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Digital Logic
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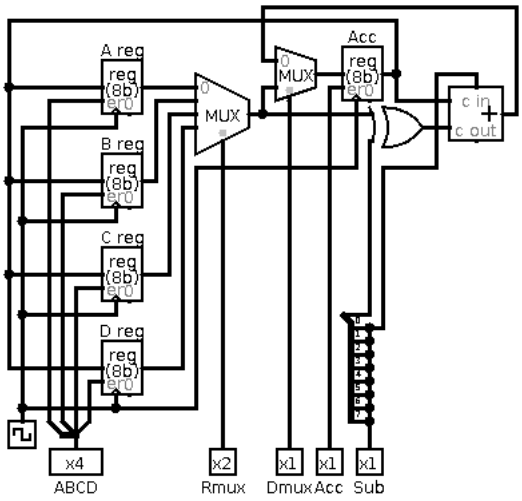
Lab 5

Part 1

- 1) Register Transfer Circuit



  2)
  There are 9 bits in the control code.

Part 2 - Coding your Register Transfer Sequence

- 1)
  - 1)
    $A \rightarrow Acc$
  - 2)
    $Add(Acc, B) \rightarrow Acc$
  - 3)
    $Sub(Acc, C) \rightarrow Acc$
  - 4)
    $Add(Acc, D) \rightarrow Acc$
- 2)
  - 1)
    $A \rightarrow Acc$
    000000110

- 2)
  $Add(Acc, B) \rightarrow Acc$
  000001010
- 3)
  $Sub(Acc, C) \rightarrow Acc$
  000010011
- 4)
  $Add(Acc, D) \rightarrow Acc$
  000011010

- 3)
  - 1)
    $0x13 = 19_{10}$
  - 2)
    $0x5B = 91_{10}$
  - 3)
    $0x3A = 58_{10}$
  - 4)
    $0xF0 = 240_{10}$

- 4)
  - 1)
    $A \rightarrow Acc$
    $Acc = 0x13 = 19$
  - 2)
    $Add(Acc, B) \rightarrow Acc$
    $Acc = 19 + 91 = 110 = 0x6E$
  - 3)
    $Sub(Acc, C) \rightarrow Acc$
    $Acc = 110 - 58 = 52 = 0x34$
  - 4)
    $Add(Acc, D) \rightarrow Acc$
    $Acc = 52 - 16 = 36 = 0x24$

- 5)
  None of the operations produced overflow.

- 6)
  $0x24 = 36$

- 7)
  $(((A + B) - C) + D)$

Part 3 - Executing and Recording You Register Transfer Sequence

- 1) Execution Trace Table

Time	A	B	C	D	Acc	Control Code	Action
0	$0x13$	$0x5B$	$0x3A$	$0xF0$	$0x00$	0000 00 1 1 0	$A \rightarrow Acc$
1	$0x13$	$0x5B$	$0x3A$	$0xF0$	$0x13$	0000 01 0 1 0	$Add(B, Acc) \rightarrow Acc$
2	$0x13$	$0x5B$	$0x3A$	$0xF0$	$0x6E$	0000 10 0 1 1	$Sub(C, Acc) \rightarrow Acc$
3	$0x13$	$0x5B$	$0x3A$	$0xF0$	$0x34$	0000 11 0 1 0	$Add(D, Acc) \rightarrow Acc$
4					$0x24$		

There should be 5 registers.