# SPEC® CINT2006 Result
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## Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant XL420 Gen9
(2.10 GHz, Intel Xeon E5-2695 v4)

$SPECint^®2006 =$ 67.9

$SPECint\_base2006 =$ 65.9

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



400.perlbench 41.8 / 38.6
401.bzip2 23.4
403.gcc 36.8 / 35.3
429.mcf 61.4
445.gobmk 28.0
456.hmmer 80.8
458.sjeng 33.3 / 32.9
462.libquantum 7630
464.h264ref 51.6
471.omnetpp 52.3 / 46.4
473.astar 34.6
483.xalancbmk 80.4 / 73.5

SPECint_base2006 = 65.9

SPECint2006 = 67.9

## Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon E5-2695 v4 |
| CPU Characteristics: | Intel Turbo Boost Technology up to 3.30 GHz |
| CPU MHz: | 2100 |
| FPU: | Integrated |
| CPU(s) enabled: | 36 cores, 2 chips, 18 cores/chip |
| CPU(s) orderable: | 1,2 chips |
| Primary Cache: | 32 KB I + 32 KB D on chip per core |
| Secondary Cache: | 256 KB I+D on chip per core |
| L3 Cache: | 45 MB I+D on chip per chip |
| Other Cache: | None |
| Memory: | 256 GB (8 x 32 GB 2Rx4 PC4-2400T-R) |
| Disk Subsystem: | 2 x 400 GB SAS SSD, RAID 1 |
| 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: | Yes |
| File System: | xfs |
| System State: | Run level 3 (multi-user) |
| Base Pointers: | 32/64-bit |
| Peak Pointers: | 32/64-bit |
| Other Software: | Microquill SmartHeap V10.2 |

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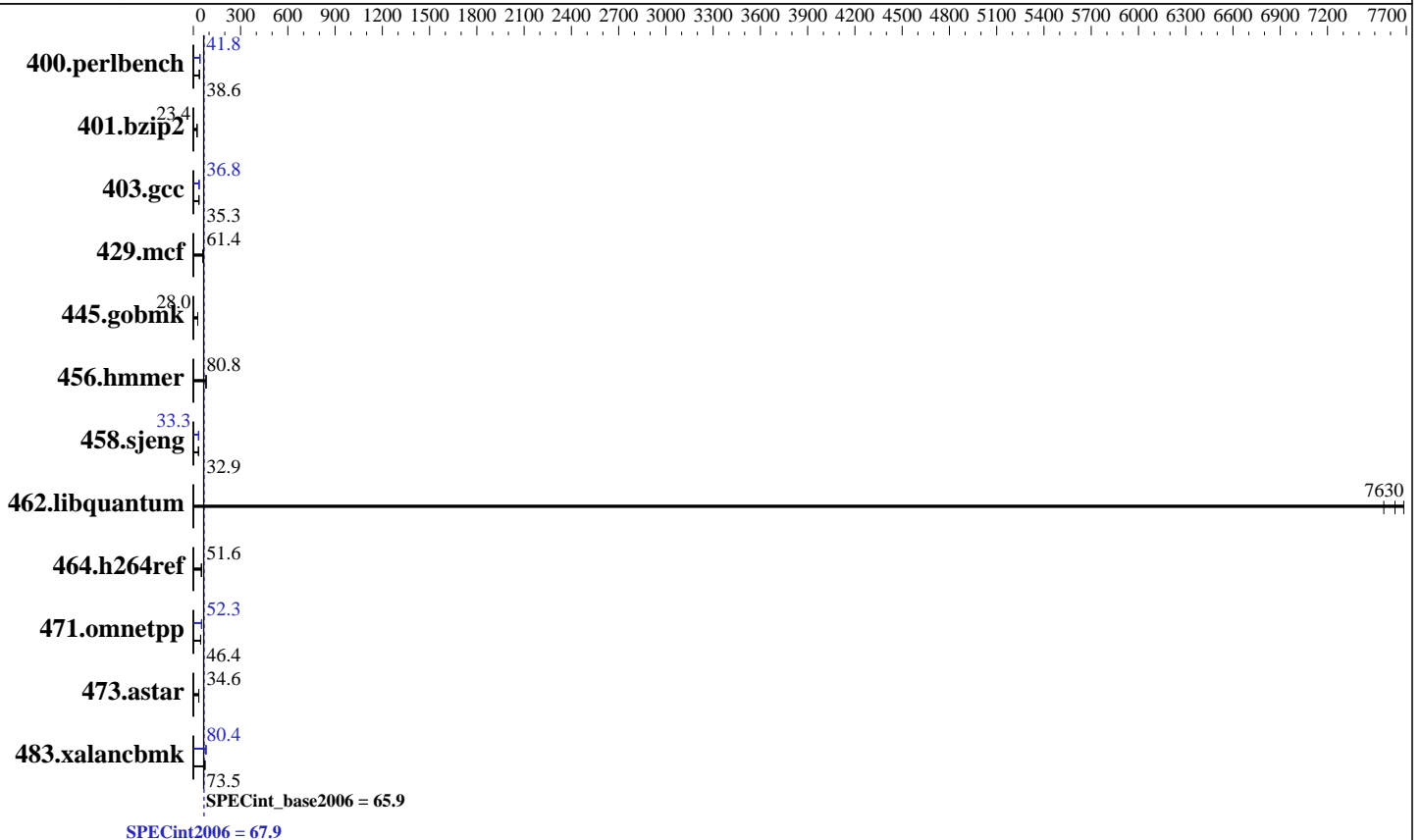
SPECint_base2006 =   65.9

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## Results Table

| Benchmark | Base | | | | | | Peak | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Seconds** | **Ratio** | **Seconds** | **Ratio** | **Seconds** | **Ratio** | **Seconds** | **Ratio** | **Seconds** | **Ratio** | **Seconds** | **Ratio** |
| 400.perlbench | 253 | 38.7 | **253** | **38.6** | 253 | 38.6 | 233 | 41.9 | 234 | 41.7 | **234** | **41.8** |
| 401.bzip2 | **412** | **23.4** | 411 | 23.5 | 412 | 23.4 | **412** | **23.4** | 411 | 23.5 | 412 | 23.4 |
| 403.gcc | 228 | 35.4 | 228 | 35.3 | **228** | **35.3** | **219** | **36.8** | 219 | 36.7 | 219 | 36.8 |
| 429.mcf | 149 | 61.2 | 148 | 61.8 | **149** | **61.4** | 149 | 61.2 | 148 | 61.8 | **149** | **61.4** |
| 445.gobmk | **375** | **28.0** | 374 | 28.0 | 375 | 28.0 | **375** | **28.0** | 374 | 28.0 | 375 | 28.0 |
| 456.hmmer | 116 | 80.7 | 116 | 80.8 | **116** | **80.8** | 116 | 80.7 | 116 | 80.8 | **116** | **80.8** |
| 458.sjeng | 368 | 32.9 | 368 | 32.9 | **368** | **32.9** | 363 | 33.3 | 363 | 33.3 | **363** | **33.3** |
| 462.libquantum | **2.72** | **7630** | 2.70 | 7680 | 2.74 | 7560 | **2.72** | **7630** | 2.70 | 7680 | 2.74 | 7560 |
| 464.h264ref | 430 | 51.5 | 429 | 51.6 | **429** | **51.6** | 430 | 51.5 | 429 | 51.6 | **429** | **51.6** |
| 471.omnetpp | **135** | **46.4** | 135 | 46.3 | 134 | 46.7 | **119** | **52.3** | 119 | 52.4 | 121 | 51.8 |
| 473.astar | 204 | 34.5 | 203 | 34.6 | **203** | **34.6** | 204 | 34.5 | 203 | 34.6 | **203** | **34.6** |
| 483.xalancbmk | 94.0 | 73.4 | 93.8 | 73.5 | **93.8** | **73.5** | 85.9 | 80.3 | 85.8 | 80.4 | **85.8** | **80.4** |

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

## Submit Notes

The config file option 'submit' was used.

## 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:
    Intel Hyperthreading set to Disabled
    Power Profile set to Custom
    Power Regulator set to Static High Performance Mode
    Minimum Processor Idle Power Core C-State set to C1E State
    Minimu Processor Idle Power Package C-State set to No Package State
    QPI Snoop Configuration set to Home Snoop
    Collaborative Power Control set to Disabled
    Thermal Configuration set to Maximum Cooling
    Processor Power and Utilization Monitoring set to Disabled
    Memory Double Refresh Rate set to 1x Refresh

Sysinfo program /cpu2006/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on mvb-xl420-g9 Wed May 25 12:50:37 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 E5-2695 v4 @ 2.10GHz
      2 "physical id"s (chips)
      36 "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 : 18
      siblings  : 18
      physical 0: cores 0 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
      physical 1: cores 0 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
   cache size : 46080 KB

From /proc/meminfo
   MemTotal:       263710292 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 mvb-xl420-g9 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 May 25 12:49

SPEC is set to: /cpu2006
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/sda4       xfs   364G   21G  344G   6% /
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 U19 03/10/2016
```

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## Platform Notes (Continued)

```
    Memory:
      8x UNKNOWN NOT AVAILABLE
      8x 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 256 GB and the dmidecode description should have one line reading as:
   8x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2400 MHz
```

## General Notes

```
Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,scatter"
LD_LIBRARY_PATH = "/cpu2006/libs/32:/cpu2006/libs/64:/cpu2006/sh"
OMP_NUM_THREADS = "36"

 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  -m64

C++ benchmarks:
    icpc -m64

## Base Portability Flags

```
    400.perlbench: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX_X64
       401.bzip2: -DSPEC_CPU_LP64
         403.gcc: -DSPEC_CPU_LP64
         429.mcf: -DSPEC_CPU_LP64
       445.gobmk: -DSPEC_CPU_LP64
       456.hmmer: -DSPEC_CPU_LP64
       458.sjeng: -DSPEC_CPU_LP64
    462.libquantum: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX
      464.h264ref: -DSPEC_CPU_LP64
      471.omnetpp: -DSPEC_CPU_LP64
        473.astar: -DSPEC_CPU_LP64
    483.xalancbmk: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX
```

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## Base Optimization Flags

C benchmarks:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch -auto-p32
```

C++ benchmarks:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
-Wl,-z,muldefs -L/sh -lsmartheap64
```

## Base Other Flags

C benchmarks:

```
403.gcc: -Dalloca=_alloca
```

## Peak Compiler Invocation

C benchmarks (except as noted below):
```
icc  -m64
```

```
400.perlbench: icc -m32 -L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin
```

C++ benchmarks (except as noted below):
```
icpc -m32 -L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin
```

```
473.astar: icpc -m64
```

## Peak Portability Flags

```
400.perlbench: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX_IA32
      401.bzip2: -DSPEC_CPU_LP64
        403.gcc: -DSPEC_CPU_LP64
        429.mcf: -DSPEC_CPU_LP64
     445.gobmk: -DSPEC_CPU_LP64
     456.hmmer: -DSPEC_CPU_LP64
      458.sjeng: -DSPEC_CPU_LP64
  462.libquantum: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX
    464.h264ref: -DSPEC_CPU_LP64
    471.omnetpp: -D_FILE_OFFSET_BITS=64
       473.astar: -DSPEC_CPU_LP64
  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) -opt-prefetch
               -ansi-alias

   401.bzip2: basepeak = yes

     403.gcc: -xCORE-AVX2 -ipo -O3 -no-prec-div -inline-calloc
              -opt-malloc-options=3 -auto-ilp32

     429.mcf: basepeak = yes

   445.gobmk: basepeak = yes

   456.hmmer: basepeak = yes

    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

462.libquantum: basepeak = yes

   464.h264ref: basepeak = yes
```

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)
             -opt-ra-region-strategy=block          -ansi-alias
             -Wl,-z,muldefs -L/sh -lsmartheap

   473.astar: basepeak = yes

483.xalancbmk: -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch
               -ansi-alias -Wl,-z,muldefs -L/sh -lsmartheap
```

# Peak Other Flags

C benchmarks:

```
     403.gcc: -Dalloca=_alloca
```

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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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