Information System Design

IT60105

Lecture 5

Introduction to Information System Design

Lecture #5

- **Concepts of Function-Oriented Design**
- **Concepts of Object-Oriented Design**
- **Function-Oriented Design vs. Object-Oriented Design**
- **Case Study:**
  - Library Information System (LIS)

Function-Oriented vs. Object-Oriented

- Function-oriented approach
  - Decomposition of a system from the functional point of view
  - Identifies functions
  - Decompose complex functions into less simpler sub-functions

- Object-oriented approach
  - Decomposition of a system from the object point of view
  - Identifies objects
  - Decompose complex objects into simpler objects

Note: Both approaches follow Divide & Conquer strategy

Case Study: Library Information System

- **Problem Description**
  - Users point of view:
    - Three types of users are there
      - Borrowers (perform transactions with the system)
      - Library Management Personnel (who responsible for providing service, maintenance, administration, ... etc.). Further they can be divided into two types
        - » Library Assistants (support to the Borrowers for their transactions)
        - » Library Managers (responsible for overall maintenance and management of the library)
      - Suppliers (who supply books, response to quotations etc.)

Case Study: Library Information System

- **Problem Description**
  - Functional point of view:
    - Privileged services for the Borrowers
      - Get registration
      - Membership renew
      - Search book
      - Renew book
      - Reserve book
    - Privileged services for the Library Assistants
      - Issue and renew book to a borrower
      - Return a book by a borrower
      - Validate new registration
      - Validate renew of membership
      - Delete a membership

Case Study: Library Information System

- **Problem Description**
  - Functional point of view:
    - Privileged service for the Library Manager
      - Enter a New book
      - Remove a book
      - Billing System
        - » Get membership fee
        - » Get renewal fee
        - » Get fine/recovery charge
        - » Payment to a supplier
      - Status of books
        - » Total number of books in the text book section
        - » Total number of books in the reference section
        - » Number of books lost etc.

Case Study: Library Information System

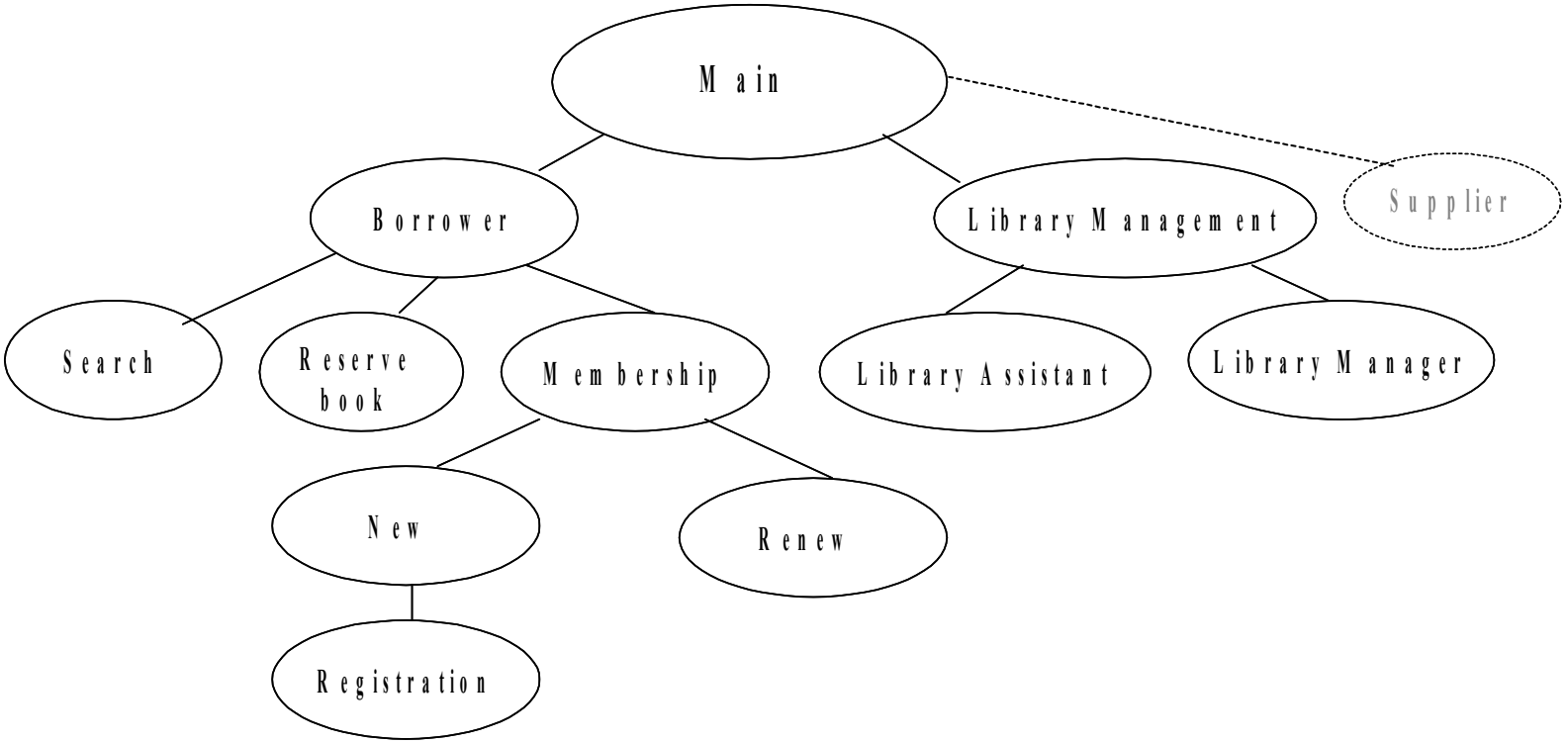
- **Problem Description**
  - Functional point of view:
    - Privileged services for the Library Manager
      - Miscellaneous queries
        - » Total number of books for a given subject
        - » How many books for a given title?
        - » How many books for a given author?
        - » Total deposit on membership
        - » Total earn on fine/recovery
    - Privileged services for the Suppliers
        - » Books on demand
        - » Authorization request
        - » Response to quotation
        - » Submit bill
        - » Get payment etc.

Case Study: Library Information System

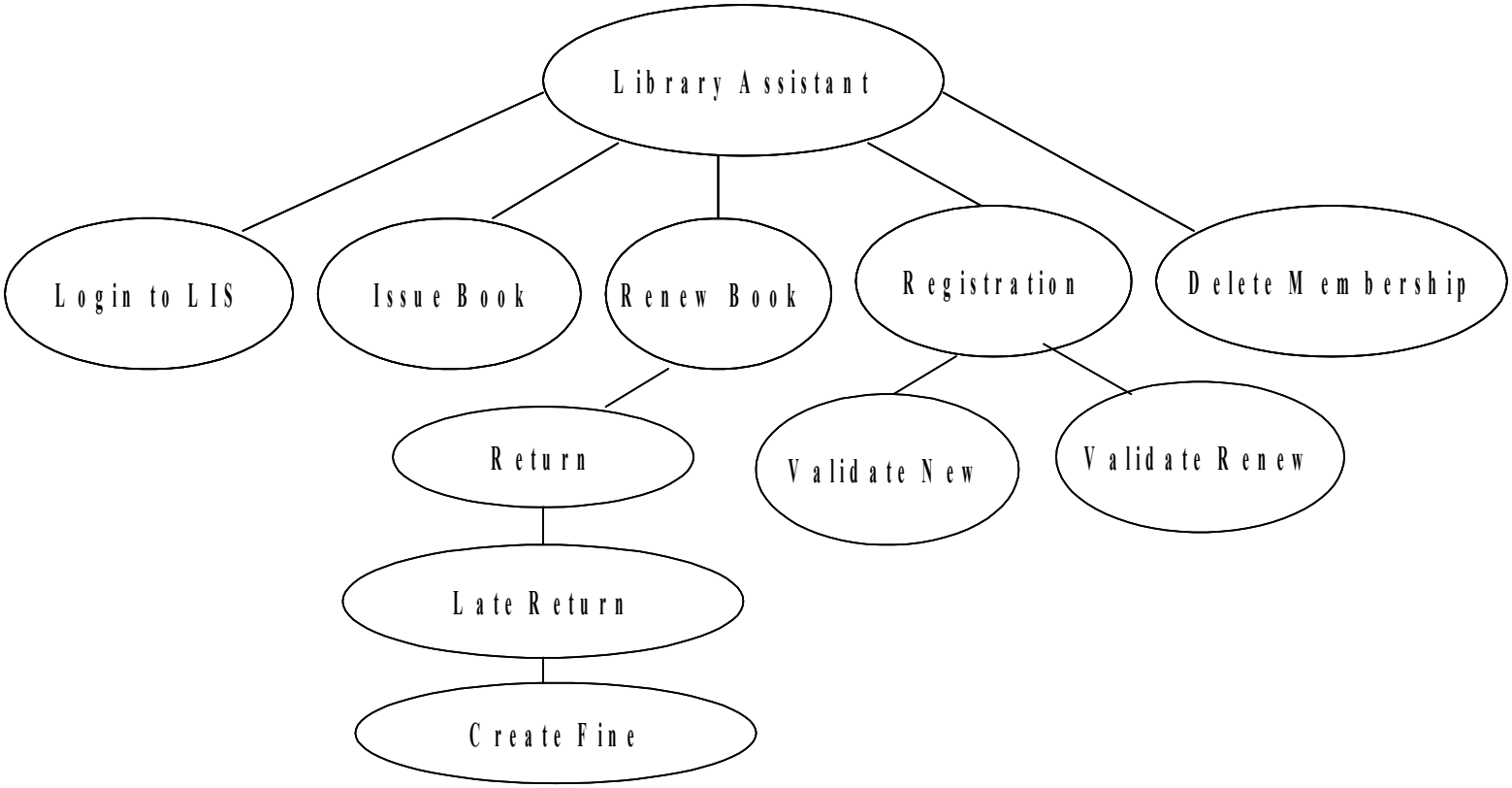
- **Problem Description**
  - Information point of view:
    - List of books
    - List of borrowers
    - List of library personnel and their authorizations
    - List of all suppliers and supplies

Function-Oriented Design

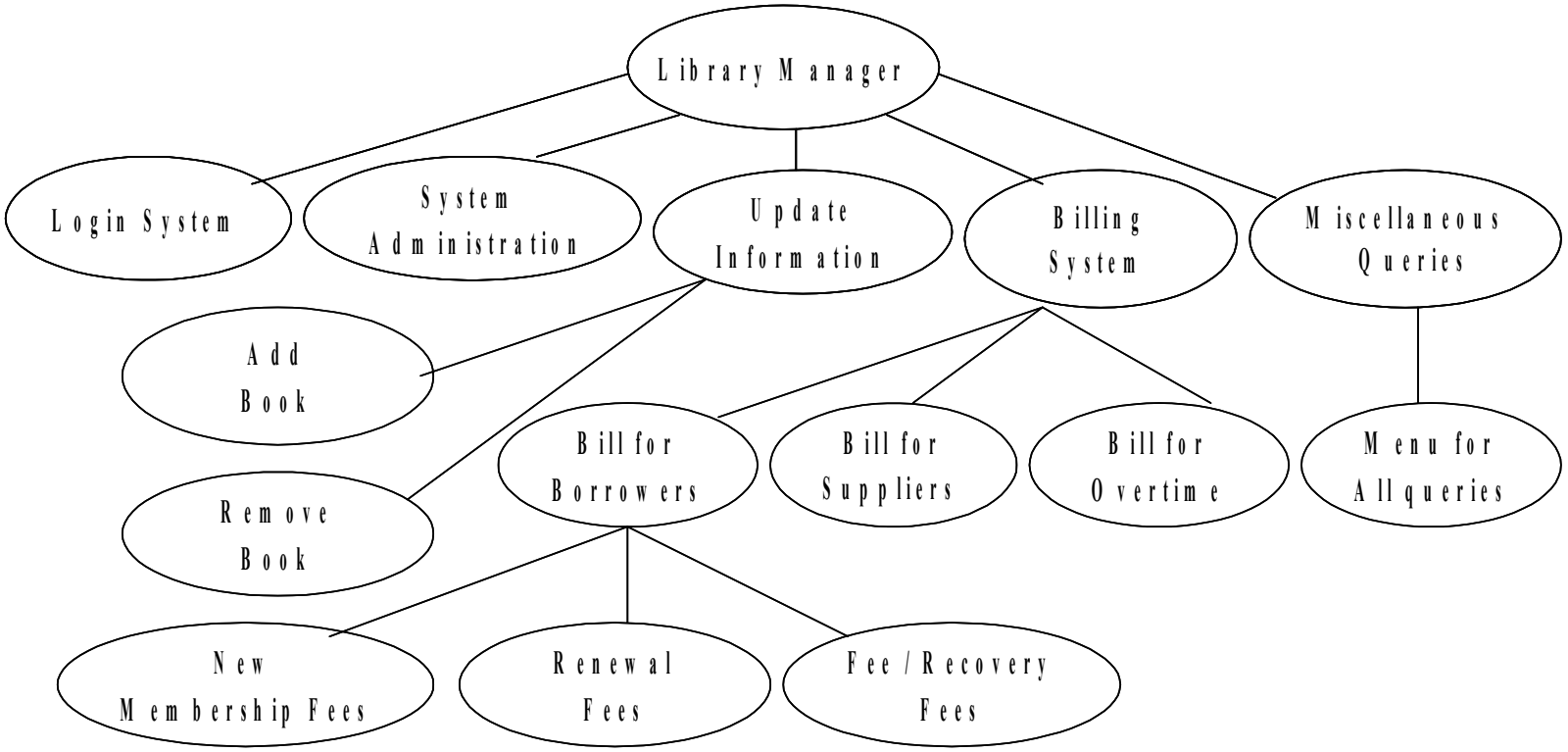
Function-Oriented Design of LIS
Structural View



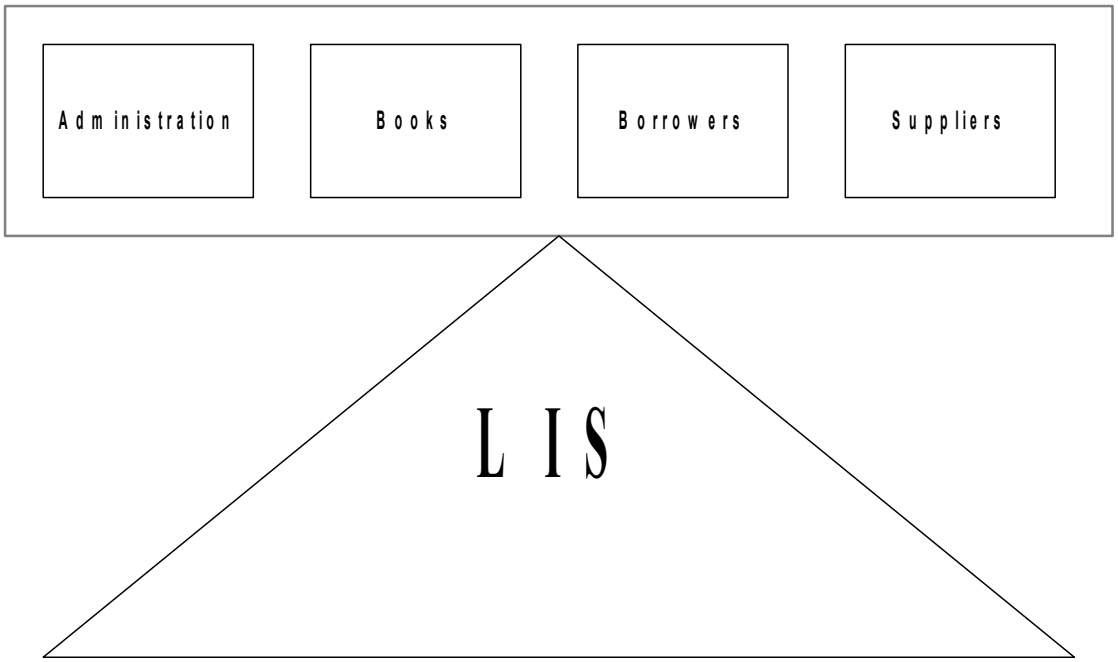
Function-Oriented Design of LIS
Structural View (cont'd)



Function-Oriented Design of LIS
Structural View (cont'd)



Function-Oriented Design of LIS
System View (cont'd)

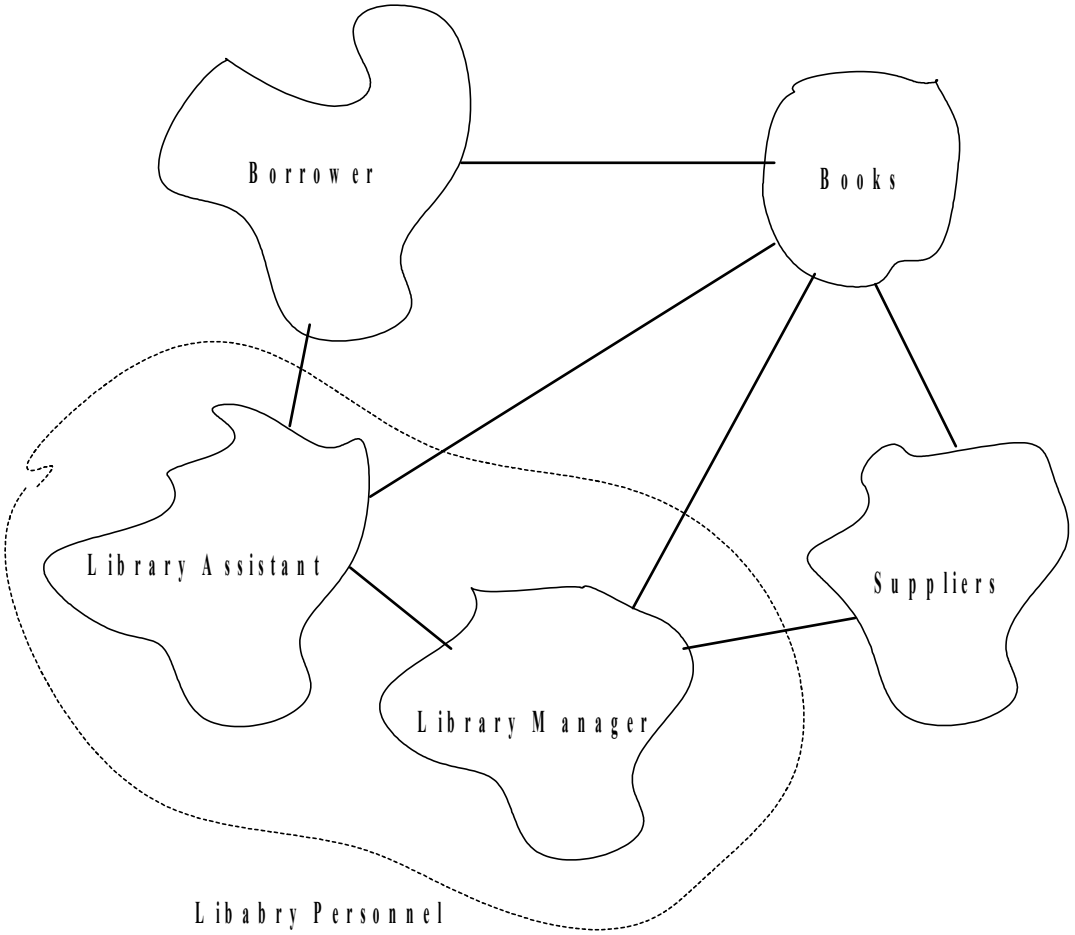


Points to be noted

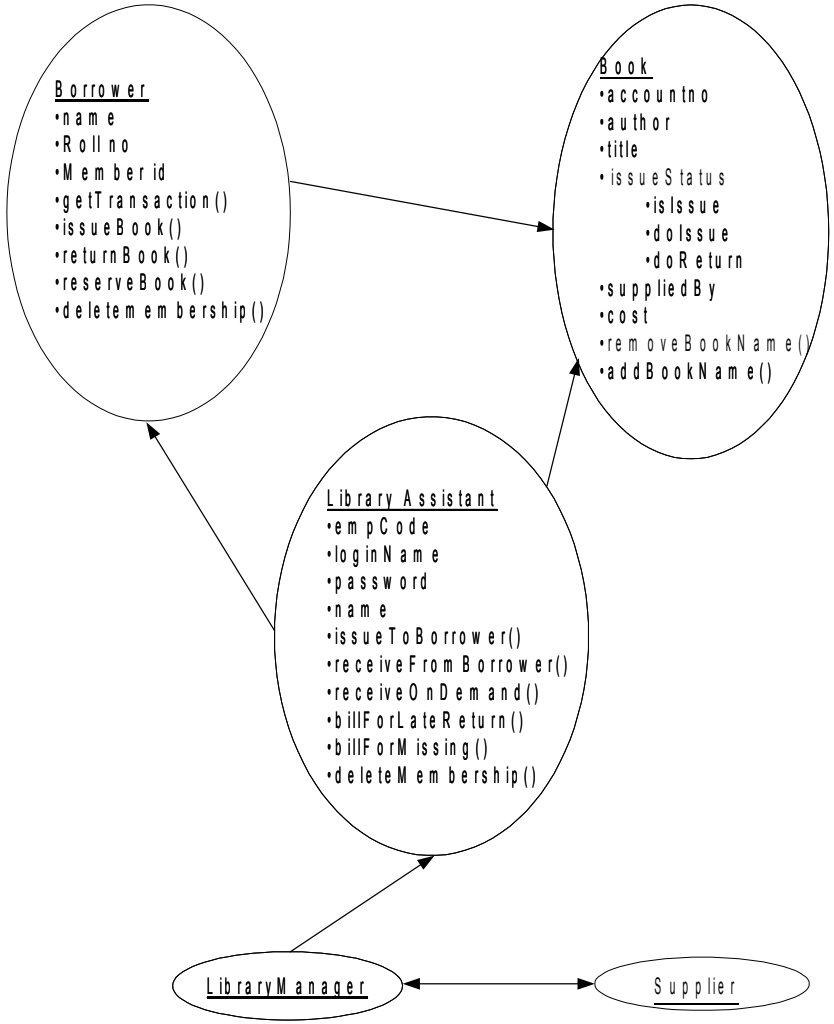
- Data is centralized
- Several functions are there to manipulate centralized data
- Functions are grouped together to form high level functions

Object-Oriented Design

Object-Oriented Design of LIS
Structural View



Object-Oriented Design of LIS Structural View (cont'd)



Object-Oriented Design of LIS

- System is designed by designing objects
- Objects are abstractions of real-world or system entities and manage themselves
- Each object has attributes, operations
- Information is not represented as a centralized store
- Data and operations are grouped together

Problems to Ponder

- How an object can be created?
- What happen when an object is destroyed?
- What is the basic principle of decomposing an object?
- How the decompose objects are integrated?
- Compare function-oriented approach and object-oriented approach
  - Decide parameters for comparison