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LAB MID

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Submitted To

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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.

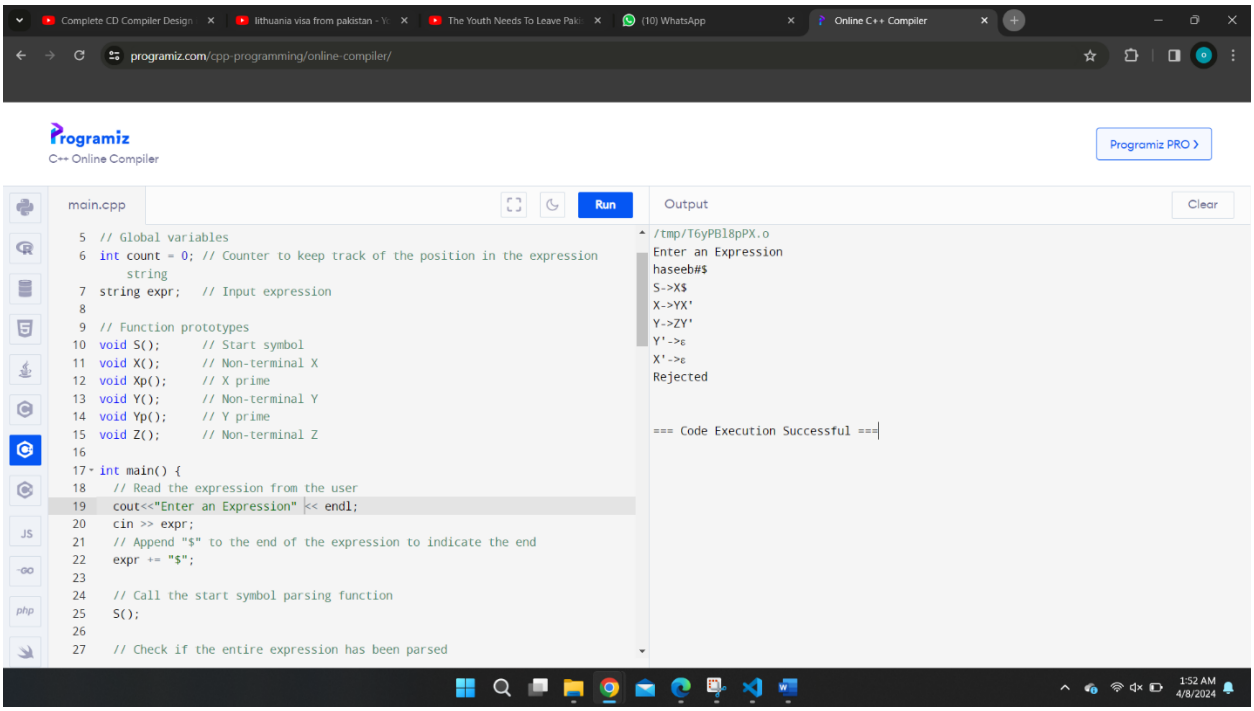
Question No 2:

```
#include <iostream>
#include <stdlib.h>
using namespace std;

// Global variables
int count = 0; // Counter to keep track of the position in the expression string
string expr;   // Input expression

// Function prototypes
void S();      // Start symbol
void X();      // Non-terminal X
void Xp();     // X prime
void Y();      // Non-terminal Y
void Yp();     // Y prime
void Z();      // Non-terminal Z

int main() {
  // Read the expression from the user
  cin >> expr;
  // Append "$" to the end of the expression to indicate the end
  expr += "$";

  // Call the start symbol parsing function
  S();
```

```
  // Check if the entire expression has been parsed
  if (expr.length() == count) {
    cout << "Accepted" << endl;
  } else {
    cout << "Rejected" << endl;
  }

  cin.get(); // Wait for a character input
}

// Parse S
void S() {
  cout << "S->X$" << endl;
  X();
  if (expr[count] == '$') {
    count++;
  } else {
    cout << "Rejected" << endl;
    exit(0);
  }
}

// Parse X
void X() {
  cout << "X->YX'" << endl;
  Y();
  Xp();
}

// Parse X prime
void Xp() {
  if (expr[count] == '%') {
    count++;
    cout << "X'->%YX'" << endl;
    Y();
    Xp();
  } else {
    cout << "X'->ε" << endl;
  }
}

// Parse Y
void Y() {
  cout << "Y->ZY'" << endl;
```

```
  Z();
  Yp();
}

// Parse Y prime
void Yp() {
  if (expr[count] == '&') {
    count++;
    cout << "Y'->&ZY'" << endl;
    Z();
    Yp();
  } else {
    cout << "Y'->ε" << endl;
  }
}

// Parse Z
void Z() {
  if (expr[count] == 'k') {
    count++;
    cout << "Z->kXk" << endl;
    X();
    if (expr[count] == 'k') {
      count++;
    } else {
      cout << "Rejected" << endl;
      exit(0);
    }
  } else if (expr[count] == 'g') {
    count++;
    cout << "Z->g" << endl;
    return;
  }
}
```

OUTPUT:



Question No 3:

```
using System;
using System.Linq;
using System.Text;

class Program
{
    static void Main(string[] args)
    {
        Console.WriteLine("Welcome to the Password Generator!");
        Console.WriteLine("Please enter your first name:");
        string firstName = Console.ReadLine();

        Console.WriteLine("Please enter your last name:");
        string lastName = Console.ReadLine();

        Console.WriteLine("Please enter your registration numbers:");
        string registrationNumbers = Console.ReadLine();
```

```
        string password = GeneratePassword(firstName, lastName,
registrationNumbers);
        Console.WriteLine("Generated Password: " + password);
    }

    static string GeneratePassword(string firstName, string lastName, string
registrationNumbers)
    {
        StringBuilder password = new StringBuilder();

        password.Append(char.ToUpper(firstName[0]));
        password.Append(char.ToUpper(lastName[0]));

        for (int i = 0; i < firstName.Length; i++)
        {
            if (i % 2 == 0)
                password.Append(firstName[i]);
        }

        for (int i = 0; i < lastName.Length; i++)
        {
            if (i % 2 != 0)
                password.Append(lastName[i]);
        }

        password.Append((char)('A' + new Random().Next(0, 26)));

        var selectedNumbers = registrationNumbers.Where(char.IsDigit).OrderBy(n
=> Guid.NewGuid()).Take(2);
        foreach (var number in selectedNumbers)
        {
            password.Append(number);
        }

        for (int i = 0; i < 2; i++)
        {
            password.Append(new Random().Next(0, 10));
        }

        string specialChars = "!@#$%^&*()_+-=[]{}|;:,.<>?";
        for (int i = 0; i < 2; i++)
        {
            password.Append(specialChars[new Random().Next(0,
specialChars.Length)]);
        }
```

```
        string shuffledPassword = new string(password.ToString().OrderBy(x =>
Guid.NewGuid()).ToArray());

        if (shuffledPassword.Length > 16)
        {
            shuffledPassword = shuffledPassword.Substring(0, 16);
        }

        return shuffledPassword;
    }
}
```

OUTPUT: