SPEC® CFP2006 Result

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Lenovo Group Limited

Lenovo ThinkServer RD350 (Intel Xeon E5-2620 v3, 2.40 GHz)

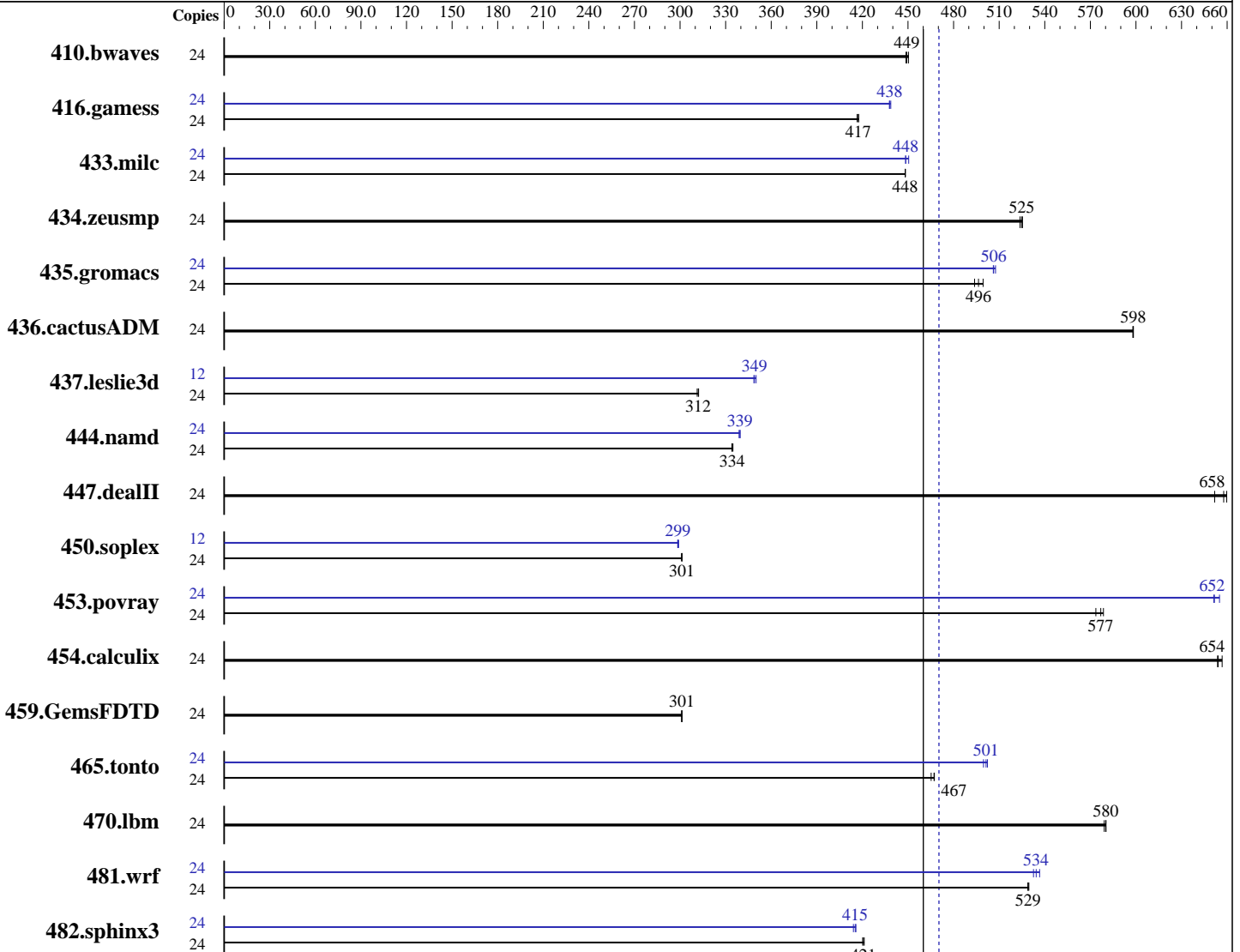$SPECfp^{®}\_rate2006 =$ 470

$SPECfp\_rate\_base2006 =$ 460

Benchmark	Copies	Result
410.bwaves	24	449
416.gamess	24 / 24	438 / 417
433.milc	24 / 24	448 / 448
434.zeusmp	24	525
435.gromacs	24 / 24	506 / 496
436.cactusADM	24	598
437.leslie3d	12 / 24	349 / 312
444.namd	24 / 24	339 / 334
447.dealII	24	658
450.soplex	12 / 24	299 / 301
453.povray	24 / 24	652 / 577
454.calculix	24	654
459.GemsFDTD	24	301
465.tonto	24 / 24	501 / 467
470.lbm	24	580
481.wrf	24 / 24	534 / 529
482.sphinx3	24 / 24	415 / 421

SPECfp_rate_base2006 = 460

SPECfp_rate2006 = 470

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: No
File System: xfs

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CPU2006 license: 9017		**Test date:**	Dec-2014
Test sponsor:	Lenovo Group Limited	**Hardware Availability:**	Dec-2014
Tested by:	Lenovo Group Limited	**Software Availability:**	Sep-2014

L3 Cache:	15 MB I+D on chip per chip	System State:	Run level 3 (multi-user)
Other Cache:	None	Base Pointers:	32/64-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

	Base						Peak					
Benchmark	**Copies**	**Seconds**	**Ratio**	**Seconds**	**Ratio**	**Seconds**	**Ratio**	**Copies**	**Seconds**	**Ratio**	**Seconds**	**Ratio**	**Seconds**	**Ratio**
410.bwaves	24	**726**	**449**	727	449	724	450	24	**726**	**449**	727	449	724	450
416.gamess	24	**1126**	**417**	1125	418	1128	417	24	**1073**	**438**	1071	439	1073	438
433.milc	24	491	448	**492**	**448**	492	448	24	491	448	489	450	**491**	**448**
434.zeusmp	24	**416**	**525**	416	525	417	524	24	**416**	**525**	416	525	417	524
435.gromacs	24	343	499	**345**	**496**	347	494	24	**338**	**506**	339	506	338	508
436.cactusADM	24	480	598	**479**	**598**	479	598	24	480	598	**479**	**598**	479	598
437.leslie3d	24	725	311	723	312	**723**	**312**	12	324	349	322	350	**323**	**349**
444.namd	24	576	334	575	335	**576**	**334**	24	**567**	**339**	567	340	568	339
447.dealII	24	**417**	**658**	421	652	416	660	24	**417**	**658**	421	652	416	660
450.soplex	24	664	301	665	301	**664**	**301**	12	335	298	335	299	**335**	**299**
453.povray	24	223	574	**221**	**577**	221	579	24	196	651	195	655	**196**	**652**
454.calculix	24	302	657	303	654	**303**	**654**	24	302	657	303	654	**303**	**654**
459.GemsFDTD	24	846	301	**846**	**301**	845	301	24	846	301	**846**	**301**	845	301
465.tonto	24	**506**	**467**	505	467	508	465	24	**471**	**501**	473	500	470	502
470.lbm	24	568	580	569	579	**568**	**580**	24	568	580	569	579	**568**	**580**
481.wrf	24	507	529	506	530	**507**	**529**	24	503	533	**502**	**534**	500	537
482.sphinx3	24	**1112**	**421**	1111	421	1113	420	24	1125	416	**1126**	**415**	1130	414

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:
    Cluster On Die set to Auto
    Early Snoop set to Auto

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Platform Notes (Continued)

```
    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
     Sysinfo program /usr/cpu2006/config/sysinfo.rev6914
     $Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
     running on RD350 Wed Dec 17 20:58:27 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:       263859072 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 RD350 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 Dec 17 09:24
```

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Platform Notes (Continued)

```
  SPEC is set to: /usr/cpu2006
    Filesystem      Type  Size  Used Avail Use% Mounted on
    /dev/sda2       xfs   741G  158G  584G  22% /
  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 LENOVO VB3TS110 10/05/2014
  Memory:
   16x Micron 36ASF2G72PZ-2G1A2 16 GB 2 rank 2133 MHz, configured at 1866 MHz

 (End of data from sysinfo program)
RD350 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:
LD_LIBRARY_PATH = "/usr/cpu2006/libs/32:/usr/cpu2006/libs/64:/usr/cpu2006/sh"

 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
 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
```

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Software Availability: Sep-2014

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
```

C++ benchmarks:
```
     -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
     -ansi-alias
```

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
```

Peak Compiler Invocation

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

C++ benchmarks (except as noted below):
```
     icpc  -m64

   450.soplex: icpc -m32 -L/opt/intel/composer_xe_2015/lib/ia32
```

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Peak Compiler Invocation (Continued)

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
          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

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

          470.lbm: basepeak = yes

       482.sphinx3: -xCORE-AVX2 -prof-gen(pass 1) -ipo -O3 -no-prec-div
                    -prof-use(pass 2) -unroll2

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

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Peak Optimization Flags (Continued)

450.soplex: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
-opt-malloc-options=3

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: -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch

459.GemsFDTD: basepeak = yes

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) -unroll4
-auto -inline-calloc -opt-malloc-options=3

Benchmarks using both Fortran and C:

435.gromacs: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-O3(pass 2) -no-prec-div(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 -auto-ilp32

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

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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

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

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