



# CS606 Compiler Constructions

## Assignment # 3

### Instructions :

Your assignment must be uploaded/submitted before or on **8<sup>th</sup> June 2011**.

- Your assignment must be in .doc format.(Any other formats like scan images, PDF, Zip, rar, bmp, docx etc will not be accepted)
- Save your assignment with your ID (e.g. bc020400600.doc).
- No assignment will be accepted through email.

It should be clear that your assignment will not get any credit if:

- The assignment is submitted after due date.
- The submitted assignment does not open or file is corrupted.
- Your assignment is copied from internet, handouts or from any other student (Strict disciplinary action will be taken in this case).

### Question 1:

[10]

Write an algorithm for constructing the canonical LR parsing table where the input and output of this algorithm will be as follows:

**Input:** An augmented grammar  $G'$

**Output:** The canonical LR parsing table functions action and goto for  $G'$

### Solution:

Method:

1. Construct  $C = \{l_0, l_1, \dots, l_n\}$ , the collection of the sets of LR(1) items for  $G'$ .
2. State  $i$  of the parser is constructed from  $l_i$ . The parsing actions for state  $i$  are determined as follows:
  - a) If  $[A \rightarrow \alpha a\beta, b]$  is in  $l_i$  and  $\text{goto}(l_i, a) = l_j$ , then set action  $[i, a]$  to "shift  $j$ ". Here,  $a$  is required to be a terminal.
  - b) If  $[A \rightarrow \alpha, a]$  is in  $l_i$ ,  $A \neq S'$ , then set action  $[i, a]$  to reduce  $A \rightarrow \alpha$ .
  - c) If  $[S' \rightarrow S, \$]$  is in  $l_i$ , then set action  $[i, \$]$  to "accept".

If a conflict results from the above rules, the grammar is said not to be LR (1), and the algorithm is said to fail.

3. The goto transitions for state  $i$  are determined as follows: If  $\text{goto}(l_i, A) = l_j$  then  $\text{goto}[i, A] = j$ .
4. All entries not defined by rules (2) and (3) are made "error".
5. The initial state of the parser is the one constructed from the set containing item  $[S' \rightarrow S, \$]$ .

### Question 2:

[10]

Apply your algorithm and construct the canonical parsing table for the following grammar without showing the intermediate steps e.g. goto graph.

$S \rightarrow aABe$   
 $A \rightarrow Abc \mid b$   
 $B \rightarrow d$

**Solution:**

STATE	actions			goto	
	c	d	\$	S	C
0	s3	s4		1	2
1			acc		
2	s6	s7			5
3	s3	s4			8
4	r3	r3			
5			r1		
6	s6	s7			9
7			r3		
8	r2	r2			
9			r2		

**Note:**

- Your answer must follow the below given specifications. **Marks will be deducted if you do not follow these instructions.**
  - Font style: "Times New Roman"
  - Font color: "Black"
  - Font size: "12"
  - **Bold** for heading only.
  - Font in *Italic* is not allowed at all.
- You should consult recommended books to clarify your concepts.
- It's better for you to submit the assignment well before the deadline.
- **Do not put any query at MDB about this assignment**, if you have any query then email at [CS606@vu.edu.pk](mailto:CS606@vu.edu.pk)

