Compiler Design

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Fall Semester 1401-1402

Writing Assignment 2 | Deadline 1401/09/14

1 Left Recursion

Eliminate left recursion from the following grammars.

a.

$$S \longrightarrow S\,a\,S \mid A$$
$$A \longrightarrow A\,b\,B \mid B$$
$$B \longrightarrow a \mid b \mid B\,c$$

b.

$$S \longrightarrow C\,C \mid 1$$
$$C \longrightarrow S\,S \mid 0$$

2 Left Factoring

Left factor the following grammar.

a.

$$S \longrightarrow x\,A\,y \mid x\,B$$
$$A \longrightarrow x \mid x\,y$$
$$B \longrightarrow z\,z \mid a\,a$$

3 Context-Free Grammar

Consider the fllowing CFG.

$$S \longrightarrow \{\ T$$
$$T \longrightarrow C\ A \mid (\ $$
$$A \longrightarrow @\ B \mid (\ $$
$$B \longrightarrow C\ A \mid (\ $$
$$C \longrightarrow b \mid a \mid S$$

a. Compute the FIRST sets for each of non-terminals.

b. Compute the FOLLOW sets for each of non-terminals.

c. Construct the LL(1) parsing table for the grammar.

4 Transition Diagram

Construct a transition diagram with the minimum number of states that compiles all non-empty binary strings which do not contain 010.

5 Recursive descent parser

Write recursive descent parser for the following grammar.

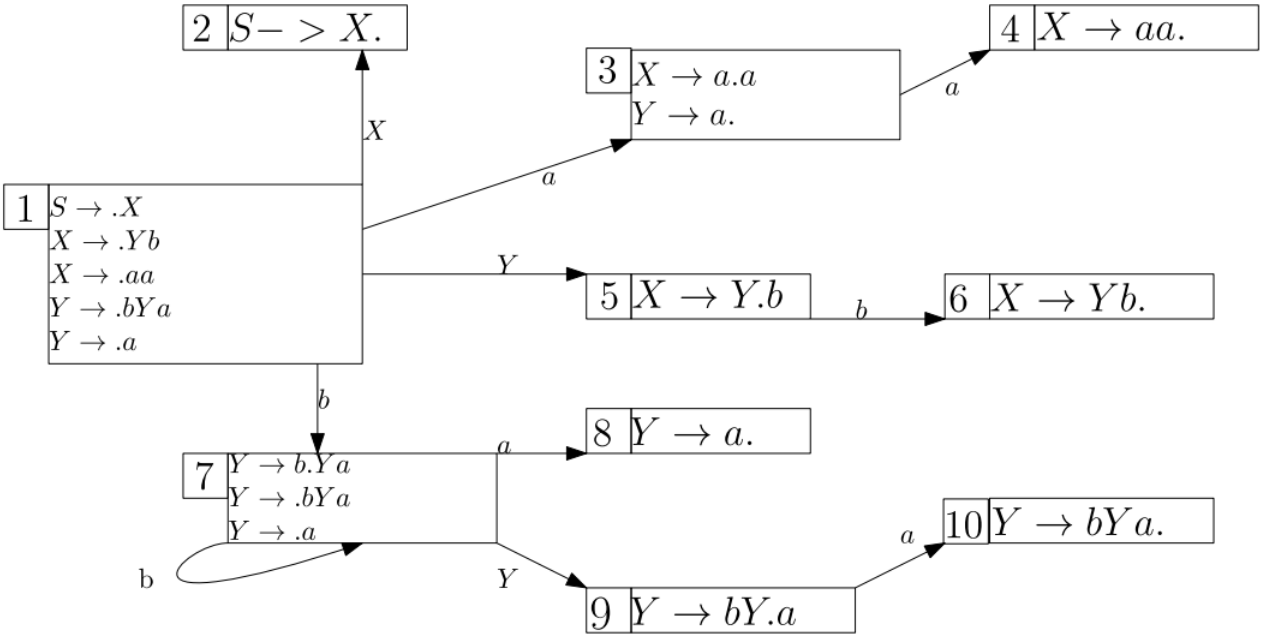
$$A \longrightarrow B\ a \mid A\ a \mid \varepsilon$$
$$B \longrightarrow A\ b \mid d$$

6

Consider the following grammar

$$S \longrightarrow X$$
$$X \longrightarrow Yb \mid aa$$
$$Y \longrightarrow a \mid bYa$$

The LR(0) diagram of this grammar is placed below.



a. Is this grammar SLR(1) or not? why?

b. Using the LR(0) diagram, obtain the augmented grammar used to build LALR(1) parser.

c. Compute the FOLLOW sets for each of non-terminals.

d. Using the Follow set and the given LR(0) diagram, get all the Lookaheads that are generated for the LALR parser for each of the reduce items in this diagram.

e. Is this grammar LALR(1) or not? why?

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Consider the following grammar.

$$S \longrightarrow SS+ \mid SS* \mid a$$

a. Get the set of LR(1) items of this grammar.

b. Get the set of LALR(1) items of this grammar.

Required Document

Please upload a zip or a pdf file in Quera.

General Rules

Submissions with more than 48 hours delay will not be graded.

Deadline

Monday 23:59. 1401/09/14.

Contact Information

Ask your questions in Quera

Good Luck