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Lab Exercise: 01

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Basic Lex Programs

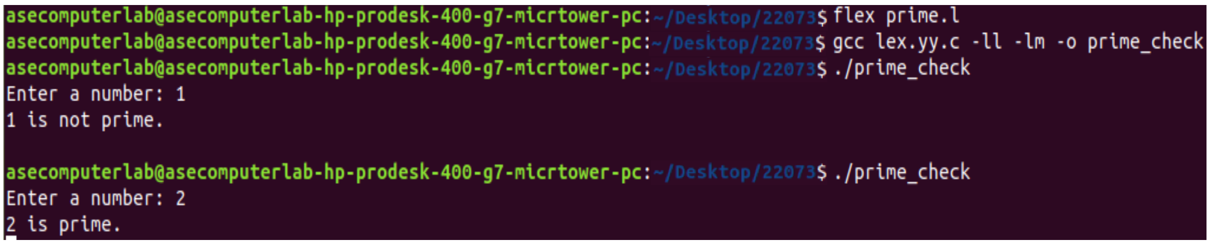
1.Title: Write a program to check if a given number is prime or not.

Code:

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

%%
[0-9]+    {
            int num = atoi(yytext);

            if(num <= 1) {
               printf("%d is not prime.\n", num);
            } else {
               int i, flag = 1;
               int limit = (int)sqrt(num);

               for(i = 2; i <= limit; i++) {
                  if(num % i == 0) {
                     flag = 0;
                     break;
                  }
               }
               if(flag)
                  printf("%d is prime.\n", num);
               else
                  printf("%d is not prime.\n", num);
            }
         }
\n    ;   // ignore new lines
.      ;   // ignore other characters
%%
```

```
int main() {
    printf("Enter a number: ");
    yylex();
    return 0;
}

int yywrap() {
    return 1;
}
```

Output:



```
asecomputerlab@asecomputerlab-hp-prodesk-400-g7-micrtower-pc:~/Desktop/22073$ flex prime.l
asecomputerlab@asecomputerlab-hp-prodesk-400-g7-micrtower-pc:~/Desktop/22073$ gcc lex.yy.c -ll -lm -o prime_check
asecomputerlab@asecomputerlab-hp-prodesk-400-g7-micrtower-pc:~/Desktop/22073$ ./prime_check
Enter a number: 1
1 is not prime.

asecomputerlab@asecomputerlab-hp-prodesk-400-g7-micrtower-pc:~/Desktop/22073$ ./prime_check
Enter a number: 2
2 is prime.
```

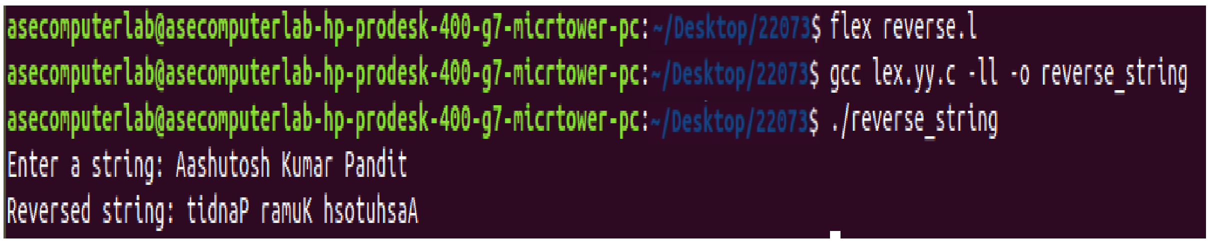
2.Title: Write a program to reverse a string without using built-in functions.

Code:

```
%{
#include <stdio.h>

void reverse(char *str, int length) {
    int i;
    for(i = 0; i < length / 2; i++) {
        char temp = str[i];
        str[i] = str[length - 1 - i];
        str[length - 1 - i] = temp;
    }
}

%}

%%
.*\n    {
            // yytext contains the whole line including newline
            int length = 0;
            // Calculate length excluding newline
            while(yytext[length] != '\n' && yytext[length] != '\0') {
```

```
            length++;
        }

        // Reverse the string in yytext (modifying in place)
        reverse(yytext, length);

        // Add newline back manually
        yytext[length] = '\n';
        yytext[length+1] = '\0';

        printf("Reversed string: %s", yytext);
        return 0; // Stop after processing one line
    }
%%
int main() {
    printf("Enter a string: ");
    yylex();
    return 0;
}

int yywrap() {
    return 1;
}
```

<u>Output:</u>



```
asecomputerlab@asecomputerlab-hp-prodesk-400-g7-micrtower-pc:~/Desktop/22073$ flex reverse.l
asecomputerlab@asecomputerlab-hp-prodesk-400-g7-micrtower-pc:~/Desktop/22073$ gcc lex.yy.c -ll -o reverse_string
asecomputerlab@asecomputerlab-hp-prodesk-400-g7-micrtower-pc:~/Desktop/22073$ ./reverse_string
Enter a string: Aashutosh Kumar Pandit
Reversed string: tidnaP ramuK hsotuhsaA
```

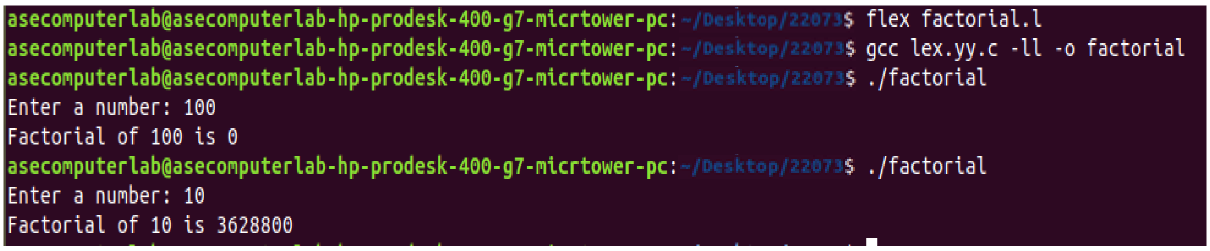
3.Title: Write a program to find the factorial of a number using recursion.

<u>Code:</u>

```
%{
#include <stdio.h>

// Recursive factorial function
long long factorial(int n) {
    if (n <= 1)
```

```
        return 1;
    else
        return n * factorial(n - 1);
}
%}

%%
[0-9]+  {
            int num = atoi(yytext);
            printf("Factorial of %d is %lld\n", num, factorial(num));
            return 0;  // Stop after processing one number
        }
\n      ;  // ignore newline
.       ;  // ignore any other characters
%%

int main() {
    printf("Enter a number: ");
    yylex();
    return 0;
}

int yywrap() {
    return 1;
}
```

Output:



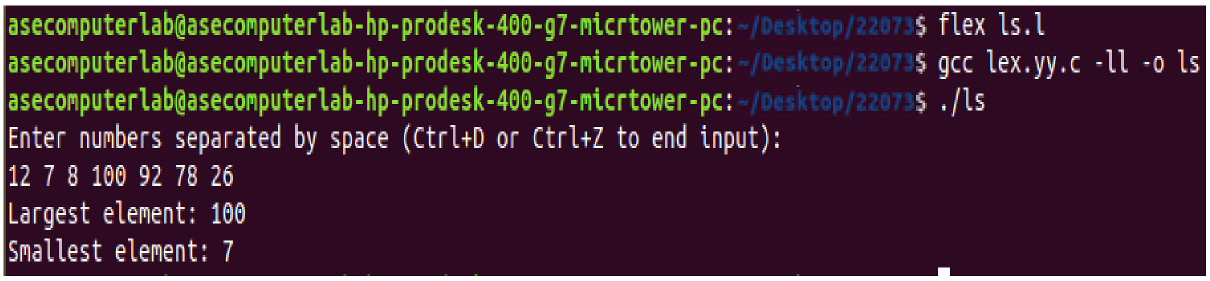
```
asecomputerlab@asecomputerlab-hp-prodesk-400-g7-micrtower-pc:~/Desktop/22073$ flex factorial.l
asecomputerlab@asecomputerlab-hp-prodesk-400-g7-micrtower-pc:~/Desktop/22073$ gcc lex.yy.c -ll -o factorial
asecomputerlab@asecomputerlab-hp-prodesk-400-g7-micrtower-pc:~/Desktop/22073$ ./factorial
Enter a number: 100
Factorial of 100 is 0
asecomputerlab@asecomputerlab-hp-prodesk-400-g7-micrtower-pc:~/Desktop/22073$ ./factorial
Enter a number: 10
Factorial of 10 is 3628800
```

4.Title: Write a program to find the largest and smallest element in an array.

Code:

```
%{
#include <stdio.h>
#include <limits.h>
int largest = INT_MIN;
int smallest = INT_MAX;
%}

%%
[0-9]+ {
            int num = atoi(yytext);
            if (num > largest)
                largest = num;
            if (num < smallest)
                smallest = num;
        }
[\n\t ]+  ;  // Ignore whitespace including newlines, tabs, spaces

.       ;  // Ignore any other characters
%%

int main() {
    printf("Enter numbers separated by space (Ctrl+D or Ctrl+Z to end input):\n");
    yylex();
    printf("Largest element: %d\n", largest);
    printf("Smallest element: %d\n", smallest);
    return 0;
}

int yywrap() {
    return 1;
}
```

Output:



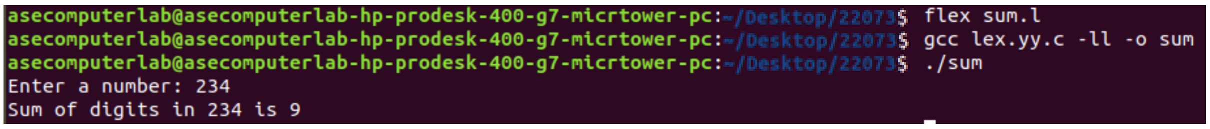
```
asecomputerlab@asecomputerlab-hp-prodesk-400-g7-micrtower-pc:~/Desktop/22073$ flex ls.l
asecomputerlab@asecomputerlab-hp-prodesk-400-g7-micrtower-pc:~/Desktop/22073$ gcc lex.yy.c -ll -o ls
asecomputerlab@asecomputerlab-hp-prodesk-400-g7-micrtower-pc:~/Desktop/22073$ ./ls
Enter numbers separated by space (Ctrl+D or Ctrl+Z to end input):
12 7 8 100 92 78 26
Largest element: 100
Smallest element: 7
```

5.Title: Write a program to find the sum of digits of a given number.

Code:

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

%%
[0-9]+ {
            int sum = 0;
            char *p = yytext;
            while (*p) {
                sum += (*p - '0');  // convert char digit to int and add
                p++;
            }
            printf("Sum of digits in %s is %d\n", yytext, sum);
            return 0;  // stop after processing one number
        }
\n     ;  // ignore newlines
.      ;  // ignore other characters
%%

int main() {
    printf("Enter a number: ");
    yylex();
    return 0;
}

int yywrap() {
    return 1;
}
```

Output:



```
asecomputerlab@asecomputerlab-hp-prodesk-400-g7-micrtower-pc:~/Desktop/22073$ flex sum.l
asecomputerlab@asecomputerlab-hp-prodesk-400-g7-micrtower-pc:~/Desktop/22073$ gcc lex.yy.c -ll -o sum
asecomputerlab@asecomputerlab-hp-prodesk-400-g7-micrtower-pc:~/Desktop/22073$ ./sum
Enter a number: 234
Sum of digits in 234 is 9
```