TOC Assignment 2

Our submission for the second assignment done under the course **Theory of Computation** @ *BITS Pilani, Hyderabad Campus*

Group Members

- **Ankesh Pandey**: $2020A7PS0104H$
- **Khooshrin Aspi Pithawalla**: $2020A7PS2067H$
- **Khushi Biyani**: $2020A7PS0194H$
- **Kavyanjali Agnihotri**: $2020A7PS0185H$
- **Tushar Brijesh Chenan**: $2020A7PS0253H$

Grammar Of Basic C

The **Formal Context Free Grammar** of our language is:

$$G = \{V, T, P, S\}$$

$$V = \{PR, FS, MS, SS, FOR, AWS, A, EWS, E, RE, V, T, F, W, R, D, VL\}$$

$$T = \{;\} \cup \{,\} \cup \{SPACE\} \cup \{int, for, read, write, +, -, *, /, >, ==\} \\ \cup \{(\} \cup \{)\} \cup \{\{\} \cup \{\}\} \cup \{VAR, INT\_LITERAL\}$$

$$S = PR$$

$$P = \{\cdots \ written\ below\}$$

The elements of set V (Non Terminals) are correlated with the following real world entities:

$$PR = Program$$

$$FS = First\ Statement$$

$$MS = Many\ Statements$$

$$SS = Single\ Statement$$

$$FOR = For\ Statement$$

$$AWS = Assignment\ Statement\ Without\ Semicolon$$

$$A = Assignment\ Statement\ With\ Semicolon$$

$$EWS = Expression\ Without\ Semicolon$$

$$E = Expression\ With\ Semicolon$$

$$RE = Relational\ Expression$$

$$V = Value$$

$$T = Term$$

$$F = Factor$$

$$W = Write\ Statement$$

$$R = Read\ Statement$$

$$D = Declaration\ Statement$$

$$VL = Variable\ List$$

The elements of set T (Terminals) are correlated with the following real world entities:

$$VAR = Variable\ token$$

$$INT\_LITERAL = Integer\ Constant$$

$$SPACE = Space\ Token$$

The regular expression for VAR is: `\b(?!(for|int|read|write)\b)[a-z]+\b`

We don't have to handle the case of $for, int, read$ or $write$ explicitly because we are **manually checking** for those while tokenizing.

The regular expression for $INT\_LITERAL$ is: $\{0-9\}^+$

The set of **Productions** P is:

$$PR \rightarrow FS \mid FS\ MS$$

$$MS \rightarrow SS \mid SS\ MS$$

$$FS \rightarrow D \mid R \mid W \mid FOR \mid A$$

$$SS \rightarrow R \mid W \mid FOR \mid A$$

$$FOR \rightarrow for\ (A\ E\ AWS\ )\ \{MS\}\ ;$$

$$W \rightarrow write\ SPACE\ VAR\ ; \mid write\ SPACE\ INT\_LITERAL\ ;$$

$$R \rightarrow read\ SPACE\ VAR\ ;$$

$$D \rightarrow int\ SPACE\ VL\ ;$$

$$VL \rightarrow VAR \mid VAR\ ,\ VL$$

$$AWS \rightarrow VAR\ =\ EWS$$

$$A \rightarrow AWS;$$

$$EWS \rightarrow RE \mid RE == EWS$$

$$RE \rightarrow V \mid V > RE$$

$$V \rightarrow T \mid T + V \mid T - V$$

$$T \rightarrow F \mid F * T \mid F/T$$

$$F \rightarrow VAR \mid INT\_LITERAL \mid (EWS)$$

$$E \rightarrow EWS\ ;$$

Run Locally

Clone the project

```
git clone https://github.com/khushiBiyani/TOC_Assignment2.git
```

Go to the project directory

```
cd TOC_Assignment2
```

Compile the main file

```
gcc main.c -o main
```

Run the app

```
./main input.txt
```