Compiler Design   Assignment – 4

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1. **Regular Expressions:**

- `digit [0-9]*`: This defines a regular expression for matching zero or more digits.
- `letter [a-zA-Z]`: This defines a regular expression for matching a single letter.
- `id {letter}({letter}|{digit})*`: This defines a regular expression for matching identifiers. An identifier starts with a letter and can be followed by zero or more letters or digits.
- `int_num {digit}+`, `uint_num 0|({int_num})`: These regular expressions define signed and unsigned integers. An unsigned integer can be either 0 or a sequence of one or more digits.

2. **Floating-Point Numbers:**

- `float_num ({int_num}\.{digit}+)|({int_num}\.)|(\.{digit}+)`: This regular expression matches different forms of floating-point numbers. It can be an integer part followed by a decimal point and one or more digits (`{int_num}\.{digit}+`), an integer part followed by just a decimal point (`{int_num}\.`), or just a decimal point followed by one or more digits (`\.{digit}+`).

3. **Exponential Notation:**

- `exp_num ({int_num}|{float_num})[eE][+-]?{int_num}`: This regular expression matches numbers in exponential notation. It can be an integer or float part followed by `e` or `E`, an optional `+` or `-`, and then one or more digits.

4. **Tokens and Actions:**

- The section after the `%%` delimiter contains rules for recognizing various tokens.
- For example, `"//"` is a pattern to match a double forward slash, and the action `{scom=1;}` sets the single-line comment flag to 1.
- Keywords, relational operators, assignment operator, etc. are recognized based on the provided patterns.

5. **Ignoring Comments:**

- `/* ... */` style comments are ignored using the rules for `"/*"` and `"*/"`.
- Single-line comments are ignored using the rule for `"//"`.

6. **Printing and Storing:**

- When a token is recognized, it prints a message to the output file (`yyout`) indicating the type of the token.
- Identifiers are also stored in the symbol table (`st`) if they haven't been encountered before.

7. **Main Function:**

- `main()` opens the input and output files, calls `yylex()` to start the lexical analysis, and then prints the contents of the symbol table.

8. **`look_up` Function:**

- This function checks if a given identifier (`id`) is already in the symbol table.

9. **`yywrap` Function:**

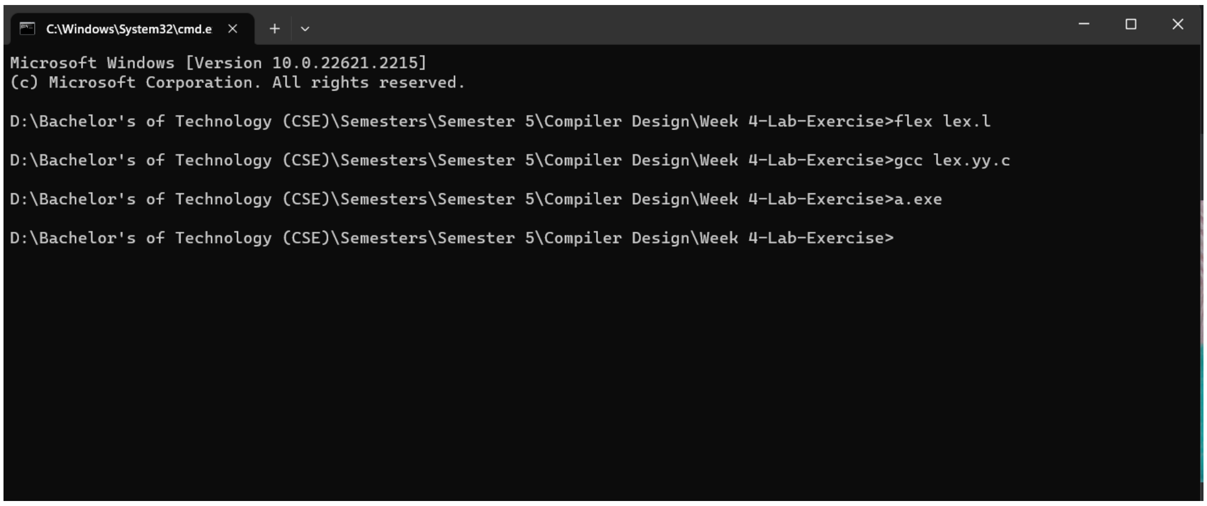
- This function is used to indicate the end of input.

10. **File Handling:**

- The program reads from a file named `x.txt` and writes to a file named `y.txt`.

This Lex program will tokenize the input based on the specified rules and print the results to `y.txt`. The program also maintains a symbol table and handles different types of numeric constants and identifiers as per the provided regular expressions.

Commands to run the program :



```
Microsoft Windows [Version 10.0.22621.2215]
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D:\Bachelor's of Technology (CSE)\Semesters\Semester 5\Compiler Design\Week 4-Lab-Exercise>flex lex.l

D:\Bachelor's of Technology (CSE)\Semesters\Semester 5\Compiler Design\Week 4-Lab-Exercise>gcc lex.yy.c

D:\Bachelor's of Technology (CSE)\Semesters\Semester 5\Compiler Design\Week 4-Lab-Exercise>a.exe

D:\Bachelor's of Technology (CSE)\Semesters\Semester 5\Compiler Design\Week 4-Lab-Exercise>
```