Programming Laboratory-1

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Need of Object Oriented Programming

Easy to develop solutions for real world problems

Class
<CAR>

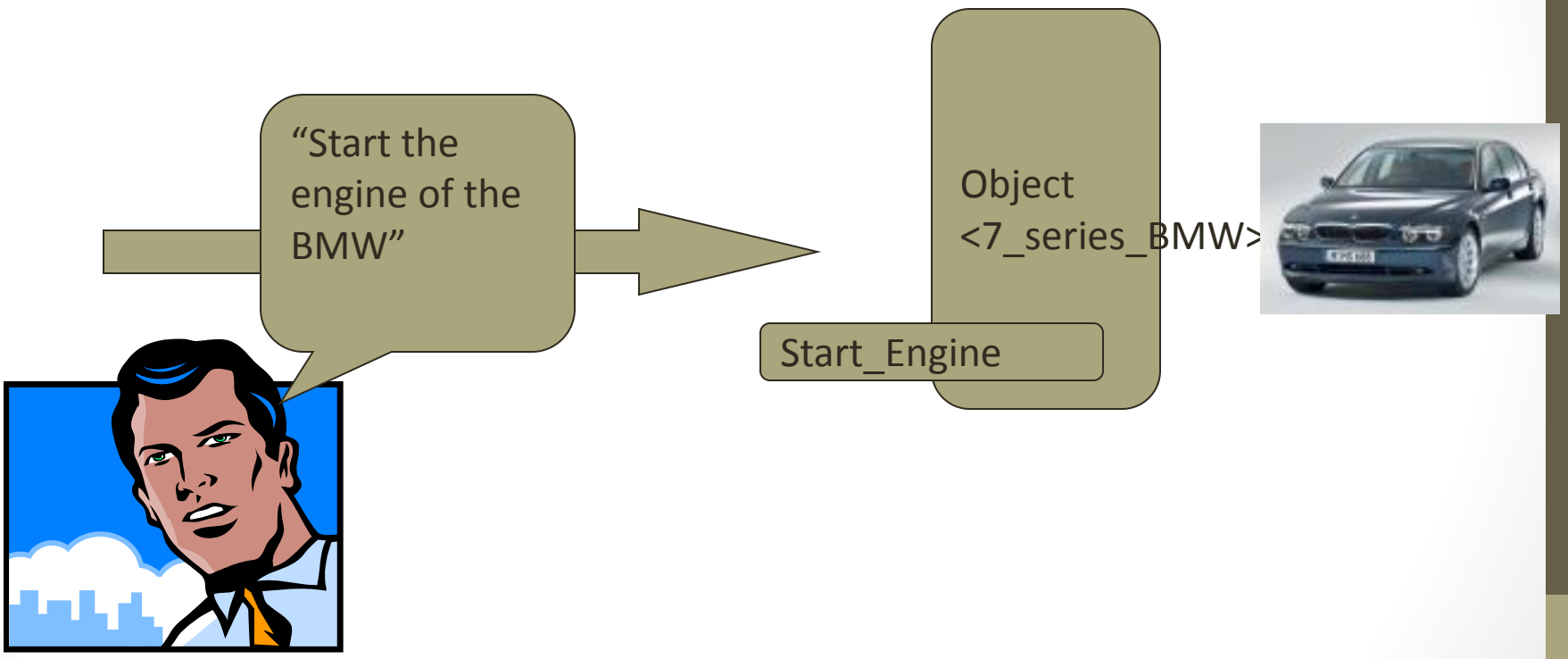
Classes and Objects

Object
<7_series_BMW>

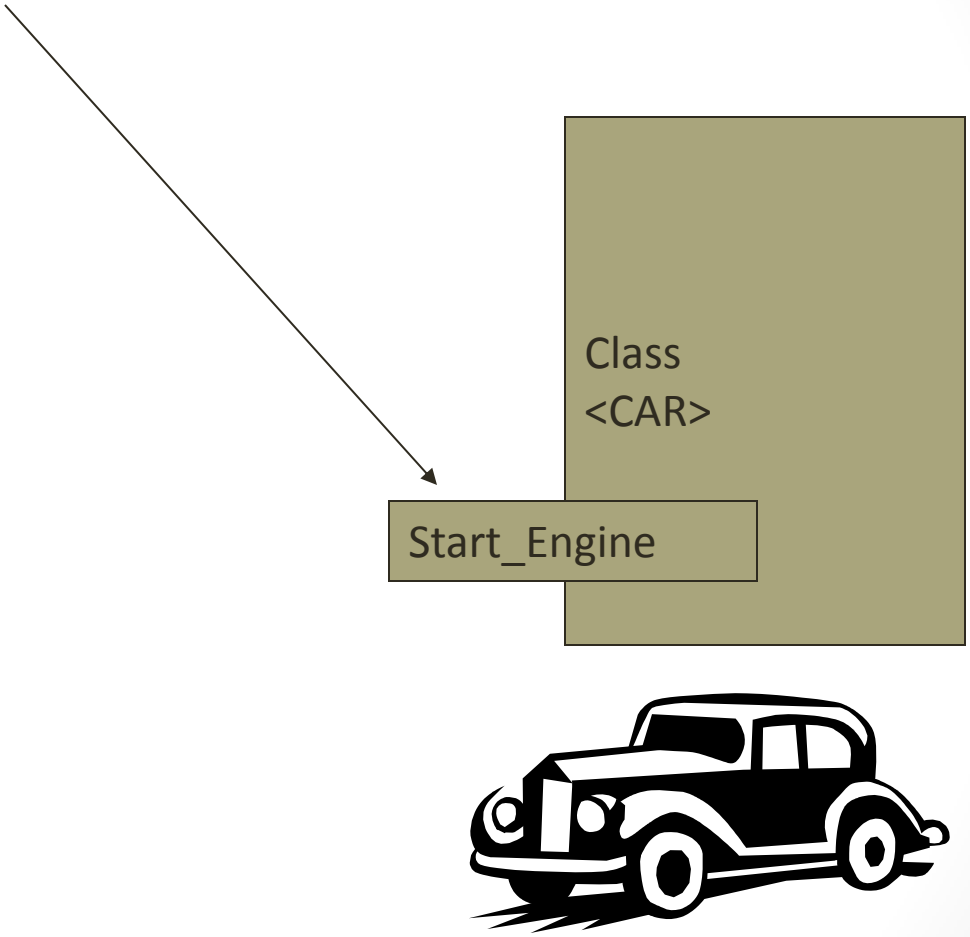
Object
<VW_Beetle>

Object
<Ford_Mustang>

Messages to Objects



Methods of a Class



Classes

- A Class is a plan which describes the object.
- We call it as a blue print of how the object should be represented.
- It defines what the class name means, that is, what an object of the class will consist of and what operations can be performed on such an object.
- A class is to an object, as a blueprint is to a building

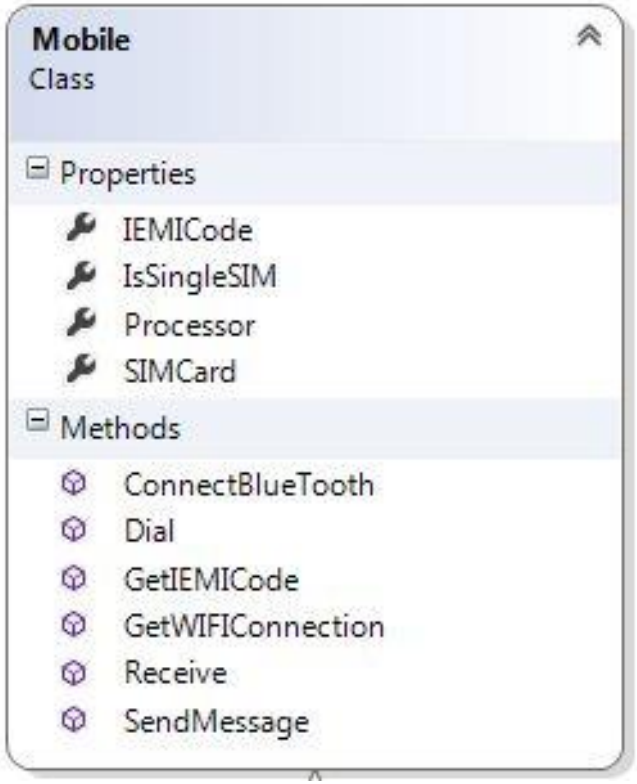
Objects

- Any real world entity which can have some characteristics or which can perform some work is called as Object.
- An Object is an instance of the class
- **Each Object consist of**

1. Attributes/Characterisitics/Properties
2. Behaviour/Function/method

Example

- A Mobile can be a class which has some attributes like Profile Type, IMEI Number, Processor, and some more.) & operations like Dial, Receive & SendMessage.



Basic Concepts of OOP

- The four essential features of OOP are

1. Abstraction
2. Encapsulation
3. Inheritance
4. Polymorphism

Abstraction

- Abstraction says, only show relevant details and rest all hide it.
- This is most important pillar in OOPS as it is providing us the technique to hide irrelevant details from User.
- If we consider an example of any mobile like Nokia, Samsung, IPhone.
  Some features of mobiles
- Dialing a number call some method internally which concatenate the numbers and displays it on screen but what is it doing we don't know.
- Clicking on green button actual send signals to calling person's mobile but we are unaware of how it is doing.
- This is called abstraction where creating method which is taking some parameter & returning some result after some logic execution without understating what is written within the method

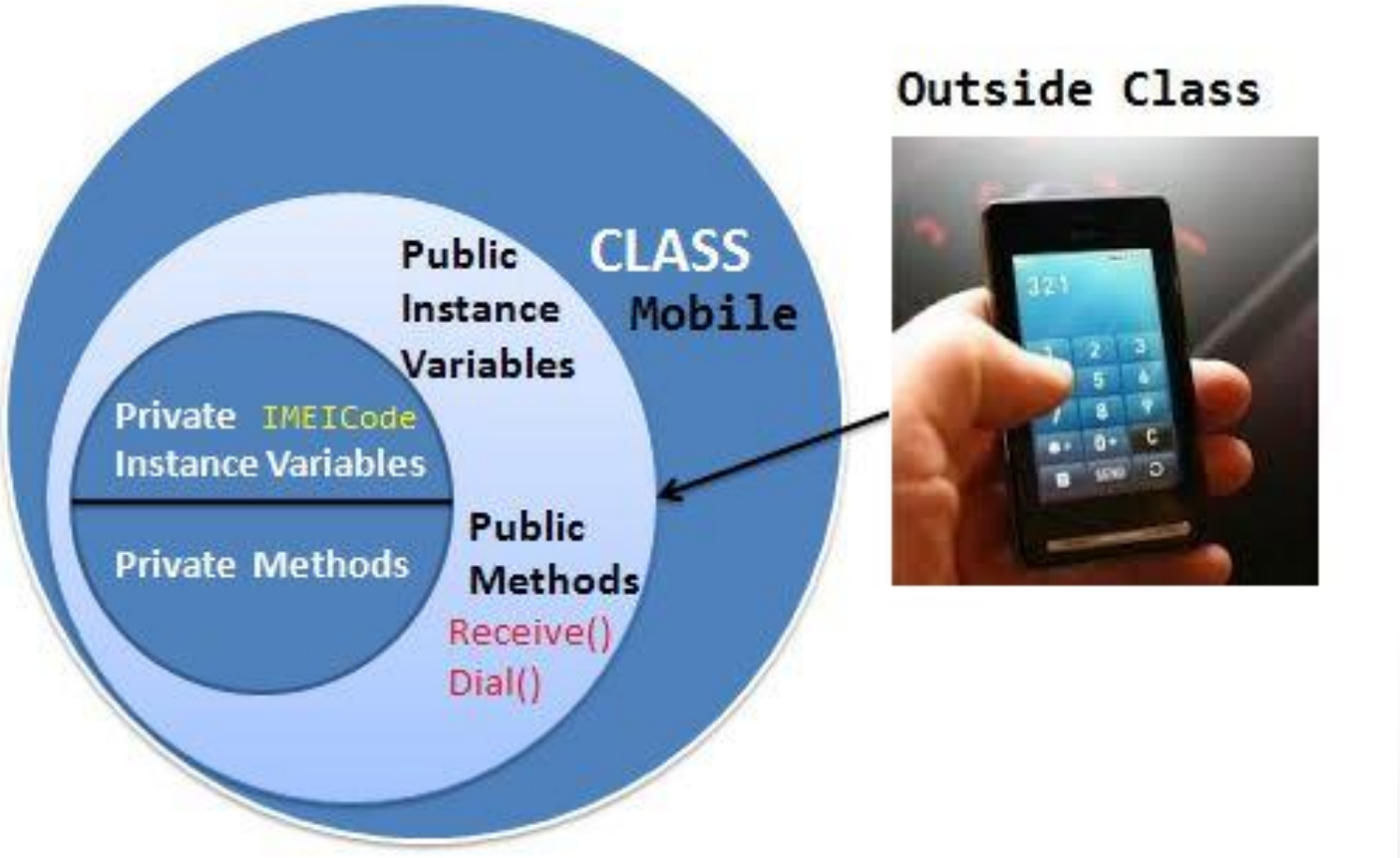
Encapsulation

- Encapsulation is defined as the process of enclosing one or more details from outside world through access right.
- It says how much access should be given to particular details.
- Both Abstraction & Encapsulation works hand in hand because Abstraction says what details to be made visible & Encapsulation provides the level of access right to that visible details. i.e. – It implements the desired level of abstraction.

Example

Talking about Bluetooth which we usually have it in our mobile. When we switch on the Bluetooth I am able to connect another mobile but not able to access the other mobile features like dialing a number, accessing inbox etc. This is because, Bluetooth feature is given some level of abstraction.

Abstraction and Encapsulation



Polymorphism

- Polymorphism means **one name many forms**

Example

- Let's say Samsung mobile have the 5MP camera available i.e. – it is having a functionality of CameraClick(). Now same mobile is having Panorama mode available in camera, so functionality would be same but with mode.

Inheritance

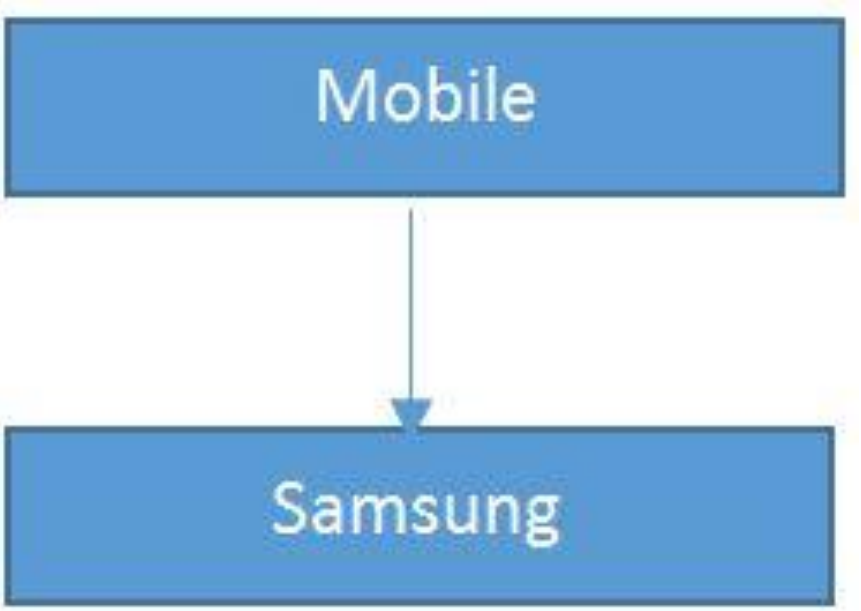
- Ability to extend the functionality from base entity in new entity belonging to same group. This will help us to reuse the functionality which is defined before.
- Example:

Basic Mobile functionality is to Send Message, dial & receive call. So the brands of mobile is using this basic functionality by extending the mobile class functionality and adding their own new features to their respective brand.

Inheritance

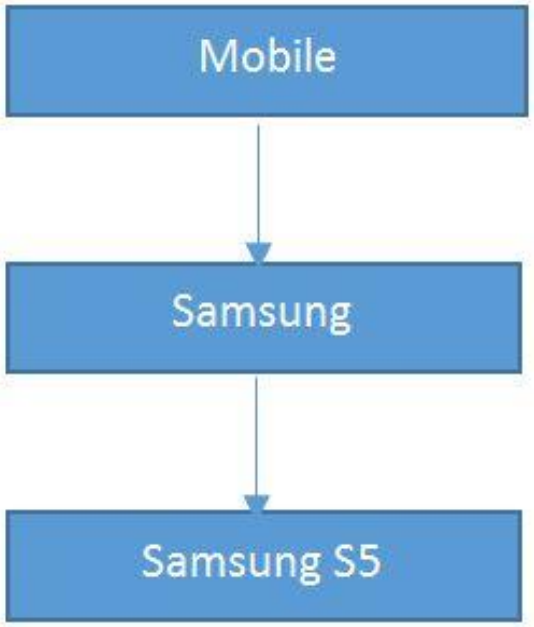
- There are mainly 4 types of inheritance:
- Single level inheritance
- Multi-level inheritance
- Hierarchical inheritance
- Hybrid inheritance
- Multiple inheritance

Single level inheritance



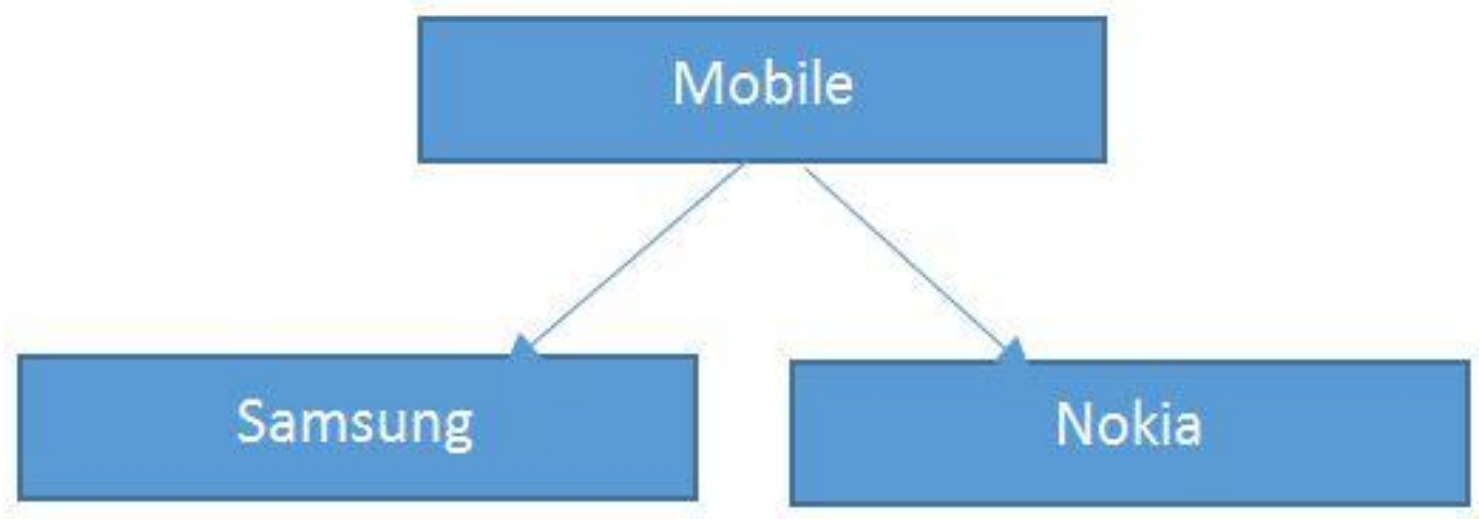
Multilevel inheritance

In Multilevel inheritance, there is more than one single level of derivation. i.e. - After base features are extended by Samsung brand. Now Samsung brand has manufactured its new model with new added features or advanced OS like Android OS, v4.4.2 (kitkat). From generalization, getting into more specification.



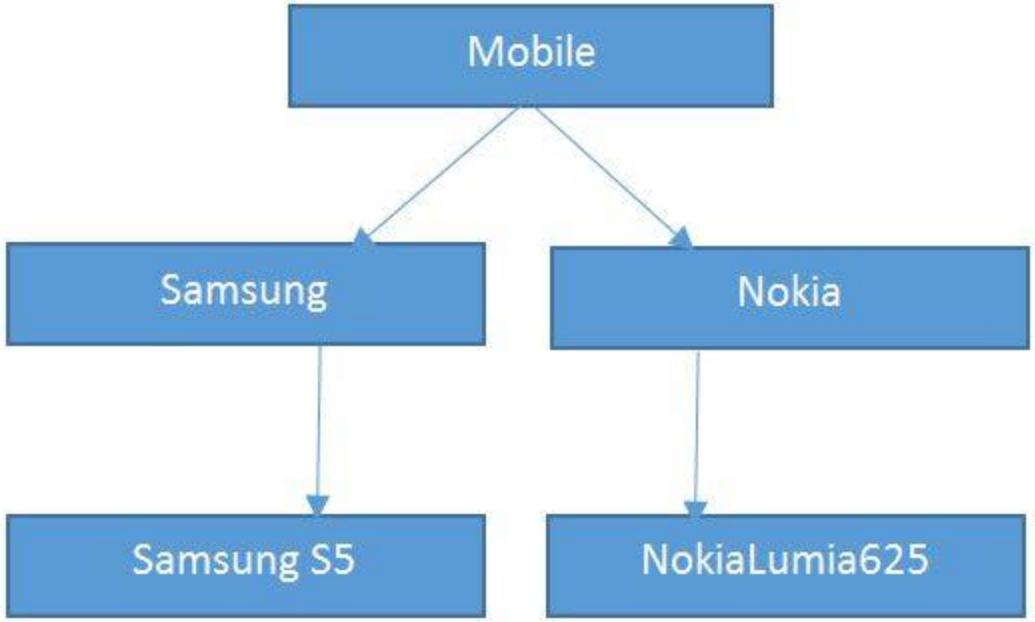
Hierarchal inheritance

In this type of inheritance, multiple derived class would be extended from base class, it's similar to single level inheritance but this time along with Samsung, Nokia is also taking part in inheritance.



Hybrid inheritance

Single, Multilevel, & hierarchal inheritance all together construct a hybrid inheritance.



Procedure Oriented v/s Object Oriented Programming

Procedural programming:

- Low-level, closer to hardware
- More intuitive, less abstract
- More ‘action’ oriented
- Focus on ‘action’, ‘procedure’, ‘method’
- Uses top-down approach

Object-oriented programming:

- High-level
- More abstract
- Focus on ‘what to do’ not on ‘how to do’