* Control Unit

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Instruction | RegDst | ALUSrc | MemToReg | RegWrite | MemRead | MemWrite | Branch | ALUOp1 | ALUOpO | Jump | Brnv | Nandi | MuxReg | Balv | Bgtzal | Jrsal | StatusRegWrite |
| R-format | 01 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 001 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| lw | 00 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 001 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| SW | XX | 1 | X | 0 | 0 | 1 | 0 | 0 | 0 | 001 | 0 | 0 | X | 0 | 0 | 0 | 0 |
| beq | XX | 0 | X | 0 | 0 | 0 | 1 | 0 | 1 | 001 | 0 | 0 | X | 0 | 0 | 0 | 0 |
| JMNOR (R-F) | 10 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 111 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| BRNV (R-F) | XX | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 01 | 1 | 0 | X | 0 | 0 | 0 | 0 |
| Nandi | 00 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 101 | 0 | 1 | 1 | 0 | 0 | 0 | 1 |
| BGTZAL | 11 | X | X | 0 | 0 | 0 | 0 | X | X | 00 | 0 | 0 | X | 0 | 1 | 0 | 0 |
| BALV | 10 | X | X | (CU) | 0 | 0 | 0 | X | X | 00 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| JRSAL | XX | 0 | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |

* ALU Control

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| opcode | ALUOp | Operation | funct | ALU function | ALU control |
| Iw | 00 | load word | XXXXXX | add | 010 |
| SW | 00 | store word | XXXXXX | add | 010 |
| beq | 01 | branch equal | XXXXXX | subtract | 110 |
| R-type | 10 | add | 100000 | add | 010 |
|  |  | subtract | 100010 | subtract | 110 |
|  |  | AND | 100100 | AND | 000 |
|  |  | OR | 100101 | OR | 001 |
|  |  | set-on-less-than | 101010 | set-on-less-than | 111 |
|  |  | NOR | 100111 | NOR | 100 |
|  |  | BRNV | 010101 | add | 010 |
| Nandi (16) | 11 | Nand | XXXXXX | Nand | 011 |