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Subject: Compiler Construction

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**Lab Mid Question 1**

Q: Briefly describe the regex library of C#.

Ans:

**Key Classes in C# Regex Library:**

1. Regex: The primary class in this library, `Regex`, represents a compiled regular expression pattern. It offers methods for pattern matching and replacement.

2. Match: The `Match` class represents a single occurrence of a regular expression pattern in an input string. It provides details about the matched text and its position in the string.

3. MatchCollection: This class represents a collection of `Match` objects and is typically returned by methods like `Regex.Matches()`. It is used when you want to find all matches in an input string.

**Basic Operations:**

1. Pattern Matching (Regex.Match): You can use `Regex.Match()` to locate the first instance of a regular expression pattern within an input string. It returns a `Match` object containing information about the first match.

2. Pattern Matching (Regex.Matches): The `Regex.Matches()` method is employed to find all occurrences of a pattern in an input string and returns a `MatchCollection` containing all these matches.

3. Pattern Replacement (Regex.Replace): To substitute all occurrences of a pattern in an input string with a specified replacement string, you can use `Regex.Replace()`.

**Common Regex Elements:**

- Literals: These are characters that match themselves, for example, "abc" matches the exact string "abc."

- Character Classes: Character classes are defined within square brackets, such as `[A-Za-z]`, which matches any uppercase or lowercase letter.

- Quantifiers: Quantifiers specify how many times a character or group should appear. For instance, `\*` matches zero or more times, and `+` matches one or more times.

- Anchors: Symbols like `^` match the start of a line, and `$` matches the end.

- Escape Sequences: Backslashes `\` are used to escape special characters. For example, `\.` matches a literal period, and `\d` matches a digit.

**Example Usage:**

In the provided code example, we utilize a regex pattern to locate an email address and another pattern to replace phone numbers within an input string. The tasks are accomplished using the `Regex.Match` and `Regex.Replace` methods. Regular expressions are a versatile tool for text processing, and a grasp of their syntax and application is vital for tasks involving pattern matching and manipulation of textual data in C#.