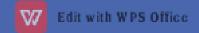
Object-Oriented Programming (OOP)

Information Hiding

- Information is stored within the object

It is hidden from the outside world

 It can only be manipulated by the object itself



Example — Information Hiding

Ali's name is stored within his brain

We can't access his name directly

Rather we can ask him to tell his name

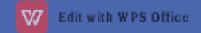


Example — Information Hiding

A phone stores several phone numbers

We can't read the numbers directly from the SIM card

Rather phone-set reads this information for us



Information Hiding Advantages

Simplifies the model by hiding implementation details

It is a barrier against change propagation



Encapsulation

 Data and behaviour are tightly coupled inside an object

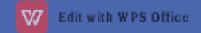
 Both the information structure and implementation details of its operations are hidden from the outer world



Example — Encapsulation

 Ali stores his personal information and knows how to translate it to the desired language

- We don't know
 - How the data is stored
 - How Ali translates this information



Example — Encapsulation

 A Phone stores phone numbers in digital format and knows how to convert it into human-readable characters

- We don't know
 - How the data is stored
 - How it is converted to human-readable characters

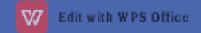


Encapsulation — Advantages

Simplicity and clarity

Low complexity

Better understanding



Object has an Interface

- An object encapsulates data and behaviour
- So how objects interact with each other?
- Each object provides an interface (operations)
- Other objects communicate through this interface



Example — Interface of a Car

- Steer Wheels
- Accelerate
- Change Gear
- Apply Brakes
- Turn Lights On/Off

Example — Interface of a Phone

- Input Number
- Place Call
- Disconnect Call
- Add number to address book
- Remove number
- Update number



Implementation

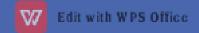
Provides services offered by the object interface

- This includes
 - Data structures to hold object state
 - Functionality that provides required services

Example — Implementation of Gear Box

- Data Structure
 - Mechanical structure of gear box

- Functionality
 - Mechanism to change gear



Example — Implementation of Address Book in a Phone

- Data Structure
 - SIM card

- Functionality
 - Read/write circuitry



Separation of Interface & Implementation

 Means change in implementation does not effect object interface

 This is achieved via principles of information hiding and encapsulation



Example — Separation of Interface & Implementation

 A driver can drive a car independent of engine type (petrol, diesel)

Because interface does not change with the implementation



Example — Separation of Interface & Implementation

 A driver can apply brakes independent of brakes type (simple, disk)

Again, reason is the same interface



Advantages of Separation

 Users need not to worry about a change until the interface is same

Low Complexity

Direct access to information structure of an object can produce errors



Messages

- Objects communicate through messages
- They send messages (stimuli) by invoking appropriate operations on the target object
- The number and kind of messages that can be sent to an object depends upon its interface



Examples – Messages

 A Person sends message (stimulus) "stop" to a Car by applying brakes

 A Person sends message "place call" to a Phone by pressing appropriate button

