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CEN 4010

Online

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Assignment 2

1) Describe the reasons for potential design conflicts in architectures where the most crucial non-functional needs are security and availability.
    a. With the system being available, various updates will require less downtime to ensure maximum availability during them and with system security updates that can require extensive testing and system restarts, which can cause temporary unavailability.
    b. As a rule for providing high availability, fast recovery from failures is needed. Contrasting this approach in security considerations, incident handling and recovery may often be more cautious, such as stopping services to analyze the situation, lowering system availability in recovery.
    c. The requirement of security for data both in transit and at rest necessitates data encryption. This is very important for maintaining confidentiality and protecting against unauthorized access. Also, encrypting and decrypting data involves computational overhead, which delays system performance. Such delays have repercussions for availability, since longer processing times are needed for the completion of a transaction or service request, particularly in real-time systems handling large volumes of data.
    d. Fail-safe mechanisms, in case of suspicion or partial breach, could kick in and prevent further damage. This can involve service stops, account locks, or parts of the system going offline for analysis and remediation. These actions might contradict availability because taking a system offline for security means invalidating access for valid users. In highly available systems, the downtime is kept to a minimum, but in some security incidents, the system may be made unavailable on purpose to contain the threat.

    e. One of the things that should be done to guarantee that only the people who should use the system use it is the installation of very strong user verification mechanisms. Insecure transmissions lead to the slowing down of response times and make the operation of the system prone to security problems because the security protocol is not followed all the time at the time of peak use. Availability oriented systems must manage the speed of the security with the other needs for an instant and correct access.

2) Compose a list of 5 non-functional requirements that specify the desired response time and reliability of the ATM system.

    a. It must have an availability of 99.9%, ensuring that it is operational and accessible for customers nearly all the time.
    b. The system must process user transactions within 2 seconds after the final input confirmation, ensuring timely feedback to the user.
    c. The system must ensure that 100% of completed transactions are accurately reflected in both the customer's account and the bank’s ledger to prevent discrepancies.
    d. Backup and Redundancy: The system must maintain redundant communication links with banking servers to ensure that services remain available in case of network failures.
    e. In case of a system failure, it must recover within 10 seconds or redirect the user to the nearest available ATM without losing transaction data.
3) Draw 5 use cases that can be used as a foundation for comprehending what an ATM system needs.
    a. Withdraw cash: The user inserts the card, enters password/PIN, selects an amount, the system will verify the account balance and then withdraw the money.
    b. Check the balance: The user logs in using their card and password/PIN, selects option to verify balance, usually will have check balance as the keyword, the system will retrieve and display the balance.

c. Transfer funds between accounts: The user logs in, selects Transfer funds, options between the accounts, and the amount to be transferred and the system verifies the balance and amount and transfers.
d. Deposit Funds: The user inserts the card, there can be a pre option without inserting pin for deposit and allows the user to enter the cash which it will count automatically and have user confirm or have the user insert checks and have them confirm the amount as well before depositing into the account and if it is not verified then to spit out the cash or check.
e. Change pin: The user will have the option to switch the pin to their debit card, asking to enter the old one and then entering a new one. The system verifies old pin and replaces it with new.

4) Draw an activity diagram that represents the data processing that occurs during a customer's cash withdrawal from the ATM.