CITS4401 Software Requirements and Design

Week 7 & 8: UML diagrams and Software design

Last updated on 26 April 2023

Reading: Pressman Chapter 8 (Requirements Modelling)

Questions 1:

“Software design principles are key notions that provide the basis for many different software design approaches and concepts. Software design principles include:

* abstraction;
* coupling and cohesion;
* decomposition and modularization;
* encapsulation/information hiding;
* separation of interface and implementation;
* sufficiency, completeness, and primitiveness; and
* separation of concerns.” [SWEBoK Chapter 2]

In your own words give a short explanation for as many of these concepts as you can. Also, provide an example for each concept. If you are not sure about a concept then make a note and come back to it in future weeks. By the end of the unit, you should be able to explain each of the principles above.

Question 2:

When you write a program, are you doing “design”? Why or why not? If not, then what makes software design different from coding?

Question 3:

If a software design is not a program, then what is it?

Question 4:

How do we assess the quality of a software design?

Question 5

The E-mail Filter system filters incoming e-mails with a whitelist (e-mails from senders on the whitelist are accepted), a blacklist (e-mails from senders on the blacklist are deleted), and the Spam-assassin tool (e-mails that do not pass this check are marked as spam). The system will run on a single-core server machine, but may be moved to a multi-core server if the load gets too high.

A brief web search reveals that there are hundreds of existing software libraries that can identify spam emails for you. But they are written in different languages and use a variety of machine learning approaches. On the other hand, you could implement your own Spam filter.

Use ***design rationale***to document the best design decision considering the alternatives of using existing spam software or implementing your own.

Your answer should clearly identify: Issue, Proposals, Criteria, Arguments and Resolution. Also mention any unresolved questions or assumptions you identify.

Question 6 **Reading UML sequence diagrams**

In plain English sentences, describe the scenario represented by the following UML sequence diagram. You can read more about this (real world!) scenario at https://docs.oracle.com/cd/E82085\_01/160027/JOS%20Implementation% 20Guide/Output/oauth.htm

Diagram

Description automatically generated

**Question 7 UML State Diagrams**

In plain English sentences, describe the scenario represented by the following UML state diagram. For more details see the source for this example which includes actions for managing a waiting list and actions for state changes. https://www. tutorialspoint.com/uml/uml\_statechart\_diagram.htm

Diagram

Description automatically generated

**Question 8**

Developing UML state diagrams Draw a UML state diagram to describe the states of the following security light system. A security light system has a switch and a motion sensor attached. It can be either armed or unarmed. If the switch is in the off position the light is off and the system is unarmed. When the switch is turned on, the light stays off but the system is armed. If the system is armed and the motion sensor detects movement, the light comes on. If no movement is detected for 5 seconds, the light goes off.