Lecture # 39

Requirements Document for the Banking System

Requirements Document

- The requirements document is a formal document used to communicate the requirements to customers, engineers and managers
- It is also known as software requirements specifications or SRS

Requirements Document

- The services and functions which the system should provide
- The constraints under which the system must operate
- Overall properties of the system i.e., constraints on the system's emergent properties

Today's Topics

- In this lecture, we'll discuss the requirements document of the Banking system that we have been talking about in this course
- Let's develop a template based on the IEEE standard

SRS for the Banking System

- Preface
- Introduction
- Glossary
- Specific requirements
- Appendices
  - Use-case model
  - Object model
  - Data-flow model

SRS for the Banking System

- Preface
  - This should define the expected readership of the document and describe its version history including a rationale for creation of a new version and a summary of the changes made in each version
- Introduction
  - This should define the product in which the software is embedded, its expected usage and present an overview of the functionality of the control software

SRS for the Banking System

- Glossary
  - This should define all technical terms and abbreviations used in the document
- Specific requirements
  - This should define specific requirements for the system using natural language with the help of diagrams, where appropriate
- Appendices
  - Use-case model
  - Object model
  - Data-flow model

Software Requirements Specifications for the Banking System

1. Preface

- This document, Software Requirements Specification (SRS), is created to document the software requirements for the Banking System, as described in section 2, Introduction, of this document

1. Preface

- This document was created on the request of the ‘XYZ Bank Inc.’ – the ‘Client’. The creator of this document is ‘A Software House Inc.’ – ‘Vendor’. The ‘Client’ has asked the ‘Vendor’ to develop an SRS for the Banking System. The ‘Vendor’ will also be responsible for the development of the software based on this SRS

1. Preface

- This is the first version of the SRS.

2. Introduction

- This section documents an overview of the functionality expected from the software for the Banking System
- We'll review the functionality of the software to be developed

2. Introduction

- 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.

2. Introduction

- 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.

2. Introduction

- 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.

3. Glossary

- ATM: Automated Teller Machine
- PIN: Personal Identification Number

4. Specific Requirements

1. The XYZ Bank Inc. can have many automated teller machines (ATMs), and the new software system shall provide functionality on all ATMs.

2. The system shall enable the customers of XYZ Bank Inc., who have valid ATM cards, to perform three types of transactions; 1) withdrawal of funds, 2) Query of account balance, and 3) transfer of funds from one bank account to another account in the same bank.

4. Specific Requirements

3. An ATM card usage shall be considered valid if it meets the following conditions:
   a) The card was issued by an authorized bank.
   b) The card is used after the start date, i.e., the date when the card was issued.
   c) The card is used before the expiration date, i.e., the date when the card expires.
   d) The card has not been reported lost or stolen by the customer, who had been issued that card.
   e) The customer provides correct personal identification number (PIN), which matches the PIN maintained by the system.

4. Specific Requirements

4. The system shall confiscate the ATM card if it detects that a lost or stolen card has been inserted by a customer. The system shall also display an apology to the customer.
5. The system shall allow the customer to enter the correct PIN in no more three attempts. The failure to provide correct PIN in three attempts shall result in the confiscation of the ATM card.

4. Specific Requirements

6. The system shall ask for the transaction type after satisfactory validation of the customer PIN. The customer shall be given three options: withdrawal transaction, or query transaction, or transfer transaction.
7. If a customer selects withdrawal transaction, the system shall prompt the customer to enter account number and amount to be dispensed.

4. Specific Requirements

8. For a withdrawal transaction, the system shall determine that sufficient funds exist in the requested account, that the maximum daily limit has not be exceeded, and that there are sufficient funds available at the local cash dispenser.

4. Specific Requirements

9. If a withdrawal transaction is approved, the requested amount of cash shall be dispensed, a receipt shall be printed containing information about the transaction, and the card shall be ejected. The information printed on the receipt includes transaction number, transaction type, amount withdrawn, and account balance.

4. Specific Requirements

10. If a customer selects query transaction, the system shall prompt the customer to enter account number.
11. If a query transaction is approved, the system shall print a receipt and eject the card. The information contained on the receipt includes transaction number, transaction type, and account balance.

4. Specific Requirements

12. If a customer selects transfer transaction, the system shall prompt the customer to enter from account number, to account number, and amount to be transferred.
13. The system shall check if there are enough funds available in the from account, which are being requested for transfer to the to account.

4. Specific Requirements

14. If the transfer transaction is approved, a receipt shall be printed and card shall be ejected. The information printed on the receipt includes transaction number, transaction type, amount transferred, and account balance.
15. The system shall cancel any transaction if it has not been completed if the customer presses the Cancel button

4. Specific Requirements

16. The customer records, account records, and debit card records will all be maintained at the server and shall not be the responsibility of the system.
17. The system shall enable an ATM operator to shutdown or start up an ATM for routine maintenance.

4. Specific Requirements

18. The system shall enable an ATM operator to add cash to the cash dispenser.
19. The system shall not be responsible for opening or closing of accounts, and to create, update, and delete customer and debit card records. These tasks are performed elsewhere by a bank.

4. Specific Requirements

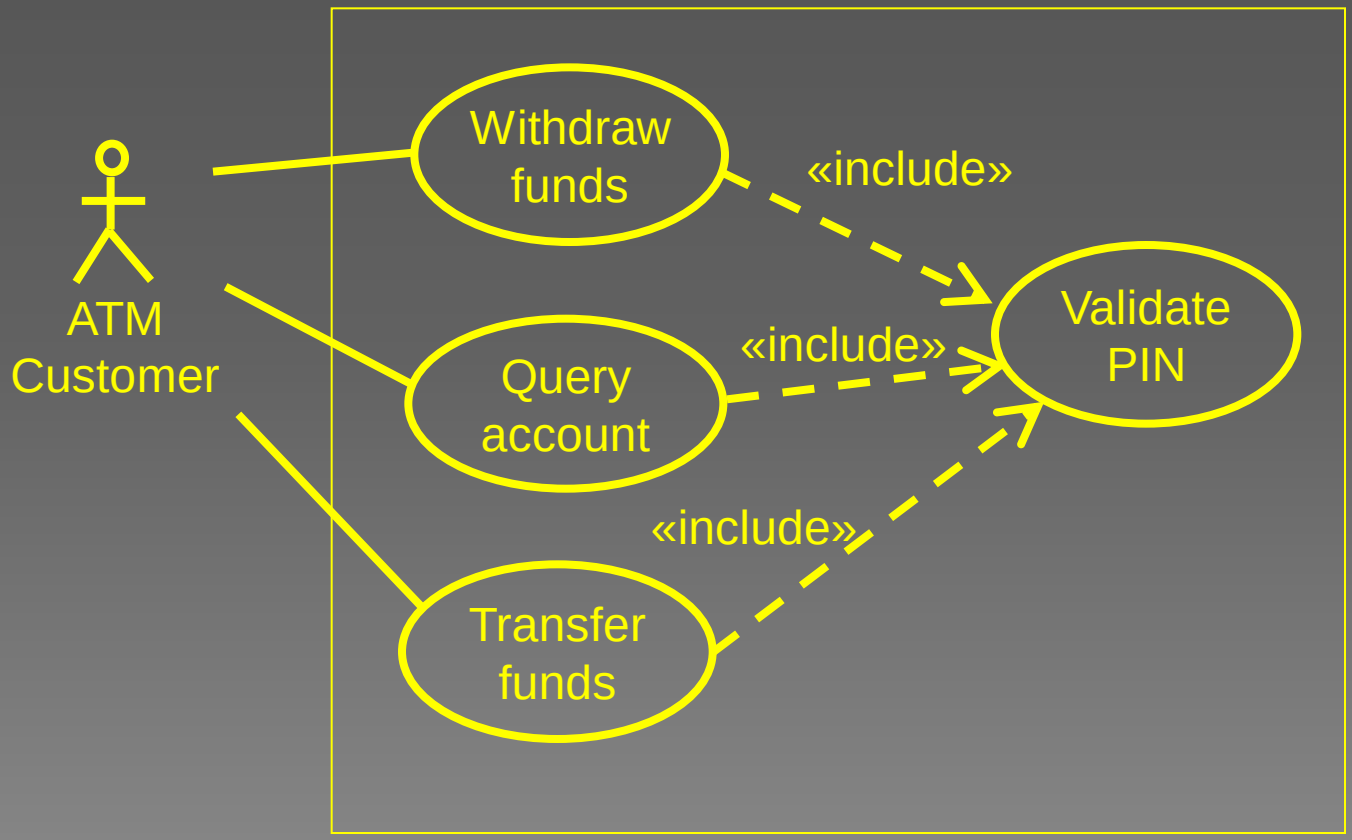
20. The system shall be linked with the bank server through communication systems, which are beyond the scope of the current system. It is assumed that this facility is always available.
21. The system shall not be responsible for the maintenance of the hardware devices of the ATM or network facilities.

5. Appendices

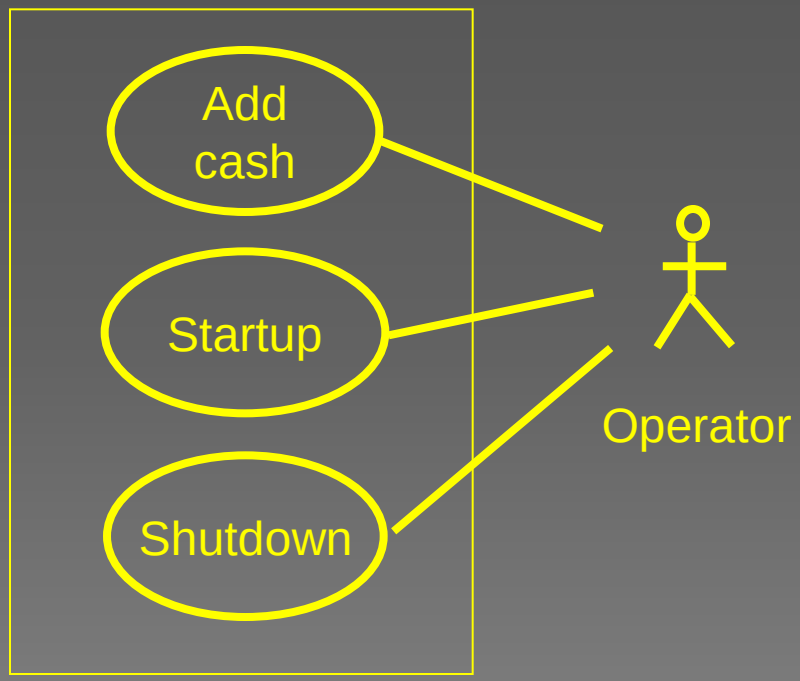
- 5.1 Use-case model
- 5.2 Object model
- 5.3 Functional model
  - 5.3.1 Data-flow model
  - 5.3.2 SADT model
- 5.4 Dynamic model
  - 5.4.1 Statecharts
  - 5.4.2 Interaction diagrams

Use Case Model

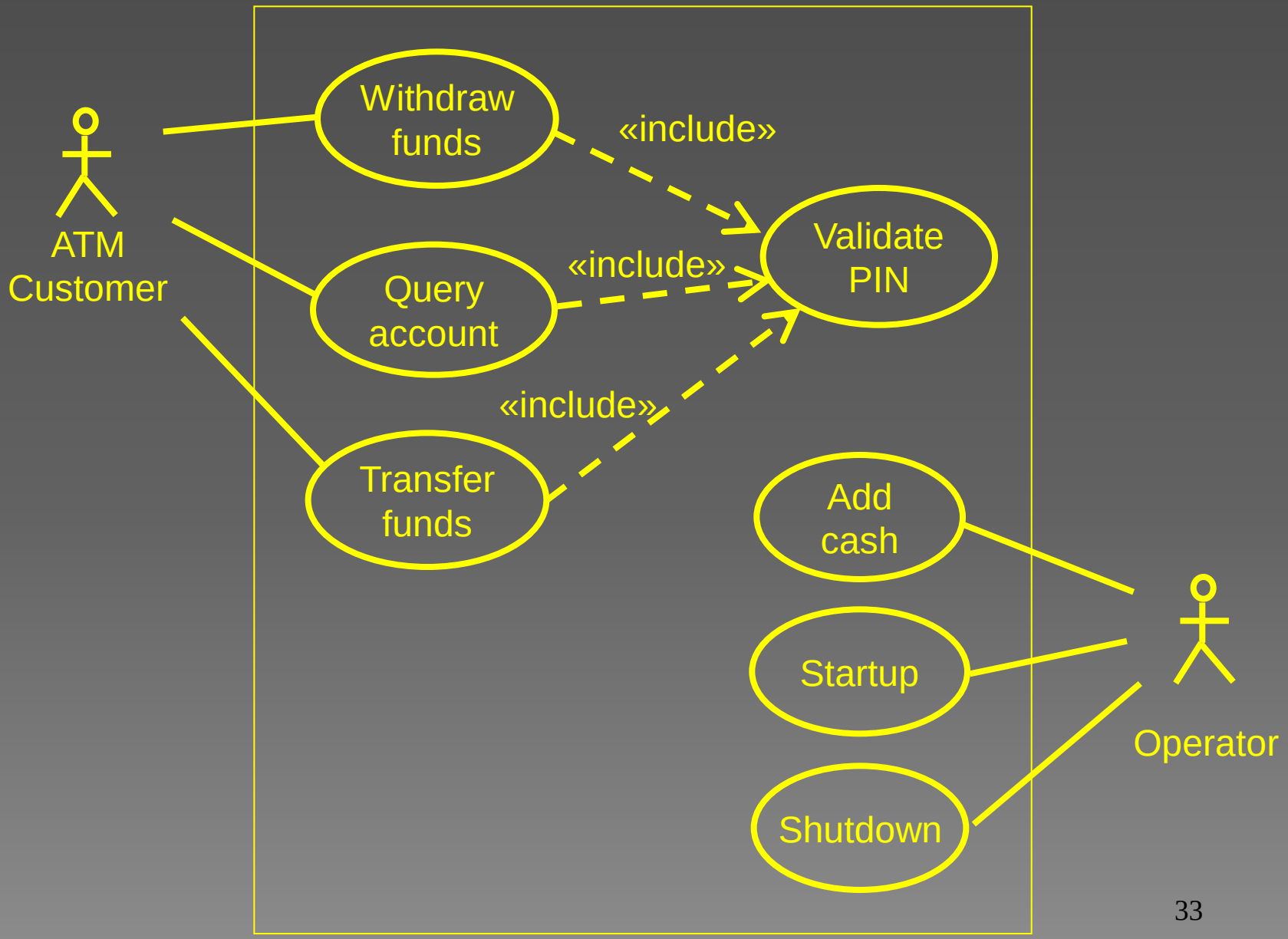
Uses Case Diagram for ATM Customer



Use Case Diagram for ATM Operator

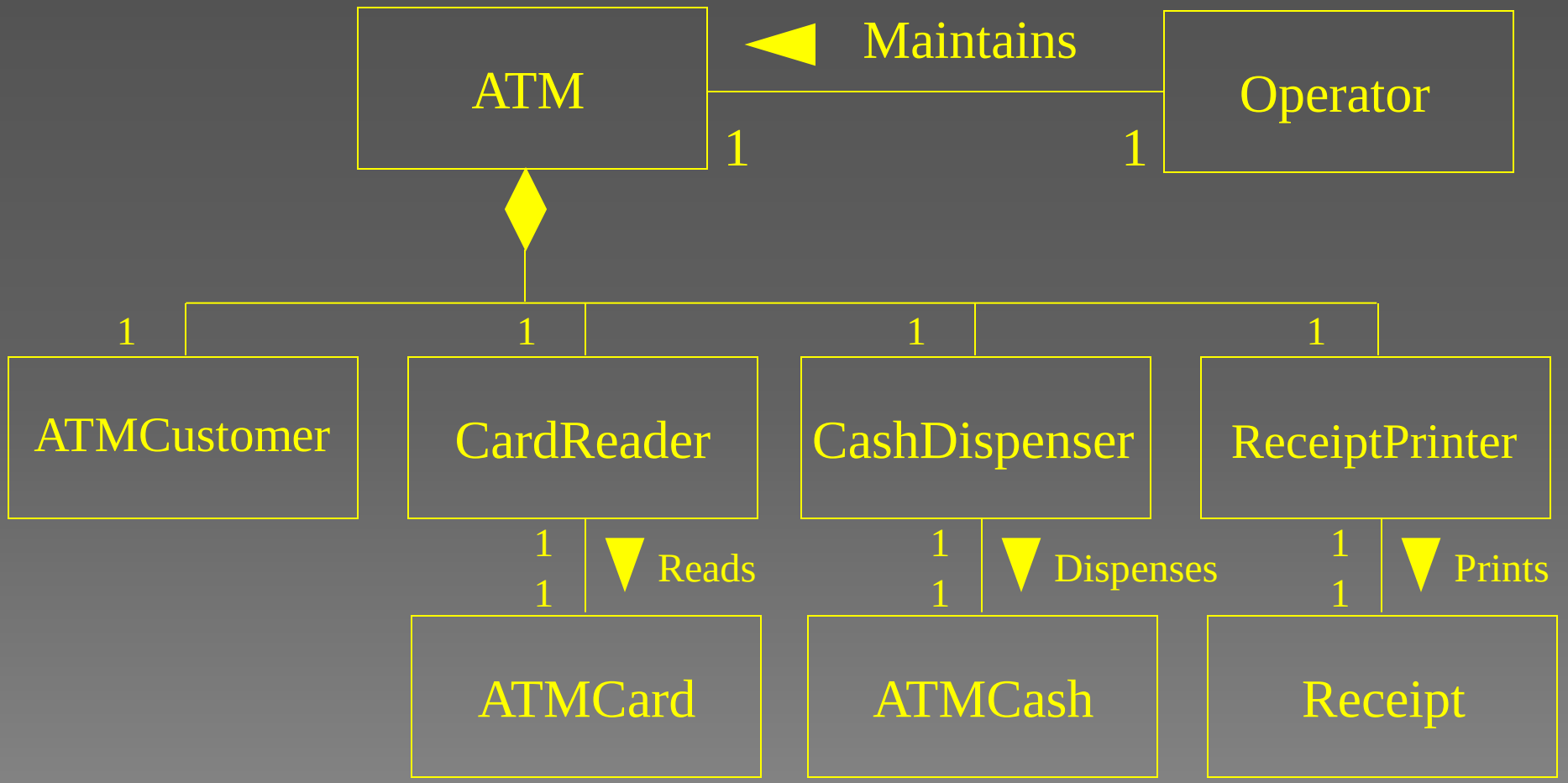


Use Case Diagram for ATM

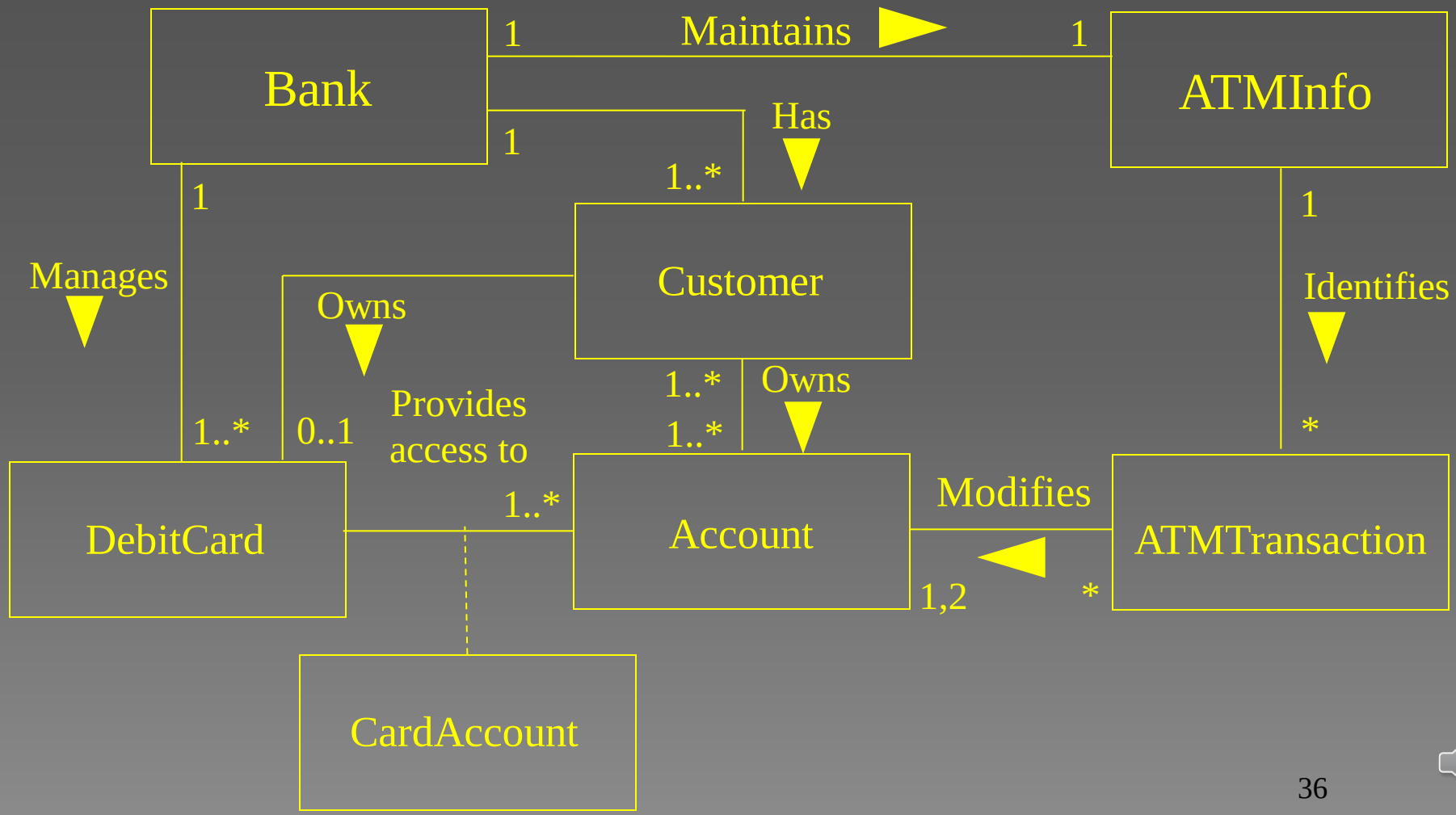


Object Model

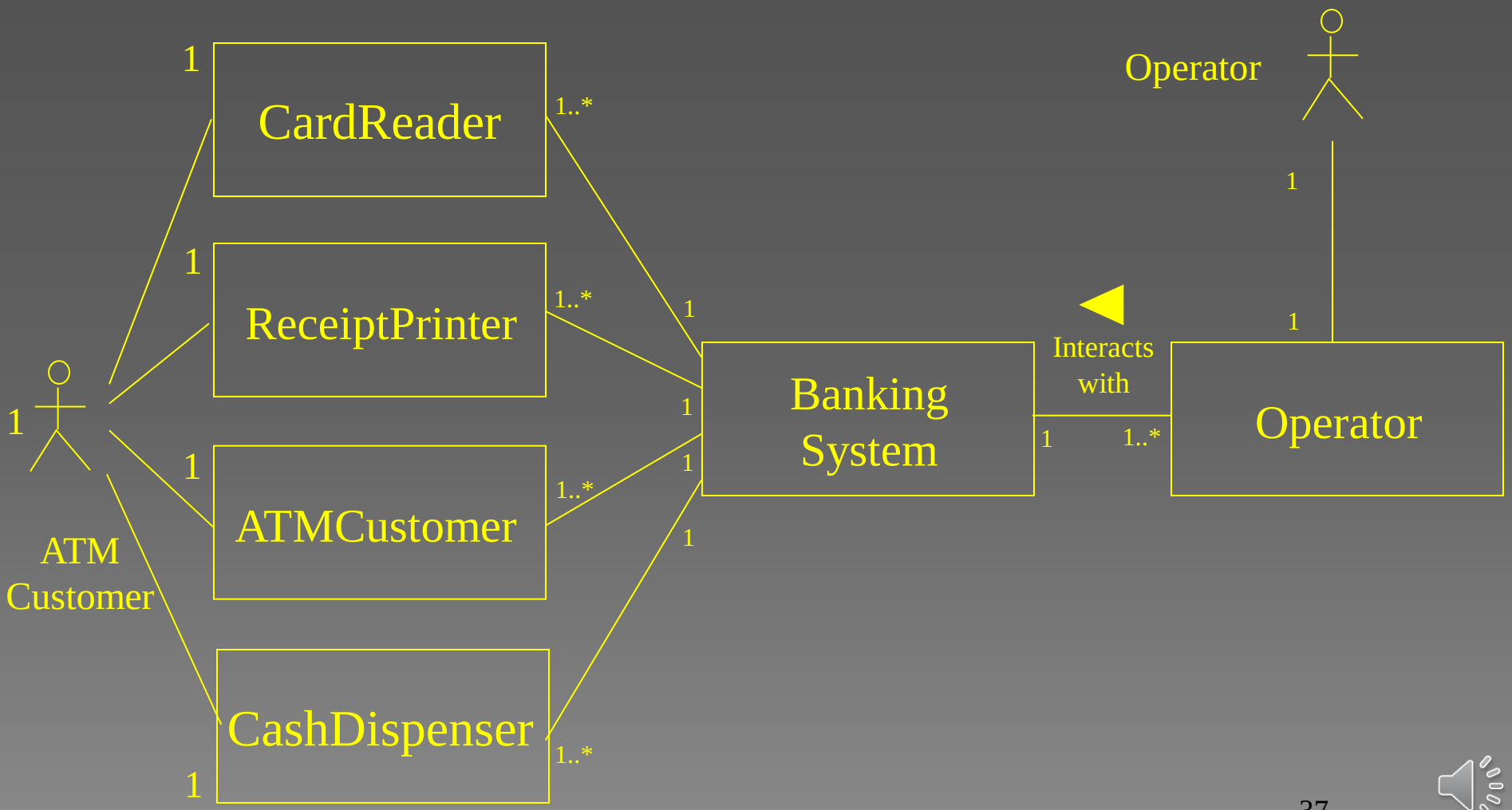
Conceptual Static Model for Problem Domain: Physical Classes



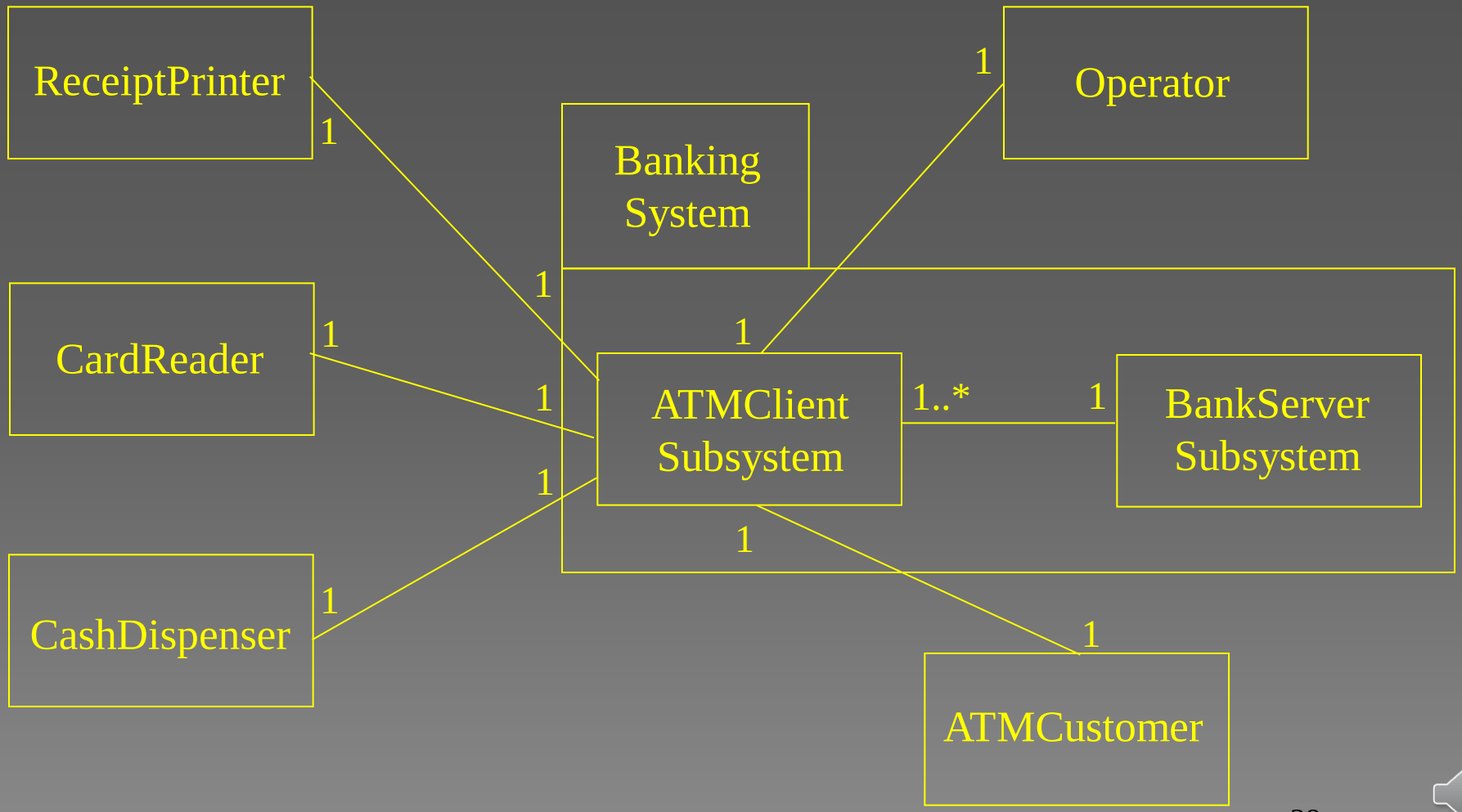
Conceptual Static Model for Problem Domain: Entity Classes



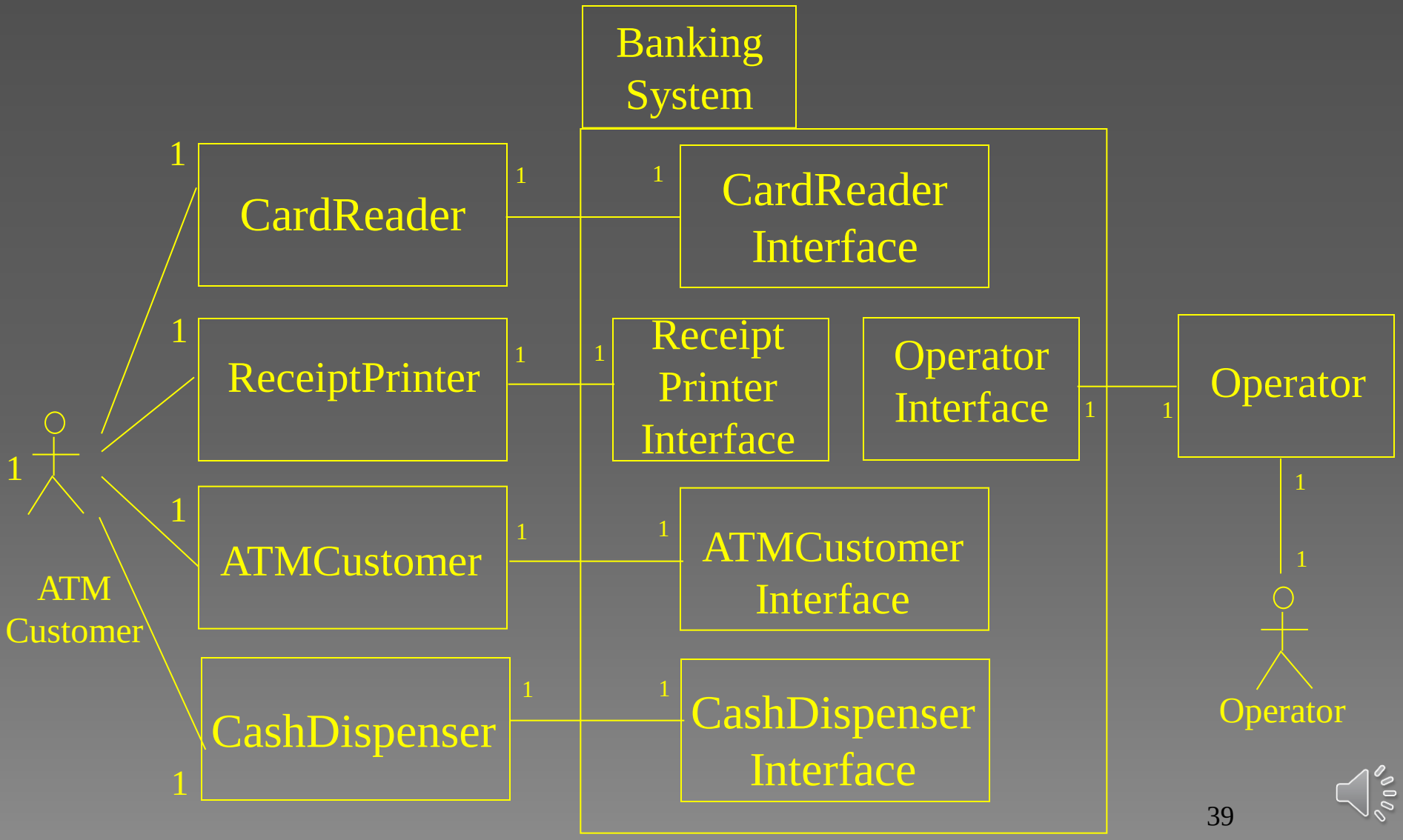
Banking System Context Class Diagram



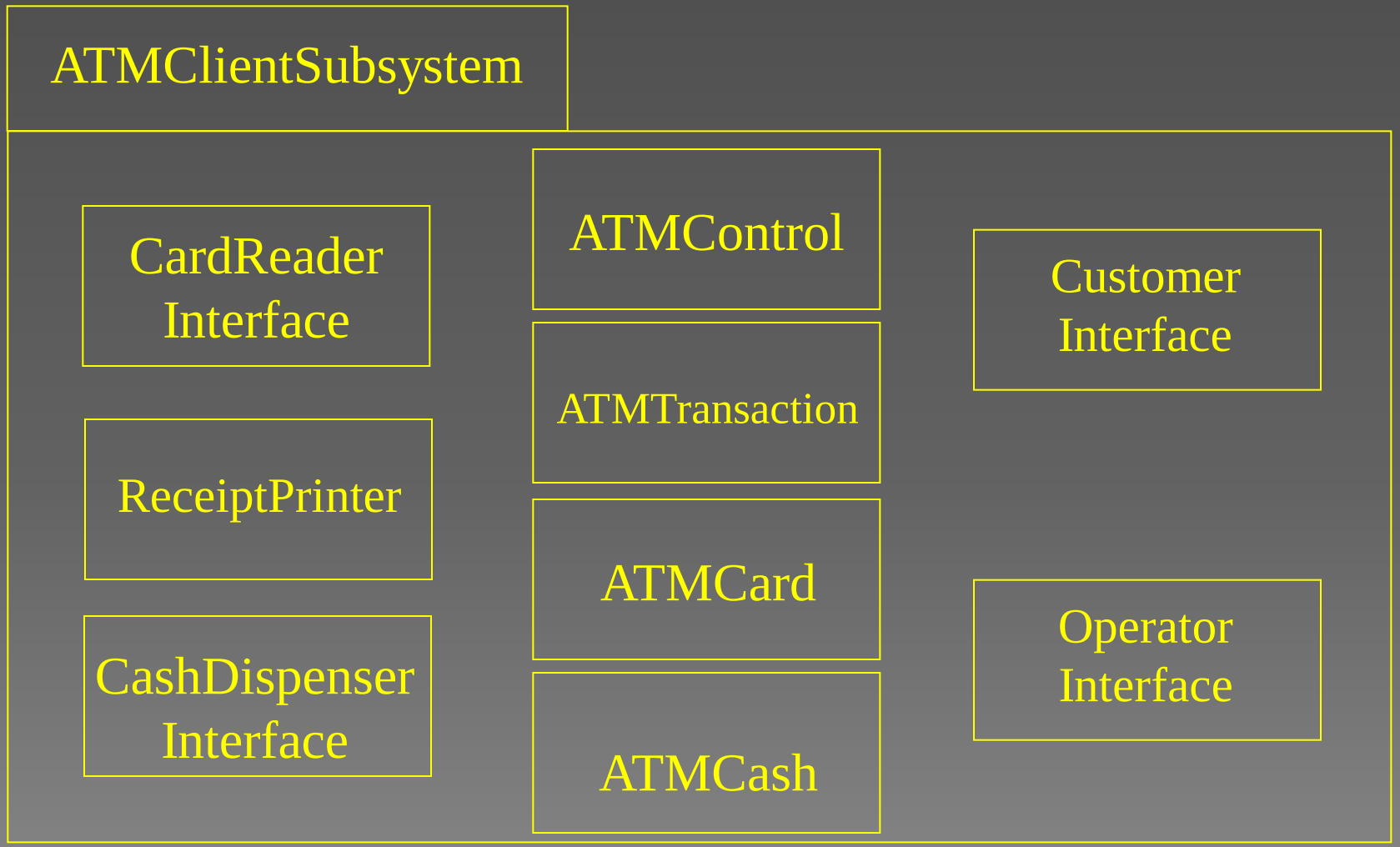
Banking System: Major Subsystems



Banking System External Classes and Interfaces Classes

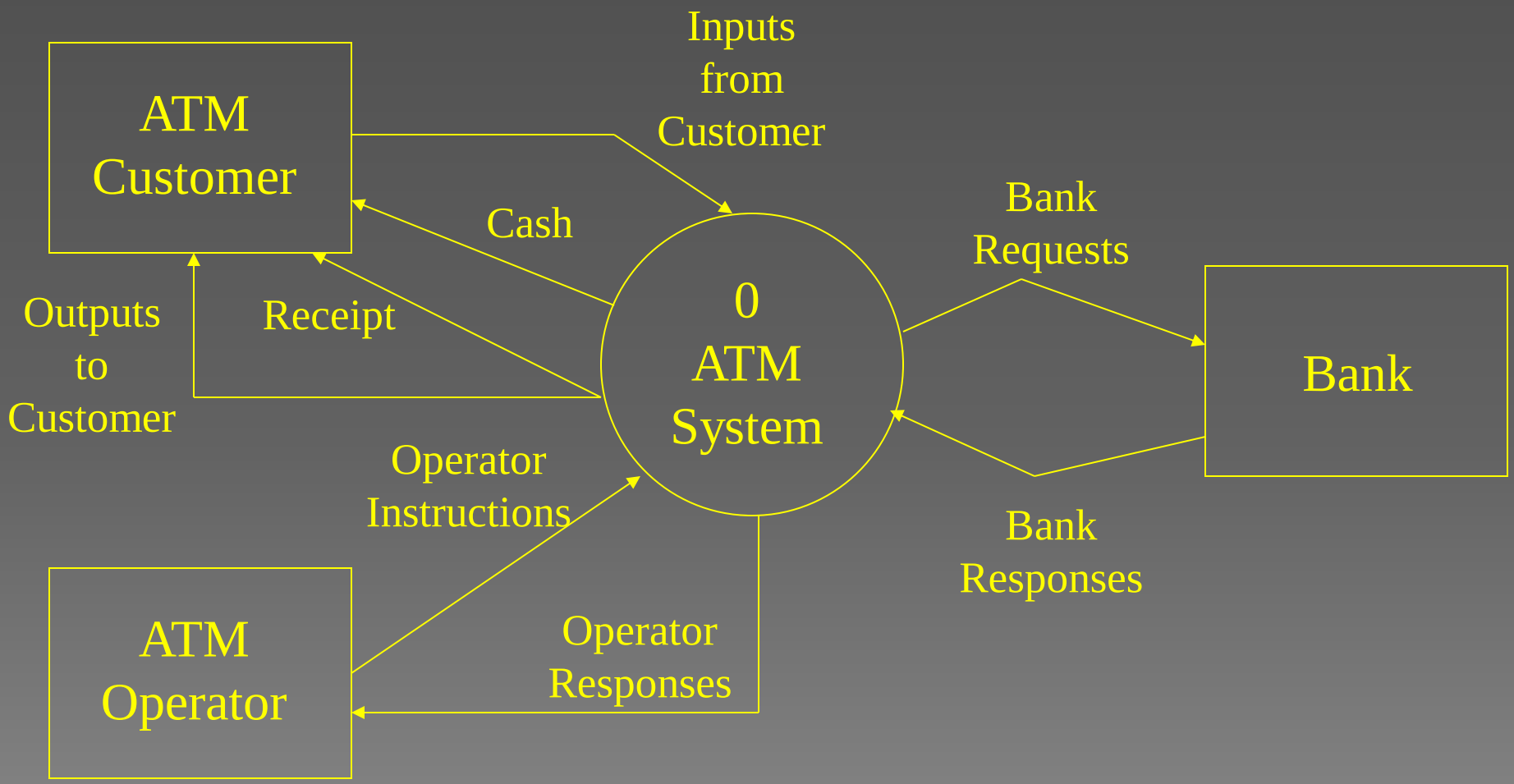


ATM Client Subsystem Classes

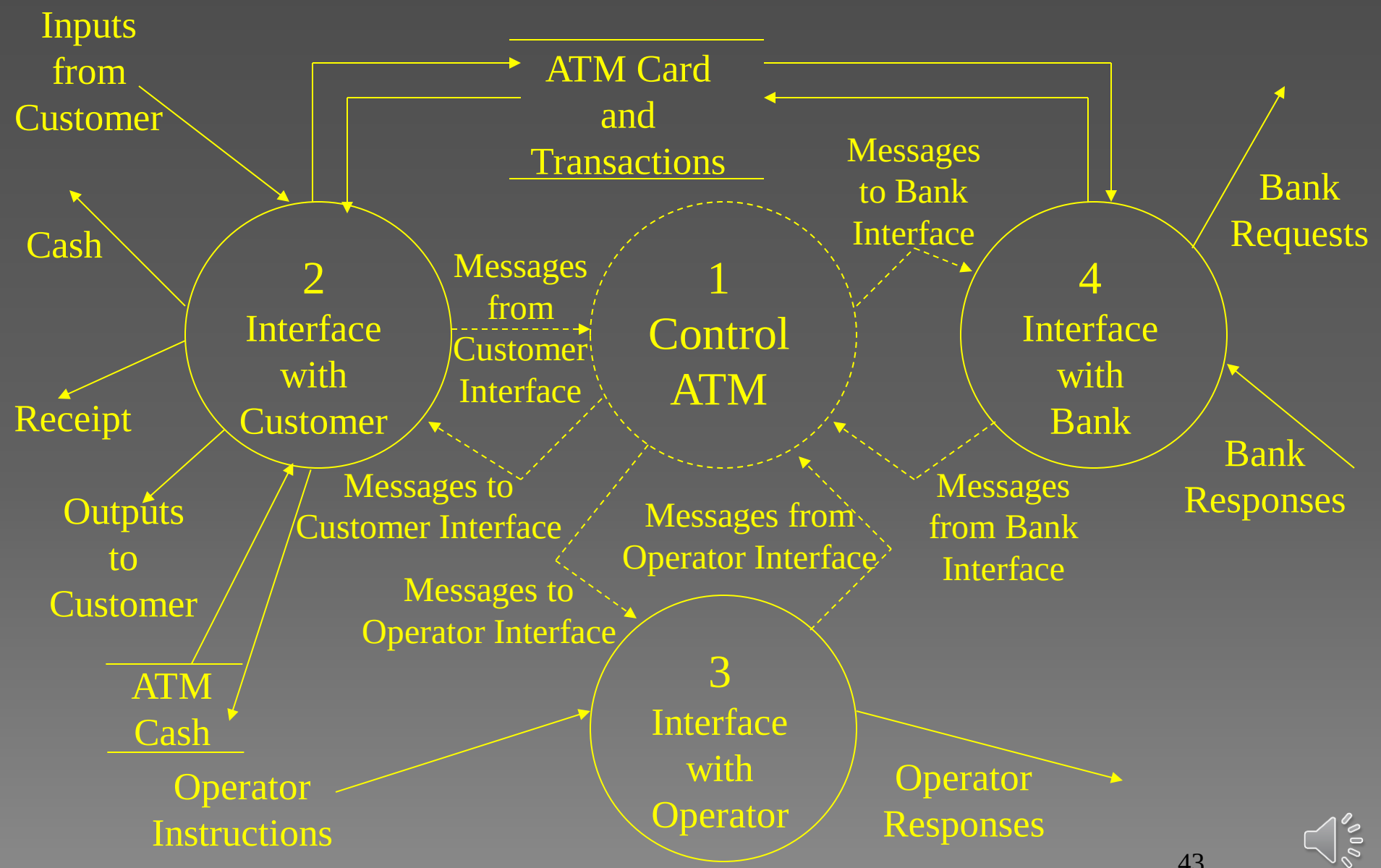


Data Flow Diagrams

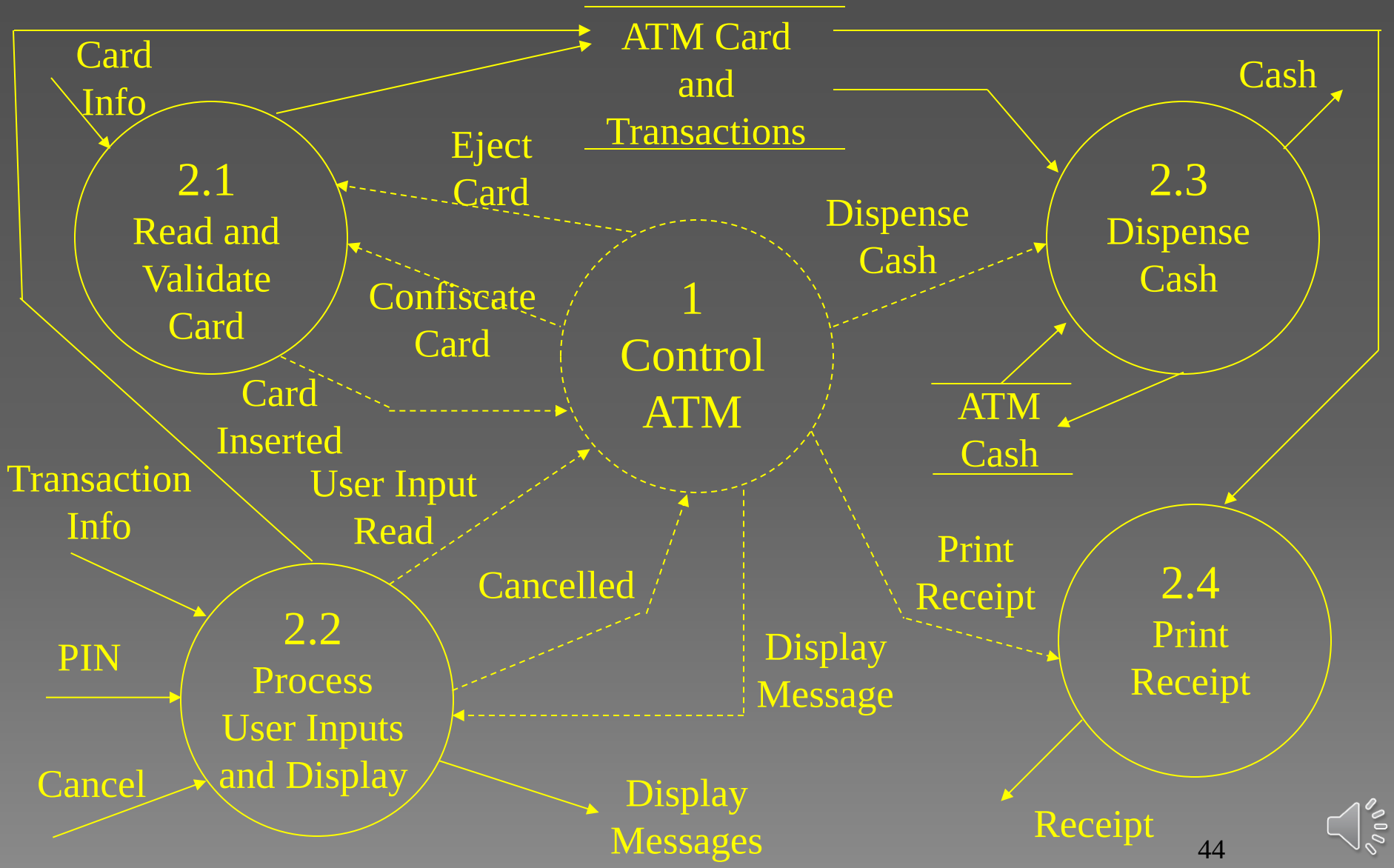
System Context Diagram



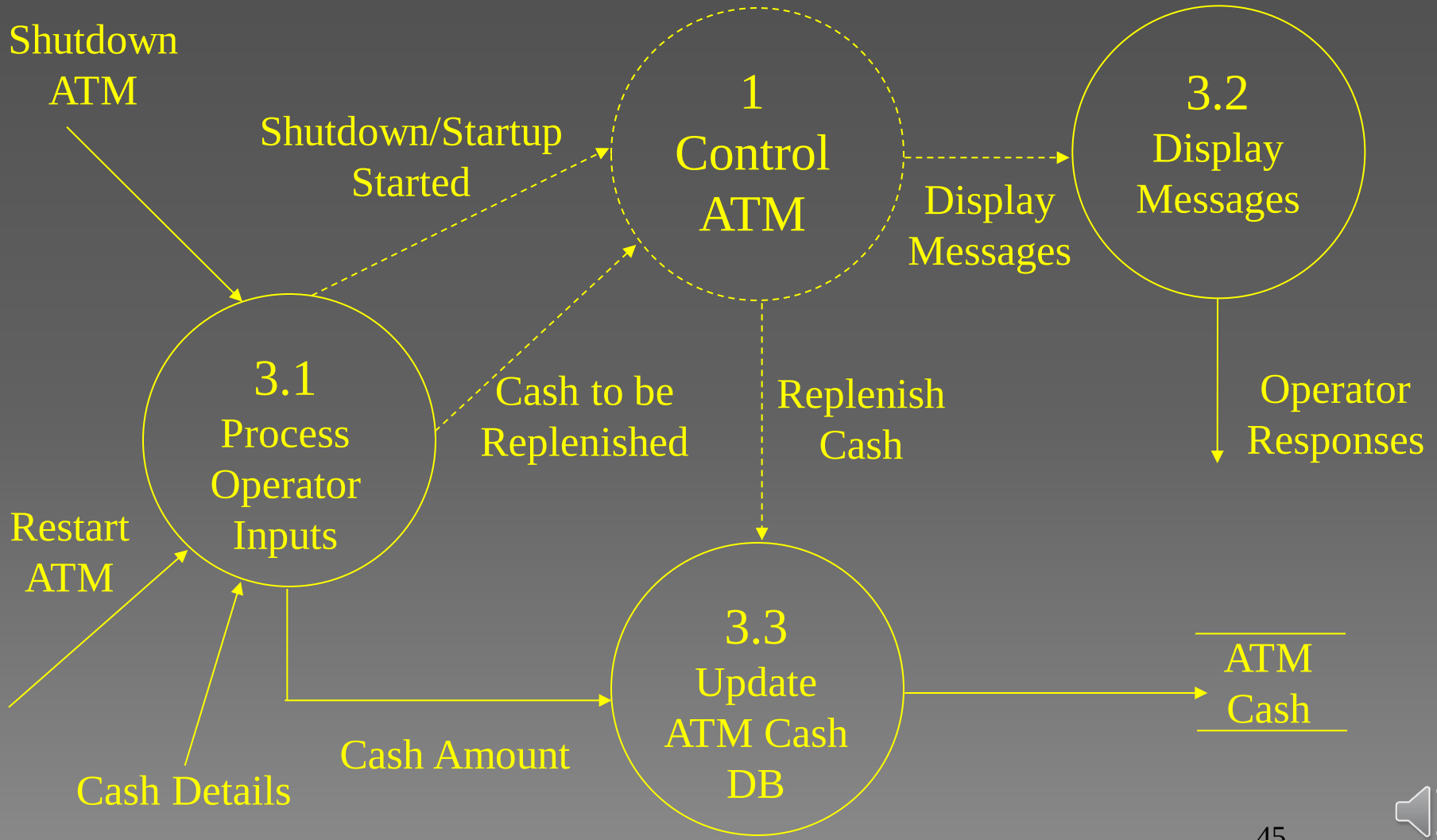
Data Flow Diagram – Level 1



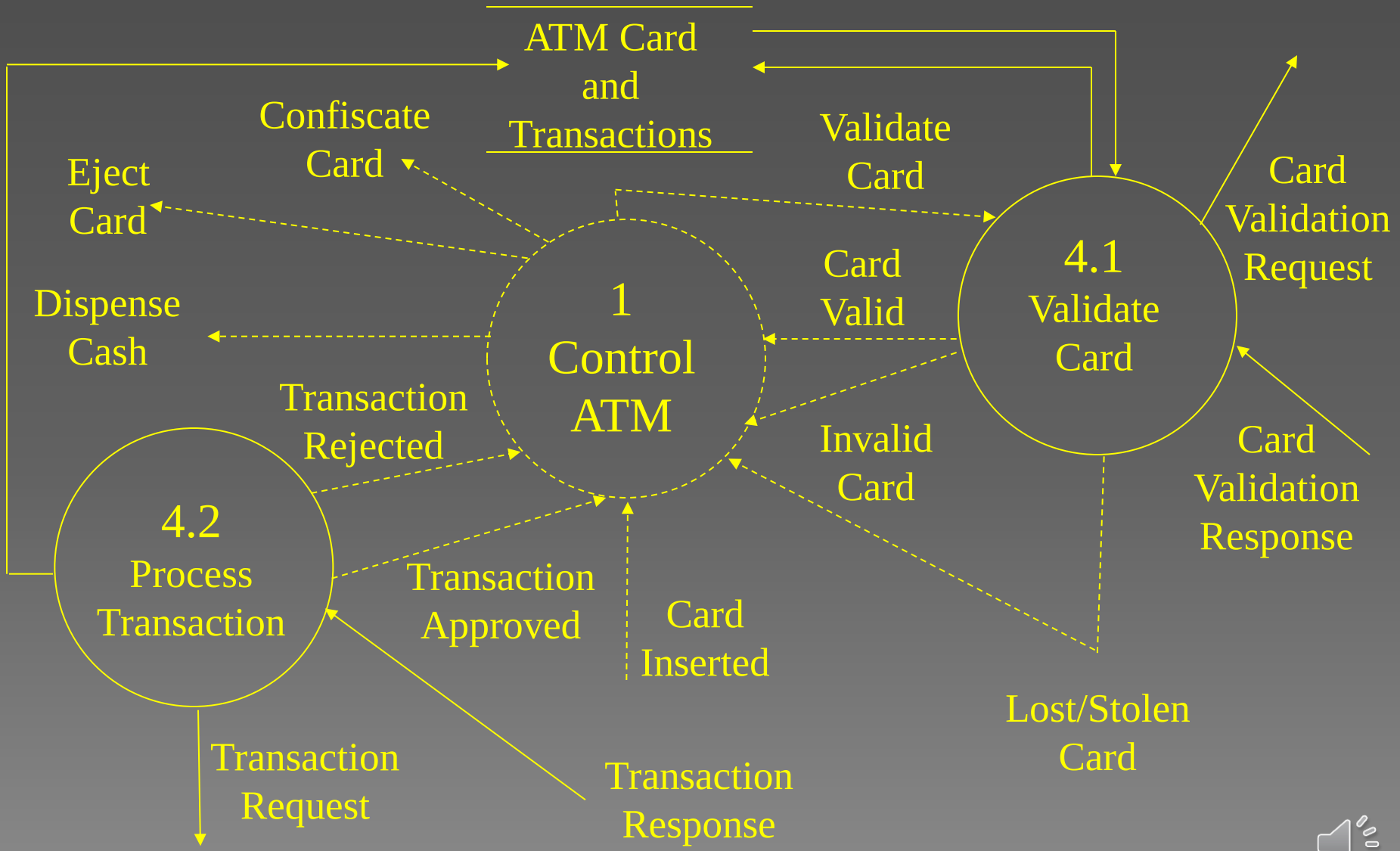
Level 2 DFD: Interface with Customer



Level 2 DFD: Interface with Operator

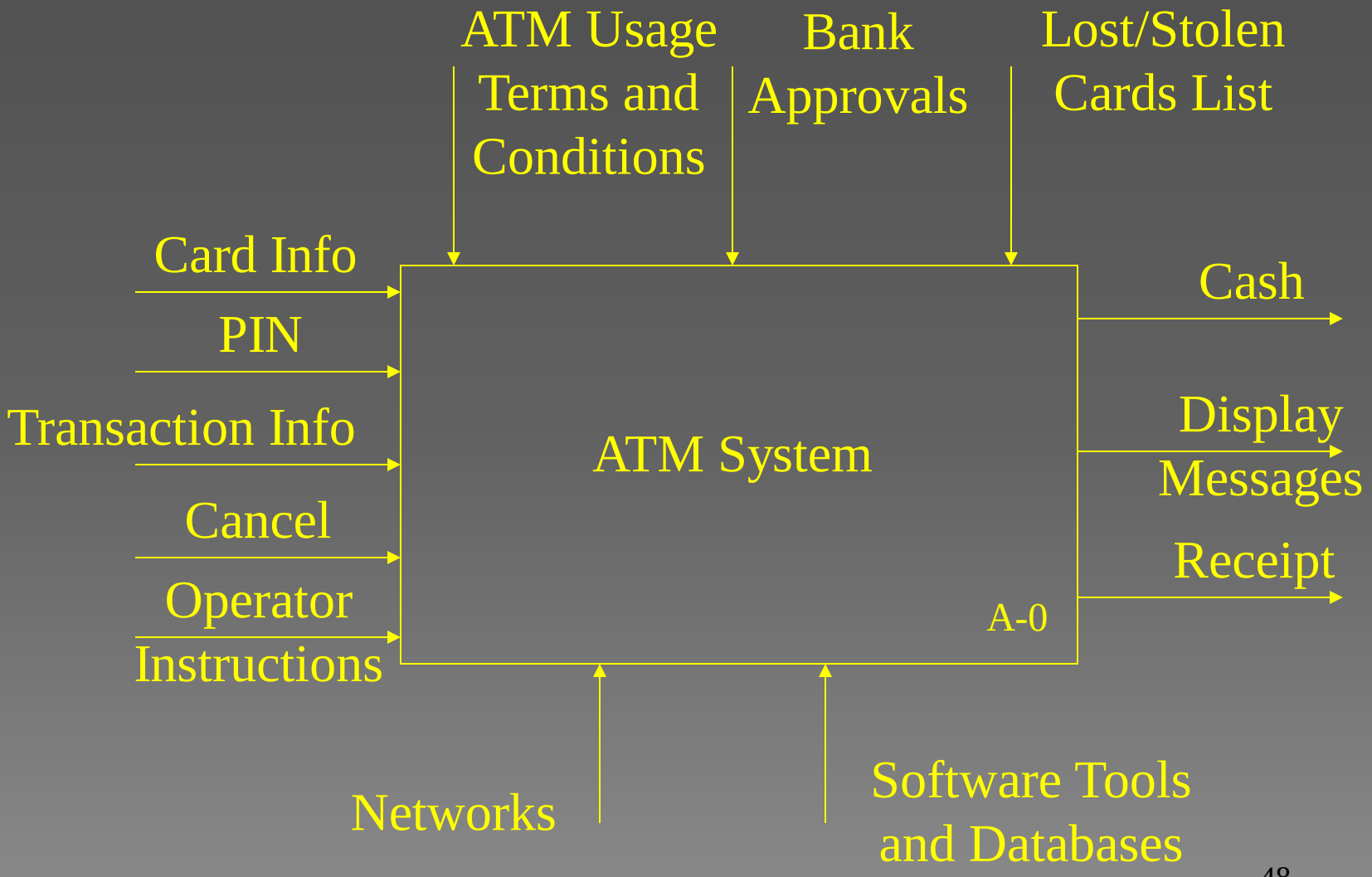


Level 2 DFD: Interface with Bank

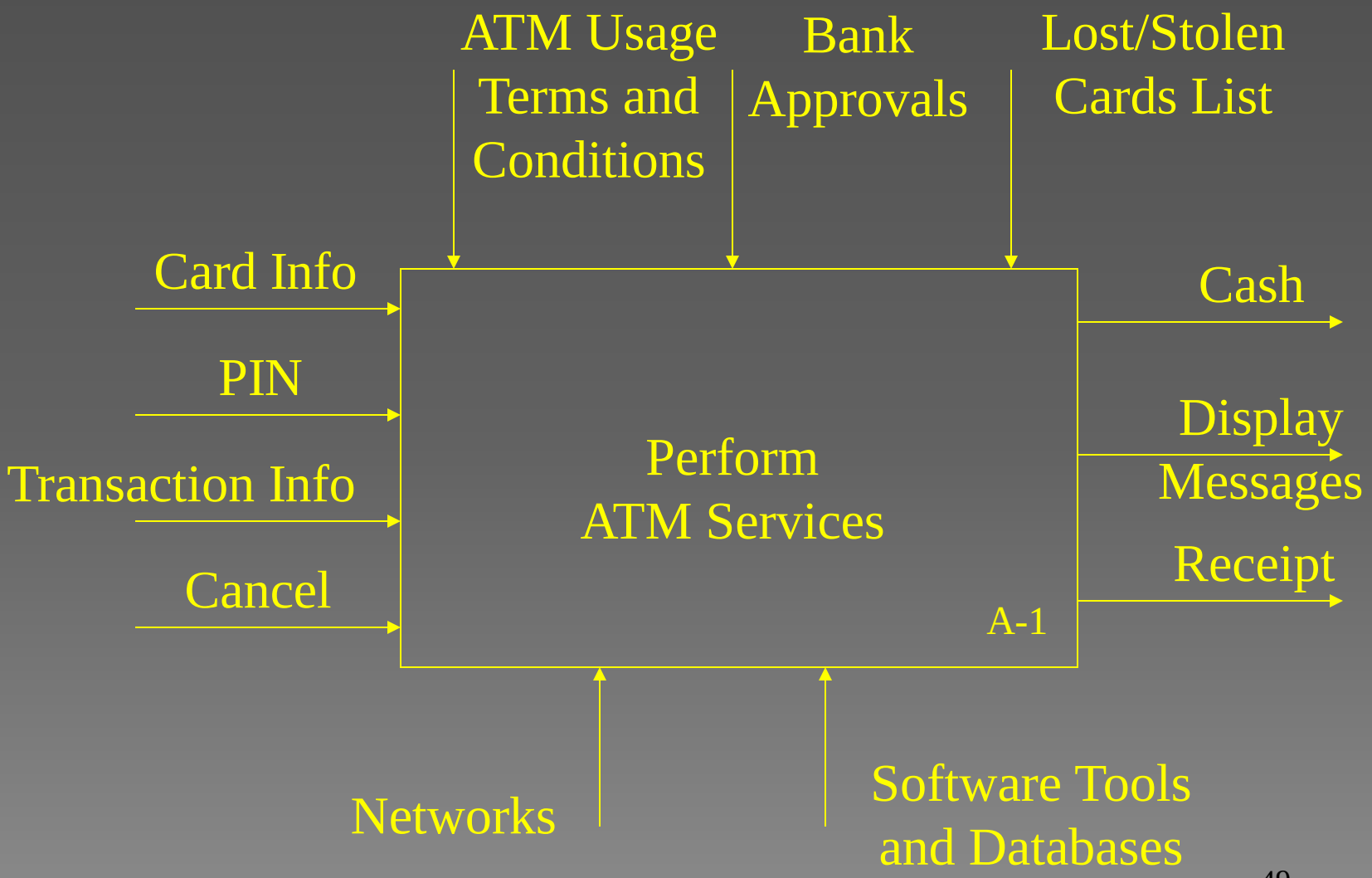


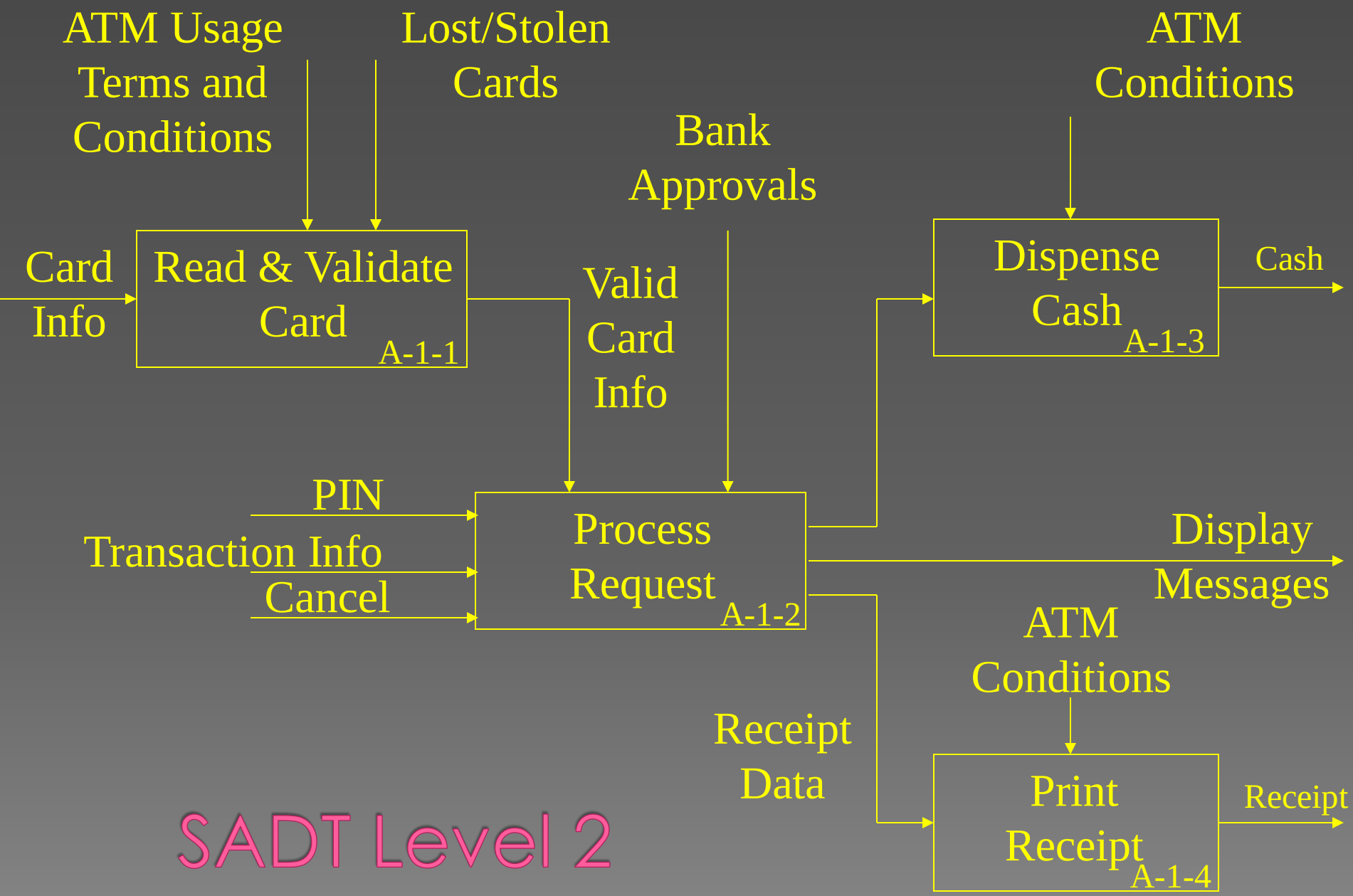
SADT Diagrams

Banking System Context Diagram



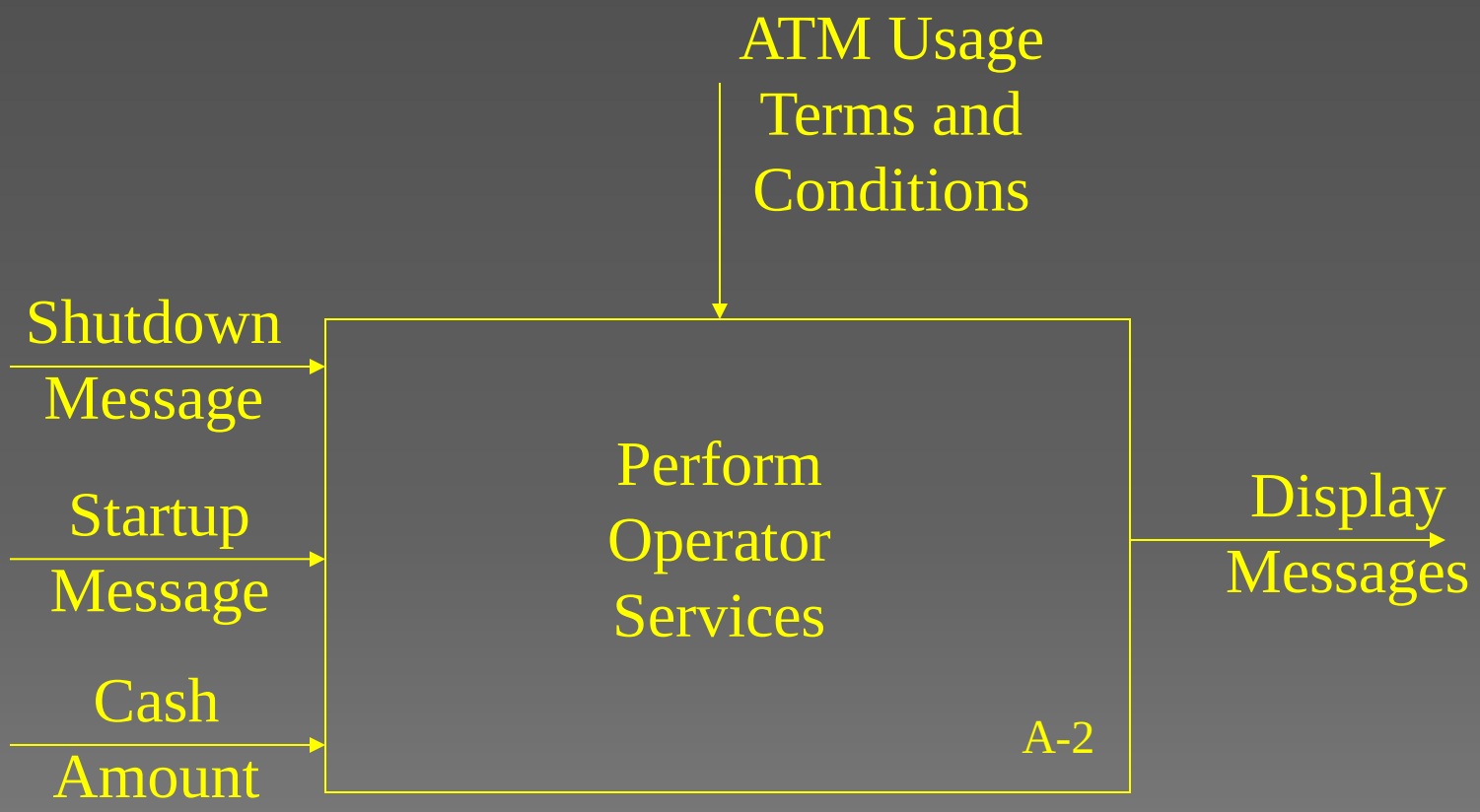
SADT Level 1 Diagram




ATM Usage Terms and Conditions
Lost/Stolen Cards
ATM Conditions
Bank Approvals
Card Info
Read & Validate Card
A-1-1
Valid Card Info
Dispense Cash
A-1-3
Cash
PIN
Transaction Info
Cancel
Process Request
A-1-2
Display Messages
ATM Conditions
Receipt Data
Print Receipt
A-1-4
Receipt

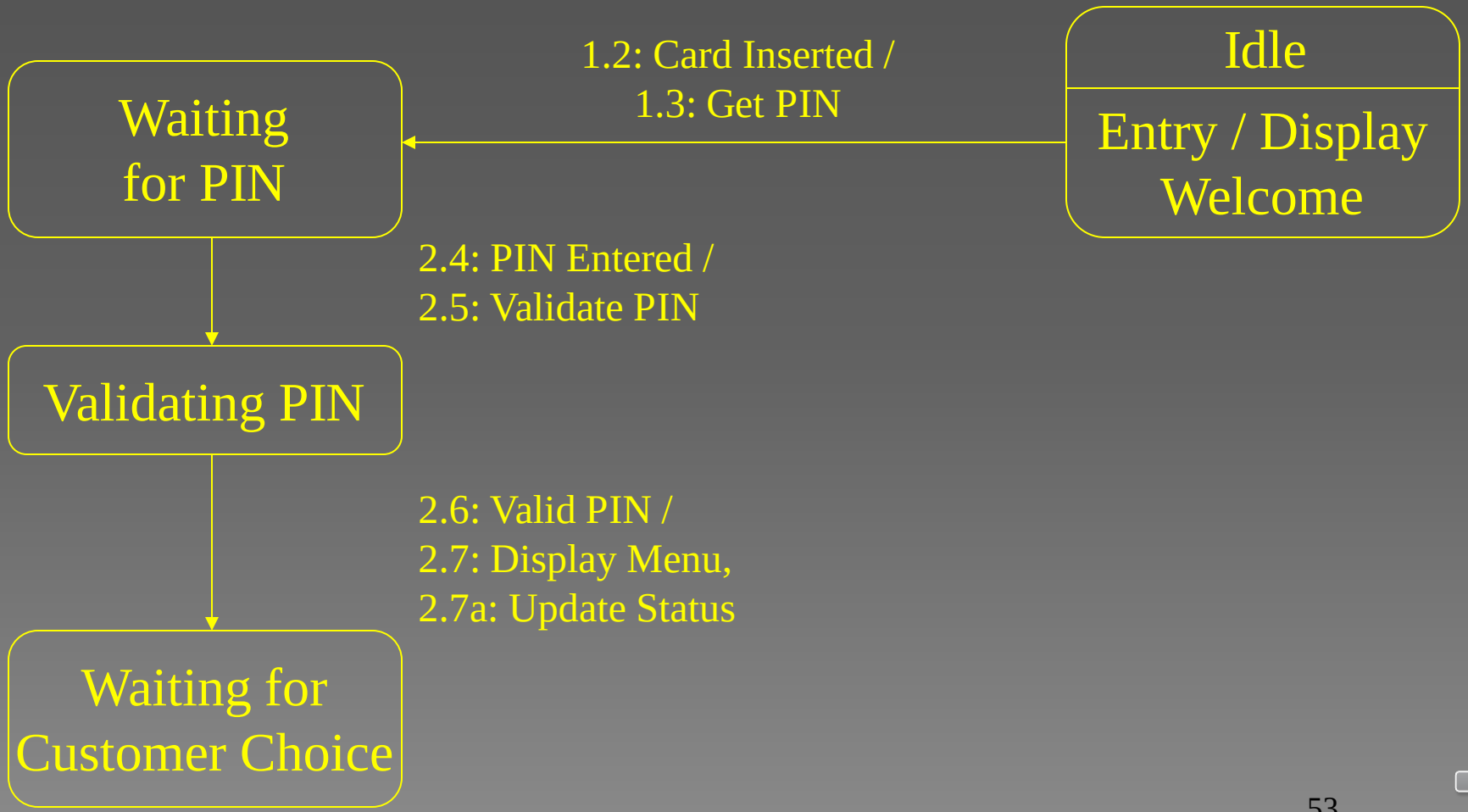
SADT Level 2

SADT Level 1 Diagram

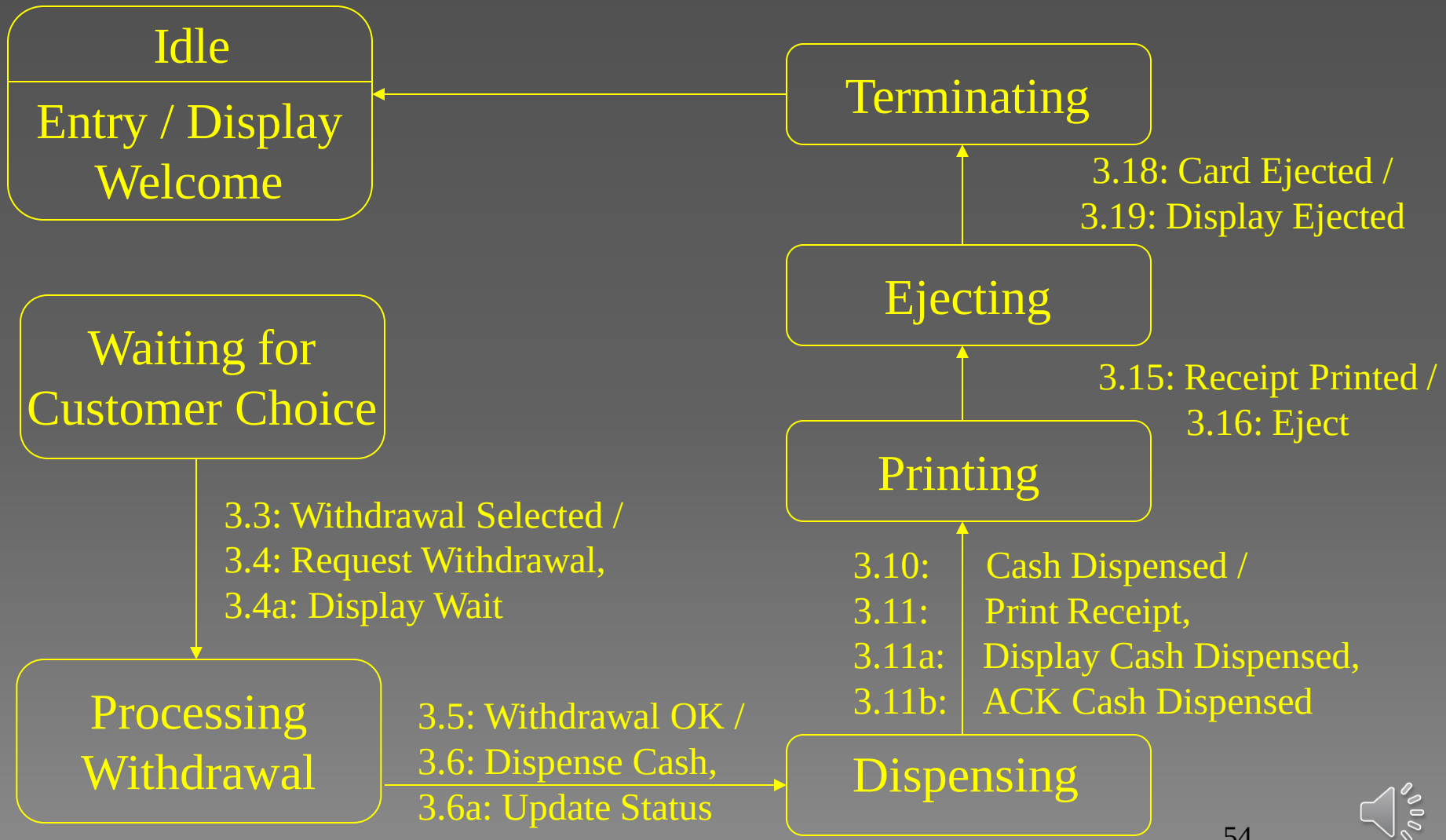


Statecharts

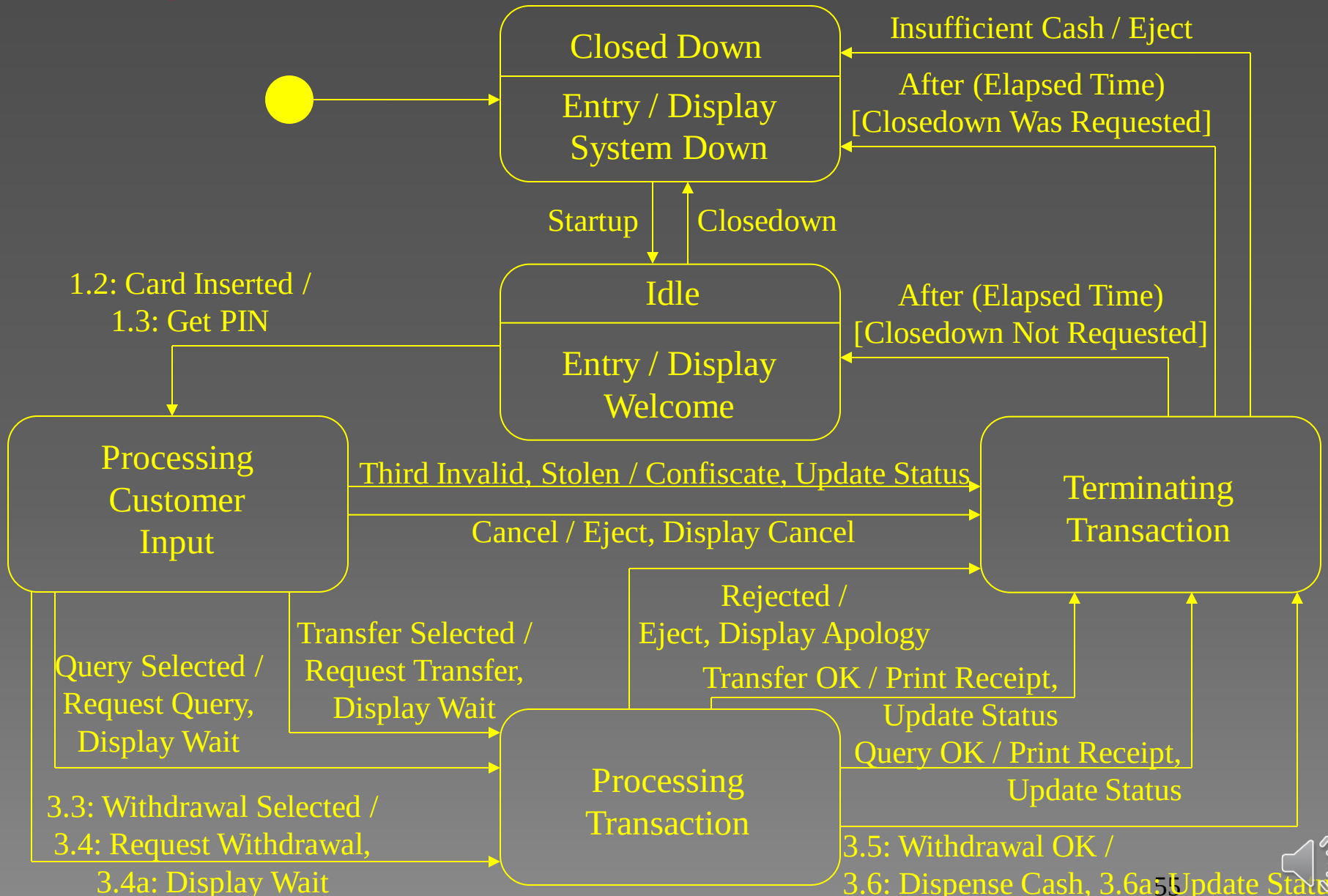
Statechart for ATM Control: Validate PIN Use Case



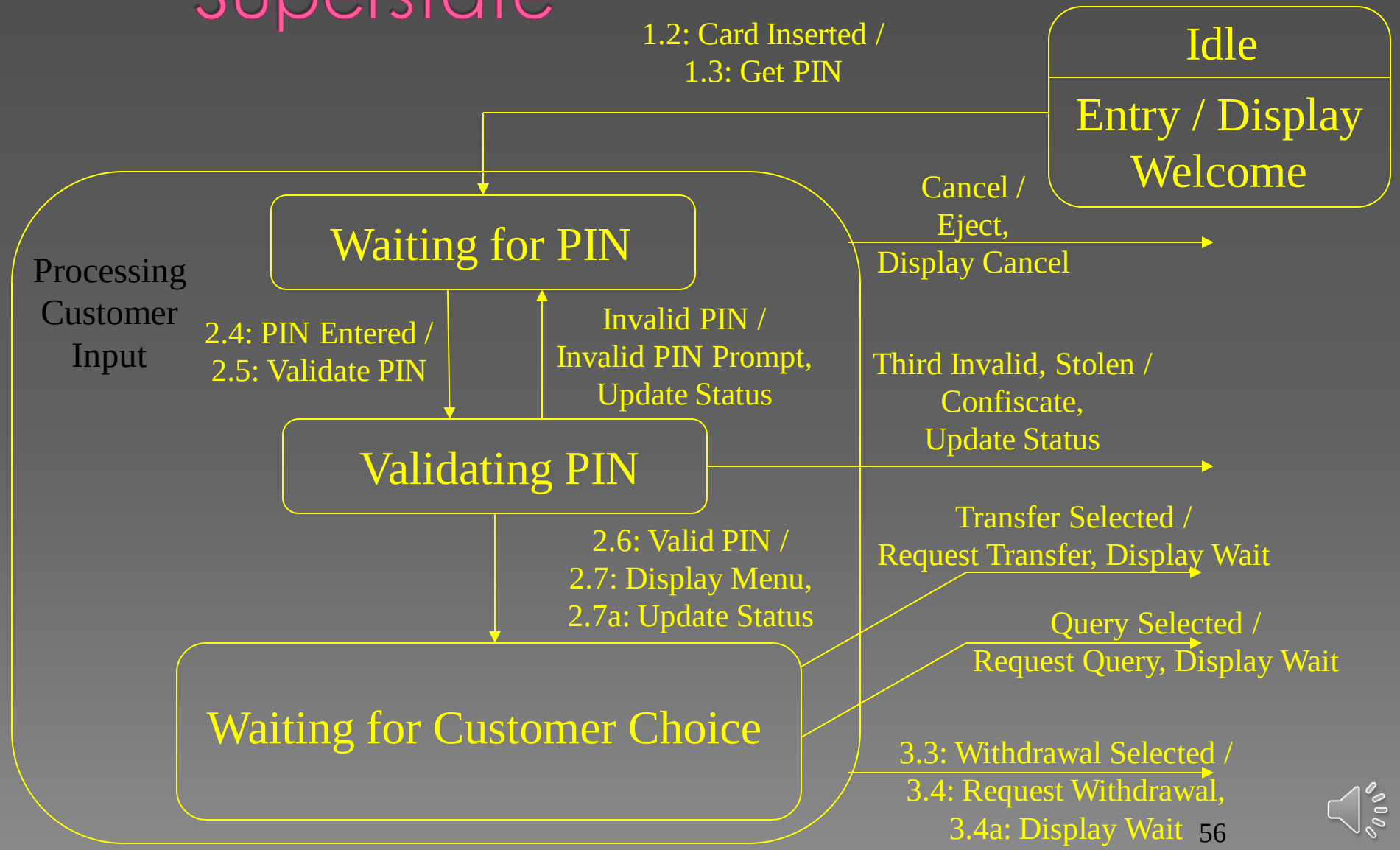
Statechart for ATM Control: Withdraw Funds Use Case



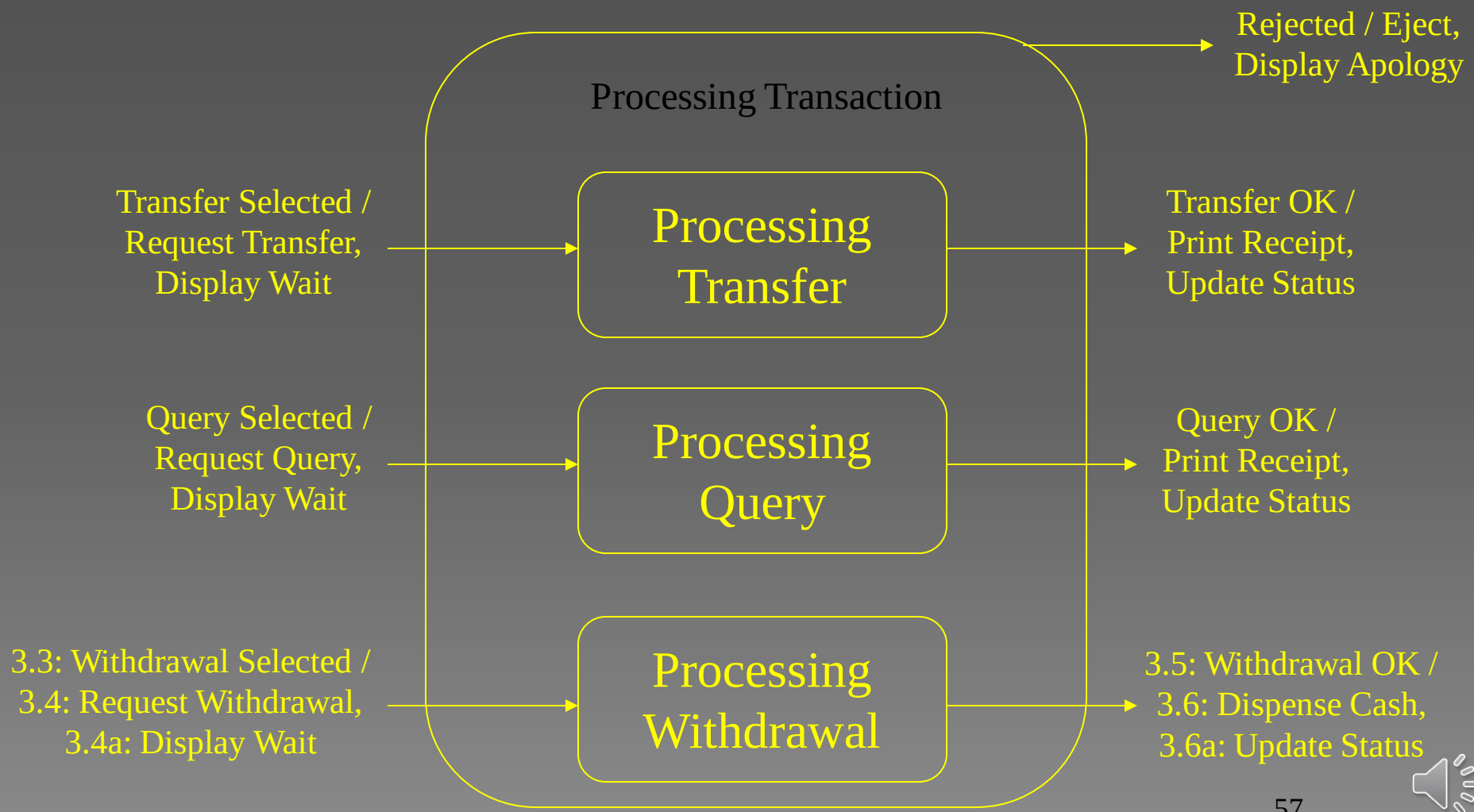
Top-Level ATM Control Statechart



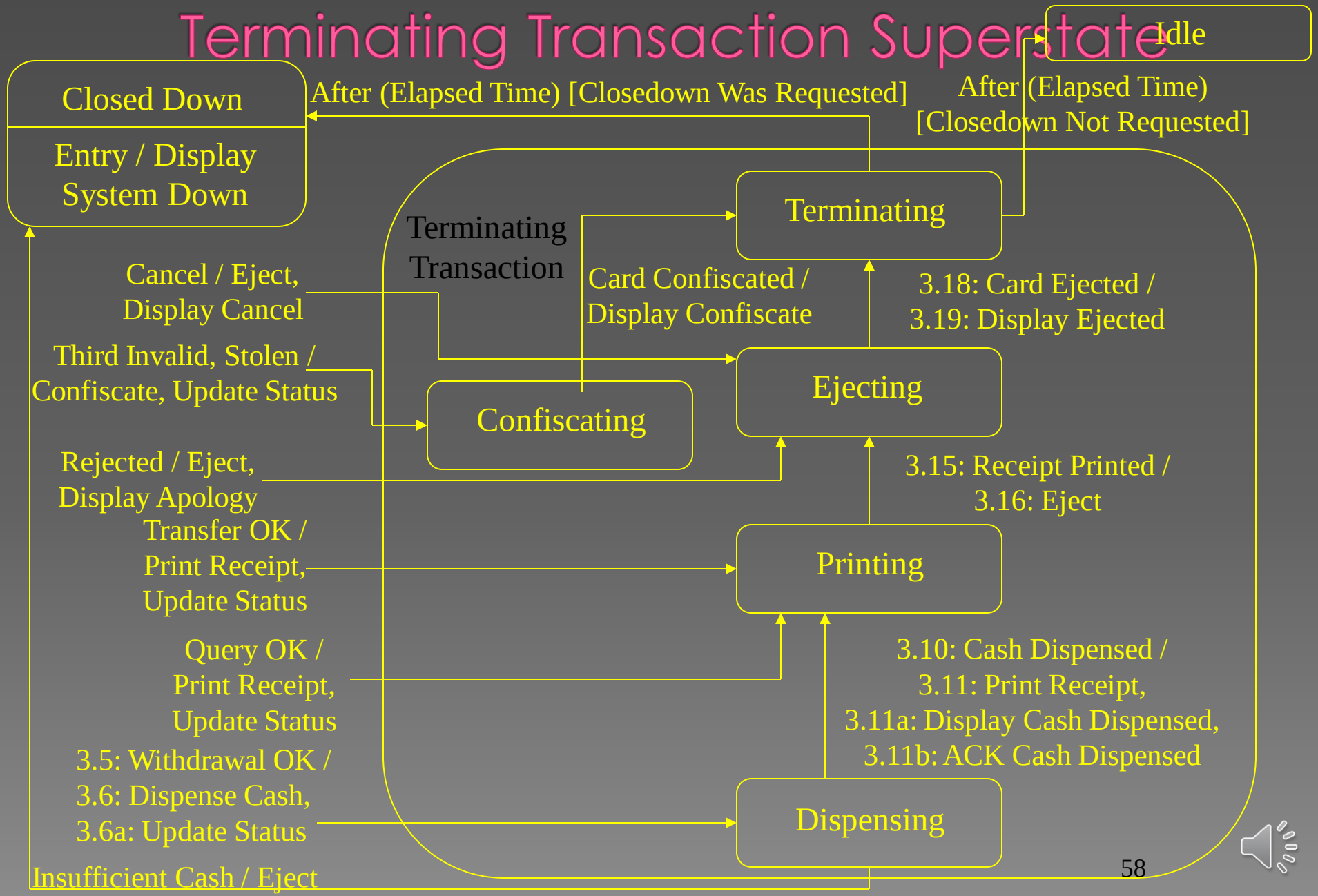
ATM Control Statechart: Processing Customer Input Superstate



ATM Control Statechart: Processing Transaction Superstate

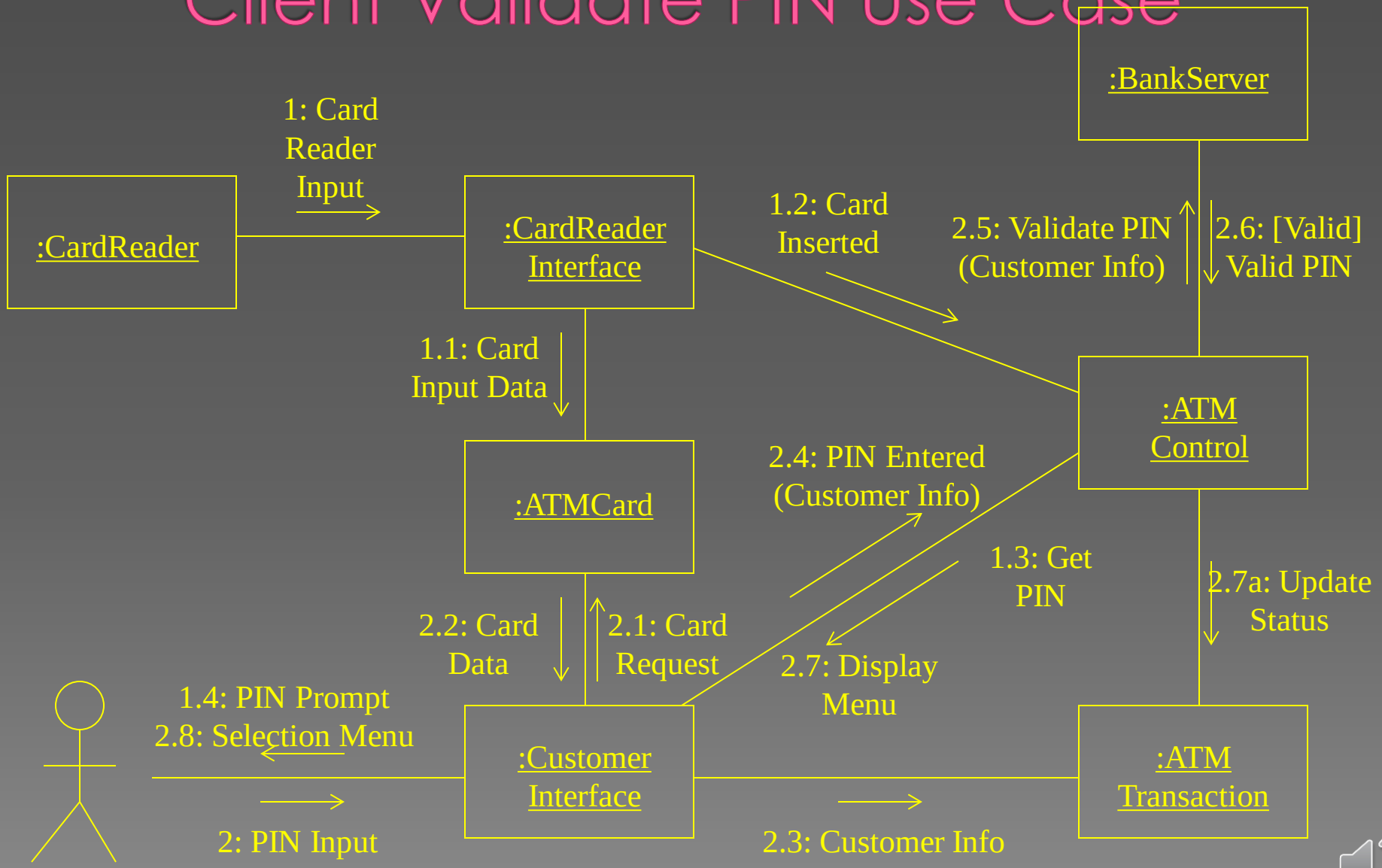


ATM Control Statechart: Terminating Transaction Superstate

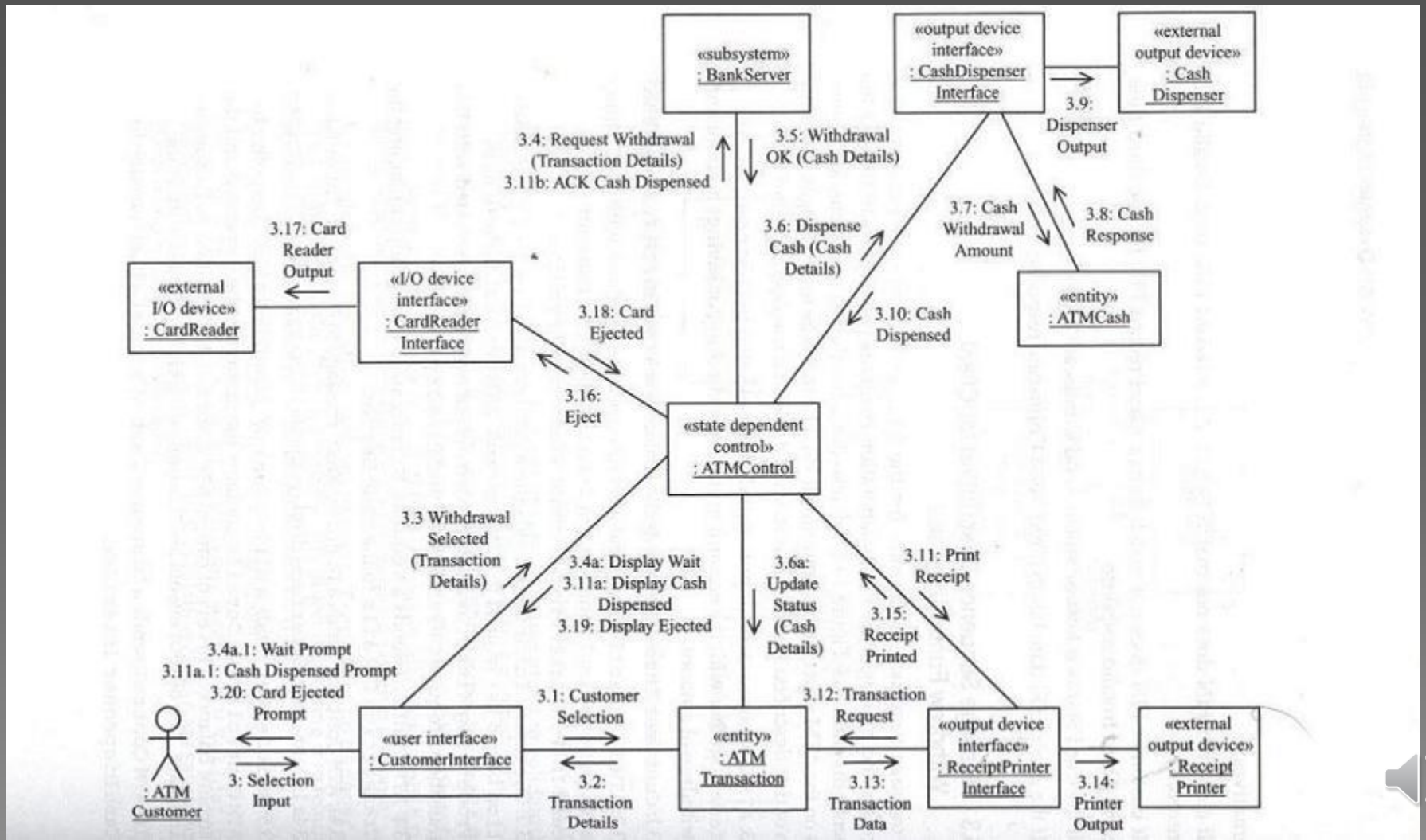


Collaboration Diagrams

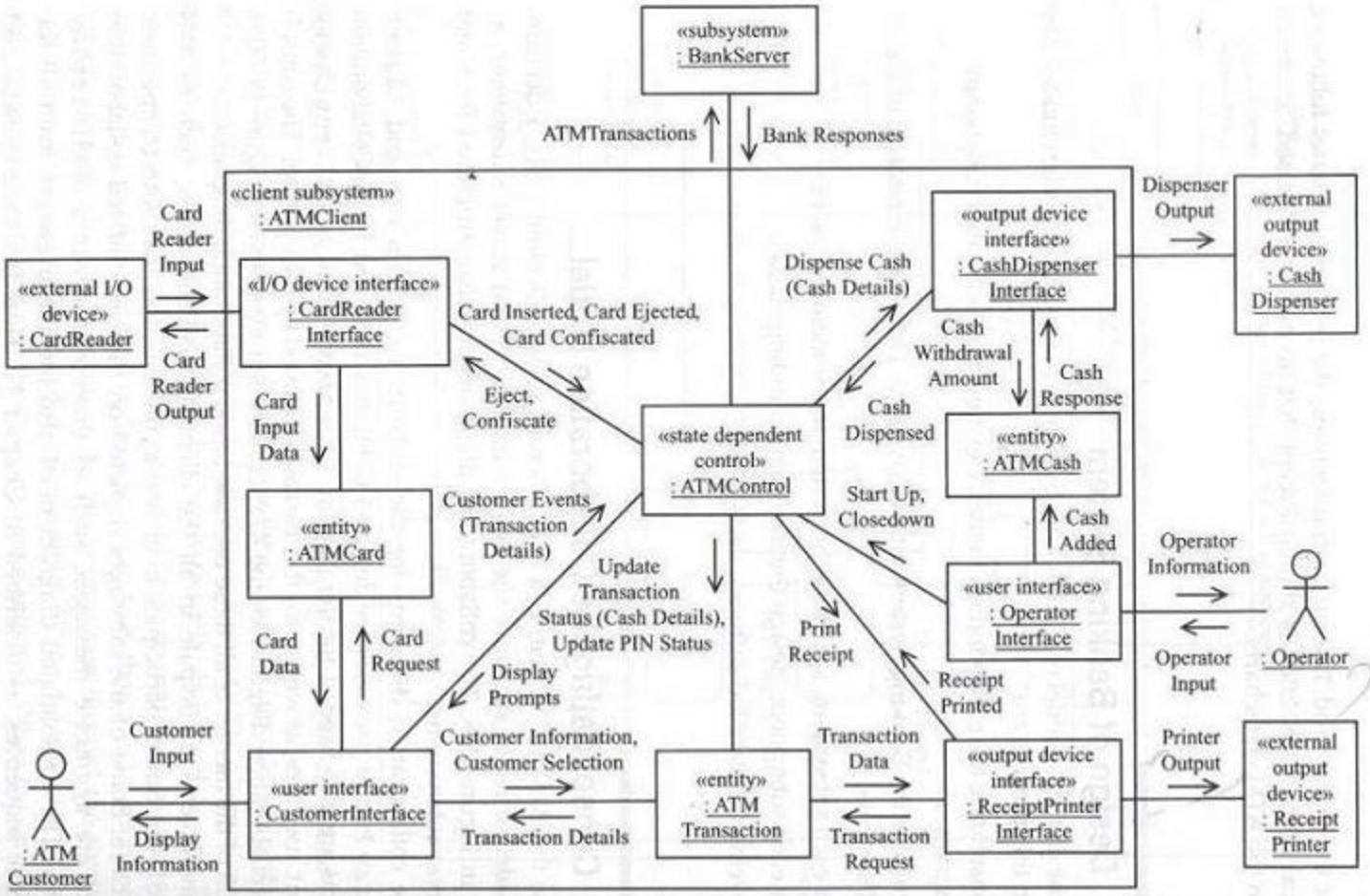
Collaboration Diagram: ATM Client Validate PIN Use Case



Collaboration Diagram: ATM Client Withdraw Funds Use Case

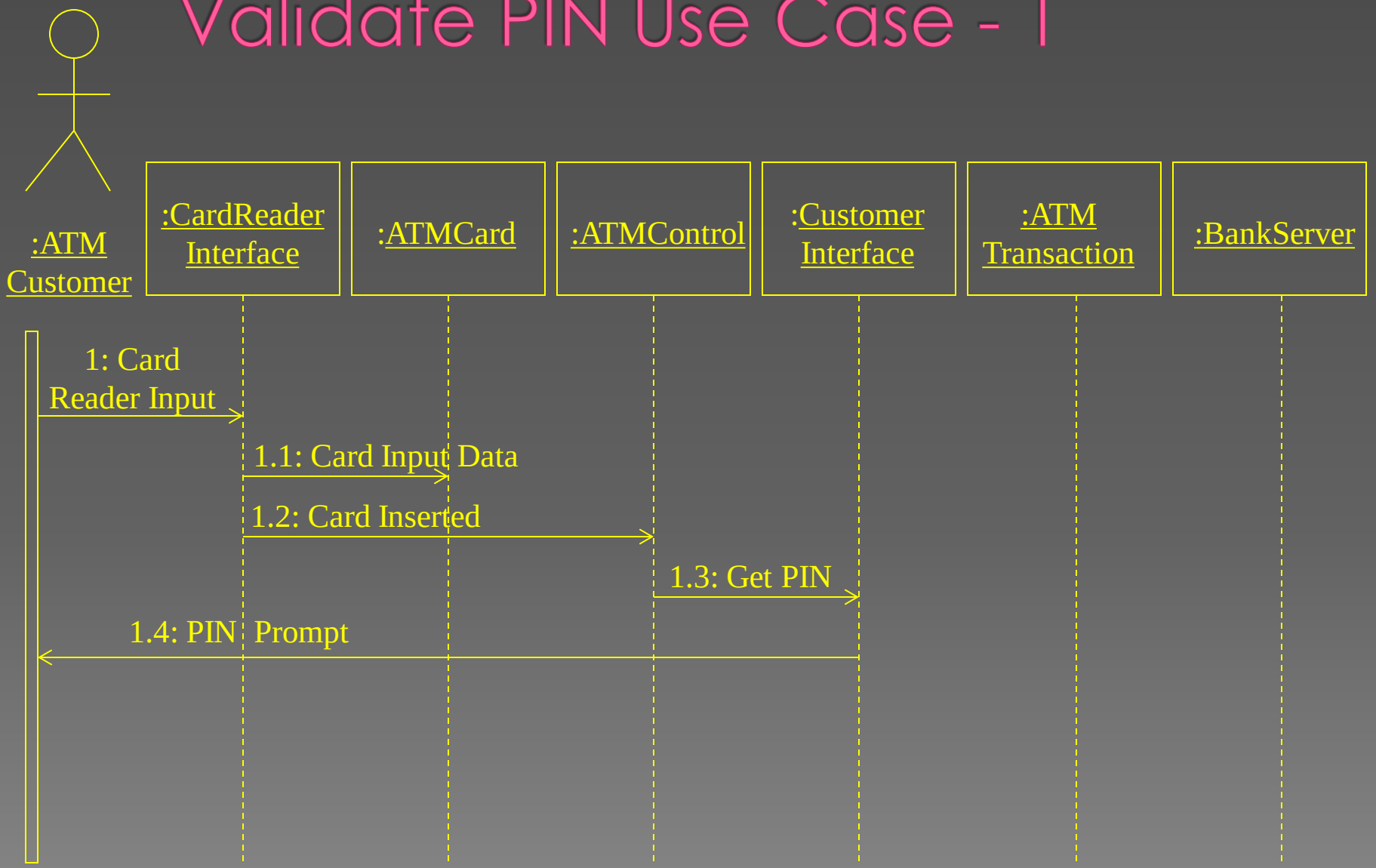


Consolidated Collaboration Diagram for ATM Client Subsystem

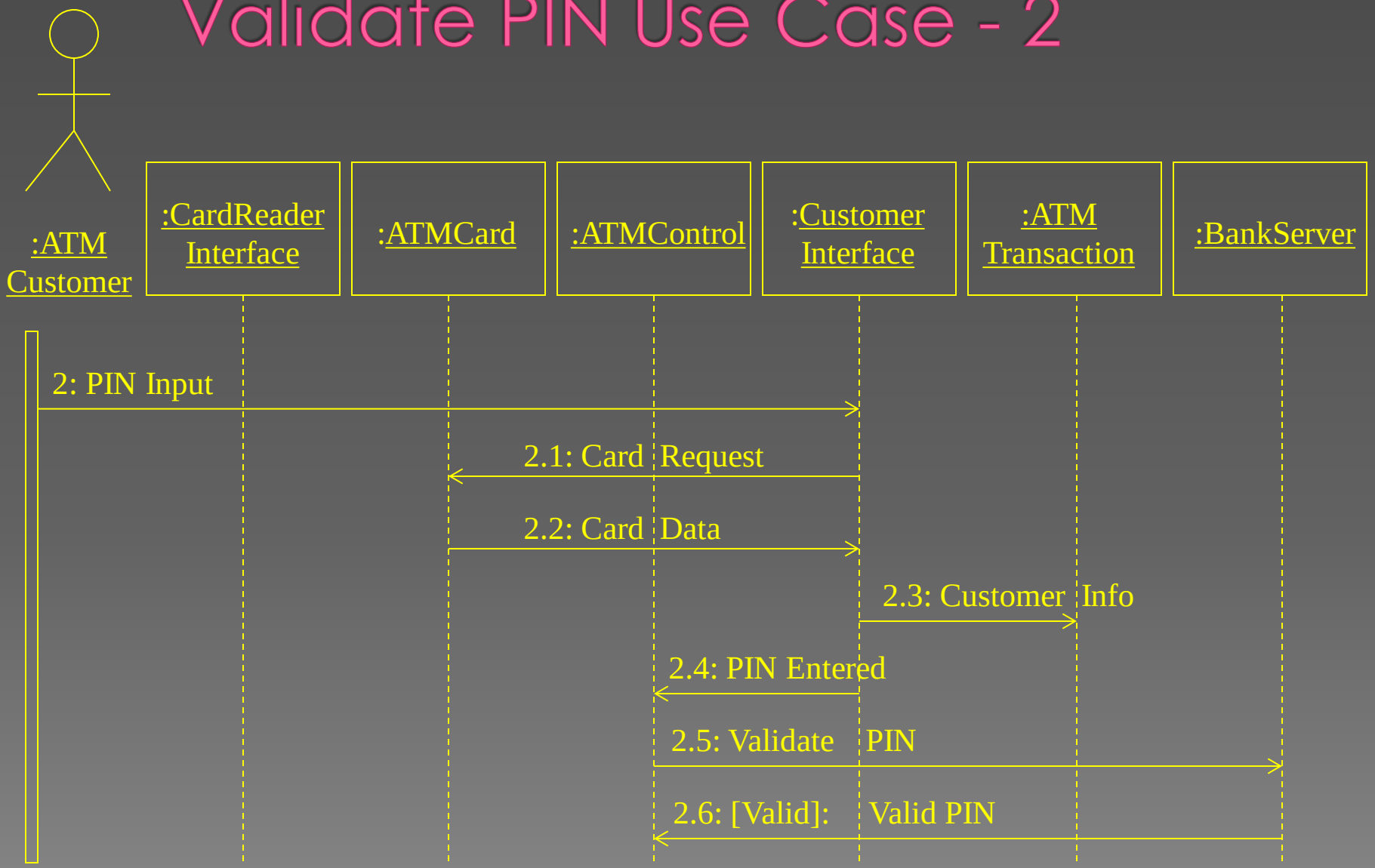


Sequence Diagram

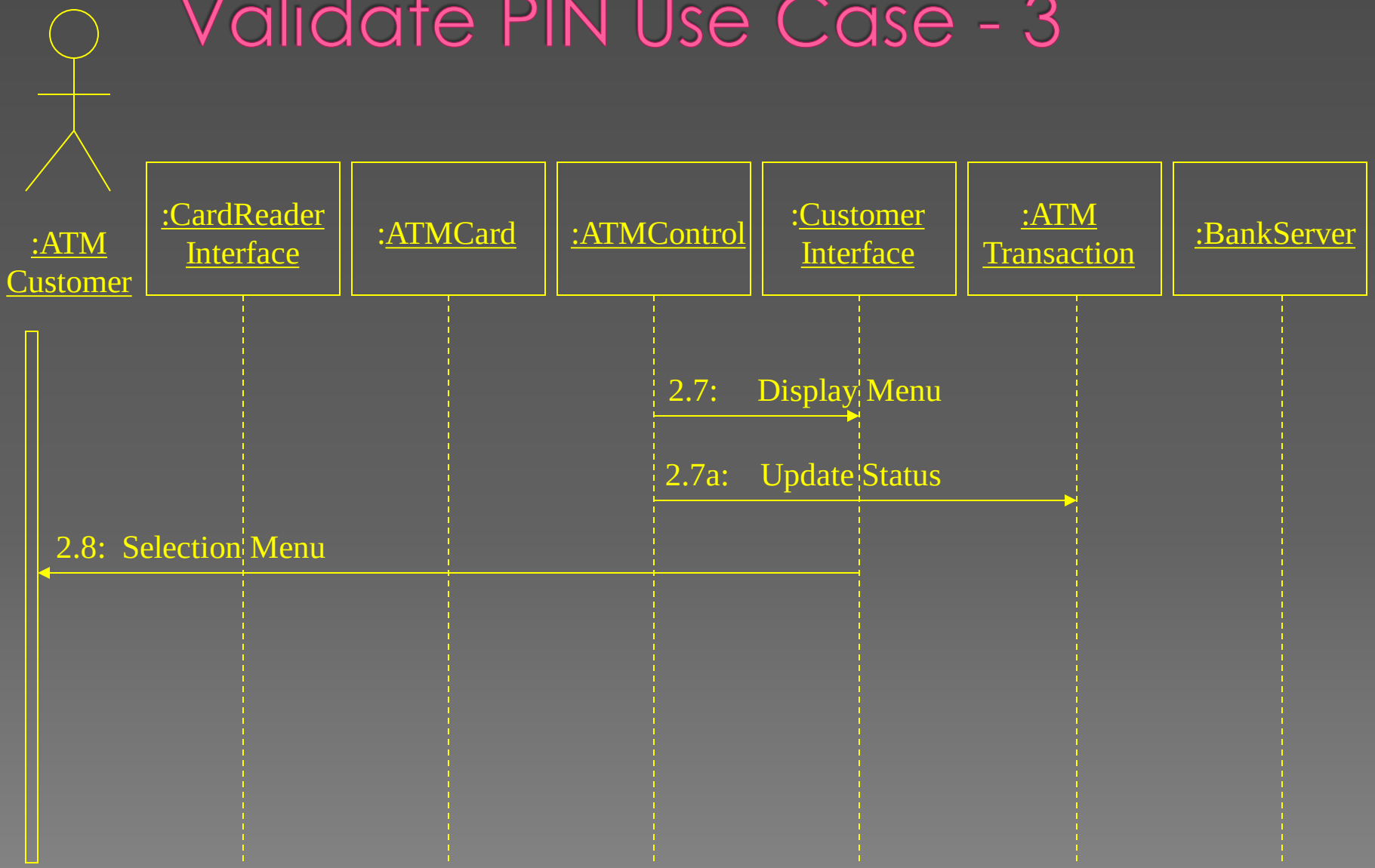
Sequence Diagram: ATM Client Validate PIN Use Case - 1



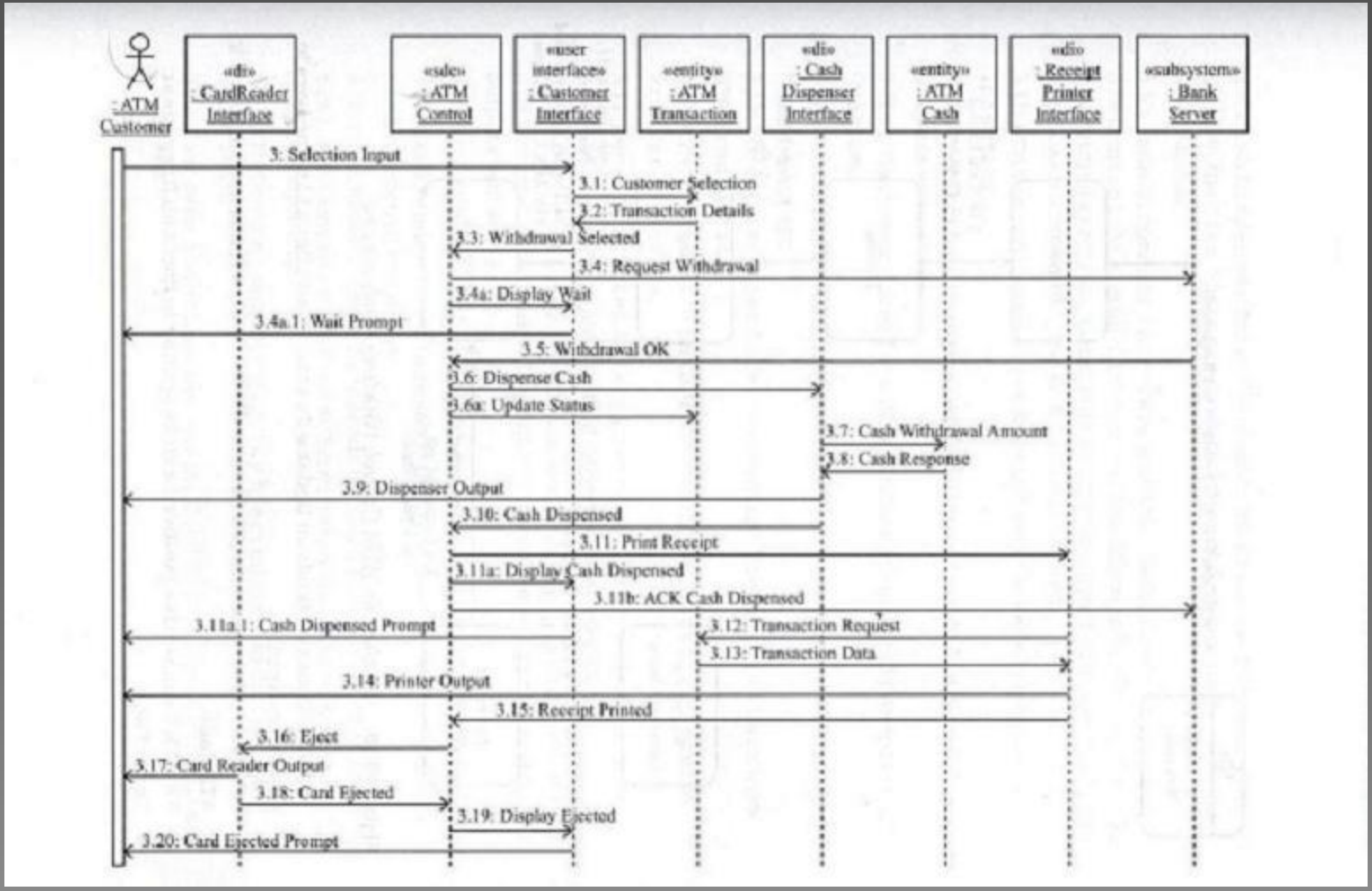
Sequence Diagram: ATM Client Validate PIN Use Case - 2



Sequence Diagram: ATM Client Validate PIN Use Case - 3



Sequence Diagram: ATM Client Withdraw Funds Use Case



Summary

- Up till now we have completed the analysis, requirements modeling, and specification of requirements for the banking system case study
- We have formally completed the requirements document for the case study