

Topic for today:

Macroinstruction formats

How long is an instruction?

“On some machines, all instructions have the same length; on others there may be two or three lengths. Moreover, instructions may be shorter than, the same length as, or longer than the word length.”

– Andrew Tanenbaum
Structured Computer Organization

Macroinstruction formats

- 3-address instructions
- 2-address instructions
- 1-address instructions
- 0-address instructions (huh?)

3-address format

- Opcode
- Three address fields:
 - 2 operands
 - Where to store the result

2-address format

- Opcode
- Two address fields:
 - 2 operands
- The result is stored in the accumulator or (more typically) in one of the operand locations

1-address format

- Opcode
- One address field:
 - one of the operands
- The other operand is the accumulator register
- The result is stored in the accumulator

0-address format

- Typical instruction is only an opcode
- Operands are kept in a *stack*:
 - Operands are popped into CPU
 - Result is pushed back to stack
- The only instructions with addresses are explicit pushes and pops (i.e., loads and stores)