



# SPEC® CINT2006 Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL380 Gen9

(2.60 GHz, Intel Xeon E5-2690 v4)

SPECint®\_rate2006 = 1370

SPECint\_rate\_base2006 = 1310

CPU2006 license: 3

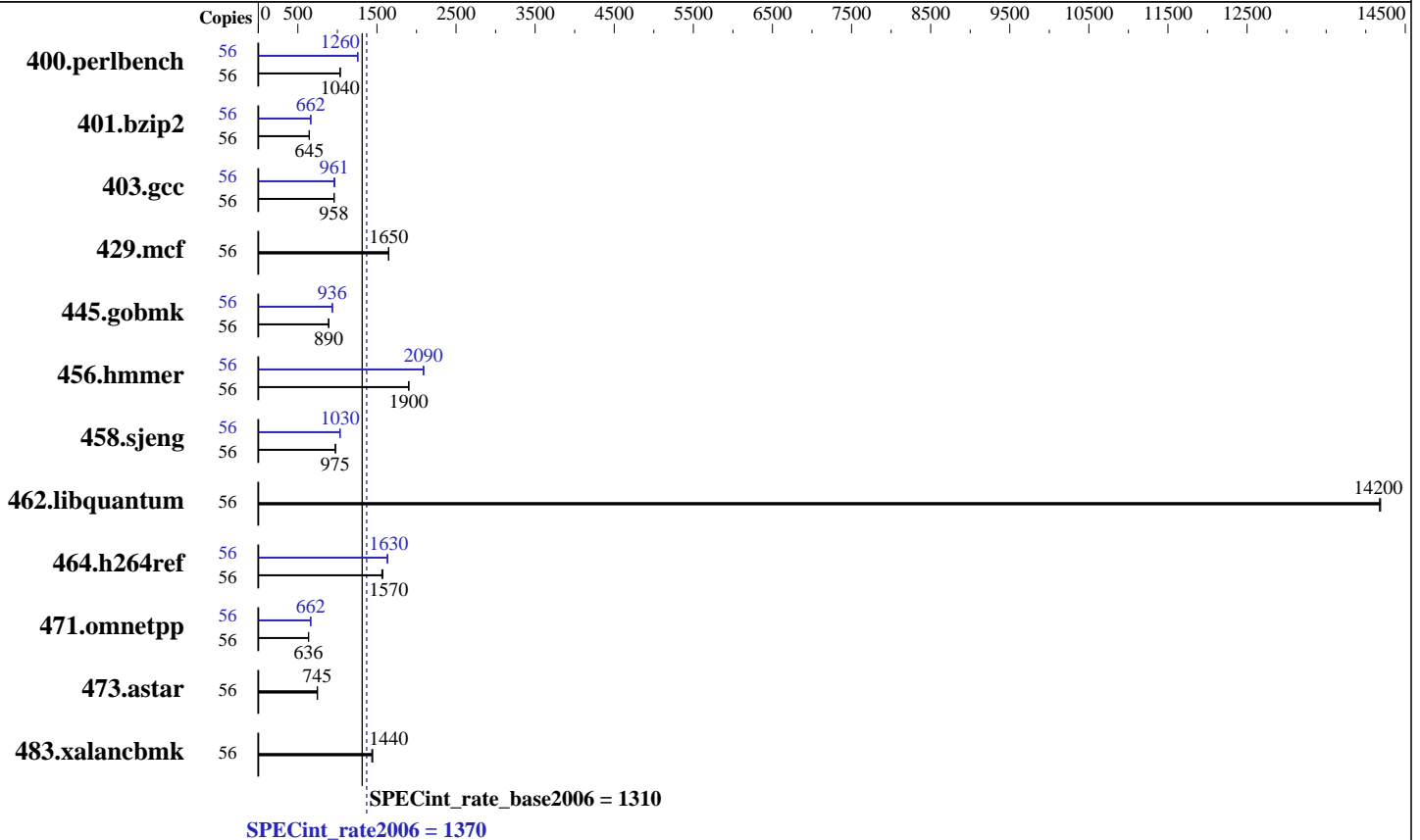
Test sponsor: HPE

Tested by: HPE

Test date: Mar-2016

Hardware Availability: Mar-2016

Software Availability: Nov-2015



## Hardware

CPU Name: Intel Xeon E5-2690 v4  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.50 GHz  
 CPU MHz: 2600  
 FPU: Integrated  
 CPU(s) enabled: 28 cores, 2 chips, 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: 512 GB (16 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  | 56     | 529               | 1030               | <b><u>528</u></b>  | <b><u>1040</u></b>  | 528               | 1040              | 56     | 436               | 1260               | 435                | 1260                | <b><u>435</u></b> | <b><u>1260</u></b> |
| 401.bzip2      | 56     | 836               | 647                | 841                | 642                 | <b><u>838</u></b> | <b><u>645</u></b> | 56     | 814               | 664                | <b><u>816</u></b>  | <b><u>662</u></b>   | 817               | 661                |
| 403.gcc        | 56     | 471               | 958                | 470                | 960                 | <b><u>471</u></b> | <b><u>958</u></b> | 56     | <b><u>469</u></b> | <b><u>961</u></b>  | 466                | 968                 | 470               | 958                |
| 429.mcf        | 56     | 310               | 1650               | <b><u>310</u></b>  | <b><u>1650</u></b>  | 309               | 1650              | 56     | 310               | 1650               | <b><u>310</u></b>  | <b><u>1650</u></b>  | 309               | 1650               |
| 445.gobmk      | 56     | 659               | 891                | <b><u>660</u></b>  | <b><u>890</u></b>   | 661               | 889               | 56     | <b><u>628</u></b> | <b><u>936</u></b>  | 626                | 938                 | 628               | 936                |
| 456.hammer     | 56     | <b><u>275</u></b> | <b><u>1900</u></b> | 275                | 1900                | 275               | 1900              | 56     | <b><u>250</u></b> | <b><u>2090</u></b> | 250                | 2090                | 251               | 2080               |
| 458.sjeng      | 56     | 695               | 974                | <b><u>695</u></b>  | <b><u>975</u></b>   | 695               | 975               | 56     | <b><u>655</u></b> | <b><u>1030</u></b> | 655                | 1030                | 656               | 1030               |
| 462.libquantum | 56     | 81.9              | 14200              | <b><u>81.8</u></b> | <b><u>14200</u></b> | 81.8              | 14200             | 56     | 81.9              | 14200              | <b><u>81.8</u></b> | <b><u>14200</u></b> | 81.8              | 14200              |
| 464.h264ref    | 56     | 793               | 1560               | <b><u>791</u></b>  | <b><u>1570</u></b>  | 787               | 1570              | 56     | 758               | 1630               | <b><u>759</u></b>  | <b><u>1630</u></b>  | 760               | 1630               |
| 471.omnetpp    | 56     | <b><u>551</u></b> | <b><u>636</u></b>  | 550                | 636                 | 552               | 634               | 56     | 529               | 662                | <b><u>529</u></b>  | <b><u>662</u></b>   | 527               | 664                |
| 473.astar      | 56     | <b><u>527</u></b> | <b><u>745</u></b>  | 524                | 750                 | 528               | 744               | 56     | <b><u>527</u></b> | <b><u>745</u></b>  | 524                | 750                 | 528               | 744                |
| 483.xalancbmk  | 56     | <b><u>268</u></b> | <b><u>1440</u></b> | 267                | 1450                | 269               | 1440              | 56     | <b><u>268</u></b> | <b><u>1440</u></b> | 267                | 1450                | 269               | 1440               |

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"  
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>

## 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  
QPI Snoop Configuration set to Cluster on Die  
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

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## Platform Notes (Continued)

Sysinfo program /home/intel\_binary/cpu2006/config/sysinfo.rev6914  
\$Rev: 6914 \$ \$Date:: 2014-06-25 # \$ e3fbb8667b5a285932ceab81e28219e1  
running on DL380Gen9allbin Sat Mar 5 07:07:31 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>

From /proc/cpuinfo

```
model name : Intel(R) Xeon(R) CPU E5-2690 v4@ 2.60GHz
 2 "physical id"s (chips)
 56 "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
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
cache size : 17920 KB
```

From /proc/meminfo

```
MemTotal:      528063236 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 DL380Gen9allbin 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 02:53

SPEC is set to: /home/intel\_binary/cpu2006

```
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda5        xfs   318G  9.2G  309G   3% /home
```

Additional information from dmidecode:

Warning: Use caution when you interpret this section. The 'dmidecode' program  
Continued on next page



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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 HP P89 02/22/2016

Memory:

8x UNKNOWN NOT AVAILABLE

16x 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 512 GB and the dmidecode description should have one line reading as:

16x 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



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## 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

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

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**Software Availability:** Nov-2015

## Peak Portability Flags (Continued)

483.xalanbmk: -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  
-opt-ra-region-strategy=block -Wl,-z,muldefs  
-L/sh -lsmartheap

473.astar: basepeak = yes

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## Peak Optimization Flags (Continued)

483.xalanbmk: 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/HP-Platform-Flags-Intel-V1.2-HSW-revE.html>

<http://www.spec.org/cpu2006/flags/Intel-ic16.0-official-linux64.html>

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

<http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.xml>

<http://www.spec.org/cpu2006/flags/Intel-ic16.0-official-linux64.xml>

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