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RISC-V Instruction Disassembler Report

1 Introduction

This report discusses the implementation of a RISC-V instruction disassembler in C. The goal of this code is to convert hexadecimal RISC-V machine code into assembly instructions.File name is given as an input.File should be in same directory.

2 Coding Approach

The disassembler is implemented in C and consists of several functions, each responsible for extracting specific fields from the RISC-V machine code. These functions include opcode(), funct3(), funct7(), rdest(), rsource1(), rsource2(), bimm(), iimm(), iimm2(), simm(), jimm(), uimm(), and the main instruction() function.

It will open the file using fopen() function and will read every line which consits of hexadecimal strings.Then these hexadecinmal strings are converted into decimal using 'strtol' function.This decimal is passed through the function instruction to print the instructions. Opcode will be found by the function opcode(). According to this opcode the instructions are being categorized into types and functions related to these types are being called for further process.

To find the imm values for different types we use manipulations methods such as left shift,right shift,bitwise AND,etc...Same opcode instructions such as add,and are differentiated by the functions 'funct3' and 'funct7'.Then registers and signed immediate calculated using various functions such as bimm(),simm(), etc. Then the label is added(if there is a label) to instruction and the instruction will be printed.As soon as these instructions assign a label to other instruction label will be printed beside the assigned instruction using printlabel() function.

NOTE: I am considering offset in B format and J format is positive.

3 Conclusion

In conclusion, the RISC-V instruction disassembler successfully converts hexadecimal machine code into assembly instructions.I checked with different containing loops,if-else statements to check the code using RIPES and cross checked the answers.