In [2]:

```
# Number of vertices in the graph
V = 4

# Convert adjacency matrix to adjacency list (dictionary)
graph = {
    0: [1, 2],  # Vertex 0 is connected to 1 and 2
    1: [0, 2, 3],  # Vertex 1 is connected to 0, 2, and 3
    2: [0, 1, 3],  # Vertex 2 is connected to 0, 1, and 3
    3: [1, 2]   # Vertex 3 is connected to 1 and 2
}

# List of available color names
colornames = ["Red", "Green", "Blue"]

# Function to check if the current color assignment is valid for vertex
def isSafe(vertex, colorsassigned, currentcolor):
    for neighbor in graph[vertex]:
        # Check if the neighbor has the same color
        if colorsassigned[neighbor] == currentcolor:
            return False
    return True

# Recursive function to solve the graph coloring problem
def graphColoring(colorsavailable, colorsassigned, vertex):
    # Base case: If all vertices are colored, return True
    if vertex == V:
        return True

    # Try assigning each color from the list of color names to the current vertex
    for color in colorsavailable:
        # Check if it's safe to assign this color to the current vertex
        if isSafe(vertex, colorsassigned, color):
            # Assign the color
            colorsassigned[vertex] = color

            # Recursively try to color the rest of the graph
            if graphColoring(colorsavailable, colorsassigned, vertex + 1):
                return True

            # If assigning color doesn't lead to a solution, backtrack
            colorsassigned[vertex] = None

    # If no valid color assignment is found, return False
    return False

# Main function to solve the problem
def solveGraphColoring():
    # Initialize all vertices as uncolored (None means no color assigned)
    colorsassigned = [None] * V

    # Start coloring from vertex 0
    if not graphColoring(colornames, colorsassigned, 0):
        print("No solution exists.")
    else:
        print("Assigned colors:", colorsassigned)

# Call the function to solve the graph coloring problem
solveGraphColoring()
```

```
Assigned colors: ['Red', 'Green', 'Blue', 'Red']
```

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