

## Control Signal Decoding

			rs/PC/SP	rt/imm		4/bran/mem[sp]			rd/rt	ALU/mem	ALU/SP	-4/0	-4/+4		update/Mem
INSTRUCTION	OPCODE	TYPE	ALU1	ALU2	ALUOp	PCsel	memW	regW	regDst	regWfrom	memAdr	SPload	SPupdate	SPwrite	SPWfrom
ADD	000000	R	00	0	0000	00	0	1	0	0	0	x	x	0	x
SUB	000001	R	00	0	0010	00	0	1	0	0	0	x	x	0	x
AND	000010	R	00	0	0101	00	0	1	0	0	0	x	x	0	x
OR	000011	R	00	0	0100	00	0	1	0	0	0	x	x	0	x
XOR	000100	R	00	0	0001	00	0	1	0	0	0	x	x	0	x
SLA	000101	R	00	0	0110	00	0	1	0	0	0	x	x	0	x
SRA	000110	R	00	0	0111	00	0	1	0	0	0	x	x	0	x
SRL	000111	R	00	0	1000	00	0	1	0	0	0	x	x	0	x
NOT	001000	R	00	x	0011	00	0	1	0	0	0	x	x	0	x
PUSH	001001	R	x	x	x	00	1	0	x	x	1	0	0	1	0
MOVE	001010	R	00	0	0000	00	0	1	0	0	0	x	x	0	x
POP	001011	R	x	x	x	00	0	1	1	1	1	1	1	1	0
ADDI	100000	I	00	1	0000	00	0	1	1	0	0	x	x	0	x
SUBI	100001	I	00	1	0010	00	0	1	1	0	0	x	x	0	x
ANDI	100010	I	00	1	0101	00	0	1	1	0	0	x	x	0	x
ORI	100011	I	00	1	0100	00	0	1	1	0	0	x	x	0	x
XORI	100100	I	00	1	0001	00	0	1	1	0	0	x	x	0	x
SLAI	100101	I	00	1	0110	00	0	1	1	0	0	x	x	0	x
SRAI	100110	I	00	1	0111	00	0	1	1	0	0	x	x	0	x
SRLI	100111	I	00	1	1000	00	0	1	1	0	0	x	x	0	x
LD	101000	I	00	1	0000	00	0	1	1	1	0	x	x	0	x
LDSP	101001	I	00	1	0000	00	0	0	x	x	0	x	x	1	1
ST	101010	I	00	1	0000	00	1	0	x	x	0	x	x	0	x
STSP	101011	I	00	1	0000	00	1	0	x	x	0	x	x	0	x
BR	101100	I	01	1	0000	01	0	0	x	x	0	x	x	0	x
BMI	101101	I	01	1	0000	01	0	0	x	x	0	x	x	0	x
BPL	101110	I	01	1	0000	01	0	0	x	x	0	x	x	0	x
BZ	101111	I	01	1	x	01						x	x	0	x
CALL	110000	I	00	1	0000	01	1	0	x	x	1	0	0	1	0
RET	110001	I	x	x	x	10	0	0	x	x	1	1	1	1	0
HALT	110010	-													
NOP	110011	-	x	x	x	00	0	0	x	x	x	x	x	0	x

MUX NUMBER	Name	Explanation
1	ALU1	ALU operand 1
2	ALU2	ALU operand 2
3	ALUOp	Operation to performed on 1 and 2 in ALU
4	PCsel	indicates whether PC = PC+4 or branch or return from stack pointer
5	memW	0 indicates read, 1 indicated write to memory
6	regW	whether to write the output to a register
7	regDst	Which register to write the output in
8	regWfrom	Write to register from ALU or memory selector
9	memAdr	Load the value in the address shown by ALU or SP
10	SPload	whether to load from SP-4 or SP
11	SPupdate	whether to update SP=SP-4 or SP=SP+4
12	SPWfrom	Whether to updata SP from Memory or from SPupdate