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**Course Title**

Compiler Construction

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**Question No 1:**

**Briefly describe the regex library of C#**

**Overview of Regular Expressions Library in C#**

**Introduction:**

Regular expressions (regex) are a powerful tool for pattern matching and text manipulation. In C#, the **System.Text.RegularExpressions** namespace provides a comprehensive library for working with regular expressions. This document presents an overview of its features and functionalities.

**1. Pattern Matching:**

Regular expressions allow defining patterns to match text within strings.

**2. Regex Class:**

The **Regex** class is central to the library, offering methods for compiling regex patterns into **Regex** objects and performing various operations like matching, replacing, and splitting strings.

**3. Match and MatchCollection:**

When a regex is applied to a string, it returns a **Match** object representing the first match found. Multiple matches can be retrieved using the **Matches** method, which returns a **MatchCollection**.

**4. Groups and Capturing Groups:**

Regex matches are organized into groups, and capturing groups allow extraction of specific parts of the matched text.

**5. Options:**

The library supports options that affect regex behavior, such as case sensitivity, single-line mode, and explicit capture.

**6. Replacement:**

Methods are available for replacing matched substrings with new strings based on regex patterns.

**7. Anchors and Quantifiers:**

Use anchors (**^**, **$**) to specify the start and end of a line or string, and quantifiers (**\***, **+**, **?**, **{}**) to specify repetition of characters or groups.

**8. Character Classes and Escapes:**

Support for character classes (**[...]**) for specifying sets of characters, as well as escape sequences (**\d**, **\w**, **\s**) for common character types.

**9. Lookahead and Lookbehind:**

Advanced features include lookahead (**(?=...)**, **(?!...)**) and lookbehind (**(?<=...)**, **(?<!...)**) for more complex matching conditions.

**Conclusion:**

The **System.Text.RegularExpressions** namespace in C# provides comprehensive support for working with regular expressions, making it invaluable for tasks like text parsing, validation, and transformation.