Software Architecture

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Lecture 12: UML
UML

- What is UML? (me, 10 min)
- Use Case Diagram (me, 10 min)
- Use Case Diagram for your game (you, 5 min)
- Class Diagram (me, 20 min)

- BON vs. UML (me, 10 min)
- Course Evaluation (you, 10 min)
- Info about Final Presentation (me, 5 min)
- Exam Information (me, 10 min)
- ESDL Sound (me, 10 min)
Unified Modelling Language

• 9 different diagram types
  • Use case diagrams
  • Class diagrams
  • Object diagrams
  • Sequence diagrams
  • Collaboration diagrams
  • Statechart diagrams
  • Activity diagrams
  • Component diagrams
  • Deployment diagrams
Use Case Diagram

- **Add Comment**
  - **Blog Reader**
  - **Moderate Comments**
  - **Add Comment Spam**
  - **Crook**
- **Run IP Blacklist**
  - **Blogger**

Relationships:
- Blog Reader → Add Comment
- Moderate Comments → Prevents
- Blogger → Prevents
- Add Comment Spam → Crook
Collaboration Diagram

: Order Entry Window
  └── Order
      ├── Order Line
      └── Delivery Item
        ├── Macallan Stock : Stock Item
        │      └── Recorder Item
        └── Macallan Stock : Stock Item
           └── Recorder Item

1. prepare()
2. For all order lines: prepare()
3. hasStock = check()
4. hasStock = remove()
5. needsReorder = needToReorder()
6. [needsReorder]: new()
7. [hasStock]: new()
Component Diagram

[Diagram of component architecture with connections and labels like Seminar Management, Student Administration, Facilities, Student, Seminar, Schedule, Security Infrastructure, Persistence Infrastructure, University DB, JDBC, Encryption, Access Control, Data Access, etc.]

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From Scenario to Use Case

- Scenario:
  - “My grandmother orders a cup of tea. She is served a little later by a waitress”
- Use Case is a summary of a couple of scenarios
Use Case Example

- **Student**: order beer
- **Barkeeper**: order beer
Use Case Diagram

- Actor Name
- Communication Name
- Use Case Name

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Use Case Diagram Example

Customer

Order Ticket

Cashier

Pay Ticket

Buy Ice Cream

Barkeeper
Use Case Diagram for your Project

Remember:
- Multiple Actors possible
- Multiple Use Cases possible
- Many Actors can exchange Communications with one Use Case
- Use Case is a summary for a Task or a Goal of your Project
- Actors can be People or Objects
When to use a Use Case Diagram

- When you want to determine the functionality of a System
- When you communicate with clients
- When you try to generate Test Suites for your System
Associations

Class Diagram

Diagram showing associations between classes:
- Customer
  - name
  - address
- Order
  - date
  - status
- Payment
  - amount
- Credit
  - amount
  - number
  - type
  - expiryDate
- OrderDetail
  - quantity
  - description
- Item

The diagram illustrates associations with multiplicity indicators (e.g., 0..* for zero or more associations).
Aggregations

Class Diagram

Customer
  name
  address

Order
  date
  status

Payment
  amount

Credit
  amount

Credit
  number
  type
  expiryDate

OrderDetail
  quantity

Item
  description

Aggregations
Generalization
Multiplicities

Class Diagram

Customer
- name
- address

Order
- date
- status

Payment
- amount

Credit
- amount

OrderDetail
- quantity

Item
- description

1:* Customer - Order
0:* Order - OrderDetail
1:* Payment - OrderDetail
0:* Credit - OrderDetail
**BON vs. UML**

- **BON**
  - More natural
  - Immediately understandable
  - No need to learn a new language

- **UML**
  - More expressive
  - Standard
Info about Final Presentation

- Wednesday June 29th
  - Bring you Friends, your Mom!
  - We will stay until 14.00
  - Bazar to see other projects
  - Games can be downloaded on our website
Info about Exam

- July 4th, 10.00-12.00
  - Materials from Lecture Slides
  - OOSC Chapters
    - 1-5 as overview
    - 6 ADT's
    - 4-12 for the basic mechanisms
    - 14-16 for inheritance
End of lecture 12