

CS328, Fall 2001, Test 1

Time 50 min. 4 questions. Open notes/books. Use extra paper as needed, but make sure to identify each answer.

YOU MUST RETURN THIS PAGE. NAME _____

- 1 You have the source for a C compiler. Its a wonderful compiler that generated fast and small target. Super. TO use it you use your old C executable compiler, which was knows to generate very inefficient target. So you compile the new one.
 - a) Show how you do that
 - b) What are the potential inefficiencies now?
 - c) How would you fix those problems?

- 2 10) You have an assembler where each instruction takes 1 argument. The instruction takes 6 bits, and the argument takes 18 bits (total of 3 bytes). Assembly arguments can be either symbols or immediate values. Data is in 2 bytes. For example, we may write either or
Add X
Add 20
 - a) What serious limitations does the language have? Why? Assume that all arguments translate to addresses, that is literal pool is needed.
 - b) Would a) change if immediately values translated into immediate arguments in the machine code? How?
 - c) Would a) change if data and program were in different segments? How?

- 3 10) Show machine code, in dec digits for individual bytes, for this program
LOAD X
SUB 10
STORE Y
ADD 20
BOGUS
JUMP EXIT
X CONST 200
EXIT: STORE X
STOP
Y CONST 100
STOP takes no arguments and uses 1 byte, other opcodes take 1 byte and each argument takes 1 byte. Assume opcodes are Add=10, Load=20, Sub=30, Stop=40, Jump=50, Store=60, Bogus=70. Data storage is allocated in the same segment exactly where it appears in the program except all data must be even aligned and takes 2 bytes. Literals are appended at the end and that they are treated like other data.

- 4 We have a washing machine. The machine takes dimes and quarters only. It needs 40 cents for operation. The user puts money until the machine detects 40 cents, in which case it starts and also if necessary it gives change in nickels. We want a FA to handle the task.
 - a) what is the alphabet

- b) what are the tokens?
- c) design the FA as a graph, indicating which states do recognize which tokens