# SPEC® CFP2006 Result

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## HITACHI

Compute Blade 520H (Intel Xeon E5-2699 v4)

$SPECfp®2006 =$ 121

$SPECfp\_base2006 =$ 113
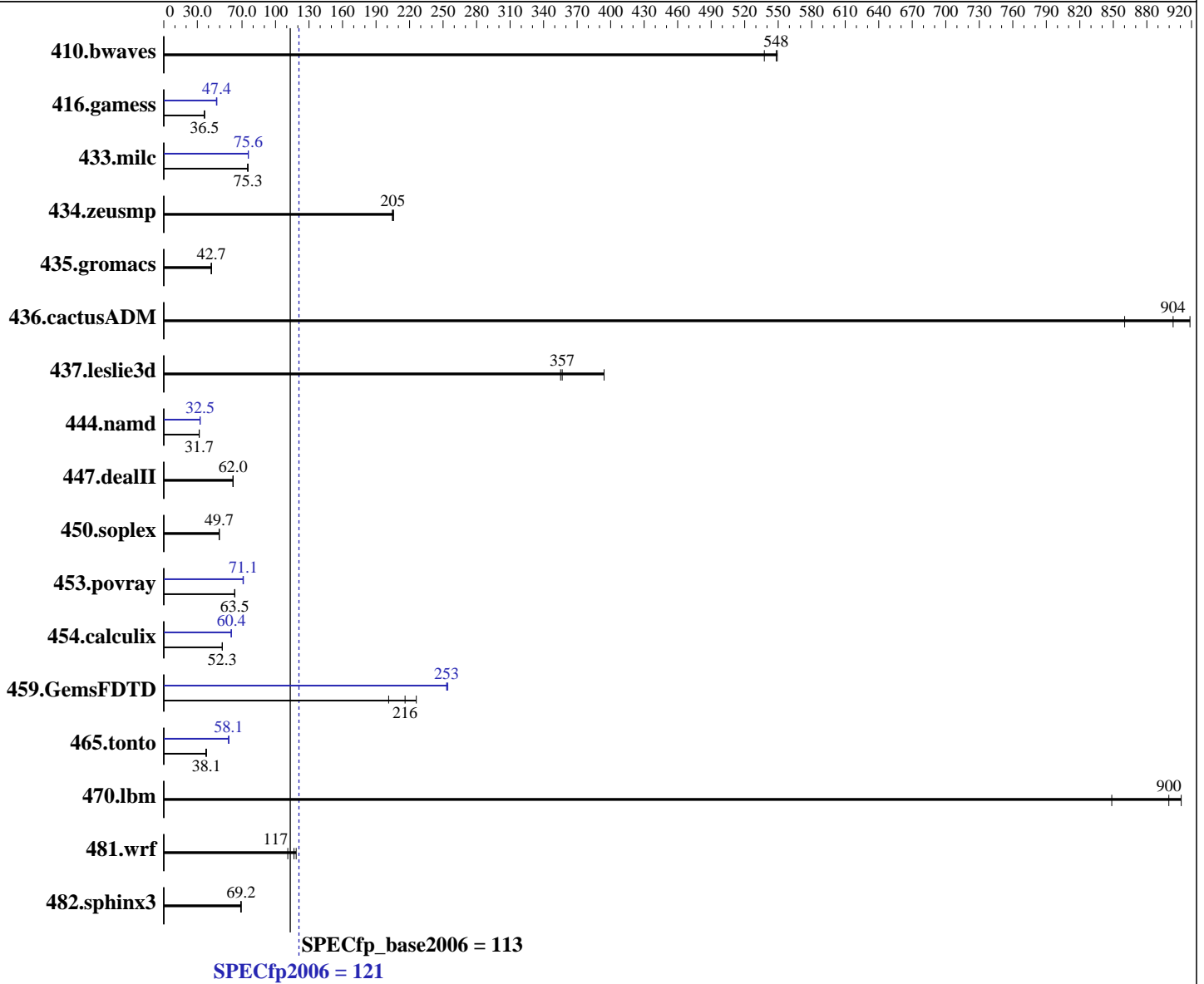
**CPU2006 license:** 35
**Test sponsor:** HITACHI
**Tested by:** HITACHI

**Test date:** Mar-2016
**Hardware Availability:** Apr-2016
**Software Availability:** Nov-2015



| | |
|---|---|
| 410.bwaves | 548 |
| 416.gamess | 47.4 / 36.5 |
| 433.milc | 75.6 / 75.3 |
| 434.zeusmp | 205 |
| 435.gromacs | 42.7 |
| 436.cactusADM | 904 |
| 437.leslie3d | 357 |
| 444.namd | 32.5 / 31.7 |
| 447.dealII | 62.0 |
| 450.soplex | 49.7 |
| 453.povray | 71.1 / 63.5 |
| 454.calculix | 60.4 / 52.3 |
| 459.GemsFDTD | 253 / 216 |
| 465.tonto | 58.1 / 38.1 |
| 470.lbm | 900 |
| 481.wrf | 117 |
| 482.sphinx3 | 69.2 |

**SPECfp_base2006 = 113**
**SPECfp2006 = 121**

## 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 chips
Primary Cache: 32 KB I + 32 KB D on chip per core
Secondary Cache: 256 KB I+D on chip per core

**Continued on next page**

## Software

Operating System: Red Hat Enterprise Linux Server release 7.2 (Maipo)
3.10.0-327.el7.x86_64
Compiler: C/C++: Version 15.0.0.090 of Intel C++ Studio XE for Linux;
Fortran: Version 15.0.0.090 of Intel Fortran Studio XE for Linux
Auto Parallel: Yes
File System: xfs

**Continued on next page**

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| | |
|---|---|
| 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: | 2 x 300 GB SAS, 15000 RPM, RAID1 |
| Other Hardware: | None |

| | |
|---|---|
| System State: | Run level 3 (multi-user) |
| Base Pointers: | 64-bit |
| Peak Pointers: | 32/64-bit |
| Other Software: | none |

## Results Table

| Benchmark | Base Seconds | Base Ratio | Base Seconds | Base Ratio | Base Seconds | Base Ratio | Peak Seconds | Peak Ratio | Peak Seconds | Peak Ratio | Peak Seconds | Peak Ratio |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 410.bwaves | **24.8** | **548** | 25.3 | 538 | 24.7 | 549 | **24.8** | **548** | 25.3 | 538 | 24.7 | 549 |
| 416.gamess | **537** | **36.5** | 536 | 36.5 | 541 | 36.2 | **413** | **47.4** | 413 | 47.4 | 416 | 47.1 |
| 433.milc | **122** | **75.3** | 122 | 75.4 | 122 | 75.0 | **121** | **75.6** | 121 | 75.6 | 121 | 75.7 |
| 434.zeusmp | **44.4** | **205** | 44.5 | 205 | 44.2 | 206 | **44.4** | **205** | 44.5 | 205 | 44.2 | 206 |
| 435.gromacs | 168 | 42.4 | **167** | **42.7** | 167 | 42.7 | 168 | 42.4 | **167** | **42.7** | 167 | 42.7 |
| 436.cactusADM | 13.0 | 919 | 13.9 | 860 | **13.2** | **904** | 13.0 | 919 | 13.9 | 860 | **13.2** | **904** |
| 437.leslie3d | 23.8 | 394 | 26.5 | 355 | **26.4** | **357** | 23.8 | 394 | 26.5 | 355 | **26.4** | **357** |
| 444.namd | **253** | **31.7** | 253 | 31.7 | 253 | 31.7 | 247 | 32.5 | 247 | 32.5 | **247** | **32.5** |
| 447.dealII | **185** | **62.0** | 185 | 61.9 | 184 | 62.1 | **185** | **62.0** | 185 | 61.9 | 184 | 62.1 |
| 450.soplex | 168 | 49.7 | **168** | **49.7** | 168 | 49.6 | 168 | 49.7 | **168** | **49.7** | 168 | 49.6 |
| 453.povray | **83.7** | **63.5** | 83.8 | 63.5 | 83.7 | 63.5 | **74.8** | **71.1** | 75.0 | 70.9 | 74.6 | 71.3 |
| 454.calculix | 157 | 52.4 | **158** | **52.3** | 158 | 52.3 | **137** | **60.4** | 137 | 60.4 | 137 | 60.4 |
| 459.GemsFDTD | 46.9 | 226 | **49.1** | **216** | 52.7 | 201 | 41.7 | 254 | 41.9 | 253 | **41.9** | **253** |
| 465.tonto | **258** | **38.1** | 261 | 37.6 | 258 | 38.1 | 169 | 58.3 | 170 | 57.9 | **169** | **58.1** |
| 470.lbm | 16.2 | 849 | **15.3** | **900** | 15.1 | 911 | 16.2 | 849 | **15.3** | **900** | 15.1 | 911 |
| 481.wrf | 94.3 | 119 | **95.8** | **117** | 101 | 111 | 94.3 | 119 | **95.8** | **117** | 101 | 111 |
| 482.sphinx3 | 281 | 69.3 | **281** | **69.2** | 283 | 68.8 | 281 | 69.3 | **281** | **69.2** | 283 | 68.8 |

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

## Operating System Notes

```
Stack size set to unlimited using "ulimit -s unlimited"
```

## Platform Notes

```
BIOS configuration:
 Patrol Scrub = Disable
 Per Core P-state = Disable
 EarlySnoopPreference=Disable

 Sysinfo program /home/speccpu2006/cpu2006/config/sysinfo.rev6914
 $Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
 running on rhel7.2 Fri Mar  4 15:19:00 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 E5-2699 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 : 56320 KB

  From /proc/meminfo
     MemTotal:       527315512 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 rhel7.2 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 4 09:26

  SPEC is set to: /home/speccpu2006/cpu2006
     Filesystem            Type  Size  Used Avail Use% Mounted on
     /dev/mapper/rhel-home xfs   225G  7.8G  217G   4% /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.
```

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## Platform Notes (Continued)

```
   BIOS HITACHI 10-00 01/29/2016
   Memory:
    8x NO DIMM Unknown
    16x Samsung M393A4K40BB1-CRC 32 GB 2 rank 2400 MHz

 (End of data from sysinfo program)
```

## General Notes

```
Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact,1,0"
LD_LIBRARY_PATH = "/home/speccpu2006/cpu2006/libs/32:/home/speccpu2006/cpu2006/libs/64:/home/speccpu2006/cpu2006/sh"
OMP_NUM_THREADS = "44"

 Binaries compiled on a system with 1x Core i5-4670K CPU + 16GB
 memory using RedHat EL 7.0
 Transparent Huge Pages enabled with:
 echo always > /sys/kernel/mm/transparent_hugepage/enabled
 runspec command invoked through numactl i.e.:
 numactl --interleave=all runspec <etc>
 BladeSymphony BS520H, Hitachi Compute Blade 520H and BladeSymphony BS2500 are electronically equivalent.
 The results have been measured on a Hitachi Compute Blade 520H.
```

## Base Compiler Invocation

C benchmarks:
      icc    -m64

C++ benchmarks:
      icpc   -m64

Fortran benchmarks:
      ifort -m64

Benchmarks using both Fortran and C:
      icc    -m64 ifort -m64

## Base Portability Flags

```
      410.bwaves: -DSPEC_CPU_LP64
      416.gamess: -DSPEC_CPU_LP64
        433.milc: -DSPEC_CPU_LP64
      434.zeusmp: -DSPEC_CPU_LP64
     435.gromacs: -DSPEC_CPU_LP64 -nofor_main
   436.cactusADM: -DSPEC_CPU_LP64 -nofor_main
```

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# Base Portability Flags (Continued)

```
437.leslie3d: -DSPEC_CPU_LP64
 444.namd: -DSPEC_CPU_LP64
 447.dealII: -DSPEC_CPU_LP64
 450.soplex: -DSPEC_CPU_LP64
 453.povray: -DSPEC_CPU_LP64
454.calculix: -DSPEC_CPU_LP64 -nofor_main
459.GemsFDTD: -DSPEC_CPU_LP64
  465.tonto: -DSPEC_CPU_LP64
   470.lbm: -DSPEC_CPU_LP64
   481.wrf: -DSPEC_CPU_LP64 -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX
 482.sphinx3: -DSPEC_CPU_LP64
```

# Base Optimization Flags

C benchmarks:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch
-ansi-alias
```

C++ benchmarks:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -ansi-alias
```

Fortran benchmarks:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch
```

Benchmarks using both Fortran and C:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch
-ansi-alias
```

# Peak Compiler Invocation

C benchmarks:
```
icc   -m64
```

C++ benchmarks:
```
icpc  -m64
```

Fortran benchmarks:
```
ifort -m64
```

Benchmarks using both Fortran and C:
```
icc   -m64 ifort -m64
```

## HITACHI

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## Peak Portability Flags

```
Same as Base Portability Flags
```

## Peak Optimization Flags

C benchmarks:

      433.milc: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
          -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
          -auto-ilp32 -ansi-alias

      470.lbm: basepeak = yes

    482.sphinx3: basepeak = yes

C++ benchmarks:

      444.namd: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
          -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
          -fno-alias -auto-ilp32

    447.dealII: basepeak = yes

    450.soplex: basepeak = yes

    453.povray: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
          -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2) -unroll4
          -ansi-alias

Fortran benchmarks:

    410.bwaves: basepeak = yes

    416.gamess: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
          -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2) -unroll2
          -inline-level=0 -scalar-rep-

    434.zeusmp: basepeak = yes

    437.leslie3d: basepeak = yes

459.GemsFDTD: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
          -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2) -unroll2
          -inline-level=0 -opt-prefetch -parallel

    465.tonto: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
          -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
          -inline-calloc -opt-malloc-options=3 -auto -unroll4

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# Peak Optimization Flags (Continued)

Benchmarks using both Fortran and C:

    435.gromacs: basepeak = yes

    436.cactusADM: basepeak = yes

    454.calculix: -xCORE-AVX2 -ipo -O3 -no-prec-div -auto-ilp32 -ansi-alias

    481.wrf: basepeak = yes

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/Intel-ic15.0-official-linux64.html
http://www.spec.org/cpu2006/flags/PlatformHitachi-V1.6.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic15.0-official-linux64.xml
http://www.spec.org/cpu2006/flags/PlatformHitachi-V1.6.xml

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