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Object Oriented Programming

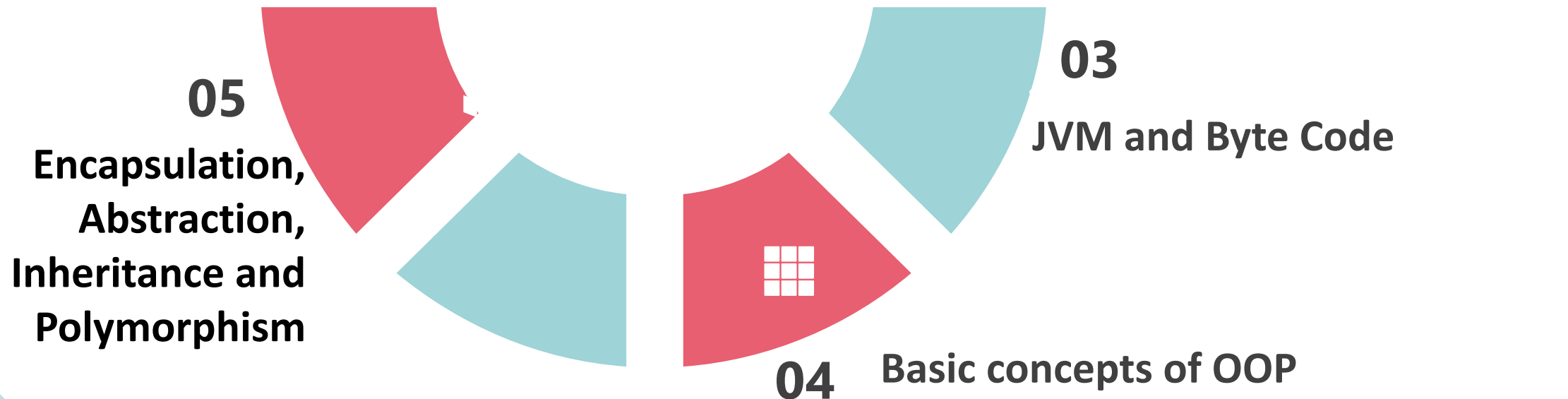


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Contents

Object Oriented Programming
chapter 1 will include this topics.



What is OOP?

*OOP is a programming paradigm based on the concept of "objects", which can contain **data** and **code**.*



***Data** in the form of fields (often known as attributes or properties), and **code**, in the form of procedures (often known as **methods**).*

Cont..

Object-Oriented-Programing allows programmers to think of software development as if they are working with real-life entities.

In your everyday life, people have the knowledge and can-do various works/tasks. In OOP, objects have fields to store knowledge/state/data and can-do various methods

In OOP principle every thing can be represented as an object.

What is Java ?

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Java is a popular programming language and It is owned by Oracle

It is used for:

- ❖ *Mobile applications (specially Android apps)*
- ❖ *Desktop applications*
- ❖ *Web applications*
- ❖ *Games*
- ❖ *Database connection*
- ❖ *And much, much more*

Why Use Java ?

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- ❖ *Java is an object oriented language which gives a clear structure to programs and allows code to be reused, lowering development costs*
- ❖ *Java works on different platforms (Windows, Mac, Linux, Raspberry Pi, etc.)*
- ❖ *It is one of the most popular programming language in the world*
- ❖ *It is easy to learn and simple to use*
- ❖ *It is open-source and free*
- ❖ *It is secure, fast and powerful*
- ❖ *It has a huge community support (tens of millions of developers)*

Java developmet tools

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The most popular Java tools for every phase of development

Java Development Kit(JDK)

The Java Development Kit (JDK) is a software development environment used for developing Java applications and applets.

It includes the Java Runtime Environment (JRE), an interpreter/loader (java), a compiler (javac), an archiver (jar), a documentation generator (javadoc) and other tools needed in Java development

NetBeans

NetBeans is an integrated development environment for Java.

NetBeans IDE is a free and open source integrated development environment for application development on Windows, Mac, Linux, and Solaris operating systems. The IDE simplifies the development of web, enterprise, desktop, and mobile applications that use the Java and HTML5 platforms.

JVM and Byte Code

- ❖ A Java virtual machine (JVM) is a virtual machine that enables a computer to run Java programs as well as programs written in other languages that are also compiled to Java bytecode.
- ❖ The JVM has two primary functions: to allow Java programs to run on any device or operating system (known as the "Write once, run anywhere" principle), and to manage and optimize program

memory



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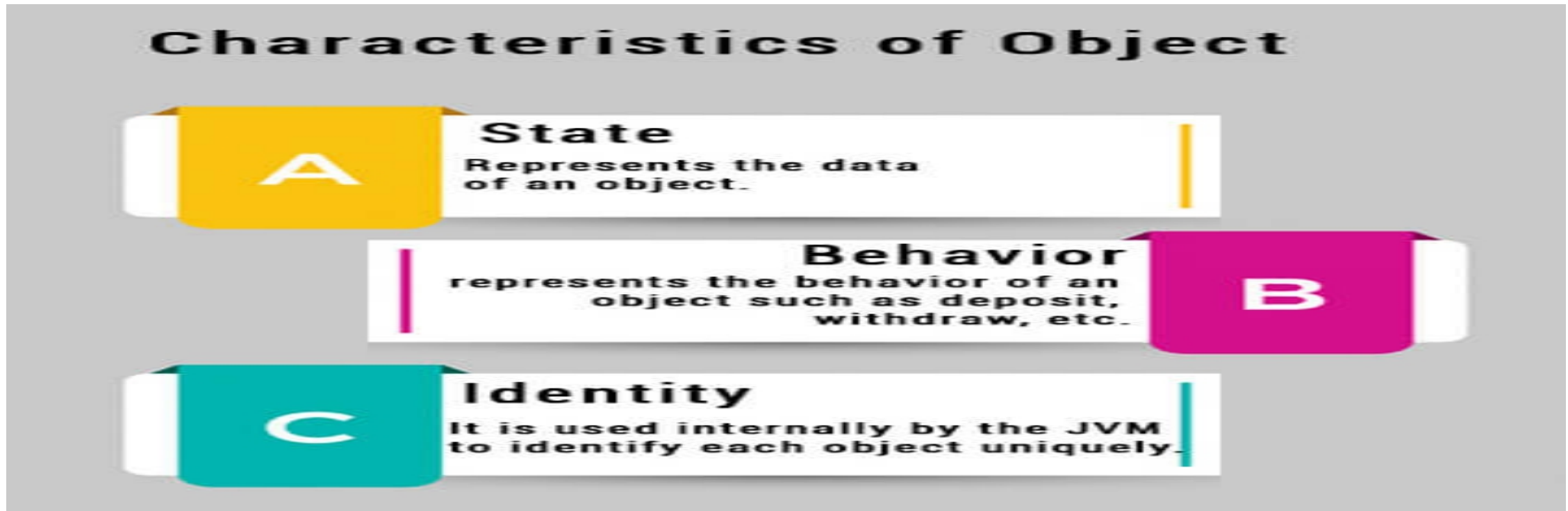
- ❖ Java bytecode is the instruction set of the Java virtual machine.
- ❖ Byte code is an intermediate code between the source code and machine code. It is a low-level code that is the result of the compilation of a source code which is written in a high-level language. It is processed by a virtual machine like Java Virtual Machine (JVM).

Basic concepts of OOP

- ❖ In this article, I will try to explain the main four principles of Object-Oriented-Programming (OOP). Object-Oriented-Programming allows programmers to think of software development as if they are working with real-life entities. In your everyday life, people have the knowledge and can-do various works/tasks. In OOP, objects have fields to store knowledge/state/data and can-do various methods.

Object

- ❖ **An object** is an instance of a class. A class is a template or blueprint from which objects are created. So, an object is the instance(result) of a class.
- ❖ An entity that has state and behavior
- ❖ **For example:** Chair, bike, marker, pen, table, car, etc. It can be physical or logical (tangible and intangible). The example of an intangible object is the banking system.



❖ **For Example**, Pen is an object. Its name is Reynolds; color is white, known as its state. It is used to write, so writing is its behavior.

Class

- ❖ A class is a group of objects which have common properties. It is a template or blueprint from which objects are created. It is a logical entity. It can't be physical.
- ❖ A class in Java can contain:
 - ✓ Fields
 - ✓ Methods
 - ✓ Constructors
 - ✓ Blocks
 - ✓ Nested class and interface

Syntax to declare a class:

```
class <class_name>{  
    field;  
    method;  
}
```

Methods

- ❖ **Method:** Can modify a class state that would apply across all the instances of the class
- ❖ In Java, a method is like a function which is used to expose the behavior of an object.
- ❖ **Advantage of Method**
 - ✓ Code Reusability
 - ✓ Code Optimization

Instance

- ❖ **Instance:** These are like Objects, however, let's think about it in these terms:
A blueprint for a car design is the class description, all the cars manufactured from that blueprint are objects of that class. Your car that has been made from that blueprint is an instance of that class.
- ❖ **Instance variable** is a variable which is created inside the class but outside the method is known as an instance variable. Instance variable doesn't get memory at compile time. It gets memory at runtime when an object or instance is created. That is why it is known as an instance variable.

The Four Pillars of Object Oriented Programming

- ❖ Encapsulation
- ❖ Abstraction
- ❖ Inheritance
- ❖ Polymorphism

Encapsulation

- ❖ Encapsulation. This is the practice of keeping fields within a class private, then providing access to them via public methods. It's a protective barrier that keeps the data and code safe within the class itself. This way, we can reuse objects like code components or variables without allowing open access to the data system-wide.

Abstraction

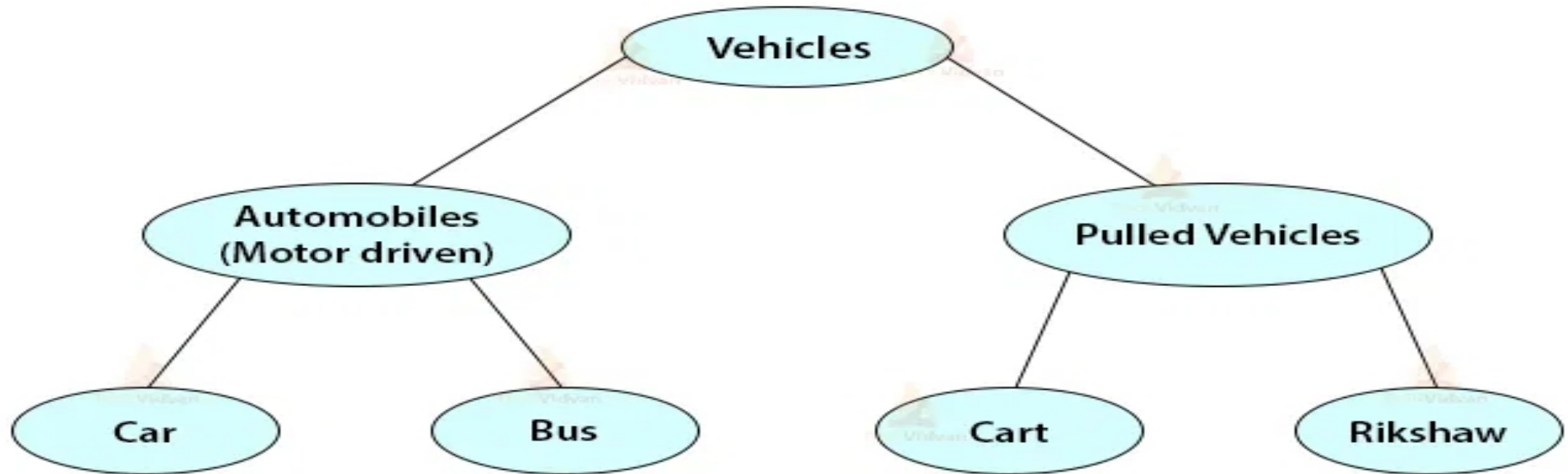
- ❖ Abstraction is a process of hiding the implementation details and showing only functionality to the user. Another way, it shows only essential things to the user and hides the internal details.
- ❖ **For example**, sending SMS where you type the text and send the message. You don't know the internal processing about the message delivery.
- ❖ Abstraction is selecting data from a larger pool to show only relevant details of the object to the user. It helps in reducing programming complexity and efforts.

Inheritance

- ❖ Inheritance in Java is a mechanism in which one object acquires all the properties and behaviors of a parent object.
- ❖ The idea behind inheritance in Java is that you can create new classes that are built upon existing classes. When you inherit from an existing class, you can reuse methods and fields of the parent class.
- ❖ The principle behind this kind of division is that each subclass (child-class) shares common characteristics with the class from which it is derived.

Conti....

Inheritance in Java



Conti....

- ❖ From the above figure
- ✓ Automobiles and Pulled Vehicles are subclasses of Vehicles.
- ✓ Vehicles are the base class or superclass of Automobiles and pulled Vehicles.
- ✓ Car and Bus are sub-classes or derived classes of Automobiles.
- ✓ Automobiles are the base class or superclass of Car and Bus.

Polymorphism

- ❖ Polymorphism is the ability for a data or message to be processed in more than one form. It is a concept by which a single operation can be performed in multiple different ways.
- ❖ Polymorphism is the concept that allows an object of a class to behave differently in response to a message or action.
- ❖ **For example**, lets say we have a class Animal that has a method sound(). Since this is a generic class so we can't give it a implementation like: Roar, Meow, Oink etc

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THANK YOU

Any questions?
Feel free !