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Lab Report

Title	Marks
Course Code: CSE-342 **Course Title**: Computer Graphics **Lab no**: 04	

Submitted By	Submitted To
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Submission Date

Teacher's Signature

1. **Title**: Drawing a National Flag Using Python Turtle Graphics

2. **Objective**:

To understand the basics of Python's Turtle graphics module by designing and drawing a national flag through coding. This lab focuses on learning geometric shapes, color filling, and positioning using Turtle.

3. **Environment**:

- Operating System: Windows
- Programming Language: Python
- Editor: Visual Studio Code
- Graphics Library: PythonTurtle
- Hardware: Standard computer system with basic graphics capabilities

4. **Introduction**:

Python's Turtle module provides a simple way to create graphics and drawings using a virtual "turtle" that moves on the screen. It is widely used for beginner-level programming to understand loops, functions, and basic graphics handling.
In this lab, we aim to draw a national flag using Turtle. For example, we can draw the **Bangladesh flag**, which consists of a green rectangle with a red circle in the middle. Through this activity, students will learn coordinate positioning, color management, and shape drawing in Turtle graphics.

5. **Algorithm**:

Import the Turtle module to access drawing functions.

1. **Create a screen** and set its background color if needed.
2. **Initialize the turtle** and set its speed and pen size.
3. **Draw the green rectangle** to represent the flag background:
    - Move the turtle to the starting position.
    - Draw a filled rectangle with green color.
4. **Draw the red circle** at the center:
    - Move the turtle to the circle's starting position.
    - Draw a filled circle with red color.
5. **Display the flag** and stop the window from closing immediately.
6. **End the program.**

6. **Code**:

```
import turtle

# Function to draw the rectangle (Flag Background)
def draw_rectangle(t, x, y, width, height, color):
    t.penup()
    t.goto(x, y)
    t.pendown()
    t.fillcolor(color)
    t.begin_fill()
    for _ in range(2):
        t.forward(width)
        t.left(90)
        t.forward(height)
        t.left(90)
    t.end_fill()

# Function to draw the circle
def draw_circle(t, x, y, radius, color):
    t.penup()
    t.goto(x, y)
    t.pendown()
    t.fillcolor(color)
    t.begin_fill()
    t.circle(radius)
    t.end_fill()

# Function to draw stripe flags
def draw_stripes(t, x, y, width, height, colors):
    stripe_width = width / len(colors)
    for i, color in enumerate(colors):
        draw_rectangle(t, x + i * stripe_width, y, stripe_width, height, color)

# Create screen and turtle
screen = turtle.Screen()
screen.setup(width=1000, height=800)
flag_turtle = turtle.Turtle()
flag_turtle.speed(10)

# Draw Bangladesh Flag
def draw_bangladesh_flag(x, y):
    draw_rectangle(flag_turtle, x, y, 250, 150, "green")
    draw_circle(flag_turtle, x + 110, y + 20, 50, "red")

# Draw Japan Flag
def draw_japan_flag(x, y):
    draw_rectangle(flag_turtle, x, y, 250, 150, "white")
    draw_circle(flag_turtle, x + 120, y + 20, 50, "red")

# Draw Germany Flag
def draw_germany_flag(x, y):
    stripe_height = 50
    draw_rectangle(flag_turtle, x, y, 250, stripe_height, "black")
    draw_rectangle(flag_turtle, x, y - stripe_height, 250, stripe_height, "red")
    draw_rectangle(flag_turtle, x, y - 2 * stripe_height, 250, stripe_height, "yellow")
```

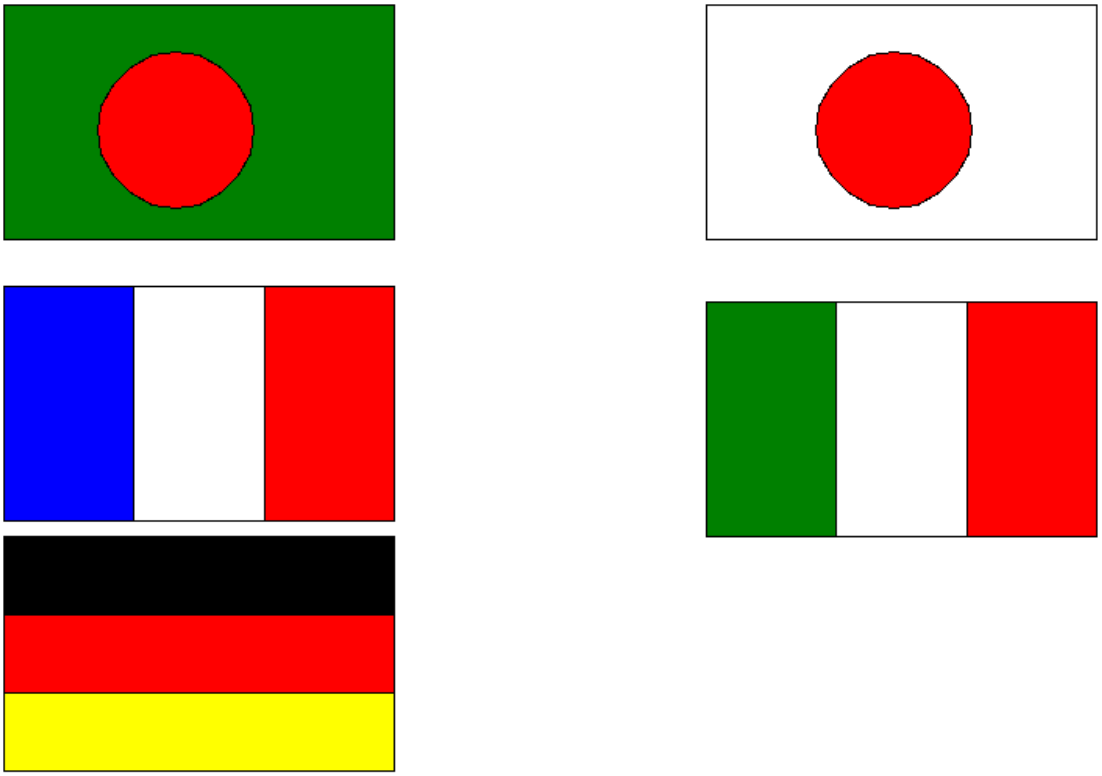
```
# Draw France Flag (vertical stripes)
def draw_france_flag(x, y):
    draw_stripes(flag_turtle, x, y, 250, 150, ["blue", "white", "red"])

# Draw Italy Flag (vertical stripes)
def draw_italy_flag(x, y):
    draw_stripes(flag_turtle, x, y, 250, 150, ["green", "white", "red"])

# Drawing all flags on the screen
draw_bangladesh_flag(-450, 90)
draw_japan_flag(0, 90)
draw_germany_flag(-450, -150)
draw_france_flag(-450, -90)
draw_italy_flag(0, -100)

flag_turtle.hideturtle()
turtle.done()
```

7.**Snapshot(Input & Output)**:



8. **Discussion & conclusion**:

The lab successfully demonstrated how Python's Turtle graphics can be used to draw simple to complex designs, such as a national flag. By completing this lab, we improved our skills in:

- Basic graphics programming.
- Managing coordinates and shapes.
- Applying logic for drawing patterns and objects.

This activity reinforced programming logic and visual problem-solving, which are essential in graphical user interface (GUI) design and game development.