**COMPILER CONSTRUCTION**

**(Summary of C-Sharp & REGEX)**

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**C#:**

**C#**(Also pronounced as C sharp) is an object oriented programming language developed by Microsoft, designed to run on the .NET Framework. First released in 2002, it has evolved into most popular programming languages , with globally latest version being C# 12.0 released in November 2023.

As it is derived from family of languages and shares many similarities with C++ and Java.

**USES OF C#:**

C# is a highly versatile and widely used in various software development fields, including but not limited to:

* **Mobile Applications**

It is used for cross platform development, particularly with Xamarin, which allows developers to build Ios, Android, Windows App using a Single Code Database.

* **Desktop Applications**

It enables the creation of robust and Secure Windows Applications.

* **Web Applications**

C# is extensively used in Conjunction with ASP.NET for building dynamic, scalable web applications and Websites.

* **Web Services**

It also allows for the development of Web Services and API’s that can communicate across platforms.

* **Games and VR**

Unity, one of the most popular game engines, uses C# as its primary scripting language making C# crucial for game and virtual Reality (VR) development.

* **Database Applications**

C# is often being used for developing data driven applications due to its seamless integration with databases like SQL Server.

**WHY WE USING C#:**

1. C# is one of the most widely used programming language across various industries particularly for enterprise level applications
2. C# has a large active community that provides extensive resources such as documentation, libraries, frameworks, and tools ensuring a strong ecosystem.
3. As C# is object oriented language, it encourages modular and reusable code. This leads to more organized code structures, which in turn reduce development costs by improving code maintainability and scalability.

**Features of C#**

1. C# supports OOP Principles like Inheritance, encapsulation, and Polymorphism providing a clear program structure and makes the code more reusable and modular
2. The .NET Framework provides automatic memory management, reducing the risk of memory leaks by garbage collection.
3. C# enforces type safety and minimizes the errors that may arise from improper type handling.
4. C# can also work with other languages in .NET ecosystem, such as Visual Basic.

**REGEX:**

Regular expressions are the patterns used to match the character combinations in the string. They allow searching, validating, extracting, replacing parts of text. In C# regex is a part of System.Text.RegularExpressions namespace.

COMPONENTS OF REGEX:

1. Literal characters(e.g a,b,c)
2. Meta Characters
3. Character classes

C# REGEX SYNTAX:

**Anchors**

* ^ asserts the position at the START of a string.
* $ asserts the position at the END of a string.
* \b matches a word boundary.

**Quantifiers**

* \* matches ZERO OR MORE occurrences of the preceding character.
* + matches ONE OR MORE occurrences.
* ? matches ZERO OR MORE occurrence.
* {n} matches exactly N occurences.
* {n,} matches N OR MORE occurrences.
* {n,m} matches between N AND M occurences.