_____
MSc in Communications Software 2009
Design Patterns
Summer Paper
Eamonn de Leastar
_____

_____

Instructions:

Below are are four short descriptions of problems in specific contexts. Two solutions are required for each problem - the second an elaboration on the first. Each solution is to be structured as follows:

I.   Briefly outline of the relevant design pattern(s) that are viable candidates in the ensuing answer.

                                                                                                              5 Marks
II.   A solution to Version 1 expressed as a class diagram and with a hight level sketch of the classes involved. Methods in the class can be expressed in any suitable pseudocode.

                                                                                                            10 Marks
III. A Solution to Version 2, which may be expressed as modifications to Version 1 with further classes and pseudocode if necessary.

                                                                                                            10 Marks
IV. A short summary of the benefits of adopting the selected patterns.

                                                                                                              8 Marks

Select *any three* of the problems and propose outline solutions. All problems are awarded equal marks.

_____

Problem 1: Instant Messaging

A library is to be designed to support instant messaging (IM) client application development. The communications model is to support the following: (1) Connecting to an IM server, (2) Authentication with username/password, (3) Downloading a buddy list consisting of groups containing the names and presence of individual buddies, (4) One-to-one messaging to individual buddies. (5) Buddy presence status changes and incoming messages from buddies can arrive asynchronously at the client.

• Version 1: Propose the simplest encapsulation of this capability for initial prototype work to commence.
• Version 2 : A more ambitious model, with a richer abstraction set and the overall objective of supporting more than one IM protocol in ensuing implementations.

_____

Problem 2: Temperature Sensors

An experimental ambient temperature monitoring system is under development. It consists of a set of mobile wireless thermostats that may be distributed throughout a building. Once these are switched on, they are capable of transmitting current temperature to interested parties. However, to optimise power consumption, they only notify registered subscriber devices of their current temperature, if no subscribers are registered then the temperature is not transmitted. The first experiments also include a wireless temperature display device which, is permanently turned on.

- Version 1: The wireless temperature display will show the temperature of the nearest thermostat.
- Version 2 : The display will show the average temperature of the nearest three thermostats.

_____

Problem 3. Command undo / redo implementation

A development team is implementing a desktop application for managing expenses claims. Its features include the ability to create expenses report, itemize individual expenses in different categories, calculate total claim and submit for approval. As there are complex rules associated with costing individual line items, the team have implemented a command pattern to simplify the desktop application development. This has been delivered as a simple command interface consisting of a single doCommand() method + a set of thirty command implementations.

- Version 1: Propose an enhancement of the command implementation to include a basic undo capability. Bear in mind that not all commands can be undone (submit claim for instance)
- Version 2 : Supplement the the undo with a redo feature.

_____

Problem GUI Table Component

A table component is being designed as part of a new GUI component library, enabling multicolumn tables of data to be displayed. The component is so support a simplified model/view/controller approach. Thus, the data is to be provided to the table component in the form on a data model object, which the component will access when the table is to be redrawn.

- Version 1: provide a simple example of how this might be realised.
- Version 2: in this version, illustrate how data held in pre-designed data structure (not related to the table model) can be rendered by the component.

•

MSc in Communications Software
Design Paterns
Summer Solutions
Eamonn de Leastar