SPEC® CINT2006 Result

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant ML110 Gen9
(2.00 GHz, Intel Xeon E5-2660 v4)

SPECint®_rate2006 =   578
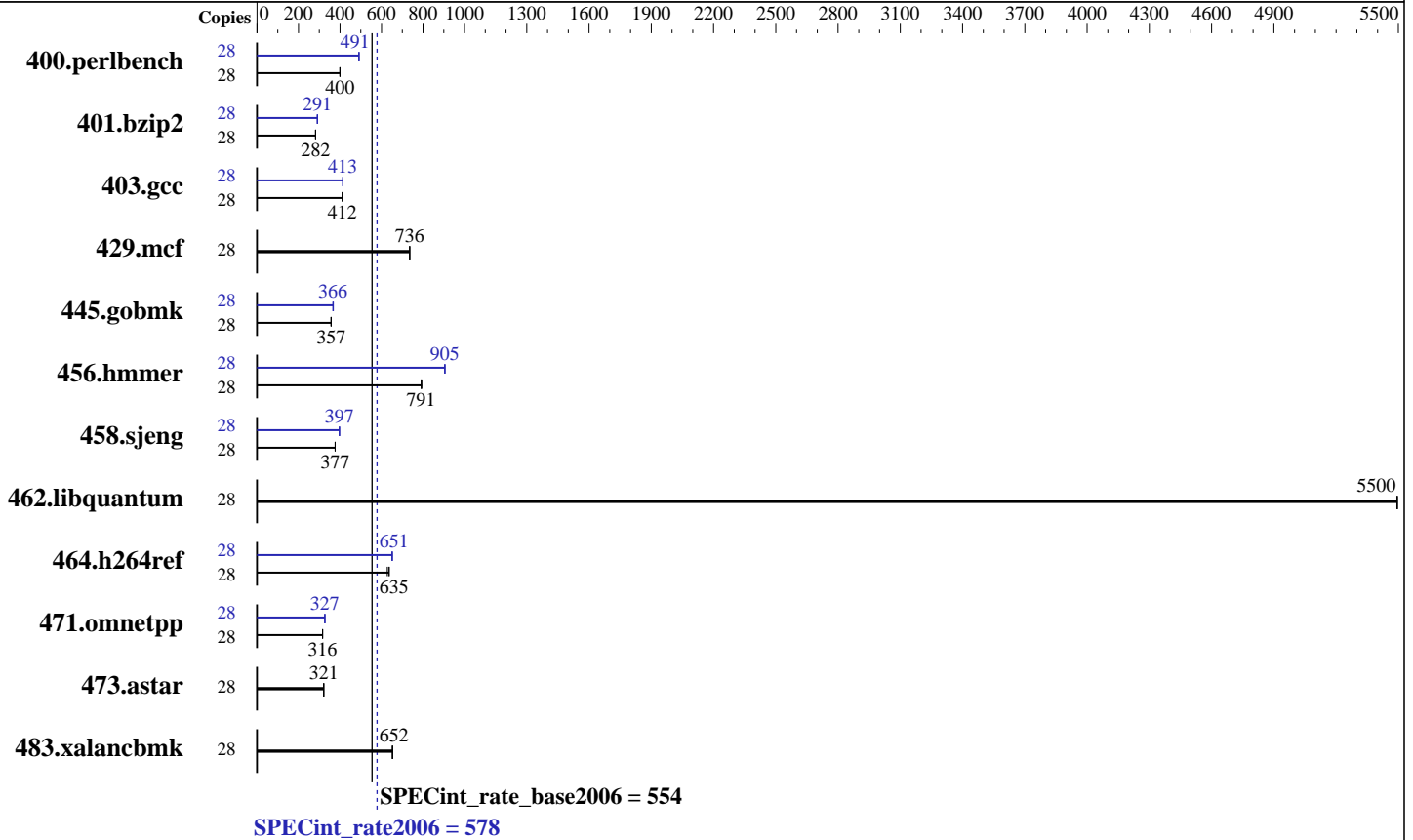
SPECint_rate_base2006 = 554

CPU2006 license: 3		**Test date:**	Mar-2016
Test sponsor:	HPE	**Hardware Availability:**	Mar-2016
Tested by:	HPE	**Software Availability:**	Nov-2015

SPECint_rate_base2006 = 554

SPECint_rate2006 = 578

Hardware

CPU Name:	Intel Xeon E5-2660 v4
CPU Characteristics:	Intel Turbo Boost Technology up to 3.20 GHz
CPU MHz:	2000
FPU:	Integrated
CPU(s) enabled:	14 cores, 1 chip, 14 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:	35 MB I+D on chip per chip
Other Cache:	None
Memory:	128 GB (4 x 32 GB 2Rx4 PC4-2400T-R)
Disk Subsystem:	1 x 400 GB SAS SSD, RAID 0
Other Hardware:	None

Software

Operating System:	Red Hat Enterprise Linux Server release 7.2, (Maipo) Kernel 3.10.0-327.el7.x86_64
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	28	**683**	**400**	683	400	686	399	28	557	491	**557**	**491**	556	492
401.bzip2	28	958	282	**957**	**282**	957	282	28	**930**	**291**	930	291	926	292
403.gcc	28	547	412	**548**	**412**	549	411	28	546	413	**545**	**413**	544	414
429.mcf	28	347	736	**347**	**736**	347	736	28	347	736	**347**	**736**	347	736
445.gobmk	28	**822**	**357**	823	357	821	358	28	**801**	**366**	798	368	802	366
456.hmmer	28	330	791	**330**	**791**	329	794	28	288	906	**289**	**905**	289	904
458.sjeng	28	899	377	900	376	**899**	**377**	28	**853**	**397**	852	398	854	397
462.libquantum	28	106	5490	**106**	**5500**	106	5500	28	106	5490	**106**	**5500**	106	5500
464.h264ref	28	**976**	**635**	972	638	987	628	28	953	650	950	652	**951**	**651**
471.omnetpp	28	554	316	**554**	**316**	554	316	28	**535**	**327**	535	327	535	327
473.astar	28	**612**	**321**	612	321	610	322	28	**612**	**321**	612	321	610	322
483.xalancbmk	28	295	654	**296**	**652**	296	652	28	295	654	**296**	**652**	296	652

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

Submit Notes

    The taskset mechanism was used to bind copies to processors. The config file option 'submit'
    was used to generate taskset 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"
    Transparent Huge Pages enabled with:
    echo always > /sys/kernel/mm/transparent_hugepage/enabled

Platform Notes

    BIOS Configuration:
      HP Power Profile set to Custom
      HP Power Regulator to HP Static High Performance Mode
      Minimum Processor Idle Power Core C-State set to C1E State
      Minimum Processor Idle Power Package C-State set to No Package State
      Collaborative Power Control set to Disabled
      Thermal Configuration set to Maximum Cooling
      Processor Power and Utilization Monitoring set to Disabled
      Memory Refresh Rate set to 1x Refresh

    Sysinfo program /home/intel_library/cpu2006/config/sysinfo.rev6914
    $Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
    running on localhost.localdomain Thu Mar 3 22:41:59 2016

    This section contains SUT (System Under Test) info as seen by

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Platform Notes (Continued)

```
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 E5-2660 v4@ 2.00GHz
      1 "physical id"s (chips)
      28 "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 : 14
      siblings  : 28
      physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
   cache size : 35840 KB

From /proc/meminfo
   MemTotal:       131599952 kB
   HugePages_Total:        0
   Hugepagesize:        2048 kB

From /etc/*release* /etc/*version*
   os-release:
      NAME="Red Hat Enterprise Linux Server"
      VERSION="7.2 (Maipo)"
      ID="rhel"
      ID_LIKE="fedora"
      VERSION_ID="7.2"
      PRETTY_NAME="Red Hat Enterprise Linux Server 7.2 (Maipo)"
      ANSI_COLOR="0;31"
      CPE_NAME="cpe:/o:redhat:enterprise_linux:7.2:GA:server"
   redhat-release: Red Hat Enterprise Linux Server release 7.2 (Maipo)
   system-release: Red Hat Enterprise Linux Server release 7.2 (Maipo)
   system-release-cpe: cpe:/o:redhat:enterprise_linux:7.2:ga:server

uname -a:
   Linux localhost.localdomain 3.10.0-327.el7.x86_64 #1 SMP Thu Oct 29 17:29:29
   EDT 2015 x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Mar 3 22:27

SPEC is set to: /home/intel_library/cpu2006
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/sda5       xfs   411G   41G  370G  10% /home
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 HP P99 02/22/2016
   Memory:
```

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Platform Notes (Continued)

```
      4x UNKNOWN NOT AVAILABLE
      4x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2400 MHz

  (End of data from sysinfo program)
  Regarding the sysinfo display about the memory installed, the correct amount of
  memory is 128 GB and the dmidecode description should have one line reading as:
  4x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2400 MHz
```

General Notes

```
  Environment variables set by runspec before the start of the run:
  LD_LIBRARY_PATH = "/home/cpu2006/libs/32:/home/cpu2006/libs/64:/home/cpu2006/sh"

   Binaries compiled on a system with 1x Intel Core i5-4670K CPU + 32GB
   memory using RedHat EL 7.1
```

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
        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
```

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Base Optimization Flags (Continued)

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`
      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`

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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`
`-opt-ra-region-strategy=block -Wl,-z,muldefs`
`-L/sh -lsmartheap`

473.astar: `basepeak = yes`

483.xalancbmk: `basepeak = yes`

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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/HP-Platform-Flags-Intel-V1.2-HSW-revE.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/HP-Platform-Flags-Intel-V1.2-HSW-revE.xml

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

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