

CS 612 - Software Architectures

Homework Assignment 3

Problem Description

CUSTOMER 1ST BANK, a small local bank, has been advised by a consulting firm that its software system needs a major overhaul. With a heavy heart, the BANK's management has decided to invest in the system's re-development.

Compared to a large commercial bank, CUSTOMER 1ST provides only a limited number of services:

- savings accounts,
- checking accounts, and
- ATM (i.e., debit) cards.

The BANK operates from a single building with three teller windows. Additionally, the bank has two ATMs off-site. BANK hours are 10-4 M-F; the ATMs are available 24 hours a day, 7 days a week.

The BANK has two types of customers and must therefore support two types of accounts: personal and business. The system must support the following basic operations for personal accounts:

- account opening and closing (through a BANK teller only);
- deposits and withdrawals (through a teller or an ATM);
- transfers between a single customer's savings and checking accounts (through a teller or an ATM).

There is a \$300 limit on withdrawals made from an ATM for a single account on a single day. Deposits made via an ATM do not become available for withdrawal until the following business day.

Business accounts may only be checking accounts. A business may only own a single account. No direct transfer of funds between two business accounts is allowed. Likewise, direct transfer of funds between a business and a personal account should never be allowed, even if they are owned by the same person.

The BANK calculates interest daily. The interest rates are as follows:

- personal savings account — 0.3%,
- personal checking account — 0.25%, and
- business account — 0.5%.

Simple interest is added to each account at midnight. A bank manager may change the daily interest rate. A new interest rate takes effect the following business day.

The system must support near-simultaneous access to customer accounts (e.g., a woman deposits a check while, at the same time, her husband withdraws money at an ATM). The system must disallow illegal transactions. For example, withdrawing or transferring more money than currently exists in an account must not be allowed.

The system must automatically log out the tellers one hour after the BANK closes for the day and deny them access until one hour prior to the BANK's opening the following business day. However, BANK managers are allowed to access the system around the clock.