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COSC 201

HW 1

1.4.)

a.) 3,932,160 bytes

b.) .31457 seconds

1.6.)

a.) For P1 the global CPI is 2.6. For P2, the global CPI is 2.0.

b.) The clock cycles for P1 is 2,600,000 and the clock cycles for P2 is 2,000,000.

1.7.)

a.) The average CPI for compiler A is 1.1. The average CPI for compiler B is 1.25.

c.) Assuming this compiler has a clock cycle time of 1 ns like the other compilers, the execution time will be .00066 seconds, meaning this compiler is 1666.66 times faster than compiler A and 2272.72 times faster than compiler B.

1.9.1.) The execution time for the program with one processor is 9.6 seconds with two processors is 6.98 seconds, with 4 processors is 3.837 seconds, and with 8 processors is 2.2 seconds. Therefore the relative speedup for two processors is 1.375 times as fast, for 4 processors is 2.502 times as fast, and for 8 processors is 4.286 times as fast.

1.12.1.) This is false in this case. P2 has a CPU time (.25 seconds) that is less than ¼ of the CPU time of P1 (1.125 seconds), even though P1 has a slightly higher clock rate.

1.12.3.) No, I found that p1 has a worse performance than p2 (see 1.12.1) even though it has a better MIPS (4444.44) than p2 (4000).

1.13.1.) The original operation takes 250 s while the modified program takes 181 seconds, therefore there is a 69 second reduction in runtime.

1.13.3.) No, this could not work because a 20% decrease in overall time would be a decrease of 50 seconds. Because the branch instructions only take 40 seconds to execute, this would not be a possible improvement by only modifying the branch instructions.

1.15.) With 2 processors: runtime = 54 seconds, speedup = 1.851 times as fast, ideal speedup = 2.0 times as fast. With 4 processors: runtime = 29 seconds, speedup = 3.45 times as fast, ideal speedup = 4 times as fast. With 8 processors, runtimes = 16.5 seconds, speedup = 6.06 times as fast, ideal speedup is 8 times as fast. With 16 processors, runtime = 10.25 seconds, speedup = 9.75 times as fast, ideal speedup is 16 times as fast. With 32 processors, runtime = 7.125 seconds, speedup = 14.03 times as fast, ideal speed is 32 times as fast. With 64 processors, runtime = 5.5625 seconds, speedup = 17.977 times as fast, ideal speedup = 64x as fast. With 128 processors, runtime = 4.78 seconds, speedup = 20.92 times as fast, ideal speedup is 128x as fast.