

Karadeniz Technical University – Software Engineering Department

SE2002-Programming Languages – Term Project I

Start Date: 22/04/2025 13:00

End Date: 30/05/2025 23:50

Lecturer: Asst. Prof. Çağatay Murat Yılmaz

Detailed information will be given in the lecture.

Assignments must be uploaded to KTU Distance Education Application system

(<https://uek.ktu.edu.tr/ogrenci.html>).

Mini Language Recognizer and Validator

Objective:

In this project, students are expected to develop a software tool that reads a formal grammar defined in BNF (Backus-Naur Form) from a file, and checks whether each of the provided test sentences complies with the grammar rules. The goal is to help students understand syntax, grammar processing, and language recognition.

Input:

1. grammar.txt: Contains grammar rules written in BNF format.
2. sentences.txt: Contains test sentences (one per line) to validate against the grammar.

Output:

For each sentence, the program should print whether it is valid or invalid according to the grammar.

Example Output:

```
Sentence 1: valid  
Sentence 2: invalid  
Sentence 3: valid
```

Remarks:

1. There will be at most one rule on each line, i.e. the RHS of a rule will not appear on more than one line. Alternative RHSs in a rule will be separated by a vertical bar on the same line. The number of rules in a row may vary according to the grammar.
2. The grammar rules must use ::= as the separator between the left-hand side and the right-hand side of each production rule.
3. The program should work for different grammars (grammar.txt) and for different query sentences (sentences.txt). It must not work only for the example given above.
4. The project can be written in C, Java or Python programming language.

5. Assignments can be done by groups of maximum three people. Presentations will be taken on the date announced at the end of the semester. Source codes and project report will be submitted at the time of assignment submission.

Example grammar.txt (in BNF format):

```
<sentence> ::= <noun-phrase> <verb-phrase>
<noun-phrase> ::= <determiner> <noun>
<verb-phrase> ::= <verb> | <verb> <noun-phrase>
<determiner> ::= the | a
<noun> ::= cat | dog | man | telescope
<verb> ::= saw | liked | admired
```

Example sentences.txt:

```
the man saw a dog
a telescope admired the cat
the man the dog
a man liked
liked the dog
```