



SLIIT

Discover Your Future

IT1050-Object Oriented Concepts

Noun Verb Analysis and CRC Cards
Lecture-08



SLIIT
FACULTY OF COMPUTING



Agenda

- Object Oriented Analysis
 - Identifying Classes
 - Noun and Verb Method



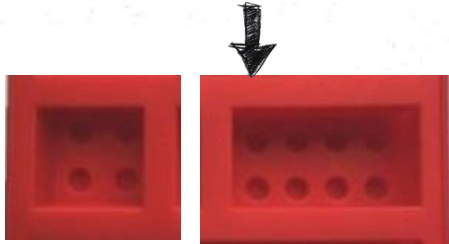
Software Engineering Coding



Problem to Solve (Requirements Engineering)

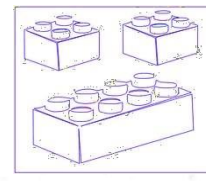
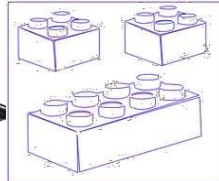


Identify Objects that are needed
(Object Oriented Analysis and Design)



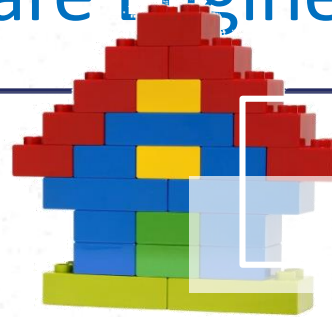
Identify Classes through Abstraction
and Implementation (writing Block class)

```
class Block {  
    private:
```



Block block1, block2, block3, block4

Create Objects from Classes (In
main function)



```
block1.assemble(block2);  
block2.assemble(block3);  
block3.assemble(block4);
```



Assemble Objects
to create the
solution (in main
function)

```
Block1.setColor(yellow);  
block2.setColor(blue);  
block3.setColor(yellow);  
block4.setColor(red);
```

SDLC – Software Development Life Cycle

- Requirements Gathering
 - Describe the Application
 - Requirements should ideally be describing the new application that needs to be built, not how things are done manually
- Analysis
- Design
- Implementation (Coding)

OOA is part of the SDLC




OOA

- Requirements are generally represented as
 - Use Case Diagrams
 - Use Case Scenarios
- Or
 - as User Stories
- In Object Oriented Analysis we take the requirements captured as above and try to develop a Class Diagram



Object Oriented Analysis

- Discover Classes for the requirements.

- 
1. Noun/Verb Analysis
 2. CRC Method



Noun/Verb Analysis

Noun/Verb Analysis

- Remember that, in general, classes correspond to nouns, which are objects— people, places, and things.

- Steps:

- Identify objects in our problem statement by looking for **nouns** and **noun phrases**.
- Each of these can be underlined and becomes a candidate for an object in our solution.
- We can eliminate some objects by some simple rules.

Common Nouns and Proper Nouns

- Common Nouns – Correspond to **Classes**
 - A common noun (e.g., **Person**) is a name of a class of beings or things.
- Proper Nouns – Correspond to **Objects**
 - A name used for an individual person, place, or organization, spelled with an initial capital letter,
 - e.g. **Jagath**, **Dehiwala**, and **Keells**



Activity-1

Library System – a Description

- In the Library a member can borrow, return Books
- The people using the library can also search for Books.
- The users of the library from the Faculty of Computing belong to the Department of IT/CSSE/CSE
- Each Book has an ISBN
- The SLIIT Librarian is Ms Pushpamala Perera.

Library System (Nouns in Red)

- In the **Library** a **member** can borrow, return **Books**
- The **people** using the **library** can also search for **Books**.
- The **users** of the **library** from the **Faculty of Computing** belong to the **Department of IT/CSSE/CSE**
- Each **Book** has an **ISBN**
- The **SLIIT Librarian** is **Ms Pushpamala Perera**.

Rules for Rejecting Nouns

Think about Library system of a **University**.

1. Redundant - In a Library system **member** and **user** refers the same person.
2. An event or an operation – **Search book** is the operation of library system.
3. Outside scope of system – **University Department (CSSE/IT)** is outside scope of library.
4. Meta-language (Meta language is words or symbols for talking about language itself.)- In a library system **people who are using library system** can call as member.
5. An attribute – **ISBN** of a book is an attribute.

Note : 1 and 2 are similar in most situations



Activity 2- Identify Nouns

- ☐ In a DVD rental store there are two types of users, a registered member can borrow up to 3 DVDs at a time. These members have already paid a deposit and only need to pay 50/= per DVD.
- ☐ Unregistered members can also borrow DVDs at the rate of 75/= per DVD. They are required to provide their id card for this purpose.
- ☐ Members can keep the DVD for three days and when they are returned appropriate fines may be calculated.

Activity 2

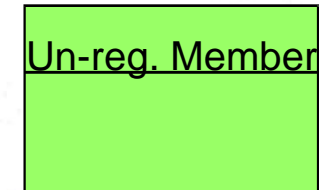
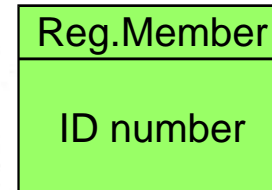
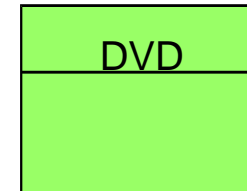
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- Members can keep the DVD for three days and when they are returned appropriate fines may be calculated.

Activity 2 Answer:

- DVD **class**
- User/Member **Redundant**
- Unregistered member **Class**
- Registered **Class**
- Member
- ID Card **ID number is an attribute**
- Fine **Attribute**
- Deposit **Attribute / operation**
- Store **Out of scope**
- Rate **Attribute**

Final Classes ?

- DVD
- Reg. Member
- Un reg. Member

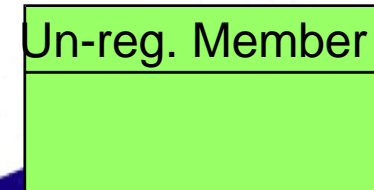
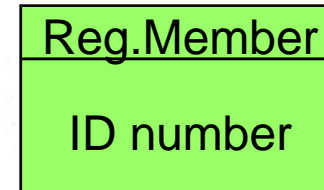
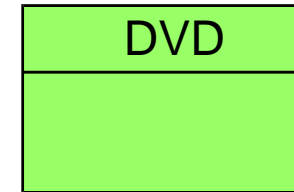


Activity 2 Answer:

- DVD **class**
- User
- Unregistered member } **Redundant**
- Member (registered) **Meta language**
- ID Card **ID number is an attribute**
- Fine **Attribute**
- Deposit **Attribute / operation**
- Store **Out of scope**
- Rate **Attribute**

Final Classes ?

- DVD
- Reg. Member
- Un reg. Member



Activity 3 – Online Order System

- A customer in an online store needs to first register providing details such as name, address.
- The online store administrator can add new items to the store, restock (increase quantity), generate a list of items that need to be restocked.
- A Customer can place an Order from an online store. An Order consists of multiple items.
- The customer can see the status of the Orders placed, and get a list of previous orders made.
- The customer specifies a payment method (credit card, debit card, pay pal) for each order.
- Once the customer confirms the order and the payment is validated the order is placed and items are updated.

Activity 3 – Online Order System

- A **customer** in an online **store** needs to first register providing details such as **name, address**.
- The online **store administrator** can add new **items** to the **store**, restock (increase quantity), generate a **list of items** that need to be restocked.
- A **Customer** can place an **Order** from an online store. An **Order** consists of multiple **items**.
- The **customer** can see the **status** of the **Orders** placed, and get a **list of previous orders made**.
- The **customer** specifies a **payment** method for each order. e.g. **credit card, debit card, paypal**
- Once the **customer** confirms the **order** and the **payment** is validated the **order** is placed and **items** are updated.

Activity 3 – Online Order System

- list of items - **Item**, (paypal, credit card, debit card) - **Payment**, list of previous order - **Order** – **Redundant**
- Administrator – **Outside Scope of System**, this is actually a user of the system (An Actor)
- Store – the system itself (**outside the scope**)
- Customer - **Class**
- Payment - **Class**
- Order – **Class**
- Item – **Class**
- Name, address, status – **Attributes of Book**





Verbs

- Definition
 - a word used to describe an action, state, or occurrence, and forming the main part of the predicate of a sentence, such as *hear, become, happen*.
- Maps to methods in a class

Activity 4 – Identify Verbs (potential methods)

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Activity 4 – Identify Verbs (potential methods)

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- The customer **specifies** a payment method (credit card, debit card, pay pal) for each order.
- Once the customer **confirms** the order and the payment is **validated** the order is **placed** and items are **updated**.

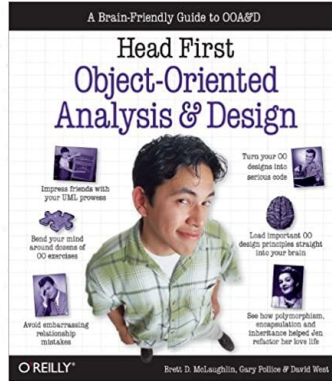
Activity 4 – Verbs are methods

- A customer in an online store needs to first **register** ~~providing~~ details such as name, address.
- The online store administrator can **add** new items to the store, **restock** (increase quantity), **generate a list of items** that need to be restocked.
- A Customer can **place an Order** from an online store. An Order consists of multiple items.
- The customer can **see the status of the Orders placed**, and **get a list of previous orders** made.
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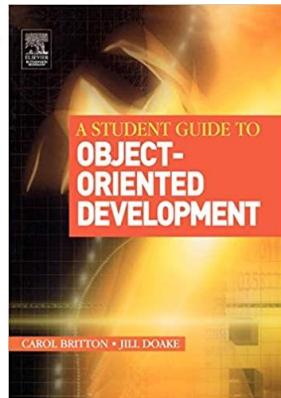
Activity 4 - Methods

- Customer – Register
- Payment - Validated
- Order – “Place an Order”, “See status of Order Placed”, Confirm
- Item – Add, Restock, Updated
- Report – “Generate List of Items”, “List of Previous orders”
- Sometimes it is not clear which class should contain which method. We can use CRC cards in such situations.

References



- Head First Object-Oriented Analysis and Design, 1st Edition – Chapters 4.



- A Student Guide to Object Oriented Development, 1st Edition – Chapter 5