

# Introduction

## Object Orientation

- **Object Orientation (OO)** is a **paradigm** that views and models a **system** as a **collection** of **interacting** objects.
- **Abstraction** is a model to **include the most important aspects** while **ignoring less important details**.
- **Encapsulation** is a mechanism for **restricting access** to some **internal components** of an **object**.
- **Polymorphism** is the ability of **different objects** to **respond to the same request** in **different ways**.

## Objects

- An **object** corresponds to a **single entity** in the **real world**.
- Objects may be **tangible** or **intangible**.
- All **objects** contain **information** and **exhibit behavior**.

## Classes

- A **class** is a **uniquely identified abstraction** of a set of **related instances** that share **identical or similar characteristics**.
- An **attribute** is a **named property** of a **class**.
- An **operation** is the **implementation** of a **service**.
- A **class** is an **object-blueprint** and becomes an **object** when **instantiated**.

## Object Oriented Software Development

- A **software process** is a **set of activities** that lead to the **production** of **software**.
- A **software process model** or **paradigm** is an **abstraction** of **software processes**.
- Common software paradigms include:
  1. **Waterfall** - A **linear process** with **distinct phases**.
  2. **Spiral** - **Iterative risk management**.
  3. **Agile** - An **iterative** and **incremental** methodology.

## OOA, OOD, OOP, and OOT

- **Object-Oriented Analysis (OOA)** is the process of **analyzing a problem** and **discovering all entities** associated with the problem.
- **Object-Oriented Design (OOD)** is the process of **taking the entities** discovered in OOA and **determining how they interact**.
- **Object-Oriented Programming (OOP)** is the process of **implementing an object-oriented design** in a **programming language**.
- **Object-Oriented Testing (OOT)** is the process of **testing the implemented design**.

## The Unified Process

- The **Unified Process** is an **iterative and incremental software development process framework**.
- The **main principals** of the **Unified Process**:
  1. It is **use-case driven**. A **use case** is a **written description of interactions** between **a role** and **a system** to **achieve a goal**. It links the **requirements** to the **implementation**.
  2. It is **architecture-centric**. It is a **theme** from the **earliest stages** of a **project**.
  3. It relies on **workflow in iterations**.
  4. It creates **incremental development**. Each **iteration** has **four properties**: the **duration**, the **tasks**, the **outcomes**, and the **usage**.
- The **main benefit** to **iterative development** is the ability to get **feedback, on a regular basis**.

## Project Inception

- The **first stage** in a project is the **inception stage**.
- The **inception stage** is a short stage that addresses the following questions:
  1. What are the outcomes?
    - a. What is the vision and business case for the project?
    - b. Is it feasible to work on this project?
    - c. Should the project be purchased or built?
    - d. What is the rough cost range of developing the project?
    - e. Should the project continue, or stop?
  2. What are the methods for achieving the outcome?
    - a. What are the requirements and how will they be achieved?
  3. What are the objectives?
    - a. What are the most important objectives?
    - b. What is the initial plan?