Software Design

Inst Nguyễn Minh Huy

Contents

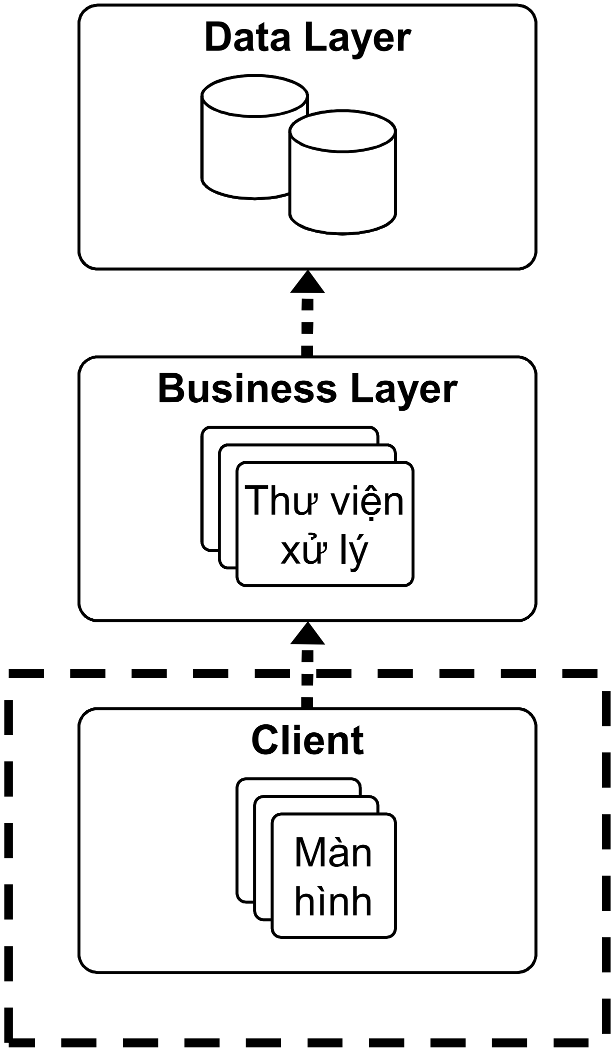
- User Interface Design.
- Object Oriented Design.
- Data Design.
- Process Design.

Contents

- **User Interface Design.**
- Object Oriented Design.
- Data Design.
- Process Design.

User Interface Design

- Software Interface:
  - Software interacts with:
    - Users.
    - Related systems.
  - ➔ Through interface.
  - Types of interface:
    - User interface (UI).
    - Programming interface (API).



User Interface Design

- User Interface Design Steps:
  - Identify screen list.
    - Based on Use Cases.
  - Draw screen diagram.
    - Show screen relationship.
  - Screen design.
    - Organize controls on screen.
  - Screen specification.
    - Explain controls.
    - Describe flow of events.

User Interface Design

- User Interface Controls:
  - Input controls:
    - Command:
      - Button.
      - Link.
    - Typing:
      - TextBox.
    - Selection:
      - ListBox.
      - ComboBox.
      - CheckBox.
      - RadioButton.

User Interface Design

- User Interface Controls:
  - Output controls:
    - Simple output:
      - Label.
      - TextBox.
      - MessageBox.
    - Complex output:
      - ListView.
      - GridView.
      - Report.

User Interface Design

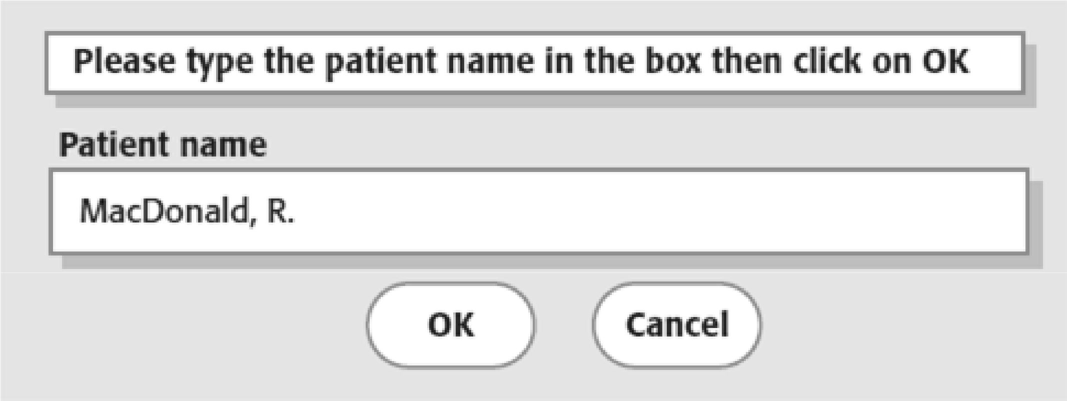
- User Interface Design Guidelines:
  - Color using:
    - Consistency.
    - Simply.
    - Do not use too many colors (4/6).
    - Be careful of contrast colors.

User Interface Design

- User Interface Design Guidelines:
  - Message using:
    - Consistency.
    - Politeness.
    - Simply.
    - Informative.
    - Use user language:
      - General.
      - Special.
      - Technical.

User Interface Design

- User Interface Design Guidelines:
  - Message using:

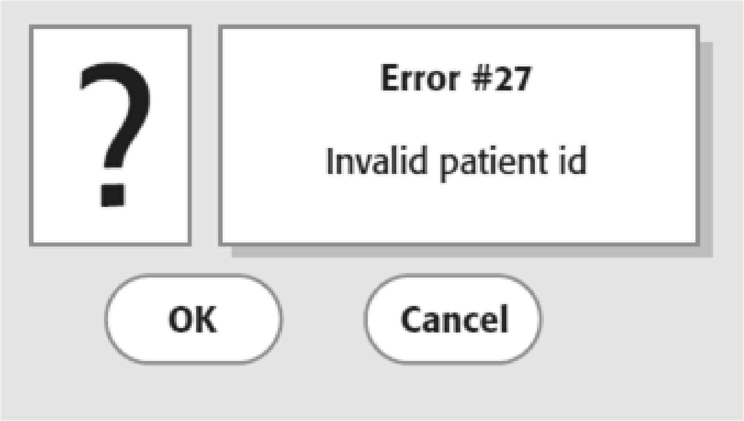


Please type the patient name in the box then click on OK

Patient name

MacDonald, R.

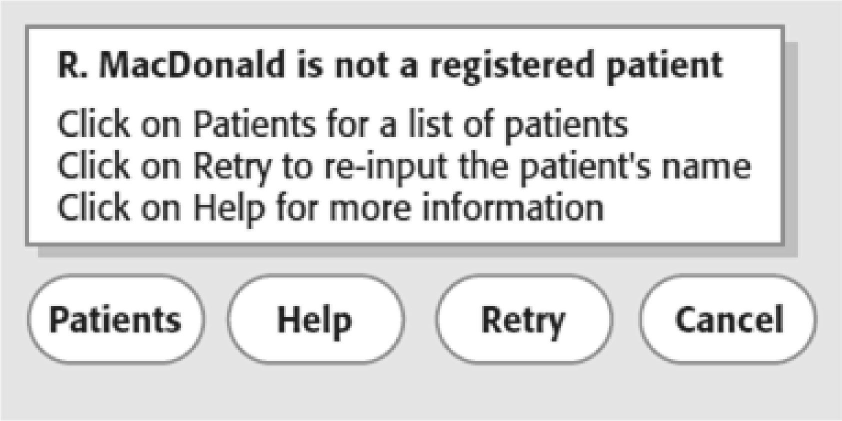
System-oriented error message



Error #27

Invalid patient id

User-oriented error message



R. MacDonald is not a registered patient

Click on Patients for a list of patients
Click on Retry to re-input the patient's name
Click on Help for more information

User Interface Design

- User Interface Design Guidelines:
  - Data validation:
    - Do not trust the users.

      ➔ Check all user input data.
    - Validation constrains:
      - Natural constrains.
      - Business constrains.
    - Types of validation:
      - Early checking.
      - Late checking.

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- **Object Oriented Design.**
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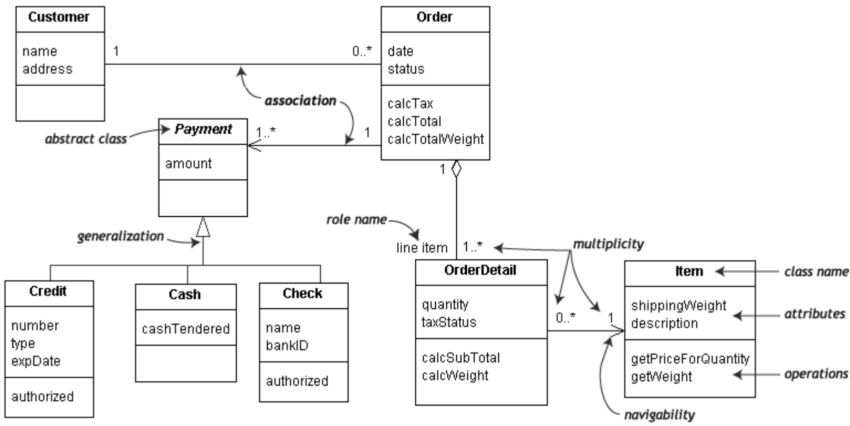
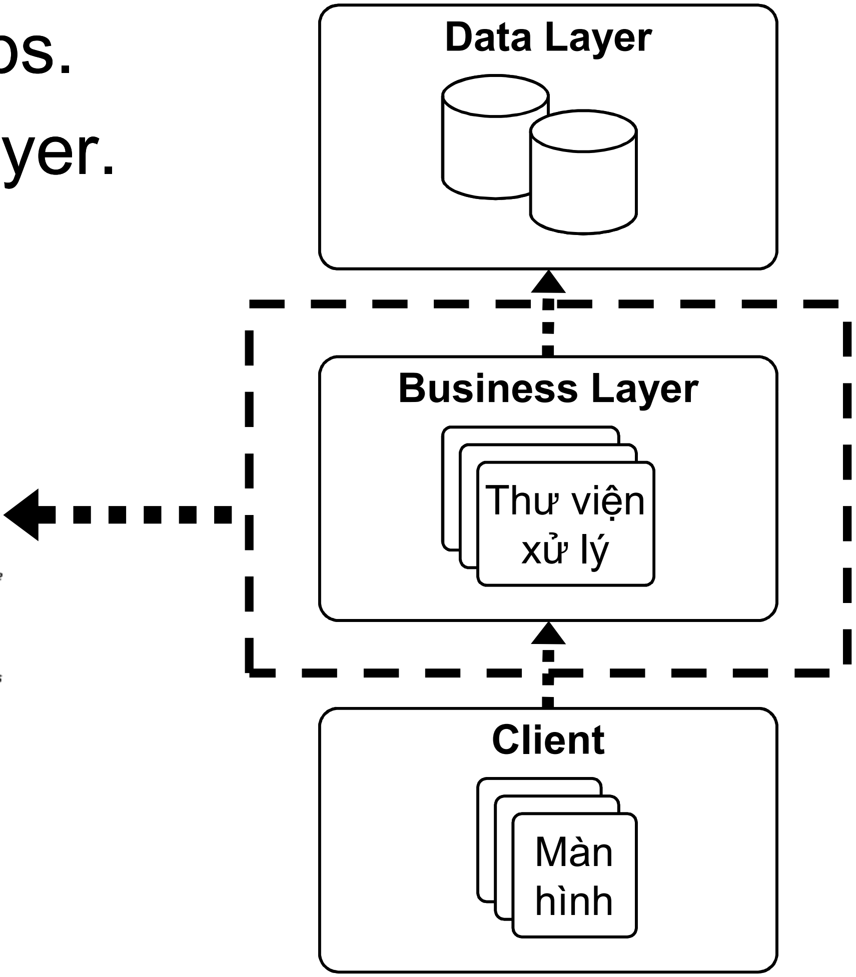
Object Oriented Design

- Class Diagram:
  - Show classes & relationships.
  - Static picture of business layer.




Data Layer

Business Layer

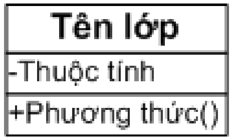
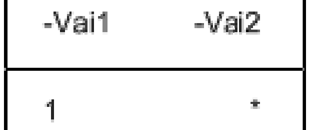
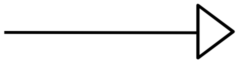
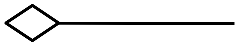
Thư viện xử lý

Client

Màn hình

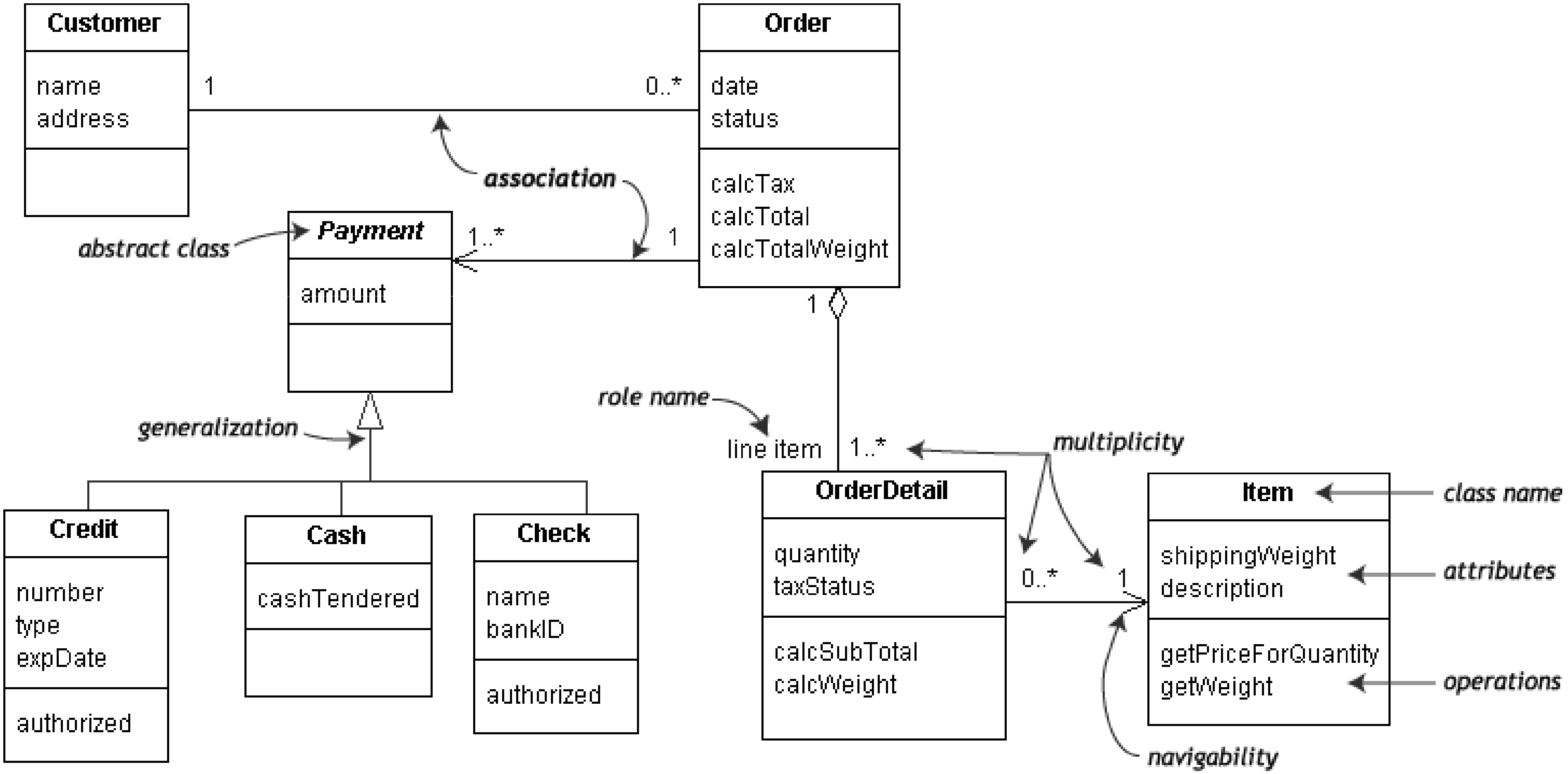
Object Oriented Design

- Class Diagram Notations:

Notation	Meaning
	Class
+/-	Scope
	Relationship
	IS-A
	HAS-A

Object Oriented Design

- Class Diagram “Online Shop”:



Object Oriented Design

- Types of Object:
  - Domain object:
    - Real-world entity.
    - Take role in business process.
    - Has storage data.
  - System object:
    - Created entity.
    - Support processing & calculations.

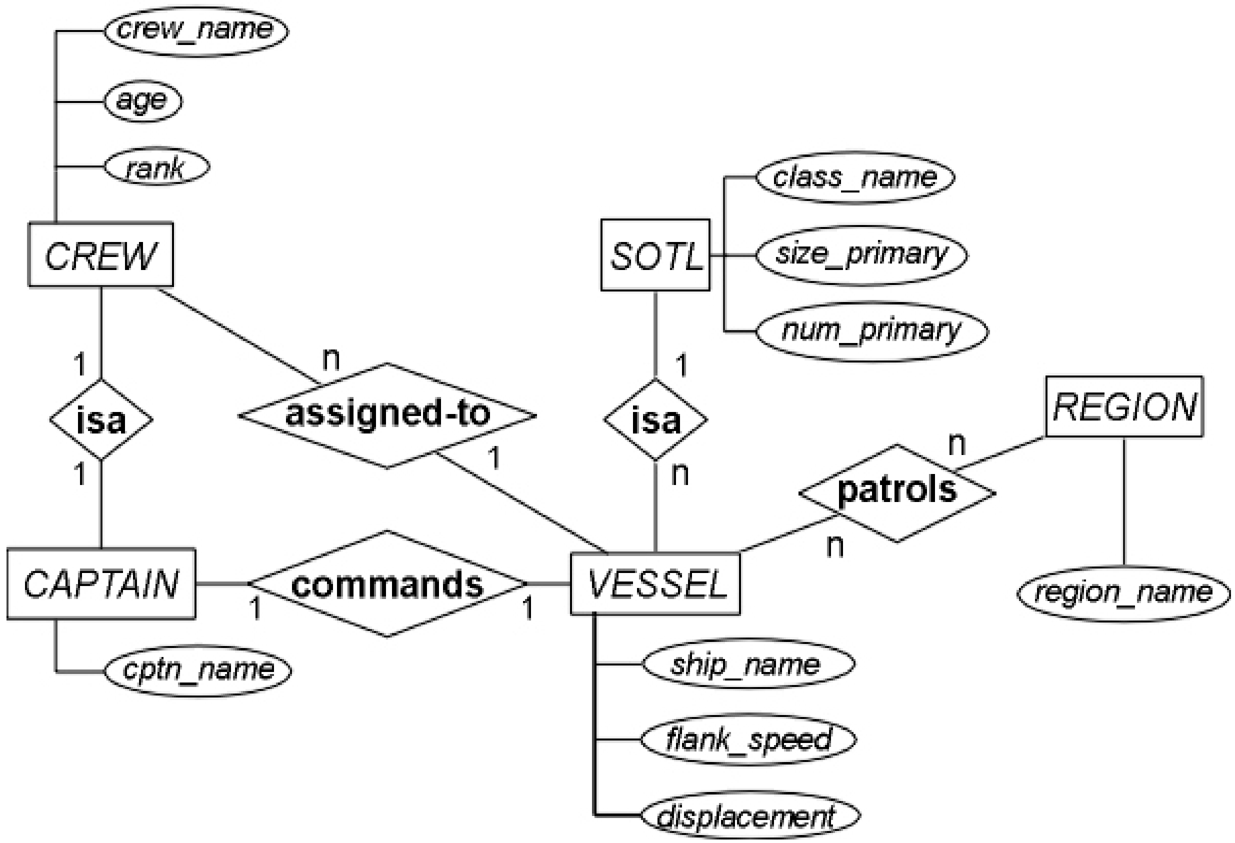
Object Oriented Design

- Class Diagram Guidelines:
  - Step 1: identify domain objects.
    - Convert from ERD.
    - Each entity ~ each class.

Object Oriented Design

- Example: “Shipping System”.
  - Convert from ERD:

Figure 1: Entity-Relationship Diagram Example



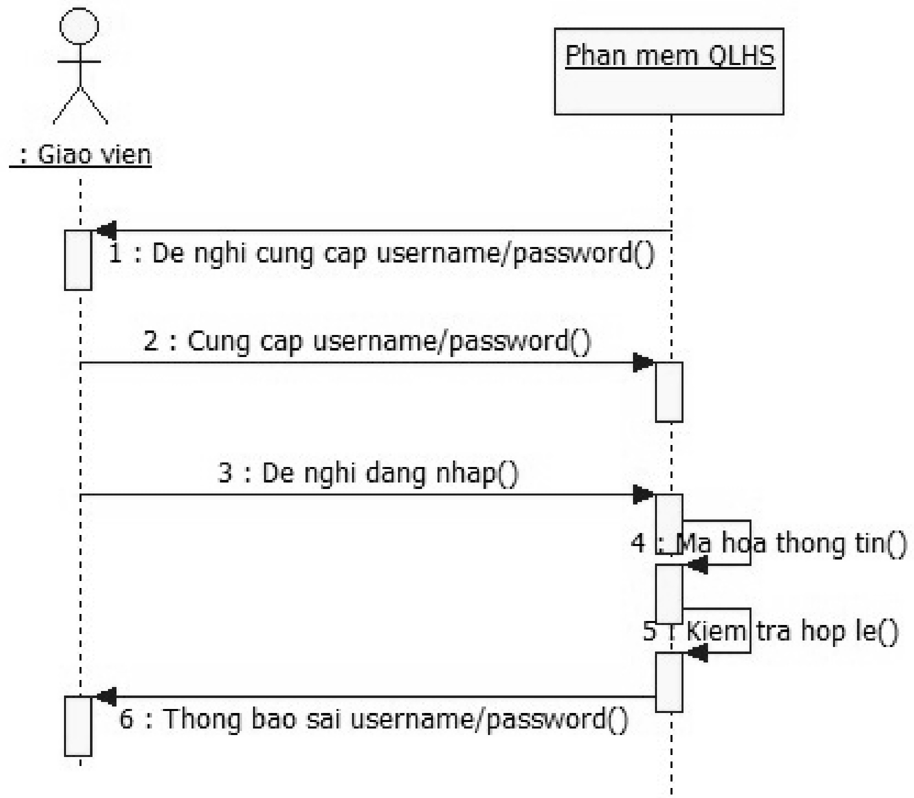
Object	Type
Vessel	Domain
VesselType	Domain
Region	Domain
Crew	Domain
Captain	Domain

Object Oriented Design

- Class Diagram Guidelines:
    - Step 2: identify system objects.
        - Based on Use Case Specification.
        - Steps in “screenplay” must be performed by objects.
        - Create system objects if needed.

Object Oriented Design

- Example: “Student Management System”.
  - Use Case: Login.
  - Scenario: Login failed.



: Giao vien
Phan mem QLHS
1 : De nghi cung cap username/password()
2 : Cung cap username/password()
3 : De nghi dang nhap()
4 : Ma hoa thong tin()
5 : Kiem tra hop le()
6 : Thong bao sai username/password()

Step	Object	Type
4	Encryptor	System
5	LoginAccount	System

Object Oriented Design

- Class Diagram:
  - Step 3: class refine.
    - Follow Object Oriented Rules.
      - Encapsulation, Inheritance, Polymorphism.
    - Rule of black-box.
    - Data redundancy and reuse → inheritance.
    - Data & process classification → polymorphism.

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- **Data Design.**
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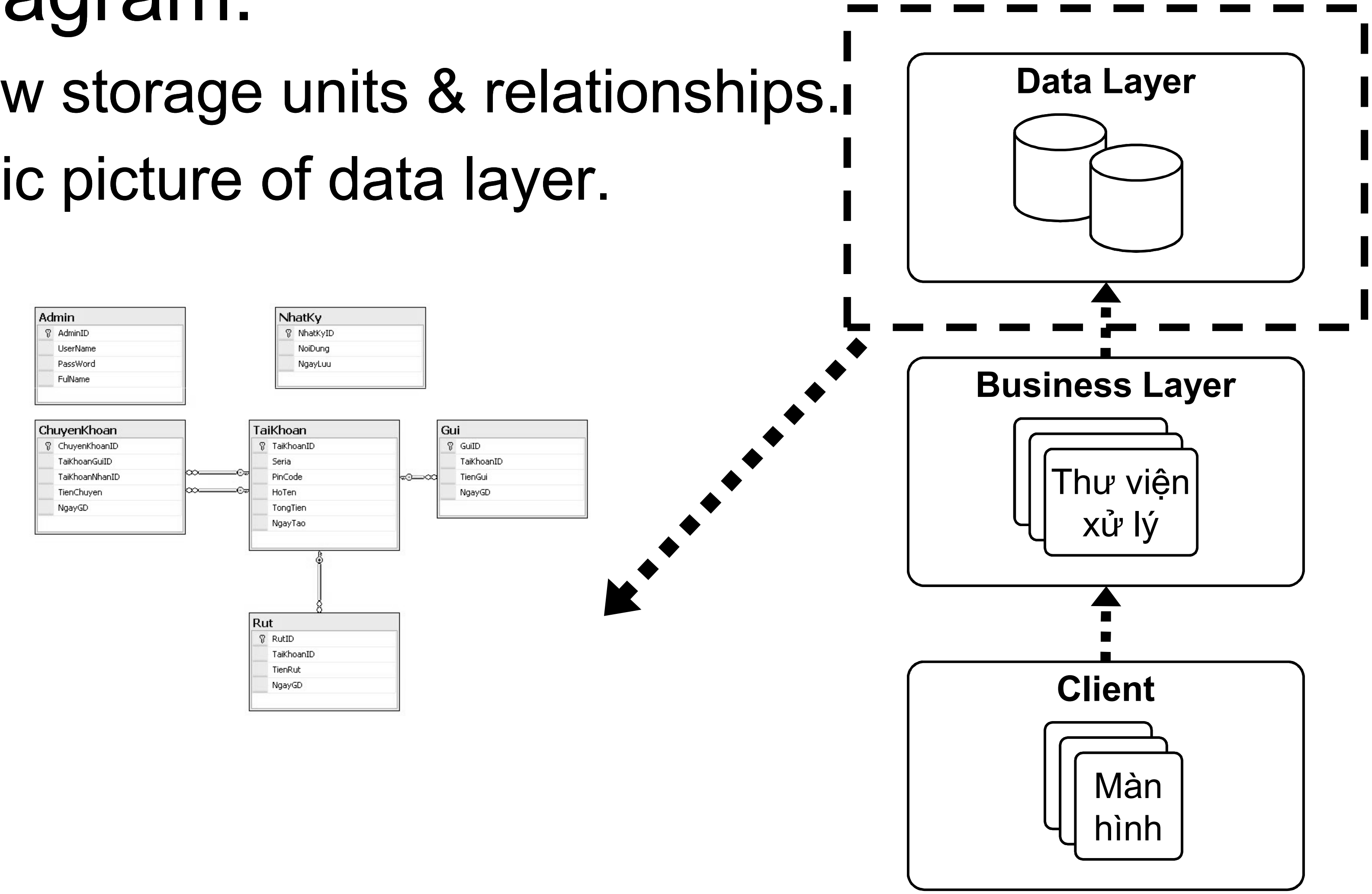
Data Design

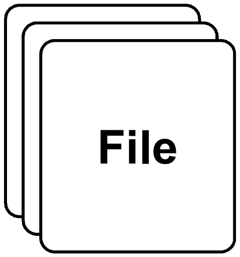
- Data Diagram:
  - Show storage units & relationships.
  - Static picture of data layer.

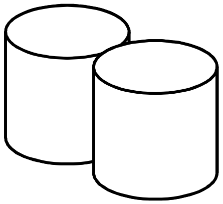


Data Design

- Types of Data Storage System:
  - File system:
    - Store data in files.
    - Self-organize file structures.
    - Pros: simple, fast.
    - Cons: hard to manage large data.
  - Database system:
    - Store data in tables.
    - Use DBMS.
    - Pros: manage large data efficiently.
    - Cons: complex, slow.

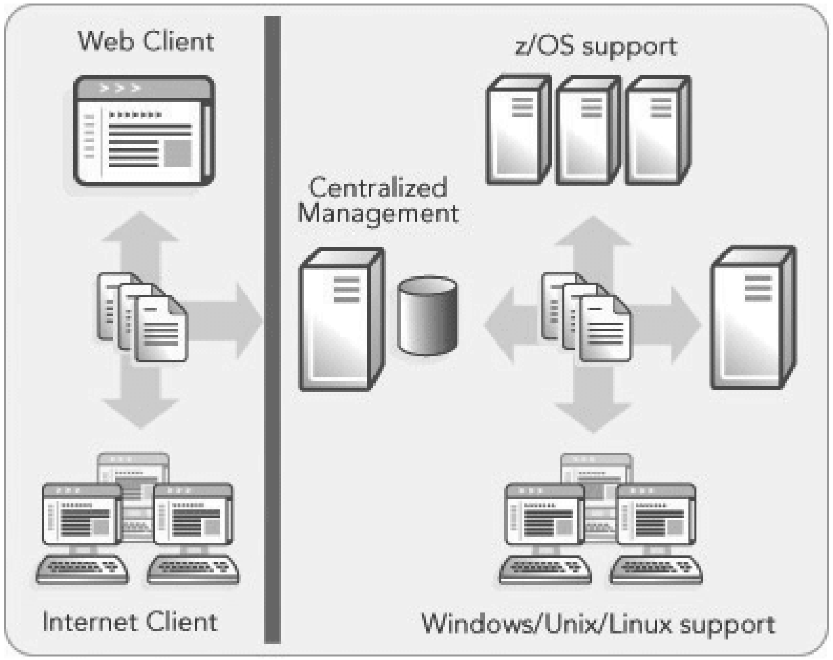
➔ Big Data.

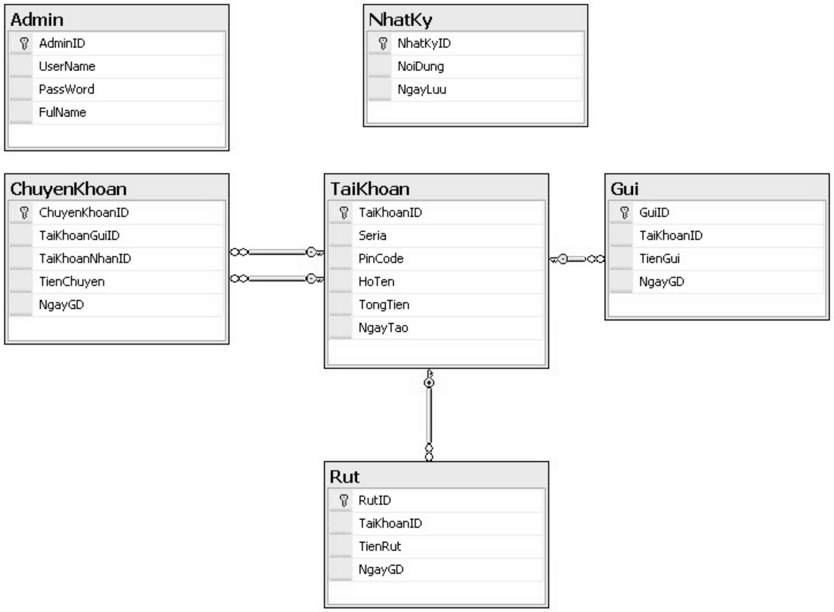



Database

Data Design

- Data Diagram:
  - Step 1: convert from ERD.
    - Entities ~ Storage Unit.
      - File system: file.
      - Database: table.





Admin
- AdminID
- UserName
- PassWord
- FulName

NhatKy
- NhatKyID
- NoiDung
- NgayLuu

ChuyenKhoan
- ChuyenKhoanID
- TaiKhoanGuiID
- TaiKhoanNhanID
- TienChuyen
- NgayGD

TaiKhoan
- TaiKhoanID
- Seria
- PinCode
- HoTen
- TongTien
- NgayTao

Gui
- GuiID
- TaiKhoanID
- TienGui
- NgayGD

Rut
- RutID
- TaiKhoanID
- TienRut
- NgayGD

Data Design

- Data Specification:
  - File system:
    - Describe file format.
  - Database:
    - Describe table fields.

Data Design

- Data Specification:

Student Table

#.	Fields	Constrains	Descriptions
1	ma_hocsinh	Khóa chính Định dạng: YYCCCXX YY: năm học CCC: lớp học XX: số thứ tự	Mã học sinh
2	ho_hocsinh	Chuỗi(100)	Họ và tên lót của học sinh
3	ten_hocsinh	Chuỗi(10)	Tên của học sinh
4	ngay_sinh	Ngày Định dạng: dd-MM-yyyy ngay_sinh > 01-01-1995	Ngày sinh
5	dia_chi	Chuỗi(500)	Địa chỉ thường trú

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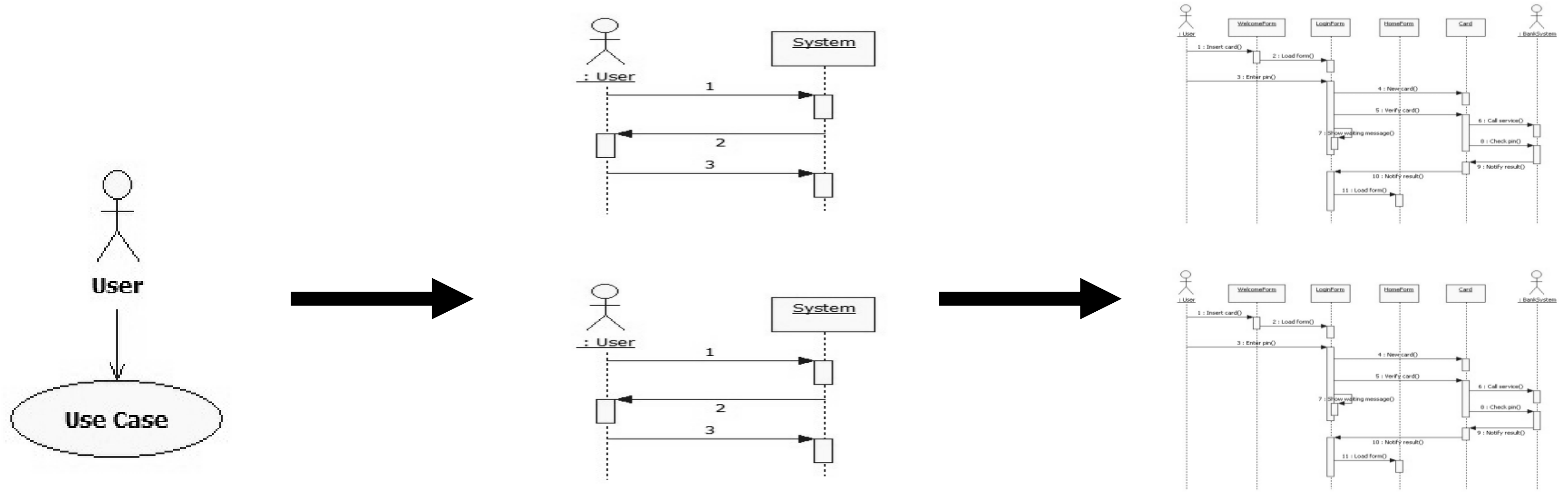
Process Design

- Process Screenplay:
  - Use Case screenplay in details.
    - Actors are split into objects.
    - Interactions split into functions.
  - Use sequence diagram.



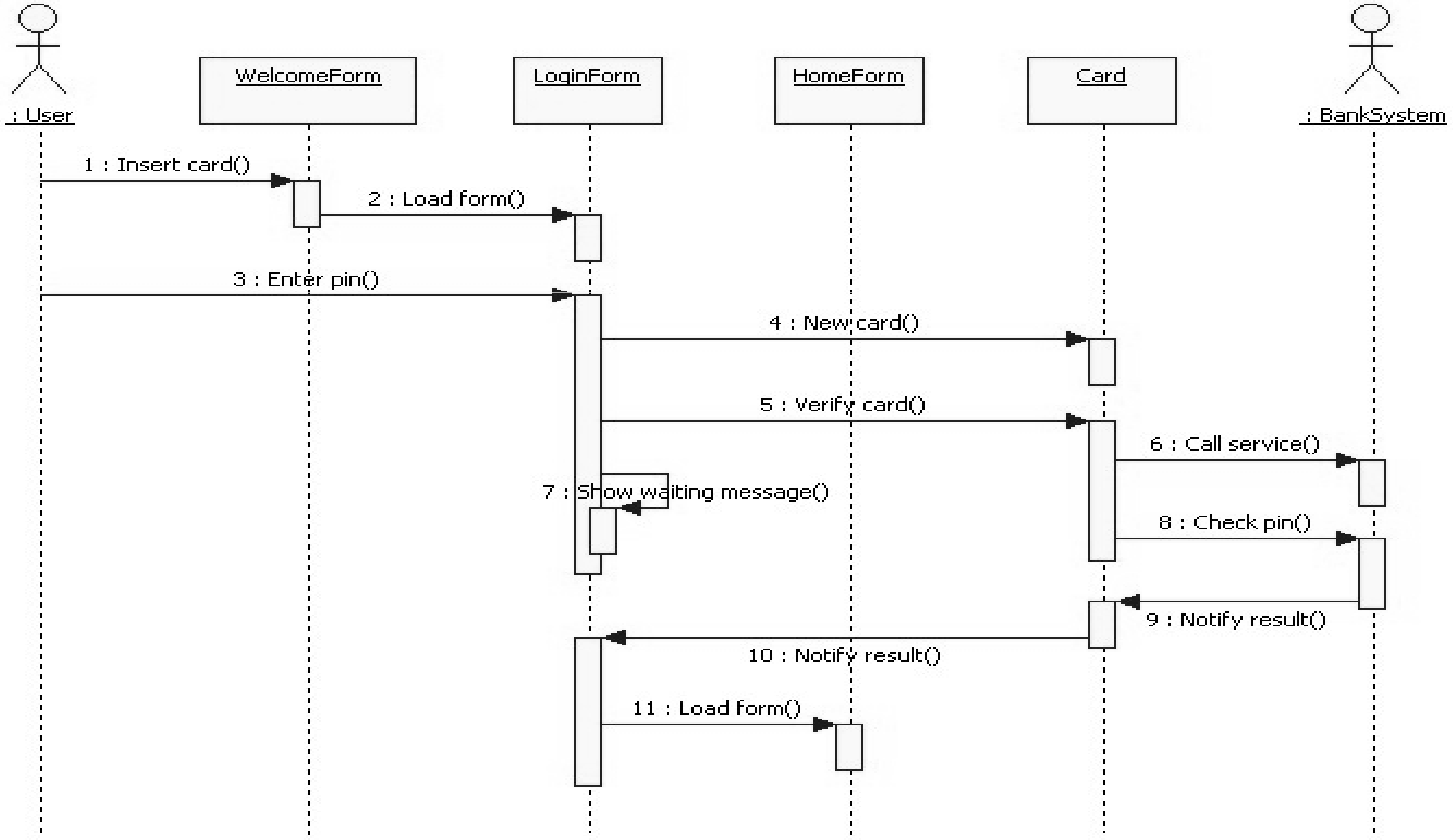
Use Case

Use Case Screenplay
(Analysis Phase)

Process Screenplay
(Design Phase)

Process Design

- Process screenplay “withdraw money failed”:



Practice

- Software Design:
  - “Online Bookstore” Project.
  - Tasks:
    - User Interface Design:
      - Identify screen list.
      - Draw Screen Diagram.
      - Design screen for requirement “Search books”.
    - Object Oriented Design:
      - Draw class diagram for the system.
      - Draw sequence diagram for “Search books”.