

SPECint2006 = 33.7
SPECint_base2006 = 33.8

CPU2006 license: 55
Test sponsor: Dell Inc.
Test date: Jun-2017
Tested by: Dell Inc.
Hardware Availability: Jul-2017
Software Availability: Nov-2016

Base Optimization Flags

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

C++ benchmarks:
- xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32
  -Wl,-z,muldefs -L/sh10.2 -lsmartheap64

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_2017/linux/lib/ia32
  445.gobmk: icc -m32 -L/opt/intel/compilers_and_libraries_2017/linux/lib/ia32

C++ benchmarks (except as noted below):
  icc -m32 -L/opt/intel/compilers_and_libraries_2017/linux/lib/ia32
  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: -D_FILE_OFFSET_BITS=64
  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
Dell Inc.  
PowerEdge C6420 (Intel Xeon Bronze 3104, 1.70 GHz)

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CPU2006 license: 55
Test date: Jun-2017
Test sponsor: Dell Inc.
Hardware Availability: Jul-2017
Tested by: Dell Inc.
Software Availability: Nov-2016

Peak Optimization Flags

C benchmarks:

400.perlbench: 
- 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) -qopt-prefetch

401.bzip2: 
- 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 -auto-ilp32 -qopt-prefetch

403.gcc: 
-xCORE-AVX2 -ipo -O3 -no-prec-div -inline-calloc
- qopt-malloc-options=3 -auto-ilp32

429.mcf: 
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel
- qopt-prefetch -auto-p32

445.gobmk: 
- 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)

456.hmmer: basepeak = yes

458.sjeng: 
- 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

462.libquantum: basepeak = yes

464.h264ref: basepeak = yes

C++ benchmarks:

471.omnetpp: 
- 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) -qopt-ra-region-strategy=block
- Wl,-z,muldefs -L/sh10.2 -lsmartheap

473.astar: 
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
- auto-p32 -Wl,-z,muldefs -L/sh10.2 -lsmartheap64

483.xalancbmk: 
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
- Wl,-z,muldefs -L/sh10.2 -lsmartheap

Peak Other Flags

C benchmarks:

Continued on next page
Dell Inc.  
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CPU2006 license: 55  
Test sponsor: Dell Inc.  
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Test date: Jun-2017  
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Software Availability: Nov-2016  

Peak Other Flags (Continued)  
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-ic17.0-official-linux64-revF.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-revF.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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