

SACE Instruction-Set

Register arithmetic

Mnemonic	Type [3]	Op [4]	Rd [5]	Rs [5]	Rt [5]	[10]
ADD	000	0000	X	X	X	0
SUB	000	0001	X	X	X	0
MUL	000	0010	X	X	X	0
SLR	000	0011	X	X	X	0
SLL	000	0100	X	X	X	0
SAR	000	0101	X	X	X	0

Immediate arithmetic

Mnemonic	Type [3]	Op [4]	Rd [5]	Rs [5]	Value [15]
ADDI	001	0000	X	X	Imm
SUBI	001	0001	X	X	Imm
MULI	001	0010	X	X	Imm
SLRI	001	0011	X	X	Imm
SLLI	001	0100	X	X	Imm
SARI	001	0101	X	X	Imm

Compare

Mnemonic	Type [3]	Op [4]	[5]	Rs [5]	Rt [5]	[10]
COMP	010	0001	0	X	X	0

Jumps

Mnemonic	Type [3]	Op [4]	[5]	Label [20]
J	011	0000	0	Imm
JEQ	011	0001	0	Imm
JNEQ	011	0010	0	Imm
JGT	011	0011	0	Imm
JGE	011	0100	0	Imm
JLT	011	0101	0	Imm
JLE	011	0110	0	Imm

Store / Load

Mnemonic	Type [3]	Op [4]	Rd [5]	Rs [5]	Offset [15]
LW	100	0000	X	X	Imm
SW	101	0000	X	X	Imm

32-bit instruction format

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
RA	Type [3]			Op [4]			Rd [5]					Rs [5]					Rt [5]					[10]											
IA	Type [3]			Op [4]			Rd [5]					Rs [5]					Value [15]																
C	Type [3]			Op [4]			[5]					Rs [5]					Rt [5]					[10]											
J	Type [3]			Op [4]			[5]					Label [20]																					
SL	Type [3]			Op [4]			Rd [5]					Rs [5]					Offset [15]																

Register File

x0	x1	x2	x3	x4	x5	x6	x7
x8	x9	x10	x11	x12	x13	x14	x15
x16	x17	x18	x19	x20	x21	x22	x23
x24	x25	x26	x27	x28	x29	x30	x31

Register Use	
x1 – x28	General purpose registers
x0	Zero
x29	LEDs register (8 LEDs)
x30	Switches register (3 switches)
x31	PC+8

Use of instructions in code

Use examples			
Addition	ADD x3 x1 x2	Shift Arithmetic Right Immediate	SARI x2 x1 3
Subtraction	SUB x3 x1 x2	Compare	COMP x1 x2
Multiplication	MUL x3 x1 x2	Jump	J label
Shift Logic Right	SLR x3 x1 x2	Jump Equal	JEQ label
Shift Left Logic	SLL x3 x1 x2	Jump Not Equal	JNEQ label
Shift Arithmetic Right	SAR x3 x1 x2	Jump Greater Than	JGT label
Add Immediate	ADDI x2 x1 1	Jump Greater Equal	JGE label
Subtract Immediate	SUBI x2 x1 2	Jump Less Than	JLT label
Multiply Immediate	MULI x2 x1 5	Jump Less Equal	JLE label
Shift Logic Right Immediate	SLRI x2 x1 8	Load Word	LW x10 x9 0
Shift Logic Left Immediate	SLLI x2 x1 4	Save Word	SW x10 x9 0