SPEC® CFP2006 Result

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Dell Inc.

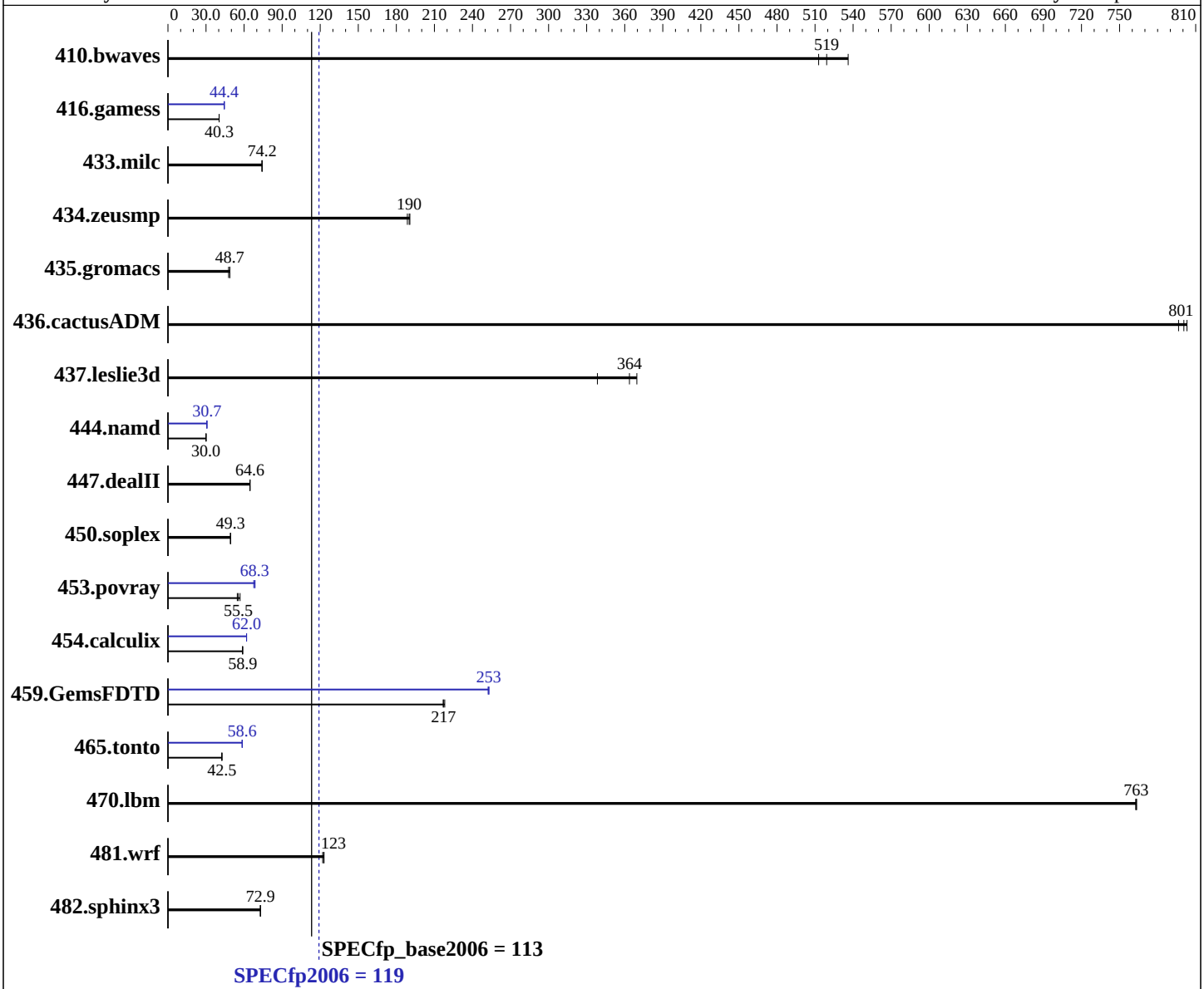
PowerEdge R730xd (Intel Xeon E5-2640 v4, 2.40 GHz)

SPECfp®2006 = 119

SPECfp_base2006 = 113

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

Test date: Feb-2017
Hardware Availability: Oct-2016
Software Availability: Sep-2016



Hardware

CPU Name:	Intel Xeon E5-2640 v4
CPU Characteristics:	Intel Turbo Boost Technology up to 3.40 GHz
CPU MHz:	2400
FPU:	Integrated
CPU(s) enabled:	20 cores, 2 chips, 10 cores/chip
CPU(s) orderable:	1,2 chip
Primary Cache:	32 KB I + 32 KB D on chip per core
Secondary Cache:	256 KB I+D on chip per core

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Software

Operating System:	SUSE Linux Enterprise Server 12 3.12.28-4-default
Compiler:	C/C++: Version 17.0.0.098 of Intel C/C++ Compiler for Linux; Fortran: Version 17.0.0.098 of Intel Fortran Compiler for Linux
Auto Parallel:	Yes
File System:	ext4
System State:	Run level 3 (multi-user)

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L3 Cache: 25 MB I+D on chip per chip
Other Cache: None
Memory: 256 GB (16 x 16 GB 2Rx8 PC4-2400T-R, running at 2133 MHz)
Disk Subsystem: 2 x 2000 GB 7200 RPM SAS RAID 0
Other Hardware: None

Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other Software: None

Results Table

Benchmark	Base						Peak					
	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	**26.2**	**519**	25.3	536	26.5	513	**26.2**	**519**	25.3	536	26.5	513
416.gamess	485	40.4	**486**	**40.3**	486	40.3	441	44.4	442	44.3	**441**	**44.4**
433.milc	124	74.2	124	74.1	**124**	**74.2**	124	74.2	124	74.1	**124**	**74.2**
434.zeusmp	47.7	191	48.2	189	**47.9**	**190**	47.7	191	48.2	189	**47.9**	**190**
435.gromacs	146	48.8	150	47.8	**147**	**48.7**	146	48.8	150	47.8	**147**	**48.7**
436.cactusADM	**14.9**	**801**	15.0	797	14.9	803	**14.9**	**801**	15.0	797	14.9	803
437.leslie3d	25.4	370	**25.8**	**364**	27.8	338	25.4	370	**25.8**	**364**	27.8	338
444.namd	**267**	**30.0**	267	30.0	267	30.0	261	30.7	**261**	**30.7**	261	30.7
447.dealII	**177**	**64.6**	177	64.6	177	64.7	**177**	**64.6**	177	64.6	177	64.7
450.soplex	169	49.4	**169**	**49.3**	169	49.3	169	49.4	**169**	**49.3**	169	49.3
453.povray	**95.9**	**55.5**	97.4	54.6	93.6	56.9	**77.9**	**68.3**	77.5	68.6	78.7	67.6
454.calculix	**140**	**58.9**	140	58.9	141	58.7	133	62.0	133	61.9	**133**	**62.0**
459.GemsFDTD	48.6	218	**48.8**	**217**	48.9	217	41.9	253	**42.0**	**253**	42.1	252
465.tonto	**231**	**42.5**	232	42.4	231	42.6	168	58.6	169	58.4	**168**	**58.6**
470.lbm	18.0	763	18.0	763	**18.0**	**763**	18.0	763	18.0	763	**18.0**	**763**
481.wrf	90.8	123	**91.0**	**123**	91.6	122	90.8	123	**91.0**	**123**	91.6	122
482.sphinx3	**267**	**72.9**	268	72.8	267	72.9	**267**	**72.9**	268	72.8	267	72.9

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:
Snoop Mode set to Opportunistic Snoop Broadcast
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
```

Continued on next page

Platform Notes (Continued)

```
Energy Efficiency Policy set to Performance
Memory Patrol Scrub disabled
Logical Processor disabled
Sysinfo program /root/previous-cpu2006-1.2/config/sysinfo.rev6993
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
running on linux-0171 Thu Feb  2 21:32:06 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) CPU E5-2640 v4 @ 2.40GHz
      2 "physical id"s (chips)
      20 "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 : 10
      siblings  : 10
      physical 0: cores 0 1 2 3 4 8 9 10 11 12
      physical 1: cores 0 1 2 3 4 8 9 10 11 12
   cache size : 25600 KB

From /proc/meminfo
   MemTotal:       264567484 kB
   HugePages_Total:       0
   Hugepagesize:       2048 kB

/usr/bin/lsb_release -d
   SUSE Linux Enterprise Server 12

From /etc/*release* /etc/*version*
   SuSE-release:
      SUSE Linux Enterprise Server 12 (x86_64)
      VERSION = 12
      PATCHLEVEL = 0
      # 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"
      VERSION_ID="12"
      PRETTY_NAME="SUSE Linux Enterprise Server 12"
      ID="sles"
      ANSI_COLOR="0;32"
      CPE_NAME="cpe:/o:suse:sles:12"

uname -a:
   Linux linux-0171 3.12.28-4-default #1 SMP Thu Sep 25 17:02:34 UTC 2014
   (9879bd4) x86_64 x86_64 x86_64 GNU/Linux
```

Continued on next page

Platform Notes (Continued)

```
 run-level 3 Feb 2 15:06

 SPEC is set to: /root/previous-cpu2006-1.2
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/sda2      ext4  246G   18G  227G   8% /
 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. 2.3.4 11/08/2016
   Memory:
    7x 00AD063200AD HMA82GR7MFR8N-UH 16 GB 2 rank 2400 MHz, configured at 2133
    MHz
    9x 00CE00B300CE M393A2K43BB1-CRC 16 GB 2 rank 2400 MHz, configured at 2133
    MHz
    8x 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/previous-cpu2006-1.2/libs/32:/root/previous-cpu2006-1.2/libs/64:/root/previous-cpu2006-1.2/sh10.2"
OMP_NUM_THREADS = "20"
 The Dell PowerEdge R730 and the PowerEdge R730xd models are electronically equivalent.
 The results have been measured on a Dell PowerEdge R730xd model.
 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 with:
 echo never > /sys/kernel/mm/transparent_hugepage/enabled
```

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
```

Base Portability Flags

410.bwaves: -DSPEC_CPU_LP64
416.gamess: -DSPEC_CPU_LP64
433.milc: -DSPEC_CPU_LP64
434.zeusmp: -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

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-ilp32

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.html`
`http://www.spec.org/cpu2006/flags/Dell-Platform-Flags-PowerEdge13G-revE.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.xml`
`http://www.spec.org/cpu2006/flags/Dell-Platform-Flags-PowerEdge13G-revE.xml`

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