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PLC EXAM 2
UMOJA
FALL 2020

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Question 1 (20 points) Create code that allows you to create an ordered list of tokens. This code should take in a file as input and process that file for the following lexemes:

• Perl style identifiers

• Literals:

- Java-Style string literals
- C-Style integer literals
- C-Style character literals
- C-Style floating point literals

• Non-Alphanumeric special symbols that denote (at least two of which must be more than two characters):

- Addition
- Assignment
- Subtraction
- Division
- Multiplication
- Increment
- Decrement
- Modulo Operator
- Logical And
- Logical Or
- Logical Not
- Open Code Block
- Close Code Block
- Open Function parameter
- Close Function parameter

You may choose whatever symbol you represent for the special symbol but this must be explained in the comments with operation represents which symbol. Every type of lexeme defined must have a unique token equivalence. In this language every identifier must be followed by a non-alphanumeric character (excluding the character) too denote the end of the identifier. In this language every literal must be followed by white space or a special symbol to mark its end.

I HAVE SEPARATE FILES FOR EACH TOKEN AND A DRIVER FILE THAT TAKES IN A TEXT FILE, EVERY STRING IN THE TEXT FILE IS ENCASED IN QUOTATIONS SO THE ANALYZERS CAN TAKE A STING AS INPUT EVEN THOUGH IT MAY ACTUALLY REPRESENT A FLOAT OR CHAR… ETC.

WOULD COMMENT FOR EXPLANATION BUT NOT ENOUGH TIME AT THIS POINT, SHOULD BE PRETTY READABLE BUT IF YOU HAVE ANY QUESTIONS YOU MAY EMAIL OR DM ME

also posted my text file contents and a log of output.

DRIVER.PY

```
####################################
####################################
############ PLC EXAM 2 ############
###### Created by Anthony Asilo #####
########## November 2020 ##########
#### https://github.com/pillared ####
####################################
####################################

"""
DRIVER.PY TAKES A TEXT FILE AS INPUT, AND FOR EACH STRING
WILL CHECK ALL FUNCTIONS TO FIND A VALID TOKEN
"""


from perl import validateToken_Perl
from javastring import validateToken_JavaString
from cint import validateToken_cInt
from cchar import validateToken_cChar
from cfloat import validateToken_cFloat
from ops import validateToken_Ops

import sys

def main():
    # a giant list of test words for function matching
    token={

        'token_A' : 'Perl',
        'token_B' : 'JavaString',
        'token_C' : 'cInt',
        'token_D' : 'cChar',
        'token_E' : 'cFloat',
        'token_F' : 'Ops'

    }
    arr = []
    string = ""
    filex = open("q1.txt", "r")
    string = filex.read()
    arr = string.split( )
    print(arr)
    filex.close()
    ans = None
    xo= None
```

```
    for word in arr:
        # pass to all of the validations
        # if true, let it be known what token type that word is
        print(word)
        for each in token.values():
            try:
                # eval function
                xo = "validateToken_" + each + "(" + word + ")"
                # call each specific function to test same word.
                if(eval(xo)):
                    ans = each
                    print("TOKEN FOUND :", word, "is:", each, ans)
            except SyntaxError:
                pass
        print('\n')


if __name__ == "__main__":
    main()
```

PERL.PY

```
#####################################
#####################################
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###### Created by Anthony Asilo #####
########## November 2020 ###########
#### https://github.com/pillared ####
#####################################
#####################################

"""
PERL.PY TAKES A WORD AS INPUT, AND FOR EACH LETTER
WILL CHECK ALL OPTIONS TO CHECK A VALID TOKEN
"""

import sys
bits={
    'dollar' : '$',
    'at' : '@',
    'perc' : '%',
    'und' : '_',
    'letA' : 'A',
    'letB' : 'B',
    'letC' : 'C',
    'letD' : 'D',
    'letE' : 'E',
    'letF' : 'F',
    'letG' : 'G',
    'letH' : 'H',
    'letI' : 'I',
    'letJ' : 'J',
    'letK' : 'K',
    'letL' : 'L',
    'letM' : 'M',
    'letN' : 'N',
    'letO' : 'O',
    'letP' : 'P',
    'letQ' : 'Q',
    'letR' : 'R',
    'letS' : 'S',
    'letT' : 'T',
    'letU' : 'U',
    'letV' : 'V',
    'letW' : 'W',
    'letX' : 'X',
```

```
    'letY' : 'Y',
    'letZ' : 'Z',
    'leta' : 'a',
    'letb' : 'b',
    'letc' : 'c',
    'letd' : 'd',
    'lete' : 'e',
    'letf' : 'f',
    'letg' : 'g',
    'leth' : 'h',
    'leti' : 'i',
    'letj' : 'j',
    'letk' : 'k',
    'letl' : 'l',
    'letm' : 'm',
    'letn' : 'n',
    'leto' : 'o',
    'letp' : 'p',
    'letq' : 'q',
    'letr' : 'r',
    'lets' : 's',
    'lett' : 't',
    'letu' : 'u',
    'letv' : 'v',
    'letw' : 'w',
    'letx' : 'x',
    'lety' : 'y',
    'letz' : 'z',
    'num0' : '0',
    'num1' : '1',
    'num2' : '2',
    'num3' : '3',
    'num4' : '4',
    'num5' : '5',
    'num6' : '6',
    'num7' : '7',
    'num8' : '8',
    'num9' : '9',
    'BEGIN' : 1,
    'NEXT' : None
}
def split(word):
    return [char for char in word]

def validateToken_Perl(arr):
    identifier = None
```

```
    for char in arr:
        # and isnumeric() for numbers, otherwise check hard code wise
        if(char in bits.values()):
            # Make sure that identifier only happens once!!!! otherwise FAIl
            if (identifier == None):
                if( (char == "$" or char == "%" or char == "@")):
                    identifier = char
                    #first letter, make sure doesnt happen again in word...
                    #make sure from now on letters, underscore, numbers,...
                    #print(char)
                else:
                    return False
            else:
                if( char.isalnum() or char == "_"):
                    pass
                else:
                    return False
        else:
            return False
    return True

def main():
    print("CORRECT PERL WORDS INCLUDE")
    print("$nwi_nw")
    print("@nwif13")
    print("%nwfm_n2ei\n")

    print("INCORRECT PERL WORDS INCLUDE")
    print("$nwi_#nw")
    print("@nwif%13")
    print("%nw@m_n2ei\n")

    print("OUR PERLWORD")
    perlword = '$nq93b'
    arr = split(perlword)
    print(perlword)
    print(arr)

    if( validateToken_Perl(arr) ):
        print("Arr is a PERL!")
    else:
        sys.exit("ERROR FAILED PARSING OF TOKEN ")

    """for key, value in bits.items():
        print(key, ' : ', value)"""
```

```
if __name__ == "__main__":
    main()
```

JAVASTRING.PY

```
#####################################
#####################################
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###### Created by Anthony Asilo #####
########### November 2020 ###########
#### https://github.com/pillared ####
#####################################
#####################################

"""
JAVASTRING.PY TAKES A WORD AS INPUT, AND FOR EACH LETTER
WILL CHECK ALL OPTIONS TO CHECK A VALID TOKEN
"""

import sys


"""
VALID
String s = "a dog jumped over the fucking moon!!";
String s = "N@I)INR@ )(#B ";
String s = "OI #OR\"NJ O#";
String s = "n210h_8";
String s = "";
String

Carriage return and newline: "\r" and "\n"
Backslash: "\\\\"
Single quote: "\'"
Horizontal tab and form feed: "\t" and "\f"

System.out.println('a'); //a
"""

bits={
    'num0' : '0',
```

```
'num1' : '1',
'num2' : '2',
'num3' : '3',
'num4' : '4',
'num5' : '5',
'num6' : '6',
'num7' : '7',
'num8' : '8',
'num9' : '9',
'letA' : 'A',
'letB' : 'B',
'letC' : 'C',
'letD' : 'D',
'letE' : 'E',
'letF' : 'F',
'letG' : 'G',
'letH' : 'H',
'letI' : 'I',
'letJ' : 'J',
'letK' : 'K',
'letL' : 'L',
'letM' : 'M',
'letN' : 'N',
'letO' : 'O',
'letP' : 'P',
'letQ' : 'Q',
'letR' : 'R',
'letS' : 'S',
'letT' : 'T',
'letU' : 'U',
'letV' : 'V',
'letW' : 'W',
'letX' : 'X',
'letY' : 'Y',
'letZ' : 'Z',
'leta' : 'a',
'letb' : 'b',
'letc' : 'c',
'letd' : 'd',
'lete' : 'e',
'letf' : 'f',
'letg' : 'g',
'leth' : 'h',
'leti' : 'i',
'letj' : 'j',
'letk' : 'k',
```

```
'letl' : 'l',
'letm' : 'm',
'letn' : 'n',
'leto' : 'o',
'letp' : 'p',
'letq' : 'q',
'letr' : 'r',
'lets' : 's',
'lett' : 't',
'letu' : 'u',
'letv' : 'v',
'letw' : 'w',
'letx' : 'x',
'lety' : 'y',
'letz' : 'z',
'symbol0' : '~' ,
'symbol1' : '`' ,
'symbol2' : '!' ,
'symbol3' : '@' ,
'symbol4' : '#' ,
'symbol5' : '$' ,
'symbol6' : '%' ,
'symbol7' : '^' ,
'symbol8' : '&' ,
'symbol9' : '*' ,
'symbol10' : '(' ,
'symbol11' : ')' ,
'symbol12' : '-' ,
'symbol13' : '_' ,
'symbol14' : '+' ,
'symbol15' : '=' ,
'symbol16' : '{' ,
'symbol17' : '[' ,
'symbol18' : '}' ,
'symbol19' : ']' ,
'symbol20' : '|' ,
'symbol21' : ' ' ,
'symbol22' : ':' ,
'symbol23' : ';' ,
'symbol24' : "" ,
'symbol25' : """ ,
'symbol26' : '<',
'symbol27' : ',',
'symbol28' : '>',
'symbol29' : '.',
'symbol30' : '?',
```

```
    'symbol31' : '/',
    'BEGIN' : 1,
    'NEXT' : None
}
validbits = {
    't':'t',
    'r':'r',
    'n':'n',
    'f':'f',
    "'":"'",
    '"':'"',
    '\\':'\\',

}

def validateToken_JavaString(arr):
    identifier = None
    previous = None
    next = None
    isSlash = False
    isDoubleSlash = False
    first = None
    size = 0
    count = 0

    for char in arr:
        size = len(arr)
        if( count == 0  and first == None):
            if(char == "\""):
                first = char
                previous = char
            else:
                return False
        elif(count == size-1 ):
            if(char == '\"'):
                return True
            else:
                return False
        elif(isSlash == True):
            if(char in validbits.values()):
                pass
            elif(char == "\\"):
                isDoubleSlash = True
                isSlash = False
            else:
                return False
```

```
        elif(first != None):
            if(char in bits.values()):
                pass
            elif(char == "\\"):
                isSlash = True
            else:
                return False
        else:
            return False

        count+=1


def main():
    print('test')

    testStrings = ["'a"', "'string"', "'str ing\\t"', "'string\\"', "'stri\\"s"', "'st \\ \" ri\\"s"',
"valid??@123", "'valisd@@@/.,[][33\\{1!@#$%"']
    for word in testStrings:
        print(word)
        print('\t' + str(validateToken_JavaString(word)))
        print()


if __name__ == '__main__':
    main()
```

CINT.PY

```
#####################################
#####################################
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###### Created by Anthony Asilo #####
########### November 2020 ###########
#### https://github.com/pillared ####
#####################################
#####################################

"""
CINT.PY TAKES A WORD AS INPUT, AND FOR EACH LETTER
WILL CHECK ALL OPTIONS TO CHECK A VALID TOKEN
"""

import sys

"""
   int               dec_int    = 28;
   unsigned          dec_uint   = 4000000024u;
   long              dec_long   = 2000000022l;
   unsigned long     dec_ulong  = 4000000000ul;
   long long         dec_llong  = 9000000000LL;
   unsigned long long  dec_ullong = 900000000001ull;

   /* Octal Constants */
   int               oct_int    = 024;
   unsigned          oct_uint   = 04000000024u;
   long              oct_long   = 02000000022l;
   unsigned long     oct_ulong  = 04000000000UL;
   long long         oct_llong  = 0440000000000000ll;
   unsigned long long  oct_ullong = 044400000000000001Ull;

   /* Hexadecimal Constants */
   int               hex_int    = 0x2a;
   unsigned          hex_uint   = 0XA0000024u;
   long              hex_long   = 0x20000022l;
   unsigned long     hex_ulong  = 0XA0000021uL;
   long long         hex_llong  = 0x8a000000000000ll;
   unsigned long long  hex_ullong = 0x8A40000000000010uLL;
"""


bits={
   'zero':'0',
```

```
    'one':'1',
    'two':'2',
    'three':'3',
    'four':'4',
    'five':'5',
    'six':'6',
    'seven':'7',
    'eight':'8',
    'nine':'9',
    'a':'a',
    'A':'A',
    'b':'b',
    'B':'B',
    'c':'c',
    'C':'C',
    'd':'d',
    'D':'D',
    'e':'e',
    'E':'E',
    'f':'f',
    'F':'F',
    'prefix_x':'x',
    'prefix_X':'X',
    'unsigned_u':'u',
    'unsigned_U':'U',
    'long_l':'l',
    'long_L':'L',
    'long_ll':'ll',
    'long_LL':'LL',
}
valid_dec = {
    'zero':'0',
    'one':'1',
    'two':'2',
    'three':'3',
    'four':'4',
    'five':'5',
    'six':'6',
    'seven':'7',
    'eight':'8',
    'nine':'9',
}
valid_hex = {
    'zero':'0',
    'one':'1',
    'two':'2',
```

```
    'three':'3',
    'four':'4',
    'five':'5',
    'six':'6',
    'seven':'7',
    'eight':'8',
    'nine':'9',
    'a':'a',
    'A':'A',
    'b':'b',
    'B':'B',
    'c':'c',
    'C':'C',
    'd':'d',
    'D':'D',
    'e':'e',
    'E':'E',
    'f':'f',
    'F':'F',
}

valid_oct={
    'zero':'0',
    'one':'1',
    'two':'2',
    'three':'3',
    'four':'4',
    'five':'5',
    'six':'6',
    'seven':'7',
}

suffix={
    'prefix_x':'x',
    'prefix_X':'X',
    'unsigned_u':'u',
    'unsigned_U':'U',
    'long_l':'l',
    'long_L':'L',

}

def split(word):
    return [char for char in word]

def validateToken_cInt(arr):
```

```
identifier = None
previous = None
next = None
isHex = False
isDecimal = False
isOctal = False
neverHex = False
neverDecimal = False
neverOctal = False
first = None
second = None
firstSuffix = None
noMoreHexPlease = False
noMoreDecPlease = False
noMoreOctPlease = False
unsigned = False #u
_long = False #l
unsignedlong = False #ul
_longlong = False #ll
unsigned_longlong = False #ull
ucount = 0
lcount = 0

for char in arr:
    if(char in bits.values()):
        if(isOctal):
            if(char in valid_oct.values()):
                pass
            else:
                if(firstSuffix == None):
                    noMoreOctPlease = True
                    if(char == 'u' or char == 'U'):
                        ucount+=1
                        unsigned = True
                    elif(char == 'l'):
                        lcount+=1
                        _long = True
                    else:
                        return False
                    firstSuffix = char
                    previous = firstSuffix
                elif(noMoreOctPlease):
                    if(lcount > 2 or ucount > 1):
                        print(lcount,ucount)
                        return False
```

```
            elif(previous == 'u'):

                unsigned = True
                if(char is not None):
                    return False
            elif(previous == 'l'):
                if(firstSuffix == 'U' and char == 'l'):
                    lcount+=1
                    unsigned_longlong = True
                elif(char == 'l'):
                    lcount+=1
                    _longlong = True
                else:
                    return False
            elif(previous == 'U'):
                if(char == 'l' or char == 'L'):
                    lcount+=1
                    unsignedlong = True
                else:
                    return False
            else:
                return False
        else:
            return False

elif(isDecimal):
    if(char in valid_dec.values()):
        pass
    else:
        if(firstSuffix == None):
            noMoreDecPlease = True
            if(char == 'u'):
                ucount+=1
                unsigned = True
            elif(char == 'l'):
                lcount+=1
                _long = True
            elif(char == 'L'):
                lcount+=1
                _long = True
            else:
                return False
            firstSuffix = char
            previous = firstSuffix
        elif(noMoreDecPlease):
            print(lcount,ucount)
```

```
            if(lcount > 2 or ucount > 1):
                print(lcount,ucount)
                return False
            elif(previous == 'u'):
                if(char == 'l'):
                    lcount+=1
                    unsignedlong = True
                    #print('unsignedlong = true')
                elif(char != 'l'):
                    return False
            elif(previous == 'l'):
                if(firstSuffix == 'u' and char == 'l'):
                    lcount+=1
                    unsigned_longlong = True
                    #print('longlong = true')
                elif(char == 'l'):
                    lcount+=1
                    _longlong = True
                elif(char != 'l'):
                    return False

            elif(previous == 'L'):
                if(char == 'L'):
                    lcount+=1
                    unsigned_longlong = True
                    #print('unsignedlonglong = true')
            else:
                return False
        else:
            return False
elif(isHex):
    if(char in valid_hex.values()):
        #print("no worries, only a hex value")
        pass
    else:
        if(firstSuffix == None):
            noMoreHexPlease = True
            if(char == 'u'):
                ucount+=1
                unsigned = True
                #print('unsigned = true')
            elif(char == 'l'):
                lcount+=1
                _long = True
                #print('long = true')
            else:
```

```
                return False
            firstSuffix = char
            previous = firstSuffix
        elif(noMoreHexPlease):
            if(lcount > 2 or ucount > 1):
                print(lcount, ucount)
                return False
            elif(previous == 'u'):
                if(char == 'L'):
                    lcount+=1
                    unsignedlong = True
                    #print('unsignedlong = true')
                elif(char != 'L'):
                    return False
            elif(previous == 'l'):
                if(char == 'l'):
                    lcount+=1
                    _longlong = True
                    #print('longlong = true')
                elif(char != 'l'):
                    return False
            elif(previous == 'L'):
                if(char == 'L'):
                    lcount+=1
                    unsigned_longlong = True
                    #print('unsignedlonglong = true')
            else:
                return False
        else:
            return False
elif(first == None):
    if(char != '0'):
        neverHex = True
        neverOctal = True
        isDecimal = True
        print("is Decimal")
    first = char
elif(first == "0" and second == None):
    # the next can be a numer or it can be x for hex or b for binary
    second = char
    if(char == 'x' or char == 'X'):
        print('is Hex')
        neverOctal = True
        neverDecimal = True
        isOctal = False
        isHex = True
```

```
            elif(char != 0):
                print('is Octal')
                neverDecimal = True
                isOctal = True
                isHex = False
            else:
                pass #print('wtf')

        else:
            return False

    else:
        return False
    previous = char
    if(lcount > 2 or ucount > 1):
        print(lcount, ucount)
        return False
  return True

def main():

  trueWords =
["28","4000000024u","2000000022l","4000000000ul","9000000000LL","900000000001ull","02
4","04000000024u","02000000022l","04000000000UL",
"044000000000000ll","0444000000000000001Ull", "0x2a","0XA0000024u",
"0x20000022l","0XA0000021uL", "0x8a000000000000ll", "0x8A40000000000010uLL"]
  falseWords = ['28', '4000000024ulll', '2000000022lll', '4000000000uul', '9000000000LLL',
'900000000001ulll', '024', '04000000024uu', '02000000022ll', '04000000000ULL',
'044000000000000uull', '04440000000000001Ulll', '0x2a', '0XA0000024uu',
'0x20000022ll','0XA0000021uLLL','0x8a000000000000lll','0x8A40000000000010uLLL']

  for word in falseWords:
    if( validateToken_cInt(word) ):
      print(str(word) + "  -----VALID------")
    else:
      print(str(word) + "  -----ERROR------")
    print()


if __name__ == "__main__":
  main()
```

CCHAR.PY

```
####################################
####################################
############ PLC EXAM 2 ############
###### Created by Anthony Asilo #####
########## November 2020 ##########
#### https://github.com/pillared ####
####################################
####################################

"""
CCHAR.PY TAKES A WORD AS INPUT, AND FOR EACH LETTER
WILL CHECK ALL OPTIONS TO CHECK A VALID TOKEN
"""

import sys

bits={
    'num0' : '0',
    'num1' : '1',
    'num2' : '2',
    'num3' : '3',
    'num4' : '4',
    'num5' : '5',
    'num6' : '6',
    'num7' : '7',
    'num8' : '8',
    'num9' : '9',
    'letA' : 'A',
    'letB' : 'B',
    'letC' : 'C',
    'letD' : 'D',
    'letE' : 'E',
    'letF' : 'F',
    'letG' : 'G',
    'letH' : 'H',
    'letI' : 'I',
    'letJ' : 'J',
    'letK' : 'K',
    'letL' : 'L',
    'letM' : 'M',
    'letN' : 'N',
    'letO' : 'O',
    'letP' : 'P',
    'letQ' : 'Q',
```

```
'letR' : 'R',
'letS' : 'S',
'letT' : 'T',
'letU' : 'U',
'letV' : 'V',
'letW' : 'W',
'letX' : 'X',
'letY' : 'Y',
'letZ' : 'Z',
'leta' : 'a',
'letb' : 'b',
'letc' : 'c',
'letd' : 'd',
'lete' : 'e',
'letf' : 'f',
'letg' : 'g',
'leth' : 'h',
'leti' : 'i',
'letj' : 'j',
'letk' : 'k',
'letl' : 'l',
'letm' : 'm',
'letn' : 'n',
'leto' : 'o',
'letp' : 'p',
'letq' : 'q',
'letr' : 'r',
'lets' : 's',
'lett' : 't',
'letu' : 'u',
'letv' : 'v',
'letw' : 'w',
'letx' : 'x',
'lety' : 'y',
'letz' : 'z',
'symbol0' : '~' ,
'symbol1' : '`' ,
'symbol2' : '!' ,
'symbol3' : '@' ,
'symbol4' : '#' ,
'symbol5' : '$' ,
'symbol6' : '%' ,
'symbol7' : '^' ,
'symbol8' : '&' ,
'symbol9' : '*' ,
'symbol10' : '(' ,
```

```
    'symbol11' : ')' ,
    'symbol12' : '-' ,
    'symbol13' : '_' ,
    'symbol14' : '+' ,
    'symbol15' : '=' ,
    'symbol16' : '{' ,
    'symbol17' : '[' ,
    'symbol18' : '}' ,
    'symbol19' : ']' ,
    'symbol20' : '|' ,
    'symbol21' : '\\' ,
    'symbol22' : ':' ,
    'symbol23' : ';' ,
    'symbol24' : "" ,
    'symbol25' : """ ,
    'symbol26' : '<',
    'symbol27' : ',',
    'symbol28' : '>',
    'symbol29' : '.',
    'symbol30' : '?',
    'symbol31' : '/',
    'BEGIN' : 1,
    'NEXT' : None
}
```

#\b	Backspace
#\f	Form feed
#\n	New line
#\r	Carriage return
#\t	Horizontal tab
#\”	Double quote
#\’	Single quote
#\\	Backslash
#\v	Vertical tab
#\a	Alert or bell
#\?	Question mark
#\N	Octal constant (N is an octal constant)
#\XN	Hexadecimal constant (N – hex.dcml cnst)

```
def split(word):
    return [char for char in word]
```

```
def validateToken_cChar(arr):
    size = len(arr)
    count = 1
    identifier = None
    first = None
    last = None
    previous = None
    next = []
    firstIsQuotation = False
    allowBackSlashChar = True
    isX = False
    noMore = False
    doubleSlash = False
    for char in arr:

        print(char)
        if (noMore):
            return False
        if(count == size):
            if(char != last):
                return False
        elif(char in bits.values()):
            if (identifier == None):
                if(char == '\"' or char == "\'" ):
                    identifier = char
                    first = char
                    last = char
                else:
                    return False
            else:
                if(previous == '\\'):
                    if(char == 'b'):
                        pass
                    elif(char == 'f'):
                        pass
                    elif(char == 'n'):
                        pass
                    elif(char == 'r'):
                        pass
                    elif(char == 't'):
                        pass
                    elif(char == "'"):
                        pass
                    elif(char == '"'):
                        pass
                    elif(char == '\\'):
```

```
                doubleSlash = True
                pass
            elif(char == 'v'):
                pass
            elif(char == 'a'):
                pass
            elif(char == '?'):
                pass
            elif(char == 'N'):
                pass
            elif(char == 'X'):
                isX = True
                pass
            else:
                return False
        elif(char =="\\"):
            previous = char
        elif(previous == "X" and isX):
            if(char == "N"):
                pass
            else:
                return False
        else:
            previous = char

    else:
        return False
    count+=1
  return True

def main():

  trueWords = ["\'2\'", "\'!\'", "\"&\"", "\'\n\'", "\'\?\'", "\'\\\'", "\'\f\'", "\'\XN\'", "\']\'", "\'n\'"]
  falseWords = ['\'x\'' , "a\'c\'",  ""]

  for word in trueWords:
    arr = split(word)
    print(word, validateToken_cChar(arr))
    print('\n')

  for word in falseWords:
    arr = split(word)
    print(word, validateToken_cChar(arr))
    print('\n')

if __name__ == "__main__":
```

```
main()
```

CFLOAT.PY

```
#####################################
#####################################
############ PLC EXAM 2 ############
###### Created by Anthony Asilo #####
########### November 2020 ###########
#### https://github.com/pillared ####
#####################################
#####################################

"""
CFLOAT.PY TAKES A WORD AS INPUT, AND FOR EACH LETTER
WILL CHECK ALL OPTIONS TO CHECK A VALID TOKEN
"""

"""
15.75
1.575E1   /* = 15.75   */
1575e-2   /* = 15.75   */
-2.5e-3   /* = -0.0025 */
25E-4

10.0L  /* Has type long double  */
10.0F  /* Has type float        */

.0075e2
0.075e1
.075e1
75e-2
"""

import sys

bits={
   'num0' : '0',
   'num1' : '1',
   'num2' : '2',
   'num3' : '3',
   'num4' : '4',
   'num5' : '5',
   'num6' : '6',
   'num7' : '7',
   'num8' : '8',
```

```
    'num9' : '9',
    'minus' : '-',
    'plus' : '+',
    'let_e' : 'e',
    'let_E' : 'E',
    'let_l' : 'l',
    'let_L' : 'L',
    'let_f' : 'f',
    'let_F' : 'F',
    'dec' : '.'
}

def split(word):
    return [char for char in word]

def validateToken_cFloat(arr):
    identifier = None
    first = None
    previous = None
    next = []
    firstIsDec = False
    allowDec = True
    allowE = True
    allowL = True
    allowF = True
    allowSign = True
    allowP = True
    noMore = False
    for char in arr:
        if (noMore):
            return False
        elif(char in bits.values()):
            if (identifier == None):
                identifier = char
                first = char
                if(char.isnumeric()):
                    next = ["e", ".", '0-9']
                elif(char == "."):
                    firstIsDec = True
                    allowDec = False
                    next = ['0-9']
                elif(char == "-"):
                    next = ['.', '0-9']
                else:
                    return False
            else:
```

```
            if( char.isnumeric() ):
                previous = char
            elif(allowDec and char == "."):
                allowDec = False
                if(firstIsDec):
                    return False
                previous = char
                next = ['0-9']
            elif(previous.isnumeric()):
                if(allowE and (char == 'e' or char =='E')):
                    allowE = False
                    allowL = False
                    allowF = False
                    previous = char
                elif(allowL and (char == 'l' or char =='L')):
                    allowE = False
                    allowL = False
                    allowF = False
                    noMore = True
                    previous = char
                elif(allowF and (char == 'f' or char =='F')):
                    allowE = False
                    allowL = False
                    allowF = False
                    noMore = True
                    previous = char
                else:
                    return False
            elif(allowSign and (char == "+" or char == "-")):
                allowSign = False
            elif(allowSign == False):
                return False
            else:
                return False
        else:
            return False
    return True

def main():

    trueWords = ["15.75", "1.575E1", "1575e-2", "-2.5e-3", "25E-4", "10.0L", "10.0F", ".0075e2",
"0.075e1", ".075e1", "75e-2"]
    falseWords = ["15.L75L", "1.57.5E1", "157.5e-+", "+2.5e-3", "25.L-4", "10.0LF", "1x0.0F",
".0075ef2", "0.075ee1", ".075e1f", "75e--2"]

    for word in trueWords:
```

```
        arr = split(word)
        print(word, validateToken_cFloat(arr))
        print('\n')

    for word in falseWords:
        arr = split(word)
        print(word, validateToken_cFloat(arr))
        print('\n')


if __name__ == "__main__":
    main()
```

OPS.PY

```
#####################################
#####################################
############# PLC EXAM 2 ############
###### Created by Anthony Asilo #####
########### November 2020 ###########
#### https://github.com/pillared ####
#####################################
#####################################

"""
OPS.PY TAKES A WORD AS INPUT, AND FOR EACH LETTER
WILL CHECK ALL OPTIONS TO CHECK A VALID TOKEN
"""

# // – Addition --> '+'
# // – Assignment --> '='
# // – Subtraction --> '-'
# // – Multiplication --> '*'
# // – Increment --> '++' | '+='
# // – Decrement --> '--' | '-='
# // – Modulo Operator --> '%'
# // – Logical And --> '&&' | 'and'
# // – Logical Or --> '||' | 'or'
# // – Logical Not --> '!' | 'not'
# // – Open Code Block --> '{'
# // – CloCode Block --> '}'
# // – Open Function parameter – '('
# // - CloFunction parameter --> '):'

def validateToken_Ops(char):
        if (char == '+' ):
                pass
        elif ( char == '-' ): # – Addition --> '+'  1lvl
                pass
        elif ( char == '='): # – Assignment --> '=' 1lvl
                pass
        elif ( char == '-'): # – Subtraction --> '-' 1lvl
                pass
        elif ( char == '/'): # – Division --> '/' 1lvl
                pass
        elif ( char == '*'): # – Multiplication --> '*' 1lvl
                pass
```

```
        elif ( char == '%'): # – Modulo Operator --> '%' 1lvl
                pass
        elif ( char == '++' or char == '+='): # – Increment --> '++' | '+='  2lvl
                pass
        elif ( char == '--' or char == '-='): # – Decrement --> '--' | '-=' 2lvl
                pass
        elif ( char == '&&' or char == 'and'): # – Logical And --> '&&' | 'and' 2lvl
                pass
        elif ( char == '||' or char == 'or'): # – Logical Or --> '||' | 'or' 2lvl
                pass
        elif ( char == '!' or char == 'not'): # – Logical Not --> '!' | 'not' 1lvl
                pass
        elif ( char == '{'): # – Open Code Block --> '{' 1lvl
                pass
        elif ( char == '}'): # – CloCode Block --> '}' 1lvl
                pass
        elif ( char == '('): # – Open Function parameter – '(' 1lvl
                pass
        elif ( char == ')'): # - CloFunction parameter --> '):' 1lvl
                pass
        else:
                return False
        return True

def main():
        trueWords = ['+', '-', '(', ')', 'or', 'and', '*', '/', '%']
        falseWords = ['lk', '!', 'nand', 'xor', 'ur mom', '*=', '==', '()', '[]']
        for word in trueWords:
                print(word)
                print(validateToken_Ops(word))
                print()
        for word in falseWords:
                print(word)
                print(validateToken_Ops(word))
                print()

if __name__ == "__main__":
        main()
```

Q1.TXT – INCLUDES ALL CASES SOME GOOD SOME BAD

'\"nai\\ow\"'
'\"0x82n3\"'
'\"13.4e12\"'
"'nai\\ow"'
'\"0x82n3\"'
'\"13.4e12\"'
"'@fuckplc"'
"\'2\"'
"\'!\"'
"\"&\""
"\"\n\""
"\"\?\""
"\"\\\"'
"\"\f\"'
"\"\XN\"'
"\"\"'
"\'n\"'
"\"15.75\""
"\"1.575E1\""
"\"1575e-2\""
"\"-2.5e-3\""
"\"25E-4\""
"\"10.0L\""
"\"10.0F\""
"\".0075e2\"" "\"0.075e1\"" "\".075e1\"" "\"75e-2\""
"\"28\""
"\"4000000024u\""
"\"2000000022l\""
"\"4000000000ul\""
"\"9000000000LL\""
"\"900000000001ull\""
"\"024\""
"\"04000000024u\""
"\"02000000022l\""
"\"04000000000UL\""
"\"0440000000000000ll\""
"\"04440000000000001Ull\""
"\"0x2a\""
"\"0XA0000024u\""
"\"0x20000022l\""
"\"0XA0000021uL\""
"\"0x8a000000000000ll\""
"\"0x8A40000000000010uLL\""
"'a"'

```
   "'string"'
    "'str ing\\t"'
     "'string\\"'
     "'stri\\"s"'
     '\"st \\ \" ri\\"s\"'
      "\"valid??@123\""
       '\"valisd@@@/.33\\{1!@#$%\""\"+\"'
       '\"-\"'
       '\"(\"'
       '\")\"'
       '\"or\"'
        '\"and\"'
         '\"*\"'
         '\"/\"'
         '\"%\"'


    "\'2\"'
     "\'!\"'
    "\"&\""
     "\'\n\"'
    "\'\?\"'
     "\'\\\"'
    "\'\f\"'
    "\'\XN\"'
     "\'\"'
     "\'n\"'


    '\'x\"'
     "a\'c\"'
     ""

  "15.75"
  "1.575E1"
   "1575e-2"
   "-2.5e-3"
   "25E-4" "10.0L" "10.0F" ".0075e2" "0.075e1" ".075e1" "75e-2"

    "15.L75L" "1.57.5E1" "157.5e-+" "+2.5e-3" "25.L-4" "10.0LF" "1x0.0F" ".0075ef2"
"0.075ee1" ".075e1f" "75e--2"

     "28" "4000000024u" "2000000022l" "4000000000ul" "9000000000LL" "900000000001ull"
     "024"
     "04000000024u"
     "02000000022l"
```

"04000000000UL" "0440000000000000ll"
"044400000000000001Ull" "0x2a"
"0XA0000024u" "0x20000022l"
"0XA0000021uL" "0x8a000000000000ll" "0x8A40000000000010uLL"

'28' '4000000024ulll' '2000000022lll' '4000000000uul' '9000000000LLL' '900000000001ulll'
'024' '04000000024uu' '02000000022ll' '04000000000ULL' '044000000000000uull'
'044400000000000001Ulll' '0x2a' '0XA0000024uu'
'0x20000022ll"0XA0000021uLLL"0x8a000000000000lll"0x8A40000000000010uLLL'

"'a"' "'string"' "'str ing\\t"' "'string\\"' "'stri\\"s"' "'st \\ \" ri\\"s"' "valid??@123"
"'valisd@@@/.[[33\\{1!@#$%"'
'+' '-' '(' ')' 'or' 'and' '*' '/' '%'
'lk' '!' 'nand' 'xor' 'ur mom' '*=' '==' '()' '[]'

'@plc' '$nowe_245' '%wbnod20983'

OUTPUT.LOG

Script started on Sun Nov 15 20:38:56 2020

The default interactive shell is now zsh.
To update your account to use zsh, please run `chsh -s /bin/zsh`.
For more details, please visit https://support.apple.com/kb/HT208050.
[?1034hbash-3.2$ python3 driver.py
['\'\\"nai\\\\ow\\"\', '\'\\"0x82n3\\"\', '\'\\"13.4e12\\"\', '\"nai\\\\ow"\', '\'\\"0x82n3\\"\',
'\'\\"13.4e12\\"\', '\"@fuckplc"\', '"\\\'2\\\'"', '"\\\'!\\\'"', '"\\"&\\""', '"\\"\\n\\""', '"\\\'\\?\\\'"',
'"\\\'\\\\\\\\"', '"\\\'\\f\\\'"', '"\\\'\\XN\\\'"', '"\\\'\\\'"', '"\\\'n\\\'"', '"\\"15.75\\""', '"\\"1.575E1\\""',
'"\\"1575e-2\\""', '"\\"-2.5e-3\\""', '"\\"25E-4\\""', '"\\"10.0L\\""', '"\\"10.0F\\""', '"\\".0075e2\\""',
'"\\"0.075e1\\""', '"\\".075e1\\""', '"\\"75e-2\\""', '"\\"28\\""', '"\\"4000000024u\\""',
'"\\"2000000022l\\""', '"\\"4000000000ul\\""', '"\\"9000000000LL\\""', '"\\"900000000001ull\\""',
'"\\"024\\""', '"\\"04000000024u\\""', '"\\"02000000022l\\""', '"\\"04000000000UL\\""',
'"\\"0440000000000000ll\\""', '"\\"04440000000000001Ull\\""', '"\\"0x2a\\""',
'"\\"0XA0000024u\\""', '"\\"0x20000022l\\""', '"\\"0XA0000021uL\\""',
'"\\"0x8a000000000000ll\\""', '"\\"0x8A40000000000010uLL\\""', '\"a"\', '\"string"\', '\"str',
'ing\\\\t"\', '\"string\\\\"\', '\"stri\\\\"s"\', '\'\\"st', '\\\\', '\\"', 'ri\\\\"s\\"\', '"\\"valid??@123\\""',
'\'\\"valisd@@@/.33\\\\{1!@#$%\\"\'\\"+\\"\', '\'\\"-\\"\', '\'\\"(\\"\', '\'\\")\\"\', '\'\\"or\\"\',
'\'\\"and\\"\', '\'\\"*\\"\', '\'\\"/\\"\', '\'\\"%\\"\', '"\\\'2\\\'"', '"\\\'!\\\'"', '"\\"&\\""', '"\\\'\\n\\\'"',
'"\\\'\\?\\\'"', '"\\\'\\\\\\\\"', '"\\\'\\f\\\'"', '"\\\'\\XN\\\'"', '"\\\'\\\'"', '"\\\'n\\\'"', '\'\\\'x\\"\', '"a\\\'c\\\'"', '""',
'"15.75"', '"1.575E1"', '"1575e-2"', '"-2.5e-3"', '"25E-4"', '"10.0L"', '"10.0F"', '".0075e2"',
'"0.075e1"', '".075e1"', '"75e-2"', '"15.L75L"', '"1.57.5E1"', '"157.5e-+"', '"+2.5e-3"', '"25.L-4"',
'"10.0LF"', '"1x0.0F"', '".0075ef2"', '"0.075ee1"', '".075e1f"', '"75e--2"', '"28"', '"4000000024u"',
'"2000000022l"', '"4000000000ul"', '"9000000000LL"', '"900000000001ull"', '"024"',
'"04000000024u"', '"02000000022l"', '"04000000000UL"', '"0440000000000000ll"',
'"04440000000000001Ull"', '"0x2a"', '"0XA0000024u"', '"0x20000022l"', '"0XA0000021uL"',
'"0x8a000000000000ll"', '"0x8A40000000000010uLL"', '"28"', '"4000000024ulll"',
'"2000000022lll"', '"4000000000uul"', '"9000000000LLL"', '"900000000001ulll"', '"024"',
'"04000000024uu"', '"02000000022ll"', '"04000000000ULL"', '"044000000000000uull"',
'"04440000000000001Ulll"', '"0x2a"', '"0XA0000024uu"',
'"0x20000022ll"0XA0000021uLLL"0x8a000000000000lll"0x8A40000000000010uLLL"',
\'"a"\', \'"string"\', \'"str', 'ing\\\\t"\', \'"string\\\\"\', \'"stri\\\\"s"\', \'"st', '\\\\', '\\"', 'ri\\\\"s"\',
'"valid??@123"', \'"valisd@@@/.[[33\\\\{1!@#$%"\', "'+"', "'-"', "'(", "')"', "'or"', "'and"', "'*"',
"'/"', "'%"', "'lk"', "'!"', "'nand"', "'xor"', "'ur", "mom"', "'*="', "'=="', "'()"', "'[]"', "'@plc"',
"'$nowe_245"', "'%wbnod20983"']
'\"nai\\ow\"'
"
n
a
i
\
o

'\"0x82n3\"'
TOKEN FOUND : '\"0x82n3\"' is: JavaString JavaString
"
0
x
8
2
n
3
"
TOKEN FOUND : '\"0x82n3\"' is: cChar cChar

'\"13.4e12\"'
TOKEN FOUND : '\"13.4e12\"' is: JavaString JavaString
"
1
3
.
4
e
1
2
"
TOKEN FOUND : '\"13.4e12\"' is: cChar cChar

'"nai\\ow"'
"
n
a
i
\
o

'\"0x82n3\"'
TOKEN FOUND : '\"0x82n3\"' is: JavaString JavaString
"
0
x
8
2
n
3
"

TOKEN FOUND : \"0x82n3\"' is: cChar cChar

\"13.4e12\"'
TOKEN FOUND : \"13.4e12\"' is: JavaString JavaString
"
1
3
.
4
e
1
2
"
TOKEN FOUND : \"13.4e12\"' is: cChar cChar

"'@fuckplc"'
TOKEN FOUND : "'@fuckplc"' is: JavaString JavaString
"
@
f
u
c
k
p
l
c
"
TOKEN FOUND : "'@fuckplc"' is: cChar cChar

"\2\"'
'
2
'
TOKEN FOUND : "\2\"' is: cChar cChar

"\!\"'
'
!
'
TOKEN FOUND : "\!\"' is: cChar cChar

"\"&\""
TOKEN FOUND : "\"&\"" is: JavaString JavaString
"
&
"
TOKEN FOUND : "\"&\"" is: cChar cChar

"\"\n\""
"

"\'\?\'"
'
\
?
'
TOKEN FOUND : "\'\?\'" is: cChar cChar

"\'\\\'"
'
\
'
TOKEN FOUND : "\'\\\'" is: cChar cChar

"\'\f\'"
'

"\'\XN\'"
'
\
X
N
'
TOKEN FOUND : "\'\XN\'" is: cChar cChar

"\'\'"
'
'
TOKEN FOUND : "\'\'" is: cChar cChar

"\'n\'"
'
n
'
TOKEN FOUND : "\'n\'" is: cChar cChar

"\"15.75\""
TOKEN FOUND : "\"15.75\"" is: JavaString JavaString
"
1
5
.
7
5
"
TOKEN FOUND : "\"15.75\"" is: cChar cChar

"\"1.575E1\""
TOKEN FOUND : "\"1.575E1\"" is: JavaString JavaString
"
1
.
5
7
5
E
1

"
TOKEN FOUND : "\"1.575E1\"" is: cChar cChar

"\"1575e-2\""
TOKEN FOUND : "\"1575e-2\"" is: JavaString JavaString
"
1
5
7
5
e
-
2
"
TOKEN FOUND : "\"1575e-2\"" is: cChar cChar

"\"-2.5e-3\""
TOKEN FOUND : "\"-2.5e-3\"" is: JavaString JavaString
"
-
2
.
5
e
-
3
"
TOKEN FOUND : "\"-2.5e-3\"" is: cChar cChar

"\"25E-4\""
TOKEN FOUND : "\"25E-4\"" is: JavaString JavaString
"
2
5
E
-
4
"
TOKEN FOUND : "\"25E-4\"" is: cChar cChar

"\"10.0L\""
TOKEN FOUND : "\"10.0L\"" is: JavaString JavaString

"
1
0
.
0
L
"
TOKEN FOUND : "\"10.0L\"" is: cChar cChar

"\"10.0F\""
TOKEN FOUND : "\"10.0F\"" is: JavaString JavaString
"
1
0
.
0
F
"
TOKEN FOUND : "\"10.0F\"" is: cChar cChar

"\".0075e2\""
TOKEN FOUND : "\".0075e2\"" is: JavaString JavaString
"
.
0
0
7
5
e
2
"
TOKEN FOUND : "\".0075e2\"" is: cChar cChar

"\"0.075e1\""
TOKEN FOUND : "\"0.075e1\"" is: JavaString JavaString
"
0
.
0
7
5
e
1

"
TOKEN FOUND : "\"0.075e1\"" is: cChar cChar

"\".075e1\""
TOKEN FOUND : "\".075e1\"" is: JavaString JavaString
"
.
0
7
5
e
1
"
TOKEN FOUND : "\".075e1\"" is: cChar cChar

"\"75e-2\""
TOKEN FOUND : "\"75e-2\"" is: JavaString JavaString
"
7
5
e
-
2
"
TOKEN FOUND : "\"75e-2\"" is: cChar cChar

"\"28\""
TOKEN FOUND : "\"28\"" is: JavaString JavaString
"
2
8
"
TOKEN FOUND : "\"28\"" is: cChar cChar

"\"4000000024u\""
TOKEN FOUND : "\"4000000024u\"" is: JavaString JavaString
"
4
0
0
0
0

0
0
0
2
4
u
"
TOKEN FOUND : "\"4000000024u\"" is: cChar cChar

"\"2000000022l\""
TOKEN FOUND : "\"2000000022l\"" is: JavaString JavaString
"
2
0
0
0
0
0
0
0
2
2
l

"
TOKEN FOUND : "\"2000000022l\"" is: cChar cChar

"\"4000000000ul\""
TOKEN FOUND : "\"4000000000ul\"" is: JavaString JavaString
"
4
0
0
0
0
0
0
0
0
0
u
l
"
TOKEN FOUND : "\"4000000000ul\"" is: cChar cChar

"\"9000000000LL\""
TOKEN FOUND : "\"9000000000LL\"" is: JavaString JavaString
"
9
0
0
0
0
0
0
0
0
0
L
L
"
TOKEN FOUND : "\"9000000000LL\"" is: cChar cChar

"\"900000000001ull\""
TOKEN FOUND : "\"900000000001ull\"" is: JavaString JavaString
"
9
0
0
0
0
0
0
0
0
0
0
1
u
l
l
"
TOKEN FOUND : "\"900000000001ull\"" is: cChar cChar

"\"024\""
TOKEN FOUND : "\"024\"" is: JavaString JavaString
"

0
2
4
"
TOKEN FOUND : "\"024\"" is: cChar cChar

"\"04000000024u\""
TOKEN FOUND : "\"04000000024u\"" is: JavaString JavaString
"
0
4
0
0
0
0
0
0
0
2
4
u
"
TOKEN FOUND : "\"04000000024u\"" is: cChar cChar

"\"02000000022l\""
TOKEN FOUND : "\"02000000022l\"" is: JavaString JavaString
"
0
2
0
0
0
0
0
0
0
2
2
l
"
TOKEN FOUND : "\"02000000022l\"" is: cChar cChar

"\"04000000000UL\""

TOKEN FOUND : "\"04000000000UL\"" is: JavaString JavaString
"
0
4
0
0
0
0
0
0
0
0
0
U
L
"
TOKEN FOUND : "\"04000000000UL\"" is: cChar cChar

"\"0440000000000000ll\""
TOKEN FOUND : "\"0440000000000000ll\"" is: JavaString JavaString
"
0
4
4
0
0
0
0
0
0
0
0
0
0
0
0
l
l
"
TOKEN FOUND : "\"0440000000000000ll\"" is: cChar cChar

"\"044400000000000001Ull\""
TOKEN FOUND : "\"044400000000000001Ull\"" is: JavaString JavaString
"

0
4
4
4
0
0
0
0
0
0
0
0
0
0
0
0
1
U
l
l
"
TOKEN FOUND : "\"044400000000000001Ull\"" is: cChar cChar

"\"0x2a\""
TOKEN FOUND : "\"0x2a\"" is: JavaString JavaString
"
0
x
2
a
"
TOKEN FOUND : "\"0x2a\"" is: cChar cChar

"\"0XA0000024u\""
TOKEN FOUND : "\"0XA0000024u\"" is: JavaString JavaString
"
0
X
A
0
0
0
0

0
2
4
u
"
TOKEN FOUND : "\"0XA0000024u\"" is: cChar cChar

"\"0x20000022l\""
TOKEN FOUND : "\"0x20000022l\"" is: JavaString JavaString
"
0
x
2
0
0
0
0
0
2
2
l
"
TOKEN FOUND : "\"0x20000022l\"" is: cChar cChar

"\"0XA0000021uL\""
TOKEN FOUND : "\"0XA0000021uL\"" is: JavaString JavaString
"
0
X
A
0
0
0
0
0
2
1
u
L
"
TOKEN FOUND : "\"0XA0000021uL\"" is: cChar cChar

"\"0x8a000000000000ll\""

TOKEN FOUND : "\"0x8a000000000000ll\"" is: JavaString JavaString
"
0
x
8
a
0
0
0
0
0
0
0
0
0
0
0
0
0
l
l
"
TOKEN FOUND : "\"0x8a000000000000ll\"" is: cChar cChar

"\"0x8A40000000000010uLL\""
TOKEN FOUND : "\"0x8A40000000000010uLL\"" is: JavaString JavaString
"
0
x
8
A
4
0
0
0
0
0
0
0
0
0
0
0
0
0
1
0
u

L
L
"
TOKEN FOUND : "\"0x8A40000000000010uLL\"" is: cChar cChar

"'a"'
TOKEN FOUND : "'a"' is: JavaString JavaString
"
a
"
TOKEN FOUND : "'a"' is: cChar cChar

"'string"'
TOKEN FOUND : "'string"' is: JavaString JavaString
"
s
t
r
i
n
g
"
TOKEN FOUND : "'string"' is: cChar cChar

"'str

ing\\t"'

"'string\\"'
TOKEN FOUND : "'string\\"' is: JavaString JavaString
"
s
t
r
i
n
g
\
"
TOKEN FOUND : "'string\\"' is: cChar cChar

"'stri\\"s"'
"
s
t
r
i
\
"
s

'\"st

\\

\"

ri\\"s\"'

"\"valid??@123\""
TOKEN FOUND : "\"valid??@123\"" is: JavaString JavaString
"
v
a
l
i
d
?
?
@
1
2
3
"
TOKEN FOUND : "\"valid??@123\"" is: cChar cChar

'\"valisd@@@/.33\\{1!@#$%\""\"+\"'
"
v
a

l
i
s
d
@
@
@
/
.
3
3
\
{

'\"-\"'
TOKEN FOUND : '\"-\"' is: JavaString JavaString
"
-
"
TOKEN FOUND : '\"-\"' is: cChar cChar

'\"(\"'
TOKEN FOUND : '\"(\"' is: JavaString JavaString
"
(
"
TOKEN FOUND : '\"(\"' is: cChar cChar

'\")\"'
TOKEN FOUND : '\")\"' is: JavaString JavaString
"
)
"
TOKEN FOUND : '\")\"' is: cChar cChar

'\"or\"'
TOKEN FOUND : '\"or\"' is: JavaString JavaString
"
o
r
"
TOKEN FOUND : '\"or\"' is: cChar cChar

'\"and\"'
TOKEN FOUND : '\"and\"' is: JavaString JavaString
"
a
n
d
"
TOKEN FOUND : '\"and\"' is: cChar cChar

'\"*\"'
TOKEN FOUND : '\"*\"' is: JavaString JavaString
"
*
"
TOKEN FOUND : '\"*\"' is: cChar cChar

'\"/\"'
TOKEN FOUND : '\"/\"' is: JavaString JavaString
"
/
"
TOKEN FOUND : '\"/\"' is: cChar cChar

'\"%\"'
TOKEN FOUND : '\"%\"' is: JavaString JavaString
"
%
"
TOKEN FOUND : '\"%\"' is: cChar cChar

"\'2\"'
'
2
'
TOKEN FOUND : "\'2\"' is: cChar cChar

"\'!\"'
'
!

'
TOKEN FOUND : "\'!\'" is: cChar cChar

"\"&\""
TOKEN FOUND : "\"&\"" is: JavaString JavaString
"
&
"
TOKEN FOUND : "\"&\"" is: cChar cChar

"\'\n\'"
'

"\'\?\'"
'
\
?
'
TOKEN FOUND : "\'\?\'" is: cChar cChar

"\'\\\'"
'
\
'
TOKEN FOUND : "\'\\\'" is: cChar cChar

"\'\f\'"
'

"\'\XN\'"
'
\
X
N
'
TOKEN FOUND : "\'\XN\'" is: cChar cChar

"\'\'"
'
'
TOKEN FOUND : "\'\'" is: cChar cChar

"\'n\'"
'
n
'
TOKEN FOUND : "\'n\'" is: cChar cChar

'\'x\'"
'
x
"

"a\'c\'"
is Decimal
a

""
TOKEN FOUND : "" is: Perl Perl
TOKEN FOUND : "" is: cInt cInt
TOKEN FOUND : "" is: cChar cChar
TOKEN FOUND : "" is: cFloat cFloat

"15.75"
is Decimal
1
TOKEN FOUND : "15.75" is: cFloat cFloat

"1.575E1"
is Decimal
1
TOKEN FOUND : "1.575E1" is: cFloat cFloat

"1575e-2"
is Decimal
1
TOKEN FOUND : "1575e-2" is: cFloat cFloat

"-2.5e-3"
-
TOKEN FOUND : "-2.5e-3" is: cFloat cFloat

"25E-4"
is Decimal
2
TOKEN FOUND : "25E-4" is: cFloat cFloat

"10.0L"
is Decimal
1
TOKEN FOUND : "10.0L" is: cFloat cFloat

"10.0F"
is Decimal
1
TOKEN FOUND : "10.0F" is: cFloat cFloat

".0075e2"
.
TOKEN FOUND : ".0075e2" is: cFloat cFloat

"0.075e1"
0
TOKEN FOUND : "0.075e1" is: cFloat cFloat

".075e1"
.
TOKEN FOUND : ".075e1" is: cFloat cFloat

"75e-2"
is Decimal
7
TOKEN FOUND : "75e-2" is: cFloat cFloat

"15.L75L"
is Decimal
1

"1.57.5E1"
is Decimal
1

"157.5e-+"
is Decimal
1

"+2.5e-3"
+

"25.L-4"
is Decimal
2

"10.0LF"
is Decimal
1

"1x0.0F"
is Decimal
1

".0075ef2"
.

"0.075ee1"
0

".075e1f"
.

"75e--2"
is Decimal
7

"28"
is Decimal
TOKEN FOUND : "28" is: cInt cInt
2
TOKEN FOUND : "28" is: cFloat cFloat

"4000000024u"
is Decimal
TOKEN FOUND : "4000000024u" is: cInt cInt
4

"2000000022l"
is Decimal
TOKEN FOUND : "2000000022l" is: cInt cInt
2
TOKEN FOUND : "2000000022l" is: cFloat cFloat

"4000000000ul"
is Decimal
0 1
TOKEN FOUND : "4000000000ul" is: cInt cInt
4

"9000000000LL"
is Decimal

1 0
TOKEN FOUND : "9000000000LL" is: cInt cInt
9

"900000000001ull"
is Decimal
0 1
1 1
TOKEN FOUND : "900000000001ull" is: cInt cInt
9

"024"
is Octal
TOKEN FOUND : "024" is: cInt cInt
0
TOKEN FOUND : "024" is: cFloat cFloat

"04000000024u"
is Octal
TOKEN FOUND : "04000000024u" is: cInt cInt
0

"02000000022l"
is Octal
TOKEN FOUND : "02000000022l" is: cInt cInt
0
TOKEN FOUND : "02000000022l" is: cFloat cFloat

"04000000000UL"
is Octal
TOKEN FOUND : "04000000000UL" is: cInt cInt
0

"0440000000000000ll"
is Octal
TOKEN FOUND : "0440000000000000ll" is: cInt cInt
0

"04440000000000001Ull"

```
is Octal
TOKEN FOUND : "044400000000000001Ull" is: cInt cInt
0


"0x2a"
is Hex
TOKEN FOUND : "0x2a" is: cInt cInt
0


"0XA0000024u"
is Hex
TOKEN FOUND : "0XA0000024u" is: cInt cInt
0


"0x20000022l"
is Hex
TOKEN FOUND : "0x20000022l" is: cInt cInt
0


"0XA0000021uL"
is Hex
TOKEN FOUND : "0XA0000021uL" is: cInt cInt
0


"0x8a000000000000ll"
is Hex
TOKEN FOUND : "0x8a000000000000ll" is: cInt cInt
0


"0x8A40000000000010uLL"
is Hex
TOKEN FOUND : "0x8A40000000000010uLL" is: cInt cInt
0


'28'
is Decimal
TOKEN FOUND : '28' is: cInt cInt
2
TOKEN FOUND : '28' is: cFloat cFloat
```

'4000000024ulll'
is Decimal
0 1
1 1
2 1
3 1
4

'2000000022lll'
is Decimal
1 0
2 0
3 0
2

'4000000000uul'
is Decimal
0 1
4

'9000000000LLL'
is Decimal
1 0
2 0
3 0
9

'900000000001ulll'
is Decimal
0 1
1 1
2 1
3 1
9

'024'
is Octal
TOKEN FOUND : '024' is: cInt cInt
0

TOKEN FOUND : '024' is: cFloat cFloat

'04000000024uu'
is Octal
0

'02000000022ll'
is Octal
TOKEN FOUND : '02000000022ll' is: cInt cInt
0

'04000000000ULL'
is Octal
0

'044000000000000uull'
is Octal
0

'0444000000000000001Ulll'
is Octal
3 1
0

'0x2a'
is Hex
TOKEN FOUND : '0x2a' is: cInt cInt
0

'0XA0000024uu'
is Hex
0

'0x20000022ll"0XA0000021uLLL"0x8a000000000000lll"0x8A40000000000010uLLL'
is Hex
0

'"a"'
TOKEN FOUND : '"a"' is: JavaString JavaString
"
a
"
TOKEN FOUND : '"a"' is: cChar cChar

'"string"'
TOKEN FOUND : '"string"' is: JavaString JavaString
"
s
t
r
i
n
g
"
TOKEN FOUND : '"string"' is: cChar cChar

'"str

ing\\t"'

'"string\\"'
TOKEN FOUND : '"string\\"' is: JavaString JavaString
"
s
t
r
i
n
g
\
"
TOKEN FOUND : '"string\\"' is: cChar cChar

'"stri\\"s"'
"
s
t
r

i
\
"
s

"'st

\\

\"

ri\\"s"'

"valid??@123"
v

"'valisd@@@/.[[33\\{1!@#$%"'
"
v
a
l
i
s
d
@
@
@
/
.
[
[
3
3
\
{

'+'
+
TOKEN FOUND : '+' is: Ops Ops

'-'
-
TOKEN FOUND : '-' is: cFloat cFloat
TOKEN FOUND : '-' is: Ops Ops

'('
(
TOKEN FOUND : '(' is: Ops Ops

')'
)
TOKEN FOUND : ')' is: Ops Ops

'or'
o
TOKEN FOUND : 'or' is: Ops Ops

'and'
is Decimal
a
TOKEN FOUND : 'and' is: Ops Ops

'*'
*
TOKEN FOUND : '*' is: Ops Ops

'/'
/
TOKEN FOUND : '/' is: Ops Ops

'%'
TOKEN FOUND : '%' is: Perl Perl
%
TOKEN FOUND : '%' is: Ops Ops

'lk'

is Decimal
l

'!'
!
TOKEN FOUND : '!' is: Ops Ops

'nand'
n

'xor'
is Decimal
x

'ur

mom'

'*='
*

'=='
=

'()'
(

'[]'
[

'@plc'
TOKEN FOUND : '@plc' is: Perl Perl
@

'$nowe_245'

TOKEN FOUND : '$nowe_245' is: Perl Perl
$

'%wbnod20983'
TOKEN FOUND : '%wbnod20983' is: Perl Perl
%

bash-3.2$ exit
exit

Script done on Sun Nov 15 20:39:06 2020

Question 2 (9 points) Write three functions in C or C++: one that declares a large array statically, one that declares the same large array on the stack, and one that creates the same large array the heap. Call each of the subprograms a large number of times (at least 100,000) and output the time required by each. Explain the results.

```
/*##################################
##################################
############ PLC EXAM 2 ############
###### Created by Anthony Asilo #####
########## November 2020 ##########
#### https://github.com/pillared ####
##################################
##################################*/

#include <stdio.h>
#include <stdlib.h>
#include <ctype.h>
#include <time.h>

#define ARR_SIZE 10
#define loop_SIZE 100000

void declare_staticArr(){
   static int staticArr[ARR_SIZE];
}
void declare_stackArr(){
   int stackArr[ARR_SIZE];
}
void declare_heapArr(){
   int *heapArr = ( int* ) malloc ( ARR_SIZE * sizeof(int) );
   free(heapArr);
}

int main(int argc, char *argv[]){
   int i = 0;
   double time;
   clock_t begin;
   clock_t end;

   begin = clock();
   while(i < loop_SIZE){
      declare_staticArr();
      i++;
   }end = clock();
   time = (double)(end - begin) / CLOCKS_PER_SEC;
   printf("Time for static: %f seconds\n",time);

   i = 0;
   begin = clock();
   while(i < loop_SIZE){
      declare_stackArr();
      i++;
   }end = clock();
   time = (double)(end - begin) / CLOCKS_PER_SEC;
   printf("Time for stack: %f seconds\n",time);

   i = 0;
   begin = clock();
   while(i < loop_SIZE){
      declare_heapArr();
      i++;
```

```
   }end = clock();
   time = (double)(end - begin) / CLOCKS_PER_SEC;
   printf("Time for heap: %f seconds\n ",time);
   return 1;
}
```

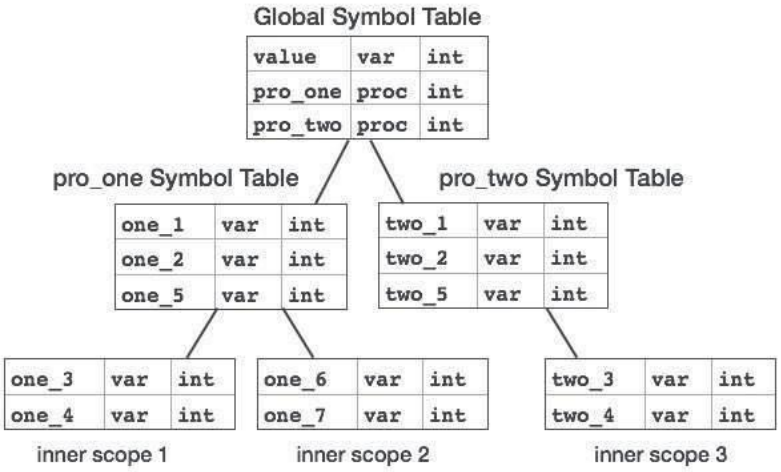
Question 3 (11 points) Write an EBNF or CFG that while handle prefix/preorder Arithmetic Operations (addition, subtraction, multiplication, division, modulo) with the proper order of operations? What all types of parsers can be used to show the syntax for this? Justify your answer.

<stmt> → <op> <var> <stmt>
<stmt> → <op> <var> <var>
<op> → ['+' | '-' | '*' | '/' | '%']
<var> → [<letter> | <num>]
<letter> → [A-Z | a-z] { <num> }
<num> → [0-9] { <num> }

I think any bottom up parsers can work because it works from the bottom of the tree up to the start statement. For example an inorder statement may look like A+B*C/D and a preorder will look like +A*B/CD so it will divide c and d then multiply the result of that with b and the add that result to a.

Question 4 (10 points) What features of the compilation process allow us to determine the reference environment for any at any given line of code in the program. Answer this question for both dynamic and static scoping? Does the type of scoping change this answer? Explain why?

The symbol table allows us to determine the reference environment at any line in code. This means we know the scope for all variables defined, and because we know the scope, it doesn't matter whether it is static or dynamic, because the symbol table may be different or the same for each scope. Here is a picture for reference



Question 5 (10 points) Detail how you would go about adding reserved words into the problem where you are designing your own lexical analyzer? How would you have to change your code? What would you have to add to let users choose a reserve word word as an identifier?

I would essentially implement a hash map / symbol table that has all of the reserved words in it. I would offers a keyword called alias. declaring alias with a keyword will essentially wrap it with quotes and allow you to identify items with that word. When checking for an alias in a lexical analyzer you could check to see if the word belongs in the reserved keyword hash map.

Question 6 (20 points) Write a recursive decent algorithm for a java while statement, a Javas if statement , an logical/mathematical expression based on the rules you created in your lexical analyzer, and an mathe- matical assignment statement , where statement may be an empty function. Supply the EBNF rule for each.

WHILE STATEMENT

<whilestmt> → "while" "(" <boolstmt> ")" "{" <block> "}"
<block> → {<stmt>}

```
public static boolean whilestmt(String s){
   x = getNextToken(s)
   if(x == whilest){
      x = getNextToken(s);
      if(x == leftparenthasis){
         x = getNextToken(s);
         if(x == boolstmt){
            x = getNextToken(s);
            if(x == rightparenthasis){
               x = getNextToken(s);
               if(x == opencurl){
                  x = getNextToken(s);
                  if(x == opencurl){
                     x = getNextToken(s);
                     if(x == blockstmt)(){
                        x = getNextToken(s);
                        if(x == closecurl){
                           return true;
                        }else{
                           return false;
                        }
                     }else{
                        return false;
                     }
                  }else{
                     return false;
                  }
               }else{
```

```
                return false;
            }
        }else{
            return false;
        }
    }else{
        return false;
    }
  }else{
    return false;
  }
}
```

While statement would be a while keyword with an open parenthesis and a bool statement with a close parenthesis, followed by open curly brace and a block, which can contain zero or more statements, with a close curly brace.

IF STATEMENT

<ifstmt> → “if” “(” <boolstmt> “)” [<stmt> | “{” <block> “}”]
{ [“else” “if” “(” <boolstmt> “)” [<stmt> | “{” <block> “}”]] }
([“else” [<stmt> | “{” <block> “}”])
<block> → {<stmt>}

```
//assume getNextToken pops string stack based on spaces.
public static boolean ifstmt(String s){
  x = getNextToken(s);
  if(x == ifst){
    x = getNextToken(s);
    if(x == leftparenthasis){
      x = getNextToken(s);
      if(x == boolstmt){
        x = getNextToken(s);
        if(x == rightparenthasis){
          x = getNextToken(s);
          //check if stmt or opencurl
          if(x == stmt || x == opencurl){
            //if open curl check for close
            if(x == opencurl){
              x = getNextToken(s);
              if(x == block){
                x = getNextToken(s);
                if(x == closecurl){
```

```
                        if(s != " " || s != ""){
                            check_for_else_or_elseif_stmt(s);
                        }else{ return true; }
                    }else{ return false; }
                }else{ return false; }
            }else if(s != " " || s != ""){
                check_for_else_or_elseif_stmt(s);
            }else{ return true; }
        }else{ return false; }
    }else{ return false; }
}else{ return false; }
}

//assume getNextToken pops string stack based on spaces.
public static boolean check_for_else_or_elseif_stmt(String s){
   x = getNextToken(s);
   if(x == else_stmt){
      x = getNextToken(s);
      if(x == if_stmt){
         //concatenates popped with string and rechecks if statment
         x = x + " " + s;
         return if_stmt(s);
      }else if (x == stmt || x == opencurl){
         x = getNextToken(s);
            if(x == block){
               x = getNextToken(s);
               if(x == closecurl){
                  if(s != " " || s != ""){
                     ifstmt(s);
                  }else{ return true; }
               }else{ return false; }
            }else{ return false; }
         return true;
      }else {return false;}
   }else{ return false;}
}
```

If statement would be a if keyword with an open parenthesis and a bool statement with a close parenthesis, followed by a choose either a single statement or an open curly brace and a block, which can contain zero or more statements, with a close curly brace. This can be followed by zero or more else if statements, which have an else and if keyword followed by an open parenthesis with a bool statement with a close parenthesis, followed by a choose either a single statement or an open curly brace and a block, which can contain zero or more statements, with a close curly brace. This is followed by an optional else statement, which contains an else keyword

and a choose either a single statement or an open curly brace and a block, which can contain zero or more statements, with a close curly brace.

ASSIGNMENT STATEMENT

<assignstmt> → <var> "=" [<var>{ "[" <mem> "]" } | <const> | <func> | "null"]

```
//assume getNextToken pops string stack based on spaces.
public static boolean assignstmt(String s){
   x = getNextToken(s);
   if(x == var){
      x = getNextToken(s);
      if(x == equalsign){
         x = getNextToken(s);
         if(x == var || x == var[mem || x == const || x == func || x == null]){
            return true;
         }else { return false; }
      }else { return false; }
   }else { return false; }
}
```

An assignment statement would be a var, which would be an object represented by valid literal for the language, with an equal sign and a choose one of another var and I put the zero or more reference to memory in case it is an array of some sort of array in which we are accessing data at that index, or a constant such as an integer, a function, or a null object

---

MATH STATEMENT

<stmt> → <var> <op> [<stmt> | <var>]
<op> → ['+' | '-' | '*' | '/' | '%']
<var> → [<letter> | <num>]
<letter> → [A-Z | a-z] { <let> }{ <num> }
<num> → [0-9] { <num> }

```
//assume getNextToken pops string stack based on spaces.
public static boolean mathexpr(String s){
   x = getNextToken(s);
   if(x == var){
      x = getNextToken(s);
      if(x == op){
         x = getNextToken(s);
         if(x == math_expr){
            return math_expr(x + " " + s);
         }else if(x == var){
            return true;
         }else { return false; }
      }else { return false; }
   }else { return false; }
}
```

A mathematical Expression would be such where you can have a variable followed by a operator and then a variable, or a variable with an operator and another statement, which will next those statements to make a more complex arithmetic calculation. a var which is a variable can be a literal or a number, which each are respectively represented by 1+ letters or numbers. This math would be in order operations, such as A+B*C/D

Question 7 (10 points) Given the natural constraints of an RDA explain how you would go about the creation of a Statement function in your RDA that would allow statement to either be a while statement, an if statement or an assignment statement.

For an rda with a while, if, and assign, you first check the token and see if it as an ifstmt, whilestmt, or (in a language such as python), a var. Depending on what token is detected, you want to check if the next token is corresponding. For example, if its an ifstmt, check next for aparenthases_in token, a booleanstatement, and then a parentheses out with a separator into a block, such as a colon in python or a curly brace in java. Then you check for an optional elifstmt that rechecks for an open parenthase, boolean statement, close parenthesis, and then a separator into a block with statements. you may then also check for an optional else statement with a separator, and a block with statements. If anything that is not optional is not found then throw an error. If considering java, check for an endcurlybrace separator.. if its python, then it checks the tabs. When looking at the whilestmt, check for a while token, a with parenthesis open, a boolean statement, and then a separator. Then check for a block of statements, and then a separator if needed such as a curly brace for java. For an assignmentstmt, depending in the language, you want to check if there is a var or a type token. For example, in Java, int x = 5 has a type for the first token while the same in python would be x = 5, where the first token is a var. then look for an assignoperator (in other words an equal sign), and then possibly check for a var, constant, function, reference to memory, or a null character.

Question 8 (10 points) Perl allows both static and a kind of dynamic scoping. Write a Perl program that uses both and clearly shows the difference in effect of the two. Explain clearly the difference between the dynamic scoping described in this chapter and that implemented in Perl.

```
$var = 10;
sub returnfunction {
   return $var;
}
sub dynamicscopingfunction{
   local $var = 20;
   return returnfunction();
}
print "Static Scope: " + returnfunction() ."\n";
print "Dynamic Scope: " + dynamicscopingfunction();
```

References

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