Dell Inc. PowerEdge M640 (Intel Xeon Silver 4109T, 2.00 GHz)

<table>
<thead>
<tr>
<th>SPECfp®2006</th>
<th>SPECfp_base2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>110</td>
<td>105</td>
</tr>
</tbody>
</table>

CPU2006 license: 55
Test sponsor: Dell Inc.
Test date: Aug-2017
Tested by: Dell Inc.
Software Availability: Sep-2017
CPU Name: Intel Xeon Silver 4109T
CPU Characteristics: Intel Turbo Boost Technology up to 3.00 GHz
CPU MHz: 2000
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

<table>
<thead>
<tr>
<th>SPECfp®2006 = 110</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
</tr>
<tr>
<td>416.gamess</td>
</tr>
<tr>
<td>433.milc</td>
</tr>
<tr>
<td>434.zeusmp</td>
</tr>
<tr>
<td>435.gromacs</td>
</tr>
<tr>
<td>436.cactusADM</td>
</tr>
<tr>
<td>437.leslie3d</td>
</tr>
<tr>
<td>444.namd</td>
</tr>
<tr>
<td>447.dealII</td>
</tr>
<tr>
<td>450.soplex</td>
</tr>
<tr>
<td>453.povray</td>
</tr>
<tr>
<td>454.calculix</td>
</tr>
<tr>
<td>459.GemsFDTD</td>
</tr>
<tr>
<td>465.tonto</td>
</tr>
<tr>
<td>470.lbm</td>
</tr>
<tr>
<td>481.wrf</td>
</tr>
<tr>
<td>482.sphinx3</td>
</tr>
</tbody>
</table>

Operating System: SUSE Linux Enterprise Server 12 SP3
Compiler: C/C++: Version 17.0.3.191 of Intel C/C++ Compiler for Linux;
Fortran: Version 17.0.3.191 of Intel Fortran Compiler for Linux
Auto Parallel: Yes
File System: btrfs
System State: Run level 3 (multi-user)
Dell Inc.

PowerEdge M640 (Intel Xeon Silver 4109T, 2.00 GHz)

CPU2006 license: 55
Test sponsor: Dell Inc.
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L3 Cache: 11 MB I+D on chip per chip
Other Cache: None
Memory: 192 GB (12 x 16 GB 2Rx8 PC4-2666V-R, running at 2400 MT/s)
Disk Subsystem: 1 x 960 GB SATA SSD
Other Hardware: None
Base Pointers: 64-bit
Peak Pointers: 32/64-bit

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base</th>
<th>Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Seconds</td>
<td>Ratio</td>
</tr>
<tr>
<td>410.bwaves</td>
<td>21.0</td>
<td>646</td>
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<tr>
<td>416.gamess</td>
<td>517</td>
<td>37.8</td>
</tr>
<tr>
<td>433.milc</td>
<td>131</td>
<td>70.1</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>44.0</td>
<td>207</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>176</td>
<td>40.5</td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>16.8</td>
<td>712</td>
</tr>
<tr>
<td>437.leslie3d</td>
<td>29.2</td>
<td>322</td>
</tr>
<tr>
<td>444.namd</td>
<td>280</td>
<td>28.7</td>
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<tr>
<td>447.dealII</td>
<td>192</td>
<td>59.6</td>
</tr>
<tr>
<td>450.soplex</td>
<td>210</td>
<td>39.7</td>
</tr>
<tr>
<td>453.povray</td>
<td>94.2</td>
<td>56.5</td>
</tr>
<tr>
<td>454.calculix</td>
<td>142</td>
<td>58.0</td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td>47.2</td>
<td>225</td>
</tr>
<tr>
<td>465.tonto</td>
<td>252</td>
<td>39.1</td>
</tr>
<tr>
<td>470.lbm</td>
<td>18.0</td>
<td>763</td>
</tr>
<tr>
<td>481.wrf</td>
<td>119</td>
<td>93.7</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>359</td>
<td>54.2</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:
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
Dell Inc.  
PowerEdge M640 (Intel Xeon Silver 4109T, 2.00 GHz)  

SPECfp2006 = 110  
SPECfp_base2006 = 105  

CPU2006 license: 55  
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Platform Notes (Continued)

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 (b5e8d4b4eb51ed28d7f98696cebe290c1)  
running on linux-ejwa Sun Aug 27 15:59:56 2017

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 4109T CPU @ 2.00GHz  
  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: 196682072 kB  
  HugePages_Total: 0  
  Hugepagesize: 2048 kB

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

  SuSE-release:  
    SUSE Linux Enterprise Server 12 (x86_64)  
    VERSION = 12  
    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

Continued on next page
**SPEC CFP2006 Result**

**Dell Inc.**

PowerEdge M640 (Intel Xeon Silver 4109T, 2.00 GHz)

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**CPU2006 license:** 55

**Test sponsor:** Dell Inc.

**Test date:** Aug-2017

**Hardware Availability:** Sep-2017

**Tested by:** Dell Inc.

**Software Availability:** Sep-2017

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**Platform Notes (Continued)**

```
run-level 3  Aug 26 06:33

SPEC is set to: /root/cpu2006-1.2_ic17u3
Filesystem     Type   Size  Used Avail Use% Mounted on
/dev/sda3      btrfs  855G  8.6G  845G   2% /
```

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. 1.0.0 08/10/2017
Memory:
  9x 002C00B3002C 18ASF2G72PD2-2G6D1 16 GB 2 rank 2666 MHz, configured at 2400
  MHz
  3x 00AD00B300AD HMA82GR7AFR8N-VK 16 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,compact,1,0"
- `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`
- **Fortran benchmarks:**
  - `ifort -m64`
- **Benchmarks using both Fortran and C:**
  - `icc -m64 ifort -m64`
SPEC CFP2006 Result

Dell Inc.

PowerEdge M640 (Intel Xeon Silver 4109T, 2.00 GHz)

SPECfp2006 = 110
SPECfp_base2006 = 105

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

Test date: Aug-2017
Hardware Availability: Sep-2017
Software Availability: Sep-2017

Base Portability Flags

410.bwaves: -DSPEC_CPU_LP64
416.games: -DSPEC_CPU_LP64
343.milc: -DSPEC_CPU_LP64
434.zesmp: -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
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 -qopt-prefetch
C++ benchmarks:
   -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
Fortran benchmarks:
   -xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -qopt-prefetch
Benchmarks using both Fortran and C:
   -xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -qopt-prefetch

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
### SPEC CFP2006 Result

**Dell Inc.**

PowerEdge M640 (Intel Xeon Silver 4109T, 2.00 GHz)

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

### Peak Portability Flags

Same as Base Portability Flags

### Peak Optimization Flags

#### C benchmarks:

- 433.milc: basepeak = yes
- 470.lbm: basepeak = yes
- 482.sphinx3: basepeak = yes

#### C++ benchmarks:

- 444.namd: -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) -fno-alias -auto-ilk32
- 447.dealII: basepeak = yes
- 450.soplex: basepeak = yes
- 453.povray: -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 -ansi-alias

#### Fortran benchmarks:

- 410.bwaves: basepeak = yes
- 416.gamess: -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) -unroll2 -inline-level=0 -scalar-rep-
- 434.zeusmp: basepeak = yes
- 437.leslie3d: basepeak = yes
- 459.GemsFDTD: -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) -unroll2 -inline-level=0 -qopt-prefetch -parallel
- 465.tonto: -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) -inline-calloc -qopt-malloc-options=3 -auto -unroll4

Continued on next page
Peak Optimization Flags (Continued)

Benchmarks using both Fortran and C:

435.gromacs: basepeak = yes

436.cactusADM: basepeak = yes

454.calculix: -xCORE-AVX2 -ipo -O3 -no-prec-div -auto-ilp32

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-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