LL(1) Parser

To construct LL(1) parsing table follow the following steps.

1) Check whether the given grammer contains left recursion (LR), left factor (LF), then eliminate them first

2) Calculation of first and follow set

3) If table contains multiple entries in a single cell, then it is not LL(1) otherwise given grammer is LL(1)

Elimination of (LR):

Consider Grammer $A \rightarrow A\alpha/\beta$ where β does not begins with A. To eliminate LR, replace the pair of production.

$$A \rightarrow \beta A'$$
$$A' \rightarrow \alpha A'/\epsilon$$

Elimination of (LF):-

Consider Grammar $A \to a\beta / a\gamma$
To eliminate LF, replace A
production by

$$A \to \alpha A'$$
$$A' \to \beta / \gamma$$

Ques → Check whether the given
grammar is LL(1) or not.

$$S \to aAB / bA / \epsilon$$
$$A \to aAb / \epsilon$$
$$B \to bB / c$$

Solution: 1) There is no LR or LF
2) Calculation of first and follow
set.

1) First Set.
First (B) = First (bB) ∪ First (c)
        = First (b) ∪ (c)
        = {b} ∪ {c}
        = {b, c}

First (A) = First (aAb) ∪ First (ε)
        = First (a) ∪ {ε}
        = {a} ∪ (ε)
        = {a, ε}

$$\text{First}(S) = \text{First}(aAB) \cup \text{First}(bA) \cup \text{First}(\epsilon)$$
$$= \text{First}(a) \cup \text{First}(b) \cup \{\epsilon\}$$
$$= \{a\} \cup \{b\} \cup \{\epsilon\}$$
$$\Rightarrow \{a, b, \epsilon\}$$

FOLLOW SET →

$$\text{Follow}(S) = \{\$\}$$

$$\text{Follow}(A) = \text{First}(B) \cup \text{Follow}(S) \cup \text{First}(b)$$
$$\Rightarrow \{b, c\} \cup \{\$\} \cup \{b\}$$
$$\Rightarrow \{b, c, \$\}$$

$$\text{Follow}(B) = \text{Follow}(S) \cup \text{Follow}(B)$$
$$\therefore \text{Follow}(S)$$
$$\text{Follow}(S)$$
$$= \{\$\}$$

3) Tom LL(1) parsing table

Non terminal \ Terminal	a	b	c	$
S	S→aAB	S→bA		S→ε
A	A→aAb	A→ε	A→ε	A→ε
B	~~B→bB~~	B→bB	B→c	

Result → The given grammar is LL(1)

(Bcoz there is no multiple Entry in one cell)