



# 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



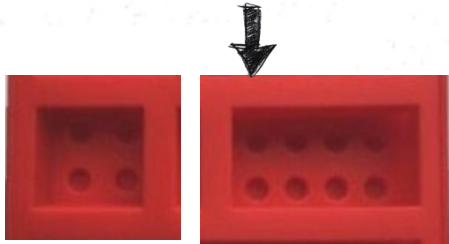
# Software Engineering Coding



Problem to Solve (Requirements Engineering)

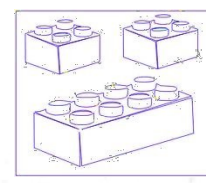
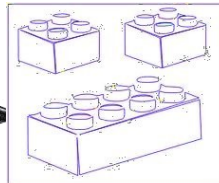


Identify Objects that are needed  
(Object Oriented Analysis and Design)



Identify Classes through Abstraction  
and Implementation (writing Block class)

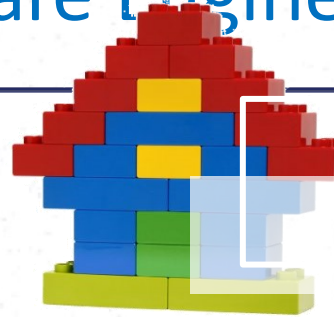
```
class Block {  
    private:
```



```
Block block1, block2, block3, block4
```

Create Objects from Classes (In main function)

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



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



Assemble Objects to  
create the solution  
(in main function)

# 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

- 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 **fin**es may be calculated.

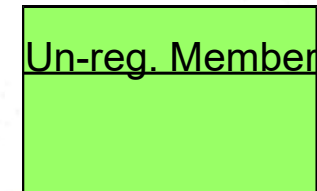
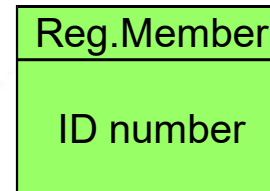
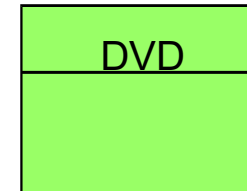


# Activity 2 Answer:

- DVD **class**
- User/Member **Redundant**
- Unregistered member **Class**
- Registered Member **Class**
- 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

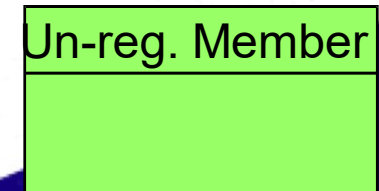
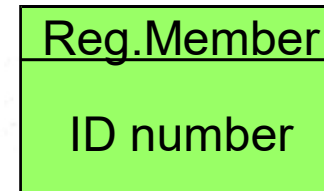
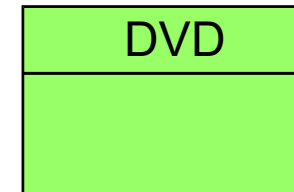


# Activity 2 Answer:

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

- DVD
- Reg. Member
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# 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**.
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- 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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- Once the customer **confirms** the order and the payment is **validated** the order is **placed** and items are **updated**.

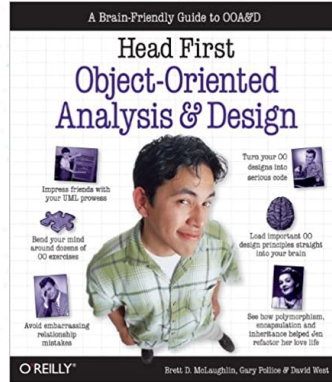
# Activity 4 – Verbs are methods

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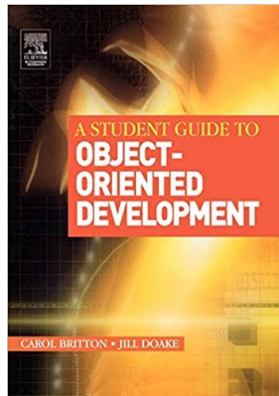
# Activity 4 - Methods

- 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