CSCE 742 - Practice Midterm
Name:

This is a 75-minute exam. On all essay type questions, you will receive points based on the quality of the answer - not the quantity.

Make an effort to write legibly. Illegible answers will not be graded and awarded 0 points.

There are a total of 8 questions and 100 points available on the test.

Problem 1

How is Software Architecture different from Software Design? How is it the same?

Problem 2

1. What are differences between requirements and goals?
2. List two requirements and two goals for the airport parking example.

Problem 3

The benefit of viewpoints is that they allow separation of concerns and prevent overwhelming users with information. However, in many cases, the viewpoints are tightly coupled, in that a change in one viewpoint necessitates a change in another viewpoint. Consider the Deployment and Concurrency viewpoints.

1. Give examples of information that is duplicated between the two viewpoints and unique to each viewpoint.
2. Should these two viewpoints be merged? Argue in terms of cohesion and coupling of the information between the two views.

Problem 4

Are the following business principles, technology principles for a specific system, or low-level object-oriented design advice? Explain why you chose each answer.
1. All external access to the system should be via two factor authentication, involving something you have and something you know, e.g. smart card and password
2. Security measures should be applied appropriately to the level of risk defined for a given system or database.
3. Encapsulate actions into objects that can be stored, replayed, or undone.
4. Adopt an appropriate level locking strategy, typically using optimistic locking for frequently changed data and pessimistic for data where there is a low rate of change.
5. Minimize the number of security interactions needed for the web store.

Problem 5

Making servers stateless (in terms of session state), like in the REST style, has many benefits for scalable and reliable client/server systems. Please describe at least three *drawbacks* of building stateless systems. Give two examples of systems where constructing stateful servers is a good idea.

Problem 6

In class and in the Garlan and Shaw paper, we considered architectural styles, including:

    a. pipe and filter
    b. event-based
    c. layered
    d. repository

Suppose that you are to design an automotive system whose subsystems (a-h) are enumerated below. For each style discussed above, describe a subsystem where the style would be an appropriate structuring mechanism - and why - or describe why this style does not apply to any of the subsystems.

    a. On-star communications: manages communications with satellite
    b. sensor management: turns noisy sensor data into useful information
    c. motion control: operates the motors and provides position and velocity
    d. Image processing system to identify highway lanes
    e. UX vehicle management involving touch screen
    f. Health/status monitoring: checks status of all other subsystems to ensure correct operation
    g. Collision avoidance system
    h. Dashboard displays

Problem 7

Create a context diagram for the automotive example in the previous question.

Problem 8

Consider the software for air-traffic control at an airport (say, CAE). Identify one performance, one availability, and one usability requirement that you think would be necessary for this software and develop a quality attribute scenario for each.