

## Assignment 4 (Pattern Matching and Profiling)

**Duration: 3 weeks**

This assignment has two problems from two different domains. For the first problem, students will have to implement pattern matching using python. The second problem includes study of code profiling basics and demonstration of profiling with gprof profiler.

### **Problem 1: Pattern matching with regular expression with python (5 Marks)**

Write a Python program that accepts a credit card number, PAN number, and a password from the user and validates it using regular expressions. You may refer to the provided document – '*Pattern matching with python.pdf*' to understand how to perform pattern matching with regular expressions. Make sure your program checks for below validations. **(Students are advised not to experiment and share with their original credit card or PAN numbers)**

Validations for **credit card number**- (Example- 1234-5678-9876-4324)

1. It should begin with a **number** and end with a **number** (not with letter/symbol).
2. It should contain '-' symbol after each 4 digits.
3. The total length of the entered digits **must not exceed 16 digits**.

Validations for **PAN number**- (Example- ABCTY1234D)

1. It should begin with a **letter** followed by exact 4 subsequent letters.
2. After 5 letters, it should accept **4 numbers**.
3. The PAN number **must end with the letter**.
4. All letters must be in **uppercase**.
5. The total length of the input (letters/symbols) must not exceed **10 alphanumeric** inputs.

Validations for **password**-

1. It should begin with **single** letter followed by exactly **three or four** uppercase/lowercase letters.
2. After the letters, it should only accept any **one** of these special symbols – '@', '\$', '\_', '#', '!', '%', '.'.
3. After the special symbol, it should accept exactly **two or three** digits.

In the explanation video, you will need to discuss your regular expression logic and demonstrate your program execution with at least one valid and one invalid input.

### **Problem 2: Code profiling (5 Marks)**

Study the basics of code profiling and basic profiling methods from the provided document – '*Profilers.pdf*'. In the explanation video, discuss the below mentioned five points.

1. What is code profiling and why is it important?
2. What is the information collected by the profilers?

3. Explain the code profiling methods and their advantages & disadvantages in brief.
4. Explain the basics of 'gprof' and 'perf' profilers and the difference between them.
5. Demonstrate (in short) profiling with 'gprof' for a C program with a couple of function calls (recursive and non-recursive) and loops.

**Note:** The provided document also contains links for understanding and getting started with 'gprof' and 'perf' profilers, students are encouraged to go through those links and study these profilers in detail.