



Course Code: CSL602	Course Name: SPCC LAB
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Experiment :09

Aim: To study LR (0) parser.

Theory:

LR Parser

LR parsing is one type of bottom up parsing. It is used to parse the large class of grammars.

In the LR parsing, "L" stands for left-to-right scanning of the input.

"R" stands for constructing a right most derivation in reverse.

"K" is the number of input symbols of the look ahead used to make number of parsing decision.

LR parsing is divided into four parts:

LR (0) parsing, SLR parsing, CLR parsing and LALR parsing.

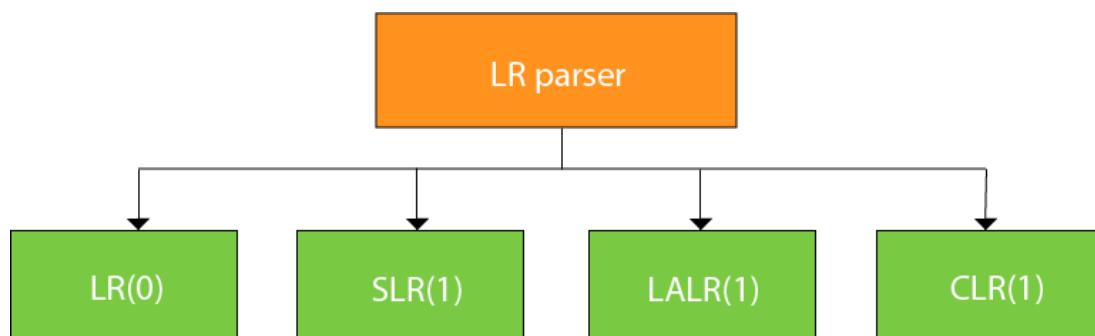


Fig: Types of LR parser

LR algorithm:

The LR algorithm requires stack, input, output and parsing table. In all type of LR parsing, input, output and stack are same but parsing table is different.

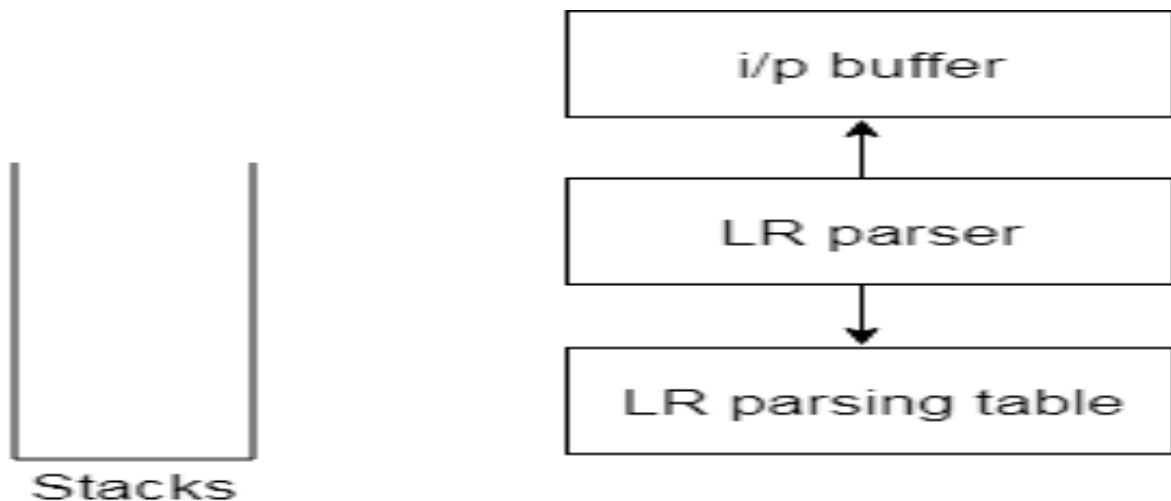


Fig: Block diagram of LR parser

Input buffer is used to indicate end of input and it contains the string to be parsed followed by a \$ Symbol.

A stack is used to contain a sequence of grammar symbols with a \$ at the bottom of the stack.

Parsing table is a two dimensional array. It contains two parts: Action part and Go To part.

LR (0) Parsing

Various steps involved in the LR (0) Parsing:

- For the given input string write a context free grammar.
- Check the ambiguity of the grammar.
- Add Augment production in the given grammar.
- Create Canonical collection of LR (0) items.
- Draw a data flow diagram (DFA).
- Construct a LR (0) parsing table.

Augment Grammar

Augmented grammar G' will be generated if we add one more production in the given grammar G . It helps the parser to identify when to stop the parsing and announce the acceptance of the input.



Example

Given grammar

$$S \rightarrow AA$$

$$A \rightarrow aA \mid b$$

The Augment grammar G' is represented by

1. $S' \rightarrow S$
2. $S \rightarrow AA$
3. $A \rightarrow aA \mid b$

Canonical Collection of LR(0) items

An LR (0) item is a production G with dot at some position on the right side of the production.

LR(0) items is useful to indicate that how much of the input has been scanned up to a given point in the process of parsing.

In the LR (0), we place the reduce node in the entire row.

Add Augment Production and insert ' \bullet ' symbol at the first position for every production in G

$$S' \rightarrow \bullet S$$

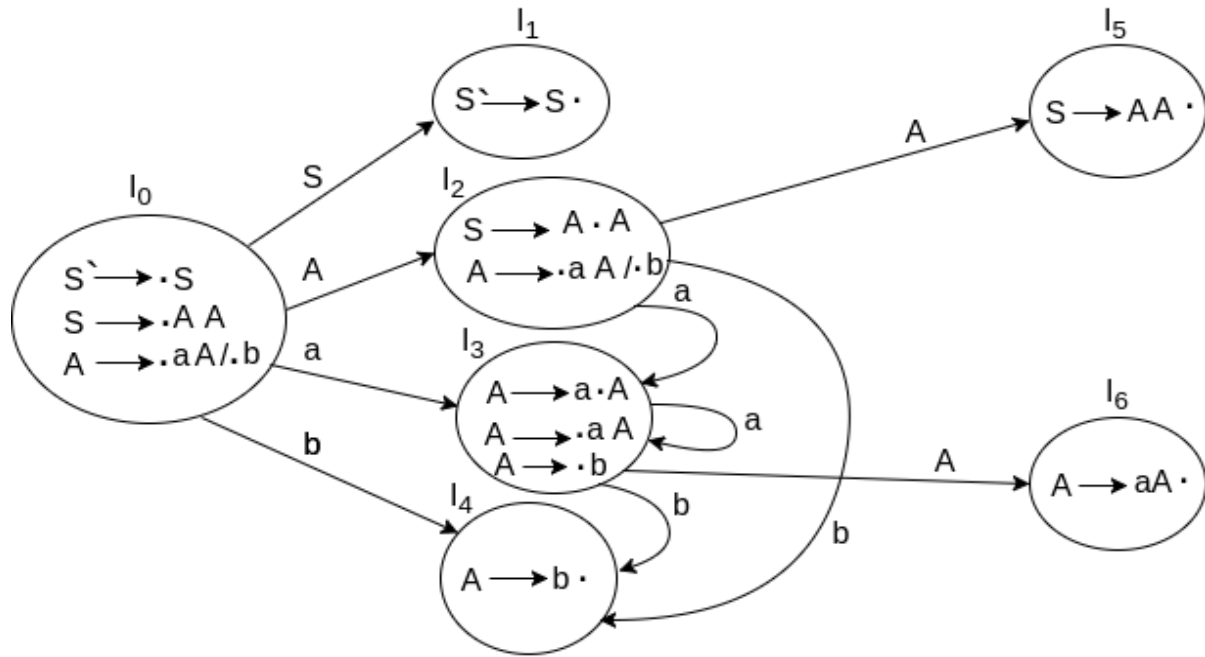
$$S \rightarrow \bullet AA$$

$$A \rightarrow \bullet aA$$

$$A \rightarrow \bullet b$$

Drawing DFA:

The DFA contains the 7 states I_0 to I_6 .



LR(0) Table

If a state is going to some other state on a terminal then it correspond to a shift move.

If a state is going to some other state on a variable then it correspond to go to move.

If a state contain the final item in the particular row then write the reduce node completely.

States	Action			Go to	
	a	b	S	A	S
I ₀	S3	S4		2	1
I ₁	accept				
I ₂	S3	S4		5	
I ₃	S3	S4		6	
I ₄	r3	r3	r3		
I ₅	r1	r1	r1		
I ₆	r2	r2	r2		



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Productions are numbered as follows:

S → AA ... (1)

A → aA ... (2)

A → b ... (3)

Conclusion:

With the help of this experiment we get information about the LR, LR(0) Parser.