

Computer Science 330 Language Implementation

Test Information 6.20-8.00pm Thursday 6th April 2006

Start reading 6.20p.m. Write your name on all sheets of your answer book. Start writing your answers at 6.30pm. Stop writing at 8.00p.m.

Remove the staple fastening the appendices to the answer book, but do not remove the staples from the answer book. Read the questions carefully. Hand in your answer book at the front of the class. Attempt all questions. Questions total 100 marks. The test counts for 20% of the total mark.

Question 1

25 Marks

Write JFlex regular expressions to match the following tokens. You may declare support regular expressions if you need them.

Note: These exercises involve understanding the use of [...], |, *, +, ?, (...). They do not involve obscure things, such as escaped characters.

- (a) - (f) (20 marks)
- (g) Indicate five different kinds of errors in the following fragment of JFlex code. (“...” just means omitted code). (5 marks)

Question 2

55 marks

Consider the CUP grammar in the appendices.

- (a) Using the information provided in the appendices, perform a shift-reduce LALR(1) parse of the valid input
...
Show both the symbols and states on the stack, the current token, and the action performed at each stage.
Note that some grammar rules are left recursive, while others are right recursive. (20 marks)
- (b) Draw the full parse tree, showing all rules used in the above shift-reduce LALR(1) parse. (5 marks)
- (c) Using the information provided in the appendices, perform a shift-reduce LALR(1) parse of the invalid input
...
giving a clear indication of how CUP processes the input in the event of an error.
Assume `error_sync_size()` returns 1, so you do not need to first parse and check three tokens can be consumed without generating an error, before reparsing and performing the actions. (20 marks)
- (d) Draw the abstract syntax tree, as specified by the actions associated with the rules. (5 marks)
- (e) Write Java code to implement a `...Node`, with a `toString()` method to reprint the node. (5 marks)

Question 3

20 marks

Write a CUP grammar definition to parse input for the language You do not have to write any actions.