



University of  
St Andrews

**CS4102: Computer Graphics**  
**Practical 1: Graphics**

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The programme fulfils all the basic requirements.

## Run Program

```
cd /pathToProject/CS4102-p1/src  
javac *.java  
java Main
```

## Functionality

- Users are able to specify the order of Bezier curve.
- Users could select a series of control points by clicking on the drawing area of the main application window.
- The application could draw the Bezier curve by the control points
- The sampling points on the curve will be shown by the number of sample points that user enters
- Users could switch on or off the display of tangent and curvature vectors at the sampling points.

## Architecture

The program has a Model-Delegate(MD) architecture. This is for making the model independent from the user interface and therefore reusable.

Furthermore, in a MD architecture, updates in the UI can be made without the risk of influencing the model functionality and it is easier than Model-View-Controller (MVC) architecture.

## BezierCurve

The class BezierCurve allows to calculate a Bezier curve with different entered control points. The used control points ( $\leq 13$ ) are generated by using `fillOval()` to draw points. The class provides a series of operations about drawing sample points, tangent and curvature of sample points as well as clear tangent and curvature of sample points. In addition, every time the sample points, tangent and curvature are generated, I draw the Bezier curve again because the operations of drawing sample points, tangent and curvature are finished during drawing Bezier curve.

## BezierFrame

The class extends the JPanel – class and setup all components of the main frame, including the buttons, the text, the box, mouse listeners and the main canvas of Bezier curve. The class also adds an instance of the BufferedImage – class to itself which serves as the canvas to paint the Bezier curve.

The actionPanel contains clearCanvas – button which used for clearing the canvas and return to an original background, addPoints – button which used for adding control points, drawDash – button which used for drawing the dash line outside the Bezier curve.

The samplePanel contains showSamplePoints – button which show the sample points uniformly, inputNumberofSamplePoitns – lable which allows user to enter the number of control points, showTangent – box which allows user to switch on or off the tangent of sample points, showCurvature – box which allows user to switch on or off the curvature of sample points.

The alertPoints() – method reminds the user to clear the canvas due to the number of control points have to be less than 13.

The alertSample() – method reminds the user to enter the number of sample points in case of the appeared mistakes when click the showSamplePoints – button, showTangent and showCurvature – box.

## Problems

1. The number of control points cannot be scaled while it has to be less than 13.
2. The interactive interface still has some space to improve

## Testing

I have tested the programme. The programme showed the expected behavior.

