

THE OPEN UNIVERSITY OF SRI LANKA
BACHELOR OF SOFTWARE ENGINEERING
DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING



ECI6267 – Software Architecture

Final Examination - 2013/ 2014

Date: 16th August 2014

Time: 9.30 – 12.30 hrs

Answer only four (4) Questions

1) Answer the following questions related to Architecture Business Cycle (**ABC**).

(a) Draw a diagram to illustrate the Architecture Business Cycle and briefly explain how different stakeholders interact. **[10 marks]**

(b) How can an architecture influences on customer requirements and organization development? Discuss this with the use of **ABC**. **[10 marks]**

(c) Write down five (5) architecture activities relevant to software development project.

[5 marks]

2) You have learned following three fundamental reasons for software architecture's importance

- Communication among stakeholders
- Early design decisions
- Transferable abstraction of a system.

Elaborate above three facts with strong points to prove their importance.

[25 marks]

3) Design by contract (DbC), also known as contract programming is an approach for designing software.

(a) What are the three major pieces of DbC? Describe each.

[9 marks]

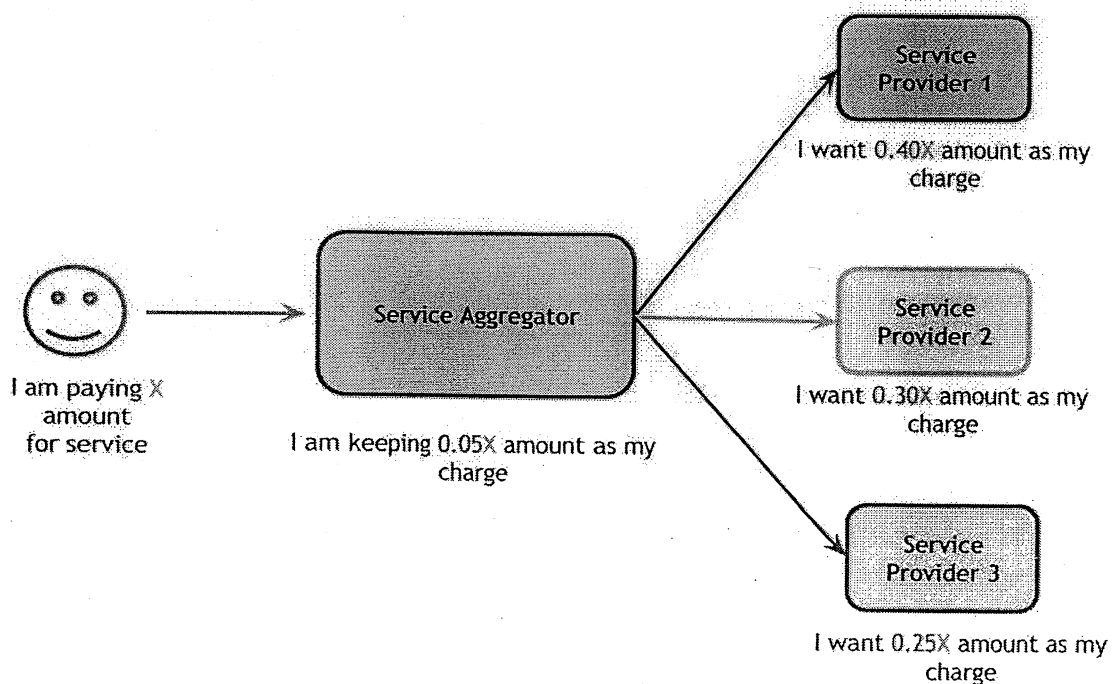
(b) DbC guarantees that every component of a system lives up to its expectations. Do a design to the below shown 'Queue' specification following DbC concepts.

```
Queue {
    add(Element e)
    Element peek()
    Element poll()
}
```

Queues typically order elements in a FIFO (first-in-first-out) manner. The add method inserts an element. The poll method removes and returns the head of the queue. The peek method return, but do not remove, the head of the queue.

[16 marks]

4) 'Fare Service Aggregators' (FSA) is a web service aggregator which provides set of services as web services. It has following business model between their consumers and service providers.



When a request comes to FSA platform they respond back to the customer with relevant information after getting support from several third party service providers. Then FSA will charge consumer and will be divided in to the portions as per the revenue share rules configured previously.

- (a) Draw the conceptual architecture for FSA platform after carefully reading above description. Also justify your architectural style selection.

[12 marks]

- (b) Using relevant diagrams, discuss about Adapter design patten.

[6 marks]

- (c) Describe how Adapter design pattern could be used when designing for FSA platform. (Use diagrams to illustrate)

[7 marks]

- 5) Answer following questions related to database architecture.

- (a) Explain with examples, in what situations you would consider a database as part of your software architecture and in what situations it is not.

[4 marks]

- (b) Briefly explain with examples, for what type of software solutions you would consider Big Data as part of your software architecture and what type of software solutions you would consider a relational database as part of your software architecture.

[4 marks]

- (c) As an architect, how do you make sure a relational database solution is efficient? Explain your answer with the actions you would take at software design, implementation and production stages. Use example as appropriate to convince your explanation.

[7 marks]

- (d) Consider a situation where you have a high volume database in a software system. The database is very well-tuned and it runs efficiently in production. A new requirement comes up from management that they need to run some queries to generate analytical reports. Discuss different solutions to this by giving examples to make sure that the database still run in same efficiency and at the same time management gets their analytical reports in time.

[8 marks]

- (e) As an architect, what steps would you take to make sure that a database solution more secure? Give examples as needed.

[2 marks]