

## Practical work 3 ( 2 weeks)

### Questions:

Write a program in C language:

- a) Allows to read a grammar G from a text file:  $G = (V_t, V_n, S, R)$
- b) Displays all the rules of the grammar
- c) Displays the type of each rule of the grammar
- d) Displays the type of the grammar

**Type 3 : left**

**Type 3 : right**

**Type 2:**

**Type 1 context-sensitive**

**Type 1: monotone**

**Type 0**

**The content of the input file is as follows:**

**ligne 1:** terminals set (  $V_t$  )

**ligne 2:** non terminals set (  $V_n$  )

**ligne 3:** axiom

**ligne 4:** the number of rules of the grammar (  $K$  )

**ligne 5 :** rule 1

**ligne 6 :** rule 2

.....

**ligne :** rule k

### Example of a file containing a grammar:

**0 a b**

**S A B**

**S**

**5**

**$S \rightarrow 00S$**

**$S \rightarrow SbB$**

**$AS \rightarrow aA0$**

**$B \rightarrow \epsilon$**

**$B \rightarrow 00S$**

### Remarks :

- 1- You must choose the best data structure to represent the grammar
- 2- You must take into account the case of the empty word ( $\epsilon$ )
- 3- The use of subroutine and function is obligatory.
- 4- TPs that look similar will not be corrected. TP is an individual work
- 5- We have a software to check TPS similarities.

## Examples of grammars to be verified by your program :

**Grammar 1 :**  $G_1 = (V_t, V_n, S, R)$   $V_t = \{a, b\}$  ,  $V_n = \{S\}$

$R_1 = ( S \rightarrow ab \quad S \rightarrow a \quad S \rightarrow bb \quad )$

**Grammar 2 :**  $G_2 = (V_t, V_n, S, R)$   $V_t = \{a, b\}$  ,  $V_n = \{S, A, B\}$

$R_2 = ( S \rightarrow aS \quad S \rightarrow aA \quad A \rightarrow a \quad A \rightarrow bB \quad B \rightarrow b \quad )$

**Grammar 3 :**  $G_3 = (V_t, V_n, S, R)$   $V_t = \{a, b\}$  ,  $V_n = \{S\}$

$R_3 = ( S \rightarrow aS \quad S \rightarrow Sb \quad S \rightarrow a \quad S \rightarrow b \quad )$

**Grammar 4 :**  $G_4 = (V_t, V_n, S, R)$   $V_t = \{a, b\}$  ,  $V_n = \{S, A, B\}$

$R_4 = ( S \rightarrow aSa \quad S \rightarrow aAB \quad A \rightarrow ba \quad B \rightarrow b \quad B \rightarrow \epsilon \quad )$

**Grammar 5 :**  $G_5 = (V_t, V_n, S, R)$   $V_t = \{+, -, *, /, a, b\}$  ,  $V_n = \{S, A, B\}$

$R_5 = ( S \rightarrow (A+B) \quad S \rightarrow (A-B) \quad S \rightarrow (A*B) \quad S \rightarrow (A/B) \quad A \rightarrow a \quad B \rightarrow b \quad S \rightarrow \epsilon \quad )$

**Grammar 6 :**  $G_6 = (V_t, V_n, S, R)$   $V_t = \{a, b\}$  ,  $V_n = \{S, A, B\}$

$R_6 = ( S \rightarrow aS \quad S \rightarrow aA \quad A \rightarrow a \quad A \rightarrow Bb \quad B \rightarrow b \quad )$

**Grammar 7 :**  $G_7 = (V_t, V_n, S, R)$   $V_t = \{a, b\}$  ,  $V_n = \{S, A, B\}$

$R_7 = ( S \rightarrow aAB \quad B \rightarrow aAB \quad aA \rightarrow aaA \quad bbAa \rightarrow bbBa \quad A \rightarrow a \quad B \rightarrow b \quad )$

**Grammar 8 :**  $G_8 = (V_t, V_n, S, R)$   $V_t = \{a, b\}$  ,  $V_n = \{S, A, B\}$

$R_8 = ( S \rightarrow aAB \quad B \rightarrow aAB \quad aA \rightarrow aaA \quad bbAa \rightarrow bbBa \quad A \rightarrow a \quad B \rightarrow \epsilon \quad )$

**Grammar 9 :**  $G_8 = (V_t, V_n, S, R)$   $V_t = \{a, b\}$  ,  $V_n = \{S, A, B\}$

$R_9 = ( S \rightarrow aAB \quad B \rightarrow aAB \quad aA \rightarrow aaA \quad bbAa \rightarrow bbBa \quad A \rightarrow a \quad S \rightarrow \epsilon \quad )$

**Grammar 10 :**  $G_8 = (V_t, V_n, S, R)$   $V_t = \{a, b\}$  ,  $V_n = \{S, A, B\}$

$R_{10} = ( S \rightarrow AB \quad aAB \rightarrow aAbB \quad AB \rightarrow BA \quad bbAa \rightarrow bbBa \quad A \rightarrow a \quad B \rightarrow b \quad S \rightarrow \epsilon \quad )$