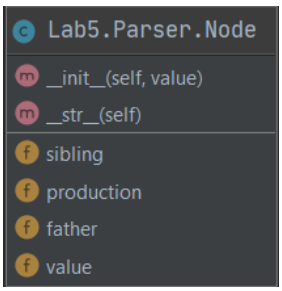
Parsing Labs (L5, L6, L7 Integration)

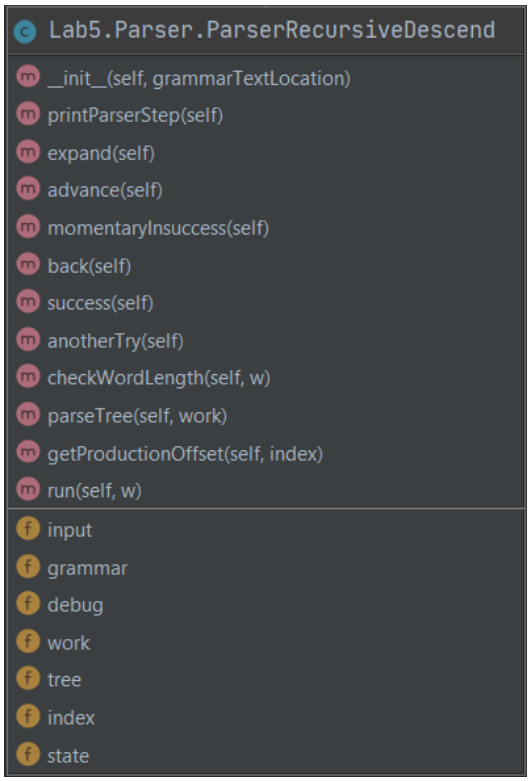
Recursive descent parser – implemented in team with Andrei Oniță

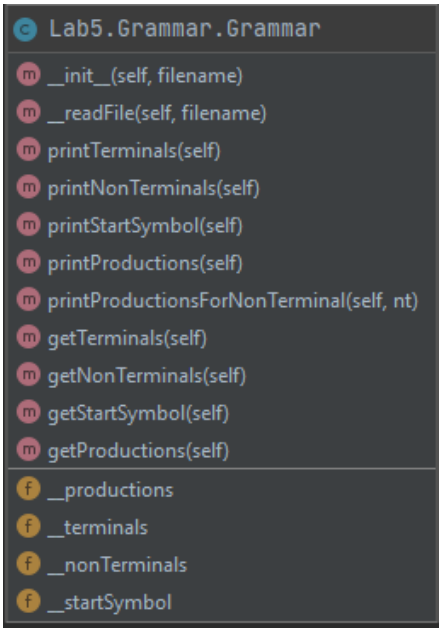
Github link: https://github.com/the-coding-cloud/FLCD/tree/main/Lab5

- Integrated Scanner into this lab (ScannerIntegration folder – for *g2*)
- Implemented the pipeline between the Scanner and Parser – the output of the Scanner (token sequence from PIF) becomes the input for the Parser
- Implemented functions that print to the console each step from parsing
- Wrote g2-codes.txt using the token codes from *tokens.in*, in order to have the matching codification for the grammar of the mini language
- Printed the output of parsing (parse tree as an arbitrary tree with father sibling representation on a table) to an external file (*g1.out, g2-codes.out*)
- Added code review for our classmates (Istvan Olah & Razvan Neta)

UML Diagrams







Grammar

Data Structure

We created the class Grammar which stores the grammar from a text file

Constructor(file)

- Pre:
- In: file: string - location of Grammar definition
- Out: Grammar object
- Post: creates a Grammar object initialised with the terminals, nonTerminals, productions, startSymbol, File

The *terminals, nonTerminals, productions* fields are lists.

Operations:

Function readFile(filename)

- Pre: an existing fileName path
- In: fileName : String
- Out: -
- Post: the *terminals, nonTerminals, productions, startSymbol* fields are read from the file and initialised
- Desc: reads the Grammar and loads it in the memory

Parser - Recursive Descent

Data Structure

We created the class ParserRecursiveDescent

Constructor(file)

- Pre: file - location of Grammar definition
- In: file - string
- Out: a Parser object
- Post: creates a Parser object that initialises with the work and input stacks, index, state

Operations:

Function expand()

- Pre:
- In:
- Out: -
- Post:
- Desc: expands the non-terminal into its first production of terminals

Function advance()

- Pre:
- In:
- Out: -
- Post:
- Desc: puts one terminal in the work stack

Function momentaryInsuccess()

- Pre:
- In:
- Out: -
- Post:
- Desc: state is change to b

Function back()

- Pre:
- In:
- Out: -
- Post:
- Desc: goes back one index

Function success()

- Pre:
- In:
- Out: -
- Post:
- Desc: state set to s

Function anotherTry()

- Pre:
- In:
- Out: -
- Post:
- Desc: parses the last non terminal to the next set of terminals in its production, or pops the non terminal from work stack to input stack

Function checkWordLength()

- Pre:
- In: word to be checked
- Out: True or False
- Post:
- Desc: checks if the word length wasn't exceeded by the index and then checks the first letter in the stack with its word counterpart.

Function parseTree()

- Pre: work is the work stack
- In: work – list

- Out: prints tree
- Post: the table respecting the father sibling representation of the parse tree is printed
- Desc: the table respecting the father sibling representation of the parse tree is printed

Function getProductionOffset(index)

- Pre: index is a valid index from the work stack
- In: index - int
- Out: offset
- Post: offset - int
- Desc: returns an offset used in computing the index of a certain node in the parse tree represented using the table with father-sibling notation

Function run(w)

- Pre: w – sequence to parse
- In: w - list
- Out: True/False
- Post: function returns True and prints the parse tree if the sequence is accepted; returns False otherwise
- Desc: function returns True and prints the parse tree if the sequence is accepted; returns False otherwise

Node

Data Structure

We created the class Node, which stores the information of a node in the parse tree

Constructor(value)

- Pre:
- In: value - string
- Out: Node object
- Post: creates a Node object initialised with the value given in the constructor and the father, sibling and production fields are initialised with -1 (“invalid” value chosen to represent that no actual value had been assigned to them)