

Practical Sheet 8

Software Development, Modelling and Inheritance

1 Software Lifecycles

Exercise 1.1: Open Source Development

A famous article (later book) about the open source s/w movement is entitled *The Cathedral and the Bazaar*. Discuss whether this would be suitable reading for a 6th former. There is a summary at

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

Exercise 1.1: Extreme Programming (XP)

XP is a specific agile methodology. Read a summary at (just the introduction is enough)

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

2 Structure Modelling

Exercise 2.1: Minesweeper Structure

A simple version of the minesweeper game is available. Download it and review the code. Draw a function-call structure chart. Discuss how much this tells you about the program.

Exercise 2.2: 20 Questions

A very simple version of '20 Questions' randomly selects from a fixed set of animals (for example). The player can see the answers of 3 questions (e.g. how many legs?) chosen from 5. The player then guesses the animal.

Suggest a functional decomposition for this problem

3 State Modelling

Exercise 3.1: Calculator

Draw a state-transition model of a simple calculator. Consider how much detail is needed. For example, should you distinguish between pressing the different number keys?

Exercise 3.2: Minesweeper

In minesweeper, a square in the minefield:

- Can hide a mine or no mine
- Can be hidden, flagged or tested

Draw a state model of this. What transitions are needed? How is the game ended?

4 Object Modelling

Exercise 4.1: Minesweeper Objects

Sketch an Object Model for the minesweeper game

Exercise 4.2: Inheritance at School

The school has a directory listing students and staff. Different information is held about the different categories of people. Discuss how inheritance can model this.

5 Inheritance

Exercise 5.1: Animals

Enter the classes Mammal and Dog from the slide.

- Create a Dog. Find out if the dog has fur, can swim and see
- Add one or more new subclasses, such as: Dolphin, Bat or Cow.

Exercise 5.2: Shapes in Turtle Graphics

Create some classes to draw shapes in turtle graphics. Here are some ideas

- All shapes have a position and colour
- All shapes can be drawn
- One kind of shape is a polygon: it has a list of coordinates
- Another kind of shape is a circle
- Triangles and squares are polygons.
- A picture has a collection of shapes.