Informatics 1B
Data and Analysis: Lab Session 1
Drawing ER diagrams and SQL Querying Basics

Authors: Manuel Marques Pita and Stratis Viglas, 2006
Revised: Kate Byrne

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1 Introduction

In this lab session you will go through a tutorial on drawing ER diagrams using an application called `dia`. You will need this for your first assignment. Also there will be a basic introduction to querying databases using SQL. The work you will be doing today will be helpful for your assessed practical. (The handout for this assignment will be available from Friday — end of week 3.)

2 Drawing ER diagrams with `dia`

One of your tasks for the first Data and Analysis assignment is to draw an Entity Relationship diagram. The first part of this lab session is a tutorial on using an application called `dia` which allows you to draw ER diagrams.

2.1 Setting up the diagram drawing environment

1. Start `dia`. Either go to the main menu on your `dice` desktop (by clicking on the icon at the bottom-left corner of the screen) and select the option for `Dia Diagram Editor` from the `Graphics` menu, or type `dia` at the command line in a terminal window. (You can run it in the background by typing "`dia &`" — ask your demonstrator if you don't know what this means.)
2. You will see a diagram window and a `Diagram Editor` window with tool buttons. In the middle of the tool buttons window there is a pull-down menu (which may be labelled `Misc` or `Assorted` initially). Click on that menu and select the option `ER`, either from the list if it's present, or from the `Other Sheets` sub-menu. Once you've done this, you will see a set of buttons for drawing entities, relationships and so on, just below the pull-down menu.

3. The blue lines on the diagram window are page-delimiters. By default they are set as size A4 with portrait orientation. You may prefer using landscape orientation for this task. To change the orientation use the `File - Page Setup...` menu option.

Now your environment for drawing ER diagrams is all set. The next part of this tutorial is to draw the ER diagram you built during your first Data and Analysis tutorial. The steps to achieve this are described in the next section.

2.2 Drawing the Guipuzcoana ER model

1. Select the `Entity` drawing tool (first one on the left, denoted with a square labelled "E") and click anywhere on the diagram window. Double click on the Entity you just created and explore the different options you can use for customising entities. Once you have played with these options, set the final name of this entity to be `Vessel`.
2. In the same way, but using the `Attribute` tool (a circle with the letter "A") define the attributes for this entity. When you double click on a defined attribute you also have a number of options for customisation. Spend some time exploring these as well.
3. In order to connect objects, select the icon with two parallel lines and then click on the screen. Then click and drag (while keeping mouse button pressed) on one of the green ends of the line and connect it to one of the objects (when you see a red line around the object it means the connection is made and you can release the mouse). Do the same for the other end of the line. The small square in the middle of the line allows you to change the shape of the line. Notice that the connection lines will follow if you move the objects around — this makes it easy to lay your diagram out neatly.
4. If you prefer a straight line connection to a zig-zag, use the `Line` button from the top part of the tools window. You can also add arrows and change the width of lines using the options at the bottom of the window. These are useful for showing key dependencies and total participation relationships. Experiment with these options — even if you don't need them all for this tutorial exercise, they may be useful in the assessed assignment.
5. There is also a tool for drawing relationships (the button icon contains a letter "R"). Explore how it works and define the relationships between entities.
6. Build up your ER diagram by adding and connecting all the entities, attributes and relationships from the model you designed in the tutorial.
7. Editing tips:
   (a) *Deleting:* If you want to delete an object, click on it and press the `delete` key. You can also undo the last action performed, by clicking `Edit - Undo`.
   (b) *Scaling:* Objects created in `dia` by default are quite large; you will want to make them smaller for printing. The simplest way to achieve this is to lay out your diagram on the screen without worrying about the size, and then — once it is complete — use the `File - Page Setup...` menu, `Scaling` option, and scale the diagram to fit in a single page (i.e. `1 x 1`).
   (c) *Printing:* To print your diagram, use the `File - Print Diagram...` menu.

2.3 Some questions about your model

1. Are there any weak entity sets in your model? Explain your answer. How can you express weak entity sets in `dia`?
2. Suppose that people's roles were not fixed. This means that for different journeys one person could have been a chef or a sailor (for example). How can you represent this in the ER model you just created?
3. What should happen to members of other entities if we deleted a member of the `vessel` entity, i.e. if there were only three ships instead of four?

Note. Before continuing with the next part of the exercise, show your ER model and answers to the three questions above to your lab demonstrator and make sure they are correct.

3 Introduction to SQL Queries

In this part of the lab, your task is to understand on an intuitive level the meaning of some simple SQL queries we use to query databases. In this exercise you will query the database you will be using later in the coursework.

First of all, open the database by typing on a terminal window:

```
psql -h pgteach inf1 inf1
```

when asked for password type `inf1`

then type the following query:

```
SELECT title, year FROM movie WHERE year > 2004;
```

(It doesn't matter whether you use upper or lower case when typng.) Look at the results you get from this query. To see more, press the spacebar; to finish the query, press `q`. What data is being returned by this query? What is the entity (or entities) involved? Paraphrase the query to explain what is its meaning. Once you are finished with this query, explore (in the same way) the next query.

```
SELECT * FROM director WHERE lname = 'Jeunet' AND fname = 'Jean-Pierre';
```

To quit PostgreSQL, type `\q`

Check your answers with your lab demonstrator before leaving!