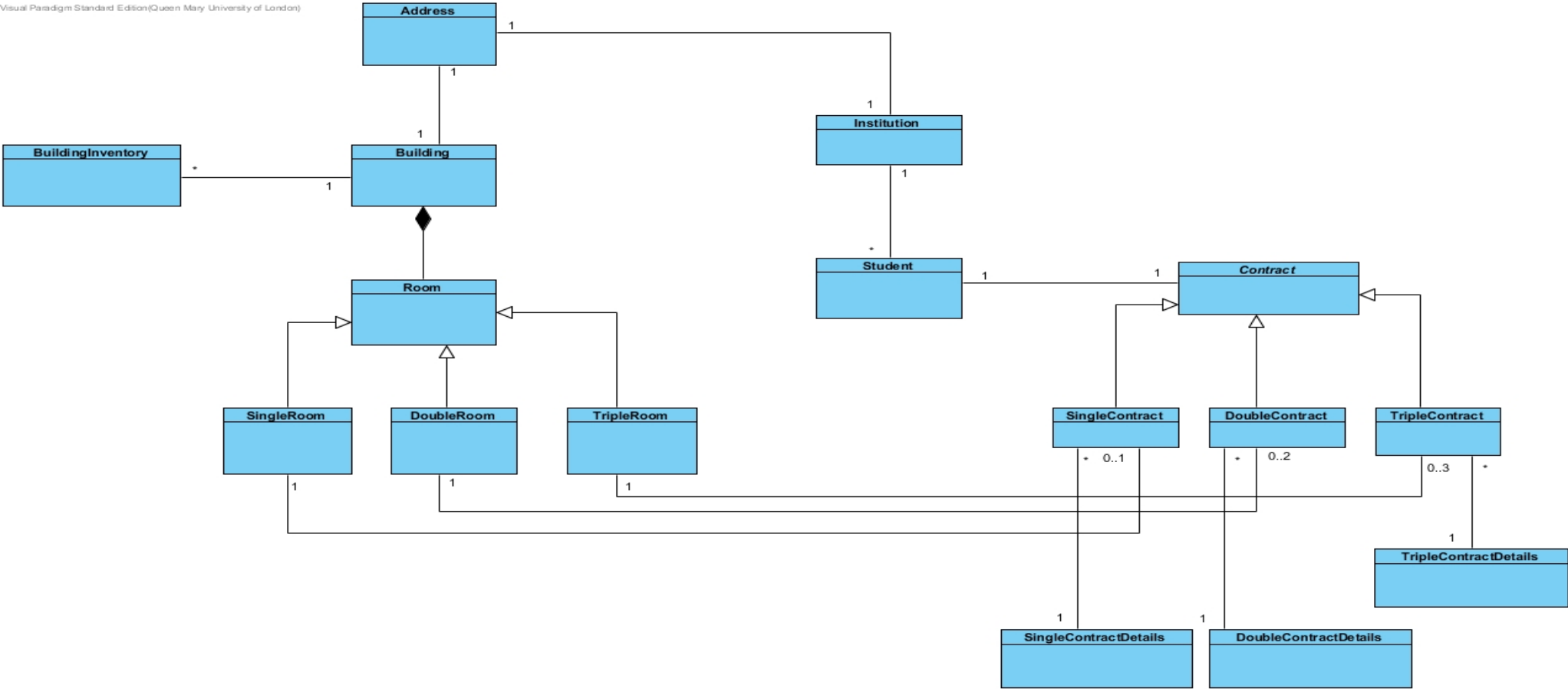
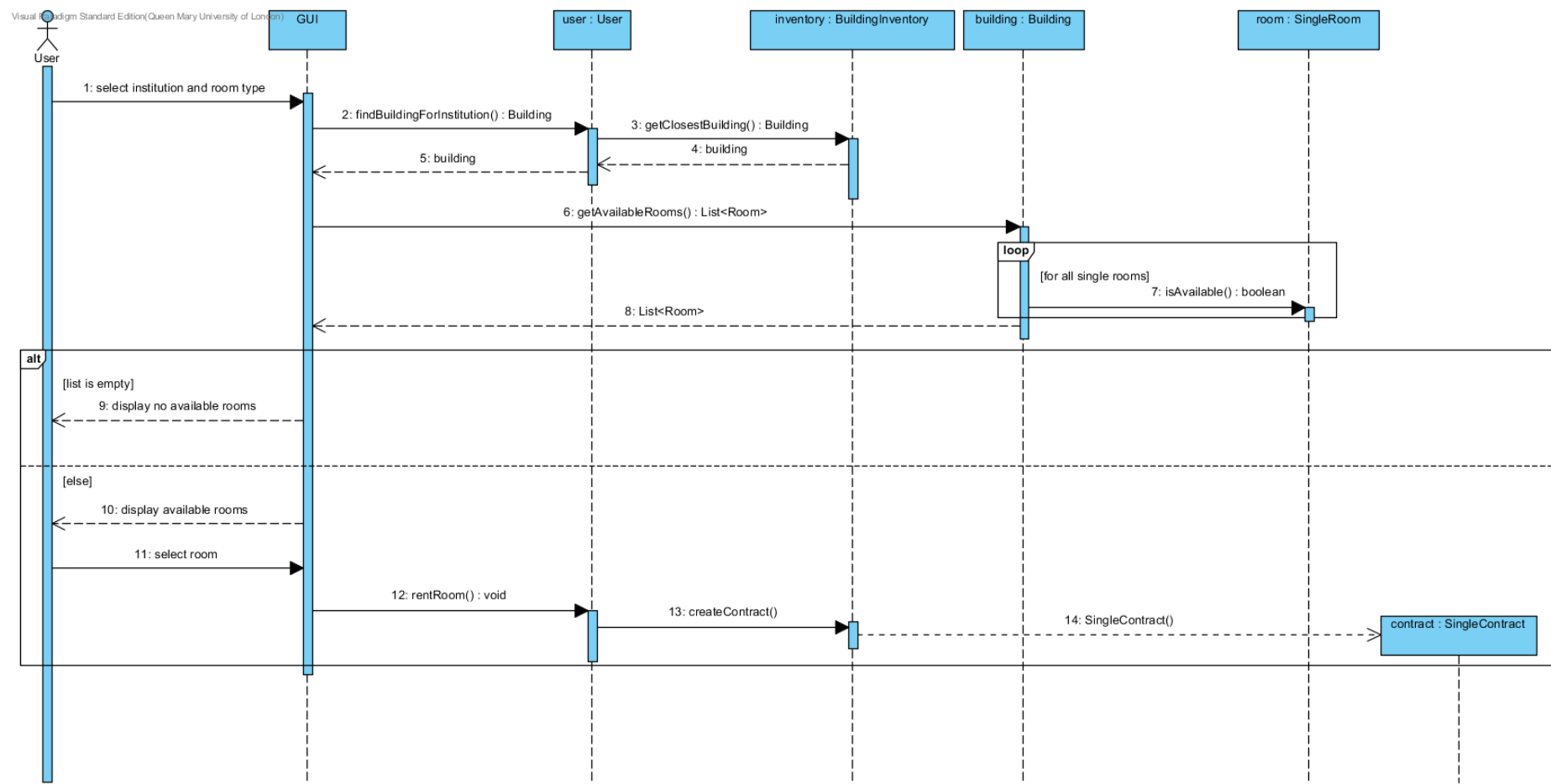


Question 1

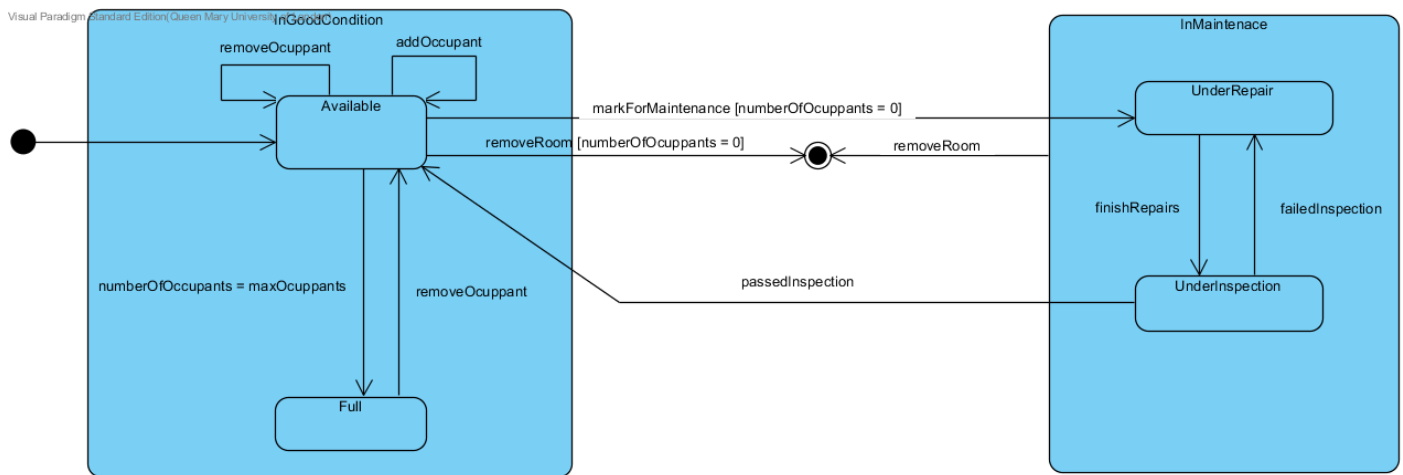
Visual Paradigm Standard Edition(Queen Mary University of London)



Question 2



Question 3



Question 4

- a) The implemented hierarchy is not a good design as it goes against Liskov substitution principle. Liskov principle suggest that the subclasses should not require more, and not deliver less than the super class. In this hierarchy, Triangle class delivers less than its super class Rectangle which has an additional side. Possible hierarchy designs would be to make triangle superclass of Rectangle or creating another class such as Shape to be the super class of both Triangle and Rectangle. The latter one is a better option as it will allow Triangle and Rectangle to be specializations of Shape while Shape class containing all common attributes and behavior of all shapes.

b)

- A path represents the flow of execution from the start of a method to its exit. In software testing, path coverage is measured as the percentage of number of paths executed by the test suite over the number of total paths in the code. [2 marks]
- There are 8 paths in the code [5 marks]

	Feasible				Infeasible			
First if	TRUE	FALSE	FALSE	FALSE	TRUE	TRUE	FALSE	TRUE
Second if	FALSE	TRUE	FALSE	FALSE	TRUE	FALSE	TRUE	TRUE
Third if	FALSE	FALSE	TRUE	FALSE	FALSE	TRUE	TRUE	TRUE

- A message with one character long will cause a failure in this code. The defect can be revealed by executing the path in which all three conditions evaluate to false. [3 marks]

- c) General knowledge about the domain (2 marks), customers and users (2 marks), environment (1 mark), tasks and procedures currently performed (2 marks), similarities across domains and organizations (1 mark)

d)

- i) Singleton pattern is implemented via a static private class variable, private constructor and public static method to get the instance. [2 marks]
- ii) Observer design pattern is implemented via two interfaces one for observable and the other for observer. The concrete implementation of observers and observables are generalization of these interfaces. Observable holds references (association) to all observers so observers are notified when the state of an observable changes. [4 marks]
- iii) Adapter pattern is implemented via creating a new class (in your hierarchy) that holds a reference to the existing class. This way the methods in the new class can be named following the hierarchy's conventions and the functionality of the existing class can be called from within these new methods. [3 marks]

e) In iterative development, the software is developed in several iterations where as in non-iterative approaches software is developed in a single iteration. As a result, in iterative development a working version of the software is available in earlier stages compared to non-iterative development. [3 marks]

Advantages: [3 marks]

- i) Customer feedback due to early working software.
- ii) Requirements and specifications in phases.
- iii) Step-by-step improvement makes easy to track defects.

Disadvantages: [3 marks]

- i) Without careful planning early design decisions can cripple future evolutions.
- ii) Difficult to switch methodologies and languages.
- iii) Not having all requirements might cause problems

f) Q

- i) In this scenario, the use of algorithmic cost modelling might be the right option. Being able to estimate the size of this project allow us to use models such as COCOMO or COCOMOII. COCOMO model can estimate both cost and effort and it's well documented, widely used and supported by many commercial tools. [3 marks]
- ii) In the second scenario, we can estimate the cost and effort required using estimation by analogy method since we got the documentation and an experienced project manager. The documents can also be used to estimate the size of the project which can be used in algorithmic estimation. [3 marks]