R-type Instructions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Inst | Regs | Op | fct | ALU |
| sll | rd, rt, sa | 0x00 | 0x00 | Sl |
| srl | rd, rt, sa | 0x00 | 0x02 | Sr |
| sra | rd, rt, sa | 0x00 | 0x03 | Sr |
| sllv | rd, rt, rs | 0x00 | 0x04 | Sl |
| srlv | rd, rt, rs | 0x00 | 0x06 | Sr |
| srav | rd, rt, rs | 0x00 | 0x07 | Sr |
| jr | rs | 0x00 | 0x08 | - |
| jalr | rd, rs | 0x00 | 0x09 | - |
| syscall |  | 0x00 | 0x0C | - |
| break |  | 0x00 | 0x0D | - |
| Add | rd, rs, rt | 0x00 | 0x20 | Add |
| Addu | rd, rs, rt | 0x00 | 0x21 | Add |
| sub | rd, rs, rt | 0x00 | 0x22 | Sub |
| subu | rd, rs, rt | 0x00 | 0x23 | Sub |
| And | rd, rs, rt | 0x00 | 0x24 | And |
| or | rd, rs, rt | 0x00 | 0x25 | Or |
| xor | rd, rs, rt | 0x00 | 0x26 | Xor |
| nor | rd, rs, rt | 0x00 | 0x27 | Xor |
| slt | rd, rs, rt | 0x00 | 0x2A | Alt |
| sltu | rd, rs, rt | 0x00 | 0x2B | slt |

|  |  |  |
| --- | --- | --- |
| inst | op | ALU |
| J | 0x02 | -- |
| Jal | 0x03 | -- |

|  |  |  |  |
| --- | --- | --- | --- |
| Inst | Regs | Op | ALU |
| Beq | rs, rt, label | 0x04 | Add |
| Bne | rs, rt, label | 0x05 | Add |
| Addi | rt, rs, imm | 0x08 | Add |
| Addiu | rt, rs, imm | 0x09 | Add |
| slti | rt, rs, imm | 0x0A | Slt |
| sltiu | rt, rs, imm | 0x0B | Slt |
| Andi | rt, rs, imm | 0x0C | And |
| ori | rt, rs, imm | 0x0D | Or |
| xori | rt, rs, imm | 0x0E | xor |
| Lui | rt, imm | 0x0F | Sl |
| Lb | rt, imm(rs) | 0x20 | Add |
| Lh | rt, imm(rs) | 0x21 | Add |
| Lw | rt, imm(rs) | 0x23 | Add |
| Lbu | rt, imm(rs) | 0x24 | Add |
| Lhu | rt, imm(rs) | 0x25 | Add |
| sb | rt, imm(rs) | 0x28 | Add |
| sh | rt, imm(rs) | 0x29 | Add |
| sw | rt, imm(rs) | 0x2B | Add |

MIPS Registers

|  |  |
| --- | --- |
| Number | Name |
| 0 | $0 |
| 1 | $at |
| 2 | $v0 |
| 3 | $v1 |
| 4 | $a0 |
| 5 | $a1 |
| 6 | $2 |
| 7 | $a3 |
| 8 | $t0 |
| 9 | $t1 |
| 10 | $t2 |
| 11 | $t3 |
| 12 | $t4 |
| 13 | $t5 |
| 14 | $t6 |
| 15 | $t7 |
| 16 | $s0 |
| 17 | $s1 |
| 18 | $s2 |
| 19 | $s3 |
| 20 | $s4 |
| 21 | $s5 |
| 22 | $s6 |
| 23 | $s7 |
| 24 | $t8 |
| 25 | $t9 |
| 26 | $k0 |
| 27 | $k1 |
| 28 | $gp |
| 29 | $sp |
| 30 | $fp |
| 31 | $ra |

MIPS Instruction fields

|  |  |
| --- | --- |
| **Field** | **Instruction bits** |
| Operation Code | 26-31 |
| Rs | 21-25 |
| Rt | 16-20 |
| Rd | 11-15 |
| Shift Amount | 6-11 |
| Function Code | 0-5 |
| 16-bit immediate value | 0-15 |
| 26-bit immediate value | 0-25 |