19CSE401 - Compiler Design

Lab Sheet 1

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1. Implement a Finite Automata which recognizes the input if it is an integer or float number.
   - If the input is an integer then output **<NUM, *the number*>**
   - If the number is a float, then output **<FLOAT, *the number*>**

   Example:
   1. Enter an input: 1233
      Output : <NUM, 1233>
   2. Enter an input: 0.22
      Output : <FLOAT, 0.22>
   3. Enter an input: 0123
      Output: Invalid Number

```
root at Abhishek in /mnt/c/Users/abhis/Downloads
 ○ cat 1.py
n = input('Enter an Input: ')

Key = ''

for i in n:

    if (len(n) > 1 and n[0] == '0' and n[1] != '.') or (len(n) == 1 and i == '.'):

        Key = 'Invalid Number'

        break

    if i >='0' and i <='9':

        if Key != 'float': Key = 'int'

    elif i == '.': Key = 'float'

    else:

        Key = 'Invalid Number'

        break

if Key == 'float': print('<FLOAT,', n + '>')

elif Key == 'int': print('<NUM,', n + '>')

else : print(Key)
```

```
root at Abhishek in /mnt/c/Users/abhis/Downloads
 ○ python3 1.py
Enter an Input: 1234
<NUM, 1234>
root at Abhishek in /mnt/c/Users/abhis/Downloads
 ○ python3 1.py
Enter an Input: 0.1234
<FLOAT, 0.1234>
root at Abhishek in /mnt/c/Users/abhis/Downloads
 ○ python3 1.py
Enter an Input: 0123
Invalid Number
```

2. Program to recognize if the input is a valid **identifier or not**.
   Sample output
   - Enter an input : abd23
     Output: <ID, abd23>
   - Enter an output: 23b
     Output: Invalid identifier

```
root at Abhishek in /mnt/c/Users/abhis/Downloads
 ○ cat 2.py
def Check(s):

    if not s[0].isalpha() and s[0] != '_':

        return "Invalid Identifier"

    for i in s[1:]:

        if not i.isalnum() and i != '_':

            return "Invalid Identifier"

    return f"<ID, {s}>"

print(Check(input("Enter the Input : ")))
root at Abhishek in /mnt/c/Users/abhis/Downloads
 ○ python3 2.py
Enter the Input : _123ab
<ID, _123ab>
root at Abhishek in /mnt/c/Users/abhis/Downloads
 ○ python3 2.py
Enter the Input : abhi123
<ID, abhi123>
root at Abhishek in /mnt/c/Users/abhis/Downloads
 ○ python3 2.py
Enter the Input : 123Abhi
Invalid Identifier
```

3. To recognize the keywords if, while, then, else, switch, int, float. Output the corresponding token <INT>, <WHILE>, <THEN>, <ELSE>, <SWITCH>, <INT>, <FLOAT>.

```
root at Abhishek in /mnt/c/Users/abhis/Downloads
 ○ cat 3.py
Identifier = ["if", "while", "then", "else", "switch", "int", "float"]

s = input("Enter the Keyword : ")

if s in Identifier:

    s = "<" + s.upper() + ">"

    print(s)

else:

    print("Not a valid Keyword")
```

```
root at Abhishek in /mnt/c/Users/abhis/Downloads
 ○ python3 3.py
Enter the Keyword : int
<INT>
root at Abhishek in /mnt/c/Users/abhis/Downloads
 ○ python3 3.py
Enter the Keyword : float
<FLOAT>
root at Abhishek in /mnt/c/Users/abhis/Downloads
 ○ python3 3.py
Enter the Keyword : while
<WHILE>
root at Abhishek in /mnt/c/Users/abhis/Downloads
 ○ python3 3.py
Enter the Keyword : abhi
Not a valid Keyword
```

4. Write a program to list all the tokens from the statement **a = b * 100;** . The output must be **<ID, a> <=> <ID, b> < * > <NUM, 100> <SEMI>**

```
root at Abhishek in /mnt/c/Users/abhis/Downloads
 ○ cat 4.py
n = input('Enter an Input : ').replace(' ','')

Operators = ['**','+','-','/','//','%','*','^']

s = ''

c = 0

for i in range(len(n)):

    if n[i] == '=':

        s += '<ID, '+ n[:i] + '> <=> '

        c = i

    if n[i] in Operators:

        if n[c+1:i].isdigit(): s += '<NUM, '+ n[c+1:i] + '>' + ' <'+ n[i] + '> '

        else: s += '<ID, ' + n[c+1:i] + '>' + ' <' + n[i] + '> '

        c = i

    if n[i] == ';':

        if n[c+1:i].isdigit(): s += '<NUM, '+ n[c+1:i] +'>' + ' <SEMI>'

        else: s += '<ID, ' + n[c+1:i] + '>' + ' <SEMI>'

print(s)
```

```
root at Abhishek in /mnt/c/Users/abhis/Downloads
 ○ python3 4.py
Enter an Input : a = b * 100;
<ID, a> <=> <ID, b> <*> <NUM, 100> <SEMI>
root at Abhishek in /mnt/c/Users/abhis/Downloads
 ○ python3 4.py
Enter an Input : a = 100;
<ID, a> <=> <NUM, 100> <SEMI>
root at Abhishek in /mnt/c/Users/abhis/Downloads
 ○ python3 4.py
Enter an Input : abhi = abhi1;
<ID, abhi> <=> <ID, abhi1> <SEMI>
root at Abhishek in /mnt/c/Users/abhis/Downloads
 ○ python3 4.py
Enter an Input : i = 1;
<ID, i> <=> <NUM, 1> <SEMI>
```

Thankyou!!