

## hw4 export

Wednesday, September 25, 2019 8:33 PM

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# 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[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(65536 + int(l
ine[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(65536 + int(l
ine[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(65536 + int(l
ine[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(65536 + int(l
ine[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] == "lw"): # LW
            line = line.replace("lw", "")
            line = line.split(",")
            imm = format(int(line[2]), '016b') if (int(line[2]) > 0) else format(65536 + int(l
ine[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(65536 + int(l
ine[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(65536 + int(l
ine[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(65536 + int(l
ine[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('00000100000') + '\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('0000011001') + '\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')
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        f.write(str('000000') + str(rs) + str(rt) + str(rd) + str('0000001000') + '\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('0000000010') + '\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') + '\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('00000101010') + '\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 integer
            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]),'026b')) + '\n')
)

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

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