

IT1050-Object Oriented Concepts

Noun Verb Analysis and CRC Cards
Lecture-08



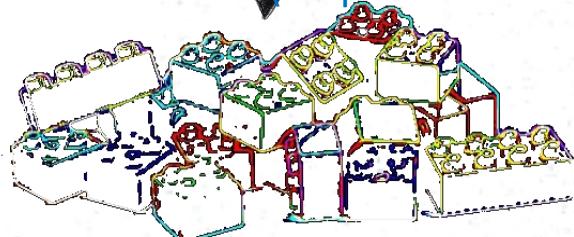
Agenda

- Object Oriented Analysis
 - Identifying Classes
 - Noun and Verb Method
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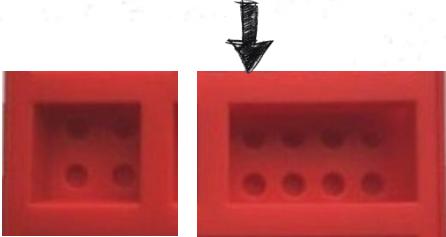
Software Engineering Coding



Problem to Solve (Requirements Engineering)

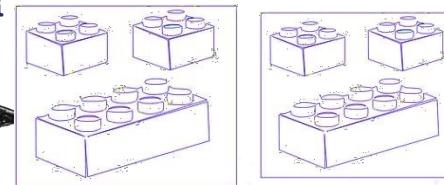


Identify Objects that are needed
(Object Oriented Analysis and Design)



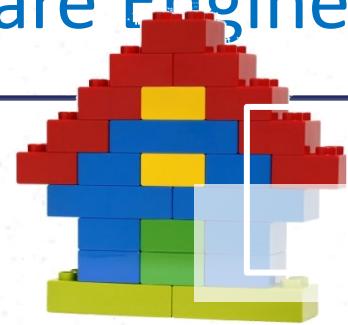
Identify Classes through Abstraction
and Implementation (writing Block class)

```
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
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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
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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

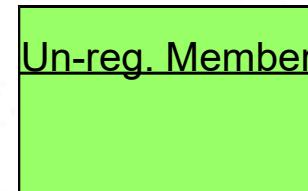
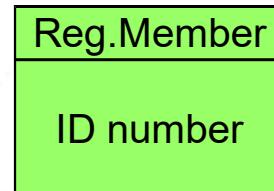
- In a **DVD** rental **store** there are two types of **users**, a **registered member** can borrow up to 3 DVDs at a time. These members have already paid a **deposit** and only need to pay 50/= per DVD.
- **Unregistered members** can also borrow DVDs at the **rate** of 75/= per DVD. They are required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

Final Classes ?

- DVD
- Reg. Member
- Un reg. Member

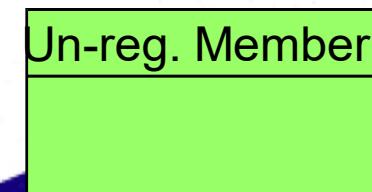
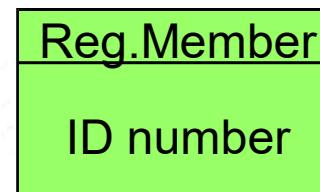


Activity 2 Answer:

- 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.
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-
- 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)

- 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 (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**.

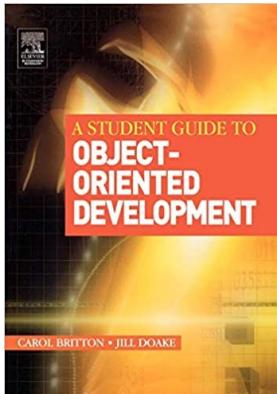
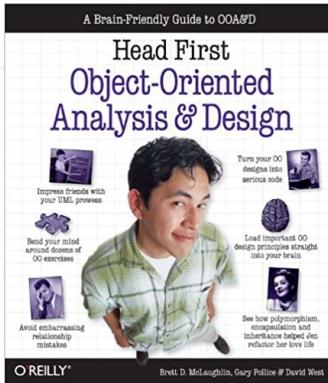
Activity 4 – Verbs are methods

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 - The online store administrator can add new items to the store, restock (increase quantity), generate a list of items that need to be restocked.
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 - 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, paypal) for each order.
 - Once the customer confirms the order and the payment is validated the order is placed and items are updated.

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