DA-IICT

IT314: Software Engineering

UML Introduction... Continue
Use Case Diagram, Activity and Sequence/Collaboration Diagram

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Diagrams in UML

The UTD wants to computerize its registration system

- The Registrar sets up the curriculum for a semester
- Students select 3 core courses and 2 electives
- Once a student registers for a semester, the billing system is notified so the student may be billed for the semester
- Students may use the system to add/drop courses for a period of time after registration
- Professors use the system to set their preferred course offerings and receive their course offering rosters after students register
- Users of the registration system are assigned passwords which are used at logon validation

What's most important?

Diagrams in UML – Actors in Use case

- An actor is someone or some thing that must interact with the system under development

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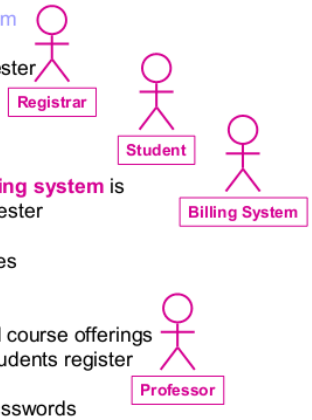

Diagrams in UML – Use cases in Use case diagram

- A use case is a sequence of interactions between an actor and the system

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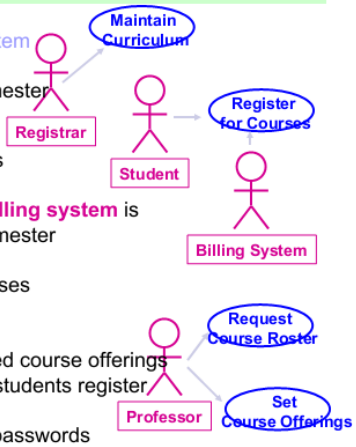
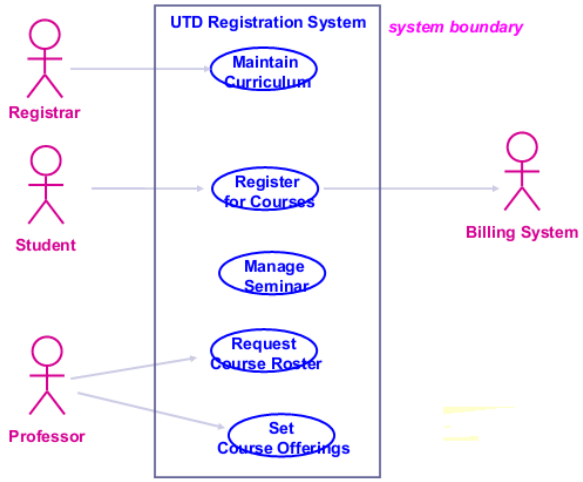


Diagrams in UML – Use case Diagram

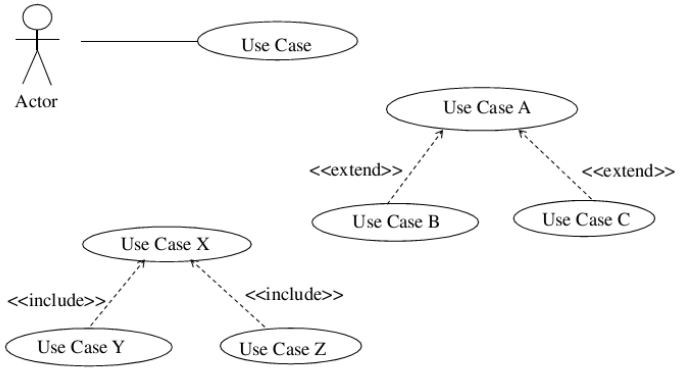
- Use case diagrams depict the relationships between actors and use cases



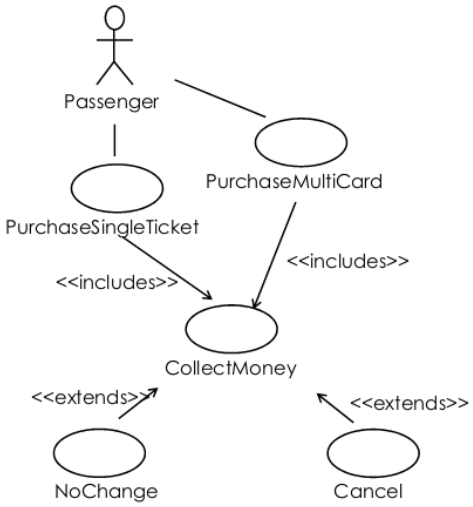
Diagrams in UML – Uses and Extend – Use case Diagram

A includes relationship shows behavior common to one or more use cases

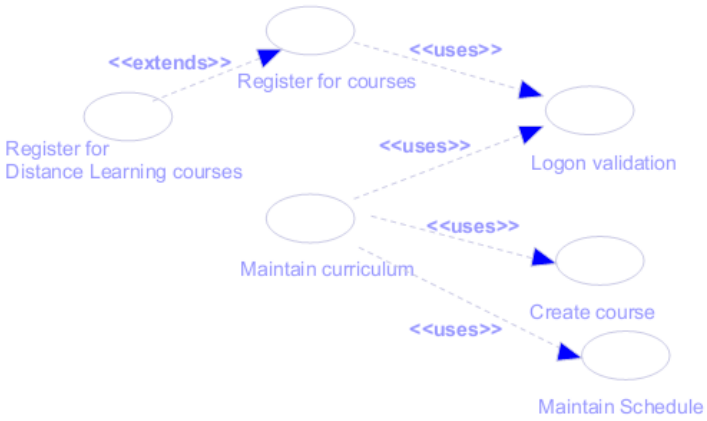
An extends relationship shows optional/exceptional behavior



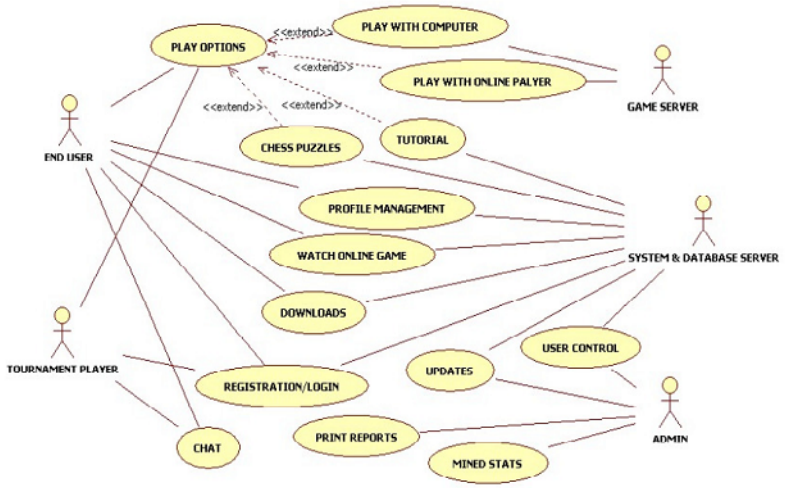
Use Case Diagrams in UML



Diagrams in UML – Uses and Extend – Use case Diagram



Use Case Diagrams in UML



Question? – Design a use case diagram

A POS (Point-Of-Sale) system is a computer system typically used to manage the sales in retail stores. It includes hardware components such as a computer, a bar code scanner, a printer and also software to manage the operation of the store.

The most basic function of a POS system is to handle sales. When a customer arrives at a POS counter with goods to purchase, the cashier will start a new sale transaction. When the barcode of a good is read by the POS system, it will retrieve the name and price of this good from the backend catalog system and interact with inventory system to deduce the stock amount of this good.

When the sale transaction is over, the customer can pay in cash, credit card or even check. After the payment is successful, a receipt will be printed. Note that for promotion, the store frequently issue gift coupons. The customer can use the coupons for a better price when purchasing goods.

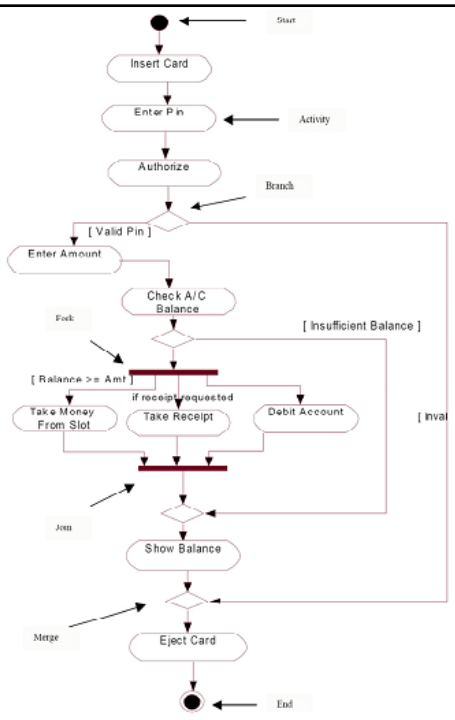
Another function of a POS system is to handle returns…. [The details of which are not given here]

Activity Diagram

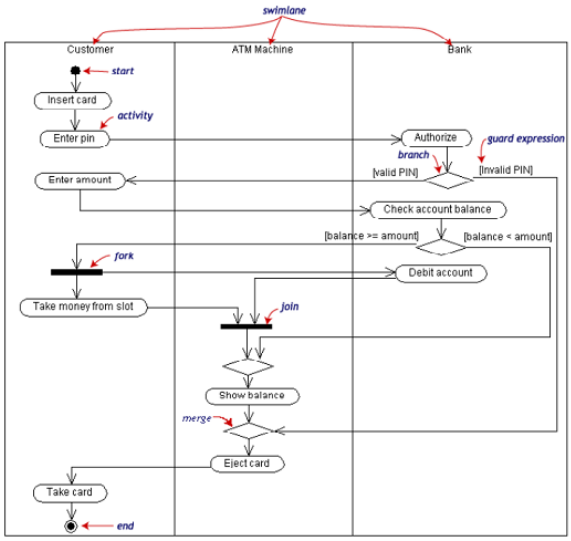
- Models a process workflow
- Models concurrency and synchronization
- Models normal and alternate flow of control in the same diagram

Activity Diagram

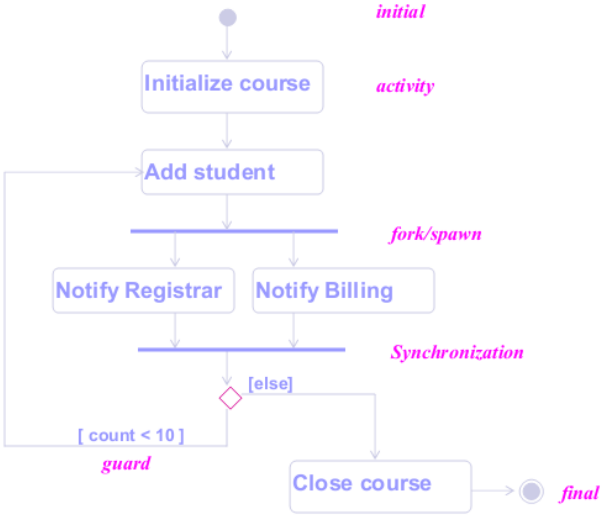
Withdraw money from the ATM



Activity Diagram



Activity Diagram



Diagrams in UML – Interaction Diagrams

*A use case diagram presents an **outside** view of the system.*

*Then, how about the **inside** view of the system?*

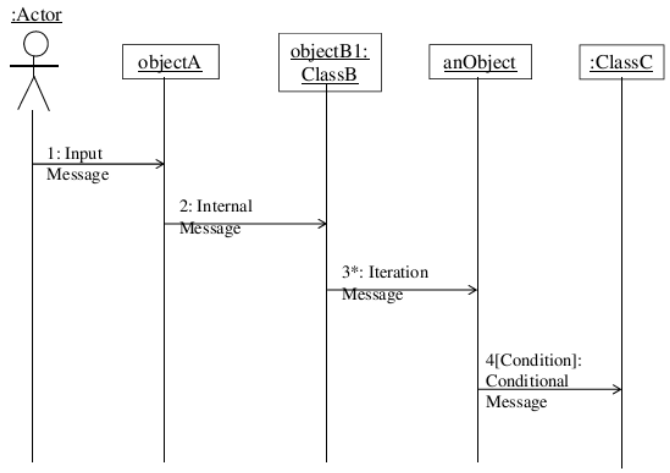
- Interaction diagrams describe how use cases are ***realize***d in terms of interacting objects.
- Two types of interaction diagrams
  - Sequence diagrams
  - Collaboration *(Communication)* diagrams

Sequence Diagrams in UML

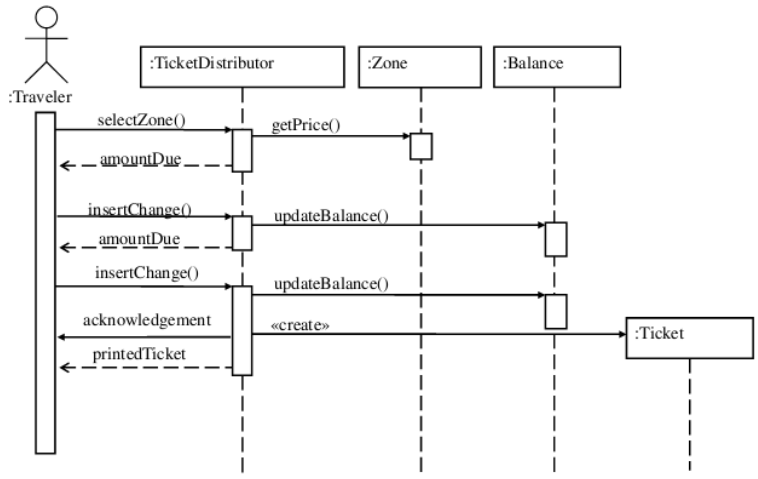
Shows sequence of object interactions in a use case

- Emphasis on messages passed between objects
  - Objects represented by vertical lines
    - Actor is on extreme left of page
  - Messages represented by labeled horizontal arrows
    - Only source and destination of arrow are relevant
    - Message is sent from sending object to receiving object
- Time increases from top of page to bottom
- Spacing between messages is not relevant
- Message sequence numbering is optional

UML Notation of Sequence Diagram

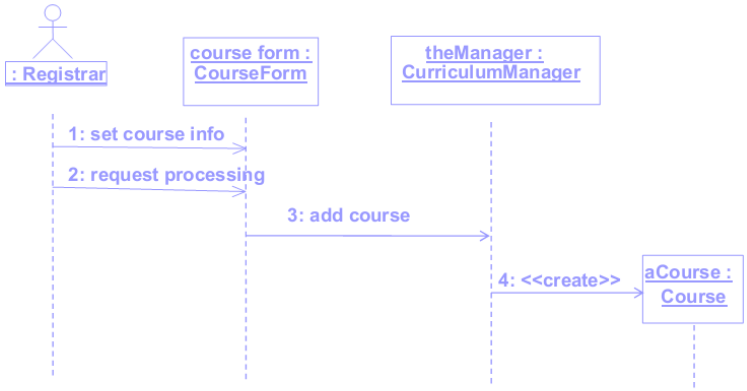


Example Sequence Diagram for Issue a Ticket



Diagrams in UML – Sequence Diagram

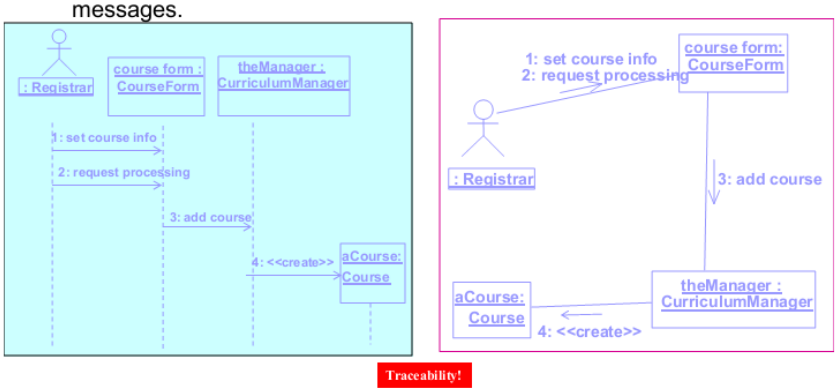
- A sequence diagram displays object interactions arranged in a time sequence



The registrar fills in the course form with the appropriate semester and course related info. The Registrar requests the system to process the course form. The system creates a new course, and this use case ends

Diagrams in UML – Collaboration Diagram

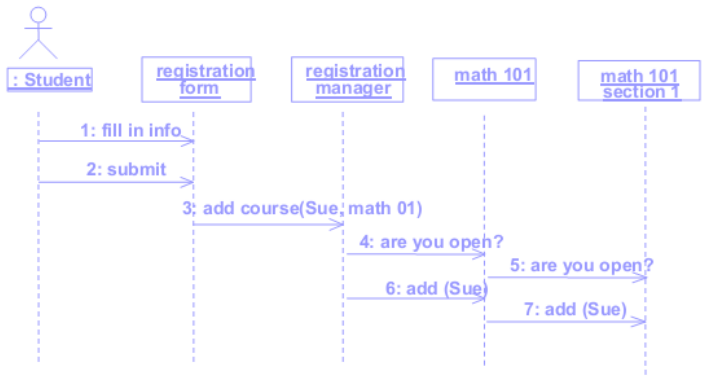
- Displays object interactions organized around objects and their direct links to one another.
- Emphasizes the structural organization of objects that send and receive messages.



Traceability!

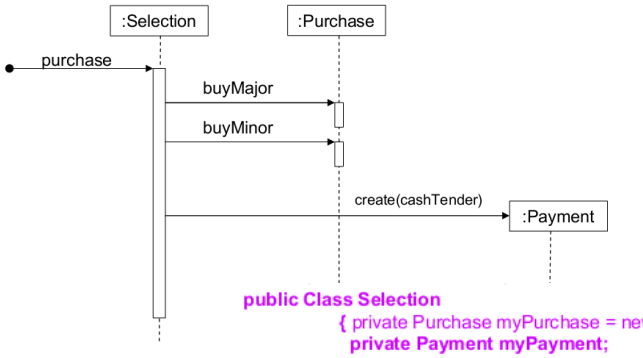
Diagrams in UML – Collaboration Diagram

- What would be the corresponding collaboration diagram?



Which use case could this be for?

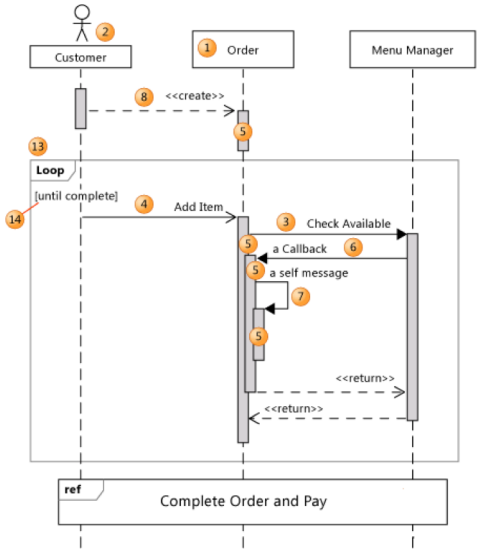
Sequence Diagrams & Some Programming




```
public Class Selection
        { private Purchase myPurchase = new Purchase();
          private Payment myPayment;
           public void purchase()
                  { myPurchase.buyMajor();
                    myPurchase.buyMinor():
                    myPayment = new Payment( cashTender );
                    //. .
                  }
          // . .
        }
```

Question?

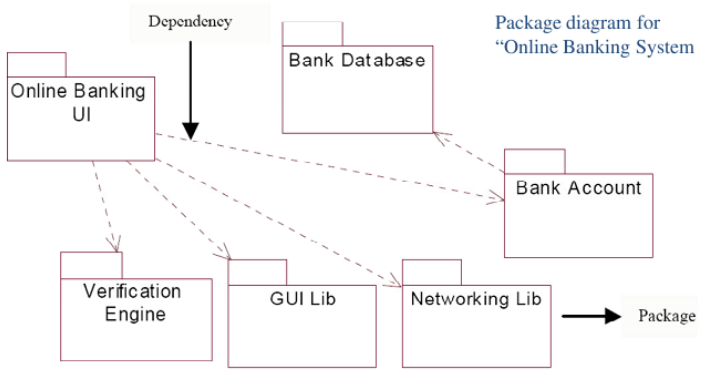
Prepare a sequence diagram for Ordering Meal scenario



Package Diagram

- Structured organization of Code
- Grouping of related classes to help the software engineer to identify and to understand dependencies
- When to use?
  - Program Comprehension
  - Change Management

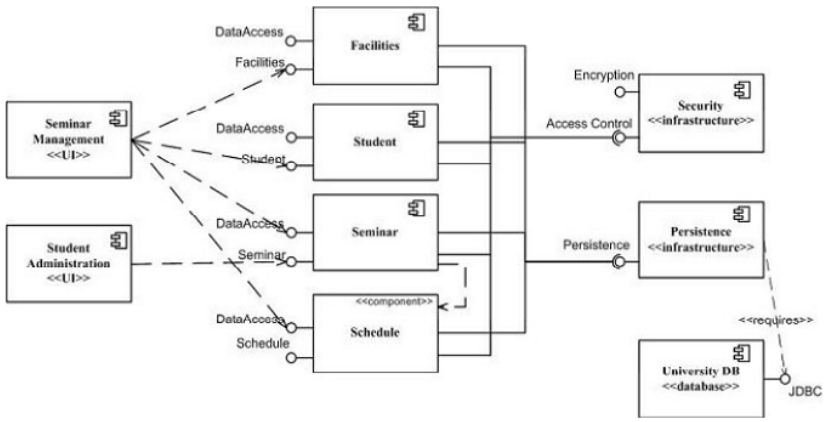
Package Diagram: An Example



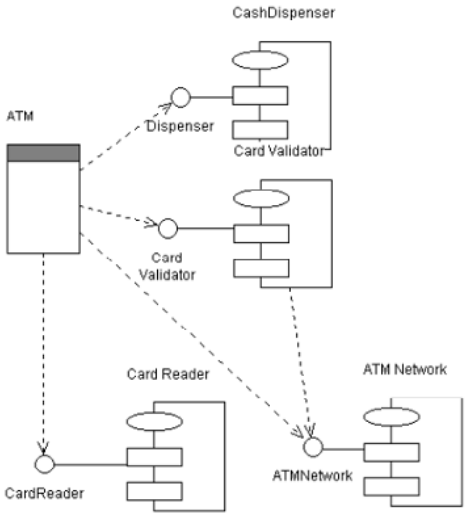
Component Diagram

- Depicts how components are wired together to form bigger component or system
- Component interacts with each other though interfaces
- Connect the required interface of one component with the provided interface of another component.
- Designed with an eye towards deployment

Component Diagram



Component Diagram



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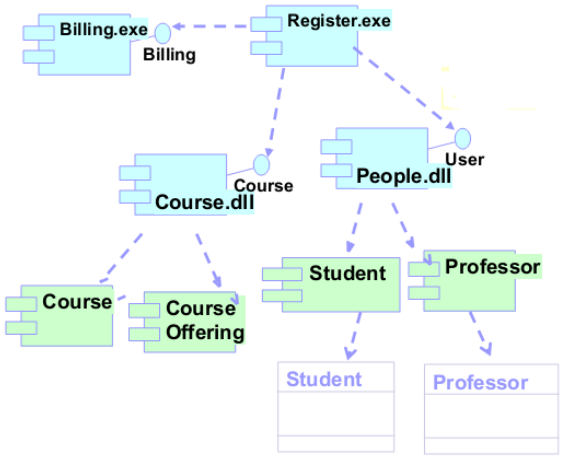
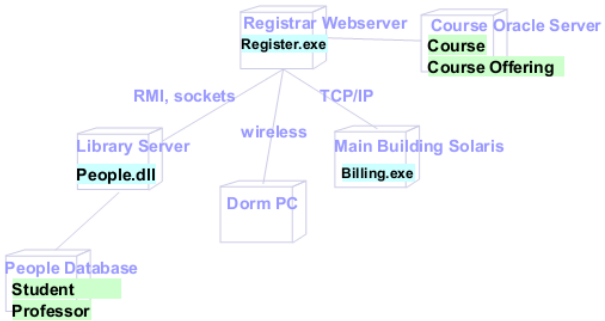


Deployment Diagram

- shows the configuration of run-time processing elements and the software processes living on them.
- visualizes the distribution of components across the enterprise.




Next Lectures...
Object Relationships: Association
(Aggregation, Composition) & Inheritance, Dependency