CSE 3302 Lab Assignment 4

Due November 21, 2012

Goals:

1. Experience with object-oriented development.
2. Experience with a prototype-based language, JavaScript.
3. Experience with user interaction.

Requirements:

1. Design, code, and test an HTML/JavaScript application for object drawing. Your implementation will feature object selection, creation, manipulation, rendering, and saving drawings. You may work alone or in groups of two or three students. The requirements for groups are more significant than those for individuals.

   Team commitments should be submitted by November 5 to `mehra.nourozborazjany@mavs.uta.edu`. Just one message is needed.

   All projects must provide:

   a. Selection

      1. By mouse click - selects the object with a closest point. Ties broken by reverse drawing order. (Rounded objects have a point at their center. A grouped object has all of its points available.)
      2. By rectilinear box of a mouse drag - all objects whose bounding boxes are within the selection box are included.

   b. Creation of the following unfilled objects (at top of drawing order):

      1. Rectilinear squares and rectangles by mouse drag.
      2. Equilateral triangles - drag for first edge. Drawn counterclockwise.
      3. Circles (based on a drag from the center to perimeter) and ellipses (based on bounding box from mousedrag).
      4. Lines between existing points of other objects - defined by different closest points for the two ends of a drag.

   c. Manipulation

      1. Group selected objects into one object (which should be highlighted as selected).
      2. Ungroup selected objects into original (component) objects (which are selected).
      3. Delete selected objects. Refuse if a point within the selection is shared with a line whose other point is outside the selection.
      4. Nudge selected objects by 1 pixel using keys u/U - up, n/N - down, h/H - left, k/K - right.

   d. Rendering

      1. Gridlines, in gray, separated by 20 pixels.
      2. Canvas should be 500-by-500 pixels.
      3. Points have a radius of 3 pixels.
      4. The objects should be rendered by black stroke (no fill).
      5. During mouse movement prior to selection, a red line to the closest point should appear.
      6. During a drag selection, the selection box and the selected objects should appear in red.
      7. After a drag selection, the selected objects should appear in red.

   e. File

      1. Command to produce a string from the current drawing.
      2. Command to bring back a drawing from a previously generated string (into empty canvas).

f. Constraints

1. Objects must stay in the canvas. Restore drawing when this is violated.
2. Moving the mouse outside the canvas cancels the action (with restore).

Groups of two must also provide:

a. Improved selection

1. Selections may be extended by holding shift key during subsequent clicks or start of drag.

b. Additional objects:

1. Single-line centered text objects with a single point. (Only one font, need to compute bounding box.)
2. Regular polygon - drag for first edge and type single digit for number of sides. Drawn counterclockwise.

c. Additional manipulation:

1. Drag selection to a new position using the vector of a drag, i.e. you don't have to be over the selection.
2. Propagate selection for shared points - one level. Goes across both lines and objects. The only transitivity is "across" a grouped object.

e. File

1. Command to produce a string for the current selection.
2. Command to augment drawing with objects from a previously generated string (at position of mouse click, on top).

Groups of three must also provide:

a. Selection or extending a selection by clicking the points (clockwise or counterclockwise) for a convex polygon. Terminate selection (and restore) upon a convex hull violation.

b. Additional objects.

1. Convex polygons by clicking the points (either direction) until a convex hull violation occurs.

c. Additional manipulation

1. Grouped object that animates by cycling through the drawing order by bringing the back object to the front every 200 msec. This is to be supported at an arbitrary number of levels.
2. Ungrouping stops animation among original objects.

2. Email an HTML file for the UI (e.g. canvas, buttons, radio buttons, text boxes) to `mehra.nourozborazjany@mavs.uta.edu` by 12:45 p.m. on November 14.

3. Email your entire project, including a README and some saved strings, by 12:45 p.m. on November 21. Be sure to indicate browsers and versions that you tested with.

Getting Started:

1. `http://javascript.crockford.com/private.html` is useful regarding O-O and JavaScript.

2. `http://www.w3schools.com/html/html5_canvas.asp` and `https://developer.mozilla.org/en-US/docs/Canvas_tutorial` are useful for graphics details.

3. Screen coordinates . . . not cartesian coordinates.