



# SPEC<sup>®</sup> CFP2006 Result

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## Fujitsu

SPECfp<sup>®</sup>\_rate2006 = 2500

PRIMERGY RX4770 M3, Intel Xeon E7-8894 v4, 2.40GHz

SPECfp\_rate\_base2006 = 2450

CPU2006 license: 19

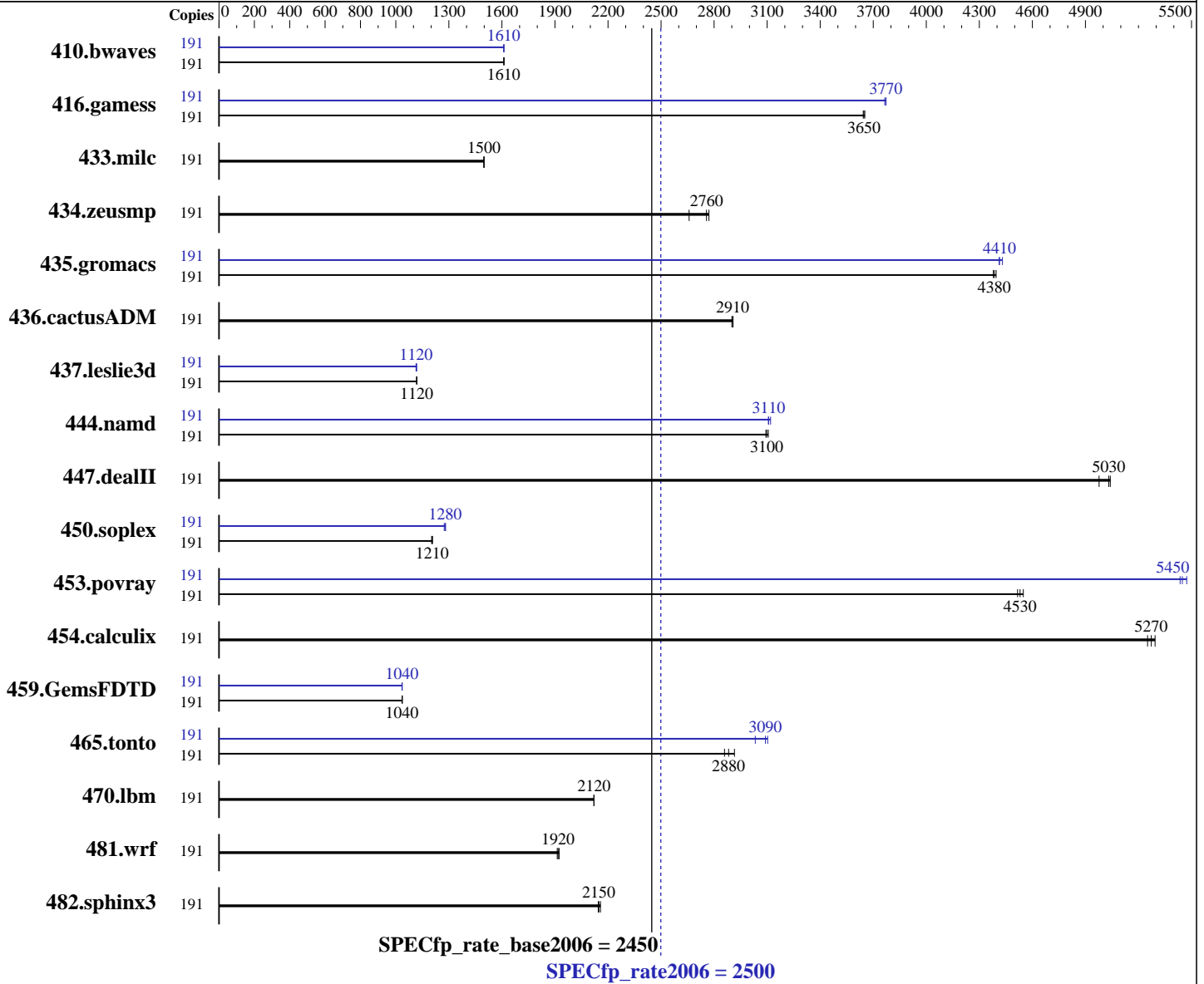
Test sponsor: Fujitsu

Tested by: Fujitsu

Test date: Feb-2017

Hardware Availability: Feb-2017

Software Availability: Nov-2016



### 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

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### Software

Operating System: SUSE Linux Enterprise Server 12 SP2 4.4.21-68-default  
 Compiler: C/C++: Version 17.0.0.098 of Intel C/C++ Compiler for Linux;  
 Fortran: Version 17.0.0.098 of Intel Fortran Compiler for Linux  
 Auto Parallel: No  
 File System: tmpfs  
 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: 512 GB (32 x 16 GB 2Rx4 PC4-2400T-R, running at 1600 MHz)  
Disk Subsystem: 1006 GB tmpfs  
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	191	1611	1610	1610	1610	<b>1611</b>	<b>1610</b>	191	1611	1610	<b>1611</b>	<b>1610</b>	1611	1610
416.gamess	191	1026	3640	<b>1025</b>	<b>3650</b>	1024	3650	191	991	3770	<b>992</b>	<b>3770</b>	993	3770
433.milc	191	<b>1170</b>	<b>1500</b>	1170	1500	1170	1500	191	<b>1170</b>	<b>1500</b>	1170	1500	1170	1500
434.zeusmp	191	627	2770	<b>630</b>	<b>2760</b>	654	2660	191	627	2770	<b>630</b>	<b>2760</b>	654	2660
435.gromacs	191	311	4380	<b>311</b>	<b>4380</b>	310	4390	191	309	4410	308	4430	<b>309</b>	<b>4410</b>
436.cactusADM	191	785	2910	<b>786</b>	<b>2910</b>	787	2900	191	785	2910	<b>786</b>	<b>2910</b>	787	2900
437.leslie3d	191	1607	1120	1604	1120	<b>1606</b>	<b>1120</b>	191	1611	1110	1606	1120	<b>1610</b>	<b>1120</b>
444.namd	191	495	3090	493	3110	<b>494</b>	<b>3100</b>	191	493	3110	<b>493</b>	<b>3110</b>	491	3120
447.dealII	191	433	5040	<b>434</b>	<b>5030</b>	439	4980	191	433	5040	<b>434</b>	<b>5030</b>	439	4980
450.soplex	191	1325	1200	1320	1210	<b>1320</b>	<b>1210</b>	191	1243	1280	<b>1246</b>	<b>1280</b>	1251	1270
453.povray	191	<b>224</b>	<b>4530</b>	225	4520	223	4550	191	<b>187</b>	<b>5450</b>	186	5470	187	5440
454.calculix	191	<b>299</b>	<b>5270</b>	300	5250	298	5290	191	<b>299</b>	<b>5270</b>	300	5250	298	5290
459.GemsFDTD	191	1958	1040	1954	1040	<b>1957</b>	<b>1040</b>	191	1958	1040	<b>1957</b>	<b>1040</b>	1956	1040
465.tonto	191	645	2920	657	2860	<b>652</b>	<b>2880</b>	191	<b>608</b>	<b>3090</b>	620	3030	606	3100
470.lbm	191	1238	2120	<b>1237</b>	<b>2120</b>	1237	2120	191	1238	2120	<b>1237</b>	<b>2120</b>	1237	2120
481.wrf	191	1109	1920	<b>1113</b>	<b>1920</b>	1115	1910	191	1109	1920	<b>1113</b>	<b>1920</b>	1115	1910
482.sphinx3	191	1725	2160	1736	2140	<b>1733</b>	<b>2150</b>	191	1725	2160	1736	2140	<b>1733</b>	<b>2150</b>

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"  
Kernel Boot Parameter set with : nohz\_full=1-191 isolcpus=1-191  
Turbo mode set with :  
cpupower -c all frequency-set -g performance  
Tmpfs filesystem can be set with:  
mkdir /home/memory  
mount -t tmpfs -o size=1006g,rw tmpfs /home/memory

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## Operating System Notes (Continued)

```
Process tuning setting:
echo 10000000 > /proc/sys/kernel/sched_min_granularity_ns
echo 15000000 > /proc/sys/kernel/sched_wakeup_granularity_ns
echo 0 > /proc/sys/kernel/numa_balancing
cpu idle state set with:
cpupower idle-set -d 2
cpupower idle-set -d 3
cpupower idle-set -d 4
```

## Platform Notes

```
BIOS configuration:
Energy Performance = Performance
QPI snoop mode: Cluster on Die
Intel Virtualization Technology = Disabled
VT-d = Disabled
QPI Link Frequency Select = 9.6 GT/s
Patrol Scrub = Disabled
Sysinfo program /home/memory/speccpu/config/sysinfo.rev6993
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
running on linux-53n1 Fri Feb 17 22:08:29 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: 527983716 kB
HugePages_Total: 0
Hugepagesize: 2048 kB
```

```
/usr/bin/lsb_release -d
```

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## Platform Notes (Continued)

SUSE Linux Enterprise Server 12 SP2

From /etc/\*release\* /etc/\*version\*

SuSE-release:

SUSE Linux Enterprise Server 12 (x86\_64)

VERSION = 12

PATCHLEVEL = 2

# 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-SP2"

VERSION\_ID="12.2"

PRETTY\_NAME="SUSE Linux Enterprise Server 12 SP2"

ID="sles"

ANSI\_COLOR="0;32"

CPE\_NAME="cpe:/o:suse:sles:12:sp2"

uname -a:

Linux linux-53n1 4.4.21-68-default #1 SMP Tue Oct 18 18:19:37 UTC 2016  
(63cf368) x86\_64 x86\_64 x86\_64 GNU/Linux

run-level 3 Feb 17 06:54

SPEC is set to: /home/memory/speccpu

Filesystem Type Size Used Avail Use% Mounted on

tmpfs tmpfs 1006G 3.7G 1003G 1% /home/memory

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 FUJITSU // American Megatrends Inc. V5.0.0.11 R1.8.94 for D3749-A1x  
11/11/2016

Memory:

32x Hynix HMA42GR7AFR4N-UH 16 GB 2 rank 2400 MHz, configured at 1600 MHz

64x NO DIMM NO DIMM

(End of data from sysinfo program)

## General Notes

Environment variables set by runspec before the start of the run:

LD\_LIBRARY\_PATH = "/home/memory/speccpu/libs/32:/home/memory/speccpu/libs/64:/home/memory/speccpu/sh10.2"

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

Transparent Huge Pages enabled with:

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## General Notes (Continued)

```
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>
```

## 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.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 -qopt-prefetch -auto-p32
-qopt-mem-layout-trans=3
```

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## Base Optimization Flags (Continued)

C++ benchmarks:

-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32  
-qopt-mem-layout-trans=3

Fortran benchmarks:

-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch

Benchmarks using both Fortran and C:

-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32  
-qopt-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\_2017/linux/lib/ia32

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.deallI: -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: -prof-gen(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) -fno-alias -auto-ilp32  
-qopt-mem-layout-trans=3

447.dealIII: basepeak = yes

450.soplex: -prof-gen(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-malloc-options=3  
-qopt-mem-layout-trans=3

453.povray: -prof-gen(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 -qopt-mem-layout-trans=3

Fortran benchmarks:

410.bwaves: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch

416.gamess: -prof-gen(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 -inline-level=0 -scalar-rep-

434.zeusmp: basepeak = yes

437.leslie3d: Same as 410.bwaves

459.GemsFDTD: Same as 410.bwaves

465.tonto: -prof-gen(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 -inline-calloc  
-qopt-malloc-options=3

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## Peak Optimization Flags (Continued)

Benchmarks using both Fortran and C:

435.gromacs: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)  
-par-num-threads=1(pass 1) -qopt-prefetch -auto-ilp32  
-qopt-mem-layout-trans=3

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-ic17.0-official-linux64.html>

<http://www.spec.org/cpu2006/flags/Fujitsu-Platform-Settings-V1.2-BDW-RevC.20170307.html>

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2006/flags/Intel-ic17.0-official-linux64.xml>

<http://www.spec.org/cpu2006/flags/Fujitsu-Platform-Settings-V1.2-BDW-RevC.20170307.xml>

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