UNIT 5: TOP-DOWN PARSING TECHNIQUES

1. Is this an LL(1) grammar (why)? Transform the GRAMMAR INTO an equivalent LL(1):

$G= \Sigma_N=\{ S, A, B, C \}, \Sigma_T=\{ 0, 1, 2 \}, S, \wp \}$

$\wp$ = { S::= B 2 A
A::= 0 A |0
B::= 1 C | λ
C::= 2 A| 1
}

SOLUTION:

Let's verify the LL(1) conditions by means of the FIRST and FOLLOW sets:

	FIRST	FOLLOW
S	{1, 2}	{$}
A	{0}	{$, 2}
B	{1, λ}	{2}
C	{1, 2}	{2}

The production rules for A do not fulfill the conditions first-first, FIRST(A→ 0 A) ∩ FIRST (A→ 0)={0} not empty.

The transformation of the grammar to an LL (1) requires factorizing the productions of A.

S→ B 2 A
A→ 0 A'
A'→ A | λ
B→ 1 C | λ
C→ 2 A | 1

	Primero	Siguiente
S	{1, 2}	{$}
A	{0}	{$, 2}
A'	{0, λ}	{$, 2}
B	{1, λ}	{2}
C	{1, 2}	{2}

This grammar fulfills the LL(1) requirements.

2. Calculate the LL(1) table for the transformed grammar. Show the derivation tree for the sentence 120 applying the LL(1) analysis.

The LL(1) Table for the transformed grammar is:

	0	1	2	$
S		S→ B 2 A	S→ B 2 A	
A	A→ 0 A'			
A'	A'→ A		A'→ λ	A'→ λ
B		B→ 1 C	B→ λ	
C		C→ 1	C→ 2 A	

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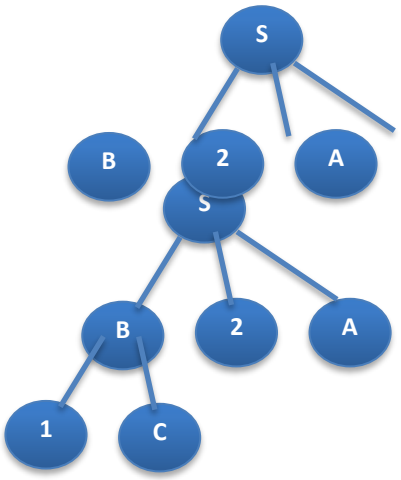
The derivation tree for the input 120 is:

Stack

S
$

token=120$ See in the table[S,1]= S→ B 2 A



Stack

B
2
A
$

token=120$ See in the table[B,1]= B→ 1 C

Stack

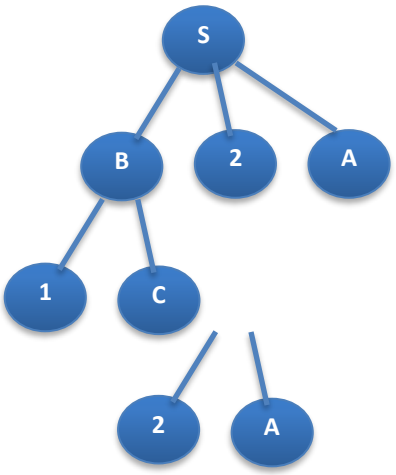
1
C
2
A
$

token=120$

Stack

C
2
A
$

token=120$ See in the table[C,2]= C→ 2 A



Stack

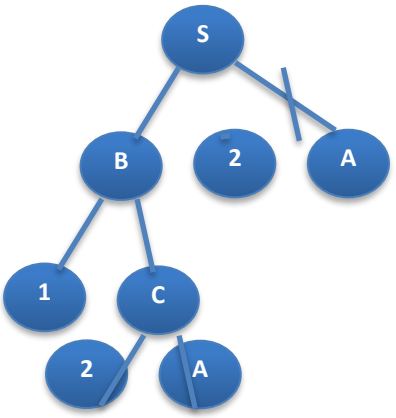
2
A
2
A
$

token=120$

Stack

A
2
A
$

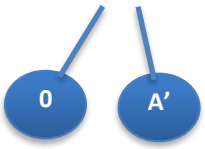
token=120$ See in the table[A,0]= A→ 0 A'



Stack

0
A’
2
A
$

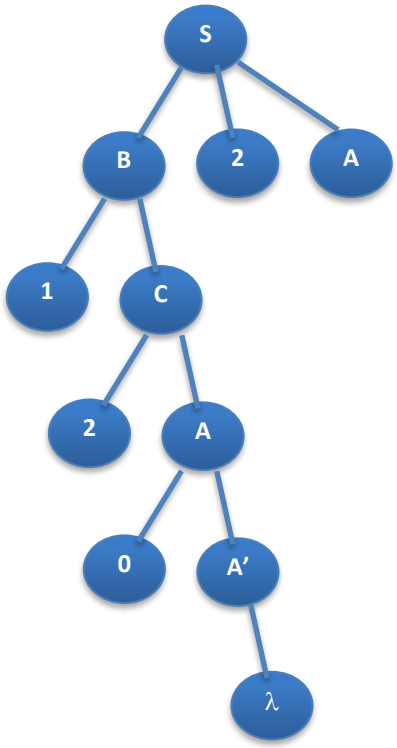
token=120$



Stack

A’
2
A
$

token=120$ See in the table[A’,$]= A’→ λ



Stack

2
A
$

token=120$

The top of the stack is a terminal symbol (2), but it is not the same that the current token ($). Thus, an error is generated. The sentence 120 is not recognized.