

GEORGIA INSTITUTE OF TECHNOLOGY

College of Computing

CS6290/CS4290 — High-Performance Computer Architecture

Fall 2001

CS6290/CS4290
Homework 1

Issued: August 20, 2001
Due: August 31, 2001

Purpose: This homework covers Amdahl's law, instruction sets and some VLSI issues.

Reading: H&P Chapters 1, 2 for background.
[Patterson85] to be discussed in class Friday.

Problems:

1. Amdahl's law.
2. Instruction sets.
3. MIPS vs. SPEC: performance experiment.
4. Read [Patterson85].

Collaboration: (*As in the syllabus*) collaboration on projects and homework in **pairs** is encouraged. If you work in a pair, turn in one write-up with the names of both collaborators. You're welcome to discuss high-level concepts with other groups, but all homework solutions must be worked out and written up separately.

Problem 1: Amdahl's Law

A: Problem 1.1 in the book.

B: Problem 1.12 in the book.

Problem 2: Instruction Sets

A: Problem 2.3 in the book. Show all four code sequences as well as the computed code sizes and total memory bandwidths. The four variables should start and end in memory.

Problem 3: MIPS versus SPEC

A: Problem 1.16 in the book. See the course web page for instructions on running the right version of gcc and for ideas on timing your own code. Note that your program doesn't have to produce an actual MIPS number (although that's interesting to do) but just an execution time that you can use to compare the two machines. How does the ratio of your code times compare to the ratio of gcc times? Also, turn in your C code. UltraSPARCs (e.g. forge, cities cluster) versus IA32 machines (states cluster) make good targets for comparison because they're very different.

Problem 4: Reading

(0 points) Please read [Patterson85] in order to be prepared to discuss it on Friday, August 24st.