Part III

CSCE 747 Software Testing and Quality Assurance

Lecture 09-Integration and System Testing

9/25/2013
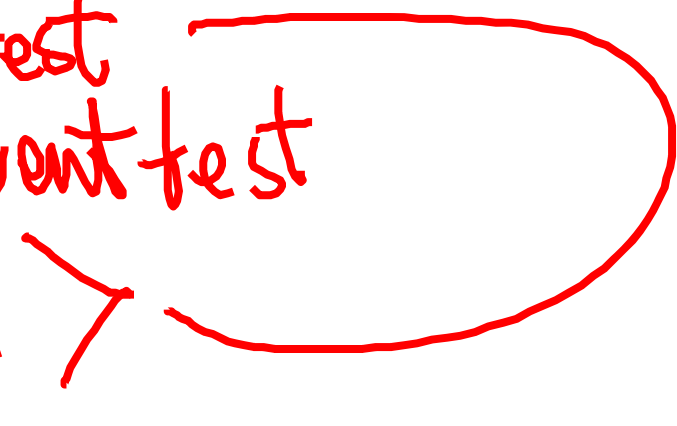
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Last Time

- **Structural Testing WrapUp**
- **Ch 11, pp 169-177**

Today

- **Integration & System Testing Part III**
- **Levels of Testing Ch 12, pp 181-19X**

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Levels of Testing

- **Unit Tests** — (testsuite)
- acceptence tests — system test with custom
- integration — test interaction of modules
- System test
- deployment test
- α test
  β test

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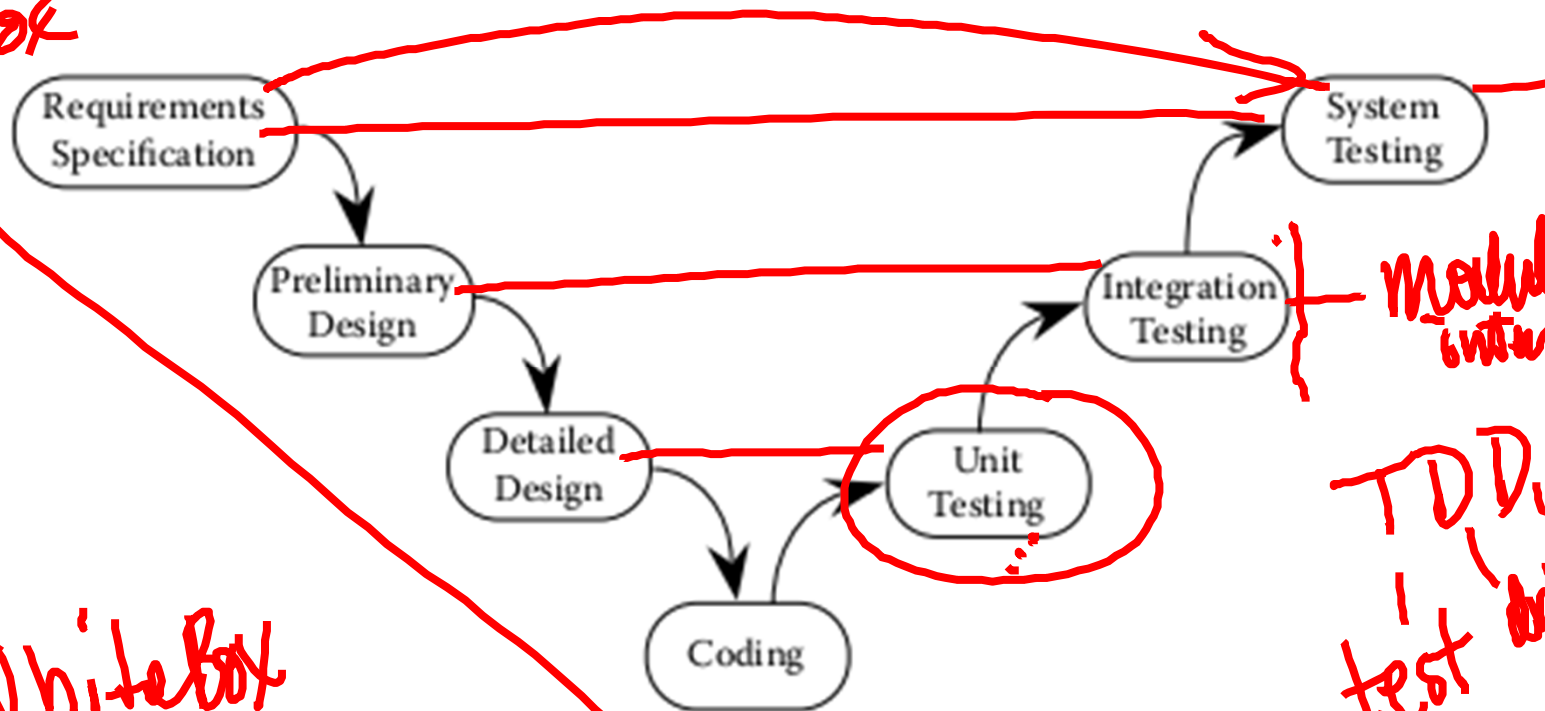A Craftsman Approach

Waterfall Life Cycle

SUT
MUT — module under test
OUT

UML
Seq diagram

BlackBox

Requirements Specification → Preliminary Design → Detailed Design → Coding → Unit Testing → Integration Testing → System Testing

Integration Testing — module interaction

TDD design
test driven

WhiteBox

V diagram

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Fig 12.2 Decomposition of ATM system

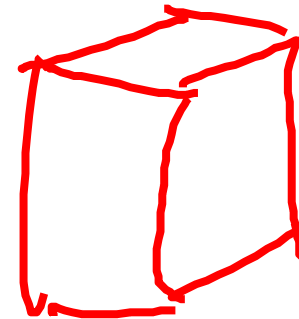- **Integrate subsystems**

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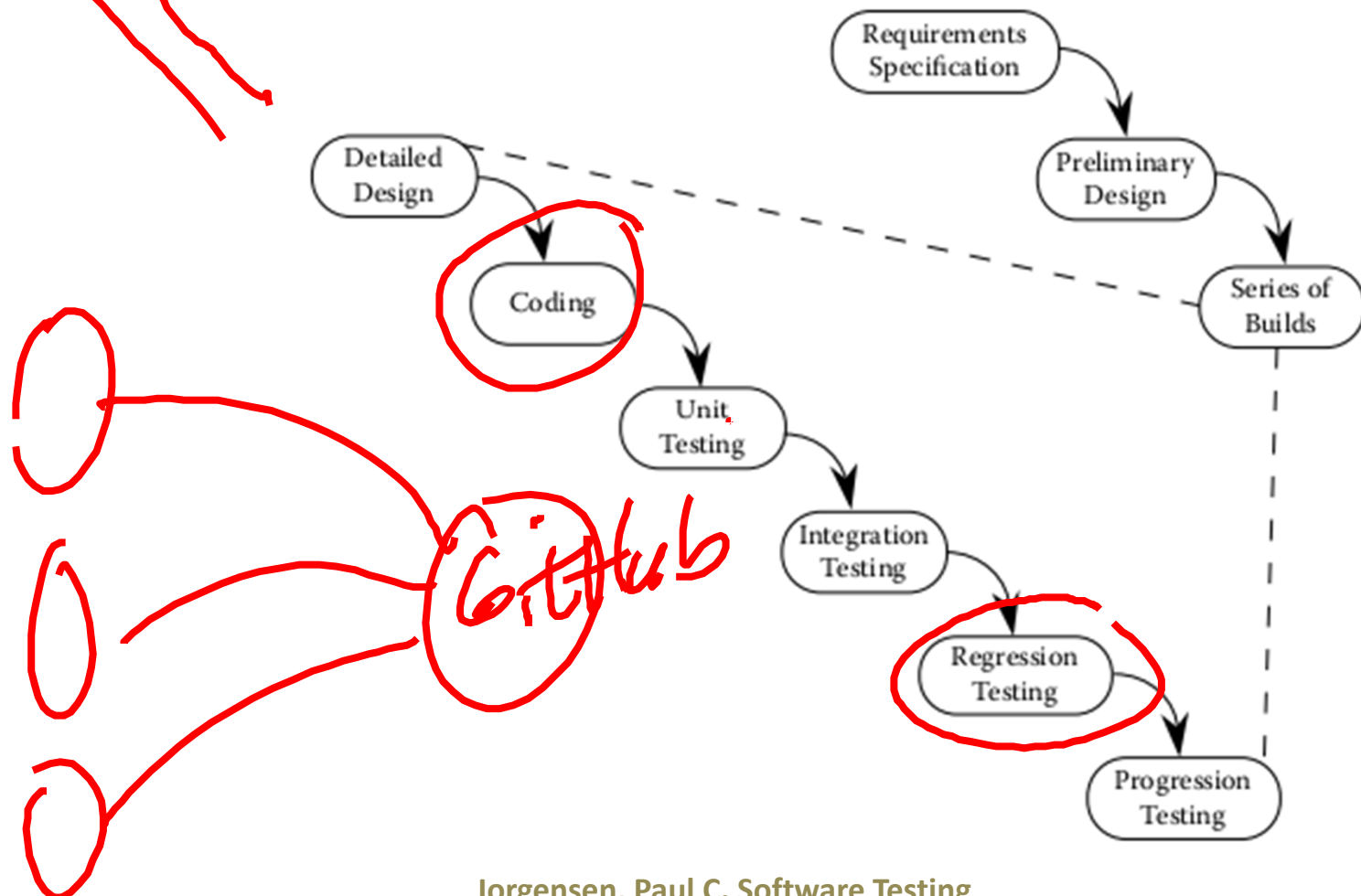A Craftsman Approach
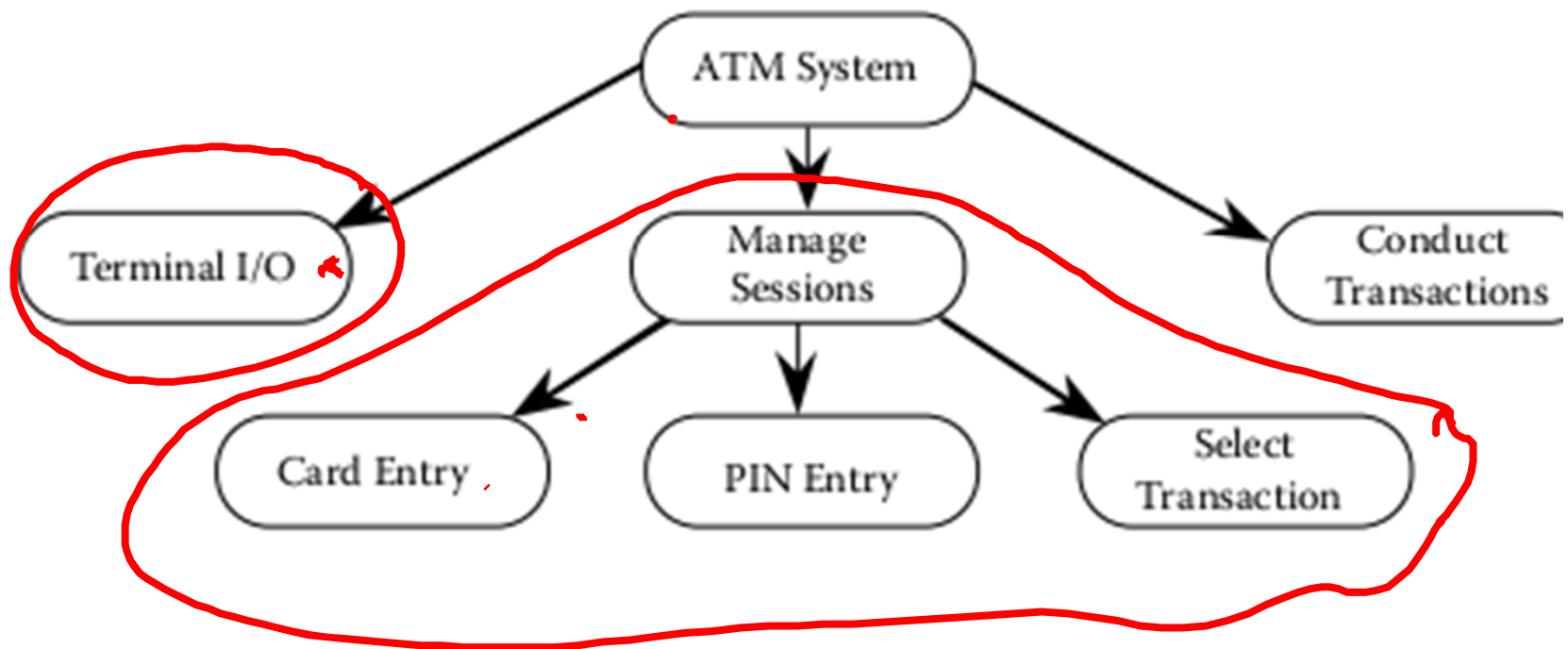
Functional decomposition
Sculpting analogy

- **Functional decomposition**
  - **Can only be done well when we understand the final system**

- **Sculpting analogy**
  - **Marble sculpture**
  - **Wax Sculpture**
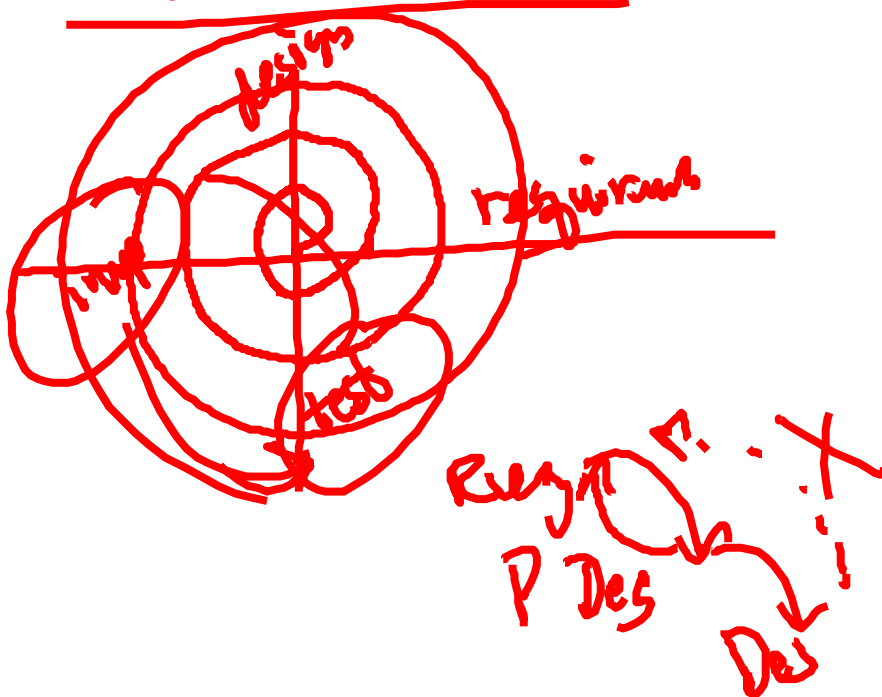 - **Clay - pottery**

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Life Cycle with Builds

Requirements Specification

Preliminary Design

Detailed Design

Coding

Series of Builds

Unit Testing

Integration Testing

Regression Testing

Progression Testing

GitHub

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~~Specification-based Life Cycle Models~~

Agile Life Cycle

Spiral Model

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Rapid Prototyping life cycle

Agile

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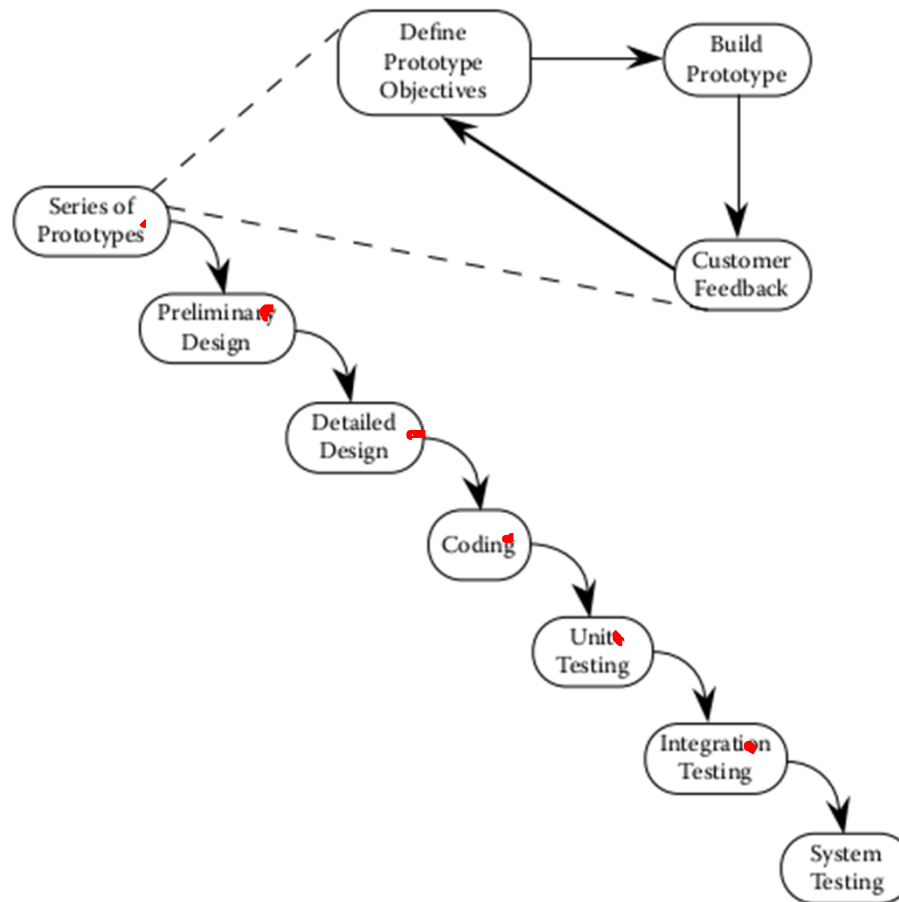
Executable Specifications
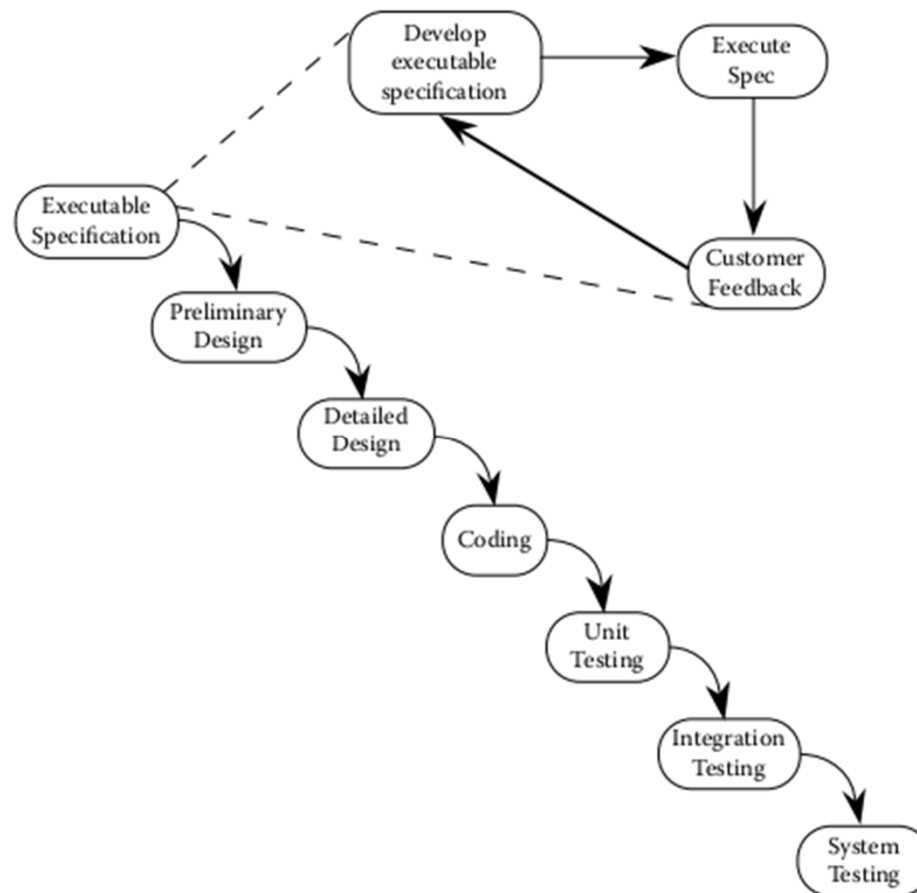
Behavior Driven Design

BDD

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Screens of the SATM

Screen 1

Welcome.

Please Insert your ATM card for service

Screen 2

Enter your Personal Identification Number

_ _ _ _

Press Cancel if Error

Screen 3

Your Personal Identification Number is incorrect. Please try again.

Screen 4

Invalid identification. Your card will be retained. Please call the bank.

Screen 5

Select transaction type:
balance
deposit
withdrawal
Press Cancel if Error

Screen 6

Select account type:
checking
savings

Press Cancel if Error

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Screens of the SATM

Screen 7

Enter amount.
Withdrawals must be
in increments of $10.

_ _ _ _ . _ _

Press Cancel if Error

Screen 8

Insufficient funds.
Please enter a new
amount.

_ _ _ _ . _ _
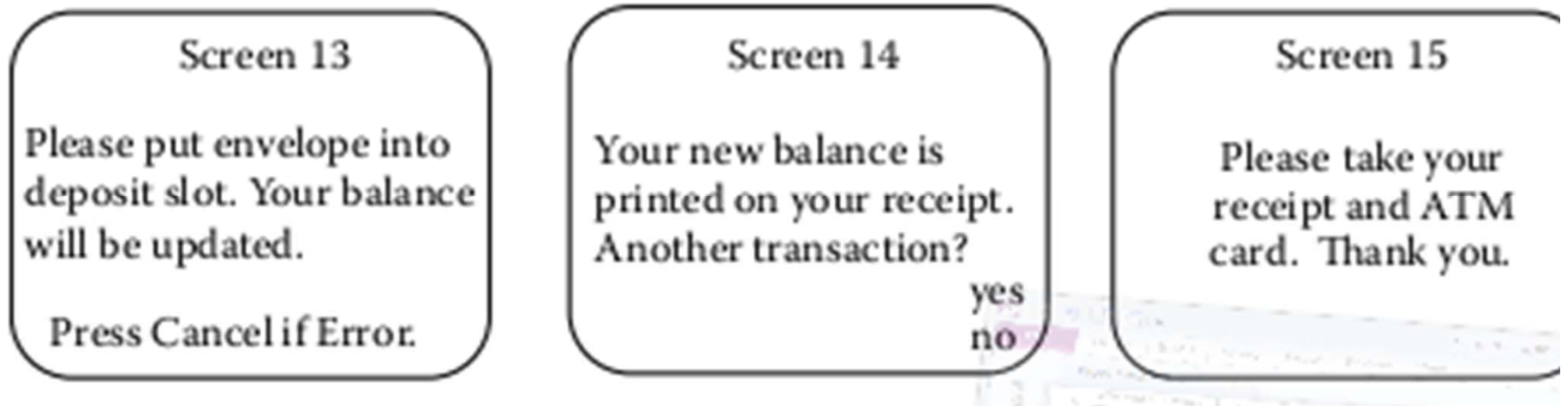
Press Cancel if Error

Screen 9

Machine cannot dispense
that amount.

Please try again.

Screen 10

Temporarily unable to
process withdrawals.
Another transaction?

yes
no

Screen 11

Your balance is being
updated. Please take cash
from dispenser.

Screen 12

Temporarily unable to
process deposits.
Another transaction?

yes
no

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Screens of the SATM

Screen 13

Please put envelope into deposit slot. Your balance will be updated.

Press Cancel if Error.

Screen 14

Your new balance is printed on your receipt. Another transaction?

yes
no

Screen 15

Please take your receipt and ATM card. Thank you.

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SATM Interface

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SATM: Screen 1
Welcome/Enter PIN

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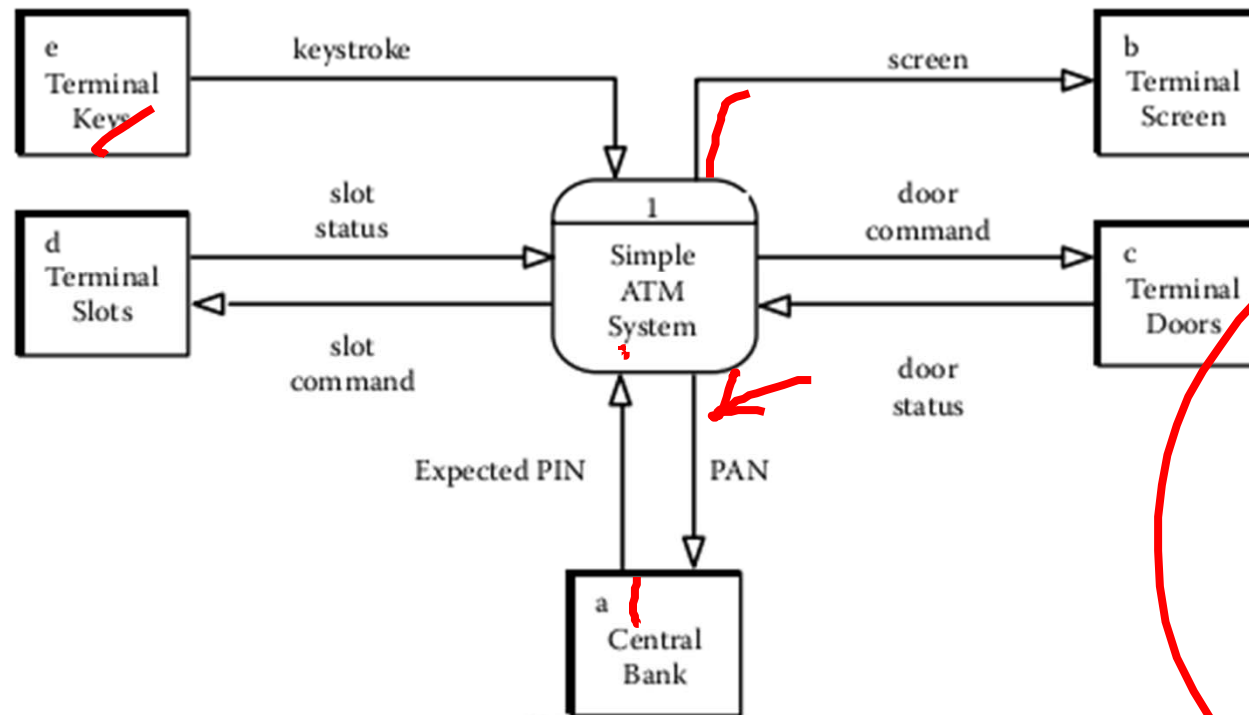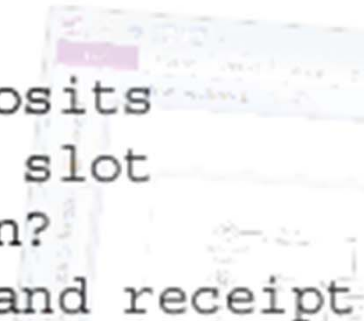
SATM Dataflow

- **More**

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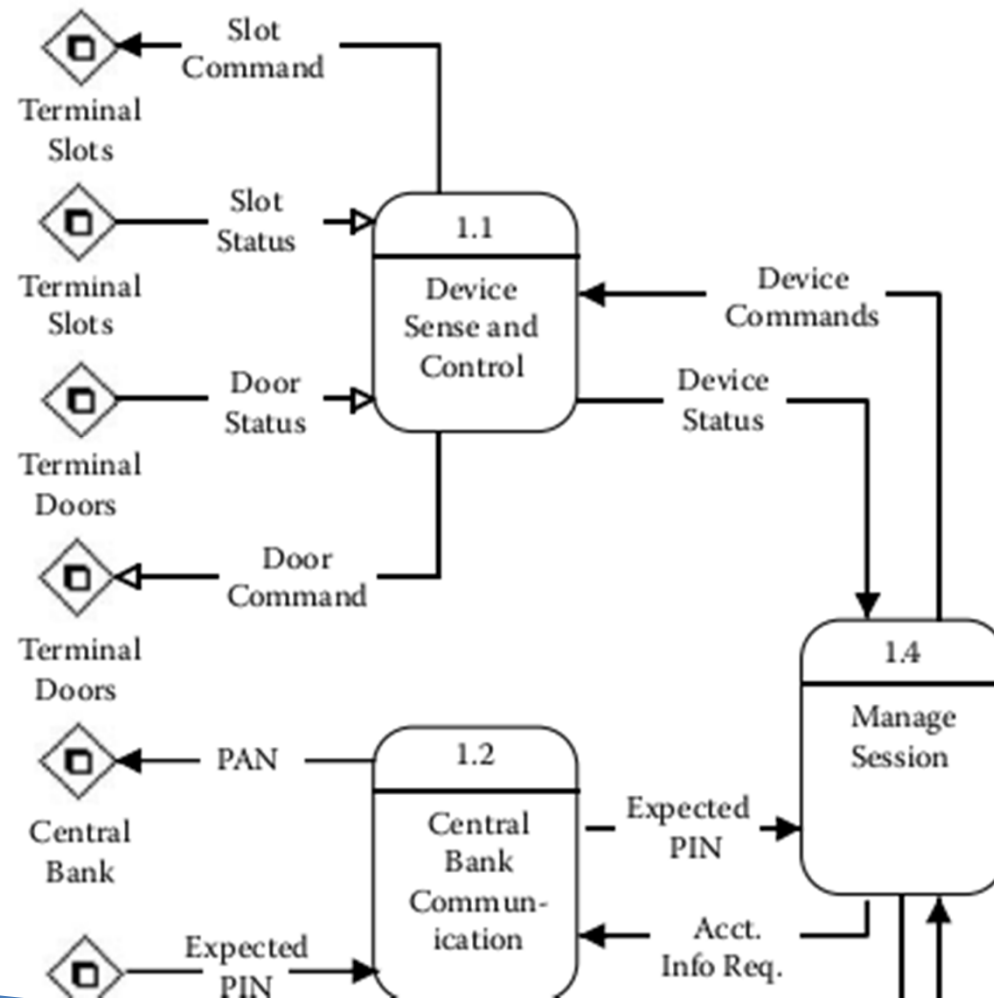
```
screen3      wrong PIN
screen4      PIN failed, card retained
screen5      select trans type
screen6      select account type
screen7      enter amount
screen8      insufficient funds
screen9      cannot dispense that amount
screen10     cannot process withdrawals
screen11     take your cash
screen12     cannot process deposits
screen13     put dep envelop in slot
screen14     another transaction?
screen15     Thanks; take card and receipt
```

ER Model of the SATM

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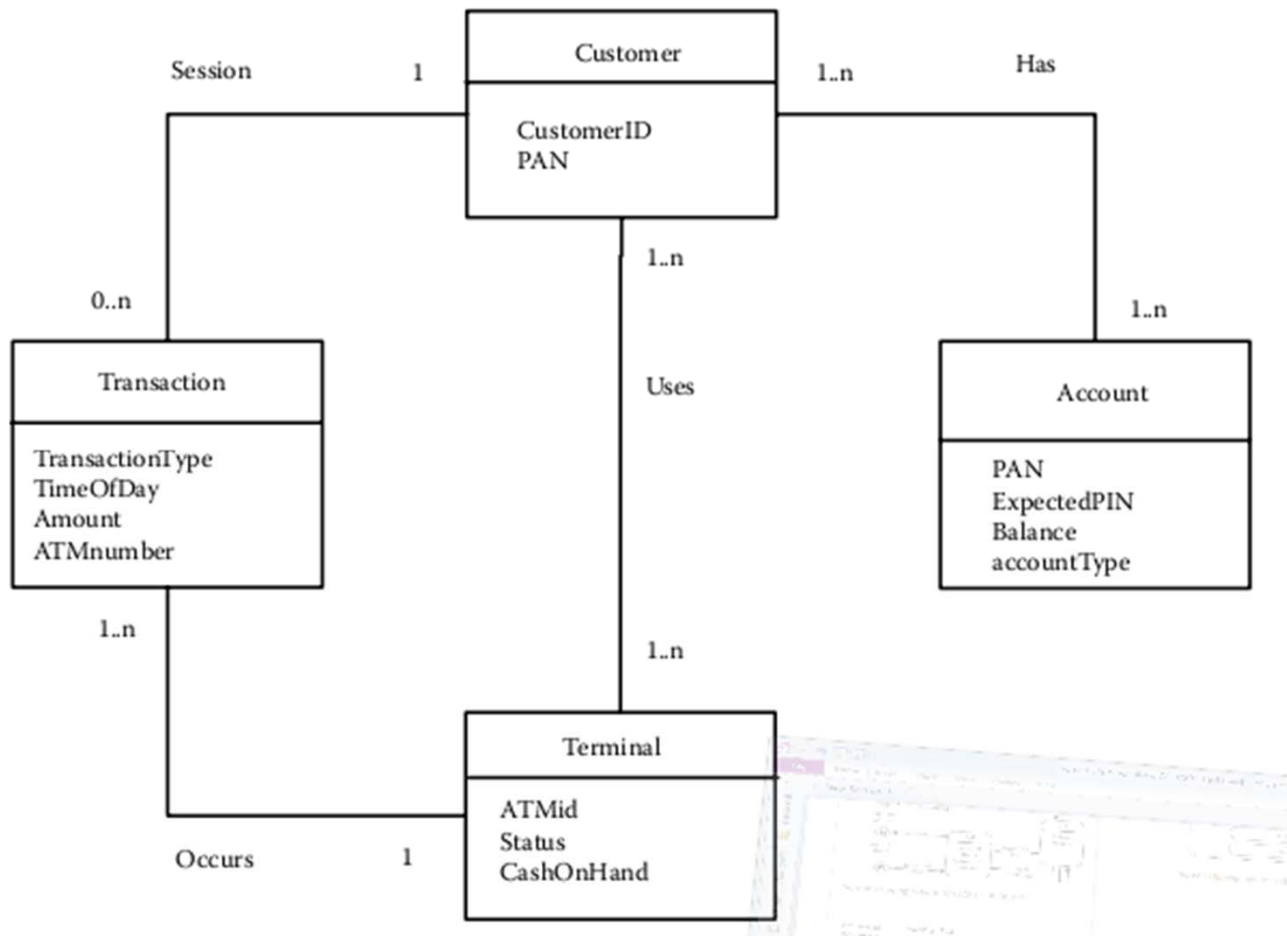
Finite State Model of SATM

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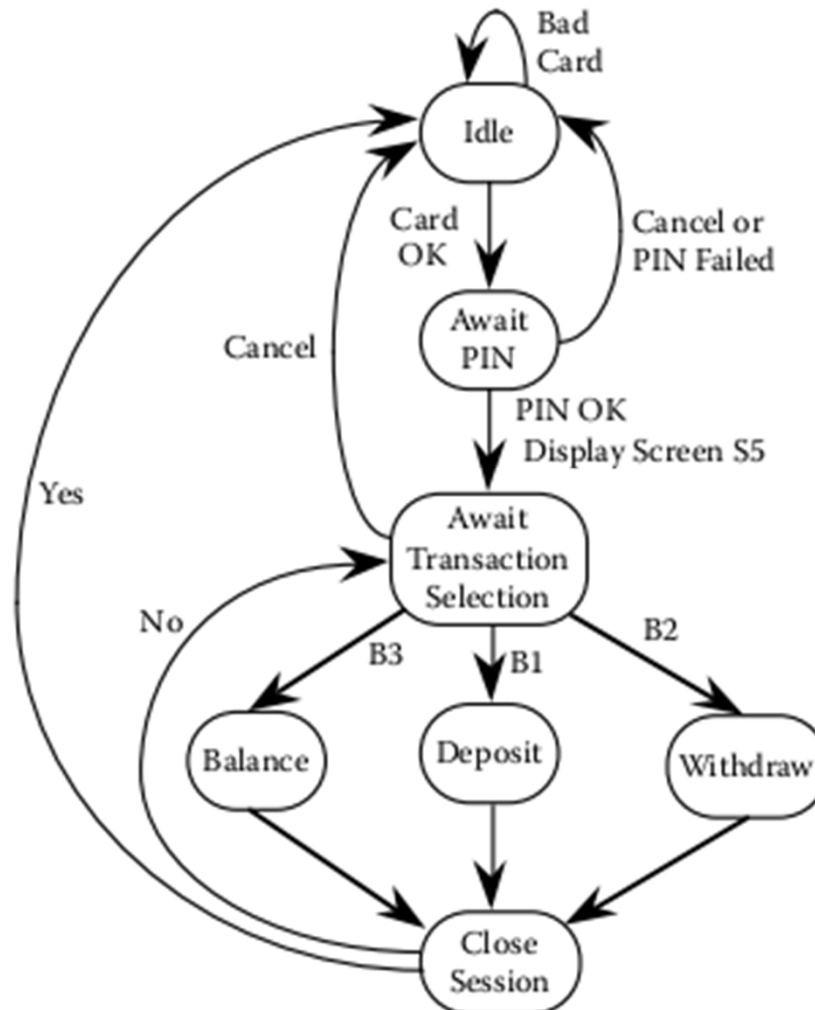
FS Model of SATM: PIN-entry

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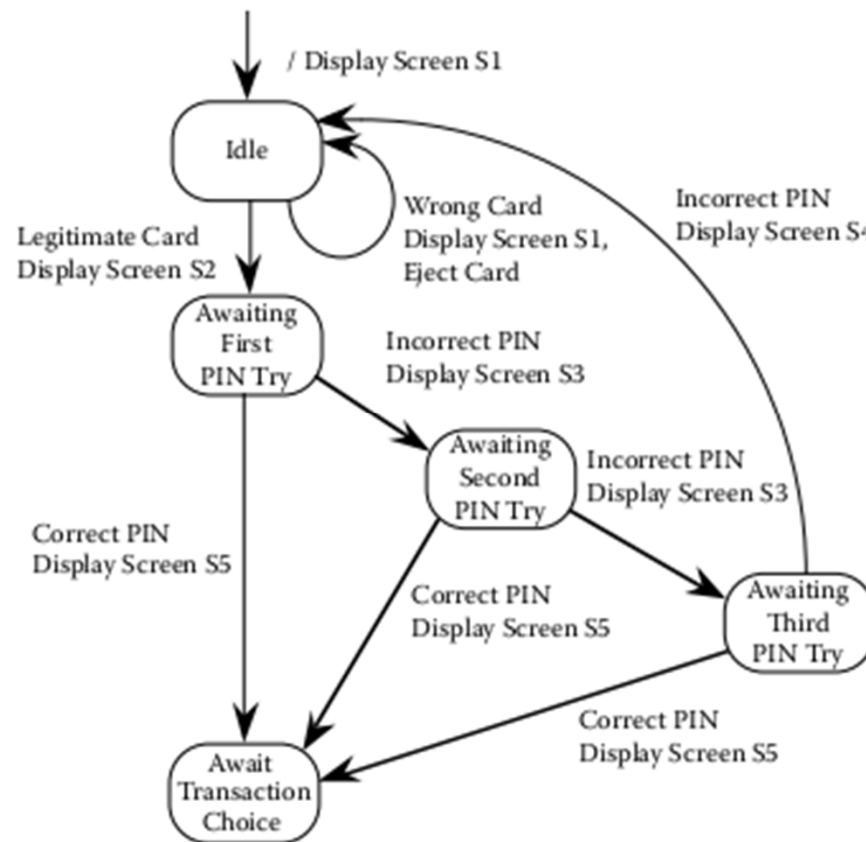
Functional Decomposition

```
1        SATM System
1.1      Device Sense & Control
1.1.1    Door Sense & Control
1.1.1.1     Get Door Status
1.1.1.2     Control Door
1.1.1.3     Dispense Cash
1.1.2 Slot Sense & Control
1.1.2.1     WatchCardSlot
1.1.2.2     Get Deposit Slot Status
1.1.2.3     Control Card Roller
1.1.2.3     Control Envelope Roller
1.1.2.5     Read Card Strip
1.2      Central Bank Comm.
1.2.1 Get PIN for PAN
1.2.2 Get Account Status
1.2.3 Post Daily Transactions
1.3      Terminal Sense & Control
1.3.1 Screen Driver
1.3.2 Key Sensor
1.4      Manage Session
1.4.1 Validate Card
1.4.2 Validate PIN
```

```
1.4.2.1     GetPIN
1.4.3 Close Session
1.4.3.1     New Transaction Request
1.4.3.2     Print Receipt
1.4.3.3     Post Transaction Local
1.4.4 Manage Transaction
1.4.4.1     Get Transaction Type
1.4.4.2     Get Account Type
1.4.4.3     Report Balance
1.4.4.4     Process Deposit
1.4.4.5     Process Withdrawal
```

SATM Functional Decomposition

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