G51UST – Unix and Software Tools
Coursework 2: Shell scripting
Weight: 60% of coursework mark (30% of total mark)
Deadline: 09/12/2013, 4pm

Preface

This coursework focuses on using shell scripting to perform complex tasks by gluing together many different UNIX tools. The scripts created for the first coursework should be used here. Model solutions for the cw1 scripts will be published one week after the specification is released.

Submission

You should be submitting a "tarball" cw2.tar.gz containing the following files via **Moodle**:

- genMap.sh
- genPlot.sh
- Any auxiliary script (sed, awk, etc.) that you used within the shell scripts

The shell scripts should be well indented and commented. Scripts should also produce a simple trace of what they are doing. Marks will be discounted otherwise.

Marking criteria

The next sections detail the weight that each part of the coursework will have in the mark. There is no single correct solution any of these scripts. Any script that produces the correct answer will get pass marks. To achieve higher grades, you should make appropriate use of the bash syntax & unix tools, to create the scripts that are as compact (but intelligible) as possible. Commenting your code and using meaningful variable names (whenever appropriate) will be a bonus.

Preliminaries

In this coursework you will be using two *Open Data* datasets that have been fetched from the UK open data repository at data.gov.uk. The two datasets are:
- **Code Point Open**: dataset from Ordnance Survey that converts post codes into coordinates. Available at http://www.cs.nott.ac.uk/~jqb/codepoint.zip
- **Road Safety**: dataset from the Department of Transport, detailing car accidents for 2012 in England and Wales. Available at http://www.cs.nott.ac.uk/~jqb/accidents.zip

Moreover, you will be dealing with UK postcodes and geographical coordinates, so here is a bit of background knowledge on both:
http://en.wikipedia.org/wiki/Postcodes_in_the_United_Kingdom
http://en.wikipedia.org/wiki/Easting_and_northing

http://en.wikipedia.org/wiki/Geographic_coordinate_system

Plotting accidents on map (50%)

Make a shell script `genMap.sh` that, given any postcode and a radius, identifies all accidents within the radius and plots the 15 closest accidents on a map, producing a png image of the map as a result.

The script should:
- Ensure that the correct number of arguments (2) is given
- Take postcodes with/without spaces, upper case, lower case, etc.
- Take postcodes from any area
- The map file to generate should be called map_<postcode>.png
- Eliminate any temporary file that may have been created throughout the script

Open Street Map allows the generation of map images by constructing a URL with the coordinates, image size, zoom level, markers, etc. that you wish to include in the map:
http://staticmap.openstreetmap.de/staticmap.php?center=52.955123797858,-1.1885166187702&zoom=16&size=1024x768

It includes a simple wizard that you can use to construct maps, and then see what URL generated them here: http://staticmap.openstreetmap.de/wizzard/

This image is what your script should generate for the input “NG8 1BB” and a 500 meters radius:


Rodwell Close
Beechdale Baths
Robert Shaw Primary School
Airsley Road
Vale Crescent South
Southfield Road
A6514
Robert Shaw Playing Fields
New Road
Millers Court
Hartley Road
Norwood Road
Brixton Road
Croydon Road
Green Academy
Opal 1 Block E,F
Midland Way
Seaford Avenue
Sydney Road
Kingswood Road
Hollinwell Avenue
Ringwood Crescent
Woodhall Road
Radford Bridge Road
Southwold Drive
Newland Close
Western Boulevard
Marchwood Close
Southwold Primary School
Kennington Road
Canterbury Road
Dorset Street
Medway Street
Wollaton Road
A609
Crown Island
Players Bonded Stores
Raleigh Park
Silitoe Way
Robin Hood Line
Salisbury Street
Heron Drive
Middleton School
Eton Grove
Harrow Road
Calver Close
Orston Drive
Triumph Road
Jubilee Campus
Sutton Passeys Crescent
Hawton Spinney
Middleton Boulevard
Herby Drive
Bluecoat School, Wollaton Campus
Toston Drive
Scalford Drive
Selston Drive
Hawton Crescent
Broughton Drive
Wollaton Park
Fairham Drive
The Boulevard
TAVR
former Dairy Crest Dairy
Papermoon Day Nursery
Falcon Close
Cycle Road
Farnsley Road
Radmarsh Road
Riverside Point
Derby Road
Derkel Drive
Lenton Manor

Plotting number of accidents by month and weekday (50%)

Make a shell script `genPlot.sh` that, given any postcode and a radius, identifies all accidents within the radius and counts the number of accidents by month and weekday. Afterwards it makes a plot of the counts.

The script should:
- Ensure that the correct number of arguments (2) is given
- Take postcodes with/without spaces, upper case, lower case, etc.
- Take postcodes from any area
- The plot file to generate should be called accidents_<postcode>.png
- Eliminate any temporary file that may have been created throughout the script
- All axis and lines in the plot should be properly labelled.
- The title of the plot should contain the postcode and radius

To generate plots you can use **gnuplot** as shown in the lectures.

This image is what your script should generate for the input “NG8 1BB” and a 10000 meters radius: