

		PC ctrl	Main ctrl				ALU ctrl						Main ctrl							
Instruction	opcode	PC src	Ext op	Selection1	Src1	RegWrite	Zero	Carry	Overflow	positive	negative	ALU op	Selection2	Memory data	Wb data	Memory read	Memory write	OPERAND2	Mode	Data selector
AND	0000	0	X	0	1	1	X	X	X	X	X	AND	1	X	0	0	0	1	X	X
ADD	0001	0	X	0	1	1	X	X	X	X	X	ADD	1	X	0	0	0	1	X	X
SUB	0010	0	X	0	1	1	X	X	X	X	X	SUB	1	X	0	0	0	1	X	X
ADDI	0011	0	1	X	1	1	X	X	X	X	X	ADD	1	X	0	0	0	0	X	X
ANDI	0100	0	0	X	1	1	X	X	X	X	X	AND	1	X	0	0	0	0	X	X
LW	0101	0	1	X	1	1	X	X	X	X	X	ADD	1	X	1	1	0	0	X	0
LBU	0110	0	1	X	1	1	X	X	X	X	X	ADD	1	X	1	1	0	0	0	1
LBS	0110	0	1	X	1	1	X	X	X	X	X	ADD	1	X	1	1	0	0	1	1
SW	0111	0	1	X	1	0	X	X	X	X	X	ADD	1	1	X	0	1	0	X	X
BGT	1000	1	1	1	1	0	0	X	0	1	0	SUB	X	X	X	0	0	X	X	X
BGTZ	1000	1	1	1	0	0	0	X	X	1	0	SUB	X	X	X	0	0	X	X	X
BLT	1001	1	1	1	1	0	X	X	0	0	1	SUB	X	X	X	0	0	X	X	X
BLTZ	1001	1	1	1	0	0	X	X	X	0	1	SUB	X	X	X	0	0	X	X	X
BEQ	1010	1	1	1	1	0	1	X	X	X	X	SUB	X	X	X	0	0	X	X	X
BEQZ	1010	1	1	1	0	0	1	X	X	X	X	SUB	X	X	X	0	0	X	X	X
BNE	1011	1	1	1	1	0	0	X	X	X	X	SUB	X	X	X	0	0	X	X	X
BNEZ	1011	1	1	1	0	0	0	X	X	X	X	SUB	X	X	X	0	0	X	X	X
JUMP	1100	2	X	X	X	0	X	X	X	X	X	X	X	X	X	0	0	X	X	X
CALL	1101	2	X	X	X	0	X	X	X	X	X	X	X	X	X	0	0	X	X	X
RET	1110	3	X	2	X	0	X	X	X	X	X	X	X	X	X	0	0	X	X	X
SV	1111	0	X	X	1	0	X	X	X	X	X	X	0	0	X	0	1	X	X	X

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Signal	PC src	Ext op	Selection 1	Src1	RegWrite	Zero	Carry	Overflow	Positive	Negative	ALU op	Selection 2	Memory data	Wb data	Memory read	Memory write	Operand 2	Mode	Data selector
Description	Used to choose the suitable value of next PC.	Used to select if the required extension is zero or signed extension.	Used to choose the second operand which will appear at the 2nd read bus.	Used to select the first operand which enters the ALU.	A flag if there is a required data to write back it to the register file.	A flag resulted from ALU to indicate if the result is 0.	A flag resulted from ALU to indicate if the result contains a carry.	A flag resulted from ALU to indicate if there is an overflow.	A flag resulted from ALU to indicate if the result is positive.	A flag resulted from ALU to indicate if the result is negative.	Used to determine the used ALU unit.	Used to select the required data memory address.	Used to select the data in to be written to the data memory is store instructions.	Used to select the required data to be written back to the register file.	Used to indicate if the data memory will be read. (Load)	Used to indicate if the data memory will be written. (store)	Used to choose the second operand which enters the ALU.	Used to determine the type of extension to the loaded byte. (0 or sign)	Used to select the data out in load operation (word or extended byte)

Signal	Ext op	Selection 1	Src1	RegWrite	Zero	Carry	Overflow	Positive	Negative	ALU op	Selection2	Memory data	Wb data	Memory read	Memory write	Operand2	Mode	Data selector
Boolean equation	~ANDI.		Used to select the first operand which enters the ALU.	A flag if there is a required data to write back it to the register file.	A flag resulted from ALU to indicate if the result is 0.	A flag resulted from ALU to indicate if the result contains a carry.	A flag resulted from ALU to indicate if there is an overflow.	A flag resulted from ALU to indicate if the result is positive.	A flag resulted from ALU to indicate if the result is negative.	Used to determine the used ALU unit.	Used to select the required data memory address.	Used to select the data in to be written to the data memory is store instructions.	Used to select the required data to be written back to the register file.	Used to indicate if the data memory will be read. (Load)	Used to indicate if the data memory will be written. (store)	Used to choose the second operand which enters the ALU.	Used to determine the type of extension to the loaded byte. (0 or sign)	Used to select the data out in load operation (word or extended byte)