SPEC® CINT2006 Result
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Dell Inc.

PowerEdge R730 (Intel Xeon E5-2699 v4, 2.20 GHz)

$SPECint^{®}_rate2006 = $ 1810

$SPECint_rate_base2006 = $ 1740

CPU2006 license: 55	**Test date:** Jun-2016
Test sponsor: Dell Inc.	**Hardware Availability:** Mar-2016
Tested by: Dell Inc.	**Software Availability:** Mar-2016

Copies — 400.perlbench: 88 / 1780, 88 / 1450; 401.bzip2: 88 / 939, 88 / 916; 403.gcc: 88 / 1270, 88 / 1260; 429.mcf: 88 / 2150; 445.gobmk: 88 / 1310, 88 / 1250; 456.hmmer: 88 / 2550, 88 / 2350; 458.sjeng: 88 / 1440, 88 / 1360; 462.libquantum: 88 / 19100; 464.h264ref: 88 / 2290, 88 / 2240; 471.omnetpp: 88 / 825, 88 / 808; 473.astar: 88 / 946; 483.xalancbmk: 88 / 1700.

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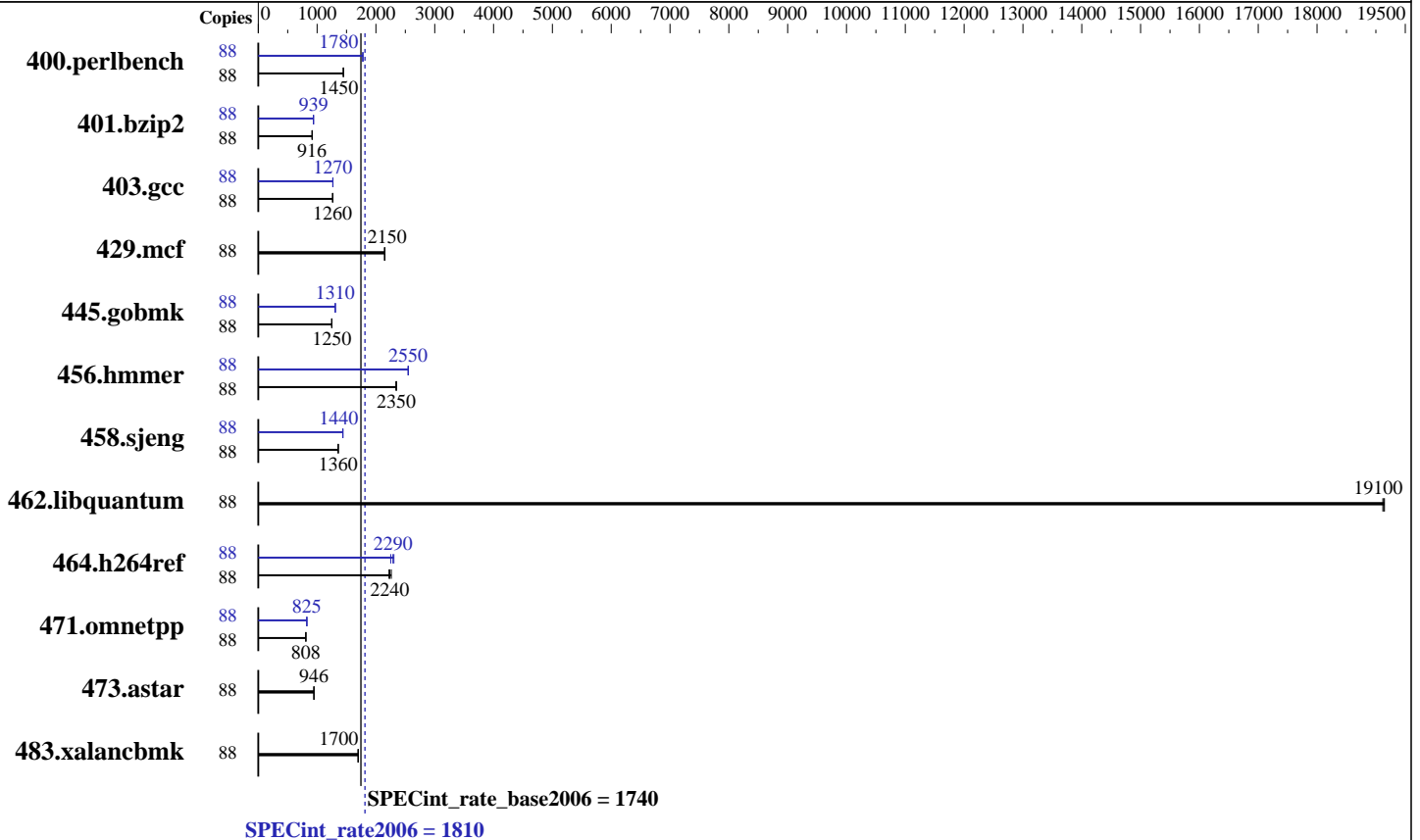
Hardware
CPU Name:	Intel Xeon E5-2699 v4
CPU Characteristics:	Intel Turbo Boost Technology up to 3.60 GHz
CPU MHz:	2200
FPU:	Integrated
CPU(s) enabled:	44 cores, 2 chips, 22 cores/chip, 2 threads/core
CPU(s) orderable:	1,2 chip
Primary Cache:	32 KB I + 32 KB D on chip per core
Secondary Cache:	256 KB I+D on chip per core
L3 Cache:	55 MB I+D on chip per chip
Other Cache:	None
Memory:	512 GB (16 x 32 GB 2Rx4 PC4-2400T-R)
Disk Subsystem:	1 x 160 GB SATA SSD
Other Hardware:	None

Software
Operating System:	SUSE Linux Enterprise Server 12 SP1 3.12.49-11-default
Compiler:	C/C++: Version 16.0.0.101 of Intel C++ Studio XE for Linux
Auto Parallel:	No
File System:	xfs
System State:	Run level 3 (multi-user)
Base Pointers:	32-bit
Peak Pointers:	32/64-bit
Other Software:	Microquill SmartHeap V10.2

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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
400.perlbench	88	593	1450	**595**	**1450**	595	1440	88	483	1780	**484**	**1780**	484	1780
401.bzip2	88	926	917	929	914	**928**	**916**	88	906	937	**905**	**939**	903	940
403.gcc	88	561	1260	**560**	**1260**	560	1270	88	558	1270	**559**	**1270**	559	1270
429.mcf	88	373	2150	374	2140	**373**	**2150**	88	373	2150	374	2140	**373**	**2150**
445.gobmk	88	739	1250	**739**	**1250**	739	1250	88	705	1310	706	1310	**705**	**1310**
456.hmmer	88	351	2340	**350**	**2350**	349	2350	88	**322**	**2550**	322	2550	322	2550
458.sjeng	88	783	1360	784	1360	**783**	**1360**	88	**741**	**1440**	741	1440	740	1440
462.libquantum	88	95.4	19100	95.2	19100	**95.3**	**19100**	88	95.4	19100	95.2	19100	**95.3**	**19100**
464.h264ref	88	876	2220	**871**	**2240**	861	2260	88	**851**	**2290**	845	2310	865	2250
471.omnetpp	88	678	811	681	808	**681**	**808**	88	666	826	667	825	**666**	**825**
473.astar	88	**653**	**946**	653	946	652	947	88	**653**	**946**	653	946	652	947
483.xalancbmk	88	357	1700	**358**	**1700**	358	1700	88	357	1700	**358**	**1700**	358	1700

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:
    Snoop Mode set to Cluster on Die
    Virtualization Technology disabled
    CPU Performance set to Maximum Performance
    C1E disabled
    Cstates set to Autonomous
    Memory Patrol Scrub disabled
    Energy Efficient Turbo disabled
    Energy Efficiency Policy set to Performance
    Sysinfo program /root/cpu2006-1.2/config/sysinfo.rev6914
    $Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
    running on linux-b18b Fri Jun 10 16:06:34 2016

    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

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Platform Notes (Continued)

```
From /proc/cpuinfo
   model name : Intel(R) Xeon(R) CPU E5-2699 v4 @ 2.20GHz
      2 "physical id"s (chips)
      88 "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 : 22
      siblings  : 44
      physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27
      28
      physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27
      28
   cache size : 28160 KB

From /proc/meminfo
   MemTotal:       529332884 kB
   HugePages_Total:        0
   Hugepagesize:        2048 kB

/usr/bin/lsb_release -d
   SUSE Linux Enterprise Server 12 SP1

From /etc/*release* /etc/*version*
   SuSE-release:
      SUSE Linux Enterprise Server 12 (x86_64)
      VERSION = 12
      PATCHLEVEL = 1
      # 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-SP1"
      VERSION_ID="12.1"
      PRETTY_NAME="SUSE Linux Enterprise Server 12 SP1"
      ID="sles"
      ANSI_COLOR="0;32"
      CPE_NAME="cpe:/o:suse:sles:12:sp1"

uname -a:
   Linux linux-b18b 3.12.49-11-default #1 SMP Wed Nov 11 20:52:43 UTC 2015
   (8d714a0) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Jun 10 15:40

SPEC is set to: /root/cpu2006-1.2
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/sda2       xfs   145G   11G  135G   8% /
Additional information from dmidecode:

   Warning: Use caution when you interpret this section. The 'dmidecode' program
```

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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. 2.1.5 04/11/2016
  Memory:
    8x 00AD063200AD HMA84GR7MFR4N-UH 32 GB 2 rank 2400 MHz
    8x 00CE00B300CE M393A4K40BB1-CRC 32 GB 2 rank 2400 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:
LD_LIBRARY_PATH = "/root/cpu2006-1.2/libs/32:/root/cpu2006-1.2/libs/64:/root/cpu2006-1.2/sh"

 Binaries compiled on a system with 1x Intel Core i5-4670K CPU + 32GB
 memory using RedHat EL 7.1
 Transparent Huge Pages enabled with:
 echo always > /sys/kernel/mm/transparent_hugepage/enabled
 Filesystem page cache cleared with:
 echo 1>         /proc/sys/vm/drop_caches
 runspec command invoked through numactl i.e.:
 numactl --interleave=all runspec <etc>
```

Base Compiler Invocation

C benchmarks:
```
    icc -m32 -L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin
```

C++ benchmarks:
```
    icpc -m32 -L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin
```

Base Portability Flags

```
  400.perlbench: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX_IA32
     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 -DSPEC_CPU_LINUX
    464.h264ref: -D_FILE_OFFSET_BITS=64
    471.omnetpp: -D_FILE_OFFSET_BITS=64
```

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Base Portability Flags (Continued)

```
      473.astar: -D_FILE_OFFSET_BITS=64
483.xalancbmk: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX
```

Base Optimization Flags

C benchmarks:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch
-opt-mem-layout-trans=3
```

C++ benchmarks:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch
-opt-mem-layout-trans=3 -Wl,-z,muldefs -L/sh -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_2016/linux/compiler/lib/ia32_lin
```

```
   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_2016/linux/compiler/lib/ia32_lin
```

Peak Portability Flags

```
400.perlbench: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX_X64
    401.bzip2: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LP64
      403.gcc: -D_FILE_OFFSET_BITS=64
      429.mcf: -D_FILE_OFFSET_BITS=64
```

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Peak Portability Flags (Continued)

```
      445.gobmk: -D_FILE_OFFSET_BITS=64
      456.hmmer: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LP64
      458.sjeng: -D_FILE_OFFSET_BITS=64 -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
   483.xalancbmk: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX
```

Peak Optimization Flags

C benchmarks:

```
   400.perlbench: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
                  -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
                  -par-num-threads=1(pass 1) -prof-use(pass 2) -auto-ilp32

       401.bzip2: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
                  -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
                  -par-num-threads=1(pass 1) -prof-use(pass 2) -opt-prefetch
                  -auto-ilp32 -ansi-alias

         403.gcc: -xCORE-AVX2 -ipo -O3 -no-prec-div

         429.mcf: basepeak = yes

       445.gobmk: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
                  -prof-use(pass 2) -par-num-threads=1(pass 1) -ansi-alias
                  -opt-mem-layout-trans=3

       456.hmmer: -xCORE-AVX2 -ipo -O3 -no-prec-div -unroll2 -auto-ilp32

       458.sjeng: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
                  -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
                  -par-num-threads=1(pass 1) -prof-use(pass 2) -unroll4
                  -auto-ilp32

   462.libquantum: basepeak = yes

     464.h264ref: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
                  -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
                  -par-num-threads=1(pass 1) -prof-use(pass 2) -unroll2
                  -ansi-alias
```

C++ benchmarks:

```
     471.omnetpp: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
                  -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
                  -par-num-threads=1(pass 1) -prof-use(pass 2) -ansi-alias
```

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Peak Optimization Flags (Continued)

471.omnetpp (continued):
```
-opt-ra-region-strategy=block -Wl,-z,muldefs
-L/sh -lsmartheap
```

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-ic16.0-official-linux64.html
http://www.spec.org/cpu2006/flags/Dell-Platform-Settings-V1.2-revD.20151006.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic16.0-official-linux64.xml
http://www.spec.org/cpu2006/flags/Dell-Platform-Settings-V1.2-revD.20151006.xml

For questions about this result, please contact the tester.
For other inquiries, please contact webmaster@spec.org.

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