hw4 export

Wednesday, September 25, 2019 8:33 PM

```
# Author: Sheng Chen, based on assembler example from Trung Le
# Now supports MIPS instructions: add, addi, addiu, mult, multu, srl, lb, sb, lw,
 sw, j, beq, bne, slt, sltu.
# Remember where each of the jump label is, and the target location
def saveJumpLabel(asm,labelIndex, labelName):
    lineCount = 0
    for line in asm:
        line = line.replace(" ","")
        if(line.count(":")):
            labelName.append(line[0:line.index(":")]) # append the label name
            labelIndex.append(lineCount) # append the label's index
            asm[lineCount] = line[line.index(":")+1:]
        lineCount += 1
    for item in range(asm.count('\n')): # Remove all empty lines '\n'
        asm.remove('\n')
def main():
    labelIndex = []
    labelName = []
    f = open("mc.txt","w+")
    h = open("mips.asm","r")
    asm = h.readlines()
    for item in range(asm.count('\n')): # Remove all empty lines '\n'
        asm.remove('\n')
    saveJumpLabel(asm,labelIndex,labelName) # Save all jump's destinations

    for line in asm:
        line = line.replace("\n","") # Removes extra chars
        line = line.replace("$","")
        line = line.replace(" ","")
        line = line.replace("zero","0") # assembly can also use both $zero and $0

        if(line[0:5] == "addiu"): # ADDIU
            line = line.replace("addiu","")
            line = line.split(",")
            imm = format(int(line[2]),'016b') if (int(line[2]) > 0) else format(6
5536 + int(line[2]),'016b')
            rs = format(int(line[1]),'05b')
            rt = format(int(line[0]),'05b')
            f.write(str('001001') + str(rs) + str(rt) + str(imm) + '\n')
        elif(line[0:4] == "addi"): # ADDI
            line = line.replace("addi","")
            line = line.split(",")
            imm = format(int(line[2]),'016b') if (int(line[2]) > 0) else format(6
5536 + int(line[2]),'016b')
            rs = format(int(line[1]),'05b')
            rt = format(int(line[0]),'05b')
            f.write(str('001000') + str(rs) + str(rt) + str(imm) + '\n')
        elif(line[0:2] == "lb"): # LB
            line = line.replace("lb","")
            line = line.split(",")
            imm = format(int(line[2]),'016b') if (int(line[2]) > 0) else format(6
5536 + int(line[2]),'016b')
            rs = format(int(line[1]),'05b')
```

```
            rt = format(int(line[0]),'05b')
            f.write(str('100000') + str(rs) + str(rt) + str(imm) + '\n')
        elif(line[0:2] == "sb"): # SB
            line = line.replace("sb","")
            line = line.split(",")
            imm = format(int(line[2]),'016b') if (int(line[2]) > 0) else format(6
5536 + int(line[2]),'016b')
            rs = format(int(line[1]),'05b')
            rt = format(int(line[0]),'05b')
            f.write(str('101000') + str(rs) + str(rt) + str(imm) + '\n')
        elif(line[0:2] == "lw"): # LW
            line = line.replace("lw","")
            line = line.split(",")
            imm = format(int(line[2]),'016b') if (int(line[2]) > 0) else format(6
5536 + int(line[2]),'016b')
            rs = format(int(line[1]),'05b')
            rt = format(int(line[0]),'05b')
            f.write(str('100011') + str(rs) + str(rt) + str(imm) + '\n')
        elif(line[0:2] == "sw"): # SW
            line = line.replace("sw","")
            line = line.split(",")
            imm = format(int(line[2]),'016b') if (int(line[2]) > 0) else format(6
5536 + int(line[2]),'016b')
            rs = format(int(line[1]),'05b')
            rt = format(int(line[0]),'05b')
            f.write(str('101011') + str(rs) + str(rt) + str(imm) + '\n')
        elif(line[0:3] == "beq"): # BEQ
            line = line.replace("beq","")
            line = line.split(",")
            imm = format(int(line[2]),'016b') if (int(line[2]) > 0) else format(6
5536 + int(line[2]),'016b')
            rs = format(int(line[1]),'05b')
            rt = format(int(line[0]),'05b')
            f.write(str('000100') + str(rs) + str(rt) + str(imm) + '\n')
        elif(line[0:3] == "bne"): # BNE
            line = line.replace("bne","")
            line = line.split(",")
            imm = format(int(line[2]),'016b') if (int(line[2]) > 0) else format(6
5536 + int(line[2]),'016b')
            rs = format(int(line[1]),'05b')
            rt = format(int(line[0]),'05b')
            f.write(str('000101') + str(rs) + str(rt) + str(imm) + '\n')
        elif(line[0:3] == "add"): # ADD
            line = line.replace("add","")
            line = line.split(",")
            rd = format(int(line[0]),'05b')
            rs = format(int(line[1]),'05b')
            rt = format(int(line[2]),'05b')
            f.write(str('000000') + str(rs) + str(rt) + str(rd) + str('0000010000
0') + '\n')
        elif(line[0:5] == "multu"): # MULTU
            line = line.replace("multu","")
            line = line.split(",")
            rd = format(int(line[0]),'05b')
            rs = format(int(line[1]),'05b')
            rt = format(int(line[2]),'05b')
            f.write(str('000000') + str(rs) + str(rt) + str(rd) + str('0000001100
1') + '\n')
```

```
            elif(line[0:4] == "mult"): # MULT
                line = line.replace("mult","")
                line = line.split(",")
                rd = format(int(line[0]),'05b')
                rs = format(int(line[1]),'05b')
                rt = format(int(line[2]),'05b')
                f.write(str('000000') + str(rs) + str(rt) + str(rd) + str('0000001100
0') + '\n')
            elif(line[0:3] == "srl"): # SRL
                line = line.replace("srl","")
                line = line.split(",")
                rd = format(int(line[0]),'05b')
                rs = format(int(line[1]),'05b')
                rt = format(int(line[2]),'05b')
                f.write(str('000000') + str(rs) + str(rt) + str(rd) + str('0000000001
0') + '\n')
            elif(line[0:4] == "sltu"): # SLTU
                line = line.replace("sltu","")
                line = line.split(",")
                rd = format(int(line[0]),'05b')
                rs = format(int(line[1]),'05b')
                rt = format(int(line[2]),'05b')
                f.write(str('000000') + str(rs) + str(rt) + str(rd) + str('0000010101
1') + '\n')
            elif(line[0:3] == "slt"): # SLT
                line = line.replace("slt","")
                line = line.split(",")
                rd = format(int(line[0]),'05b')
                rs = format(int(line[1]),'05b')
                rt = format(int(line[2]),'05b')
                f.write(str('000000') + str(rs) + str(rt) + str(rd) + str('0000010101
0') + '\n')
            elif(line[0:1] == "j"): # JUMP
                line = line.replace("j","")
                line = line.split(",")
                # Since jump instruction has 2 options:
                # 1) jump to a label
                # 2) jump to a target (integer)
                # We need to save the label destination and its target location
                if(line[0].isdigit()): # First,test to see if it's a label or a integ
er
                    f.write(str('000010') + str(format(int(line[0]),'026b')) + '\n')
                else: # Jumping to label
                    for i in range(len(labelName)):
                        if(labelName[i] == line[0]):
                            f.write(str('000010') + str(format(int(labelIndex[i]),'02
6b')) + '\n')


        f.close()
if __name__ == "__main__":
    main()
```