

CENG3420

Lab 3-3: LC-3b Datapath

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Overview

Introduction

Lab3-3 Assignment

Golden Results



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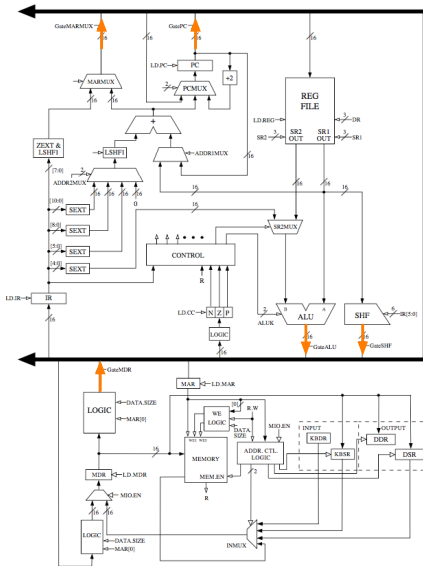
The Slides are self-contained? **NO!**

Do please refer to following document:

- ▶ [LC-3b-datapath.pdf](#)
- ▶ [LC-3b-ISA.pdf](#)



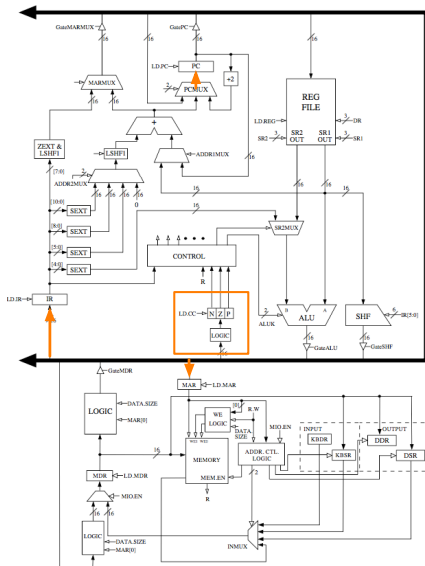
LC-3b Datapath



In lab 3-2, we write data into bus.



LC-3b Datapath



In this lab, we read data from bus:

- ▶ `NEXT_LATCHES.PC`
- ▶ `NEXT_LATCHES.IR`
- ▶ `NEXT_LATCHES.MAR`
- ▶ `NEXT_LATCHES.N`
- ▶ `NEXT_LATCHES.Z`
- ▶ `NEXT_LATCHES.P`



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Lab3-3 Assignment

- ▶ Paste your previous codes into `eval_bus_drivers()` & `drive_bus()`.
- ▶ Finish the following function.

```
671 /*
672 * datapath routine for computing all functions that need to latch
673 * values in the datapath at the end of this cycle. some values
674 * require sourcing the bus; therefore, this routine has to come
675 * after drive_bus.
676 */
677 void latch_datapath_values()
678 {
679     /* LD_MDR */
680     if (GetLD_MDR(CURRENT_LATCHES.MICROINSTRUCTION))
681     {
682         if (GetMID_ENC(CURRENT_LATCHES.MICROINSTRUCTION))
683         {
684             /* Insert TIMING here */
685             NEXT_LATCHES.MDR = MemOut/!Low16bits(MEMORY[CURRENT_LATCHES.MAR >> 1][1] << 8) + MEMORY[CURRENT_LATCHES.MAR >> 1][0]);
686         }
687         else
688         {
689             NEXT_LATCHES.MDR = blockMDRLogic2(partVal(CURRENT_LATCHES.MAR, 0, 0), GetData_SIZE(CURRENT_LATCHES.MICROINSTRUCTION), BUS);
690         }
691     }
692     /* LD_BEN */
693     if (GetLD_BEN(CURRENT_LATCHES.MICROINSTRUCTION))
694     {
695         NEXT_LATCHES.BEN = (partVal(CURRENT_LATCHES.IR, 11, 11) & CURRENT_LATCHES.N) | (partVal(CURRENT_LATCHES.IR, 10, 10) & CURRENT_LATCHES.Z) | (partVal(CURRENT_LATCHES.IR, 9, 9) & CURRENT_LATCHES.P);
696     }
697     /* LD_REG */
698     if (GetLD_REG(CURRENT_LATCHES.MICROINSTRUCTION))
699     {
700         NEXT_LATCHES.REGS[blockDRMUX(GetDRMUX(CURRENT_LATCHES.MICROINSTRUCTION), partVal(CURRENT_LATCHES.IR, 11, 0), 7)] = BUS;
701     }
702     /*
703     * lab3-3 assignment in the following
704     *
705     */
706     /* LD_MAR */
707     /* LD_IR */
708     /* LD_CC */
709     /* LD_PC */
710     /*
711     *
712     */
713     /*
714     */
715 }
```



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Assignment Package

- ▶ `lc3bsim3-3.c`, `lc3bsim3.h`: codes to work on
- ▶ `libems3-3-(darwin/linux).a`: library
- ▶ `ucode3`: FSM
- ▶ `Makefile`
- ▶ `bench`: folder with benchmarks

Run the simulator:

1. `make`, then binary “`lc3bsim3-3`” is generated
2. `./lc3bsim3-3 ucode3 bench/toupper.cod`



Golden Results – case toupper.cod

- ▶ Please refer to Lab 3-1 slides.



Golden Results – case count10.cod

- ▶ Please refer to Lab 3-2 slides.



Thanks. For any question:
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