COMP 261 Lecture 2

Graphs 1 of 3

Victoria
UNIVERSITY OF WELLINGTON
Te Whare Wānanga o te Ūpoko o te Ika a Māui
CAPITAL CITY UNIVERSITY

Auckland Roads: Assignment 1

- Load data into data structures
  - graph of intersections and roads
  - indexes for fast searching:
    - trie of road names,
    - quad-tree of intersections
- Display the map (and zoom in/out)
- Select roads (by name)
  - Show all roads matching what is typed so far
  - Highlight road on map.
- Select intersections (by mouse click)
  - Highlight intersection
  - Display names of roads at intersection.

Auckland Roads: Assignment 2

- Google maps / GPS navigation system:
  - Find shortest routes in graph between two intersections
- Emergency planning
  - Identify disconnected parts of the road system
  - Identify all intersections that would disconnect part of the system.
- All build on the graph structure of Assignment 1.

Assignment 1: step by step

- Eclipse: “hello world” program
  - Technical notes: online eclipse tutorial
- GUI is provided for you as abstract class
- Example of its use is in SquaresExample.java
- Your job is about representing the graph and drawing it similar to how squares are drawn!
- Data files:
  - load data
  - each file can be a different object
  - draw: x, y
  - build the graph

Program from scratch.

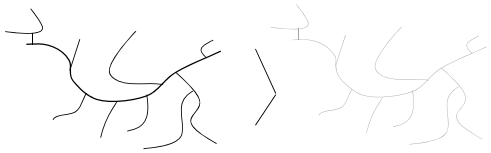
- Depends on the kind of program!
- Assume:
  - Relatively small program with a GUI interface
  - One class for the “main” program and GUI
  - Other classes for the data structures and algorithms on them
- Three questions:
  - What must the program do on start up to set itself up?
    - ➢main method
    - ➢constructor
  - What actions/events must the program respond to?
    - ➢main method
    - ➢GUI setup method
  - What are the different types of data that the program deals with
    - ➢Other classes, typically one per type.

Road Map program

- Main program
  - Needs field(s) to hold the road map data structures
  - Main method / constructor must fill the field(s)
  - Learn to fullfil the GUI methods (redraw, onClick, onSearch, onMove, onLoad etc) to make interesting things happen
  - Classes for RoadGraph, Roads, Intersections, … Location..
  - Each class has the data structure and methods for loading/accessing/modifying

The Data

- What is a road?



- Roads, parts of roads.
- Intersections
- Road segments
  - Which are nodes and which are edges?
    - Do the intersections connect the roads? or
    - Do the roads connect the intersections?

The Data

- Types
  - Road names.
  - Homogeneous parts of roads (same speed limit, type, etc)
  - Road Segments (between intersections)
  - Intersections
- Files
  - roadID-roadInfo.tab
  - nodeID-lat-lon.tab
  - roadSeg-roadID-length-nodeID-nodeID-coords.tab

Data

ROADS

roadid	type	name	city	1way	sp	tp	!car	!ped	!bic
16060	6	cowley st	waterview	0	2	0	0	0	0
16473	6	walmer rd	point chevalier	0	2	0	0	0	0
16501	4	carrington rd	point chevalier	0	2	2	0	0	0

NODES

10526	-36.871900	174.693080
10518	-36.871780	174.693510
10845	-36.872000	174.699370

SEGMENTS

roadID	length	nodeID1	nodeID2	coords			
16060	0.223	12420	12556	-36.88853	174.72218	-36.88954	174.72361
				-36.88992	174.72398		
16501	0.243	13612	13689	-36.88977	174.73364	-36.88765	174.73431
100	0.020	16931	16956	-36.85512	174.76492	-36.85529	174.76501