EXP 1

LEXICAL ANALYZER

AIM : To implement the Lexical Analyzer using C language

PROCEDURE:

- Include necessary modules and header files, stdio.h, stdlib.h, string.h, stdbool.h
- Define function isValidKeyword that will check for the valid keywords in the string argument passed to it.
- Define another function, isValidInteger that will check for integers in the string argument that is passed with the function call, returns true if the string is integer
- Define function isRealNumber with bool return type that checks if the string argument is a real number and then return true.
- Define isValidOperator with bool as the return type that returns true when the string argument is an operator.
- Define isValidDelimiter with Boolean as the return type that returns true when the string argument passes is a delimiter (, - / < >)
- Define a function named substring that takes a string, a starting index and an ending index and returns part of the string in between these indices.
- Define detectToken function that takes a string as argument and splits it into multiple parts and use the above created functions to find and print tokens.
- Call the detectToken function in the main function and pass it the string (the line of the code) that needs to be lexically analysed.

CODE:

```
#include <stdbool.h>
#include <stdio.h>
#include <string.h>
#include <stdlib.h>
bool isValidDelimiter(char ch) {
   if (ch == ' ' || ch == '+' || ch == '-' || ch == '*' ||
   ch == '/' || ch == ',' || ch == ';' || ch == '>' ||
   ch == '<' || ch == '=' || ch == '(' || ch == ')' ||
   ch == '[' || ch == ']' || ch == '{' || ch == '}')
   return (true);
   return (false);
}
bool isValidOperator(char ch){
   if (ch == '+' || ch == '-' || ch == '*' ||
   ch == '/' || ch == '>' || ch == '<' ||
   ch == '=')
   return (true);
   return (false);
}
// Returns 'true' if the string is a VALID IDENTIFIER.
bool isvalidIdentifier(char* str){
   if (str[0] == '0' || str[0] == '1' || str[0] == '2' ||
   str[0] == '3' || str[0] == '4' || str[0] == '5' ||
   str[0] == '6' || str[0] == '7' || str[0] == '8' ||
   str[0] == '9' || isValidDelimiter(str[0]) == true)
   return (false);
   return (true);
}
```

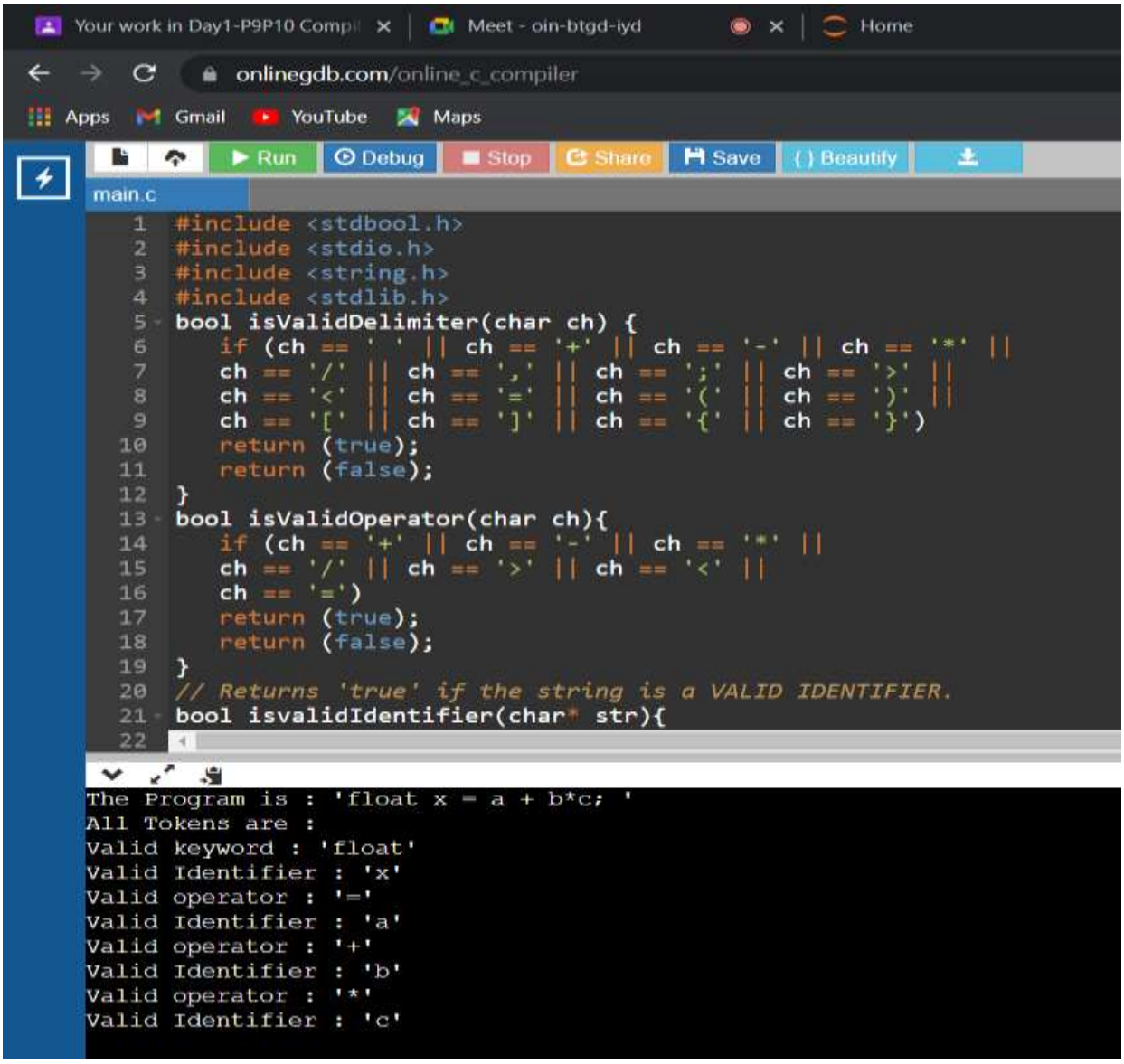
```
bool isValidKeyword(char* str) {
   if (!strcmp(str, "if") || !strcmp(str, "else") || !strcmp(str, "while") || !strcmp(str, "do") ||
!strcmp(str, "break") || !strcmp(str, "continue") || !strcmp(str, "int")
   || !strcmp(str, "double") || !strcmp(str, "float") || !strcmp(str, "return") || !strcmp(str,
"char") || !strcmp(str, "case") || !strcmp(str, "char")
   || !strcmp(str, "sizeof") || !strcmp(str, "long") || !strcmp(str, "short") || !strcmp(str, "typedef")
|| !strcmp(str, "switch") || !strcmp(str, "unsigned")
   || !strcmp(str, "void") || !strcmp(str, "static") || !strcmp(str, "struct") || !strcmp(str, "goto"))
   return (true);
   return (false);
}
bool isValidInteger(char* str) {
   int i, len = strlen(str);
   if (len == 0)
   return (false);
   for (i = 0; i < len; i++) {
      if (str[i] != '0' && str[i] != '1' && str[i] != '2'&& str[i] != '3' && str[i] != '4' && str[i] !=
'5'
      && str[i] != '6' && str[i] != '7' && str[i] != '8' && str[i] != '9' || (str[i] == '-' && i > 0))
      return (false);
   }
   return (true);
}
bool isRealNumber(char* str) {
   int i, len = strlen(str);
   bool hasDecimal = false;
   if (len == 0)
   return (false);
   for (i = 0; i < len; i++) {
      if (str[i] != '0' && str[i] != '1' && str[i] != '2' && str[i] != '3' && str[i] != '4' && str[i]
!= '5' && str[i] != '6' && str[i] != '7' && str[i] != '8'
      && str[i] != '9' && str[i] != '.' || (str[i] == '-' && i > 0))
```

```
      return (false);
        if (str[i] == '.')
      hasDecimal = true;
    }
    return (hasDecimal);
}
char* subString(char* str, int left, int right) {
    int i;
    char* subStr = (char*)malloc( sizeof(char) * (right - left + 2));
    for (i = left; i <= right; i++)
      subStr[i - left] = str[i];
    subStr[right - left + 1] = '\0';
    return (subStr);
}
void detectTokens(char* str) {
    int left = 0, right = 0;
    int length = strlen(str);
    while (right <= length && left <= right) {
      if (isValidDelimiter(str[right]) == false)
      right++;
      if (isValidDelimiter(str[right]) == true && left == right) {
        if (isValidOperator(str[right]) == true)
        printf("Valid operator : '%c'\n", str[right]);
        right++;
        left = right;
      } else if (isValidDelimiter(str[right]) == true && left != right || (right == length && left
!=      right)) {
        char* subStr = subString(str, left, right - 1);
        if (isValidKeyword(subStr) == true)
          printf("Valid keyword : '%s'\n", subStr);
        else if (isValidInteger(subStr) == true)
```

```
            printf("Valid Integer : '%s'\n", subStr);
        else if (isRealNumber(subStr) == true)
            printf("Real Number : '%s'\n", subStr);
        else if (isvalidIdentifier(subStr) == true
            && isValidDelimiter(str[right - 1]) == false)
        printf("Valid Identifier : '%s'\n", subStr);
        else if (isvalidIdentifier(subStr) == false
            && isValidDelimiter(str[right - 1]) == false)
        printf("Invalid Identifier : '%s'\n", subStr);
        left = right;
      }
    }
    return;
}
int main(){
    char str[100] = "float x = a + b*c; ";
    printf("The Program is : '%s' \n", str);
    printf("All Tokens are : \n");
    detectTokens(str);
    return (0);
}
```

RESULT: The Lexical Analyzer problem has been implemented.

OUTPUT:



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