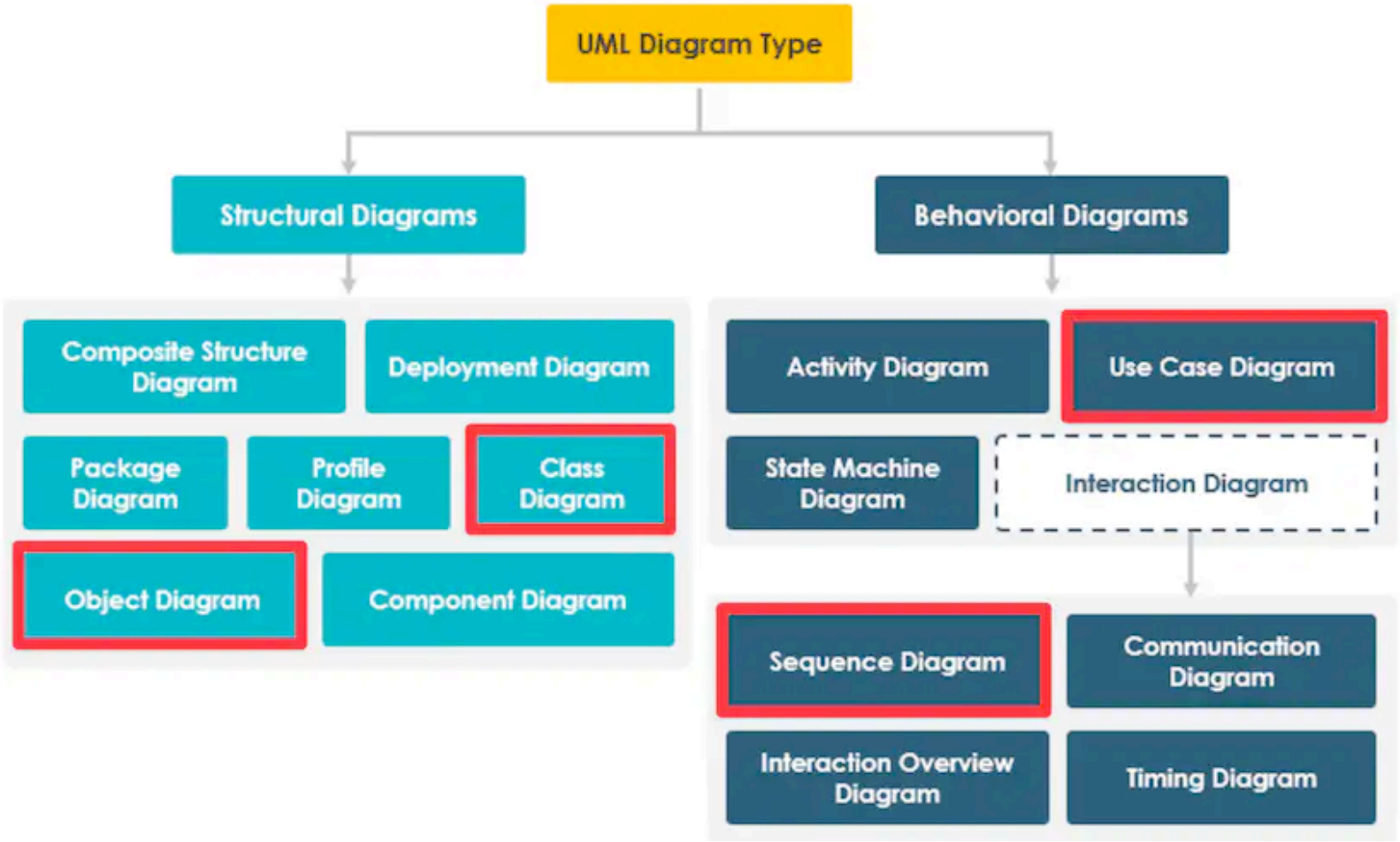
UML Diagrams

Behavioral Diagrams

- So far, we have discussed "Structural Diagrams" in UML.
    - Class Diagram & Object Diagram and their relationships.
- Now, we discuss "Behavioral Diagrams".
    - Use Case Diagram & Sequence Diagram


UML Diagram Type
Structural Diagrams
Behavioral Diagrams
Composite Structure Diagram
Deployment Diagram
Package Diagram
Profile Diagram
Class Diagram
Object Diagram
Component Diagram
Activity Diagram
Use Case Diagram
State Machine Diagram
Interaction Diagram
Sequence Diagram
Communication Diagram
Interaction Overview Diagram
Timing Diagram

Use case Diagram

A Use Case diagram shows who can do what with a system, capturing functional requirements via actors, use cases, and their relationships.

For example, in a library system.

- We need to ask questions: "Who will use this system?" and "What do they want to do?"
- Students want to find and borrow books, and Librarians want to manage the books.

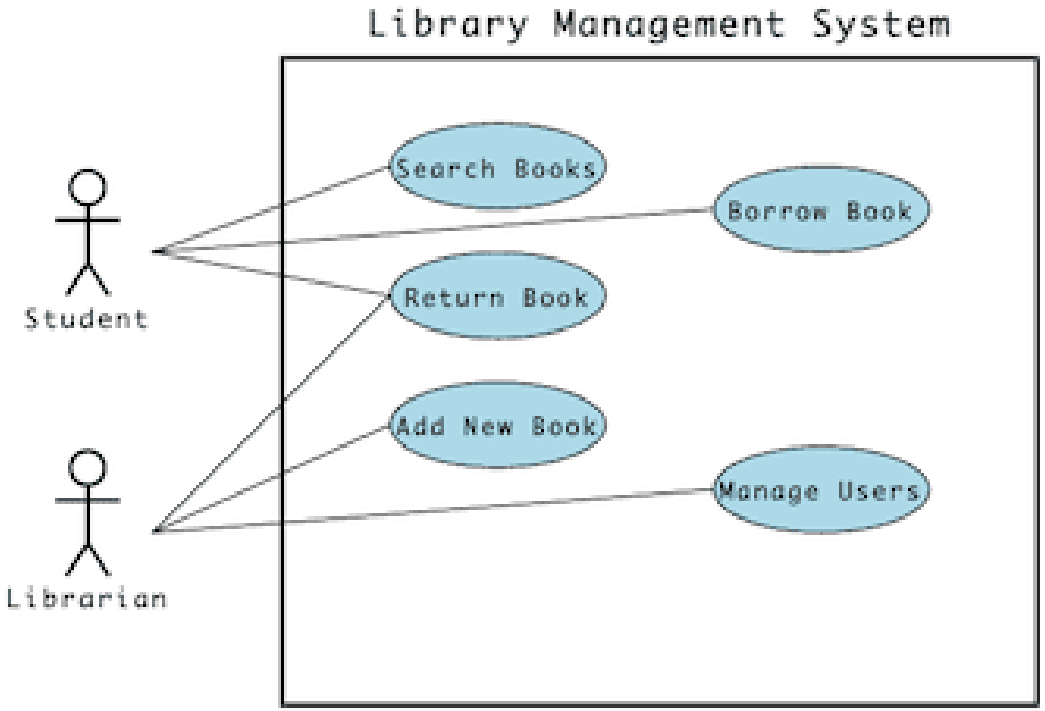
We can rewrite this question into the "Actor-Goal" Format.

- "As a [actor], I want to [use case] so that [benefit]"
- "As a student, I want to **search for books** so that I can find relevant materials for my research."

We can use the same "Actor-Goal" format for the librarian.

- "As a librarian, I want to add new books so that I can refresh my database, so that students can access it."
- "As a Librarian, I want to manage users so that I can keep track of students' database records."

Using the format, we can make a Use case diagram.



Why use case diagrams?

- Communication between developers and stakeholders
- Aid for gathering requirements
- Tool for defining system scope
- Guide for testing user scenarios

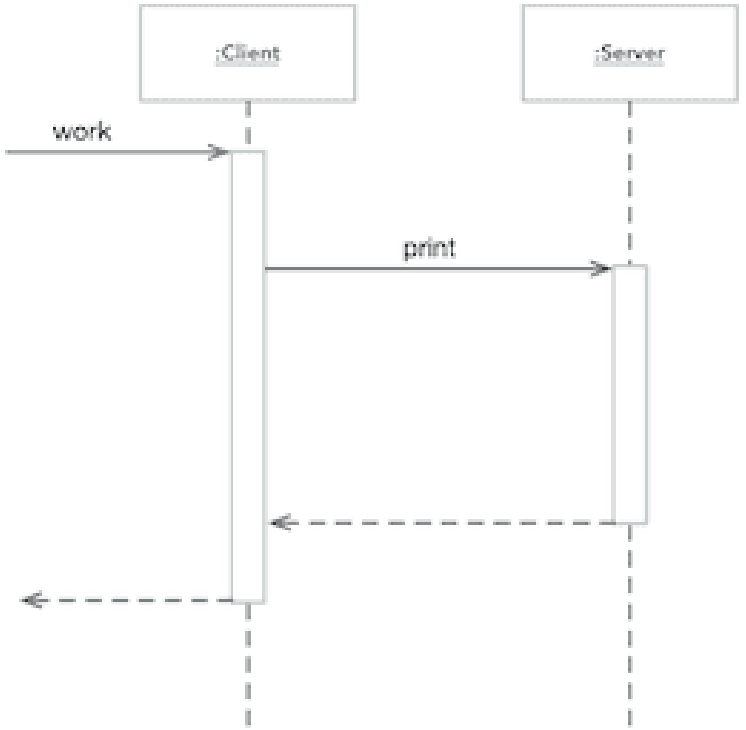
Sequence Diagram

- UML sequence diagrams show method calls between objects
- Example:
  - Client object calls work()
  - work() calls Server's print()

```
class Client(object):
 def work(): Server().print();

class Server(object):
 def open(): ...

c = Client()
c.work();
```



- A sequence diagram is about the interaction among objects.
    - It uses the object diagram convention (object type underlined).
- A solid line is used for invocation, and a dotted line is used for the return.

Why sequence diagrams?

- Shows what objects use which methods and when
- Prevents design issues (e.g., circular dependencies)
- Improves team communication