
MSc in Communications Software 2012
Design Patterns
Summer Paper
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Instructions:

Answer three questions

Section A

Question 1:

- (a) The Template Method and Strategy patterns both provide a design for varying an algorithm within a given context. Outline the structure of these patterns with a representative example. 10 Marks
- (b) Re-examine the above patterns from the perspective of the language mechanisms they employ. Present a number of simple scenarios which illustrate where one pattern more suitable than the other. 10 Marks
- (c) Dynamically typed languages present interesting opportunities for optimizing certain pattern implementations. Show how either or both of the above patterns can be simplified in such a language. 5 Marks

Question 2:

- (a) The Mediator and Bridge patterns can be said to propose a solution to a specific category of problem. Outline this problem and present the contrasting approaches of each of these patterns proposes. 10 Marks
- (b) The Bridge pattern will often rely on some synchronization/event mechanisms in order to fulfill its role within a given solution. Identify some patterns it may implement for this purpose, elaborating on one specific pattern in more detail. 10 Marks
- (c) The Façade pattern also proposes a solution within this general context. What differentiates Façade solutions from the above? What type of systems lend themselves to the use of Façade? 5 Marks

Section B

Question 3:

Problem:

A communications application is to be developed to support a simple text based protocol. The protocol has a set of verbs with each verb having a varying number of arguments – which implement a simple command set. The verbs are in two categories – “connected” mode, representing commands available to any client process and “authenticated” mode, representing an enhanced set of commands available to known users. The application is to be implemented using conventional sockets.

Solution:

- (a) Review the Command pattern in the above context. Invent a simple command vocabulary and show in pseudocode how the pattern could be implemented. *10 Marks*
- (b) Object creation can often pose interesting challenges. Present an approach for the creation of the command objects in the above problem. *15 Marks*

Question 4:

Problem:

A social media application is to be designed to replicate the Twitter user experience. i.e. registers users can identify and ‘follow’ short messages from other users, and can in turn be ‘followed’ themselves. A client component for this service – employing a conventional Observer Pattern implementation - has already been designed implemented, and tested. A Graphical User Interface application is to be designed to use this component.

Solution:

- (a) Present a high level review a set of candidate patterns that could be viable for this application. *10 Marks*
- (b) Propose an outline design using a selected subset of the patterns identified in (a). Illustrate the design using simplified UML diagrams, including the roles played by selected classes in the patterns you employ. *15 Marks*