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SYMBIOSIS INSTITUTE OF TECHNOLOGY, PUNE

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Lab Assignment No. 07

Subject: Compiler Construction Lab Assignments

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Title of Lab Assignment	**Test lines ending with "com"**

Theory:

Lexical Analysis (Lex): *Lexical analysis is the first phase of the compilation process, responsible for breaking down the input source code into a stream of tokens (lexical units). Tokens are the smallest meaningful units in a program, such as keywords, identifiers, and literals.*

Regular Expressions(RE): *Regular expressions are powerful patterns used for pattern matching in strings. In Lex, you define regular expressions to recognize and classify tokens in the input text.*

Methodology:

Setup: You begin by setting up your Lex program. This typically involves importing necessary header files (e.g., <stdio.h> and <stdlib.h>) and defining any required global variables or options.

Lexical Rules Section (Between %%): This section is where you specify the regular expressions and corresponding actions for your program. Here's what each part of the Lex program does:

*.*com\.$: This regular expression matches any line that ends with "com." and captures the entire line. The yytext variable contains the matched text.*

{ printf(...) }: When a line matching the regular expression is found, it prints the matched line along with its line number, increments counters for lines ending with "com," total lines, and checks for the maximum line length and longest line.

.|\n: This regular expression is a catch-all for any character or newline that does not match the previous rule. It essentially discards lines that do not end with "com."

***Main Function:** In the main function, you call yylex() to initiate the lexical analysis.*

***Summary Output:** After analyzing the input, you print a summary of the results, including the total number of lines, lines ending with "com," maximum line length, and the longest line encountered.*

***Memory Management:** In the enhanced version of the code, memory management is improved by dynamically allocating and freeing memory for the longest line.*

***Compilation and Execution:** You compile the Lex program using the lex utility, generate the C code using lex.yy.c, compile the C code with gcc, and then run the resulting executable on your input file.*

***Input and Output:** You redirect the input from a file (e.g., input_file.txt) so that the Lex program can process it. The program then generates the output, which includes information about lines ending with "com."*

***Analysis:** This program provides valuable information about the input, such as the location and content of lines ending with "com," the total line count, and characteristics of the longest line.*

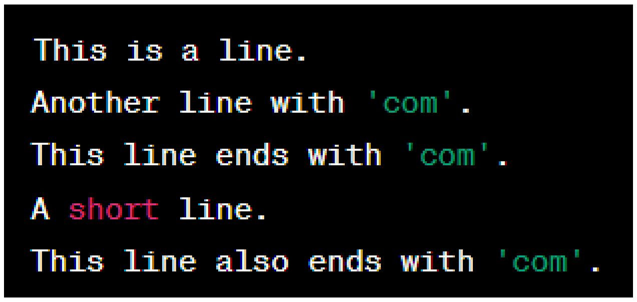
Code:

```
%{
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
%}

%option noyywrap

%{
   int line_count = 1;
   int total_lines = 0;
   int com_lines = 0;
   int max_line_length = 0;
   char* longest_line = NULL;
%}

%%
\n  { line_count++; }
.*com\.$ {
   printf("Line ending with 'com' at line %d: %s\n", line_count, yytext);
   com_lines++;
   total_lines++;
   int line_length = strlen(yytext);
   if (line_length > max_line_length) {
       max_line_length = line_length;
       if (longest_line) {
           free(longest_line);
       }
       longest_line = strdup(yytext);
   }
   line_count++;
}
.|\n  { total_lines++; }

%%
int main(int argc, char* argv[]) {
   yylex();
   printf("\nSummary:\n");
   printf("Total lines: %d\n", total_lines);
   printf("Lines ending with 'com': %d\n", com_lines);
   printf("Maximum line length: %d\n", max_line_length);
   if (longest_line) {
       printf("Longest line: %s\n", longest_line);
       free(longest_line);
   }
   return 0;
}
```

Output:

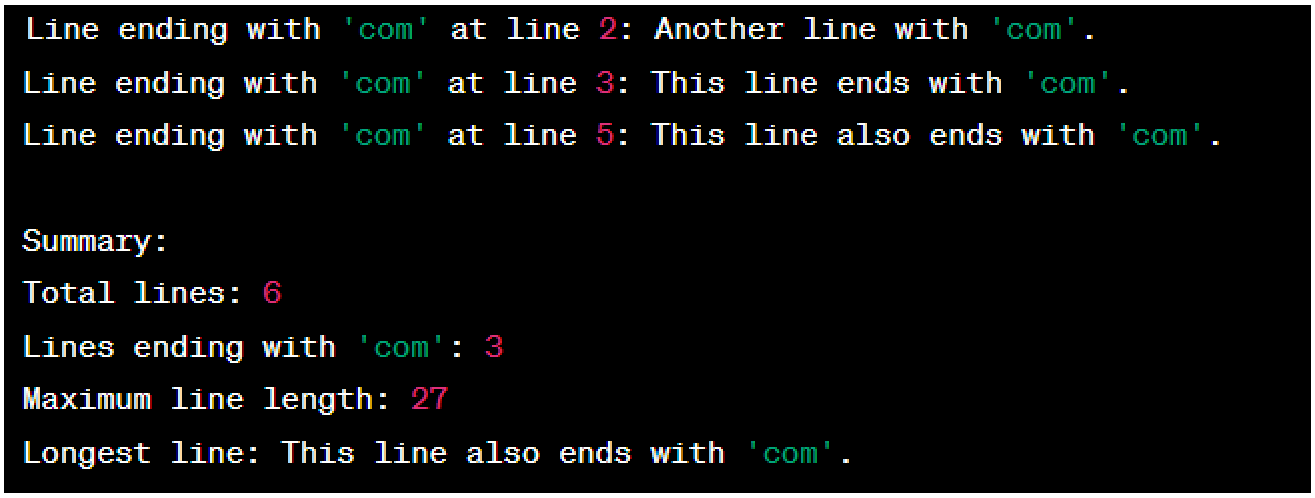
Case 1:

Let's assume that I have an input file named ***sample_input.txt*** *with the following content:*



```
This is a line.
Another line with 'com'.
This line ends with 'com'.
A short line.
This line also ends with 'com'.
```

After running the Lex program on this input file, the output might look like this:



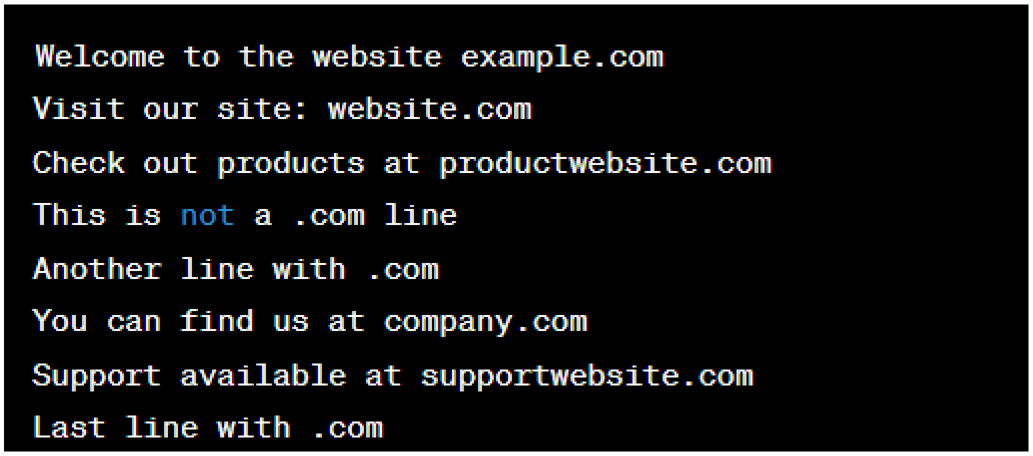
```
Line ending with 'com' at line 2: Another line with 'com'.
Line ending with 'com' at line 3: This line ends with 'com'.
Line ending with 'com' at line 5: This line also ends with 'com'.

Summary:
Total lines: 6
Lines ending with 'com': 3
Maximum line length: 27
Longest line: This line also ends with 'com'.
```

Case 2:

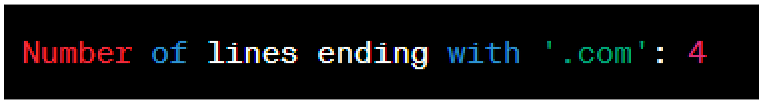
CODE:

```
%{
#include <stdio.h>
int com_line_count = 0;
%}

%%

.*\.com$   { com_line_count++; }

%%

int main() {
    yylex();
    printf("Number of lines ending with '.com': %d\n", com_line_count);
    return 0;
}
```

Now, let's create a sample input file named sample_input.txt with around 10 lines:



```
Welcome to the website example.com
Visit our site: website.com
Check out products at productwebsite.com
This is not a .com line
Another line with .com
You can find us at company.com
Support available at supportwebsite.com
Last line with .com
```



```
Number of lines ending with '.com': 4
```

Conclusion: *In this assignment, we used Lex to create a simple program that counts the number of lines ending with ".com" in a given text input. We leveraged Lex's pattern matching capabilities to identify and tally lines meeting the specified criteria. By applying this Lex program, we were able to efficiently analyze the input and provide a count of lines ending with ".com." This assignment demonstrated how Lex can be employed for straightforward text analysis tasks and showcased its versatility in processing and extracting information from textual data.*