16. Oops in java

- **Java Object-Oriented Programming (OOPs)** is a fundamental concept in Java.It allows developers to structure code using **classes and objects**, making it more modular, reusable, and scalable.
- The core idea of **OOPs** is to bind data and the functions that operate on it, preventing unauthorized access from other parts of the code. Java strictly follows the DRY (Don't Repeat Yourself) Principle, ensuring that common logic is written once (e.g., in parent classes or utility methods) and reused throughout the application. This makes the code:
  - **Easier to maintain:** Changes are made in one place.
  - **More organized:** Follows a structured approach.
  - **Easier to debug and understand**: Reduces redundancy and improves readability.

💡 **:** *The "Don't Repeat Yourself" (DRY) principle is about reducing the repetition of code. You should extract out the codes that are common for the application, and place them at a single place and reuse them instead of repeating it.*

🌟 4 pillar of Oops -

1. **Encapsulation**
   a. It is defined as the **wrapping up of data under a single unit.** It is the mechanism that binds together the code and the data it manipulates.
2. **Inheritance**
   a. Inheritance is an important pillar of OOP (Object Oriented Programming).
   b. It is the mechanism in Java by which one class is allowed to inherit the features (fields and methods) of another class.
   c. We are achieving inheritance by using **extends** keyword.
   d. Inheritance is also known as "**is-a**" relationship.
3. **Polymorphism**
   a. *It refers to the ability of object-oriented programming languages t**o differentiate between entities with the same name efficiently**.*
   b. *This is done by Java with the help of the signature and declaration of these entities.*
   c. *The ability to appear in many forms is called polymorphism*
4. **Abstraction**

a. Data **abstraction** is the process of hiding certain details and showing only essential information to the user.

b. Abstraction can be achieved with either **abstract classes** or **interfaces.**

🌟 Advantages of Oops -

- By using objects and classes, you can create reusable components, leading to less duplication and more efficient development.
- It provides a clear and logical structure, making the code easier to understand, maintain, and debug.
- OOP supports the DRY (Don't Repeat Yourself) principle.This principle encourages minimizing code repetition, leading to cleaner, more maintainable code. Common functionalities are placed in a single location and reused, reducing redundancy.
- By reusing existing code and creating modular components, OOP allows for quicker and more efficient application development.

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