



SPEC[®] CFP2006 Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant XL450 Gen9

(3.40 GHz, Intel Xeon E5-2643 v4)

SPECfp[®]_rate2006 = 614

SPECfp_rate_base2006 = 597

CPU2006 license: 3

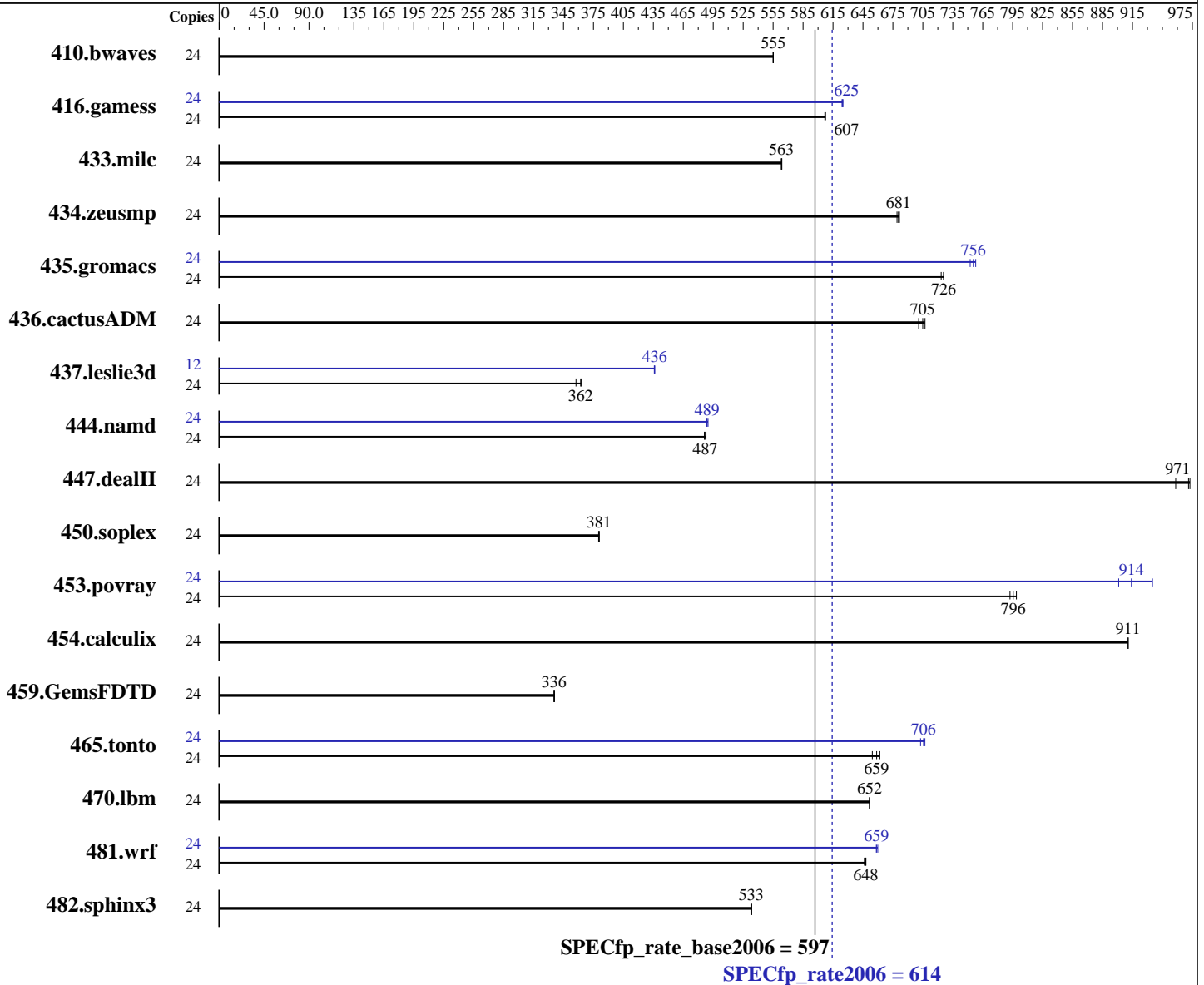
Test sponsor: HPE

Tested by: HPE

Test date: Jun-2016

Hardware Availability: Mar-2016

Software Availability: Dec-2015



Hardware

CPU Name: Intel Xeon E5-2643 v4
 CPU Characteristics: Intel Turbo Boost Technology up to 3.70 GHz
 CPU MHz: 3400
 FPU: Integrated
 CPU(s) enabled: 12 cores, 2 chips, 6 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

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Software

Operating System: SUSE Linux Enterprise Server 12 (x86_64) SP1
 Kernel 3.12.49-11-default
 Compiler: C/C++: Version 16.0.0.101 of Intel C++ Studio XE for Linux;
 Fortran: Version 16.0.0.101 of Intel Fortran Studio XE for Linux
 Auto Parallel: No
 File System: btrfs
 System State: Run level 3 (multi-user)

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L3 Cache: 20 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

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 | 24 | 588 | 555 | 587 | 555 | 587 | 555 | 24 | 588 | 555 | 587 | 555 | 587 | 555 |
| 416.gamess | 24 | 774 | 607 | 774 | 607 | 773 | 608 | 24 | 752 | 625 | 752 | 625 | 753 | 624 |
| 433.milc | 24 | 391 | 563 | 391 | 564 | 391 | 563 | 24 | 391 | 563 | 391 | 564 | 391 | 563 |
| 434.zeusmp | 24 | 320 | 682 | 321 | 681 | 322 | 679 | 24 | 320 | 682 | 321 | 681 | 322 | 679 |
| 435.gromacs | 24 | 236 | 726 | 237 | 723 | 236 | 726 | 24 | 228 | 752 | 226 | 758 | 227 | 756 |
| 436.cactusADM | 24 | 409 | 701 | 407 | 705 | 406 | 707 | 24 | 409 | 701 | 407 | 705 | 406 | 707 |
| 437.leslie3d | 24 | 623 | 362 | 622 | 363 | 631 | 358 | 12 | 259 | 436 | 258 | 436 | 259 | 436 |
| 444.namd | 24 | 395 | 488 | 395 | 487 | 396 | 486 | 24 | 394 | 489 | 393 | 490 | 394 | 489 |
| 447.dealII | 24 | 287 | 958 | 282 | 973 | 283 | 971 | 24 | 287 | 958 | 282 | 973 | 283 | 971 |
| 450.soplex | 24 | 527 | 380 | 526 | 381 | 526 | 381 | 24 | 527 | 380 | 526 | 381 | 526 | 381 |
| 453.povray | 24 | 160 | 799 | 161 | 792 | 160 | 796 | 24 | 140 | 914 | 137 | 935 | 142 | 901 |
| 454.calculix | 24 | 217 | 911 | 217 | 911 | 218 | 910 | 24 | 217 | 911 | 217 | 911 | 218 | 910 |
| 459.GemsFDTD | 24 | 759 | 336 | 758 | 336 | 759 | 336 | 24 | 759 | 336 | 758 | 336 | 759 | 336 |
| 465.tonto | 24 | 361 | 654 | 359 | 659 | 357 | 662 | 24 | 336 | 703 | 334 | 707 | 335 | 706 |
| 470.lbm | 24 | 506 | 651 | 506 | 652 | 506 | 652 | 24 | 506 | 651 | 506 | 652 | 506 | 652 |
| 481.wrf | 24 | 414 | 648 | 414 | 648 | 415 | 646 | 24 | 408 | 657 | 406 | 660 | 407 | 659 |
| 482.sphinx3 | 24 | 878 | 533 | 878 | 533 | 877 | 534 | 24 | 878 | 533 | 878 | 533 | 877 | 534 |

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>



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Platform Notes

BIOS Configuration:

Power Profile set to Maximum Performance
 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 Double Refresh Rate set to 1x Refresh

Sysinfo program /home/cpu2006/config/sysinfo.rev6914

\$Rev: 6914 \$ \$Date:: 2014-06-25 # \$ e3fbb8667b5a285932ceab81e28219e1

running on XL450-G9-node2 Mon Jun 13 21:58:42 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 E5-2643 v4 @ 3.40GHz

2 "physical id"s (chips)

24 "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 : 6

siblings : 12

physical 0: cores 0 1 2 3 6 7

physical 1: cores 0 1 2 3 6 7

cache size : 20480 KB

From /proc/meminfo

MemTotal: 264220044 kB

HugePages_Total: 0

Hugepagesize: 2048 kB

/usr/bin/lsb_release -d

SUSE Linux Enterprise Server 12 SP1

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"

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Platform Notes (Continued)

```
uname -a:
Linux XL450-G9-node2 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 Jun 13 15:41
```

SPEC is set to: /home/cpu2006

```
Filesystem      Type      Size  Used Avail Use% Mounted on
/dev/sda3        btrfs    243G  15G  228G   7% /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 U21 03/10/2016

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:

```
LD_LIBRARY_PATH = "/home/cpu2006/libs/32:/home/cpu2006/libs/64:/home/cpu2006/sh"
```

Binaries compiled on a system with 1x Intel Xeon E5-2660 v4 CPU + 128GB memory using RedHat EL 7.2

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
```



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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.deallI: -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 -static -opt-prefetch -auto-ilp32
-ansi-alias -opt-mem-layout-trans=3 -qopt-prefetch-issue-excl-hint

```

C++ benchmarks:

```

-xCORE-AVX2 -ipo -O3 -no-prec-div -static -opt-prefetch
-fp-model fast=2 -auto-ilp32 -ansi-alias

```

Fortran benchmarks:

```

-xCORE-AVX2 -ipo -O3 -no-prec-div -static -opt-prefetch
-qopt-prefetch-issue-excl-hint

```

Benchmarks using both Fortran and C:

```

-xCORE-AVX2 -ipo -O3 -no-prec-div -static -opt-prefetch -auto-ilp32
-ansi-alias -opt-mem-layout-trans=3 -qopt-prefetch-issue-excl-hint

```

Peak Compiler Invocation

C benchmarks:

```
icc -m64
```

C++ benchmarks:

```
icpc -m64
```

Fortran benchmarks:

```
ifort -m64
```

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Software Availability: Dec-2015

Peak Compiler Invocation (Continued)

Benchmarks using both Fortran and C:

icc -m64 ifort -m64

Peak Portability Flags

Same as Base Portability Flags

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) -static(pass 2)
-opt-mem-layout-trans=3(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:threadsafe(pass 1)
-ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
-par-num-threads=1(pass 1) -static(pass 2)
-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) -static(pass 2) -prof-use(pass 2)
-unroll2 -inline-level=0 -scalar-rep-

434.zeusmp: basepeak = yes

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Peak Optimization Flags (Continued)

437.leslie3d: -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) -static(pass 2) -prof-use(pass 2)
-opt-malloc-options=3 -opt-prefetch

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) -static(pass 2) -prof-use(pass 2)
-unroll4 -auto -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) -static(pass 2)
-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: -xCORE-AVX2 -ipo -O3 -no-prec-div -static -auto-ilp32

The flags files that were used to format this result can be browsed at

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

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

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