Dell Inc.  

PowerEdge M640 (Intel Xeon Silver 4110, 2.10 GHz)  

**SPECint®2006 = 59.4**  
**SPECint_base2006 = 57.0**

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

### Hardware

- **CPU Name:** Intel Xeon Silver 4110  
- **CPU Characteristics:** Intel Turbo Boost Technology up to 3.00 GHz  
- **CPU MHz:** 2100  
- **FPU:** Integrated  
- **CPU(s) enabled:** 16 cores, 2 chips, 8 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:** 11 MB I+D on chip per chip  
- **Other Cache:** None  
- **Memory:** 384 GB (12 x 32 GB 2Rx8 PC4-2666V-R, running at 2400 MT/s)  
- **Disk Subsystem:** 1 x 960 GB SATA SSD  
- **Other Hardware:** None

### Software

- **Operating System:** SUSE Linux Enterprise Server 12 SP3 4.4.70-2-default  
- **Compiler:** C/C++: Version 17.0.3.191 of Intel C/C++ Compiler for Linux  
- **Auto Parallel:** Yes  
- **File System:** btrfs  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 32/64-bit  
- **Peak Pointers:** 32/64-bit  
- **Other Software:** Microquill SmartHeap V10.2
Dell Inc. 

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### Results Table 

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>400.perlbench</td>
<td>258</td>
<td>37.8</td>
<td>258</td>
<td>37.9</td>
<td>259</td>
<td>37.8</td>
<td>227</td>
<td>43.0</td>
<td>228</td>
<td>42.9</td>
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<tr>
<td>401.bzip2</td>
<td>417</td>
<td>23.2</td>
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<td>27.9</td>
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<tr>
<td>429.mcf</td>
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<td>26.6</td>
<td>394</td>
<td>26.6</td>
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<td>26.6</td>
<td>386</td>
<td>27.2</td>
<td>385</td>
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<tr>
<td>445.gobmk</td>
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<td>79.3</td>
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<tr>
<td>456.hmmer</td>
<td>405</td>
<td>29.9</td>
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<td>29.9</td>
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<td>29.9</td>
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<td>30.6</td>
<td>397</td>
<td>30.5</td>
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<tr>
<td>462.libquantum</td>
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<td>4600</td>
<td>4.45</td>
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<td>4100</td>
<td>4.45</td>
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<td>464.h264ref</td>
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<td>54.4</td>
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<td>407</td>
<td>54.4</td>
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<tr>
<td>471.omnetpp</td>
<td>272</td>
<td>23.0</td>
<td>274</td>
<td>22.8</td>
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<td>23.1</td>
<td>215</td>
<td>29.1</td>
<td>216</td>
<td>29.0</td>
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<tr>
<td>473.astar</td>
<td>227</td>
<td>30.9</td>
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<td>30.8</td>
<td>228</td>
<td>30.8</td>
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<tr>
<td>483.xalancbmk</td>
<td>106</td>
<td>65.2</td>
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<td>64.1</td>
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<td>64.5</td>
<td>97.8</td>
<td>70.6</td>
<td>97.9</td>
<td>70.5</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  
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-ejwa Thu Aug 24 05:38:47 2017
SPEC CINT2006 Result

Dell Inc.

PowerEdge M640 (Intel Xeon Silver 4110, 2.10 GHz)  SPECint2006 =  59.4
SPECint_base2006 =  57.0

CPU2006 license: 55  Test date: Aug-2017
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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) Silver 4110 CPU @ 2.10GHz
  2 "physical id"s (chips)
  32 "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 : 16
  physical 0: cores 0 1 2 3 4 5 6 7
  physical 1: cores 0 1 2 3 4 5 6 7
cache size : 11264 KB

From /proc/meminfo
MemTotal:       394862828 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
SuSE-release:
  NAME="SLES"
  VERSION="12-SP3"
  VERSION_ID="12.3"
  PATCHLEVEL = 3
  # 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-SP3"
  VERSION_ID="12.3"
  PRETTY_NAME="SUSE Linux Enterprise Server 12 SP3"
  ID="sles"
  ANSI_COLOR="0;32"
  CPE_NAME="cpe:/o:suse:sles:12:sp3"

uname -a:
  Linux linux-ejwa 4.4.70-2-default #1 SMP Wed Jun 7 15:12:06 UTC 2017
  (4502c76) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Aug 24 05:37

SPEC is set to: /root/cpu2006-1.2_ic17u3
Filesistema Type  Size  Used Avail Use% Mounted on
/dev/sda3 btrfs  855G  6.8G  847G 1% /
Additional information from dmidecode:

Warning: Use caution when you interpret this section. The 'dmidecode' program
Continued on next page
**Platform Notes (Continued)**

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. 1.0.0 08/10/2017  
Memory:  
- 2x 002C00B3002C 36ASF4G72PZ-2G6D1 32 GB 2 rank 2666 MHz, configured at 2400 MHz  
- 10x 002C0632002C 36ASF4G72PZ-2G6D1 32 GB 2 rank 2666 MHz, configured at 2400 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 = "16"

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

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Base Portability Flags (Continued)  

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 -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
SPEC CINT2006 Result

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Peak Portability Flags (Continued)

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: -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

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### Dell Inc.

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### Peak Optimization Flags (Continued)

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

### Peak Other Flags

C benchmarks:

- 403.gcc: -Dalloca=_alloca

The flags files that were used to format this result can be browsed at:


You can also download the XML flags sources by saving the following links:


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