## Week-2

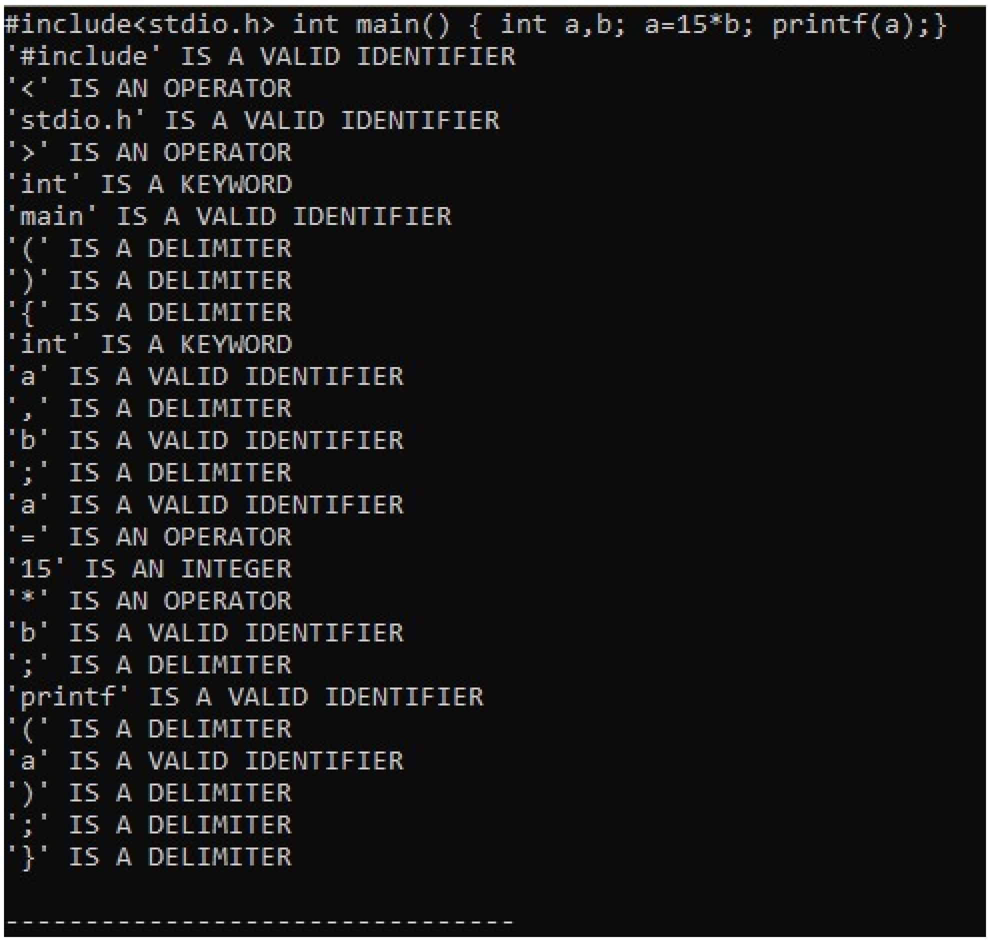
### 2. C program to implement lexical analyzer

```
#include <stdbool.h>
#include <stdio.h>
#include <string.h>
#include <stdlib.h>

bool isDelimiter(char ch) {
        if (ch == ' ' || ch == '+' || ch == '-' || ch == '*' ||
                ch == '/' || ch == ',' || ch == ';' || ch == '>' ||
                ch == '<' || ch == '=' || ch == '(' || ch == ')' ||
                ch == '[' || ch == ']' || ch == '{' || ch == '}')
                return (true);
        return (false);
}

bool isOperator(char ch) {
        if (ch == '+' || ch == '-' || ch == '*' ||
                ch == '/' || ch == '>' || ch == '<' ||
                ch == '=')
                return (true);
        return (false);
}

bool validIdentifier(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' || isDelimiter(str[0]) == true)
                return (false);
        -+*return (true);
}
```

```
bool isKeyword(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 isInteger(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);
        }
         (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 parse(char* str) {
        int left = 0, right = 0;
        int len = strlen(str);

        while (right <= len && left <= right) {
                if (isDelimiter(str[right]) == false)
                        right++;
                if (isDelimiter(str[right]) == true && left == right) {
                        if (isOperator(str[right]) == true)
                                printf("'%c' IS AN OPERATOR\n", str[right]);
                        else {
                                if(str[right]!=' ')
                                        printf("'%c' IS A DELIMITER\n", str[right]);
                        }
                right++;
        left = right;
}
else if (isDelimiter(str[right]) == true && left != right ||

(right == len && left != right)) {

char* subStr = subString(str, left, right - 1);
if (isKeyword(subStr) == true)
printf("'%s' IS A KEYWORD\n", subStr);
else if (isInteger(subStr) == true)
printf("'%s' IS AN INTEGER\n", subStr);
else if (isRealNumber(subStr) == true)
printf("'%s' IS A REAL NUMBER\n", subStr);

else if (validIdentifier(subStr) == true &&

isDelimiter(str[right - 1]) == false)

printf("'%s' IS A VALID IDENTIFIER\n",

subStr);

else if (validIdentifier(subStr) == false &&

isDelimiter(str[right - 1]) == false)

printf("'%s' IS INVALID IDENTIFIER\n",

subStr);

left = right;
}
}
return;
}
int main()
{
```

```
char str[100] ;
gets(str);
parse(str);
return (0);
}
```

**Output:**



```
#include<stdio.h> int main() { int a,b; a=15*b; printf(a);}
'#include' IS A VALID IDENTIFIER
'<' IS AN OPERATOR
'stdio.h' IS A VALID IDENTIFIER
'>' IS AN OPERATOR
'int' IS A KEYWORD
'main' IS A VALID IDENTIFIER
'(' IS A DELIMITER
')' IS A DELIMITER
'{' IS A DELIMITER
'int' IS A KEYWORD
'a' IS A VALID IDENTIFIER
',' IS A DELIMITER
'b' IS A VALID IDENTIFIER
';' IS A DELIMITER
'a' IS A VALID IDENTIFIER
'=' IS AN OPERATOR
'15' IS AN INTEGER
'*' IS AN OPERATOR
'b' IS A VALID IDENTIFIER
';' IS A DELIMITER
'printf' IS A VALID IDENTIFIER
'(' IS A DELIMITER
'a' IS A VALID IDENTIFIER
')' IS A DELIMITER
';' IS A DELIMITER
'}' IS A DELIMITER

--------------------------------
```