Computer Logic

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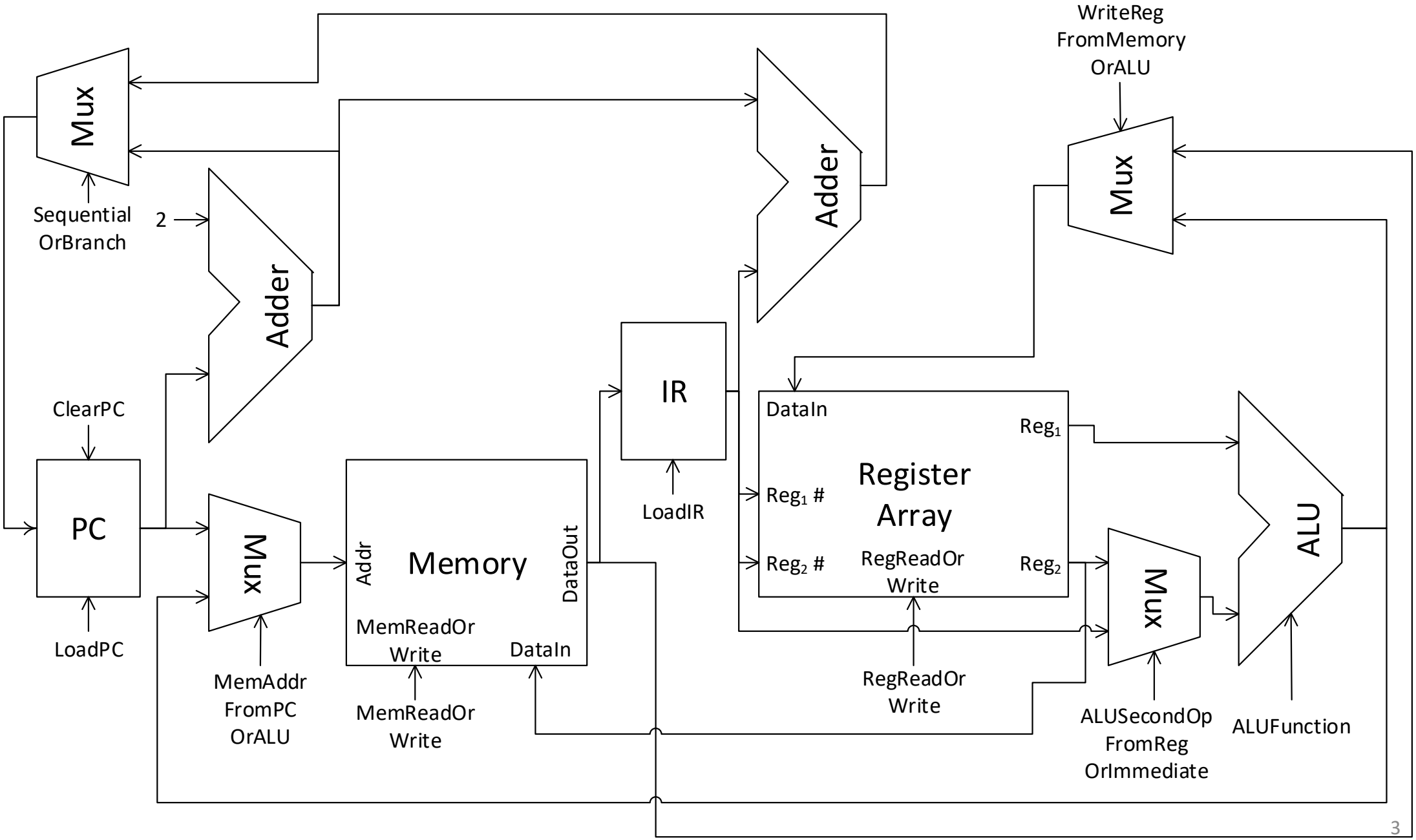
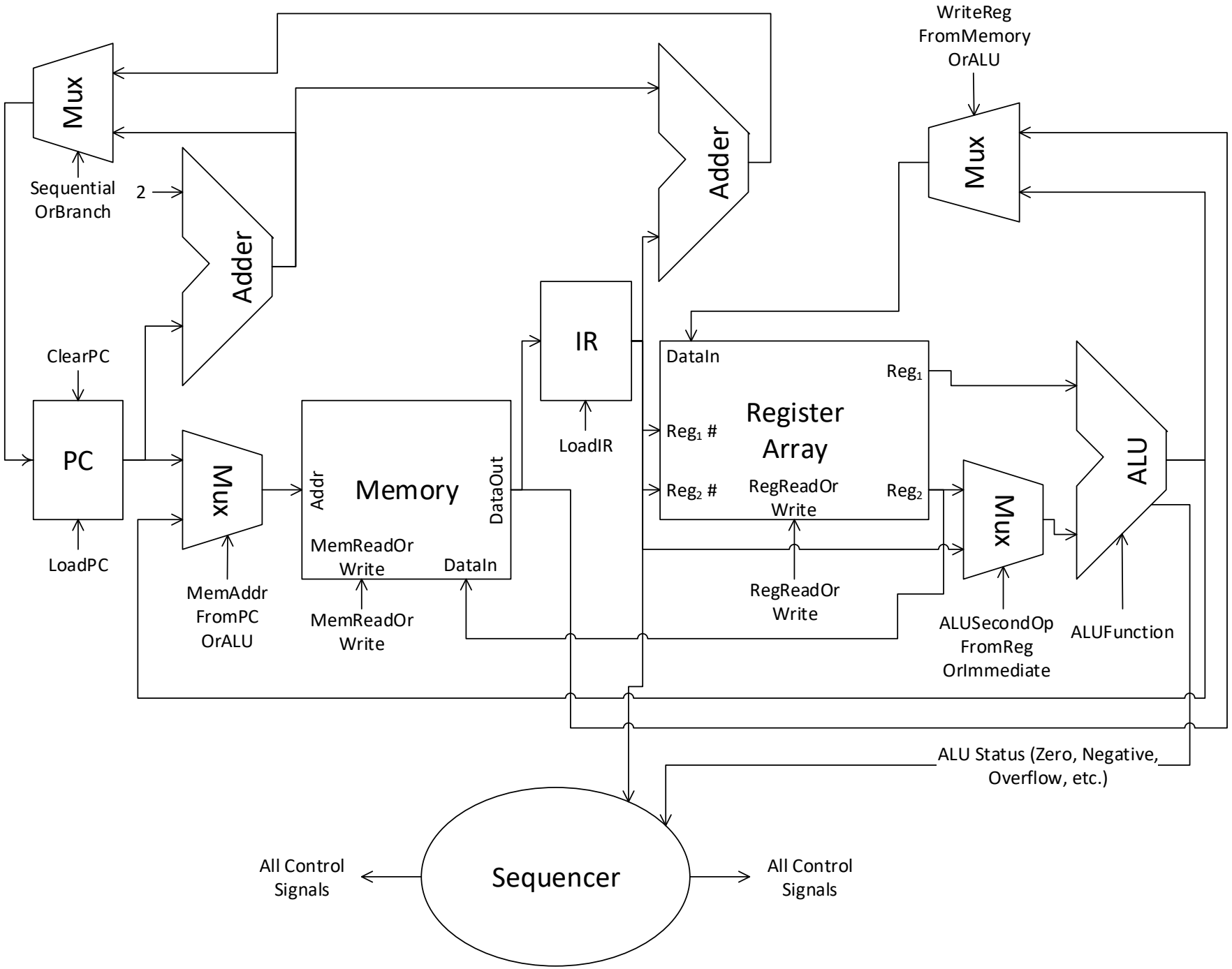
First Version of a Computer Block Diagram

- What follows is a first pass at the block diagram/data path for a 16-bit MIPS-like computer
  - 16-bit means that each instruction is 16-bits wide
  - The data path assumes a byte-addressable memory
  - MIPS-like means that the computer uses a General Purpose Register (GPR) array to store data within the processor
    - A GPR can be read or written at roughly the speed of the processor
    - The GPR array has a limited number of registers (*e.g.* 8, 16, or 32)
    - In this design, each instruction can access up to two registers
    - There are dedicated instructions to read from or write to memory
    - All branch instructions are relative to the incremented PC
  - Data that does not fit in the GPR array is stored in memory
  - All instructions are stored in memory
  - Not all details are shown in the following diagrams


Mux
Sequential
OrBranch
2
Adder
Adder
WriteReg
FromMemory
OrALU
Mux
ClearPC
PC
LoadPC
Mux
MemAddr
FromPC
OrALU
Addr
Memory
DataOut
MemReadOr
Write
DataIn
MemReadOr
Write
IR
LoadIR
DataIn
Reg1
Reg1 #
Register
Array
Reg2 #
RegReadOr
Write
Reg2
RegReadOr
Write
Mux
ALU
ALUSecondOp
FromReg
OrImmediate
ALUFunction


WriteReg
FromMemory
OrALU
Mux
Sequential
OrBranch
2
Adder
Adder
Mux
ClearPC
IR
DataIn
Reg1
PC
Reg1 #
Register
Array
ALU
Mux
Addr
Memory
DataOut
LoadIR
Reg2 #
RegReadOr
Write
Reg2
Mux
LoadPC
MemAddr
FromPC
OrALU
MemReadOr
Write
DataIn
RegReadOr
Write
ALUSecondOp
FromReg
OrImmediate
ALUFunction
ALU Status (Zero, Negative,
Overflow, etc.)
All Control
Signals
Sequencer
All Control
Signals