Course: Principles of Programming Languages **Course ID:** IT092IU

INTERNATIONAL UNIVERSITY - VIETNAM NATIONAL UNIVERSITY SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

PPL Lab 1

LexerExercise

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Write lexer rules in “BKIT.g4” that can accept the following tokens.

Example:

Int:

All integer numbers

Integer numbers can start with 0

Id:

Containing only lower-case alphabets

Exercise 1:

Int:

All integer numbers

Integer numbers do not start with 0

Float:

Example: 1.0, 1., 12e2, 9e-2

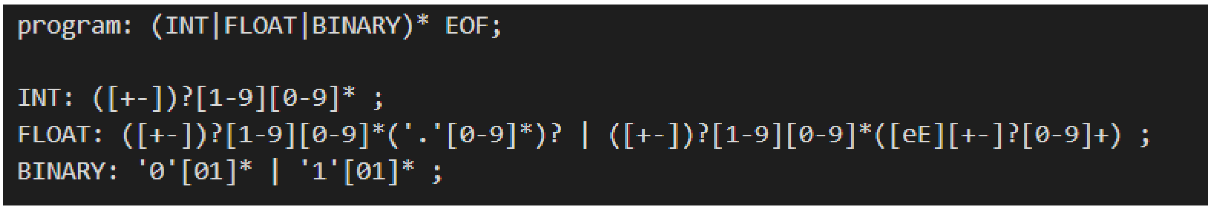
Float numbers do not start with 0

Binary:

Example: 001, 101, 0010, 1001

Solution:

With the provided Lexer Code files, changing the program part to meet the requirements in Exercise1.g4.



```
program: (INT|FLOAT|BINARY)* EOF;

INT: ([+-])?[1-9][0-9]* ;
FLOAT: ([+-])?[1-9][0-9]*('.'[0-9]*)? | ([+-])?[1-9][0-9]*([eE][+-]?[0-9]+) ;
BINARY: '0'[01]* | '1'[01]* ;
```

INT: ([+-]?)[1-9][0-9]*

([+-]?): All integer numbers including positive and negative integer numbers

[1-9][0-9]*: Integer numbers do not start with 0

FLOAT: ([+-])?[1-9][0-9]*('.'[0-9]*)? | ([+-])?[1-9][0-9]*([eE][+-]?[0-9]+)

([+-]?): All float numbers including positive and negative float numbers

([+-]?)[1-9][0-9]*('.'[0-9]*)?: All float numbers do not start with 0

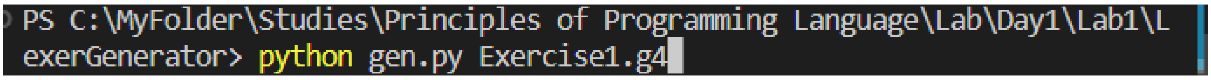
([+-])?[1-9][0-9]*([eE][+-]?[0-9]+): All float numbers that contain e or E

BINARY: '0'[01]* | '1'[01]*

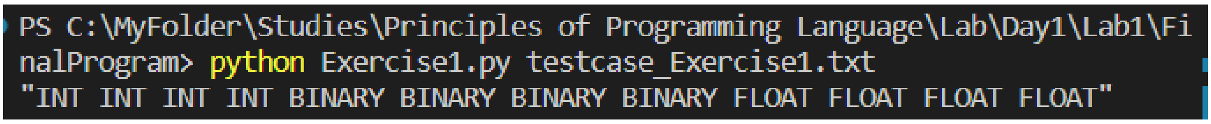
'0'[01]* | '1'[01]*: Binary that only contains 0 or 1

Then after completing, running the code to compile and test with the testcase_Exercise1.txt

+3 -45 28 2 0001 0101 0010 01001 1.0 1. 12E2 9e-2



```
PS C:\MyFolder\Studies\Principles of Programming Language\Lab\Day1\Lab1\L
exerGenerator> python gen.py Exercise1.g4
```



```
PS C:\MyFolder\Studies\Principles of Programming Language\Lab\Day1\Lab1\Fi
nalProgram> python Exercise1.py testcase_Exercise1.txt
"INT INT INT INT BINARY BINARY BINARY BINARY FLOAT FLOAT FLOAT FLOAT"
```

Exercise 2:

Id:

Starting with a lower-case alphabet

Can contain alphabets, numbers and '_'

Int, Float, Binary:

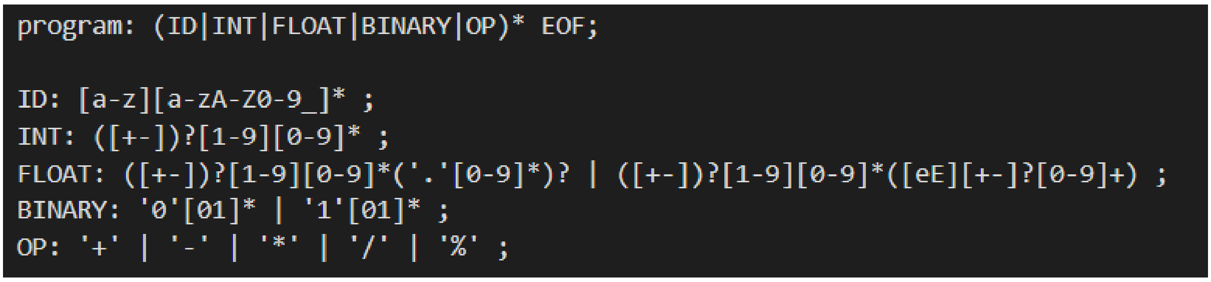
The same requirements as Exercise 1

Operator:

Example: +, -, *, /, %

Solution:

With the provided Lexer Code files, changing the program part to meet the requirements in Exercise2.g4.



```
program: (ID|INT|FLOAT|BINARY|OP)* EOF;

ID: [a-z][a-zA-Z0-9_]* ;
INT: ([+-])?[1-9][0-9]* ;
FLOAT: ([+-])?[1-9][0-9]*('.'[0-9]*)? | ([+-])?[1-9][0-9]*([eE][+-]?[0-9]+) ;
BINARY: '0'[01]* | '1'[01]* ;
OP: '+' | '-' | '*' | '/' | '%' ;
```

ID: [a-z][a-zA-Z0-9_]*

[a-z]: IDs that start with a lower-case alphabet

[a-zA-Z0-9_]*: IDs that can contain alphabets, numbers and '_'

INT: ([+-]?)[1-9][0-9]*

([+-]?): All integer numbers including positive and negative integer numbers

[1-9][0-9]*: Integer numbers do not start with 0

FLOAT: ([+-])?[1-9][0-9]*('.'[0-9]*)? | ([+-])?[1-9][0-9]*([eE][+-]?[0-9]+)

([+-]?): All float numbers including positive and negative float numbers

([+-]?)[1-9][0-9]*('.'[0-9]*)?: All float numbers do not start with 0

([+-])?[1-9][0-9]*([eE][+-]?[0-9]+): All float numbers that contain e or E

BINARY: '0'[01]* | '1'[01]*

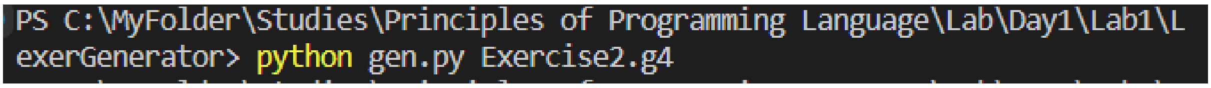
'0'[01]* | '1'[01]*: Binary that only contains 0 or 1

OP: '+' | '-' | '*' | '/' | '%'

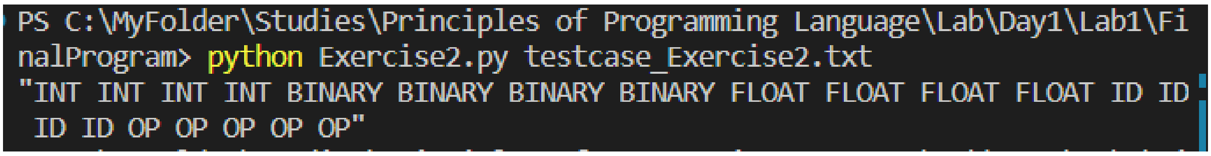
'+' | '-' | '*' | '/' | '%': operators that contain +, -, *, /, %

Then after completing, running the code to compile and test with the testcase_Exercise2.txt

3 45 28 2 001 0101 0010 01001 1.0 1. 12e2 9e-2 myVariable x alpha_123 vuNhatDuy + * / - %



```
PS C:\MyFolder\Studies\Principles of Programming Language\Lab\Day1\Lab1\L
exerGenerator> python gen.py Exercise2.g4
```



```
PS C:\MyFolder\Studies\Principles of Programming Language\Lab\Day1\Lab1\Fi
nalProgram> python Exercise2.py testcase_Exercise2.txt
"INT INT INT INT BINARY BINARY BINARY BINARY FLOAT FLOAT FLOAT FLOAT ID ID
 ID ID OP OP OP OP OP"
```