



МІНІСТЕРСТВО ОСВІТИ І НАУКИ УКРАЇНИ
НАЦІОНАЛЬНИЙ ТЕХНІЧНИЙ УНІВЕРСИТЕТ УКРАЇНИ
“КИЇВСЬКИЙ ПОЛІТЕХНІЧНИЙ ІНСТИТУТ
імені ІГОРЯ СІКОРСЬКОГО”

Факультет прикладної математики
Кафедра програмного забезпечення комп’ютерних систем

Лабораторна робота № 2

з дисципліни “Математичні та алгоритмічні основи комп’ютерної графіки”

варіант № 4

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Зарахована

“ _____ ” “ _____ ” 20__ р.
викладачем

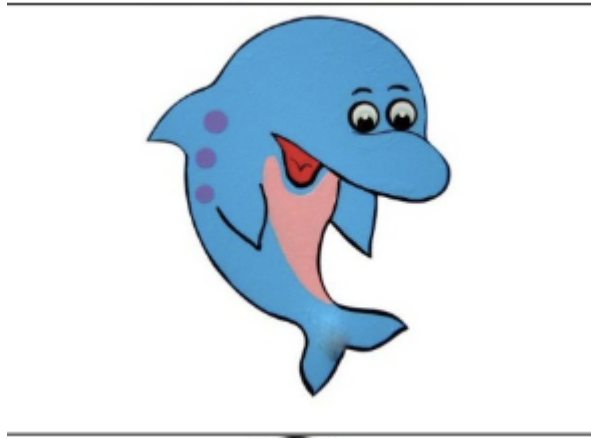
Шкурат Оксаною Сергіївною *(прізвище, ім'я, по батькові)*

Київ 2021

Варіант завдання

Завдання: За допомогою примітивів JavaFX максимально реально зобразити персонажа за варіантом та виконати його 2D анімацію. Для анімації скористатися стандартними засобами бібліотеки JavaFX.

Варіант:



Лістинг коду програми

```
// package sample;

import javafx.animation.*;
import javafx.application.Application;
import javafx.scene.Group;
import javafx.scene.Scene;
import javafx.scene.paint.Color;
import javafx.scene.shape.*;
import javafx.stage.Stage;
import javafx.util.Duration;

public class Main extends Application {
    public static void main(String args[]) {
        launch(args);
    }

    @Override
    public void start(Stage primaryStage) {
        Group root = new Group();
        Scene scene = new Scene(root, 1200, 600);

        // dolphin body

        Path path = new Path();
        MoveTo moveTo = new MoveTo();
        moveTo.setX(135.0f);
        moveTo.setY(80.0f);

        QuadCurveTo quadTo = new QuadCurveTo();
        quadTo.setControlX(200.0f);
        quadTo.setControlY(0.0f);
        quadTo.setX(260.0f);
        quadTo.setY(80.0f);

        LineTo line1 = new LineTo();
        line1.setY(100.0f);
        line1.setX(265.0f);

        QuadCurveTo quadNose = new QuadCurveTo();
        quadNose.setControlX(315.0f);
        quadNose.setControlY(145.0f);
        quadNose.setX(251.0f);
```

```
quadNose.setY(145.0f);

LineTo line2 = new LineTo();
line2.setX(245.0f);
line2.setY(180.0f);

LineTo line3 = new LineTo();
line3.setX(225.0f);
line3.setY(163.0f);

QuadCurveTo quad3 = new QuadCurveTo();
quad3.setControlX(210.0f);
quad3.setControlY(190.0f);
quad3.setX(225.0f);
quad3.setY(210.0f);

LineTo line4 = new LineTo();
line4.setX(255.0f);
line4.setY(230.0f);

QuadCurveTo quad4 = new QuadCurveTo();
quad4.setControlX(241.0f);
quad4.setControlY(250.0f);
quad4.setX(220.0f);
quad4.setY(240.0f);

LineTo line5 = new LineTo();
line5.setX(205.0f);
line5.setY(266.0f);

QuadCurveTo quad5 = new QuadCurveTo();
quad5.setControlX(180.0f);
quad5.setControlY(250.0f);
quad5.setX(190.0f);
quad5.setY(228.0f);

LineTo line6 = new LineTo();
line6.setX(190.0f);
line6.setY(216.0f);

QuadCurveTo quad6 = new QuadCurveTo();
quad6.setControlX(145.0f);
quad6.setControlY(200.0f);
quad6.setX(129.0f);
quad6.setY(124.0f);

LineTo line7 = new LineTo();
line7.setX(104.0f);
line7.setY(109.0f);

QuadCurveTo quad7 = new QuadCurveTo();
quad7.setControlX(110.0f);
quad7.setControlY(90.0f);
quad7.setX(135.0f);
quad7.setY(80.0f);

path.getElements().add(moveTo);
path.getElements().add(quadTo);
path.getElements().add(line1);
path.getElements().add(quadNose);
path.getElements().add(line2);
path.getElements().add(line3);
```

```

path.getElements().add(quad3);
path.getElements().add(line4);
path.getElements().add(quad4);
path.getElements().add(line5);
path.getElements().add(quad5);
path.getElements().add(line6);
path.getElements().add(quad6);
path.getElements().add(line7);
path.getElements().add(quad7);

path.setFill(Color.rgb(48, 162, 215));
path.setStrokeWidth(2.0f);

root.getChildren().add(path);

//dolphin chest

Path chest = new Path();
MoveTo moveTo1 = new MoveTo();
moveTo1.setX(194.0f);
moveTo1.setY(130.0f);

QuadCurveTo quadChest1 = new QuadCurveTo();
quadChest1.setControlX(210.0f);
quadChest1.setControlY(178.0f);
quadChest1.setX(230.0f);
quadChest1.setY(136.0f);

QuadCurveTo quadChest2 = new QuadCurveTo();
quadChest2.setControlX(231.0f);
quadChest2.setControlY(140.0f);
quadChest2.setX(225.0f);
quadChest2.setY(163.0f);

QuadCurveTo quadChest3 = new QuadCurveTo();
quadChest3.setControlX(210.0f);
quadChest3.setControlY(190.0f);
quadChest3.setX(225.0f);
quadChest3.setY(210.0f);

QuadCurveTo quadChest4 = new QuadCurveTo();
quadChest4.setControlX(195.0f);
quadChest4.setControlY(190.0f);
quadChest4.setX(194.0f);
quadChest4.setY(130.0f);

chest.getElements().add(moveTo1);
chest.getElements().add(quadChest1);
chest.getElements().add(quadChest2);
chest.getElements().add(quadChest3);
chest.getElements().add(quadChest4);

chest.setFill(Color.rgb(232, 147, 150));

root.getChildren().add(chest);

Circle circle1 = new Circle();
circle1.setCenterX(155.0f);
circle1.setCenterY(100.0f);
circle1.setRadius(8.0f);
circle1.setFill(Color.rgb(105, 105, 178));
root.getChildren().add(circle1);

```

```

Circle circle2 = new Circle();
circle2.setCenterX(150.0f);
circle2.setCenterY(125.0f);
circle2.setRadius(7.0f);
circle2.setFill(Color.rgb(105,105,178));
root.getChildren().add(circle2);

Circle circle3 = new Circle();
circle3.setCenterX(150.0f);
circle3.setCenterY(150.0f);
circle3.setRadius(6.0f);
circle3.setFill(Color.rgb(105,105,178));
root.getChildren().add(circle3);

Polyline polyhand = new Polyline();
polyhand.getPoints().addAll(164.0, 160.0,
    183.0, 180.0,
    185.0, 166.0,
    188.0, 160.0,
    189.0, 156.0,
    189.0, 154.0,
    189.0, 153.0,
    188.0, 150.0);
polyhand.setStrokeWidth(2.0);
root.getChildren().add(polyhand);

QuadCurve quadUnderEye = new QuadCurve();
quadUnderEye.setStartX(265.0f);
quadUnderEye.setStartY(100.0f);
quadUnderEye.setEndX(225.0f);
quadUnderEye.setEndY(100.0f);
quadUnderEye.setControlX(244.0f);
quadUnderEye.setControlY(94.0f);
quadUnderEye.setFill(Color.rgb(48, 162, 215));
quadUnderEye.setStroke(Color.BLACK);
quadUnderEye.setStrokeWidth(1.0);

root.getChildren().add(quadUnderEye);

Circle circleEyel = new Circle();
circleEyel.setCenterX(225.0f);
circleEyel.setCenterY(90.0f);
circleEyel.setRadius(8.0f);
circleEyel.setFill(Color.WHITE);
circleEyel.setStroke(Color.BLACK);
circleEyel.setStrokeWidth(1.5);
root.getChildren().add(circleEyel);

Circle circleInner1 = new Circle();
circleInner1.setCenterX(226.0f);
circleInner1.setCenterY(93.0f);
circleInner1.setRadius(4.0f);
circleInner1.setFill(Color.BLACK);
circleInner1.setStroke(Color.BLACK);
circleInner1.setStrokeWidth(1.0);
root.getChildren().add(circleInner1);

Circle circleEye2 = new Circle();
circleEye2.setCenterX(245.0f);
circleEye2.setCenterY(87.0f);
circleEye2.setRadius(8.0f);

```

```

circleEye2.setFill(Color.WHITE);
circleEye2.setStroke(Color.BLACK);
circleEye2.setStrokeWidth(1.5);
root.getChildren().add(circleEye2);

Circle circleInner2 = new Circle();
circleInner2.setCenterX(246.0f);
circleInner2.setCenterY(90.0f);
circleInner2.setRadius(4.0f);
circleInner2.setFill(Color.BLACK);
circleInner2.setStroke(Color.BLACK);
circleInner2.setStrokeWidth(1.0);
root.getChildren().add(circleInner2);

QuadCurve quadMouth = new QuadCurve();
quadMouth.setStartX(194.0f);
quadMouth.setStartY(110.0f);
quadMouth.setEndX(224.0f);
quadMouth.setEndY(135.0f);
quadMouth.setControlX(210.0f);
quadMouth.setControlY(168.0f);
quadMouth.setFill(Color.rgb(201, 36, 35));
quadMouth.setStroke(Color.BLACK);
quadMouth.setStrokeWidth(1.5);
root.getChildren().add(quadMouth);

QuadCurve quadBelow = new QuadCurve();
quadBelow.setStartX(251.0f);
quadBelow.setStartY(145.0f);
quadBelow.setEndX(194.0f);
quadBelow.setEndY(110.0f);
quadBelow.setControlX(210.0f);
quadBelow.setControlY(134.0f);
quadBelow.setFill(Color.rgb(48, 162, 215));
quadBelow.setStroke(Color.BLACK);
quadBelow.setStrokeWidth(1.0);
root.getChildren().add(quadBelow);

QuadCurve leftEyebrow = new QuadCurve();
leftEyebrow.setStartX(218.0f);
leftEyebrow.setStartY(80.0f);
leftEyebrow.setEndX(230.0f);
leftEyebrow.setEndY(80.0f);
leftEyebrow.setControlX(224.0f);
leftEyebrow.setControlY(75.0f);
leftEyebrow.setFill(Color.rgb(48, 162, 215));
leftEyebrow.setStroke(Color.BLACK);
leftEyebrow.setStrokeWidth(1.5);
root.getChildren().add(leftEyebrow);

QuadCurve rightEyebrow = new QuadCurve();
rightEyebrow.setStartX(238.0f);
rightEyebrow.setStartY(78.0f);
rightEyebrow.setEndX(249.0f);
rightEyebrow.setEndY(76.0f);
rightEyebrow.setControlX(242.0f);
rightEyebrow.setControlY(73.0f);
rightEyebrow.setFill(Color.rgb(48, 162, 215));
rightEyebrow.setStroke(Color.BLACK);
rightEyebrow.setStrokeWidth(1.5);
root.getChildren().add(rightEyebrow);

```

```

        // Animation
        int cycleCount = 2; //
        int time = 4000;

        ScaleTransition scaleTransition = new
ScaleTransition(Duration.millis(time), root);
        scaleTransition.setToX(2);
        scaleTransition.setToY(2);
        scaleTransition.setCycleCount(cycleCount);
        scaleTransition.setAutoReverse(true);

        TranslateTransition translateTransition = new
TranslateTransition(Duration.millis(time), root);
        translateTransition.setFromX(50);
        translateTransition.setToX(750);
        translateTransition.setCycleCount(cycleCount+2);
        translateTransition.setAutoReverse(true);

        RotateTransition rotateTransition = new
RotateTransition(Duration.millis(time), root);
        rotateTransition.setByAngle(180f);
        rotateTransition.setCycleCount(cycleCount);
        rotateTransition.setAutoReverse(true);

        ScaleTransition scaleTransition2 = new
ScaleTransition(Duration.millis(time), root);
        scaleTransition2.setToX(0.5);
        scaleTransition2.setToY(0.5);
        scaleTransition2.setCycleCount(cycleCount);
        scaleTransition2.setAutoReverse(true);

        ParallelTransition parallelTransition = new ParallelTransition();
        parallelTransition.getChildren().addAll(
            translateTransition,
            scaleTransition,
            rotateTransition,
            scaleTransition2
        );

        parallelTransition.setCycleCount(Timeline.INDEFINITE);
        parallelTransition.play();

        primaryStage.setTitle("Lab3");
        primaryStage.setScene(scene);
        primaryStage.show();
    }
}

```

Результат

