CSE 351

Programming Languages

Makeup Term Project

Write a translator using Lex/Yacc tools to translate VSCPU (Very Simple CPU) instructions into statements given in the following table.

VSCPU Instructions and Their Translations

Instruction	Statement Description
ADD A B	MEM[A] = MEM[A] + MEM[B]
ADDi A B	MEM[A] = MEM[A] + B
NAND A B	MEM[A] = ~(MEM[A] & MEM[B])
NANDi A B	MEM[A] = ~(MEM[A] & B)

SRL A B	IF (MEM[B] < 32) THEN
	  MEM[A] = MEM[A] >> MEM[B]
	ELSE
	  MEM[A] = MEM[A] << (MEM[B] - 32)
	ENDIF

SRLi A B	IF (B < 32) THEN
	  MEM[A] = MEM[A] >> B
	ELSE
	  MEM[A] = MEM[A] << (B - 32)
	ENDIF

LT A B	MEM[A] = MEM[A] < MEM[B]
LTi A B	MEM[A] = MEM[A] < B
CP A B	MEM[A] = MEM[B]
CPi A B	MEM[A] = B
CPI A B	MEM[A] = MEM[MEM[B]]
CPIi A B	MEM[MEM[A]] = MEM[B]

BZJ A B	IF (MEM[B] == 0) THEN
	  PC = MEM[A]
	ELSE
	  PC = PC+1
	ENDIF

BZJi A B	PC = MEM[A] + B
MUL A B	MEM[A] = MEM[A] * MEM[B]
MULi A B	MEM[A] = MEM[A] * B

Each VSCPU instruction has one opcode, such as ADD, CP, MUL, and BZJ, and two operands, such as A and B. Both A and B operands are always integer numbers. You can use the sample translation to verify if your translation is correct or not. Note that immediate-operand-type instructions, NANDi, SRLi, ADDi, MULi, CPi, BZJi and LTi, are translated by substituting the B operand as an integer number. Also note that in the SRLi translation, since the B value is 3, there is no reason to inject the IF ELSE block since we already know the value of B, which is 3, is already less than 32, and, therefore, we only inject the statement of the IF block, and nothing else.

Example Input Code and Its Expected Translation

Input	Expected Translation
CP 50 51	MEM[50] = MEM[51]
MUL 50 52	MEM[50] = MEM[50] * MEM[52]
CP 100 50	MEM[100] = MEM[50]
SRLi 100 3	MEM[100] = MEM[100] >> 3
ADDi 100 1	MEM[100] = MEM[100] + 1
CP 101 53	MEM[101] = MEM[53]
LT 101 100	MEM[101] = MEM[101] < MEM[100]

BZJ 12 101	IF (MEM[101] == 0) THEN
	  PC=MEM[12]
	ELSE
	  PC=PC+1
	ENDIF

CPi 50 5	MEM[50] = 5
ADD 50 51	MEM[50] = MEM[50] + MEM[51]
ADDi 50 5	MEM[50] = MEM[50] + 5

SRL 100 50	IF (MEM[50] < 32) THEN
	  MEM[100] = MEM[100] >> MEM[50]
	ELSE
	  MEM[100] = MEM[100] << (MEM[50] - 32)
	ENDIF

BZJi 13 0	PC=MEM[13]+0

Do not collaborate with any of your friends, and do not get help from anybody. If your submitted project happens to be located on any internet site or the copy of your colleague's project, a disciplinary investigation will be initiated.