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Class: CS 2160-002: Assembly Programming and Computer Organization, Spring 2024
Instructor: Keith Paarporn
Project Title: Assembly Programming Project #1

How to Run the Program

1. Open the QtRVSim simulator and select "Start Empty" with the "No Pipeline no cache" option.
2. Navigate to "Open Source" and load the desired source file.
3. Compile the source code by selecting "Compile Source".
4. Run the program by clicking "Run". To input data, use the "Input:" box in the Terminal window.

Assignment Overview

This project consists of four parts, focusing on assembly programming and computer organization concepts:

Part 1: Getting Started with QtRVSim.
Part 2: Refactoring Functions into read_string and write_string.
Part 3: Implementing libc functions getchar, putchar, gets, and puts.
Part 4: Reporting and Logging, including documentation and test cases.

Part 1's details can be seen at the end of this read me with the misc notes detailed my thought process.

Part 2's direct result can be seen as part2.s

Part 3's direct result can be seen as project1-libc.S

Part 4 is this document itself and the additional logs.pdf

The "final source" code, is just part 2's code, as part 3 does not work.

Test Cases

Description: Verify that the program correctly reads and outputs a user-inputted message for p2
Input: "Kaden Bilyeu"
Expected Output: "Kaden Bilyeu"

Actual Output: "Kaden Bilyeu"
Notes: This test verifies the basic I/O functionality of the program for part 2

Description: Verify that the program correctly reads and outputs a user-inputted message for p3
Input: "Kaden Bilyeu"
Expected Output: "Kaden Bilyeu"
Actual Output:

Notes: This test was supposed to verify the basic I/O functionality of the program for part 3, but failed., the attached image is a screenshot of what was pasted in the search bar, as the characters could not be pasted

Resources Used

- QtRVSim Documentation: https://github.com/cvut/qtrvsim
- Lecture Slides
- Computer Organization and Design RISC-V Edition, 2nd Edition

Challenges and Solutions

- **Challenge:** Basic refactoring for part 2
- **Solution:** Reviewed textbook and slides for guidance, solved within an hour or two

- **Challenge:** Advanced refactoring for part 3
- **Solution:** Reviewed textbook and slides for guidance, reached out to professor but as of this writing, no reply. Unable to resolve but attempt was provided.

Time Investment

Approximately 14 hours were spent completing this project, from initial setup to final testing, and then me giving up after being unable to complete part 3.

Functionality Bugs and Issues

- **Known Bug:** For part 4, project1-libc.S, outputs invalid characters, and then ends abruptly

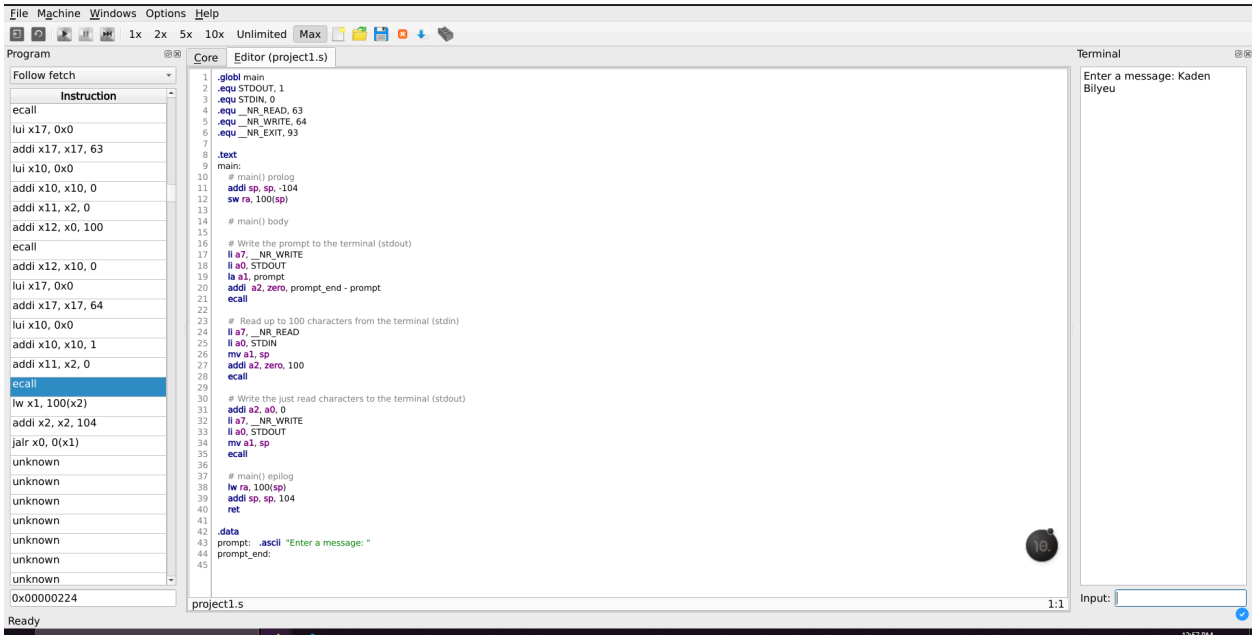
Screenshots

- Screenshots can be seen below

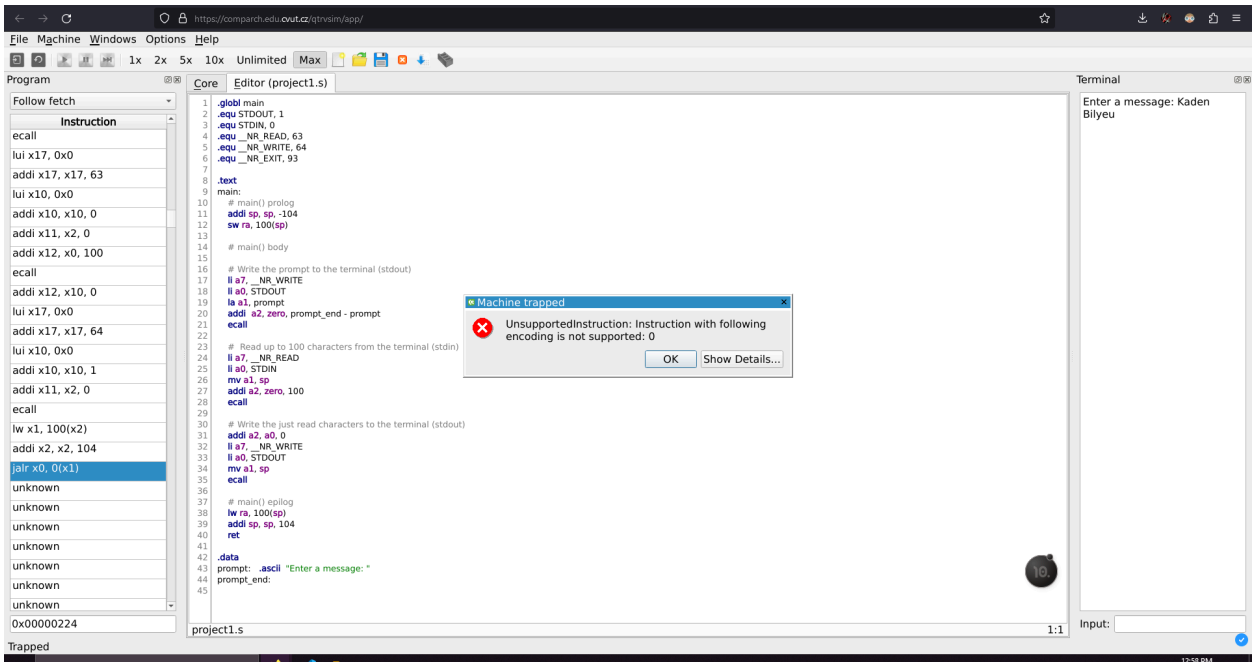
Personal Notes on each part

Part 1:

Name Input:



UnsupportedInstruction:



No difficulties encountered yet.
Part 2:

Tried to run the sim on Firefox again and ran into an issue of it not supporting the web framework, so I had to switch to edge. I'm not sure what happened here because I know it worked when I completed part 1 but oh well, minor setup

As for actually completing part 2, I took the approach of creating another file with the original source code, and saving the modified code in another file, so I don't have to keep looking at GitHub.

It was relatively easy, I took the second sequence of code, and moved it into a function, had two simulator windows open and ran them side by side to ensure it worked the same. Then I repeated the step with the first and third sequence.

Part 3:

I spent many hours attempting this, but ran into the same issue of invalid characters being printed and abrupt ending of the program, as of writing this I was unable to solve. I emailed the professor, perhaps a bit too late Saturday evening, and have yet to receive a response.

I'm frustrated, as I'm not sure what the issue is, but i hope my explanation and code is enough for partial credit, as this is a major part of my grade.