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

ProLiant DL580 Gen9
(2.40 GHz, Intel Xeon E7-8894 v4)

$SPECint^®\_rate2006 =$ 3840

$SPECint\_rate\_base2006 =$ 3710

| **CPU2006 license:** 3 | | **Test date:** Feb-2017 |
|---|---|---|
| **Test sponsor:** | HPE | **Hardware Availability:** Mar-2017 |
| **Tested by:** | HPE | **Software Availability:** Sep-2016 |



SPECint_rate_base2006 = 3710

SPECint_rate2006 = 3840

## Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon E7-8894 v4 |
| CPU Characteristics: | Intel Turbo Boost Technology up to 3.40 GHz |
| CPU MHz: | 2400 |
| FPU: | Integrated |
| CPU(s) enabled: | 96 cores, 4 chips, 24 cores/chip, 2 threads/core |
| CPU(s) orderable: | 2,4 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: | 60 MB I+D on chip per chip |
| Other Cache: | None |
| Memory: | 512 GB (32 x 16 GB 2Rx4 PC4-2400T-R, running at 1600 MHz) |
| Disk Subsystem: | 1 x 800 GB NVMe PCIe SSD, RAID 0 |
| Other Hardware: | DL580 Gen9 NVMe SSD Express Bay Enablement Kit |

## Software

| | |
|---|---|
| Operating System: | SUSE Linux Enterprise Server 12 (x86_64) SP1, Kernel 3.12.49-11-default |
| Compiler: | C/C++: Version 17.0.0.098 of Intel C/C++ Compiler 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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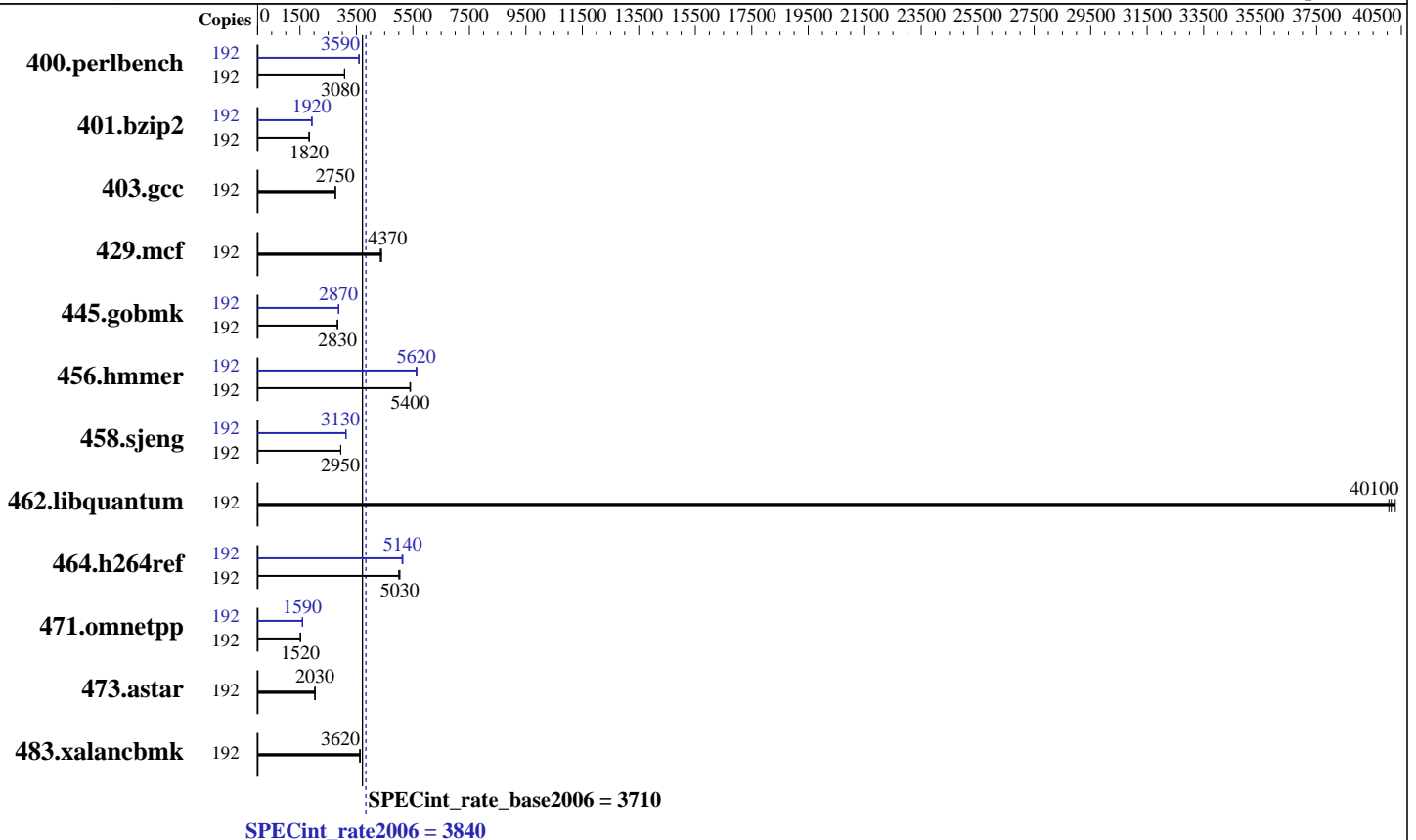SPECint_rate_base2006 =  3710

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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 | 192 | 609 | 3080 | 608 | 3090 | **608** | **3080** | 192 | 521 | 3600 | **522** | **3590** | 523 | 3590 |
| 401.bzip2 | 192 | 1016 | 1820 | **1016** | **1820** | 1011 | 1830 | 192 | 962 | 1930 | 965 | 1920 | **965** | **1920** |
| 403.gcc | 192 | 562 | 2750 | 561 | 2760 | **561** | **2750** | 192 | 562 | 2750 | 561 | 2760 | **561** | **2750** |
| 429.mcf | 192 | 403 | 4350 | **400** | **4370** | 399 | 4390 | 192 | 403 | 4350 | **400** | **4370** | 399 | 4390 |
| 445.gobmk | 192 | 712 | 2830 | **712** | **2830** | 711 | 2830 | 192 | 701 | 2870 | **702** | **2870** | 703 | 2860 |
| 456.hmmer | 192 | 332 | 5400 | **332** | **5400** | 331 | 5420 | 192 | 319 | 5620 | 317 | 5640 | **319** | **5620** |
| 458.sjeng | 192 | 789 | 2950 | **789** | **2950** | 789 | 2940 | 192 | 742 | 3130 | 743 | 3130 | **743** | **3130** |
| 462.libquantum | 192 | 99.3 | 40100 | 98.7 | 40300 | **99.1** | **40100** | 192 | 99.3 | 40100 | 98.7 | 40300 | **99.1** | **40100** |
| 464.h264ref | 192 | 850 | 5000 | 844 | 5040 | **844** | **5030** | 192 | **827** | **5140** | 831 | 5120 | 827 | 5140 |
| 471.omnetpp | 192 | **791** | **1520** | 792 | 1510 | 790 | 1520 | 192 | **755** | **1590** | 753 | 1590 | 755 | 1590 |
| 473.astar | 192 | 664 | 2030 | **663** | **2030** | 662 | 2040 | 192 | 664 | 2030 | **663** | **2030** | 662 | 2040 |
| 483.xalancbmk | 192 | **366** | **3620** | 366 | 3620 | 365 | 3630 | 192 | **366** | **3620** | 366 | 3620 | 365 | 3630 |

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 by default
    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 C6 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
    Sysinfo program /home/arun/cpu2006/config/sysinfo.rev6993
    Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)

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## Platform Notes (Continued)

```
running on dl580_manju Fri Feb  3 09:41:21 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 E7-8894 v4 @ 2.40GHz
      4 "physical id"s (chips)
      192 "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 : 24
      siblings  : 48
      physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
      27 28 29
      physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
      27 28 29
      physical 2: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
      27 28 29
      physical 3: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
      27 28 29
   cache size : 30720 KB

From /proc/meminfo
   MemTotal:       529303984 kB
   HugePages_Total:        0
   Hugepagesize:        2048 kB

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 dl580_manju 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 Jan 24 15:39
```

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## Platform Notes (Continued)

```
   SPEC is set to: /home/arun/cpu2006
     Filesystem      Type  Size  Used Avail Use% Mounted on
     /dev/nvme0n1p4 xfs   703G  542G  161G  78% /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 U17 12/08/2016
     Memory:
      64x UNKNOWN NOT AVAILABLE
      32x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2400 MHz, configured at 1600 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:
   32x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2400 MHz, configured at 1600 MHz
```

## General Notes

```
   Environment variables set by runspec before the start of the run:
   LD_LIBRARY_PATH = "/home/arun/cpu2006/libs/32:/home/arun/cpu2006/libs/64:/home/arun/cpu2006/sh10.2"

    Binaries compiled on a system with 1x Intel Core i7-4790K CPU + 32GB RAM
    memory using Redhat Enterprise Linux 7.2
```

## Base Compiler Invocation

C benchmarks:
```
    icc -m32 -L/opt/intel/compilers_and_libraries_2017/linux/lib/ia32
```

C++ benchmarks:
```
    icpc -m32 -L/opt/intel/compilers_and_libraries_2017/linux/lib/ia32
```

## 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
```

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## Base Portability Flags (Continued)

```
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 -no-prec-sqrt -static
-qopt-prefetch -qopt-mem-layout-trans=3 -auto-ilp32
-complex-limited-range -qopt-prefetch-issue-excl-hint -ansi-alias
-unroll-aggressive -use-intel-optimized-headers -qopt-matmul
-qopt-subscript-in-range -qopt-assume-safe-padding -qopt-calloc
-inline-calloc -qopt-malloc-options=3
```

C++ benchmarks:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-qopt-mem-layout-trans=3 -use-intel-optimized-headers
-unroll-aggressive -qopt-calloc -inline-calloc -qopt-malloc-options=3
-Wl,-z,muldefs -L/home/arun/cpu2006/sh10.2 -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_2017/linux/lib/ia32
```

```
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_2017/linux/lib/ia32
```

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## Peak Portability Flags

```
   400.perlbench: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX_X64
       401.bzip2: -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: -DSPEC_CPU_LP64
       458.sjeng: -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: -prof-gen=threadsafe(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) -auto-ilp32

       401.bzip2: -prof-gen=threadsafe(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) -qopt-prefetch
                  -auto-ilp32 -ansi-alias

         403.gcc: basepeak = yes

         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
                  -qopt-mem-layout-trans=3

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

       458.sjeng: -prof-gen=threadsafe(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 -auto-ilp32

   462.libquantum: basepeak = yes

     464.h264ref: -prof-gen=threadsafe(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 -ansi-alias
```

C++ benchmarks:

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# Peak Optimization Flags (Continued)

471.omnetpp: -prof-gen=threadsafe(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)
-qopt-ra-region-strategy=block            -ansi-alias
-Wl,-z,muldefs -L/home/arun/cpu2006/sh10.2 -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/HP-Platform-Flags-Intel-V1.2-HSW-revE.html
http://www.spec.org/cpu2006/flags/HPE-Compiler-Flags-Intel-V1.2-HSW-revH.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/HPE-Compiler-Flags-Intel-V1.2-HSW-revH.xml

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

Tested with SPEC CPU2006 v1.2.
Report generated on Tue May  2 15:21:59 2017 by SPEC CPU2006 PS/PDF formatter v6932.
Originally published on  2 May 2017.