|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Op-code | RegDst | Jump | Branch | MemRead | MemtoReg | ALUop | MemWrite | ALUSrc | RegWrite |
| 000\_000 | 01 | 00 | 0 | 0 | 00 | 10 | 0 | 0 | 1 |
| 001\_000 | 00 | 00 | 0 | 0 | 00 | 10 | 0 | 1 | 1 |
| 100\_011 | 00 | 00 | 0 | 1 | 01 | 00 | 0 | 1 | 1 |
| 101\_011 | xx | 00 | 0 | 0 | Xx | 00 | 1 | 1 | 0 |
| 001\_100 | 00 | 00 | 0 | 0 | 00 | 10 | 0 | 1 | 1 |
| 000\_100 | xx | 00 | 1 | 0 | Xx | 01 | 0 | 0 | 0 |
| 000\_000 | xx | 01 | X | 0 | Xx | xx | 0 | X | 0 |
| 000\_001 | 10 | 01 | x | 0 | 10 | xx | 0 | X | 1 |
| 000\_000 | xx | 10 | x | 0 | xx | xx | 0 | x | 0 |

Table(1):before adding another bit to the jump signal

1. R-type //Verified from the Reference.
2. Addi // 90% Sure \*\*
3. Lw //Verified from the Reference.
4. Sw //Verified from the Reference.
5. Andi // 90% Sure \*\*
6. Beq //Verified from the Reference.
7. J //Verified from the Reference.
8. Jal //Verified from the Reference.
9. Jr //See the Table below,Table(2)

Reference: <http://meseec.ce.rit.edu/eecc550-winter2005/550-chapter5-exercises.pdf>

**From here one my own:**

1. TO add JR ”Jump register”, expand the multiplexer pointed by the jump control signal .So that the Multiplexor will become 3x1. The jump signal will be 2-bit instead of 1-bit.
2. Instruction flow “data path” :
3. Instruction move from INSTRUCTION MEMORY to REGISTRS FILE
4. Take a wire from Read data 1 and connect it to the New Multiplexer -mentioned above-

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Op-code | RegDst | Jump | Branch | MemRead | MemtoReg | ALUop | MemWrite | ALUsrc | RegWrite |
| 000\_000 | xx | 10 | x | 0 | xx | xx | 0 | x | 0 |

Table(2):The same as table(1) but with adding one bit to the jump signal

**NOTE:**

**“What happened here is increasing the number of bits of the Jump control signals, in case of JR it takes the value (b’10 )=(2)decimal”**