Assignment02-Q5

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Q5. Implement jal

To implement jal, we need to perform PC+4 -> R [31] and PC <- jump address.

We need to write $31 into the multiplexer associated with RegDst. $31 indicates the destination register and is later loaded into ‘Write register’ of the register file.

We also need to get the (PC+4) signal from PC into the multiplexer associated with MemtoReg. This value represents the next instruction and is later loaded into ‘Write data’ of the register file. This prevents us from jumping back and forth between PC and the current instruction infinitely.

In addition, the multiplexer control signals were only 1 bit, because those multiplexers initially had two inputs.

Therefore, we need to extend the multiplexer signals to 2 bits wide to take the third input.

When executing the jal instruction, the following signals are used:

|  |  |
| --- | --- |
| MemRead = 0  MemWrite = 0  MemtoReg = 10 (PC+4) (newly added signal)  IRWrite = 0 | RegWrite = 1  RegDist = 10 (#31) (newly added signal)  PCWrite = 1 |