Object-Oriented Static Modeling of the Banking System - II

Lecture # 31

Problem Description

- A bank has several automated teller machines (ATMs), which are geographically distributed and connected via a wide area network to a central server. Each ATM machine has a card reader, a cash dispenser, a keyboard/display, and a receipt printer. By using the ATM machine, a customer can withdraw cash from either checking or savings account, query the balance of an account, or transfer funds from one account to another. A transaction is initiated when a customer inserts an ATM card into the card reader. Encoded on the magnetic strip on the back of the ATM card are the card number, the start date, and the expiration date. Assuming the card is recognized, the system validates the ATM card to determine that the expiration date has not passed, that the user-entered PIN (personal identification number) matches the PIN maintained by the system, and that the card is not lost or stolen. The customer is allowed three attempts to enter the correct PIN; the card is confiscated if the third attempt fails. Cards that have been reported lost or stolen are also confiscated.

Problem Description

- If the PIN is validated satisfactorily, the customer is prompted for a withdrawal, query, or transfer transaction. Before withdrawal transaction can be approved, the system determines that sufficient funds exist in the requested account, that the maximum daily limit will not be exceeded, and that there are sufficient funds available at the local cash dispenser. If the transaction is approved, the requested amount of cash is dispensed, a receipt is printed containing information about the transaction, and the card is ejected. Before a transfer transaction can be approved, the system determines that the customer has at least two accounts and that there are sufficient funds in the account to be debited. For approved query and transfer requests, a receipt is printed and card ejected. A customer may cancel a transaction at any time; the transaction is terminated and the card is ejected. Customer records, account records, and debit card records are all maintained at the server.

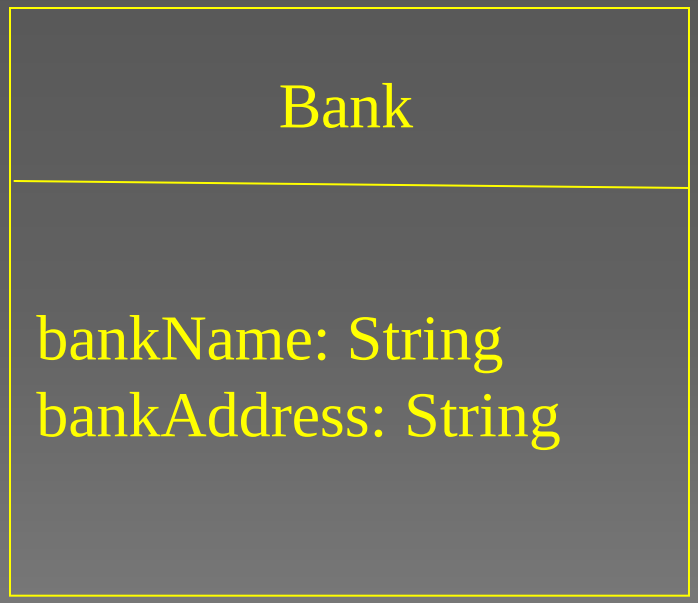
Problem Description

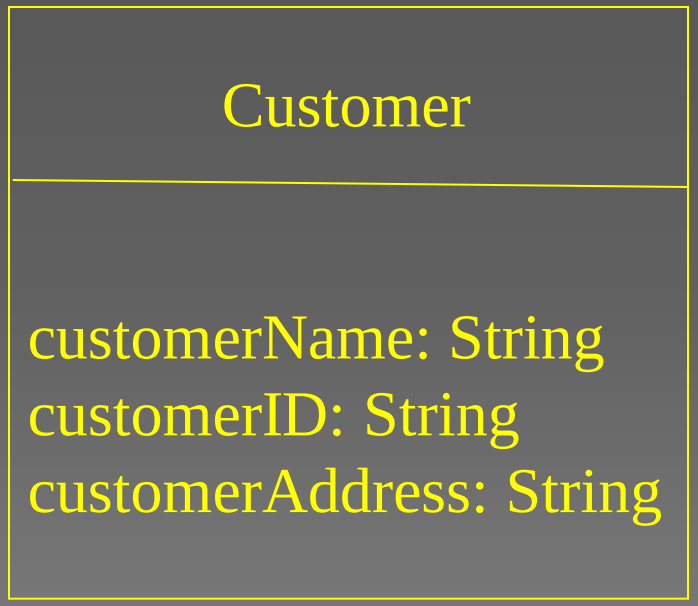
- An ATM operator may start up and close down the ATM to replenish the ATM cash dispenser and for routine maintenance. It is assumed that functionality to open and close accounts and to create, update, and delete customer and debit card records is provided by an existing system and is not part of this problem.

- 'Designing Concurrent, Distributed, and Real-Time Applications with UML' by H. Gomaa, Addison-Wesley, 2000

Entity Classes in Banking System

Entity Classes in the Banking System





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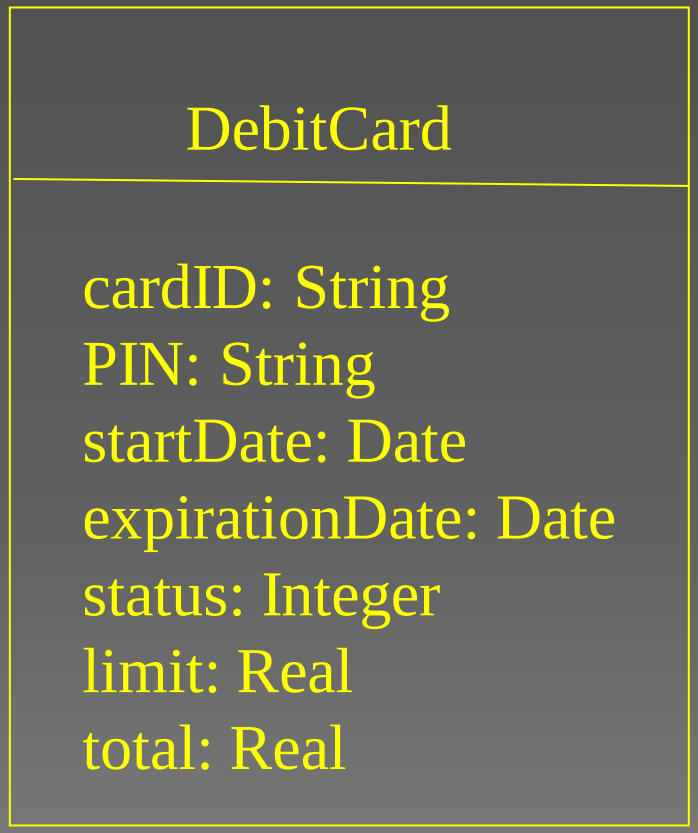

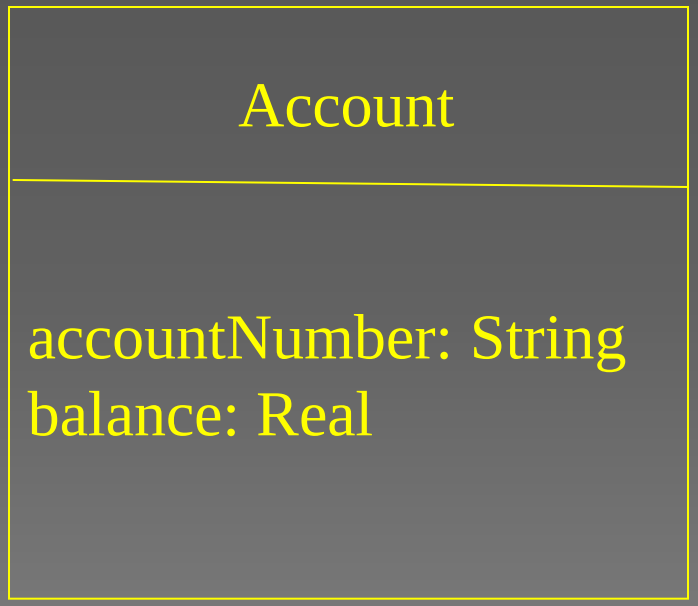

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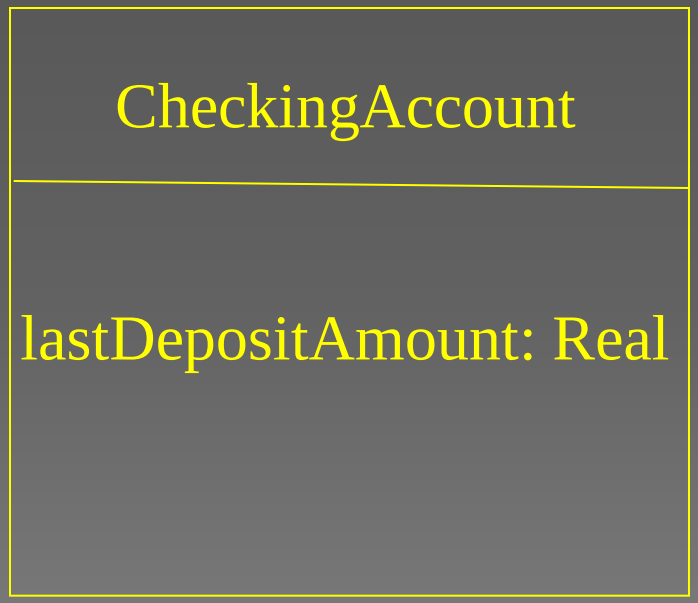

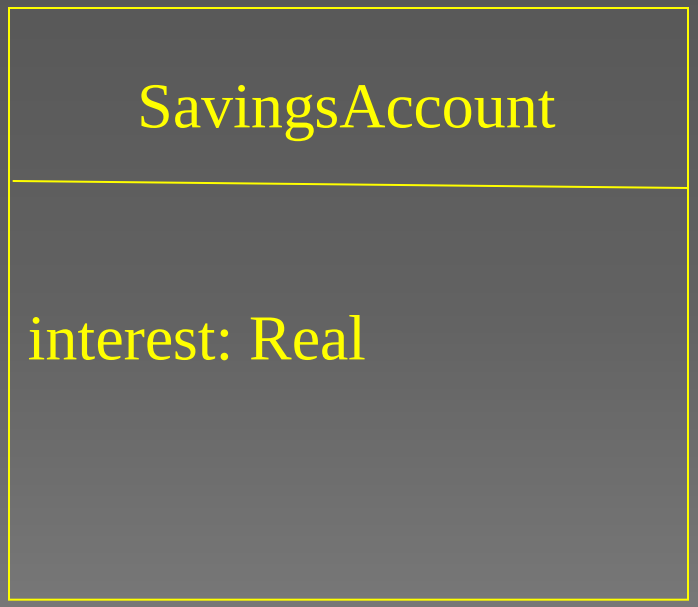

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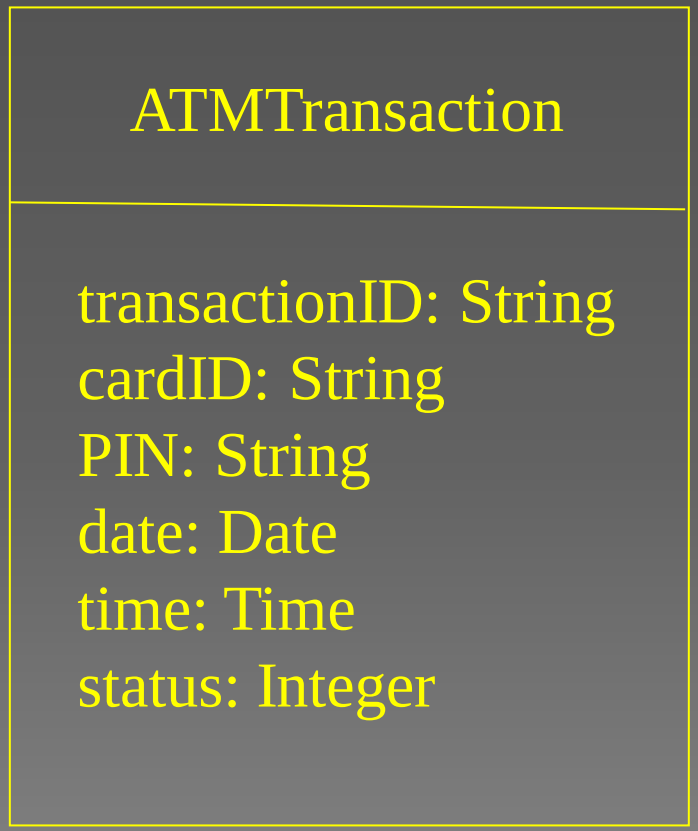

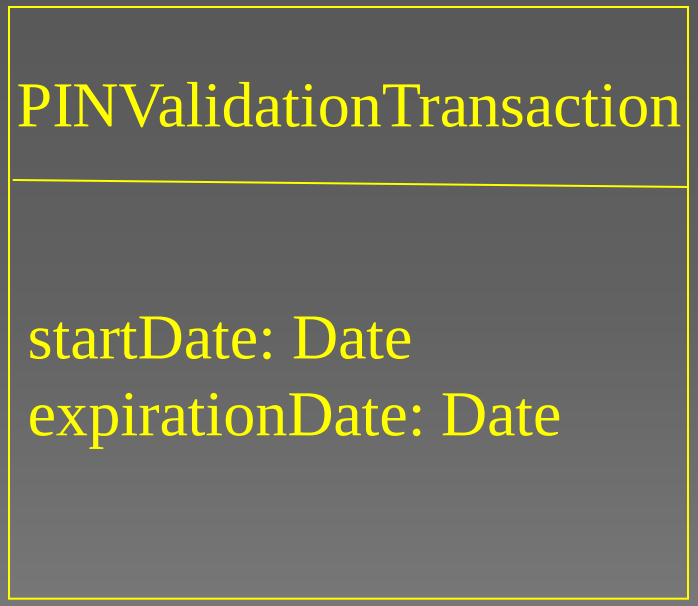

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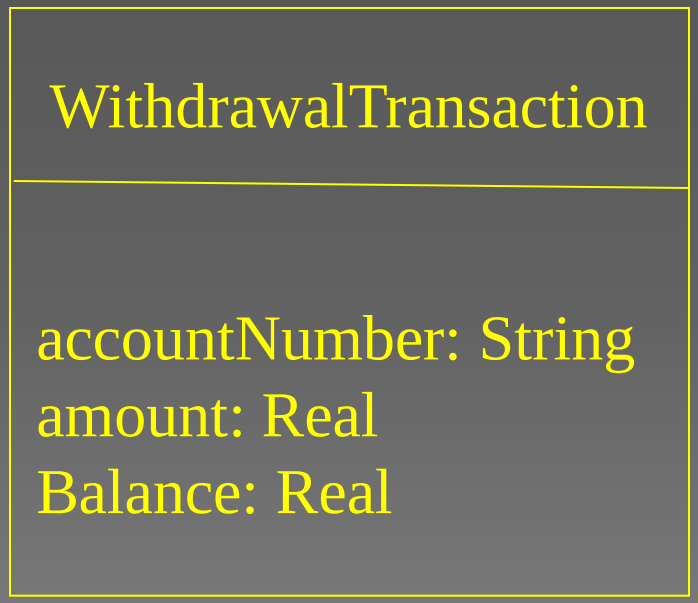

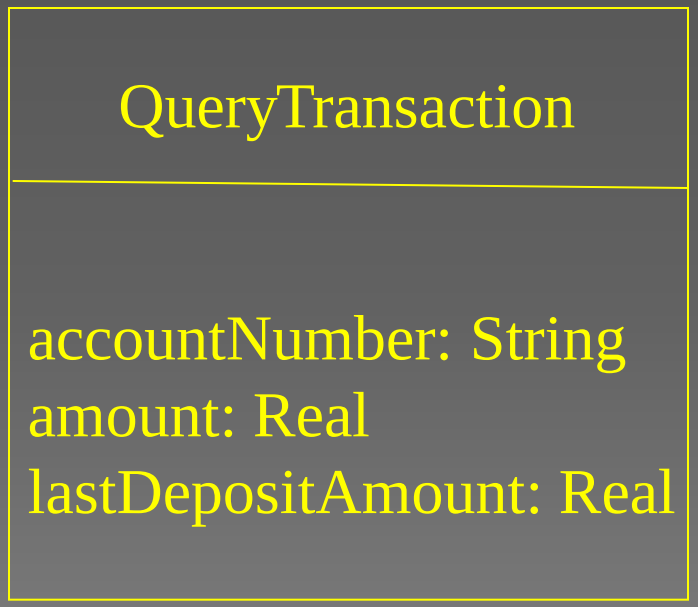

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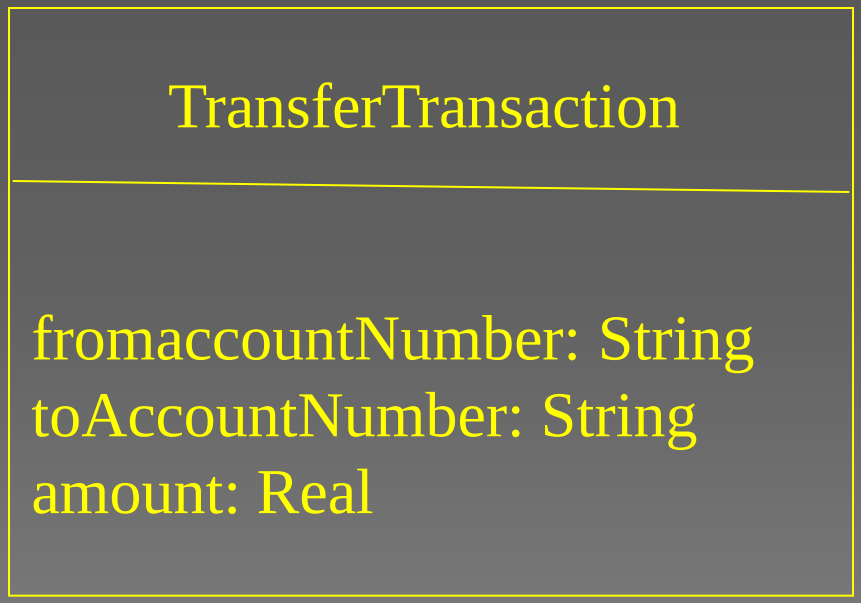

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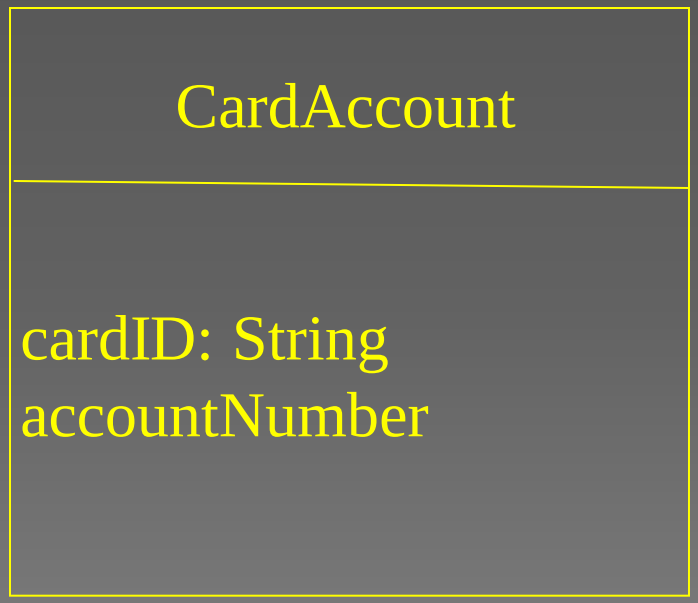

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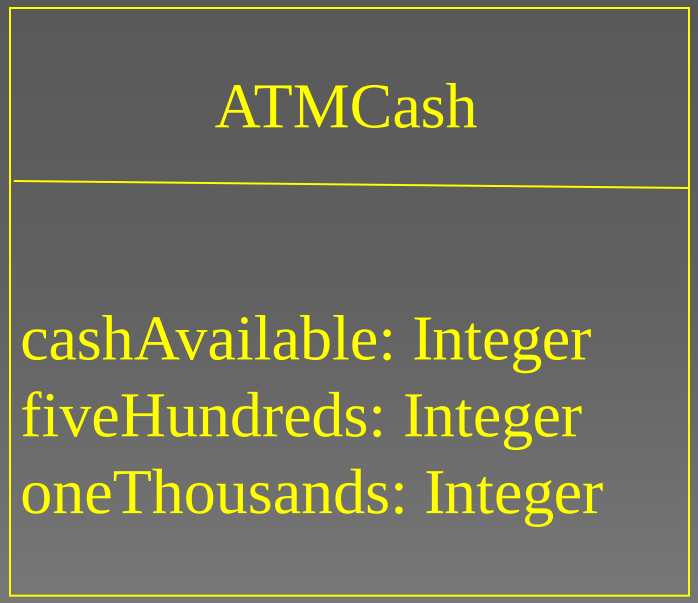
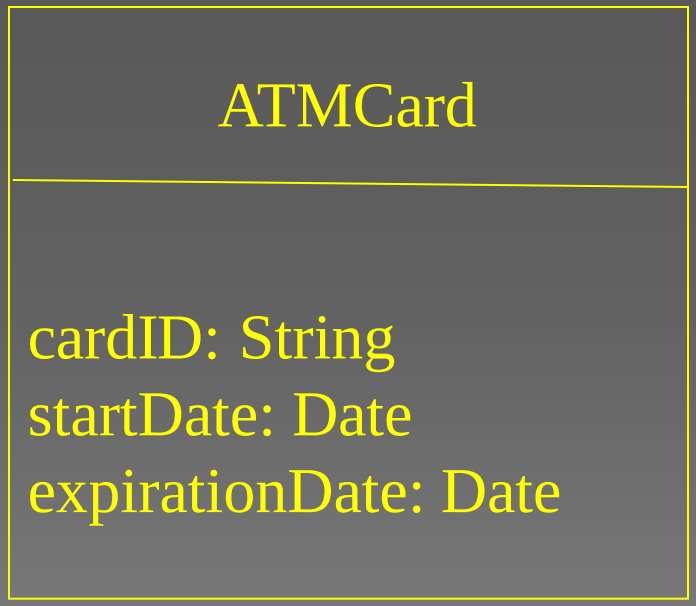




Interface Classes for External Objects

Output Device Interface Classes in the Banking System

CardReaderInterface

ReceiptPrinterInterface

CashDispenserInterface

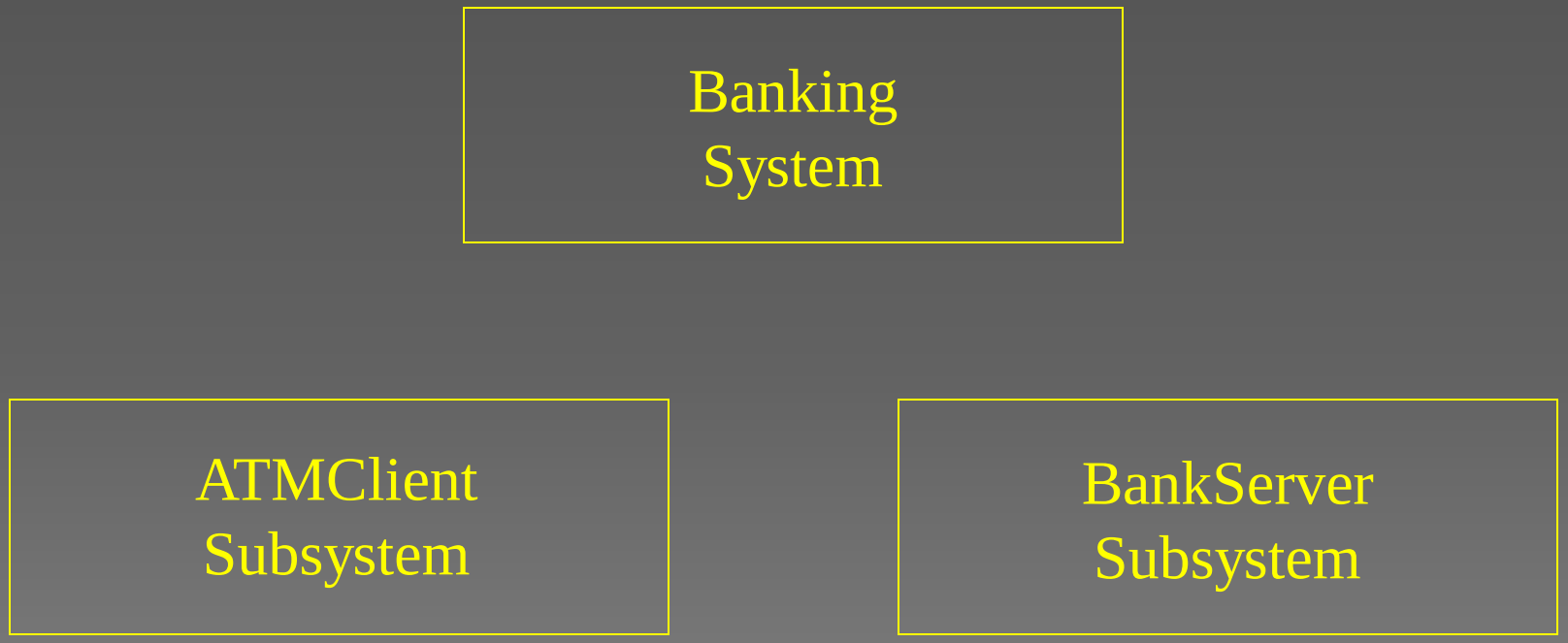
User Interface Classes in the Banking System

CustomerInterface

OperatorInterface

System and Subsystem Classes

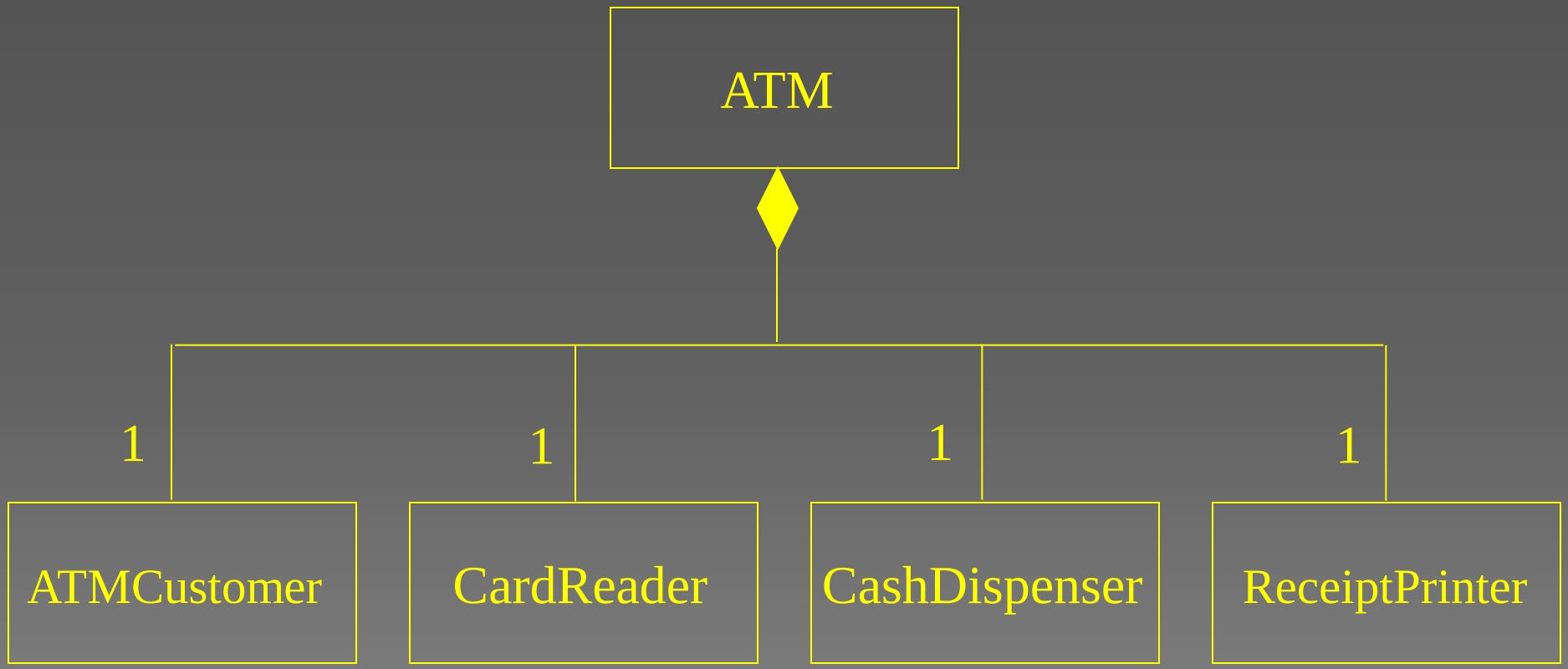
System and Subsystem Classes in the Banking System



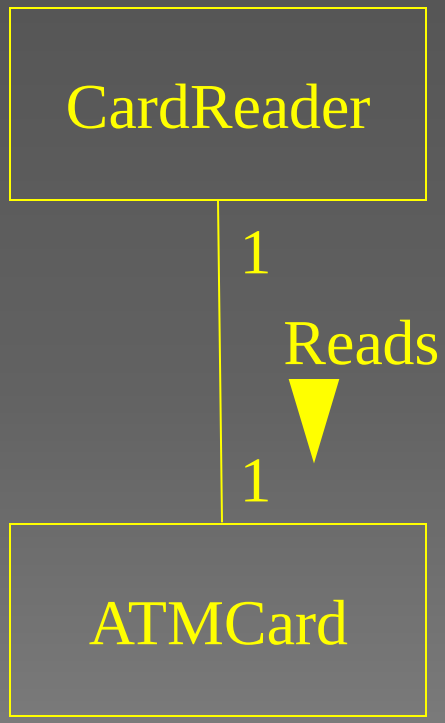
A Bank Has Many ATMs

An Operator Maintains an ATM

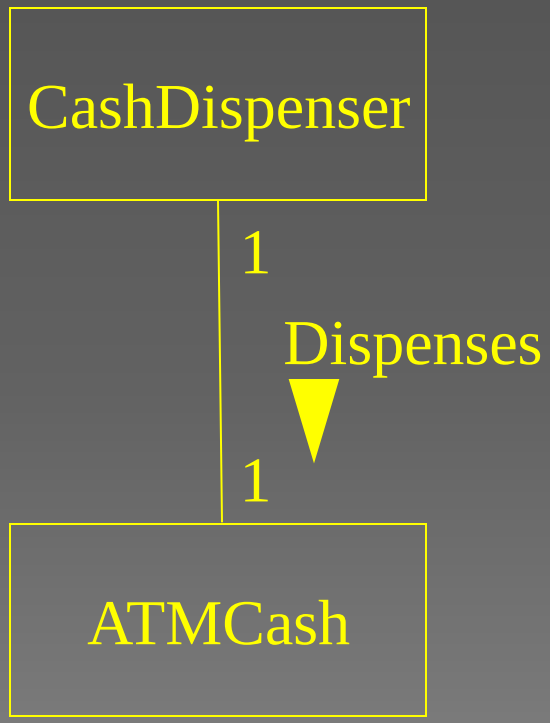
An ATM Has Other Objects



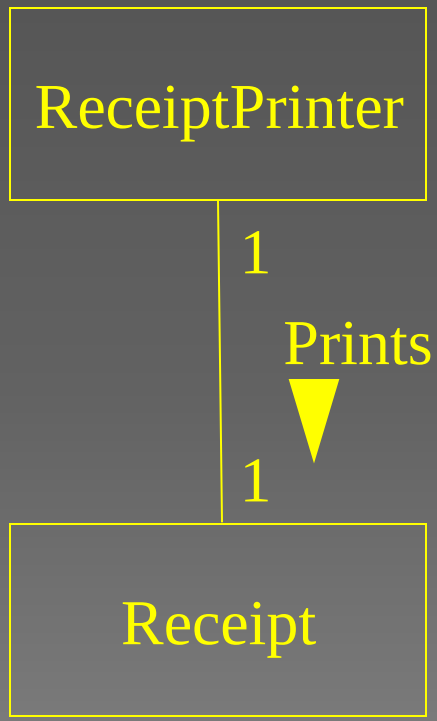
Relation Between CardReader and ATMCard



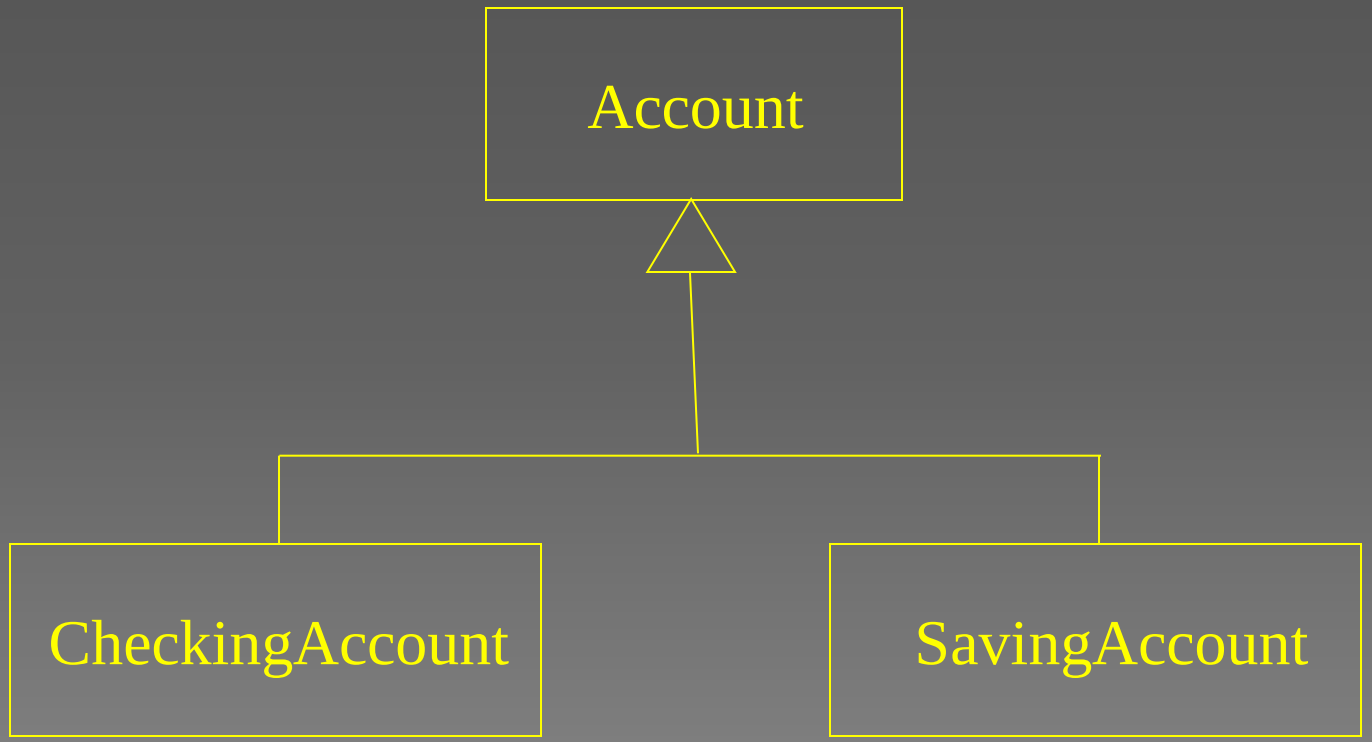
Relation Between CashDispenser and ATMCash



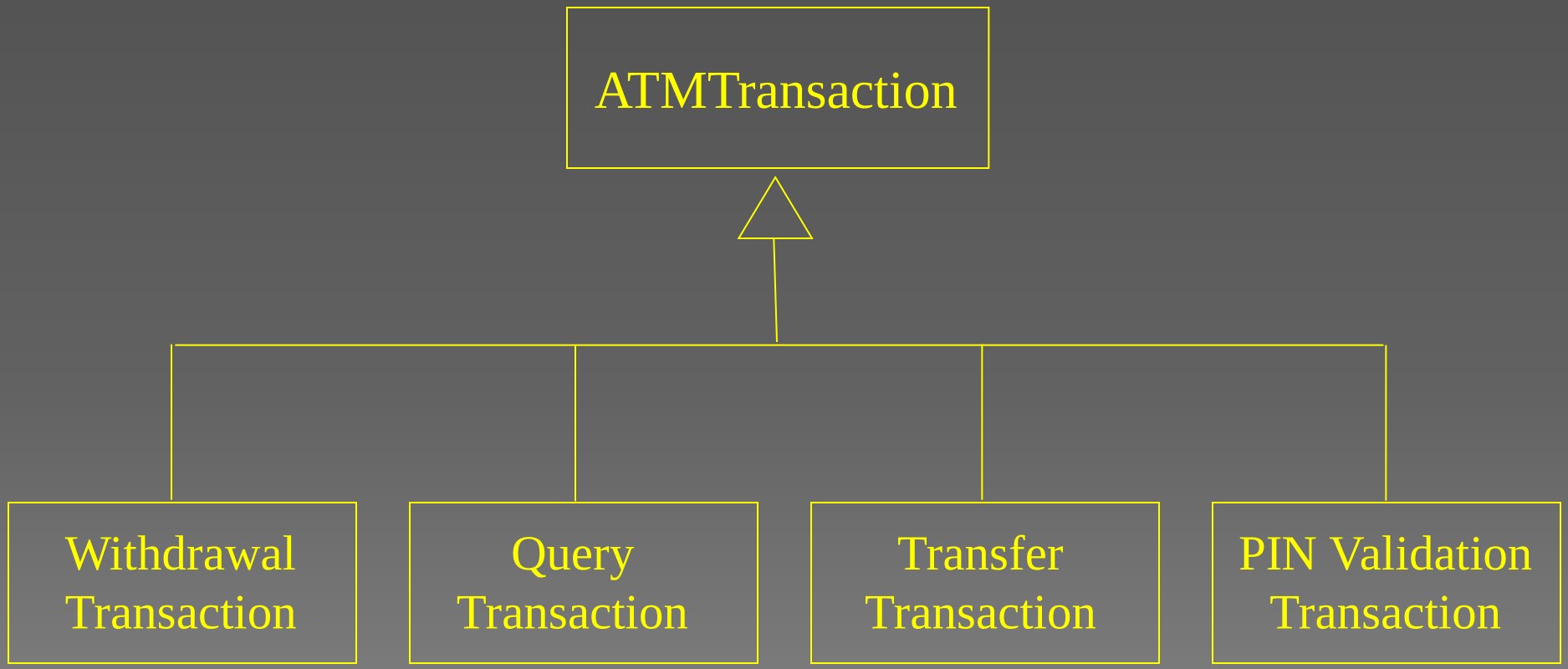
Relation Between ReceiptPrinter and Receipt



Relationship Between Account and CheckingAccount & SavingsAccount



ATMTransaction and its Subclasses



Summary

- We identified different classes in the Banking System Case Study
- We identified different relationships among those classes