

# CSCI 210: Computer Architecture

## Lecture 29: More Pipelining

Stephen Checkoway

Oberlin College

May 4, 2022

Slides from Cynthia Taylor

# Announcements

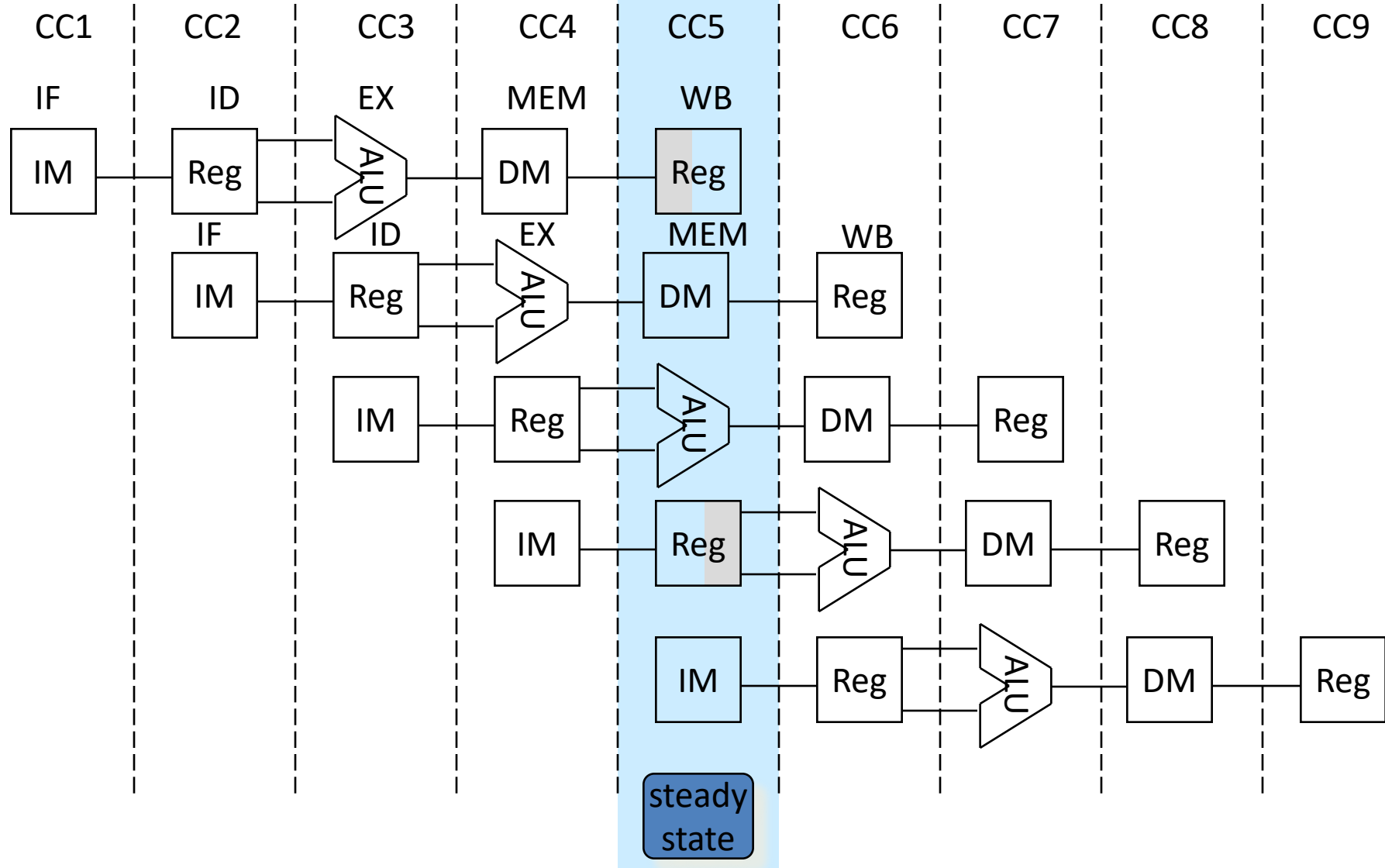
- Problem Set 9 due Friday
- Lab 8 due Sunday
- Office hours today 13:30–14:30

# MIPS Pipeline

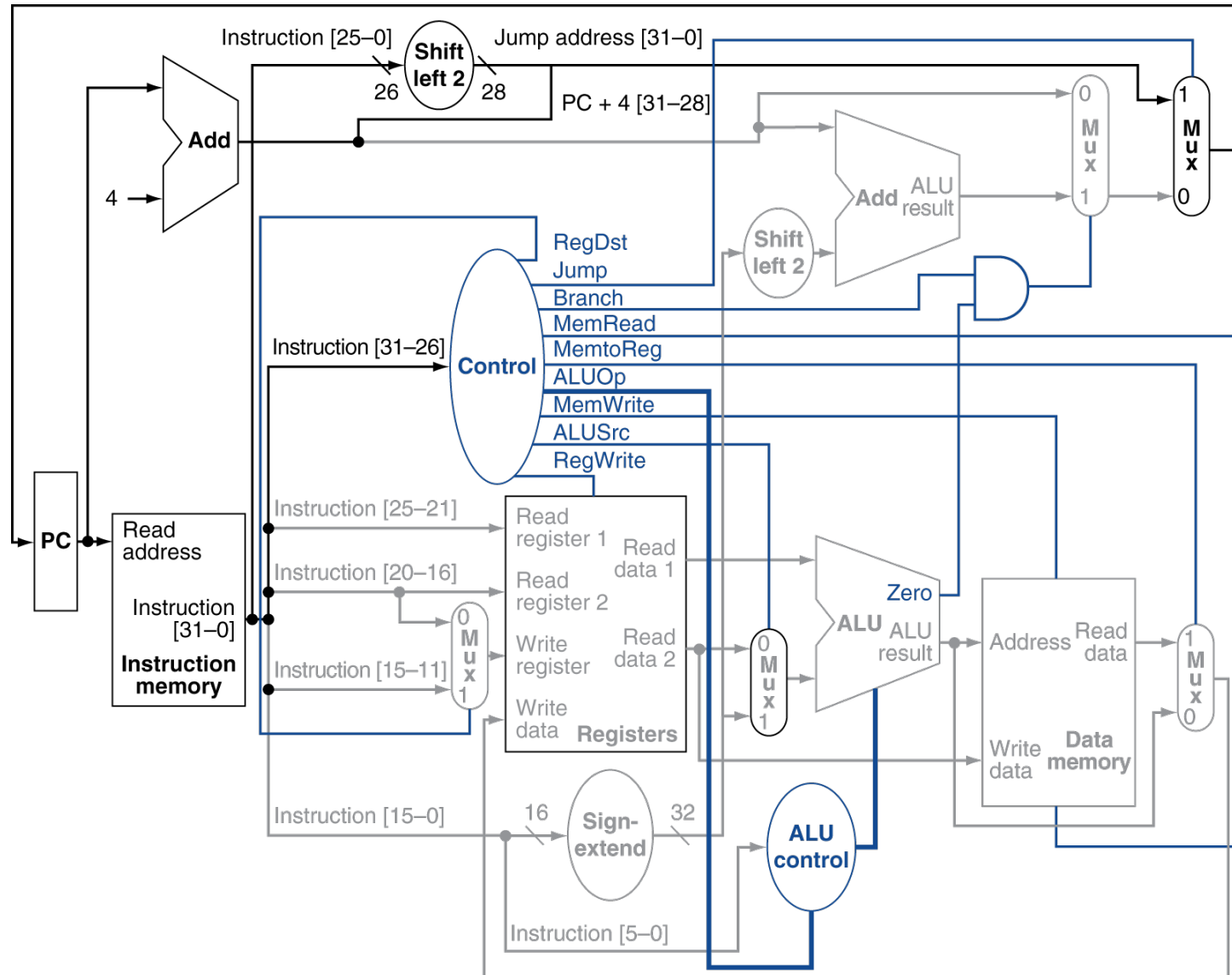
Five stages, one step per stage, one clock cycle per stage

1. IF: Instruction fetch from memory
2. ID: Instruction decode & register read
3. EX: Execute operation or calculate address
4. MEM: Access memory operand
5. WB: Write result back to register

# Execution in a Pipelined Datapath

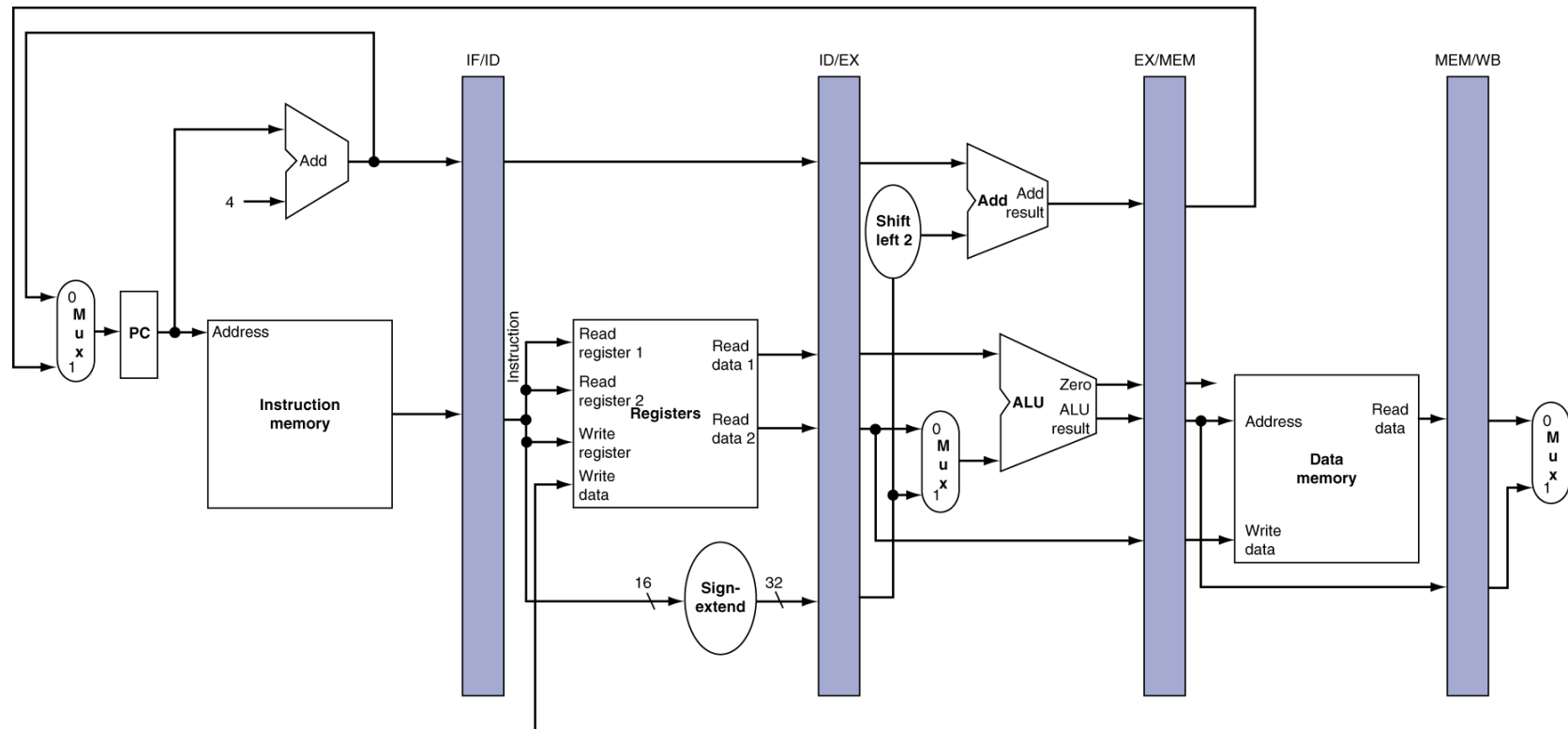


# Single Cycle Datapath

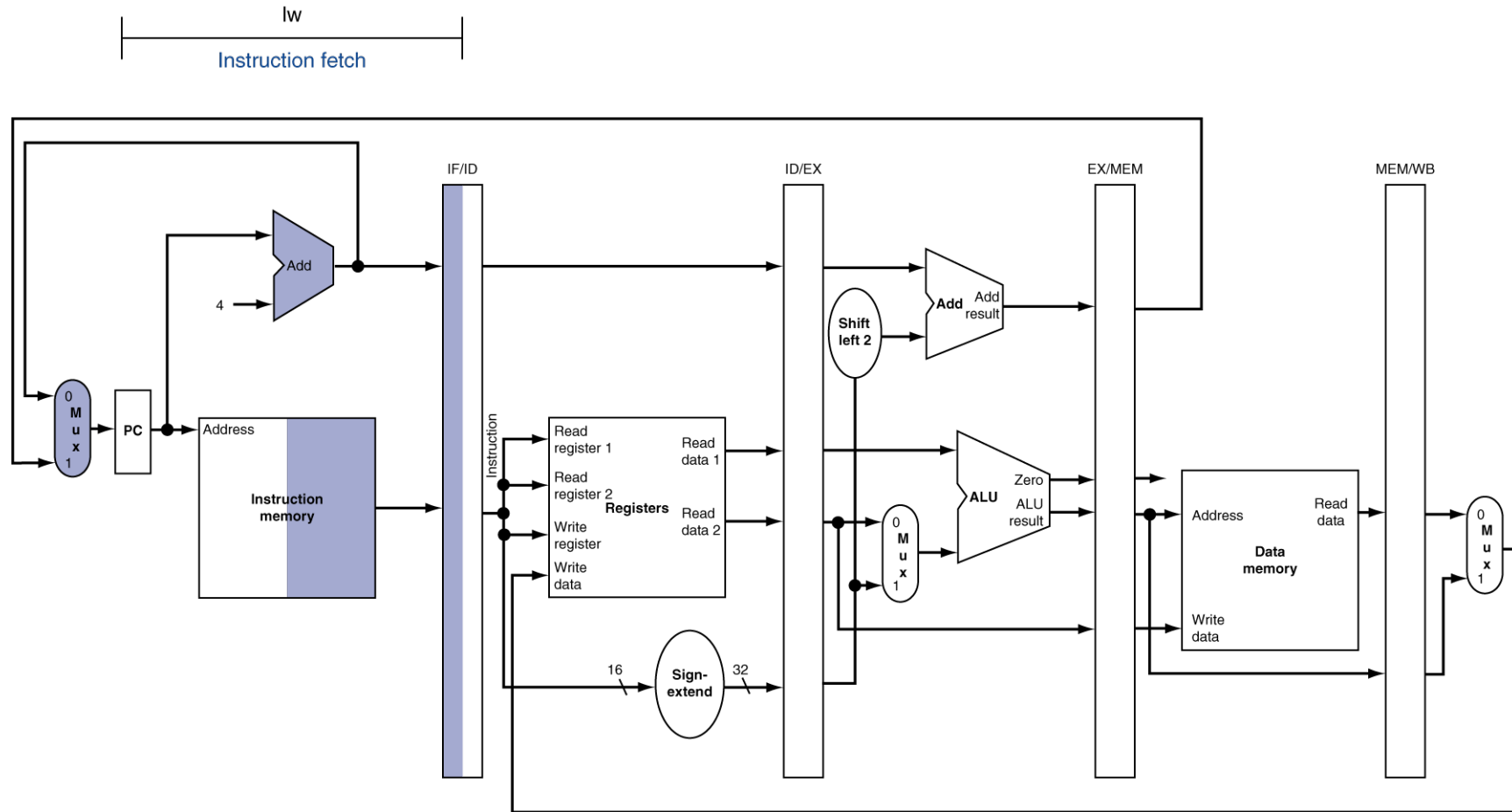


# Pipeline registers

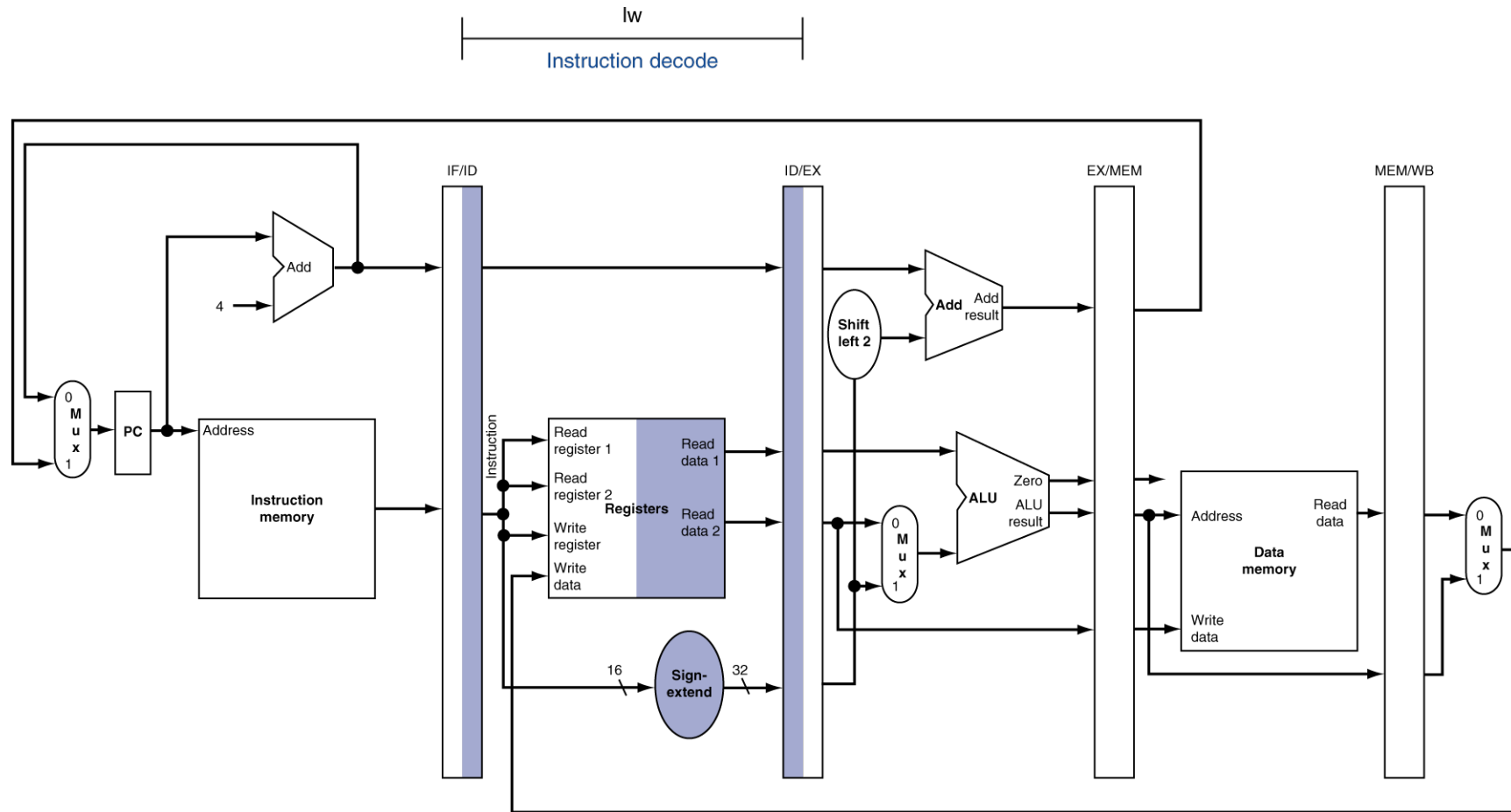
- Need registers between stages
  - To hold information produced in previous cycle



# IF for Load, Store, ...



# ID for Load, Store, ...

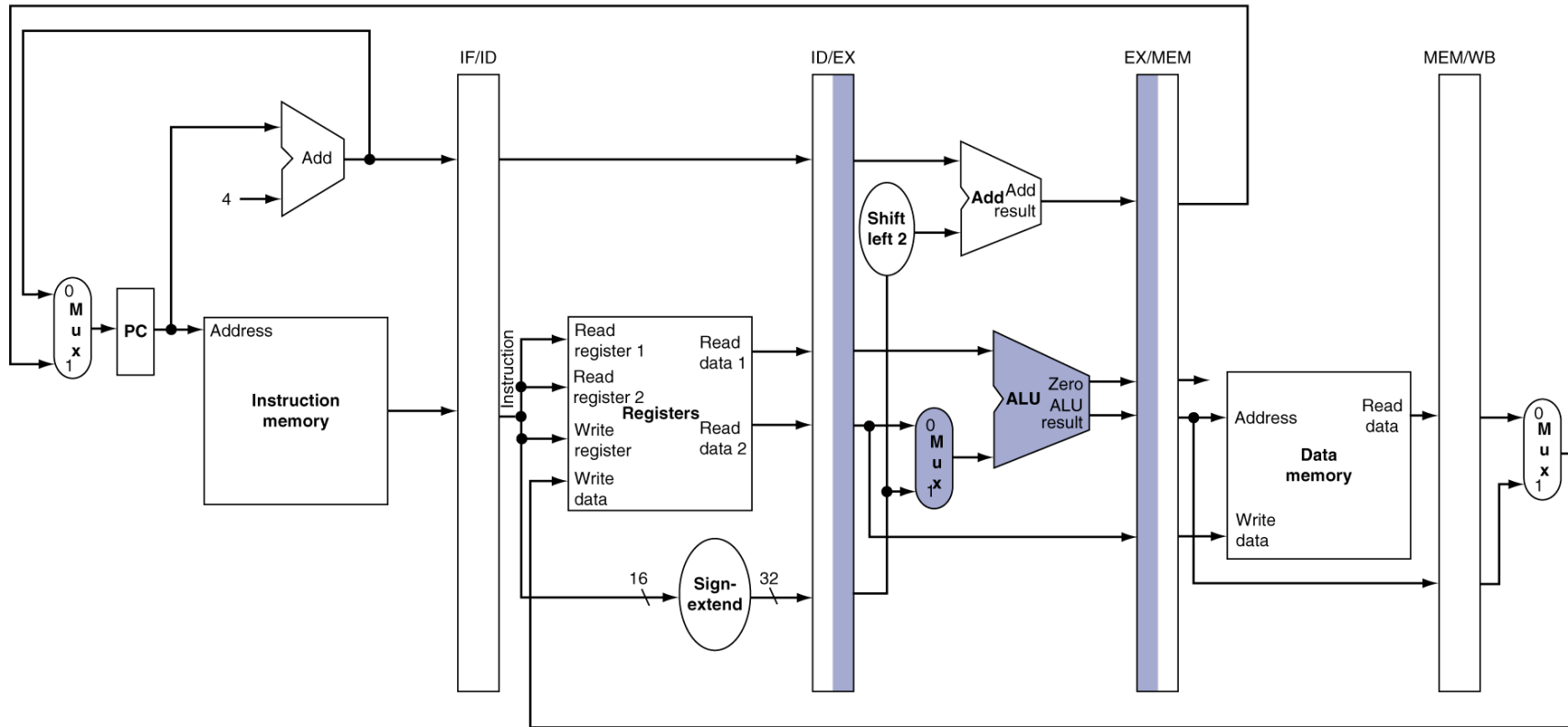
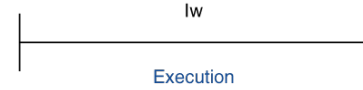




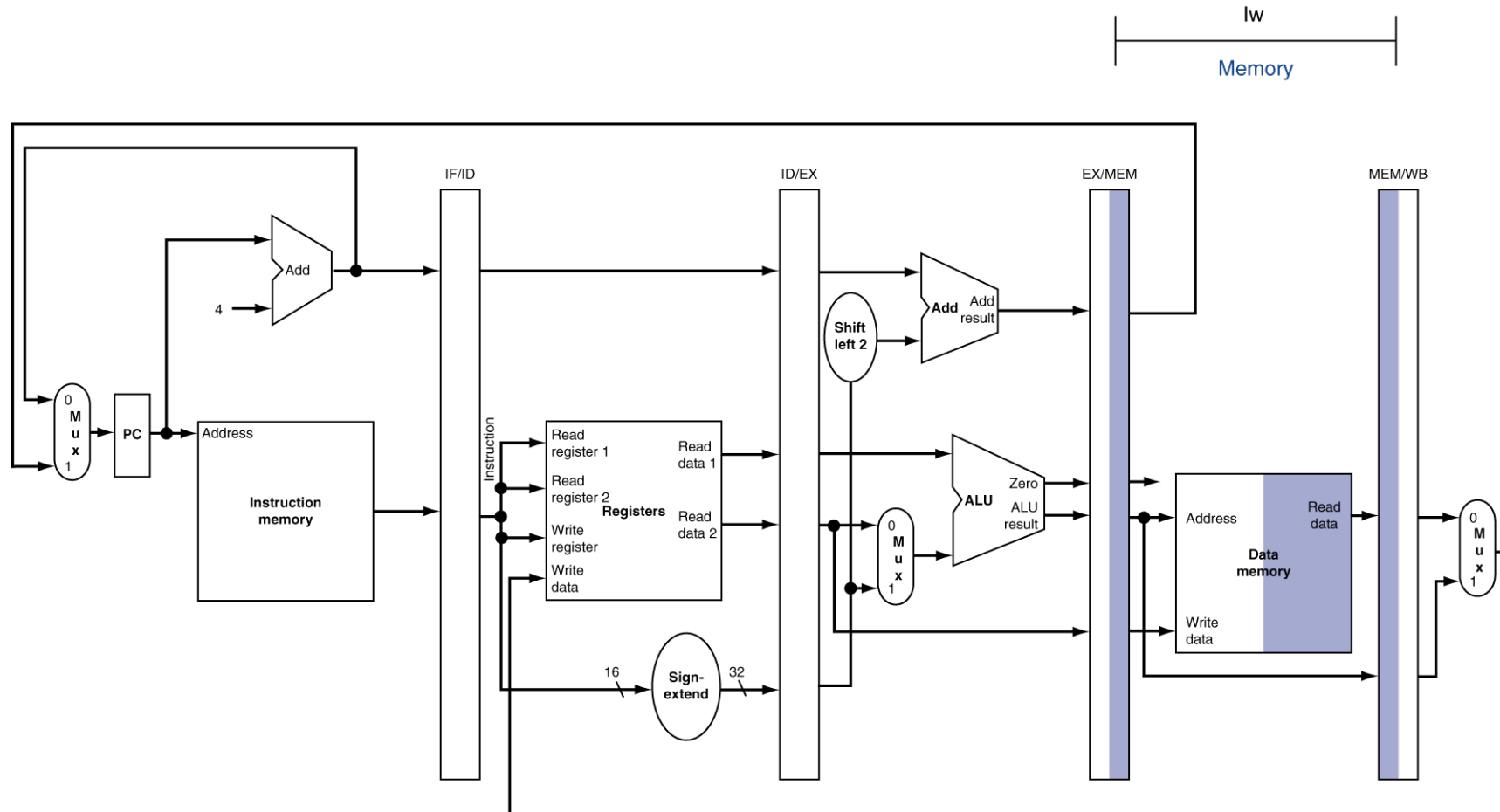
The register file will output data from both read registers, but load will only use one of them. We should

- A. Save both of them in ID/EX
- B. Only save the one we will use in ID/EX
- C. Do something else

# EX for Load

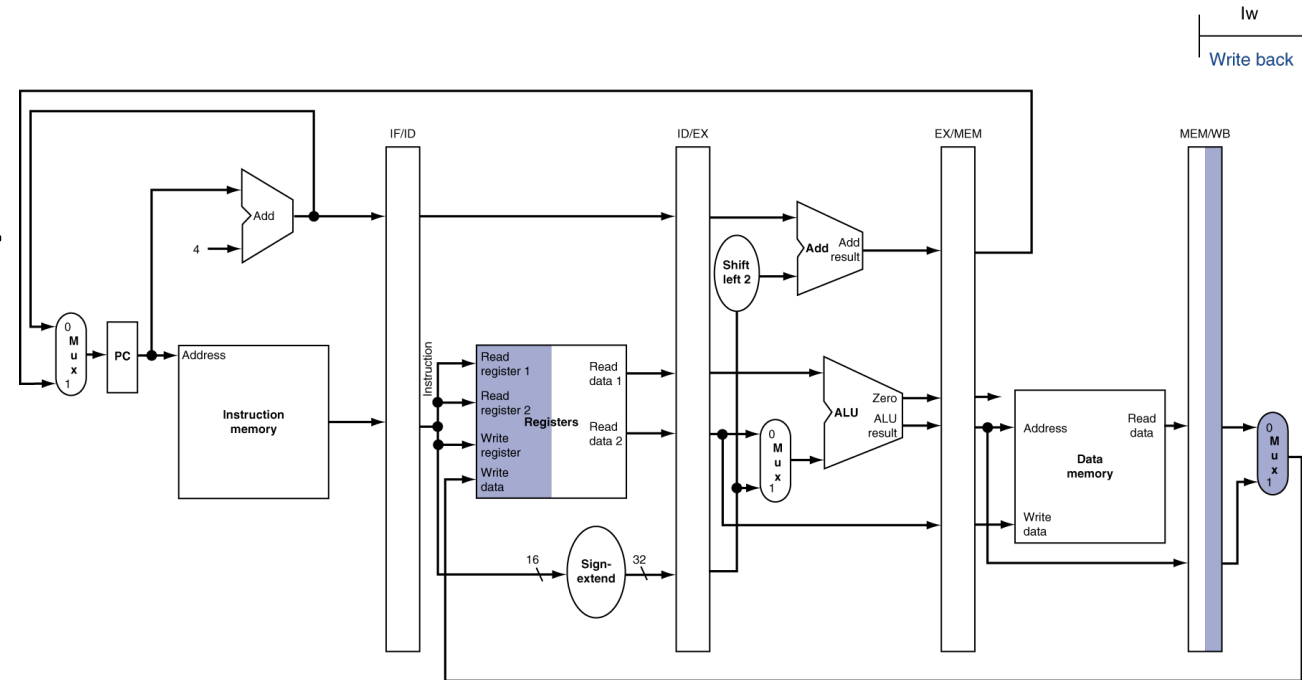


# MEM for Load

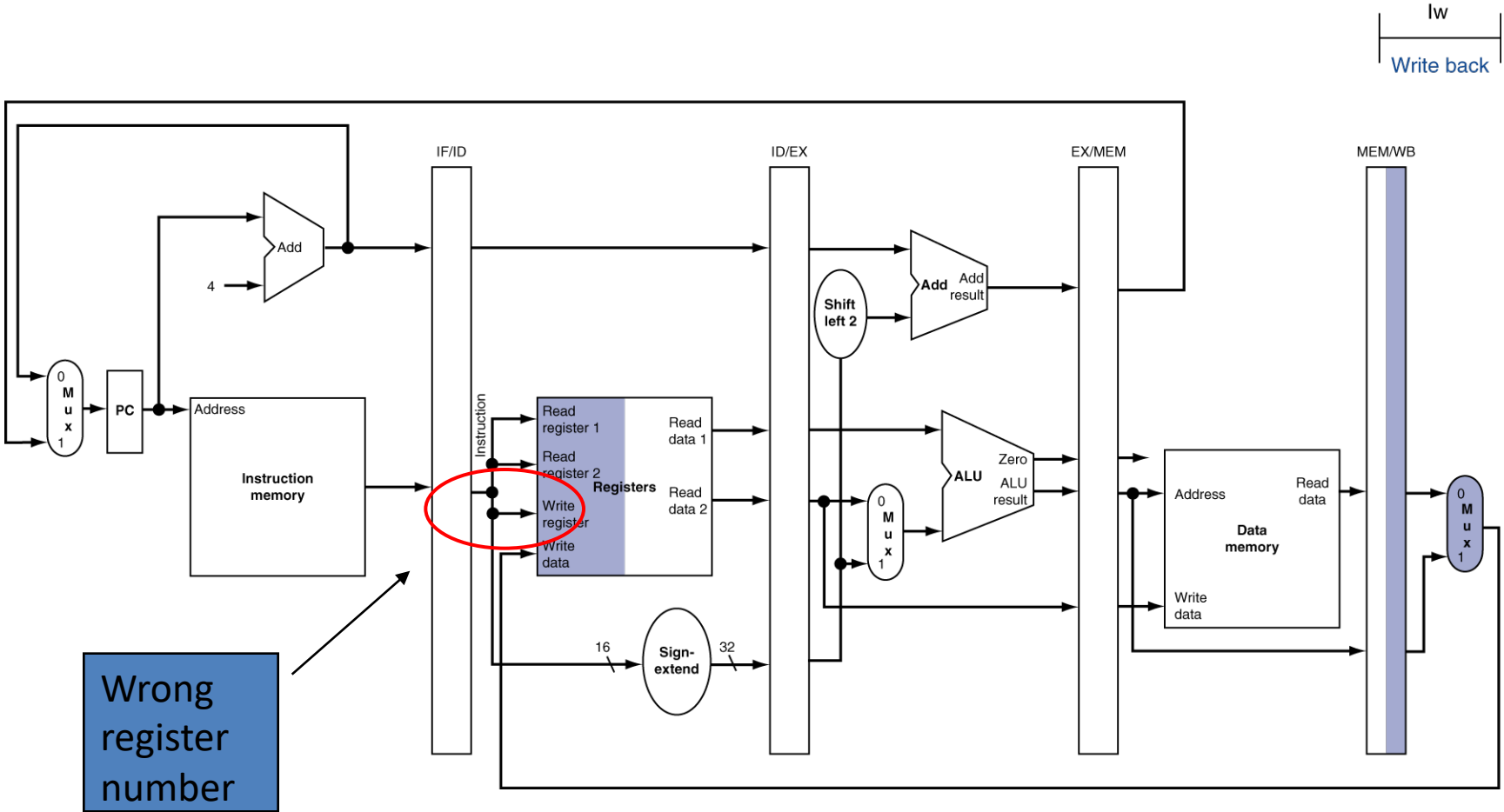


# When we do WB for load

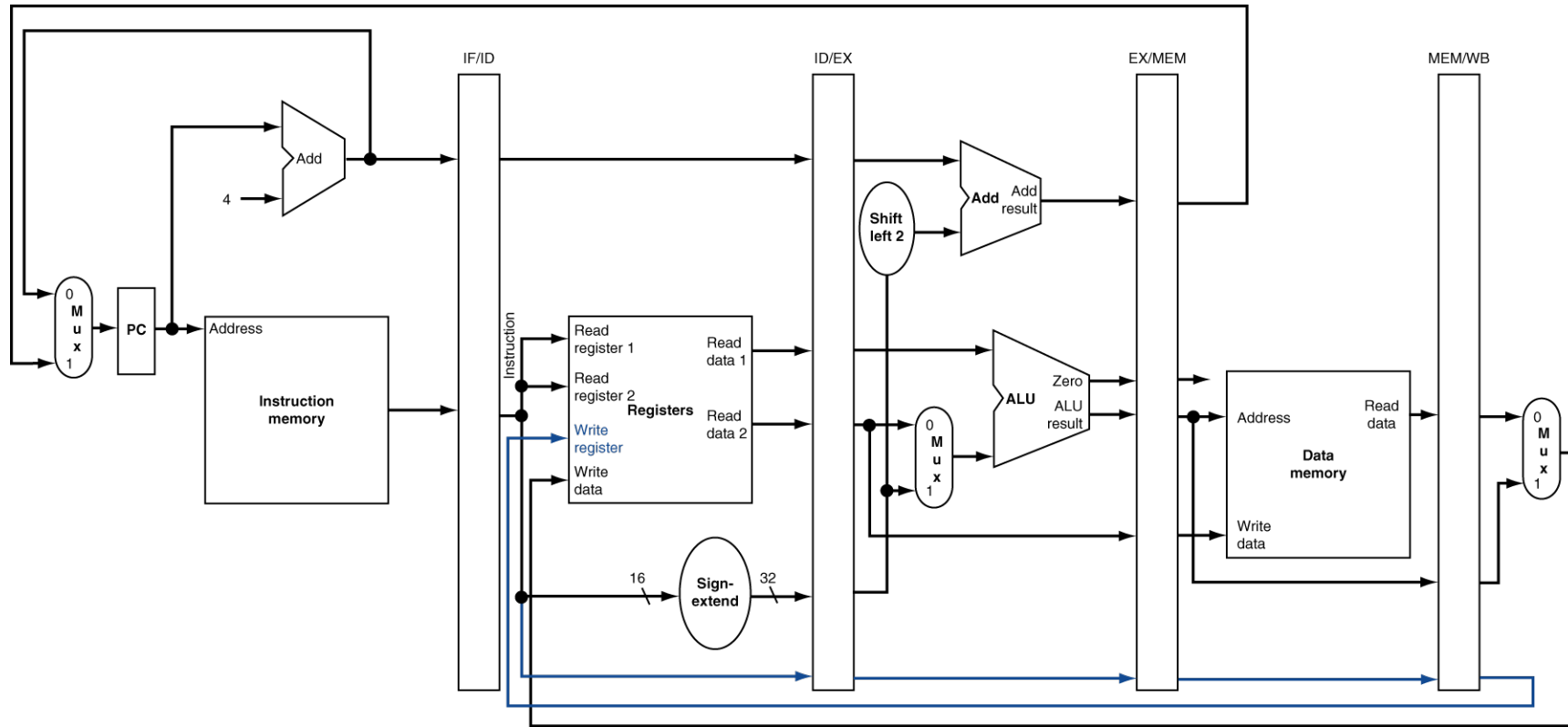
- A. Everything will be fine
- B. The data to write to the register will be wrong
- C. The register number to write to will be wrong



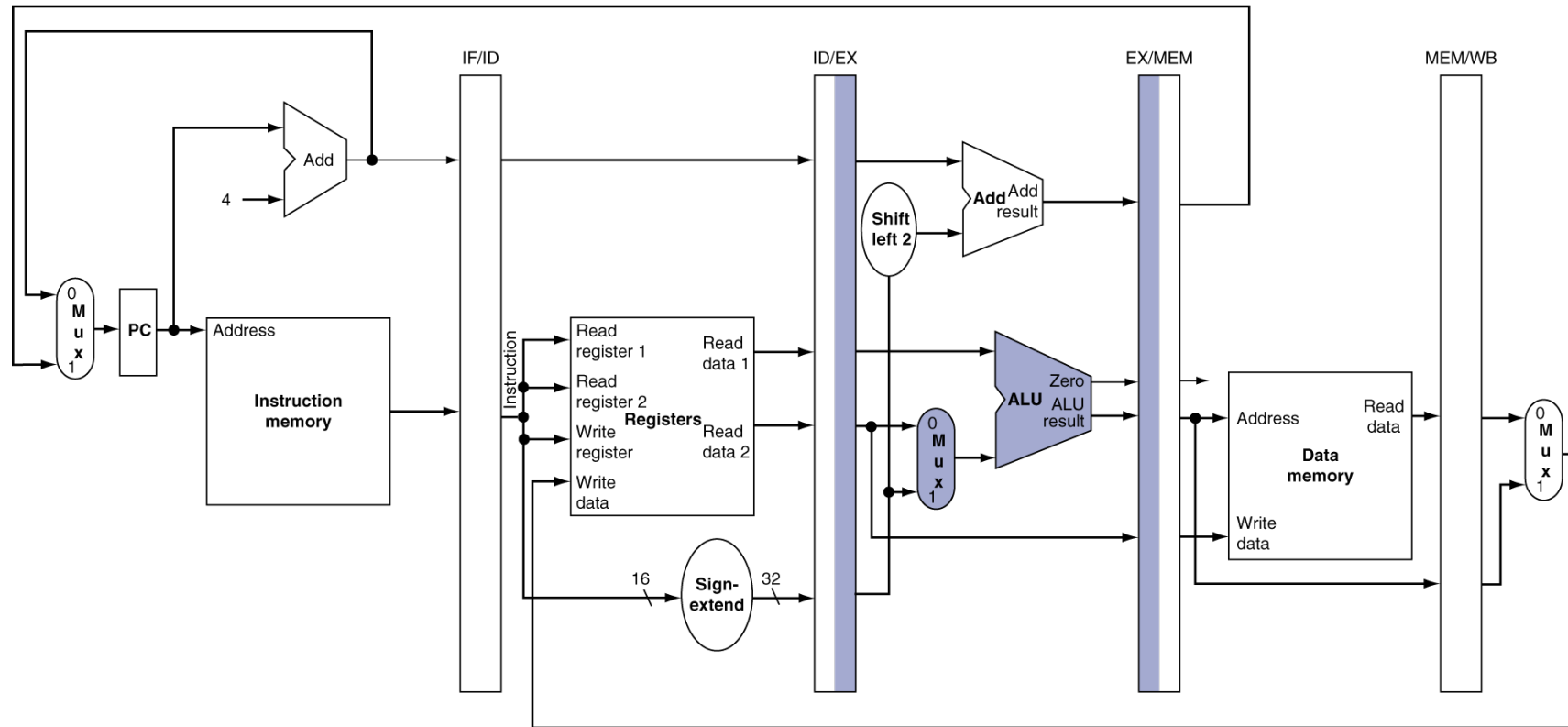
# WB for Load



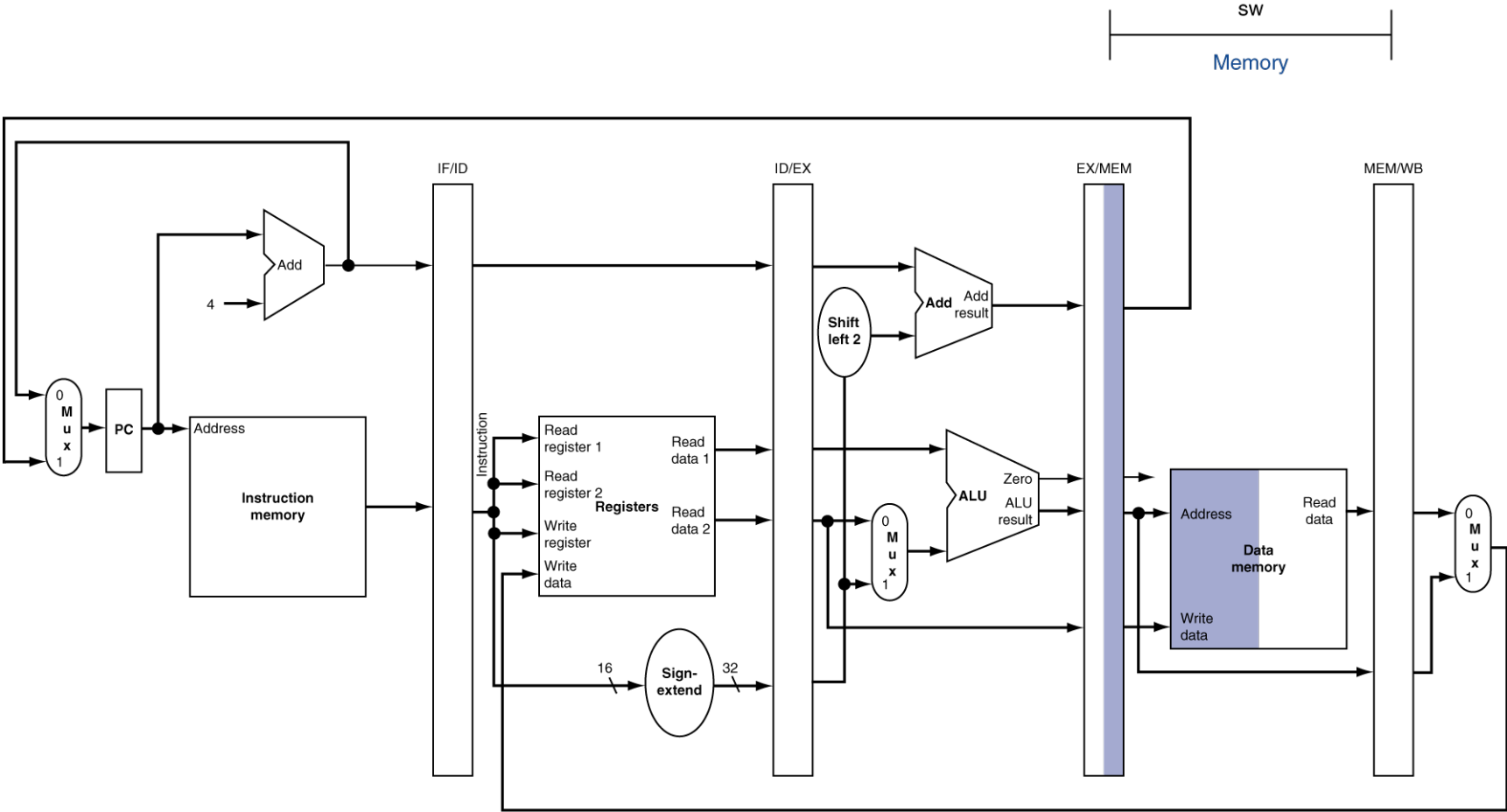
# Corrected Datapath for Load



# EX for Store

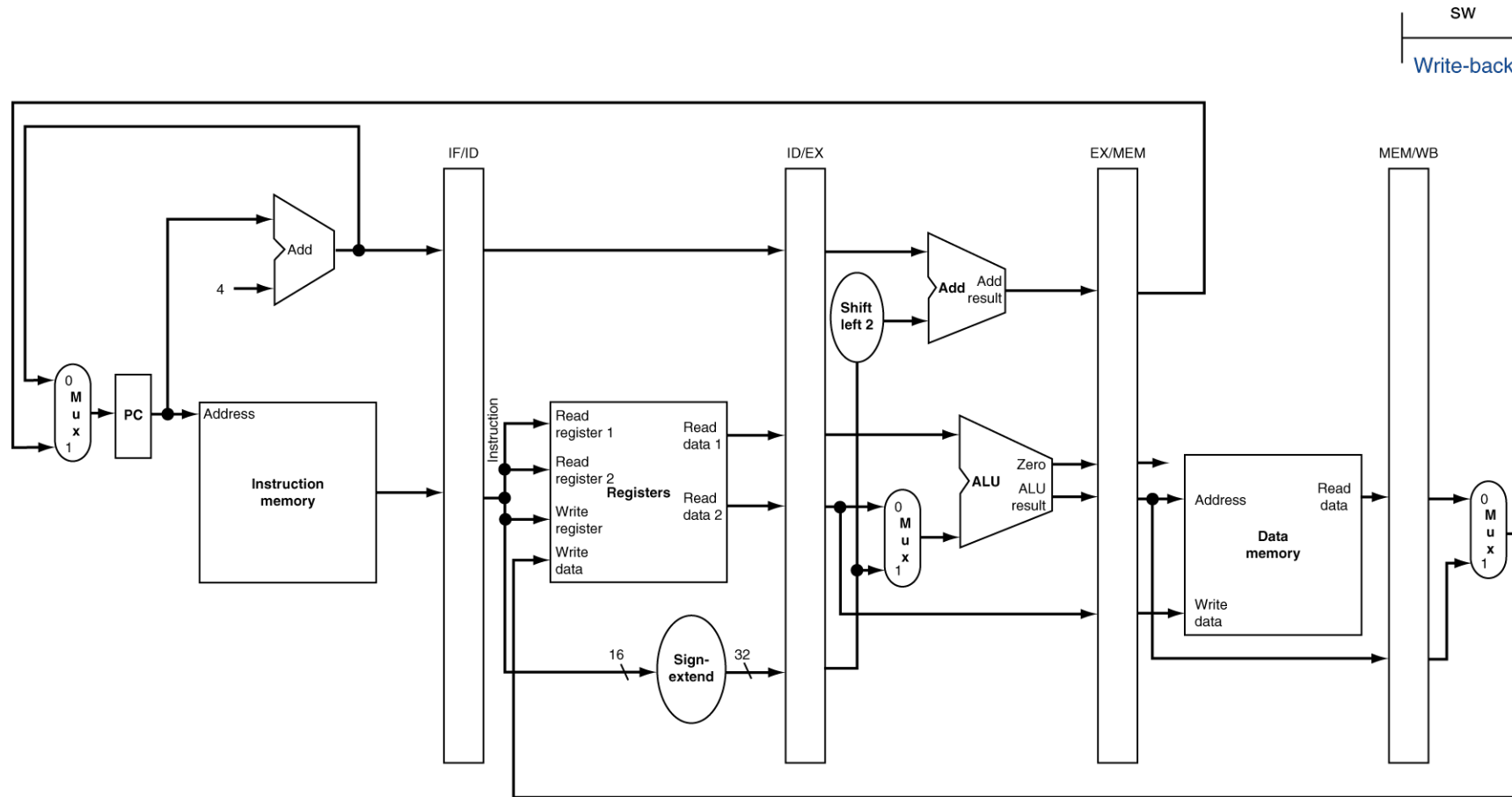


# MEM for Store





# WB for Store



# Reading

- Next lecture: Pipelined Datapath
  - Section 5.7
- Problem Set 9 due Friday
- Lab 8 due Sunday