Real-Time Structured Analysis and Design Technique (RSTAD) and Application of Banking Case Study

Lecture # 35

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Today's Lecture

- Function oriented modeling discussion
- We'll discuss the Real-Time Structured Analysis and Structured Design Technique
- We'll apply Real-Time Structured Analysis technique to the Banking System case study today

Function-oriented Modeling Techniques

- Structured requirements definition
- Structured analysis and system specification
- Modern structured analysis
- **Real-time structured analysis and structured design**
- **Structured analysis and design technique**
- PSL/PSA

Problem Description - 1

- 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 - 2

- 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 - 3

- 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

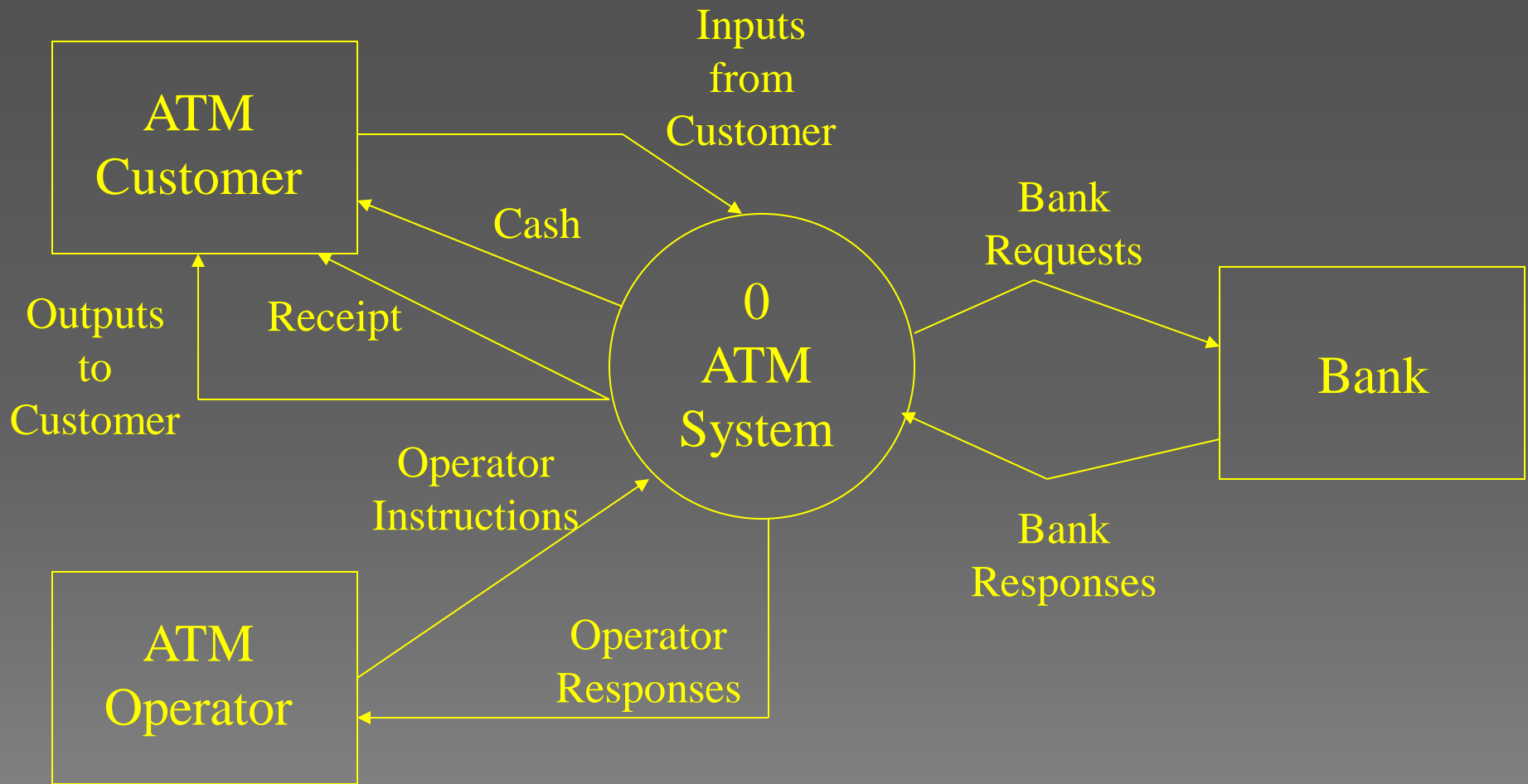# (RSTAD)
Real-Time Structured Analysis and Design Technique

Real-Time Structured Analysis and Structured Design (RSTAD)

- Develop the system context diagram
- Perform data flow/control flow decomposition
- Develop control transformations or control specifications
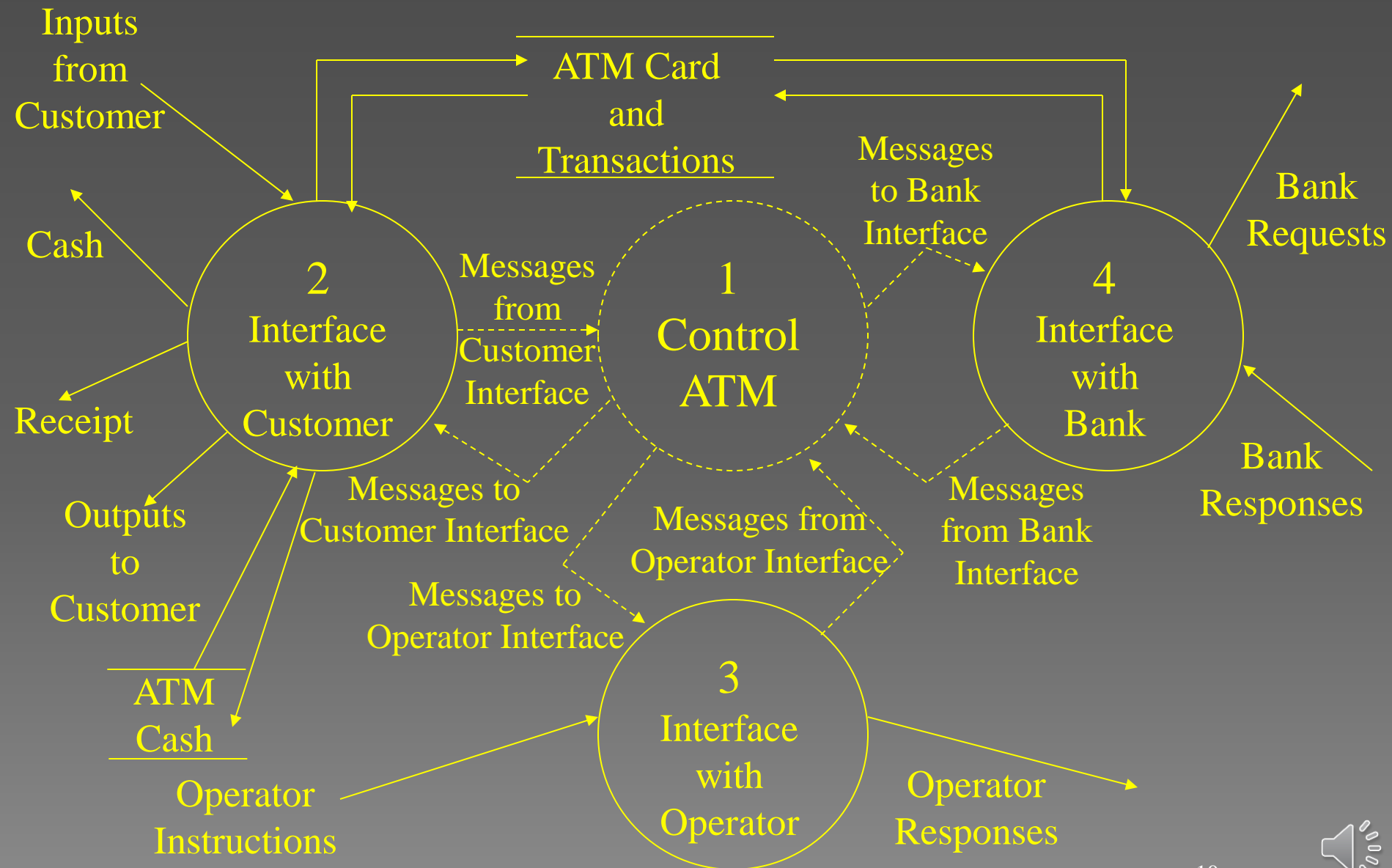- Define mini-specifications (process specifications)
- Develop data dictionary

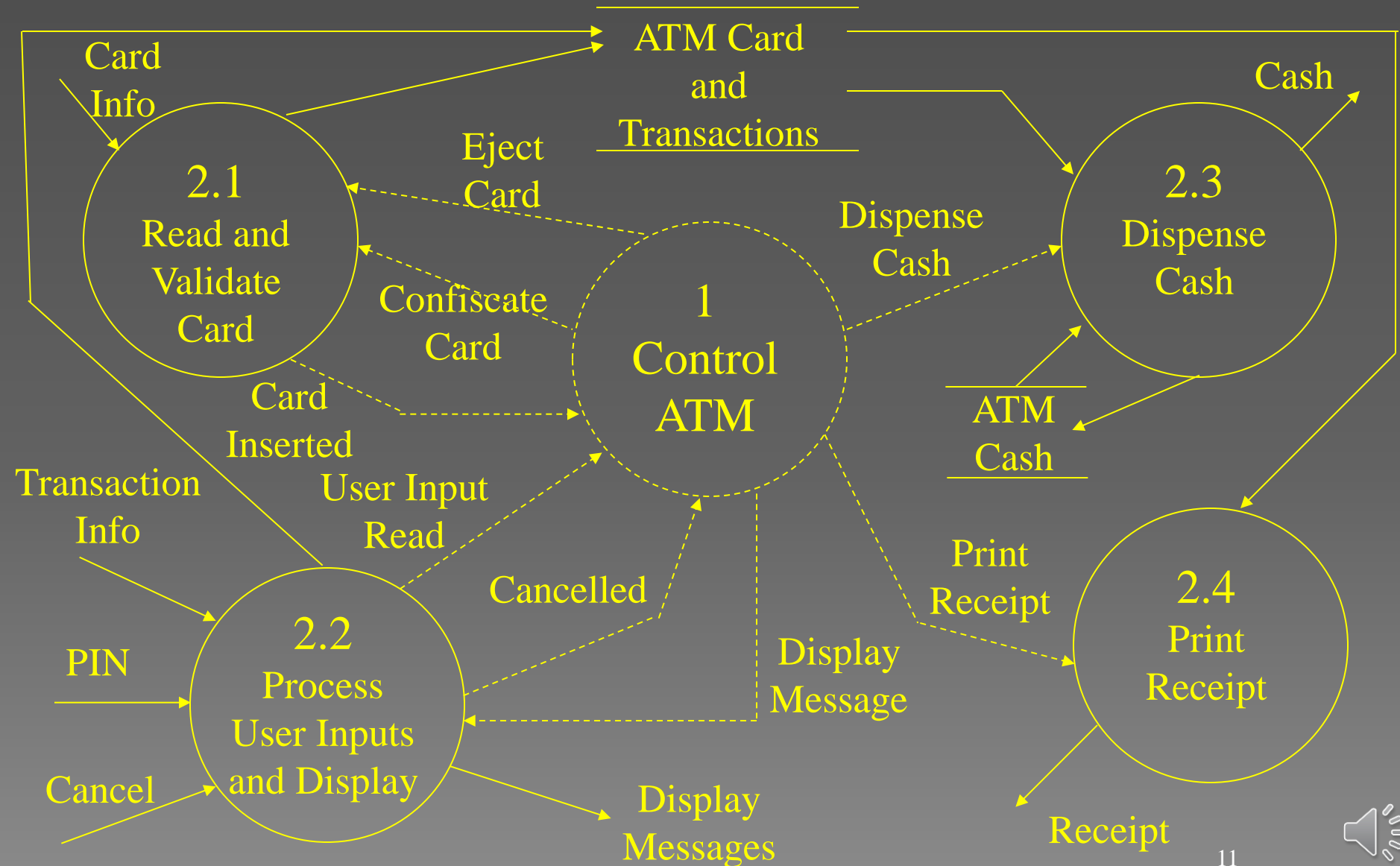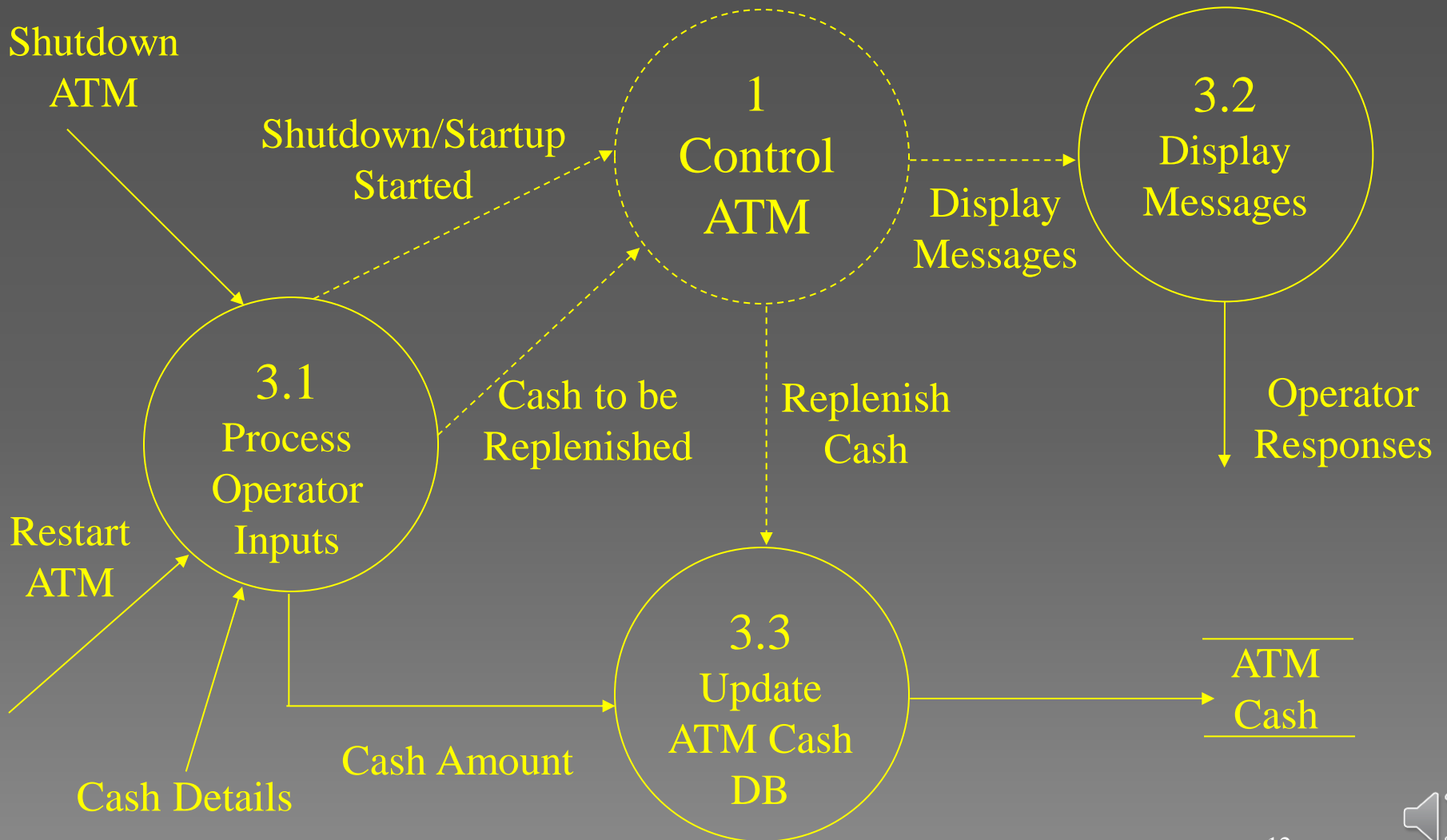# System Context Diagram

ATM Customer

Inputs from Customer

Cash

Receipt

Outputs to Customer

0 ATM System

Bank Requests

Bank

Bank Responses

Operator Instructions

ATM Operator

Operator Responses

Data Flow Diagram – Level 1

Level 2 DFD: Interface with Customer

ATM Card and Transactions

Card Info

2.1 Read and Validate Card

Eject Card

Confiscate Card

Card Inserted

1 Control ATM

Dispense Cash

2.3 Dispense Cash

Cash

ATM Cash

Transaction Info

User Input Read

PIN

2.2 Process User Inputs and Display

Cancelled

Display Message

Print Receipt

2.4 Print Receipt

Cancel

Display Messages

Receipt

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Level 2 DFD: Interface with Operator

Shutdown ATM

Shutdown/Startup Started

1 Control ATM

3.2 Display Messages

Display Messages

3.1 Process Operator Inputs

Cash to be Replenished

Replenish Cash

Operator Responses

Restart ATM

3.3 Update ATM Cash DB

ATM Cash

Cash Details

Cash Amount

Level 2 DFD: Interface with Bank
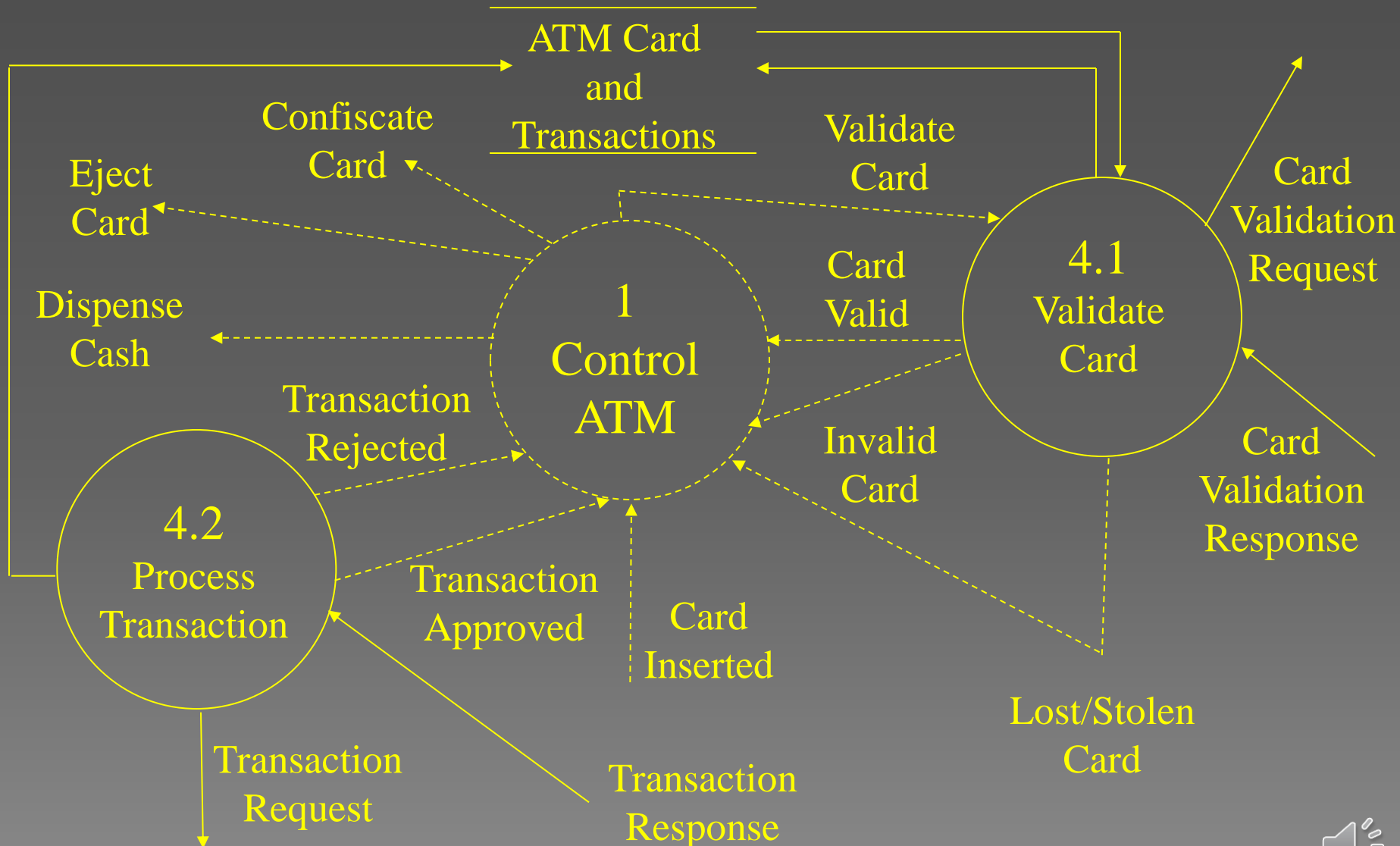
Control Flow Specification

- There is only function here, which has a control flow: Control ATM
- We will discuss control flow in dynamic modeling

Mini Specification

- These are almost equivalent to the use cases
- We had discussed these in quite detail when we talked about use cases

Contents of Data Dictionary

- Name of the data item
- Aliases
- Description/purpose
- Related data items
- Range of values
- Data flows
- Data structure definition/form

Summary

- We have applied Real Time Structured Analysis Technique to the Banking System Case Study.

- We have developed DFDs and Data Dictionaries of the system