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Lab 1 – Lexical Analyzer

Code:

```
/* A lexical analyzer system for simple
arithmetic expressions */
#include <stdio.h>
#include <ctype.h>
/* Global declarations */
/* Variables */
int charClass;
char lexeme [100];
char nextChar;
int lexLen;
int token;
int nextToken;
FILE *in_fp, *fopen();
/* Function declarations */
void addChar();
void getChar();
void getNonBlank();
int lex();
/* Character classes */
#define LETTER 0
#define DIGIT 1
#define UNKNOWN 99
/* Token codes */
#define INT_LIT 10
#define IDENT 11
#define ASSIGN_OP 20
#define ADD_OP 21
#define SUB_OP 22
#define MULT_OP 23
#define DIV_OP 24
#define LEFT_PAREN 25
#define RIGHT_PAREN 26
/******************************************************/
/* main driver */
int main(void) {
 /* Open the input data file and process its contents */
 if ((in_fp = fopen("front.txt", "r")) == NULL)
 printf("ERROR - cannot open front.in \n");
 else {
   getChar();
```

```
  do {
    lex();
  } while (nextToken != EOF);
    }
  }
/******************************************************/
/* lookup - a function to lookup operators and parentheses
and return the token */
int lookup(char ch) {
  switch (ch) {
  case '(':
    addChar();
    nextToken = LEFT_PAREN;
    break;
  case ')':
    addChar();
    nextToken = RIGHT_PAREN;
    break;
  case '+':
    addChar();
    nextToken = ADD_OP;
    break;
  case '-':
    addChar();
    nextToken = SUB_OP;
    break;
  case '*':
    addChar();
    nextToken = MULT_OP;
    break;
  case '/':
    addChar();
    nextToken = DIV_OP;
    break;
  default:
    addChar();
    nextToken = EOF;
    break;

}
  return nextToken;
}
/******************************************************/
/* addChar - a function to add nextChar to lexeme */
void addChar() {
  if (lexLen <= 98) {
    lexeme[lexLen++] = nextChar;
    lexeme[lexLen] = 0;
```

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}
  else
    printf("Error - lexeme is too long \n");
}
/*****************************************************/
/* getChar - a function to get the next character of
input and determine its character class */
void getChar() {
  if ((nextChar = getc(in_fp)) != EOF) {
    if (isalpha(nextChar))
      charClass = LETTER;
    else
    if (isdigit(nextChar))
      charClass = DIGIT;
    else
      charClass = UNKNOWN;
}
  else
  charClass = EOF;
}
/*****************************************************/
/* getNonBlank - a function to call getChar until it
returns a non-whitespace character */
void getNonBlank() {
  while (isspace(nextChar))
    getChar();
}
/*
*****************************************************/
/* lex - a simple lexical analyzer for arithmetic
expressions */
  int lex() {
  lexLen = 0;
  getNonBlank();
  switch (charClass) {
  /* Parse identifiers */
    case LETTER:
      addChar();
      getChar();
      while (charClass == LETTER || charClass == DIGIT) {
        addChar();
        getChar();
  }
      nextToken = IDENT;
      break;

  /* Parse integer literals */
      case DIGIT:
```

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      addChar();
      getChar();
      while (charClass == DIGIT) {
        addChar();
        getChar();
  }
      nextToken = INT_LIT;
      break;

  /* Parentheses and operators */
    case UNKNOWN:
      lookup(nextChar);
      getChar();
      break;
/* EOF */
    case EOF:
      nextToken = EOF;
      lexeme[0] = 'E';
      lexeme[1] = 'O';
      lexeme[2] = 'F';
      lexeme[3] = 0;
      break;
} /* End of switch */
    printf("Next token is: %d, Next lexeme is %s\n",
    nextToken, lexeme);
    return nextToken;
} /* End of function lex */
```
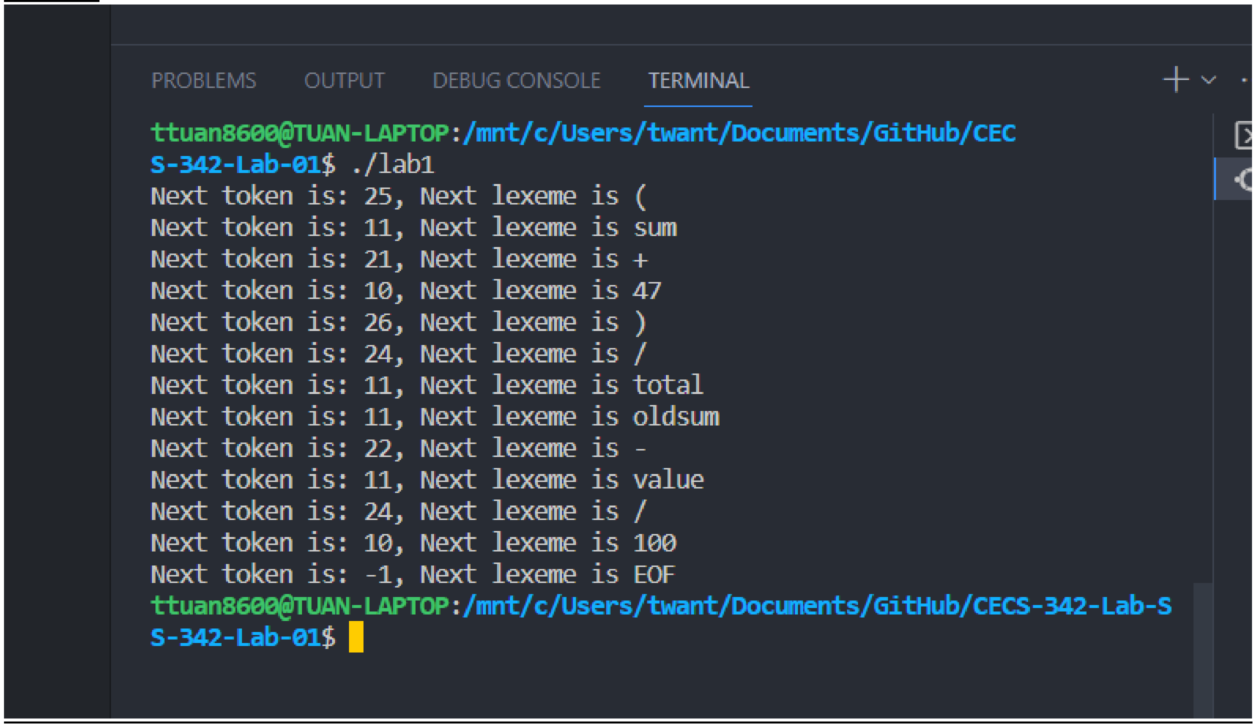

Output:



```
ttuan8600@TUAN-LAPTOP:/mnt/c/Users/twant/Documents/GitHub/CEC
S-342-Lab-01$ ./lab1
Next token is: 25, Next lexeme is (
Next token is: 11, Next lexeme is sum
Next token is: 21, Next lexeme is +
Next token is: 10, Next lexeme is 47
Next token is: 26, Next lexeme is )
Next token is: 24, Next lexeme is /
Next token is: 11, Next lexeme is total
Next token is: 11, Next lexeme is oldsum
Next token is: 22, Next lexeme is -
Next token is: 11, Next lexeme is value
Next token is: 24, Next lexeme is /
Next token is: 10, Next lexeme is 100
Next token is: -1, Next lexeme is EOF
ttuan8600@TUAN-LAPTOP:/mnt/c/Users/twant/Documents/GitHub/CECS-342-Lab-S
S-342-Lab-01$
```