Encoding

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1 MAP to custom ISA

Instruction Type	**Field Breakdown (bits)**
R-type	`[ op(4) | rs(6) | rt(6) | rd(6) | 00(2) ]`
I-type	`[ op(4) | rs(6) | rt(6) | immediate(8) ]`
J-type	`[ op(4) | target address(20) ]`

Table 1: Instruction Format Summary for the Custom ISA

Mnemonic	**Type**	**Opcode (4-bit/6-bit)**	**Description**
LOAD	I-type	0000	Load word from memory $\rightarrow$ register
STORE	I-type	0001	Store register $\rightarrow$ memory
ADD	R-type	0010	Add $R_s + R_t \rightarrow R_d$
MUL	R-type	0011	Multiply $R_s \times R_t \rightarrow R_d$
BEQ	I-type	0100	Branch if equal
JMP	J-type	0101	Jump to target address
HALT	J-type	0110	Stop program execution
LUI	I-type	0111	Load upper 8 bits into register
ORI	I-type	1000	OR immediate with register

Table 2: Opcode Assignments for Custom ISA