Comprehensive Exam Fall 2010

Software Engineering

Friday October 22, 2010, 10:00 am – 11:30 am

Instructions

Write the last four digits of your student identification number in the space below.

Answer any four (4) of the six (6) questions. Each questions has equal value.

When a question asks you to "describe", "discuss", or "explain" something, it means you must provide a convincing, clear, and reasonable answer; simply stating a fact without any supporting argument is insufficient.

No study aids (notes, books, etc.) are permitted during the exam

Good luck!

ID Number:_____

The first four questions of examination are organized around the following requirement specification:

> The ***mFerio*** is a secure peer-to-peer digital wallet that is integrated into an existing mobile device such as a cell phone. ***Mferio*** permits users to manage multiple monetary and ID instruments and quickly search them by name, type, or other keywords. ***mFerio*** enhances security as all data would be encrypted; backup options would make recovering from loss or theft easier.

Design. Consider the 6 following usability criteria: Fast to use; Easy to use; Easy to learn; Predictable performance; Accurate; Available. From a design and systems engineering perspective, rank these criteria in order of importance to the mFerio project and justify your ranking.

Management: In the mFerio system the following security risks must be managed: Anonymity of transaction (like cash); Transaction integrity (e.g., interrupting a transaction will cancel entire transaction); Replication (counterfeiting); Tamper proof (cannot break into system); Theft resistance (unlike cash).

From a security management perspective, rank these risks in order of importance; then for the two most important security risks you have determined, outline an accompanying mitigation strategy.

Process: Select a process model for an implementation of the mFerio system. Justify your choice in two ways: reasons for selecting the process model and reasons for not selecting one other process model.

Requirements. The specification confuses functional and non-functional requirements.

a. Identify the functional and non-functional requirements.

b. For one of the functional requirements and one of the non-functional requirements that you extract, write a specification using structured natural language or a design description language.

Construction/Maintenance: (nothing to do with *mFerio).*

Given three sorted lists of integers as file input, write a one-pass algorithm that produces one sorted file of output, where the output is the sorted merger of the three input files. Use any ***high-level programming language*** that you wish. Pseudo-code is ***not acceptable.***

Suppose the specification is relaxed to permit unsorted file input, in which case the program will abort with a suitable error message; otherwise the program will function as specified. Outline the changes that you would make to your implementation.

Testing/Maintenance: (nothing to do with *mFerio).*

Given three sorted lists of integers as file input, a program is to produce one sorted file of output, where the output is the sorted merger of the three input files.

a. Outline a comprehensive strategy for this program. Justify your thinking.

b. Suppose the specification is relaxed to permit unsorted file input, in which case the program will abort with a suitable error message; otherwise the program will function as specified. What changes must be made to the test strategy of part (a)?