Ch 5. Datapath and Control

Book Sections 5.1-5.5

• Understanding the Single-Cycle Implementation
  o The Datapath (Figure 5.17)
  o For each basic MIPS instruction, know the path through which data flows
  o For each basic MIPS instruction, know all control signal values
  o Associate each component in the datapath with all operations that use that component
  o Associate each wire in the datapath with all operations that use that wire
  o Be able to modify the datapath to accommodate a new instruction
  o Know how to implement a controller (remember, its combinational logic)

• Understanding the Multi-Cycle Implementation
  o Why is Multi-cycle better than Single-cycle?
  o The Datapath (Figure 5.28)
  o Memorize the 5 steps required to execute each instruction
  o Understand the control FSM (Figure 5.38)
  o Memorize what each type of operation performs in each of the 5 steps
  o For each basic MIPS instruction, know the path through which data flows in each step
  o For each basic MIPS instruction, know all control signal values in each step
  o Be able to modify the datapath to accommodate a new instruction
  o Know how to implement a controller (remember, its sequential logic)

Ch 6. Enhancing Performance with Pipelining

Book Sections 6.1-6.3

• Definition of Pipelining
  o How does pipelining increase hardware utilization?
  o What are control and data hazards? (Don’t worry about forwarding and branch prediction yet)

• Pipelined Datapath and Control
  o Understand the datapath in Figure 6.17.
  o What does each instruction do in each stage?
  o What are the control signal values at each stage, for each instruction?