Cloud and Computer Architecture – Assignment 1
JavaCC

Total Marks: 20
Submission Deadline: 22/11/24
Submission Format: Report (DOC or PDF), Screencast, and Code (JavaCC grammar file)

Overview

In this assessment, you will create a small parser using JavaCC. You will also explain your process in both a written report and a screencast. Your task involves both theoretical understanding and practical implementation of the parser.

You are expected to answer the following key questions:

1. **What is a compiler?**
2. **What is the relationship between Java and JavaCC?**
3. **What is a parser?**
4. **What is a token?**
5. **What are the implications of AI in compiler design? This can require small research**

Your project must include a simple working parser written in JavaCC, alongside a clear explanation of its components, both in a report and a screencast (feel free to use any example as long as it contains java code, javacc code, tokens, skips, and javacc method(s).

Components

1. Theoretical Explanation in the Report (8 Marks Total)

In your report, you must provide explanations for the following questions:

a. What is a compiler? (1 Mark)

- Clearly define what a compiler is and explain its role in translating source code into machine code.

b. What is the relationship between Java and JavaCC? (2 Marks)

- Explain how JavaCC is used in Java to build parsers and why it is relevant in the context of compiler construction. Why can we include java code in javacc source file?

c. What is a parser? (1 Mark)

- Provide a clear definition of a parser and its role in analysing and structuring input code.

d. What is a token? (1 Mark)

- Explain the concept of a token, its significance in parsing, and how tokens are used by the parser.

e. What are the implications of AI in compiler design? (3 Marks)

- Discuss how AI can affect compiler and parser design, including ideas such as:
    - Automated error correction.
    - Code optimization.
    - The use of machine learning for improving compiler efficiency.
    - How did you use AI in this assessment (if applicable)?

2. Practical Implementation of the Parser (6 Marks Total)

You will create a simple parser in JavaCC and explain the process in both the report and the screencast.

a. Correct Grammar Design and Setup in JavaCC (2 Marks)

- Set up JavaCC and create a grammar that parses a simple grammar.

b. Explanation of Grammar Structure (2 Marks)

- In your report, explain the key components of your grammar:

c. Generation and Testing of Parser (2 Marks)

- Test your parser with a sample input or input file.
- Explain how your parser processes this input and produces the correct result (method).

3. Screencast Presentation (6 Marks Total)

You must also create a short screencast (3-5 minutes) where you explain and demonstrate the following:

a. Explanation of JavaCC Setup and Grammar (3 Marks)

- Show how you set up JavaCC in your environment.
- Explain the grammar structure and how it relates to the parsing process.

b. Demonstration of Parser Working (2 Marks)

- Demonstrate the parser running with a sample input.
- Explain how the input is parsed step-by-step, including how the tokens are processed.

c. Presentation Quality (1 Mark)

- Ensure your screencast is clear, organized, and easy to follow.
- The screencast should have a logical flow and adequately explain both theoretical and practical aspects of the project.

Submission Requirements

1. **Report**: Submit a PDF document that includes all the theoretical explanations (answers to the provided questions) and an explanation of the grammar structure and parser design.
2. **Screencast**: Submit a video file 3–5-minute screencast that covers:
    - JavaCC setup.
    - Grammar explanation.
    - Working parser demonstration.
3. **Code**: Submit the JavaCC grammar file (.jj) you used to create the parser.

Marking Breakdown

Component	Marks	Description
Theoretical Explanation	8 Marks	Answers to the five questions provided, explaining compiler, parser, tokens, AI, and JavaCC.
Practical Parser Implementation	6 Marks	Grammar design, explanation of rules, and successful parsing of sample input.
Screencast Presentation	6 Marks	Clear explanation of JavaCC setup, parser demonstration, and overall presentation quality.

Other Information:

- **Be concise**: Your report should be clear and to the point, covering all required topics without unnecessary details.
- **Test your parser**: Ensure the parser works correctly with sample inputs.
- **Practice your screencast**: Make sure your video is well-organized and explains each step clearly.
- **Reflect on AI**: The discussion on AI in compiler design should demonstrate original thought and an understanding of the current trends in the field.

If you have any questions or need further clarification, feel free to reach out!