

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
funct7							rs2					rs1					funct3					rd					opcode					R-type
imm[11:0]												rs1					funct3					rd					opcode					I-type
imm[11:5]							rs2					rs1					funct3					imm[4:0]					opcode					S-type
imm[12 10:5]							rs2					rs1					funct3					rd					opcode					B-type
imm[31:12]																						rd					opcode					U-type
imm[20 10:1 11 19:12]																						rd					opcode					J-type

Zbb: “Basic bit-manipulation” Extension

31	25 24						20 19						15 14			12 11			7 6		0				
0	1	0	0	0	0	0	rs2			rs1			1 1 1			rd			0 1 1 0 0 1 1		ANDN				
0	1	0	0	0	0	0	rs2			rs1			1 1 0			rd			0 1 1 0 0 1 1		ORN				
0	1	0	0	0	0	0	rs2			rs1			1 0 0			rd			0 1 1 0 0 1 1		XNOR				
0	1	1	0	0	0	0	0 0 0 0 0 0			rs1			0 0 1			rd			0 0 1 0 0 1 1		CLZ				
0	1	1	0	0	0	0	0 0 0 0 1			rs1			0 0 1			rd			0 0 1 0 0 1 1		CTZ				
0	1	1	0	0	0	0	0 0 0 1 0			rs1			0 0 1			rd			0 0 1 0 0 1 1		CPOP				
0	0	0	0	1	0	1	rs2			rs1			1 1 0			rd			0 1 1 0 0 1 1		MAX				
0	0	0	0	1	0	1	rs2			rs1			1 1 1			rd			0 1 1 0 0 1 1		MAXU				
0	0	0	0	1	0	1	rs2			rs1			1 0 0			rd			0 1 1 0 0 1 1		MIN				
0	0	0	0	1	0	1	rs2			rs1			1 0 1			rd			0 1 1 0 0 1 1		MINU				
0	1	1	0	0	0	0	0 0 1 0 0			rs1			0 0 1			rd			0 0 1 0 0 1 1		SEXT.B				
0	1	1	0	0	0	0	0 0 1 0 1			rs1			0 0 1			rd			0 0 1 0 0 1 1		SEXT.H				
0	0	0	0	1	0	0	0 0 0 0 0			rs1			1 0 0			rd			0 1 1 0 0 1 1		ZEXT.H				
0	1	1	0	0	0	0	rs2			rs1			0 0 1			rd			0 1 1 0 0 1 1		ROL				
0	1	1	0	0	0	0	rs2			rs1			1 0 1			rd			0 1 1 0 0 1 1		ROR				
0	1	1	0	0	0	0	shamt			rs1			1 0 1			rd			0 0 1 0 0 1 1		RORI				
0	0	1	0	1	0	0	0 0 1 1 1			rs1			1 0 1			rd			0 0 1 0 0 1 1		ORC.B				
0	1	1	0	1	0	0	1 1 0 0 0			rs1			1 0 1			rd			0 0 1 0 0 1 1		REV8				

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
funct7								rs2				rs1				funct3			rd			opcode							R-type			
imm[11:0]												rs1				funct3			rd			opcode							I-type			
imm[11:5]								rs2				rs1				funct3			imm[4:0]			opcode							S-type			
imm[12 10:5]								rs2				rs1				funct3			rd			opcode							B-type			
imm[31:12]																						rd			opcode							U-type
imm[20 10:1 11 19:12]																						rd			opcode							J-type

Zri: “Load/Store indirect with Index” Extension

31							25 24							20 19							15 14							12 11							7 6							0							
0 0 0 0 0 0 0							rs2							rs1							1 1 1							rd							0 0 0 0 0 1 1							LB.R							
0 0 0 0 0 0 1							rs2							rs1							1 1 1							rd							0 0 0 0 0 1 1							LH.R							
0 0 0 0 0 1 0							rs2							rs1							1 1 1							rd							0 0 0 0 0 1 1							LW.R							
1 0 0 0 0 0 0							rs2							rs1							1 1 1							rd							0 0 0 0 0 1 1							LBU.R							
1 0 0 0 0 0 1							rs2							rs1							1 1 1							rd							0 0 0 0 0 1 1							LHU.R							
0 0 0 0 0 0 0							rs3							rs1							1 1 1							rs2							0 1 0 0 0 1 1							SB.R							
0 0 0 0 0 0 1							rs3							rs1							1 1 1							rs2							0 1 0 0 0 1 1							SH.R							
0 0 0 0 0 1 0							rs3							rs1							1 1 1							rs2							0 1 0 0 0 1 1							SW.R							

```

lb    rd, rs2(rs1)
lh    rd, rs2(rs1)
lw    rd, rs2(rs1)
lbu   rd, rs2(rs1)
lhu   rd, rs2(rs1)
sb    rs2, rs3(rs1)
sh    rs2, rs3(rs1)
sw    rs2, rs3(rs1)

```

- R-type
- I-type
- S-type
- B-type
- U-type
- J-type

Zor: “Objective RISC” Extension

Unprivileged:

SP.R	R
LP.R	R
SV	R
RST	R
QDTB	R
QDTH	R
QDTW	R
QDTD	R
QPI	R
JLIB	R
GCP	R
POP	R
RTLIB	R
CPFC	R
CHECK	R
SP	S
LP	I
JLIBI	I
ALC	R
ALCI.P	I
ALCI.D	I
PUSI	S
PUSHG	S
PUSHT	S

Machine Mode:

ALCB	R
CIOP	R
CCP	R
RPR	R
QPIR	R
QDTR	R
QPTR	R
SEAL	R
UNSL	R

Misc:

[illegible]

$a \leftarrow r_d, r_{s1}, r_{s2}$

