

CS375 Final Report

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1 Introduction

This independent study was done as part of the CS375(Independent study) course at Luther College under the supervision of Prof. Roman Yasinovskyy. This independent study focused on the practical exploration of compiler construction and virtual machine design. The study was divided into two primary projects: completing the second half of the Nand2Tetris course and implementing an interpreter for the Lox programming language.

2 Project 1: nand2tetris

2.1 About the project

I completed the second half of the nand2Tetris course, which involves building a virtual machine (VM) translator and a compiler for the Jack programming language as well as writing a basic Jack OS. All of my projects for this course is available on <https://github.com/paudsu01/nand2tetris> github repository publicly.

1. **VM Translator:** Implemented a virtual machine translator that converts VM code into Hack assembly language.
<https://github.com/paudsu01/nand2tetrisVMTranslator>

2. **Jack Compiler:** Built a compiler for the Jack programming language that translates **.jack** files into **.vm** files. The guide to use the compiler can be found here:
<https://github.com/paudsu01/nand2tetrisCompiler>
3. **Jack OS:** Wrote a Jack OS implementation
<https://github.com/paudsu01/JackOS>

3 Project 2: Lox interpreter

3.1 About the project

This project involved coding a tree-walk interpreter for the Lox programming language in Java as part of the **Crafting Interpreters** book. The outcome is an interpreter for a fully featured scripting language with support for functions and classes. The repository for my language interpreter can be found here:
<https://github.com/paudsu01/Lox>.

The documentation for the Lox programming language itself can be found here:
<https://craftinginterpreters.com/the-lox-language.html>

3.2 How to run the interpreter

1. Prerequisite(s): Java
2. Download the *Lox.jar* file from the releases section here: <https://github.com/paudsu01/Lox/releases>
3. Open up your terminal.

```
cd path/to/Lox.jar
```

4. To run the interpreter run:

```
java -jar Lox.jar
```

5. To run a **.lox** file, run:

```
java -jar Lox.jar file.lox
```

4 Acknowledgments

I would like to thank my advisor, Prof. Roman Yasinovskyy, for his guidance and support throughout this independent study.