
HW 2: Grammars and Parsing

CS 421
Revision 1.0

Assigned Wednesday, March 16, 2016
Due Friday, April 1, 2016

Objectives

1. Demonstrate an ability to convert a grammar into an equivalent LL grammar.
2. Demonstrate an ability to produce an LR automata from a grammar.

LL Problems

(5 pts. each) For each of these grammars, convert it to an equivalent LL grammar or else assert that it is already LL.

$$\begin{array}{lcl} 1) & S \rightarrow & x E \\ & | & z \\ E \rightarrow & E a E \\ & | & E b E \\ & | & c \end{array}$$

$$\begin{array}{lcl} 2) & S \rightarrow & z y \\ & | & y E \\ E \rightarrow & S a \\ & | & x a \end{array}$$

$$\begin{array}{lcl} 3) & S \rightarrow & x E \\ & | & x E y \\ & | & z \\ E \rightarrow & a E \\ & | & b \end{array}$$

LR Problem

Consider the following grammar:

$$\begin{array}{ll} \mathbf{1} & S \rightarrow (S S) \\ \mathbf{2} & \quad | * V \\ \mathbf{3} & V \rightarrow * V \\ \mathbf{4} & \quad | p \end{array}$$

(5 pts.) First, calculate the first and follow sets for the non-terminals of the grammar.

$$\begin{array}{l} \text{First}(S) = \\ \text{First}(V) = \end{array}$$

$$\begin{array}{l} \text{Follow}(S) = \\ \text{Follow}(V) = \end{array}$$

(30 pts.) Now, describe the LR automata for the grammar by listing the item sets (states) and filling out the action and goto tables.

Action

	p	$*$	$($	$)$	$\$$
0					
1					
2					
3					
4					
5					
6					
7					
8					
9					

Go To

	p	$*$	$($	$)$	$\$$	S	V
0							
1							
2							
3							
4							
5							
6							
7							
8							
9							