Map Schematization

Project for
Distributed Software Development
Spring 2010
U. Oregon and Peking U.
London Tube Map

“Schematic” version of map sacrifices accurate distances to communicate more effectively.

Introduced by Harry Beck, 1931; now used around the world.
“Schematized” maps are used world-wide, but few good tools are available for constructing them.
Map Schematizing Project

• Build tool(s) to aid in “schematizing” maps
  – Distort geographic relations to present important information more clearly

• Target audience: Amateur map developer
  – Example: Organizing bicycle event or foot-race
    • Important information: Landmarks, food stops, major intersections
    • Unimportant: long stretches on the same road or street
    • User is not a professional map developer; probably doesn’t have ArcGIS or other professional GIS tools
Scenario (use case)

- Take map from web
  - Probably as an image (screen shot), at least for now
- Indicate “important” areas
- Shrink “unimportant” areas
- Export to graphic format
- Import into drawing tool as background layer
- Trace map over distorted image
Project Release 0
(First half of term)

Distort

Edit in another drawing tool

Produce map image
(e.g., Google Maps)
Release 0 & Release 1

• Release 0 (4 weeks): Basic requirements and architectural design for a head start, to have a working system quickly
  • Needs elaboration; may need improvement. Don’t be afraid to suggest changes.

• Release 1 (4 weeks): You choose direction
  • We have a wish list of suggested features, but you may have better ideas. Surprise us!
Release 0

- Supports only one map layer
  - An “image” (raster) layer

- Does not support registration
  - registration = lining up layers; unnecessary with just one

- Has a simple user interface
  - Just enough to be useful and to demonstrate and test the core functionality

The simplest useful version that can serve as a building block for subsequent versions.
Architecture

These modules may not be in 1:1 correspondence with Java classes. You need to negotiate and design the interface details.
Some details ...

A map is composed of an ordered set of layers. Each layer may be a vector layer or a raster layer.

The relation between planar coordinate systems with uneven transformations is separate from actual manipulation of graphics.

A tile is a raster representation produced by the "render" operation on a map, with an interpretation of its coordinates.

Thin veneer on graphics libraries

Data structures to track coordinate transforms.

A portion of the "uses" relation among components of the map schematizer. A "tile" presents an interface suitable for the user interface to manipulate (which could include panning, scrolling, etc). The map itself manages a set of layers in a right-hand coordinate system, and composites them to create a tile. The coordinate transforms (both shrinkage of map rectangles, and mapping of left-hand integer tile coordinates to right-hand floating point map coordinates) is handled by the coordinate mapping module, which does not actually manipulate graphics at all. The Map and Tile modules depend on the graphics system (e.g. Java2D).
Getting a Start

• Study the requirements and architecture
  • What do the pieces do? Why?
  • What is needed to implement each module?

• Consider the division of work
  • What expertise is needed for each part? Who has it?
  • How should it be divided between the Chinese and the Oregon sub-teams? How will they coordinate?

• Contact, discuss, negotiate
  • Divide the work, divide the fun. Make sure everyone has something to contribute, and something to learn
Next meeting ...

• Come prepared to describe your progress
  – Have you estimated the work required?
  – Have you discussed available experience and knowledge on your team?
  – Have you discussed team roles and division of the work?
  – Have you made contact with your teammates in China? Have you discussed these matters with them?