SPEC® CFP2006 Result
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Lenovo Group Limited

Lenovo ThinkServer RD450 (Intel Xeon E5-2620 v3, 2.40 GHz)

$SPECfp^{®}2006 =$ 97.4

$SPECfp\_base2006 =$ 93.0

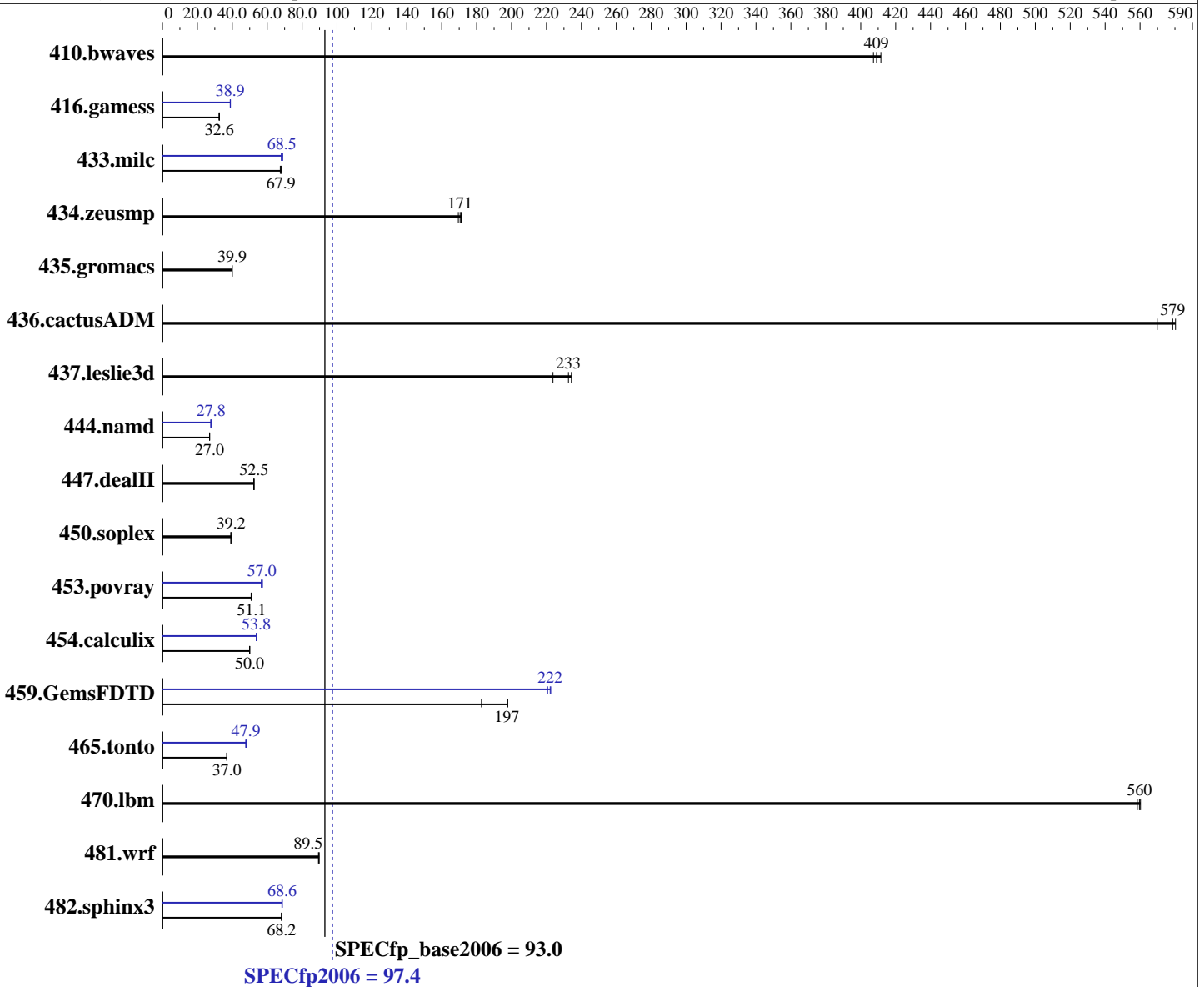|	
CPU2006 license: 9017	
Test sponsor: Lenovo Group Limited	
Tested by: Lenovo Group Limited	

Test date: Nov-2014	
Hardware Availability: Dec-2014	
Software Availability: Sep-2014	

Benchmark	Result
410.bwaves	409
416.gamess	38.9 / 32.6
433.milc	68.5 / 67.9
434.zeusmp	171
435.gromacs	39.9
436.cactusADM	579
437.leslie3d	233
444.namd	27.8 / 27.0
447.dealII	52.5
450.soplex	39.2
453.povray	57.0 / 51.1
454.calculix	53.8 / 50.0
459.GemsFDTD	222 / 197
465.tonto	47.9 / 37.0
470.lbm	560
481.wrf	89.5
482.sphinx3	68.6 / 68.2

SPECfp_base2006 = 93.0
SPECfp2006 = 97.4

Hardware

CPU Name:	Intel Xeon E5-2620 v3
CPU Characteristics:	Intel Turbo Boost Technology up to 3.20 GHz
CPU MHz:	2400
FPU:	Integrated
CPU(s) enabled:	12 cores, 2 chips, 6 cores/chip, 2 threads/core
CPU(s) orderable:	1,2 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:	Red Hat Enterprise Linux Server release 7.0 (Maipo) 3.10.0-123.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

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L3 Cache:	15 MB I+D on chip per chip	System State:	Run level 3 (multi-user)	
Other Cache:	None	Base Pointers:	64-bit	
Memory:	256 GB (16 x 16 GB 2Rx4 PC4-2133P-R, running at 1866 MHz)	Peak Pointers:	32/64-bit	
		Other Software:	None	
Disk Subsystem:	1 x 800 GB SATA SSD			
Other Hardware:	None			

Results Table

Benchmark	Base						Peak					
	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	33.4	407	33.0	412	**33.2**	**409**	33.4	407	33.0	412	**33.2**	**409**
416.gamess	**600**	**32.6**	600	32.6	605	32.4	**504**	**38.9**	502	39.0	504	38.8
433.milc	135	68.2	136	67.5	**135**	**67.9**	135	68.1	**134**	**68.5**	133	68.9
434.zeusmp	53.7	170	53.2	171	**53.4**	**171**	53.7	170	53.2	171	**53.4**	**171**
435.gromacs	179	39.9	179	40.0	**179**	**39.9**	179	39.9	179	40.0	**179**	**39.9**
436.cactusADM	20.6	580	21.0	570	**20.6**	**579**	20.6	580	21.0	570	**20.6**	**579**
437.leslie3d	40.1	234	42.0	224	**40.4**	**233**	40.1	234	42.0	224	**40.4**	**233**
444.namd	297	27.0	297	27.0	**297**	**27.0**	289	27.8	**289**	**27.8**	289	27.8
447.dealII	**218**	**52.5**	218	52.5	219	52.3	**218**	**52.5**	218	52.5	219	52.3
450.soplex	213	39.2	211	39.6	**213**	**39.2**	213	39.2	211	39.6	**213**	**39.2**
453.povray	105	50.8	**104**	**51.1**	104	51.1	**93.4**	**57.0**	92.8	57.3	93.9	56.6
454.calculix	165	50.0	**165**	**50.0**	165	49.9	153	53.9	**153**	**53.8**	153	53.8
459.GemsFDTD	53.6	198	**53.7**	**197**	58.1	183	**47.8**	**222**	48.1	221	47.7	222
465.tonto	266	37.0	267	36.8	**266**	**37.0**	205	47.9	**206**	**47.9**	206	47.8
470.lbm	**24.6**	**560**	24.6	558	24.5	560	**24.6**	**560**	24.6	558	24.5	560
481.wrf	124	89.8	126	88.7	**125**	**89.5**	124	89.8	126	88.7	**125**	**89.5**
482.sphinx3	**286**	**68.2**	286	68.2	285	68.4	**284**	**68.6**	284	68.6	285	68.4

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:
    Cluster On Die set to Disabled
    Early Snoop set to Disabled
    Performance Profile set to Custom
    C1E Support set to Disabled
    Core C3 set to Disabled
    Core C6 set to Disabled
    Thermal Profile set to High Fan Speed
    Memory Power Savings set to Disabled
```

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Platform Notes (Continued)

```
Sysinfo program /usr/cpu2006/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on RD450 Fri Nov 14 18:34:45 2014

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 E5-2620 v3 @ 2.40GHz
      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 4 5
      physical 1: cores 0 1 2 3 4 5
   cache size : 15360 KB

From /proc/meminfo
   MemTotal:       263859204 kB
   HugePages_Total:        0
   Hugepagesize:        2048 kB

From /etc/*release* /etc/*version*
   os-release:
      NAME="Red Hat Enterprise Linux Server"
      VERSION="7.0 (Maipo)"
      ID="rhel"
      ID_LIKE="fedora"
      VERSION_ID="7.0"
      PRETTY_NAME="Red Hat Enterprise Linux Server 7.0 (Maipo)"
      ANSI_COLOR="0;31"
      CPE_NAME="cpe:/o:redhat:enterprise_linux:7.0:GA:server"
   redhat-release: Red Hat Enterprise Linux Server release 7.0 (Maipo)
   system-release: Red Hat Enterprise Linux Server release 7.0 (Maipo)
   system-release-cpe: cpe:/o:redhat:enterprise_linux:7.0:ga:server

uname -a:
   Linux RD450 3.10.0-123.el7.x86_64 #1 SMP Mon May 5 11:16:57 EDT 2014 x86_64
   x86_64 x86_64 GNU/Linux

run-level 3 Nov 14 18:33

SPEC is set to: /usr/cpu2006
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/sda2      xfs   741G   84G  658G  12% /
Additional information from dmidecode:

   Warning: Use caution when you interpret this section. The 'dmidecode' program
```
Continued on next page

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Platform Notes (Continued)

```
    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 LENOVO VB3TS110 10/05/2014
    Memory:
    16x Samsung M393A2G40DB0-CPB 16 GB 2 rank 2133 MHz, configured at 1866 MHz

  (End of data from sysinfo program)
RD450 support 4 channels and 8 DIMMs per processor, total 8 channels and
16 DIMMs. All 16 DIMM slots installed with 16 GB DIMM for this run.
```

General Notes

```
Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact,1,0"
LD_LIBRARY_PATH = "/usr/cpu2006/libs/32:/usr/cpu2006/libs/64:/usr/cpu2006/sh"
OMP_NUM_THREADS = "12"

 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
```

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
```

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CPU2006 license: 9017

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Software Availability: Sep-2014

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: -xCORE-AVX2 -ipo -O3 -no-prec-div -unroll2 -ansi-alias
-parallel

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/Lenovo-Platform-Settings-V1.2-HSW-revA.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/Lenovo-Platform-Settings-V1.2-HSW-revA.xml

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

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