SPEC® CFP2006 Result
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HITACHI

Compute Blade 520X (Intel Xeon E7-8890 v4)

$SPECfp^{®}\_rate2006 = 4450$

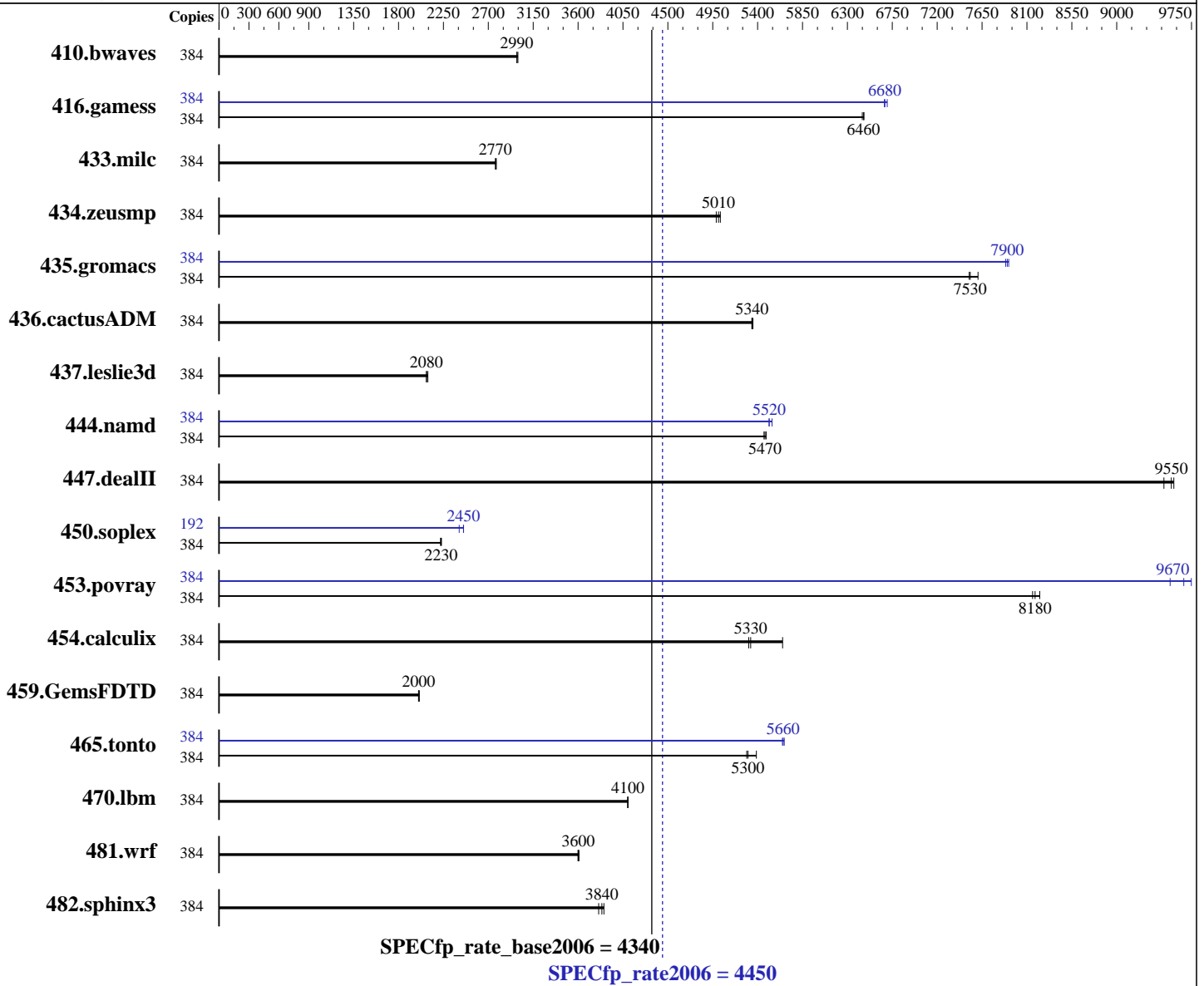$SPECfp\_rate\_base2006 = 4340$

CPU2006 license: 35
Test sponsor: HITACHI
Tested by: HITACHI

Test date: May-2016
Hardware Availability: Jun-2016
Software Availability: Mar-2016

SPECfp_rate_base2006 = 4340

SPECfp_rate2006 = 4450

Benchmark	Copies	Result
410.bwaves	384	2990
416.gamess	384	6680
416.gamess	384	6460
433.milc	384	2770
434.zeusmp	384	5010
435.gromacs	384	7900
435.gromacs	384	7530
436.cactusADM	384	5340
437.leslie3d	384	2080
444.namd	384	5520
444.namd	384	5470
447.dealII	384	9550
450.soplex	192	2450
450.soplex	384	2230
453.povray	384	9670
453.povray	384	8180
454.calculix	384	5330
459.GemsFDTD	384	2000
465.tonto	384	5660
465.tonto	384	5300
470.lbm	384	4100
481.wrf	384	3600
482.sphinx3	384	3840

Hardware

CPU Name: Intel Xeon E7-8890 v4
CPU Characteristics: Intel Turbo Boost Technology up to 3.40 GHz
CPU MHz: 2200
FPU: Integrated
CPU(s) enabled: 192 cores, 8 chips, 24 cores/chip, 2 threads/core
CPU(s) orderable: 2,4,8 chip
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: SUSE Linux Enterprise Server 12
3.12.28-4-default
Compiler: C/C++: Version 16.0.2.181 of Intel C++ Studio XE for Linux;
Fortran: Version 16.0.2.181 of Intel Fortran Studio XE for Linux
Auto Parallel: No
File System: xfs
System State: Run level 3 (multi-user)

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L3 Cache:	60 MB I+D on chip per chip
Other Cache:	None
Memory:	3 TB (192 x 16 GB 2Rx4 PC4-2133P-R, running at 1600 MHz)
Disk Subsystem:	2 x 600 GB SAS, 15000 RPM, RAID1
Other Hardware:	None

Base Pointers:	32/64-bit
Peak Pointers:	32/64-bit
Other Software:	none

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	384	1741	3000	**1747**	**2990**	1748	2990	384	1741	3000	**1747**	**2990**	1748	2990
416.gamess	384	1163	6470	1166	6450	**1163**	**6460**	384	1127	6670	**1126**	**6680**	1122	6700
433.milc	384	1268	2780	1272	2770	**1271**	**2770**	384	1268	2780	1272	2770	**1271**	**2770**
434.zeusmp	384	**698**	**5010**	695	5030	701	4990	384	**698**	**5010**	695	5030	701	4990
435.gromacs	384	360	7610	365	7520	**364**	**7530**	384	**347**	**7900**	348	7890	346	7920
436.cactusADM	384	**859**	**5340**	857	5350	859	5340	384	**859**	**5340**	857	5350	859	5340
437.leslie3d	384	1724	2090	**1735**	**2080**	1736	2080	384	1724	2090	**1735**	**2080**	1736	2080
444.namd	384	561	5490	**563**	**5470**	564	5460	384	558	5510	555	5540	**558**	**5520**
447.dealII	384	**460**	**9550**	464	9470	459	9570	384	**460**	**9550**	464	9470	459	9570
450.soplex	384	1436	2230	**1438**	**2230**	1442	2220	192	665	2410	653	2450	**653**	**2450**
453.povray	384	**250**	**8180**	248	8230	250	8160	384	210	9750	214	9540	**211**	**9670**
454.calculix	384	561	5650	597	5310	**594**	**5330**	384	561	5650	597	5310	**594**	**5330**
459.GemsFDTD	384	**2036**	**2000**	2028	2010	2036	2000	384	**2036**	**2000**	2028	2010	2036	2000
465.tonto	384	701	5390	**712**	**5300**	714	5290	384	**668**	**5660**	669	5650	667	5670
470.lbm	384	**1287**	**4100**	1287	4100	1287	4100	384	**1287**	**4100**	1287	4100	1287	4100
481.wrf	384	1188	3610	1192	3600	**1191**	**3600**	384	1188	3610	1192	3600	**1191**	**3600**
482.sphinx3	384	1939	3860	1966	3810	**1950**	**3840**	384	1939	3860	1966	3810	**1950**	**3840**

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"

Platform Notes

BIOS configuration:
 Memory Power Management = Automatic
 Active Energy Manager = "Capping Disabled"

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Platform Notes (Continued)

```
Platform Controlled Type = "Maximum Performance"
C1 Enhanced Mode = Disable
Sysinfo program /home/cpu2006/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on SLES12 Fri May 13 17:34:38 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 E7-8890 v4 @ 2.20GHz
      8 "physical id"s (chips)
      384 "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
      physical 4: 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 5: 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 6: 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 7: 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 : 61440 KB

From /proc/meminfo
   MemTotal:       3176250832 kB
   HugePages_Total:        0
   Hugepagesize:        2048 kB

/usr/bin/lsb_release -d
   SUSE Linux Enterprise Server 12

From /etc/*release* /etc/*version*
   SuSE-release:
      SUSE Linux Enterprise Server 12 (x86_64)
      VERSION = 12
      PATCHLEVEL = 0
      # This file is deprecated and will be removed in a future service pack or
      release.
```

HITACHI

Compute Blade 520X (Intel Xeon E7-8890 v4)

SPECfp_rate2006 = 4450

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Platform Notes (Continued)

```
      # Please check /etc/os-release for details about this release.
   os-release:
      NAME="SLES"
      VERSION="12"
      VERSION_ID="12"
      PRETTY_NAME="SUSE Linux Enterprise Server 12"
      ID="sles"
      ANSI_COLOR="0;32"
      CPE_NAME="cpe:/o:suse:sles:12"

 uname -a:
    Linux SLES12 3.12.28-4-default #1 SMP Thu Sep 25 17:02:34 UTC 2014 (9879bd4)
    x86_64 x86_64 x86_64 GNU/Linux

 run-level 3 May 11 17:50

 SPEC is set to: /home/cpu2006
    Filesystem      Type  Size  Used Avail Use% Mounted on
    /dev/sda4       xfs   516G   19G  498G   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.

    BIOS HITACHI 11-00 04/21/2016
    Memory:
    76x 0x0000 M393A2G40DB0-CPB 16 GB 2 rank 2133 MHz
    2x 0x0001 M393A2G40DB0-CPB 16 GB 2 rank 2133 MHz
    2x 0x0002 M393A2G40DB0-CPB 16 GB 2 rank 2133 MHz
    4x 0x0003 M393A2G40DB0-CPB 16 GB 2 rank 2133 MHz
    2x 0x0300 M393A2G40DB0-CPB 16 GB 2 rank 2133 MHz
    2x 0x0400 M393A2G40DB0-CPB 16 GB 2 rank 2133 MHz
    2x 0x0402 M393A2G40DB0-CPB 16 GB 2 rank 2133 MHz
    2x 0x0603 M393A2G40DB0-CPB 16 GB 2 rank 2133 MHz
    2x 0x0E0A M393A2G40DB0-CPB 16 GB 2 rank 2133 MHz
    2x 0x5C00 M393A2G40DB0-CPB 16 GB 2 rank 2133 MHz
    96x Samsung M393A2G40DB0-CPB 16 GB 2 rank 2133 MHz, configured at 1600 MHz

 (End of data from sysinfo program)
```

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 i7-4790K CPU + 32GB
 memory using RedHat EL 7.2 glibc 2.17
 Transparent Huge Pages enabled with:
 echo always > /sys/kernel/mm/transparent_hugepage/enabled
```

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General Notes (Continued)

```
Filesystem page cache cleared with:
echo 1>        /proc/sys/vm/drop_caches
runspec command invoked through numactl i.e.:
numactl --interleave=all runspec <etc>
```

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
    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 -opt-prefetch -auto-p32
-ansi-alias -opt-mem-layout-trans=3
```

Continued on next page

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$SPECfp\_rate2006 = \quad 4450$

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CPU2006 license: 35　　　　　　　　　　　　　　　　　　　　　**Test date:** May-2016
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Base Optimization Flags (Continued)

C++ benchmarks:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
-ansi-alias -opt-mem-layout-trans=3
```

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

Benchmarks using both Fortran and C:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
-ansi-alias -opt-mem-layout-trans=3
```

Peak Compiler Invocation

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

C++ benchmarks (except as noted below):
```
icpc   -m64
```
```
 450.soplex: icpc -m32 -L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin
```

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

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

Peak 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
    437.leslie3d: -DSPEC_CPU_LP64
      444.namd: -DSPEC_CPU_LP64
     447.dealII: -DSPEC_CPU_LP64
    450.soplex: -D_FILE_OFFSET_BITS=64
    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
```

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Peak Portability Flags (Continued)

482.sphinx3: `-DSPEC_CPU_LP64`

Peak Optimization Flags

C benchmarks:

433.milc: basepeak = yes

470.lbm: basepeak = yes

482.sphinx3: basepeak = yes

C++ benchmarks:

444.namd: `-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)` `-opt-mem-layout-trans=3(pass 2)`
`-prof-use(pass 2)` `-fno-alias` `-auto-ilp32`

447.dealII: basepeak = yes

450.soplex: `-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)` `-opt-mem-layout-trans=3(pass 2)`
`-prof-use(pass 2)` `-opt-malloc-options=3`

453.povray: `-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)` `-opt-mem-layout-trans=3(pass 2)`
`-prof-use(pass 2)` `-unroll4` `-ansi-alias`

Fortran benchmarks:

410.bwaves: basepeak = yes

416.gamess: `-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`
`-inline-level=0` `-scalar-rep-`

434.zeusmp: basepeak = yes

437.leslie3d: basepeak = yes

459.GemsFDTD: basepeak = yes

465.tonto: `-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`

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Peak Optimization Flags (Continued)

465.tonto (continued):
```
-inline-calloc -opt-malloc-options=3
```

Benchmarks using both Fortran and C:

435.gromacs: `-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) -opt-mem-layout-trans=3(pass 2)`
`-prof-use(pass 2) -opt-prefetch -auto-ilp32`

436.cactusADM: `basepeak = yes`

454.calculix: `basepeak = yes`

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-ic16.0-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-ic16.0-official-linux64.xml
http://www.spec.org/cpu2006/flags/PlatformHitachi-V1.6.xml

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