```
--------------------GUI.java-------------------------
public class GUI extends JFrame{
  private static final long serialVersionUID = 1L;

  private  class Platno extends JComponent{
    private static final long serialVersionUID = 1L;
    DocumentModel dm;
    boolean shiftDown = false;
    boolean ctrlDown = false;

    public Platno(DocumentModel dm) {
      setFocusable(true);
      this.dm = dm;
      this.dm.addDocumentModelListener(this::repaint);
      keyboardAndMouseListeners();
    }

    private void keyboardAndMouseListeners() {
      addKeyListener(new KeyAdapter() {
        @Override
        public void keyPressed(KeyEvent e) {
          System.out.println("Usao");
          switch (e.getKeyCode()) {
          case KeyEvent.VK_SHIFT -> shiftDown = true;
          case KeyEvent.VK_CONTROL -> ctrlDown = true;
          case KeyEvent.VK_ESCAPE -> changeState(new IdleState());
          }
          currentState.keyPressed(e.getKeyCode());
        }
        @Override
        public void keyReleased(KeyEvent e) {
          switch (e.getKeyCode()) {
          case KeyEvent.VK_SHIFT -> shiftDown = false;
          case KeyEvent.VK_CONTROL -> ctrlDown = false;
          }
        }
      });
      addMouseListener(new MouseAdapter() {
        @Override
        public void mousePressed(MouseEvent e) {
          currentState.mouseDown(new
Point(e.getPoint().x,e.getPoint().y), shiftDown, ctrlDown);
        }

        @Override
        public void mouseReleased(MouseEvent e) {
          currentState.mouseUp(new
Point(e.getPoint().x,e.getPoint().y), shiftDown, ctrlDown);
        }
      });
      addMouseMotionListener(new MouseAdapter() {
        @Override
        public void mouseDragged(MouseEvent e) {
          currentState.mouseDragged(new
Point(e.getPoint().x,e.getPoint().y));
        }
      });

    }

    @Override
    public Dimension getPreferredSize() {
      return new Dimension(500,500);
    }
    @Override
    public void paintComponent(Graphics g) {
      Graphics2D g2d = (Graphics2D)g;
      g2d.setColor(Color.white);
      g2d.fillRect(0, 0, 500, 500);
      Renderer r = new G2DRendererImpl(g2d);
      for(GraphicalObject object : dm.list()) {
        object.render(r);
        currentState.afterDraw(r, object);
      }
      currentState.afterDraw(r);
    }
  }

  List<GraphicalObject> objects;
  DocumentModel dm;
  Platno platno;
  private State currentState;
  private static final Map<String,GraphicalObject> TAGS = new
HashMap<>();
  static {
    GraphicalObject o = new CompositeShape(null);
    TAGS.put(o.getShapeID(), o);
  }

  public GUI(List<GraphicalObject> objects) {
    setDefaultCloseOperation(WindowConstants.DISPOSE_ON_CLOSE);
    setFocusable(false);
    setLocation(20, 20);
    currentState = new IdleState();
    this.objects = objects;
    for (GraphicalObject graphicalObject : objects) {
      TAGS.put(graphicalObject.getShapeID(), graphicalObject);
    }
    dm = new DocumentModel();
    initGUI();
    pack();

  }

  private void initGUI() {
    setLayout(new BorderLayout());
    platno = new Platno(dm);
    add(platno,BorderLayout.CENTER);
    platno.requestFocusInWindow();
    JToolBar t = new JToolBar();
```

```
    t.add(new JButton(createAction("Učitaj", ()->{
      try {
        Myimport();
      } catch (IOException e) {
        e.printStackTrace();
      }
    })));
    t.add(new JButton(createAction("Pohrani", ()->{
      try {
        Myexport();
      } catch (IOException e) {
        e.printStackTrace();
      }
    })));
    t.add(new JButton(createAction("SVG export", ()->{
      try {
        SVGexport();
      } catch (IOException e) {
        e.printStackTrace();
      }
    })));
    for(GraphicalObject obj: objects) {
      t.add(new JButton(createAction(obj.getShapeName(), ()-
>changeState(new AddShapeState(obj, dm)))));
    }
    t.add(new JButton(createAction("Selektiraj", ()->changeState(new
SelectShapeState(dm)))));
    t.add(new JButton(createAction("Brisalo", ()->changeState(new
EraserState(dm)))));
    this.add(t, BorderLayout.PAGE_START);

  }

  private void Myimport() throws IOException {
    Path filePath = getPath();
    byte[] bytes = Files.readAllBytes(filePath);
    String text = new String(bytes, StandardCharsets.UTF_8);
    List<String> rows = new
ArrayList<String>(Arrays.asList(text.split("\n")));
    Stack<GraphicalObject> stog = new Stack<GraphicalObject>();
    try {
      for(String row: rows) {
        row = row.trim();
        String[] parts = row.split(" ",2);
        if(parts.length != 2) throw new
IllegalArgumentException("Nepoznati row");
        GraphicalObject go = TAGS.get(parts[0]);
        if(go == null) throw new IllegalArgumentException("TAG: "+
parts[0] +" nije pronađen.");
        go.load(stog, parts[1]);
      }
    }catch (IllegalArgumentException e) {
      e.printStackTrace();
      return;
    }
    for (GraphicalObject graphicalObject : stog) {
      dm.addGraphicalObject(graphicalObject);
      dm.notifyListeners();
    }

  }

  private void Myexport() throws IOException {
    Path filePath = getPath();
    List<String> output = new ArrayList<String>();
    for(GraphicalObject o: dm.list()) {
      o.save(output);
    }
    byte[] podatci =
output.stream().collect(Collectors.joining("\n")).getBytes(StandardChars
ets.UTF_8);
    Files.write(filePath, podatci);
  }

  private void SVGexport() throws IOException {
    Path filePath = getPath();
    SVGRendererImpl r = new SVGRendererImpl(filePath);
    for(GraphicalObject o: dm.list()) {
      o.render(r);
    }
    r.close();
  }
  private Path getPath() throws IOException  {
    Path filePath = fileChoice(this);
    if(filePath == null) return null;
    if(!Files.exists(filePath)) Files.createFile(filePath);
    if(!Files.isReadable(filePath)) throw new
IllegalArgumentException("Datoteka: " + filePath.toAbsolutePath() + "ne
postoji!");
    return filePath;
  }

  private Action createAction(String name,Runnable onPress) {
    return new AbstractAction(name) {
      private static final long serialVersionUID = 1L;
      @Override
      public void actionPerformed(ActionEvent e) {
        onPress.run();
        platno.requestFocusInWindow();
      }
    };
  }

  private void changeState(State newState) {
    this.currentState.onLeaving();
    this.currentState = newState;
    dm.notifyListeners();
  }
```

```
  private static Path fileChoice(Component parent) {
    JFileChooser fc = new JFileChooser();
    fc.setDialogTitle("Open file");
    if(fc.showOpenDialog(parent)!=JFileChooser.APPROVE_OPTION) {
      return null;
    }
    File fileName = fc.getSelectedFile();
    Path filePath = fileName.toPath();
    return filePath;
  }

  public static void main(String[] args) {
    Runnable r = new Runnable() {

      @Override
      public void run() {
        List<GraphicalObject> objects = new ArrayList<>();

        objects.add(new LineSegment());
        objects.add(new Oval());

        GUI gui = new GUI(objects);
        gui.setVisible(true);
        gui.platno.requestFocusInWindow();

      }
    };
    SwingUtilities.invokeLater(r);
  }
}
```

---------- G2DRendererImpl.java----------

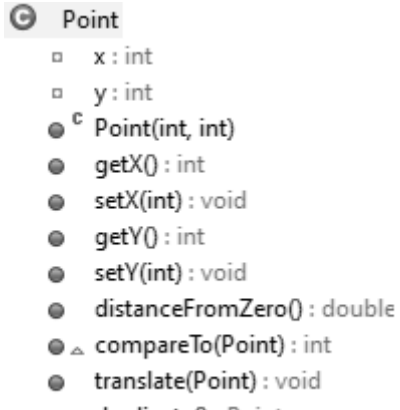
```
public class G2DRendererImpl implements Renderer {

  private Graphics2D g2d;

  public G2DRendererImpl(Graphics2D g2d) {
    this.g2d = g2d;
  }

  @Override
  public void drawLine(Point s, Point e) {
    g2d.setColor(Color.blue);
    g2d.drawLine(s.getX(), s.getY(), e.getX(), e.getY());
  }

  @Override
  public void fillPolygon(Point[] points) {
    int[] xs = Arrays.stream(points).mapToInt(Point::getX).toArray();
    int[] ys = Arrays.stream(points).mapToInt(Point::getY).toArray();
    g2d.setColor(Color.blue);
    g2d.fillPolygon(xs, ys, points.length);
    g2d.setColor(Color.red);
    g2d.drawPolygon(xs, ys, points.length);
  }}
```

---------- GeometryUtil.java----------

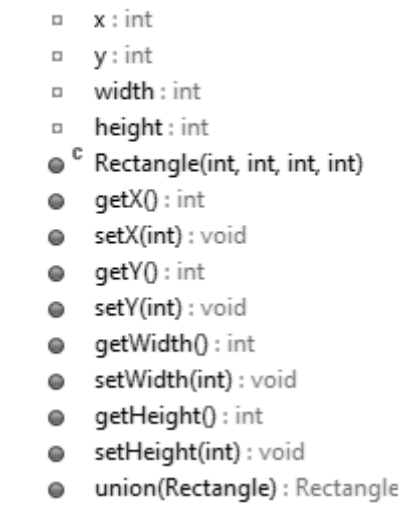
```
public class GeometryUtil {

  public static double distanceFromPoint(Point point1, Point point2) {
    int dx = point1.getX() - point2.getX();
    int dy = point1.getY() - point2.getY();
    return Math.hypot(dx, dy);
  }

  public static double distanceFromLineSegment(Point s, Point e, Point
p) {
    if(s.compareTo(e) > 0) {
      Point t = s;
      s = e;
      e = t;
    }

    if(isBellowOrAboveLine(s, e, p)) {
      return distanceBetweenLineAndPoint(s, e, p);
    }

    return Math.min(distanceFromPoint(s, p), distanceFromPoint(e, p));
  }

  private static boolean isBellowOrAboveLine(Point pointOnLine1, Point
pointOnLine2, Point testPoint) {
    double k = coefficentLine(pointOnLine1, pointOnLine2);
    double kVertical = -1.0 / k;
    return testPoint.getY() > kVertical * (testPoint.getX() -
pointOnLine1.getX()) + pointOnLine1.getY() &&
        testPoint.getY() < kVertical * (testPoint.getX() -
pointOnLine2.getX()) + pointOnLine2.getY();
  }

  private static double coefficentLine(Point pointOnLine1, Point
pointOnLine2) {
    return (pointOnLine2.getY() - pointOnLine1.getY()) * 1.0 /
(pointOnLine2.getX() - pointOnLine1.getX());
  }

  private static double distanceBetweenLineAndPoint(Point pointOnLine1,
Point pointOnLine2, Point point) {
    double k = coefficentLine(pointOnLine1, pointOnLine2);
    if(k == Double.NEGATIVE_INFINITY || k == Double.POSITIVE_INFINITY)
return Math.abs(point.getX() - pointOnLine1.getX());
    if(k ==Double.NaN) return distanceFromPoint(pointOnLine1, point);
    return Math.abs(-k * point.getX() + point.getY() -
pointOnLine1.getY() + k * pointOnLine1.getX()) / Math.sqrt(k*k +1);
  }
  public static double selectinDistance(Point mousePoint, Rectangle
boundingBox) {
    Point A = new Point(boundingBox.getX(),boundingBox.getY());
    Point B = new Point(A.getX(), A.getY() + boundingBox.getHeight());
    Point C = new Point(A.getX() + boundingBox.getWidth(), A.getY() +
boundingBox.getHeight());
```

```
    Point D = new Point(A.getX() + boundingBox.getWidth(), A.getY());
    double AB =  GeometryUtil.distanceFromLineSegment(A, B,
mousePoint);
    double BC =  GeometryUtil.distanceFromLineSegment(B, C,
mousePoint);
    double CD =  GeometryUtil.distanceFromLineSegment(C, D,
mousePoint);
    double DA =  GeometryUtil.distanceFromLineSegment(D, A,
mousePoint);
    if(AB <= boundingBox.getHeight() && CD <= boundingBox.getHeight()
        && BC <= boundingBox.getWidth() && DA <=boundingBox.getWidth())
return 0.0;
    return Math.min(AB, Math.min(BC, Math.min(CD, DA)));
  }
}
```

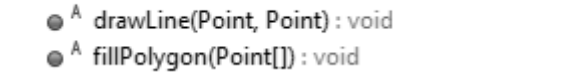
----------Point.java----------



---------- Rectangle.java ----------



----------Renderer.java----------



---------- AbstractGraphicalObject.java ----------

```
public abstract class AbstractGraphicalObject implements
GraphicalObject{
  Point[] hotPoints;
  boolean[] hotPointSelected;
  boolean selected;
  List<GraphicalObjectListener> listeners = new ArrayList<>();

  public AbstractGraphicalObject(Point... hotPoints) {
    super();
    this.hotPoints = hotPoints;
  }

  @Override
  public Point getHotPoint(int index) {
    return hotPoints[index];
  }

  @Override
  public void setHotPoint(int index, Point point) {
    hotPoints[index] = point;
    notifyListeners();
  }

  @Override
  public int getNumberOfHotPoints() {
    return hotPoints.length;
  }

  @Override
  public double getHotPointDistance(int index, Point mousePoint) {
    return GeometryUtil.distanceFromPoint(hotPoints[index],
mousePoint);
  }

  @Override
  public boolean isHotPointSelected(int index) {
    return hotPointSelected[index];
  }

  @Override
  public void setHotPointSelected(int index, boolean selected) {
    hotPointSelected[index] = selected;
  }

  @Override
  public boolean isSelected() {
    return selected;
  }
```

```
  @Override
  public void setSelected(boolean selected) {
    this.selected = selected;
    notifySelectionListeners();
  }

  @Override
  public void translate(Point delta) {
    for (Point point : hotPoints) {
      point.translate(delta);
    }
    notifyListeners();
  }
  @Override
  public void addGraphicalObjectListener(GraphicalObjectListener l) {
    listeners.add(l);
  }

  @Override
  public void removeGraphicalObjectListener(GraphicalObjectListener l)
{
    listeners.remove(l);
  }

  public void notifyListeners() {
    for (GraphicalObjectListener l : listeners) {
      l.graphicalObjectChanged(this);
    }
  }

  public void notifySelectionListeners() {
    for (GraphicalObjectListener l : listeners) {
      l.graphicalObjectSelectionChanged(this);
    }
  }
}

----------------- CompositeShape.java-------------
public class CompositeShape extends AbstractGraphicalObject {
  private List<GraphicalObject> shapes;
  public CompositeShape(List<GraphicalObject> shapes) {
    super();
    this.shapes = shapes;
  }
  @Override
  public Rectangle getBoundingBox() {
    Rectangle compositeRectangle = null;
    for(GraphicalObject obj : shapes) {
      if(compositeRectangle == null)
        compositeRectangle = obj.getBoundingBox();
      else
        compositeRectangle =
compositeRectangle.union(obj.getBoundingBox());
    }
    return compositeRectangle;
  }

  @Override
  public double selectionDistance(Point mousePoint) {
    Rectangle boundingBox = getBoundingBox();
    return GeometryUtil.selectinDistance(mousePoint, boundingBox);
  }

  @Override
  public void render(Renderer r) {
    shapes.forEach(g -> g.render(r));
  }

  @Override
  public String getShapeName() {
    // TODO Auto-generated method stub
    return null;
  }

  @Override
  public GraphicalObject duplicate() {
    // TODO Auto-generated method stub
    return null;
  }

  @Override
  public String getShapeID() {
    return "@COMP";
  }

  @Override
  public void load(Stack<GraphicalObject> stack, String data) {
    String[] parts = data.split(" ");
    if(parts.length != 1) throw new IllegalArgumentException("Shape:
"+getShapeID()+" očekuje 1 argumenta");
    try {
      int size = Integer.parseInt(parts[0]);
      List<GraphicalObject> shapes = IntStream.range(0,
size).mapToObj(i -> stack.pop()).collect(Collectors.toList());
      stack.push(new CompositeShape(shapes));
    } catch (NumberFormatException e) {
      throw new IllegalArgumentException(e);
    }

  }
  @Override
  public void save(List<String> rows) {
    rows.add(getShapeID() + " " + shapes.size());
  }
  public List<GraphicalObject> getShapes() {
    return shapes;
  }
}
```

```
---------------- DocumentModel.java -------------------
public class DocumentModel {

  public final static double SELECTION_PROXIMITY = 10;

  // Kolekcija svih grafičkih objekata:
  private List<GraphicalObject> objects = new ArrayList<>();
  // Read-Only proxy oko kolekcije grafičkih objekata:
  private List<GraphicalObject> roObjects =
Collections.unmodifiableList(objects);
  // Kolekcija prijavljenih promatrača:
  private List<DocumentModelListener> listeners = new ArrayList<>();
  // Kolekcija selektiranih objekata:
  private List<GraphicalObject> selectedObjects = new ArrayList<>();
  // Read-Only proxy oko kolekcije selektiranih objekata:
  private List<GraphicalObject> roSelectedObjects =
Collections.unmodifiableList(selectedObjects);

  // Promatrač koji će biti registriran nad svim objektima crteža...
  private final GraphicalObjectListener goListener = new
GraphicalObjectListener() {

    @Override
    public void graphicalObjectChanged(GraphicalObject go) {
      notifyListeners();

    }

    @Override
    public void graphicalObjectSelectionChanged(GraphicalObject go) {
      if(go.isSelected()) selectedObjects.add(go);
      else selectedObjects.remove(go);
      notifyListeners();
    }

  };

  // Konstruktor...
  public DocumentModel() {}

  // Brisanje svih objekata iz modela (pazite da se sve potrebno
odregistrira)
  // i potom obavijeste svi promatrači modela
  public void clear() {
    for(GraphicalObject obj: objects) {
      removeGraphicalObject(obj);
    }
    notifyListeners();
  }

  // Dodavanje objekta u dokument (pazite je li već selektiran;
registrirajte model kao promatrača)
  public void addGraphicalObject(GraphicalObject obj) {
    if(obj.isSelected()) {
      selectedObjects.add(obj);
    }
    objects.add(obj);
    obj.addGraphicalObjectListener(goListener);

  }

  // Uklanjanje objekta iz dokumenta (pazite je li već selektiran;
odregistrirajte model kao promatrača)
  public void removeGraphicalObject(GraphicalObject obj) {
    if(obj.isSelected()) {
      selectedObjects.remove(obj);
    }
    objects.remove(obj);
    obj.removeGraphicalObjectListener(goListener);

  }

  // Vrati nepromjenjivu listu postojećih objekata (izmjene smiju ići
samo kroz metode modela)
  public List<GraphicalObject> list() {
    return roObjects;
  }

  // Prijava...
  public void addDocumentModelListener(DocumentModelListener l) {
    listeners.add(l);
  }

  // Odjava...
  public void removeDocumentModelListener(DocumentModelListener l) {
    listeners.remove(l);
  }

  // Obavještavanje...
  public void notifyListeners() {
    for(DocumentModelListener l : listeners) {
      l.documentChange();
    }
  }

  // Vrati nepromjenjivu listu selektiranih objekata
  public List<GraphicalObject> getSelectedObjects() {
    return roSelectedObjects;
  }

  // Pomakni predani objekt u listi objekata na jedno mjesto kasnije...
  // Time će se on iscrtati kasnije (pa će time možda veći dio biti
vidljiv)
  public void increaseZ(GraphicalObject go) {
    moveZForDelta(go, 1);
    notifyListeners();
  }

  // Pomakni predani objekt u listi objekata na jedno mjesto ranije...
  public void decreaseZ(GraphicalObject go) {
```

```
    moveZForDelta(go, -1);
    notifyListeners();
  }

  private void moveZForDelta(GraphicalObject go, int delta) {
    int index = objects.indexOf(go);
    if(index ==  -1) return;
    if(index + delta < 0 || index + delta > objects.size() -1 ) return;
    objects.remove(index);
    objects.add(index + delta ,go);
  }

  // Pronađi postoji li u modelu neki objekt koji klik na točku koja je
  // predana kao argument selektira i vrati ga ili vrati null. Točka
selektira
  // objekt kojemu je najbliža uz uvjet da ta udaljenost nije veća od
  // SELECTION_PROXIMITY. Status selektiranosti objekta ova metoda NE
dira.
  public GraphicalObject findSelectedGraphicalObject(Point mousePoint)
{
    double min = SELECTION_PROXIMITY;
    GraphicalObject goRet = null;
    for(GraphicalObject go: objects) {
      if(go.selectionDistance(mousePoint) < min) {
        min = go.selectionDistance(mousePoint);
        goRet = go;
      }
    }
    return goRet;
  }

  // Pronađi da li u predanom objektu predana točka miša selektira neki
hot-point.
  // Točka miša selektira onaj hot-point objekta kojemu je najbliža uz
uvjet da ta
  // udaljenost nije veća od SELECTION_PROXIMITY. Vraća se indeks hot-
pointa
  // kojeg bi predana točka selektirala ili -1 ako takve nema. Status
selekcije
  // se pri tome NE dira.
  public int findSelectedHotPoint(GraphicalObject object, Point
mousePoint) {
    double min = SELECTION_PROXIMITY;
    int index = -1;
    for(int i = 0; i< object.getNumberOfHotPoints(); i++) {
      double hp =
GeometryUtil.distanceFromPoint(object.getHotPoint(i),mousePoint);
      if(hp < min) {
        index = i;
        min = hp;
      }
    }
    return index;
  }
}
```

---------- DocumnetModelListener.java---------

- DocumentModelListener
  - documentChange() : void

----------GraphicalObject.java ----------

- GraphicalObject
  - isSelected() : boolean
  - setSelected(boolean) : void
  - getNumberOfHotPoints() : int
  - getHotPoint(int) : Point
  - setHotPoint(int, Point) : void
  - isHotPointSelected(int) : boolean
  - setHotPointSelected(int, boolean) : void
  - getHotPointDistance(int, Point) : double
  - translate(Point) : void
  - getBoundingBox() : Rectangle
  - selectionDistance(Point) : double
  - render(Renderer) : void
  - addGraphicalObjectListener(GraphicalObjectListener) : void
  - removeGraphicalObjectListener(GraphicalObjectListener) : void
  - getShapeName() : String
  - duplicate() : GraphicalObject
  - getShapeID() : String
  - load(Stack<GraphicalObject>, String) : void
  - save(List<String>) : void

----------GraphicalObjectListener.java-------

- GraphicalObjectListener
  - graphicalObjectChanged(GraphicalObject) : void
  - graphicalObjectSelectionChanged(GraphicalObject) : void

----------LineSegment.java----------

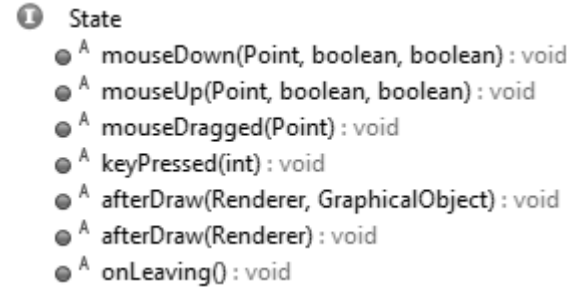
```
public class LineSegment extends AbstractGraphicalObject{

  public LineSegment(Point start, Point end) {
    super(start,end);
    // TODO Auto-generated constructor stub
  }
  public LineSegment() {
    this(new Point(0, 0), new Point(10, 0));
  }

  @Override
  public Rectangle getBoundingBox() {
    int minX = Math.min(getHotPoint(0).getX(), getHotPoint(1).getX());
    int minY = Math.min(getHotPoint(0).getY(), getHotPoint(1).getY());
    int maxX = Math.max(getHotPoint(0).getX(), getHotPoint(1).getX());
```

```
    int maxY = Math.max(getHotPoint(0).getY(), getHotPoint(1).getY());
    return new Rectangle(minX, minY, maxX-minX, maxY-minY);
  }

  @Override
  public double selectionDistance(Point mousePoint) {
    return GeometryUtil.distanceFromLineSegment(getHotPoint(0),
getHotPoint(1), mousePoint);
  }

  @Override
  public void render(Renderer r) {
    r.drawLine(getHotPoint(0), getHotPoint(1));

  }

  @Override
  public String getShapeName() {
    return "Linija";
  }

  @Override
  public GraphicalObject duplicate() {
    return new LineSegment(getHotPoint(0).duplicate(),
getHotPoint(1).duplicate());
  }

  @Override
  public String getShapeID() {
    return "@LINE";
  }

  @Override
  public void load(Stack<GraphicalObject> stack, String data) {
    String[] parts = data.split(" ");
    if(parts.length != 4) throw new IllegalArgumentException("Shape:
"+getShapeID()+" očekuje 4 argumenta");
    try {
      Point s = new Point(Integer.parseInt(parts[0]),
Integer.parseInt(parts[1]));
      Point e = new Point(Integer.parseInt(parts[2]),
Integer.parseInt(parts[3]));
      stack.push(new LineSegment(s, e));
    } catch (NumberFormatException e) {
      throw new IllegalArgumentException(e);
    }
  }

  @Override
  public void save(List<String> rows) {
    Point s = getHotPoint(0);
    Point e = getHotPoint(1);
    String line = getShapeID() + " "  +s.getX()+ " " +s.getY()+ " " +
e.getX() + " " + e.getY();
    rows.add(line);}}
```

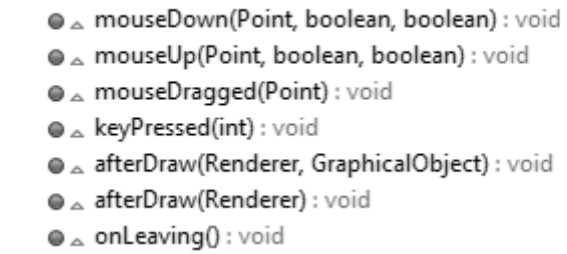
---------- Oval.java----------

```
public class Oval extends AbstractGraphicalObject{

  public Oval(Point down, Point right) {
    super(down,right);

  }
  public Oval() {
    this(new Point(0, 10), new Point(10, 0));
  }

  @Override
  public Rectangle getBoundingBox() {
    int heigth = (getHotPoint(1).getX() - getHotPoint(0).getX()) * 2;
    int weigth = (getHotPoint(0).getY() - getHotPoint(1).getY()) *2 ;
    return new Rectangle(getHotPoint(1).getX() - heigth,
getHotPoint(0).getY() - weigth, heigth, weigth);
  }

  @Override
  public double selectionDistance(Point mousePoint) {
    Rectangle boundingBox = getBoundingBox();
    return GeometryUtil.selectinDistance(mousePoint, boundingBox);
  }

  @Override
  public void render(Renderer r) {
    Rectangle boundingBox = getBoundingBox();
    int p = getHotPoint(0).getX();
    int q = getHotPoint(1).getY();
    Point[] points = eclipsePoints(p, q, boundingBox.getWidth() / 2,
boundingBox.getHeight() / 2);
    r.fillPolygon(points);

  }
  // srediste S(p,q), a velika poluos, b mala poluos
  private Point[] eclipsePoints(int p,int q, int a, int b) {
    List<Point> points = new ArrayList<Point>();
    int lastX = 0;
    for(int y = q + b; y >= q - b; y--) {
      double x = a * 1.0 /b * Math.sqrt(b*b - Math.pow((y - q),2));
      int xInt = Math.round((float)x);
//    if(y != q + b && xInt == lastX) continue;
//    lastX = xInt;
      points.add(new Point(xInt + p, y));
    }
    return Stream.concat(
        points.stream().skip(1),
        IntStream.
          range(0, points.size()).
          mapToObj(i -> {
            int index = points.size() - i - 1;
            Point point = points.get(index);
            return new Point((point.getX() - p) * -1 + p,
point.getY());
```

```
        }).skip(1)).toArray(Point[]::new);
  }

  @Override
  public String getShapeName() {
    return "Oval";
  }

  @Override
  public GraphicalObject duplicate() {
    return new Oval(getHotPoint(0).duplicate(),
getHotPoint(1).duplicate());
  }

  @Override
  public String getShapeID() {
    return "@OVAL";
  }

  @Override
  public void load(Stack<GraphicalObject> stack, String data) {
    String[] parts = data.split(" ");
    if(parts.length != 4) throw new IllegalArgumentException("Shape:
"+getShapeID()+" očekuje 4 argumenta");
    try {
      Point right = new Point(Integer.parseInt(parts[0]),
Integer.parseInt(parts[1]));
      Point down = new Point(Integer.parseInt(parts[2]),
Integer.parseInt(parts[3]));
      stack.push(new Oval(down,right));
    } catch (NumberFormatException e) {
      throw new IllegalArgumentException(e);
    }

  }

  @Override
  public void save(List<String> rows) {
    Point s = getHotPoint(1);
    Point e = getHotPoint(0);
    String line = getShapeID() + " "  +s.getX()+ " " +s.getY()+ " " +
e.getX() + " " + e.getY();
    rows.add(line);
  }
}

------------------ SVGRendererImpl.java ---------------
public class SVGRendererImpl implements Renderer {

  private List<String> lines = new ArrayList<>();
  private Path filePath;

  public SVGRendererImpl(Path filePath) {
    this.filePath = filePath;
    lines.add(
      """
        <svg xmlns="http://www.w3.org/2000/svg"
          xmlns:xlink="http://www.w3.org/1999/xlink">
      """
    );
  }

  public void close() throws IOException {
    lines.add("</svg>");
    if(filePath != null) {
      byte[] podatci =
lines.stream().collect(Collectors.joining("\n")).getBytes(StandardCharse
ts.UTF_8);
      Files.write(filePath, podatci);
    }
    // u lines još dodaj završni tag SVG dokumenta: </svg>
    // sve retke u listi lines zapiši na disk u datoteku
    // ...
  }

  @Override
  public void drawLine(Point s, Point e) {
    lines.add("<line x1=\""+s.getX()+"\"  y1=\""+s.getY()+"\"
x2=\""+e.getX()+"\"   y2=\""+e.getY()+"\" style=\"stroke:#0000FF;\"/>");
  }

  @Override
  public void fillPolygon(Point[] points) {
    String start = "<polygon points=\"";
    String end = "\" style=\"stroke:#FF0000; fill:#0000FF;\"/>";
    lines.add(Stream.of(points).
      map(p -> p.getX() + "," + p.getY()).
      collect(Collectors.joining(" ",start,end))
      );
  }
}

------------State.java--------------
```



----------IdleState.java----------




```
---------- AddShapeState.java----------
public class AddShapeState extends IdleState {

  private GraphicalObject prototype;
  private DocumentModel model;

  public AddShapeState(GraphicalObject prototype, DocumentModel model)
{
    super();
    this.prototype = prototype;
    this.model = model;
  }

  @Override
  public void mouseDown(Point mousePoint, boolean shiftDown, boolean
ctrlDown) {
    GraphicalObject og = prototype.duplicate();
    model.addGraphicalObject(og);
    og.translate(mousePoint);

  }
}
```

```
----------EraserState.java----------
public class EraserState extends IdleState {
  private DocumentModel model;
  Set<GraphicalObject> removeObjects = new HashSet<GraphicalObject>();
  List<Point> points = new ArrayList<Point>();

  public EraserState(DocumentModel model) {
    super();
    this.model = model;
  }

  @Override
  public void mouseDragged(Point mousePoint) {
    points.add(mousePoint);
    model.notifyListeners();
    GraphicalObject go = model.findSelectedGraphicalObject(mousePoint);
    if(go == null) return;
    removeObjects.add(go);
  }

  @Override
  public void mouseUp(Point mousePoint, boolean shiftDown, boolean
ctrlDown) {
    for(GraphicalObject go : removeObjects) {
      model.removeGraphicalObject(go);
    }
    points.clear();
    model.notifyListeners();
  }

  @Override
  public void afterDraw(Renderer r) {
    for(int i = 1; i<points.size();i++) {
      r.drawLine(points.get(i-1), points.get(i));
    }
  }
  @Override
  public void onLeaving() {
    removeObjects.clear();
    points.clear();
  }
}
```

```
---------- SelectShapeState.java----------
public class SelectShapeState extends IdleState {

  private static final Map<Integer, Runnable> KEYS = new HashMap<>();
  public void createKeys() {
    KEYS.put(KeyEvent.VK_PLUS,() -> {
      if(model.getSelectedObjects().size() != 1) return;
      GraphicalObject go = model.getSelectedObjects().get(0);
      model.increaseZ(go);
    });
    KEYS.put(KeyEvent.VK_MINUS,() -> {
      if(model.getSelectedObjects().size() != 1) return;
      GraphicalObject go = model.getSelectedObjects().get(0);
      model.decreaseZ(go);
    });
    KEYS.put(KeyEvent.VK_G, () -> {
      List<GraphicalObject> objects = new
ArrayList<GraphicalObject>(model.getSelectedObjects());
      for(GraphicalObject obj: objects) {
        model.removeGraphicalObject(obj);
      }
      GraphicalObject go = new CompositeShape(objects);
      model.addGraphicalObject(go);
      go.setSelected(true);
      model.notifyListeners();
    });
    KEYS.put(KeyEvent.VK_U, () -> {
      if(model.getSelectedObjects().size() != 1) return;
      GraphicalObject go = model.getSelectedObjects().get(0);
      if(!(go instanceof CompositeShape)) return;
      CompositeShape cs = (CompositeShape) go;
      List<GraphicalObject> objects = cs.getShapes();
```

```
      model.removeGraphicalObject(go);
      for(GraphicalObject object: objects) {
        model.addGraphicalObject(object);
        object.setSelected(true);
      }
      model.notifyListeners();



    });
  }


  private DocumentModel model;
  private static final int HP_SIZE = 4;

  public SelectShapeState(DocumentModel model) {
    super();
    this.model = model;
    createKeys();
  }

  @Override
  public void mouseDown(Point mousePoint, boolean shiftDown, boolean
ctrlDown) {
    if(!ctrlDown) {
      onLeaving();
    }
    GraphicalObject newGo=
model.findSelectedGraphicalObject(mousePoint);
    if(newGo == null) return;
    newGo.setSelected(true);
  }
  @Override
  public void mouseDragged(Point mousePoint) {
    if(model.getSelectedObjects().size() == 1) {
      GraphicalObject go = model.getSelectedObjects().get(0);
      int indexSelectedHotPoint = model.findSelectedHotPoint(go,
mousePoint);
      if(indexSelectedHotPoint == -1) return;
      go.setHotPoint(indexSelectedHotPoint, mousePoint);
    }
  }

  @Override
  public void keyPressed(int keyCode) {
    //System.out.println(keyCode);
    Runnable action = KEYS.get(keyCode);
    if(action != null) action.run();
  }

  @Override
  public void afterDraw(Renderer r, GraphicalObject go) {
    if(go.isSelected()) {
      Rectangle boundingBox = go.getBoundingBox();
      //Kutevi Oval
      Point A = new Point(boundingBox.getX(),boundingBox.getY());
      Point B = new Point(A.getX(), A.getY() +
boundingBox.getHeight());
      Point C = new Point(A.getX() + boundingBox.getWidth(), A.getY() +
boundingBox.getHeight());
      Point D = new Point(A.getX() + boundingBox.getWidth(), A.getY());
      r.drawLine(A, B);
      r.drawLine(B, C);
      r.drawLine(C, D);
      r.drawLine(D, A);
      if(model.getSelectedObjects().size() == 1) drawHotPoints(r,go);
    }
  }

  private void drawHotPoints(Renderer r,GraphicalObject go) {
    for(int i = 0; i < go.getNumberOfHotPoints(); i++) {
      Point hp = go.getHotPoint(i);
      Point A = new Point(hp.getX() - HP_SIZE, hp.getY() - HP_SIZE);
      Point B = new Point(hp.getX() + HP_SIZE, hp.getY() - HP_SIZE);
      Point C = new Point(hp.getX() + HP_SIZE, hp.getY() + HP_SIZE);
      Point D = new Point(hp.getX() - HP_SIZE, hp.getY() + HP_SIZE);
      r.drawLine(A, B);
      r.drawLine(B, C);
      r.drawLine(C, D);
      r.drawLine(D, A);


    }

  }
  @Override
  public void onLeaving() {
    List<GraphicalObject> objects = new
ArrayList<GraphicalObject>(model.getSelectedObjects());
    for(GraphicalObject obj: objects) {
      obj.setSelected(false);
    }
  }
}
```