SPEC® CINT2006 Result
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Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL385 Gen10
(2.20 GHz, AMD EPYC 7601)

$SPECint®\_rate2006 =$ 2440
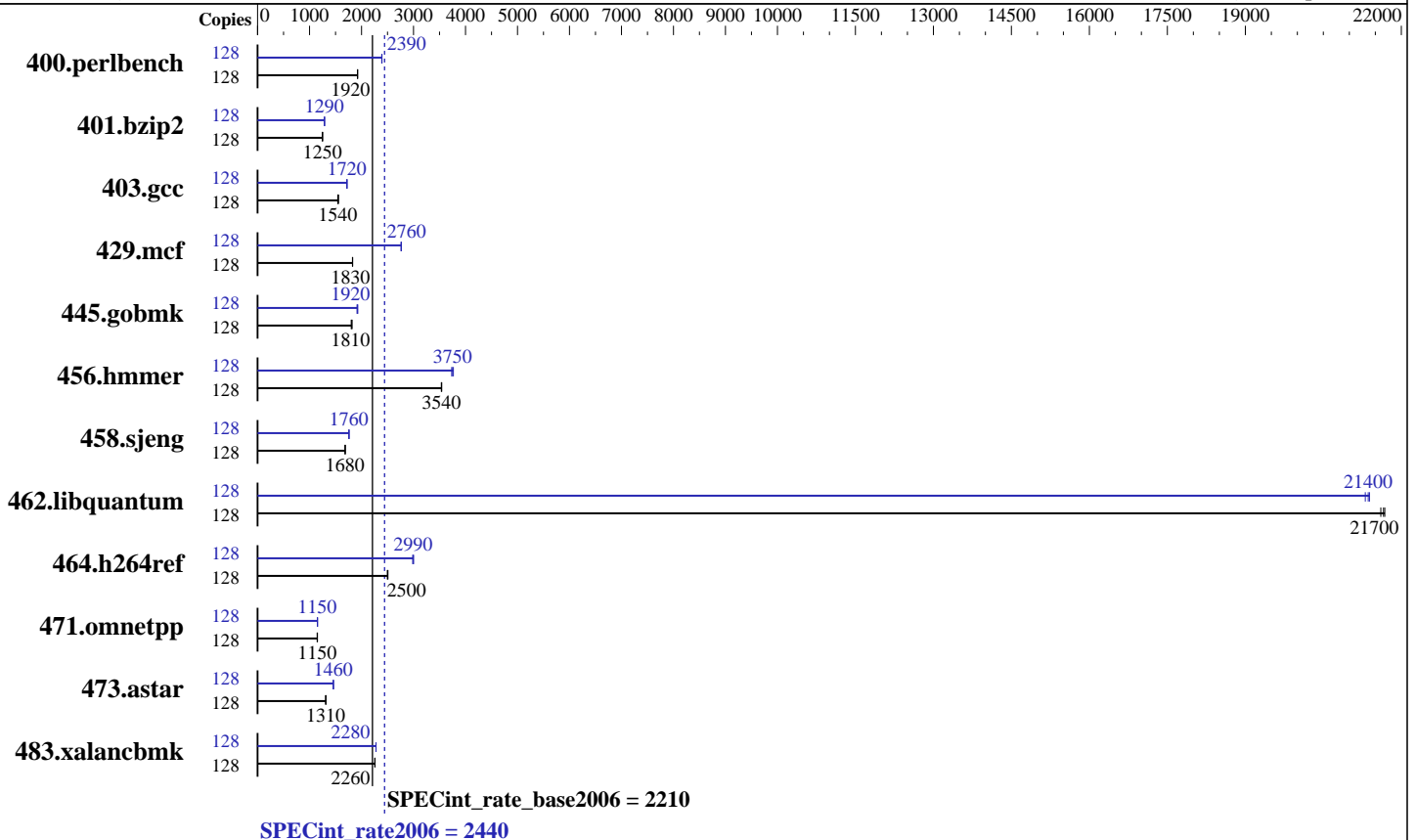
$SPECint\_rate\_base2006 =$ 2210

CPU2006 license: 3
Test sponsor: HPE
Tested by: HPE

Test date: Oct-2017
Hardware Availability: Nov-2017
Software Availability: Sep-2017

Benchmark	Copies	Result (base)	Result (peak)
400.perlbench	128	1920	2390
401.bzip2	128	1250	1290
403.gcc	128	1540	1720
429.mcf	128	1830	2760
445.gobmk	128	1810	1920
456.hmmer	128	3540	3750
458.sjeng	128	1680	1760
462.libquantum	128	21700	21400
464.h264ref	128	2500	2990
471.omnetpp	128	1150	1150
473.astar	128	1310	1460
483.xalancbmk	128	2260	2280

SPECint_rate_base2006 = 2210
SPECint_rate2006 = 2440

Hardware

CPU Name: AMD EPYC 7601
CPU Characteristics: AMD Turbo CORE technology up to 3.20 GHz
CPU MHz: 2200
FPU: Integrated
CPU(s) enabled: 64 cores, 2 chips, 32 cores/chip, 2 threads/core
CPU(s) orderable: 1, 2 chip(s)
Primary Cache: 64 KB I + 32 KB D on chip per core
Secondary Cache: 512 KB I+D on chip per core
L3 Cache: 64 MB I+D on chip per chip, 8 MB shared / 4 cores
Other Cache: None
Memory: 1 TB (16 x 64 GB 4Rx4 PC4-2666V-L)
Disk Subsystem: 1 x 300 GB 15 K RPM SAS, RAID 0
Other Hardware: None

Software

Operating System: SUSE Linux Enterprise Server 12 (x86_64) SP3 Kernel 4.4.73-5-default
Compiler: C/C++: Version 4.5.2.1 of x86 Open64 Compiler Suite (from AMD)
Auto Parallel: No
File System: ext3
System State: Run level 3 (multi-user)
Base Pointers: 32/64-bit
Peak Pointers: Not Applicable
Other Software: MicroQuill SmartHeap 10.0 32-bit Library for Linux

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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
400.perlbench	128	651	1920	649	1930	**650**	**1920**	128	**523**	**2390**	524	2390	523	2390
401.bzip2	128	991	1250	988	1250	**989**	**1250**	128	959	1290	**960**	**1290**	960	1290
403.gcc	128	668	1540	**667**	**1540**	661	1560	128	**599**	**1720**	598	1720	601	1720
429.mcf	128	638	1830	640	1830	**639**	**1830**	128	422	2760	**422**	**2760**	423	2760
445.gobmk	128	740	1810	**740**	**1810**	745	1800	128	701	1920	**701**	**1920**	696	1930
456.hmmer	128	337	3540	**337**	**3540**	338	3530	128	317	3770	320	3730	**318**	**3750**
458.sjeng	128	918	1690	**920**	**1680**	920	1680	128	**881**	**1760**	879	1760	882	1760
462.libquantum	128	**122**	**21700**	122	21700	123	21600	128	124	21300	124	21400	**124**	**21400**
464.h264ref	128	1129	2510	**1133**	**2500**	1134	2500	128	944	3000	949	2990	**947**	**2990**
471.omnetpp	128	**696**	**1150**	698	1150	694	1150	128	**694**	**1150**	694	1150	695	1150
473.astar	128	686	1310	**684**	**1310**	683	1310	128	**616**	**1460**	616	1460	617	1460
483.xalancbmk	128	391	2260	**391**	**2260**	392	2250	128	388	2280	388	2280	**388**	**2280**

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Submit Notes

```
    The config file option 'submit' was used.
    'numactl' was used to bind copies to the cores.
    See the configuration file for details.
```

Operating System Notes

```
    'ulimit -s unlimited' was used to set environment stack size
    'ulimit -l 2097152' was used to set environment locked pages in memory limit

    runspec command invoked through numactl i.e.:
    numactl --interleave=all runspec <etc>

    Set dirty_ratio=8 to limit dirty cache to 8% of memory
    Set swappiness=1 to swap only if necessary
    Set zone_reclaim_mode=1 to free local node memory and avoid remote memory
    Linux governor set to performance with cpupower "cpupower frequency-set -r -g performance"

    Transparent huge pages were enabled for this run (OS default)

    Set vm/nr_hugepages=114688 in /etc/sysctl.conf
    mount -t hugetlbfs nodev /mnt/hugepages
```

Platform Notes

```
     BIOS Configuration:
      Thermal Configuration set to Maximum Cooling
      Performance Determinism set to Power Deterministic
```

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Platform Notes (Continued)

```
    Processor Power and Utilization Monitoring set to Disabled
    Workload Profile set to General Throughput Compute
     Minimum Processor Idle Power Core C-State set to C6 State
```

General Notes

```
Environment variables set by runspec before the start of the run:
HUGETLB_LIMIT = "896"
LD_LIBRARY_PATH = "/home/cpu2006/amd1603-rate-libs-revB/32:/home/cpu2006/amd1603-rate-libs-revB/64"

The binaries were built with the AMD supported x86 Open64 Compiler Suite,
which is only available from AMD at
http://developer.amd.com/tools-and-sdks/cpu-development/x86-open64-compiler-suite/
```

Base Compiler Invocation

C benchmarks:
        opencc

C++ benchmarks:
        openCC

Base Portability Flags

```
    400.perlbench: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX_X64
       401.bzip2: -DSPEC_CPU_LP64
         403.gcc: -DSPEC_CPU_LP64
         429.mcf: -DSPEC_CPU_LP64
       445.gobmk: -DSPEC_CPU_LP64
      456.hmmer: -DSPEC_CPU_LP64
       458.sjeng: -DSPEC_CPU_LP64
   462.libquantum: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX
      464.h264ref: -DSPEC_CPU_LP64
    483.xalancbmk: -DSPEC_CPU_LINUX
```

Base Optimization Flags

C benchmarks:

```
    -Ofast -CG:local_sched_alg=1 -INLINE:aggressive=ON -IPA:plimit=8000
    -IPA:small_pu=100 -HP:bd=2m:heap=2m -mso -LNO:prefetch=2
    -march=bdver1 -mno-fma4 -mno-xop -mno-tbm
```

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Base Optimization Flags (Continued)

C++ benchmarks:

```
-Ofast -m32 -INLINE:aggressive=on -CG:cmp_peep=on -D__OPEN64_FAST_SET
-march=bdver1 -mno-fma4 -mno-xop -mno-tbm
-L/root/work/libraries/SmartHeap-10/lib -lsmartheap
```

Peak Compiler Invocation

C benchmarks:
    opencc

C++ benchmarks:
    openCC

Peak Portability Flags

```
        400.perlbench: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX_X64
            401.bzip2: -DSPEC_CPU_LP64
            445.gobmk: -DSPEC_CPU_LP64
            456.hmmer: -DSPEC_CPU_LP64
            458.sjeng: -DSPEC_CPU_LP64
        462.libquantum: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX
           464.h264ref: -DSPEC_CPU_LP64
             473.astar: -DSPEC_CPU_LP64
        483.xalancbmk: -DSPEC_CPU_LINUX
```

Peak Optimization Flags

C benchmarks:

```
        400.perlbench: -fb_create fbdata(pass 1) -fb_opt fbdata(pass 2) -Ofast
                       -LNO:prefetch=2 -LNO:opt=0 -IPA:plimit=20000
                       -OPT:unroll_times_max=8 -OPT:unroll_size=256
                       -OPT:unroll_level=2 -OPT:keep_ext=on -WOPT:if_conv=0
                       -WOPT:sib=on -CG:local_sched_alg=1 -CG:unroll_fb_req=on
                       -CG:movext_icmp=off -HP:bd=2m:heap=2m -march=bdver1
                       -mno-fma4 -GRA:aggr_loop_splitting=off
                       -GRA:loop_splitting=off

            401.bzip2: -fb_create fbdata(pass 1) -fb_opt fbdata(pass 2) -Ofast
                       -LNO:prefetch=2 -LNO:pf2=0 -OPT:alias=disjoint
                       -OPT:goto=off -CG:local_sched_alg=1 -HP:bdt=2m:heap=2m
                       -march=bdver2 -WB, -mno-fma4 -mno-tbm -mno-xop
```

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Peak Optimization Flags (Continued)

```
   403.gcc: -fb_create fbdata(pass 1) -fb_opt fbdata(pass 2) -Ofast
            -LNO:trip_count=256 -CG:cmp_peep=on -CG:pre_minreg_level=2
            -m32 -HP:bdt=2m:heap=2m -GRA:unspill=on -IPA:small_pu=200
            -WOPT:sib=on -march=bdver2 -mno-fma4 -WB, -mno-tbm
            -mno-xop

   429.mcf: -O3 -OPT:unroll_times_max=5 -ipa -INLINE:aggressive=on
            -CG:gcm=off -CG:dsched=on -GRA:prioritize_by_density=on
            -m32 -HP:bdt=2m:heap=2m -mso -march=bdver1 -mno-fma4

 445.gobmk: -fb_create fbdata(pass 1) -fb_opt fbdata(pass 2) -Ofast
            -OPT:unroll_size=256 -OPT:unroll_times_max=8
            -OPT:keep_ext=on -IPA:plimit=750 -IPA:min_hotness=300
            -IPA:pu_reorder=1 -LNO:ignore_feedback=off -WOPT:if_conv=2
            -HP:bd=2m:heap=2m -march=bdver1 -mno-fma4

 456.hmmer: -fb_create fbdata(pass 1) -fb_opt fbdata(pass 2) -Ofast
            -LNO:prefetch=2 -OPT:alias=disjoint
            -OPT:unroll_times_max=16 -OPT:unroll_size=512
            -OPT:unroll_level=2 -OPT:keep_ext=on -CG:cflow=0
            -CG:cmp_peep=on -CG:pre_local_sched=off -HP:bdt=2m:heap=2m
            -CG:p2align=0 -CG:load_exe=3 -CG:dsched=on -march=bdver1
            -mno-fma4

 458.sjeng: -fb_create fbdata(pass 1) -fb_opt fbdata(pass 2) -Ofast
            -CG:ptr_load_use=0 -CG:divrem_opt=on -CG:movext_icmp=off
            -CG:locs_best=on -LNO:full_unroll=10 -IPA:pu_reorder=2
            -HP:heap=2m:bd=2m -WOPT:sib=on -march=bdver1 -mno-fma4

462.libquantum: -Ofast -mso -OPT:unroll_size=512 -OPT:unroll_times_max=16
            -LNO:prefetch=2 -LNO:prefetch_ahead=4 -LNO:pf2=0
            -CG:local_sched_alg=1 -CG:p2align=0 -INLINE:aggressive=ON
            -IPA:plimit=15000 -IPA:small_pu=100
            -HP:bdt=2m:heap=2m,limit=300 -march=bdver2 -mno-fma4

464.h264ref: -fb_create fbdata(pass 1) -fb_opt fbdata(pass 2) -O3
            -OPT:unroll_size=256 -OPT:unroll_times_max=2
            -IPA:plimit=20000 -OPT:alias=disjoint -CG:ptr_load_use=0
            -CG:local_sched_alg=1 -HP:bdt=2m:heap=2m -march=bdver1
            -mno-fma4
```

C++ benchmarks:

```
471.omnetpp: -Ofast -m32 -INLINE:aggressive=on -CG:cmp_peep=on
            -WOPT:sib=on -D__OPEN64_FAST_SET -march=bdver2 -mno-fma4
            -L/root/work/libraries/SmartHeap-10/lib -lsmartheap

  473.astar: -fb_create fbdata(pass 1) -fb_opt fbdata(pass 2) -Ofast
            -WOPT:if_conv=0 -WOPT:sib=on -CG:divrem_opt=on
            -CG:p2align=1 -CG:dsched=on -GRA:optimize_boundary=on
            -OPT:alias=disjoint -INLINE:aggressive=on
```

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Peak Optimization Flags (Continued)

473.astar (continued):
```
-IPA:small_pu=3000 -IPA:plimit=3000 -HP:bdt=2m:heap=2m
-march=bdver1 -mno-fma4
```

483.xalancbmk: `-Ofast -LNO:prefetch=2 -OPT:unroll_size=512`
```
-OPT:unroll_times_max=8 -D__OPEN64_FAST_SET
-INLINE:aggressive=on -m32 -CG:cmp_peep=on
-CG:local_sched=off -CG:p2align=1 -GRA:unspill=on
-TENV:frame_pointer=off -fno-emit-exceptions -march=bdver2
-mno-fma4
-L/root/work/libraries/SmartHeap-10/lib -lsmartheap
```

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/x86-openflags-rate-revA-I.html
http://www.spec.org/cpu2006/flags/HPE-Platform-Flags-AMD-V1.2-EPYC-revB.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/x86-openflags-rate-revA-I.xml
http://www.spec.org/cpu2006/flags/HPE-Platform-Flags-AMD-V1.2-EPYC-revB.xml

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