# **Programming & Data Structure Laboratory (CS112)**

Lab Exercise 09 Indian Institute of Technology, Patna June 16, 2022

## Submission Deadline: 5:00 pm 16/06/2022

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### Instructions:

- Proper indentation is mandatory.
- You should comment the statements whenever necessary, to make the code understandable.
- Answers files: 9\_1.c, 9\_1\_out.txt, 9\_2.c, 9\_2\_out.txt

#### Total Marks: 50

**Q1 [30]:** This problem deals with pattern matching in strings. Let P, Q, R be given strings. We plan to find the pattern Q\*R in P. Here \* stands for any substring. So the pattern Q\*R means the occurrence of the string Q followed by any string (possibly empty) followed in turn by the string R. As an example, consider the following strings:

```
P = "Dashing through the snow on a one-horse open sleigh"
Q = "now on a one"
R = "pen"
```

The pattern Q\*R exists in P:

On the other hand, search fails with P and Q as above but for the following values of R:

```
R = "Jingle" (R is not at all a substring of P)
R = "rough" (R comes earlier than Q in P)
R = "on" (No occurrence of R strictly after the only occurrence of Q in P)
```

Write a program that does the following:

- Read three strings P, Q and R.
- Report if the pattern Q\*R is present in P.
- If the search is successful, also report the start index of a match.

Do not use any built in string function except strlen(). Use static character arrays to store the strings P, Q, R. A function that returns the index of the leftmost match of a string T in a string S may be helpful for your program. Note that the word *substring* precludes the possibility of gaps in the matching. For example, horses and tough are not substrings of P in the above example.

Report the output of your program in the output file named "9\_1\_out.txt" for the following test cases:

P = "What fun it is to ride and sing a sleighing song tonight"

a)	R =	"song"	Q = "fun and sing"
b)	R =	"e and s"	Q = "it is to rid"
C)	R =		Q = "night"
d)	R =	"tonight"	Q = ""
e)	R =	"it is"	Q = "to ride and sing"
f)	R =	"hi"	Q = "sleighing"
g)	R =	"g"	Q = "g"

#### Sample output format:

P = Some text

Q = Some text

R = Some text

The pattern  $\mathsf{Q}^*\mathsf{R}$  is not found in  $\mathsf{P}$ 

P = Some text

Q = Some text

R = Some text

The pattern  $Q^*R$  is found in P at idx 5

P = Some text

Q = Some text

R = Some text The pattern Q\*R is found in P at idx 11

Q2 [20]: Solve the above problem using dynamic arrays with same test cases and report the output of your program in the output file named "9\_2\_out.txt".