RV32I

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Instruction | Type | Opcode | funct3 | funct7 | mask |
| add | R | 0110011 | 0x0 | funct7\_bit6 = 0 |  |
| sub | 0x0 | funct7\_bit6 = 1 |  |
| xor | 0x4 | funct7\_bit6 = 0 |  |
| or | 0x6 | funct7\_bit6 = 0 |  |
| and | 0x7 | funct7\_bit6 = 0 |  |
| sll | 0x1 | funct7\_bit6 = 0 |  |
| srl | 0x5 | funct7\_bit6 = 0 |  |
| sra | 0x5 | funct7\_bit6 = 1 |  |
| slt | 0x2 | funct7\_bit6 = 0 |  |
| sltu | 0x3 | funct7\_bit6 = 0 |  |
|  |  |  |  |  |  |
| addi | I | 0010011 | 0x0 |  |  |
| xori | 0x4 |  |  |
| ori | 0x6 |  |  |
| andi | 0x7 |  |  |
| slli | 0x1 | funct7\_bit6 = 0 | imm[0:4] |
| srli | 0x5 | funct7\_bit6 = 0 | imm[0:4] |
| srai | 0x5 | funct7\_bit6 = 1 | imm[0:4] |
| slti | 0x2 |  |  |
| sltiu | 0x3 |  |  |
|  |  |  |  |  |  |
| lb | I | 0000011 | 0x0 |  |  |
| lh | 0x1 |  |  |
| lw | 0x2 |  |  |
| lbu | 0x4 |  |  |
| lhu | 0x5 |  |  |
|  |  |  |  |  |  |
| sb | S | 0100011 | 0x0 |  |  |
| sh | 0x1 |  |  |
| sw | 0x2 |  |  |
|  |  |  |  |  |  |
| beq | B | 1100011 | 0x0 |  |  |
| bne | 0x1 |  |  |
| blt | 0x4 |  |  |
| bge | 0x5 |  |  |
| bltu | 0x6 |  |  |
| bgeu | 0x7 |  |  |
|  |  |  |  |  |  |
| jal | J | 1101111 |  |  |  |
|  |  |  |  |  |  |
| jalr | I | 1100111 | 0x0 |  |  |
|  |  |  |  |  |  |
| lui | U | 0110111 |  |  |  |
| auipc | 0010111 |  |  |  |
|  |  |  |  |  |  |
| ecall | I | 1110011 | 0x0 | imm = 0 |  |
| ebreak | 0x0 | imm = 1 |  |

RV64I

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Instruction | Type | Opcode | funct3 | funct7 | mask |
| lwu | I | 0000011 | 0x6 |  |  |
| ld | 0x3 |  |  |
| slli | 0010011 | 0x1 | funct7\_bit6 = 0 | imm[5:0] |
| srli | 0x5 | funct7\_bit6 = 0 | imm[5:0] |
| srai | 0x5 | funct7\_bit6 = 1 | imm[5:0] |
| slliw | 0011011 | 0x1 | funct7\_bit6 = 0 | imm[4:0] |
| srliw | 0x5 | funct7\_bit6 = 0 | imm[4:0] |
| sraiw | 0x5 | funct7\_bit6 = 1 | imm[4:0] |
| addiw | 0x0 |  |  |
|  |  |  |  |  |  |
| addw | R | 0111011 | 0x0 | funct7\_bit6 = 0 |  |
| subw | 0x0 | funct7\_bit6 = 1 |  |
| sllw | 0x1 | 0 |  |
| srlw | 0x5 | funct7\_bit6 = 0 |  |
| sraw | 0x5 | funct7\_bit6 = 1 |  |
|  |  |  |  |  |  |
| sd | S | 0100011 | 0x3 |  |  |

RV32M

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Instruction | Type | Opcode | funct3 | funct7 | mask |
| mul | R | 0110011 | 0x0 | 0x01 |  |
| mulh | 0x1 |  |
| mulhsu | 0x2 |  |
| mulhu | 0x3 |  |
| div | 0x4 |  |
| divu | 0x5 |  |
| rem | 0x6 |  |
| remu | 0x7 |  |

RV64M

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Instruction | Type | Opcode | funct3 | funct7 | mask |
| mulw | R | 0111011 | 0x0 | 0x01 |  |
| divw | 0x4 |  |
| divuw | 0x5 |  |
| remw | 0x6 |  |
| remuw | 0x7 |  |

RV32A

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Instruction | Type | Opcode | funct3 | funct7 | | | mask |
| funct7[6:2] | aq | rl |  |
| lr.w | R | 0101111 | 0x2 | 00010 |  |  |  |
| sc.w | 00011 |  |  |  |
| amoSwap.w | 00001 |  |  |  |
| amoAdd.w | 00000 |  |  |  |
| amoXor.w | 00100 |  |  |  |
| amoAnd.w | 01100 |  |  |  |
| amoOr.w | 01000 |  |  |  |
| amoMin.w | 10000 |  |  |  |
| amoMax.w | 10100 |  |  |  |
| amoMinu.w | 11000 |  |  |  |
| amoMaxu.w | 11100 |  |  |  |

RV64A

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Instruction | Type | Opcode | funct3 | funct7 | | | mask |
| funct7[6:2] | aq | rl |
| lr.d | R | 0101111 | 0x3 | 00010 |  |  |  |
| sc.d | 00011 |  |  |  |
| amoSwap.d | 00001 |  |  |  |
| amoAdd.d | 00000 |  |  |  |
| amoXor.d | 00100 |  |  |  |
| amoAnd.d | 01100 |  |  |  |
| amoOr.d | 01000 |  |  |  |
| amoMin.d | 10000 |  |  |  |
| amoMax.d | 10100 |  |  |  |
| amoMinu.d | 11000 |  |  |  |
| amoMaxu.d | 11100 |  |  |  |

hierarchy:

extension >

RV32I\_type,

RV64I\_type

RV32M\_type,

RV64M\_type,

RV32A\_type,

RV64A\_type

RV32I\_RType\_opcode > RV32I\_RType\_funct3 > RV32I\_RType\_funct7

RV32I\_IType\_opcode > RV32I\_IType\_funct3 > RV32I\_IType\_funct7

RV64I\_RType\_opcode > RV64I\_RType\_funct3 > RV64I\_RType\_funct7

RV64I\_IType\_opcode > RV64I\_IType\_funct3 > RV64I\_IType\_funct7

RV32A\_funct5 > rs2

RV64A\_funct5 > rs2