CS-341 Lecture 25

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The IJVM Datapath

- Registers, ALU, and Shifter were designed in Chapter 3.
- B and C busses, but no A bus (register H instead)
- Memory Interface
  - MAR/MDR for reading and writing words
  - PC/MBR for reading bytes from the instruction stream.
  - SP/TOS for Stack Operations
- Microprogrammed Control

Executing an IJVM *add* Instruction

- This occurs after an *add* instruction's op code has been fetched (read) from memory.
  - Copy TOS (which holds a copy of the value in the top of stack location in memory) to H
  - Subtract 1 from SP to get the address for reading the second from top of stack memory location.
    - MAR, SP ← SP – 1
  - Read the second from top of stack memory location into the MDR.
  - MDR, TOS ← MDR + H
  - Write the value in the MDR to the new top of stack location in memory.

Controlling the Datapath

- Control Points
  - Select one of 9 registers to connect to the B Bus.
    - 4 bits
  - Select ALU operation
    - 6 bits
  - Select Shifter operation
    - 2 bits
  - Select which registers are loaded from the C Bus.
    - 9 bits
  - Specify Memory operation (read, write, fetch)
    - 3 bits (why not 2?)
- Control Words (Microinstructions)
  - Above 24 bits plus 12 to select next control word.