

Milwaukee School of Engineering
Electrical Engineering and Computer Science Department

SE-382 – Midterm Examination

Tuesday 13 January 2004

Open books and notes. No sharing of materials.

Show all work so that partial credit can be given.

Name: _____

Problem 1: (20 points) _____

Problem 2: (20 points) _____

Problem 3: (20 points) _____

Problem 4: (20 points) _____

Problem 5: (20 points) _____

Total: (100 points) _____

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1. (20 points) **Context Diagram and Business Events**

A micropayment system for various services (ACM and IEEE journal use, music downloading services, etc.) is to be developed to offer an alternative to, *e.g.*, a \$50 per year subscription. The system will allow access on a per-item (article, song, etc.) basis and will be more economical for occasional, limited use. The intent is that this would increase online service revenues by increasing legal use among low volume users.

- A. (14 points) **Draw** a system context diagram for a micropayment system. **Label** each adjacent system as active, autonomous, or cooperative. Include at least one of each type. **Justify** your answer.

- B. (6 points) **List** and briefly **describe** 3 business events for this system.

2. Short Answer (20 points)

A. (10 points total) **Identify** each of the following as a constraint, functional requirement, or nonfunctional requirement. Briefly **justify** each response.

- 1) The system shall comply with 20 USC § 1232g, the Family Educational Right to Privacy Act (FERPA).
- 2) The database backend shall use record-locking features that were available in Microsoft SQL Server 7.0.
- 3) The user interface shall be engaging to children from 4 to 6 years of age.
- 4) The system shall compute the shortest route between all pairs of cities.
- 5) Release 1.0 of the system shall be ready for production by the beginning of 2Q 2006.

B. (2 points) **List** the key decisions made during project blastoff.

C. (5 points) **Discuss** a potential business advantage or disadvantage of expanding the work context you drew for question 1 to include one of the adjacent systems that you identified.

D. (3 points) **Discuss** the meaning of “event-driven” as used in the phrase “event-driven use cases.”

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3. Requirements (20 points)

Read the following statement of requirements for part of a ticket issuing system carefully.

An automated ticket issuing system sells rail tickets. Users select their destination, and input a credit card and a personal identification number. The rail ticket is issued and their account charged with its cost. When the user presses the start button, a menu display of potential destinations is activated along with a message to the user to select a destination. Once a destination has been selected, users are requested to input their credit card. Its validity is checked and the user is then requested to input a personal identifier. When the credit card transaction has been validated, the ticket is issued.

A. (10 points) **Write** at least 2 ambiguities or omissions that you see in the requirements specified for the ticket issuing system.

B. (10 points) Keeping in mind the expected reliability and response time of the ticket issuing system described above, **write** at least 1 non-functional requirement for each.

4. Event-driven Use Case (20 points)

Consider an automated teller machine (ATM) product. The user puts a card into a slot and enters a 4-digit personal identification number (PIN). If the PIN is incorrect, the card is ejected. Otherwise the user may perform the following operations on up to four different bank accounts:

- Deposit any amount. A receipt is printed showing the date, amount deposited, and account number.
- Withdraw up to \$200 in units of \$20 (the account may not be overdrawn). In addition to the money, the user is given a receipt showing the date, amount withdrawn, account number and account balance after the withdrawal.
- Quit. The card is ejected.

Based on the response by the ATM product for one of the business events, **write** an event-driven use case. Please **specify** the title, brief description, basic flow, alternative flows, exception flows, preconditions, and post conditions for the use case.

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5. Stakeholders and Use Cases (20 points)

A software system is to be developed to automate a library catalogue. This system will contain information about all the books in the library and will be usable by the library staff and by book borrowers and readers. The system should support catalogue browsing, querying and should provide facilities allowing users to send messages to library staff reserving a book, which is on loan.

- A. (10 points) **Identify** at least 5 of the principal viewpoints / stakeholders that might be taken into account in the specification of this system.

- B. (10 points) **Write** at least 2 complete, measurable, and unambiguous functional requirements that you can derive from the above requirements.