

Exam II Review

Tom Kelliher, CS 240

Apr. 21, 2004

1 Review

1. For Monday: Read 7.1–4.
2. Basic datapath elements: memory, registers, ALUs/adders, register file, muxes.
3. The instruction cycle.
4. Single-cycle datapath. Combinational control.
5. Multi-cycle datapath:
 - (a) Improvement over the single-cycle implementation.
 - (b) Sequential control.
 - (c) State machine/instruction cycle stages.
6. Pipelining:
 - (a) Changes to datapath, control
 - (b) Hazards: structural, data, control. Penalties, solutions.
 - (c) Branch prediction: static, dynamic. Implementation.
7. Superscalar execution:

- (a) IPC
- (b) Widening the *entire* datapath.
- (c) Applicability.
- (d) Types of data dependencies. True, false dependencies. Removal of false dependencies: register renaming.
- (e) Out-of-order execution, in-order completion.