Dell Inc. PowerEdge C6420 (Intel Xeon Gold 6150, 2.70 GHz)

SPECint_rate2006 = 1950
SPECint_rate_base2006 = 1850

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

Test date: Jun-2017
Hardware Availability: Jul-2017
Software Availability: Nov-2016

Hardware

| CPU Name: | Intel Xeon Gold 6150 |
| CPU Characteristics: | Intel Turbo Boost Technology up to 3.70 GHz |
| CPU MHz: | 2700 |
| FPU: | Integrated |
| CPU(s) enabled: | 36 cores, 2 chips, 18 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: | 1 MB I+D on chip per core |
| L3 Cache: | 24.75 MB I+D on chip per core |
| Other Cache: | None |
| Memory: | 384 GB (12 x 32 GB 2Rx8 PC4-2666V-R) |
| Disk Subsystem: | 1 x 960 GB SATA SSD |
| Other Hardware: | None |

Software

| Operating System: | SUSE Linux Enterprise Server 12 SP2 (x86_64) |
| Compiler: | C/C++; Version 17.0.3.191 of Intel C/C++ Compiler for Linux |
| Auto Parallel: | Yes |
| File System: | ext4 |
| System State: | Run level 3 (multi-user) |
| Base Pointers: | 32-bit |
| Peak Pointers: | 32/64-bit |
| Other Software: | Microquill SmartHeap V10.2 |
Dell Inc.

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---

### Results Table

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<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<td>543</td>
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<td>491</td>
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<td>412</td>
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<td>403.gcc</td>
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<td>429.mcf</td>
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<tr>
<td>471.omnetpp</td>
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<tr>
<td>473.astar</td>
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<td>504</td>
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<td>72</td>
<td><strong>506</strong></td>
<td>999</td>
<td>504</td>
<td>1000</td>
</tr>
</tbody>
</table>

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

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### 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 enabled
- Virtualization Technology disabled
- System Profile set to Custom
- CPU Performance set to Maximum Performance
- C States set to autonomous
- C1E disabled
- Uncore Frequency set to Dynamic
- Energy Efficiency Policy set to Performance
- Memory Patrol Scrub disabled
- Logical Processor enabled
- CPU Interconnect Bus Link Power Management disabled
- PCI ASPM L1 Link Power Management disabled
- Sysinfo program /root/cpu2006-1.2_ic17u3/config/sysinfo.rev6993
- Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
- running on linux-fx60 Thu Jun 1 10:45:12 2017

---

Continued on next page
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) Gold 6150 CPU @ 2.70GHz
2 "physical id"s (chips)
72 "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 : 18
siblings : 36
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 : 25344 KB

From /proc/meminfo
MemTotal:       394867844 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.
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:
Linux linux-fx60 4.4.21-69-default #1 SMP Tue Oct 25 10:58:20 UTC 2016
(9464f67) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Jun 1 10:26

SPEC is set to: /root/cpu2006-1.2_ic17u3
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 ext4 909G 125G 784G 14% /

Warning: Use caution when you interpret this section. The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately
### 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. 1.0.2 05/31/2017  
Memory:  
2x 002C00B3002C 36ASF4G72PZ-2G6D1 32 GB 2 rank 2666 MHz  
10x 002C0632002C 36ASF4G72PZ-2G6D1 32 GB 2 rank 2666 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:  
LD_LIBRARY_PATH = "*/root/cpu2006-1.2_ic17u3/lib/ia32:/root/cpu2006-1.2_ic17u3/lib/intel64:/root/cpu2006-1.2_ic17u3/sh10.2"

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 runspec command invoked through numactl i.e.:  
umactl --interleave=all runspec <etc>

### Base Compiler Invocation

C benchmarks:  
```bash  
icc -m32 -L/opt/intel/compilers_and_libraries_2017/linux/lib/ia32  
```

C++ benchmarks:  
```bash  
icpc -m32 -L/opt/intel/compilers_and_libraries_2017/linux/lib/ia32  
```

### Base Portability Flags

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

---

**SPEC CINT2006 Result**

**Dell Inc.**  
PowerEdge C6420 (Intel Xeon Gold 6150, 2.70 GHz)  

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Base Optimization Flags

C benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-qopt-mem-layout-trans=3

C++ benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-qopt-mem-layout-trans=3 -Wl,-z,muldefs -L/sh10.2 -lsmartheap

Base Other Flags

C benchmarks:
403.gcc: -Dalloca=_alloca

Peak Compiler Invocation

C benchmarks (except as noted below):
icc -m32 -L/opt/intel/compilers_and_libraries_2017/linux/lib/ia32

400.perlbench: icc -m64
401.bzip2: icc -m64
456.hmmer: icc -m64
458.sjeng: icc -m64

C++ benchmarks:
icpc -m32 -L/opt/intel/compilers_and_libraries_2017/linux/lib/ia32

Peak Portability Flags

400.perlbench: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX_X64
401.bzip2: -DSPEC_CPU_LP64
403.gcc: -D_FILE_OFFSET_BITS=64
429.mcf: -D_FILE_OFFSET_BITS=64
445.gobmk: -D_FILE_OFFSET_BITS=64
456.hmmer: -DSPEC_CPU_LP64
458.sjeng: -DSPEC_CPU_LP64
462.libquantum: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX
464.h264ref: -D_FILE_OFFSET_BITS=64
471.omnetpp: -D_FILE_OFFSET_BITS=64
473.astar: -D_FILE_OFFSET_BITS=64
SPEC CINT2006 Result

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\[
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Peak Portability Flags (Continued)

\texttt{483.xalancbmk: -D\_FILE\_OFFSET\_BITS=64 \ -DSPEC\_CPU\_LINUX}

Peak Optimization Flags

C benchmarks:

\begin{itemize}
  \item 400.perlbench: \texttt{-prof-gen(pass 1) \ -prof-use(pass 2) \ -xCORE-AVX512(pass 2) }
  \item \texttt{-par-num-threads=1(pass 1) \ -ipo(pass 2) \ -O3(pass 2) }
  \item \texttt{-no-prec-div(pass 2) \ -auto-ilp32 \ -qopt-mem-layout-trans=3}
  \item 401.bzip2: \texttt{-prof-gen(pass 1) \ -prof-use(pass 2) \ -xCORE-AVX512(pass 2) }
  \item \texttt{-par-num-threads=1(pass 1) \ -ipo(pass 2) \ -O3(pass 2) }
  \item \texttt{-no-prec-div(pass 2) \ -qopt-prefetch \ -auto-ilp32 }
  \item \texttt{-qopt-mem-layout-trans=3}
  \item 403.gcc: \texttt{-xCORE-AVX512 \ -ipo \ -O3 \ -no-prec-div }
  \item \texttt{-qopt-mem-layout-trans=3}
  \item 429.mcf: basepeak = yes
  \item 445.gobmk: \texttt{-prof-gen(pass 1) \ -prof-use(pass 2) \ -xCORE-AVX512(pass 2) }
  \item \texttt{-par-num-threads=1(pass 1) \ -ipo(pass 2) \ -O3(pass 2) }
  \item \texttt{-no-prec-div(pass 2) \ -qopt-mem-layout-trans=3}
  \item 456.hmmer: \texttt{-xCORE-AVX512 \ -ipo \ -O3 \ -no-prec-div \ -unroll2 \ -auto-ilp32}
  \item \texttt{-qopt-mem-layout-trans=3}
  \item 458.sjeng: \texttt{-prof-gen(pass 1) \ -prof-use(pass 2) \ -xCORE-AVX512(pass 2) }
  \item \texttt{-par-num-threads=1(pass 1) \ -ipo(pass 2) \ -O3(pass 2) }
  \item \texttt{-no-prec-div(pass 2) \ -unroll4 \ -auto-ilp32}
  \item \texttt{-qopt-mem-layout-trans=3}
  \item 462.libquantum: basepeak = yes
  \item 464.h264ref: \texttt{-prof-gen(pass 1) \ -prof-use(pass 2) \ -xCORE-AVX512(pass 2) }
  \item \texttt{-par-num-threads=1(pass 1) \ -ipo(pass 2) \ -O3(pass 2) }
  \item \texttt{-no-prec-div(pass 2) \ -unroll2 \ -qopt-mem-layout-trans=3}
\end{itemize}

C++ benchmarks:

\begin{itemize}
  \item 471.omnetpp: \texttt{-prof-gen(pass 1) \ -prof-use(pass 2) \ -xCORE-AVX512(pass 2) }
  \item \texttt{-par-num-threads=1(pass 1) \ -ipo(pass 2) \ -O3(pass 2) }
  \item \texttt{-no-prec-div(pass 2) }
  \item \texttt{-qopt-ra-region-strategy=block}
  \item \texttt{-qopt-mem-layout-trans=3 -Wl,-z,muldefs }
  \item \texttt{-L/sh10.2 -lsmartheap}
\end{itemize}

Continued on next page
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Peak Optimization Flags (Continued)

473.astar: basepeak = yes
483.xalancbmk: basepeak = yes

Peak Other Flags

C benchmarks:

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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