Introduction to Object-oriented Programming

Session 2

Objectives:

- Define Object-oriented Programming (OOP)

- Differentiate between Object-oriented and Object- based programming

- Explain the concepts of OOP

- List the advantages and disadvantages of OOP

Totally new concept

Inception in the 1960s

Revolutionized the entire software industry
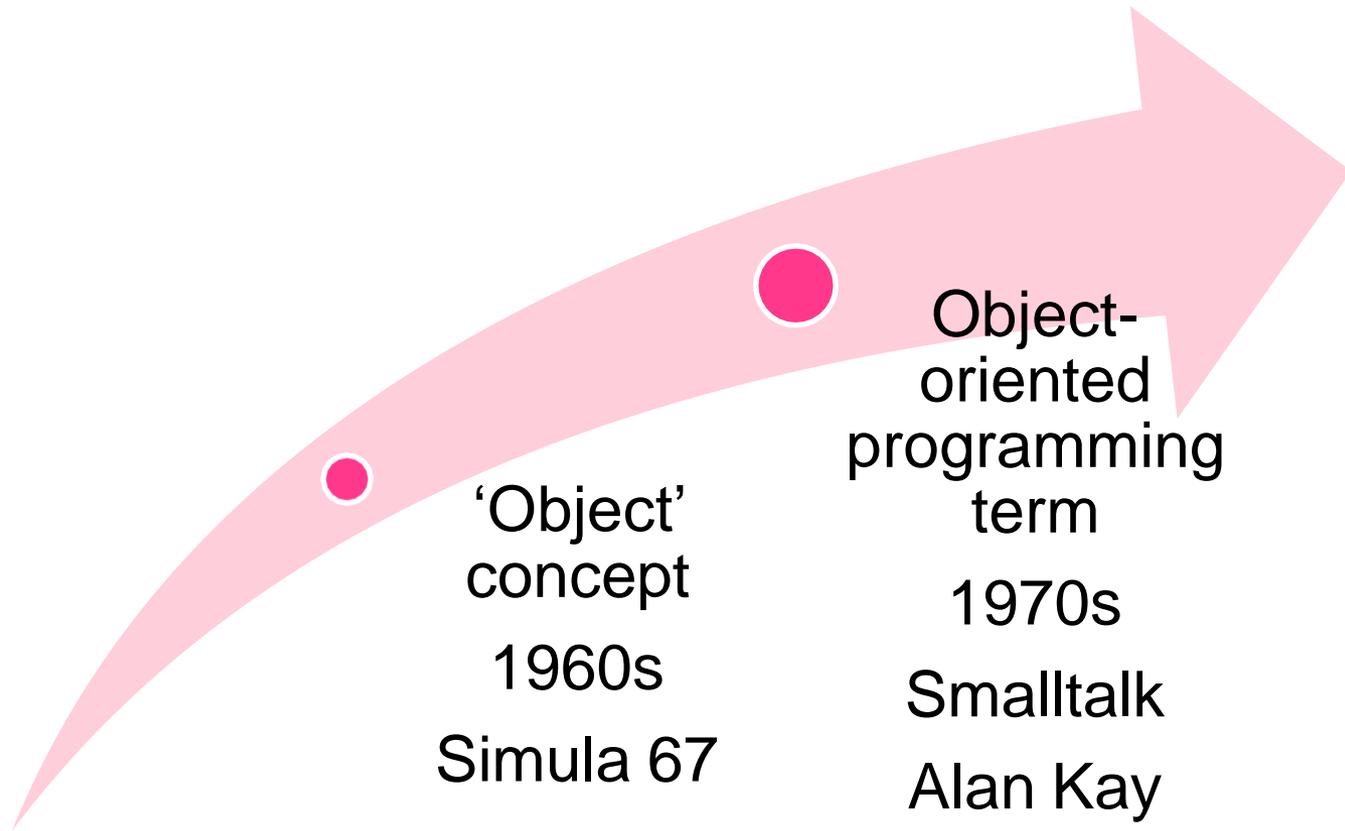
'Object' concept

1960s

Simula 67

Object-oriented programming term

1970s

Smalltalk

Alan Kay

An object is any person or a thing, living or non-living which has some characteristics or attributes which help to describe it

The figure shows examples of objects in real world.
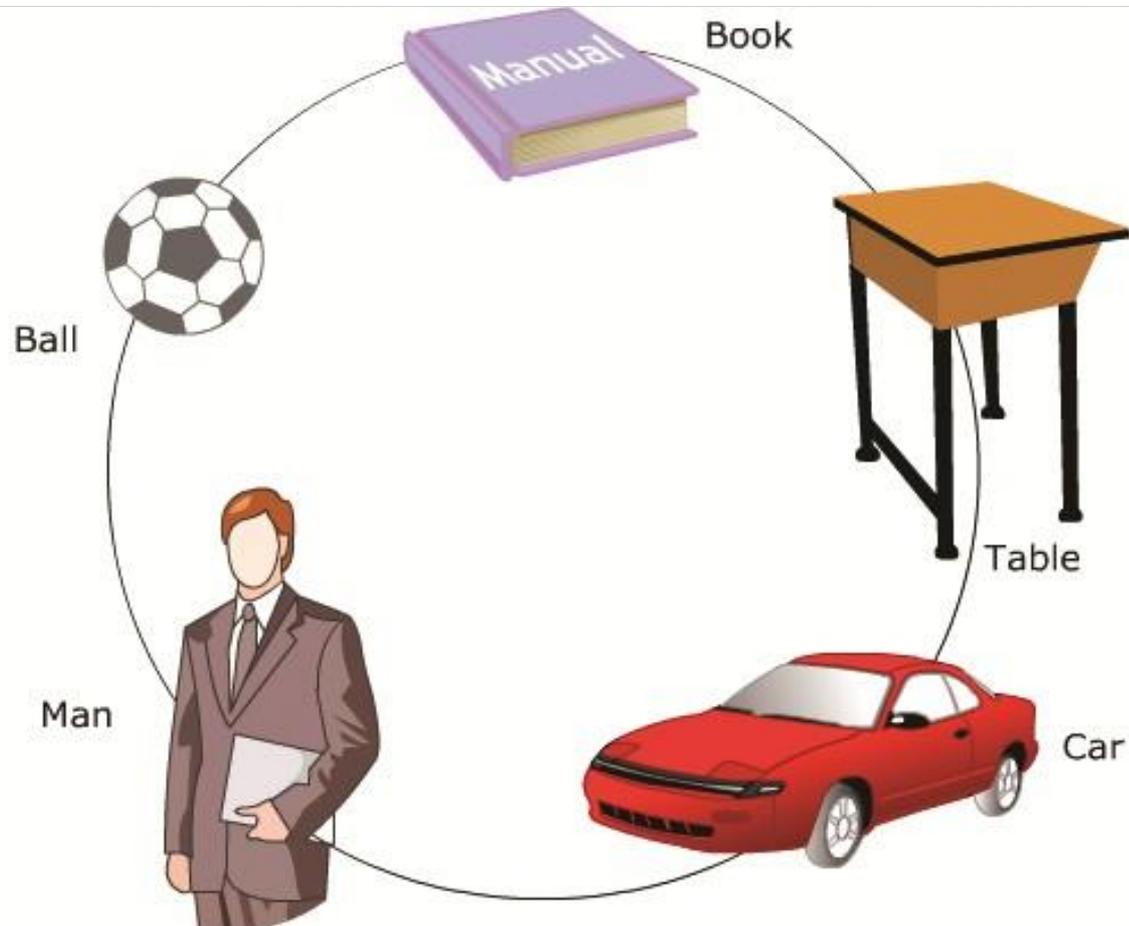
- ◆ OOP –
  - ◈ Makes use of 'objects'
    - ◈ That are data structures
    - ◈ Consisting of attributes and behavior along with their interactions
  - ◈ For designing computer programs

OOP	Object-based Programming
OOP uses a collection of objects that interact with each other to accomplish a task.	Object-based programming is more or less a limited version of OOP.
OOP includes features such as abstraction, encapsulation, inheritance, modularity, and polymorphism.	Object-based programming has no implicit inheritance, no polymorphism, and only a reduced number of available objects.
C++, C#, and Java are some examples of OOP languages.	Visual Basic and JavaScript are an example of Object-based programming language.

◆ OOP uses following four programming concepts:

Encapsulation

Abstraction

Inheritance

Polymorphism
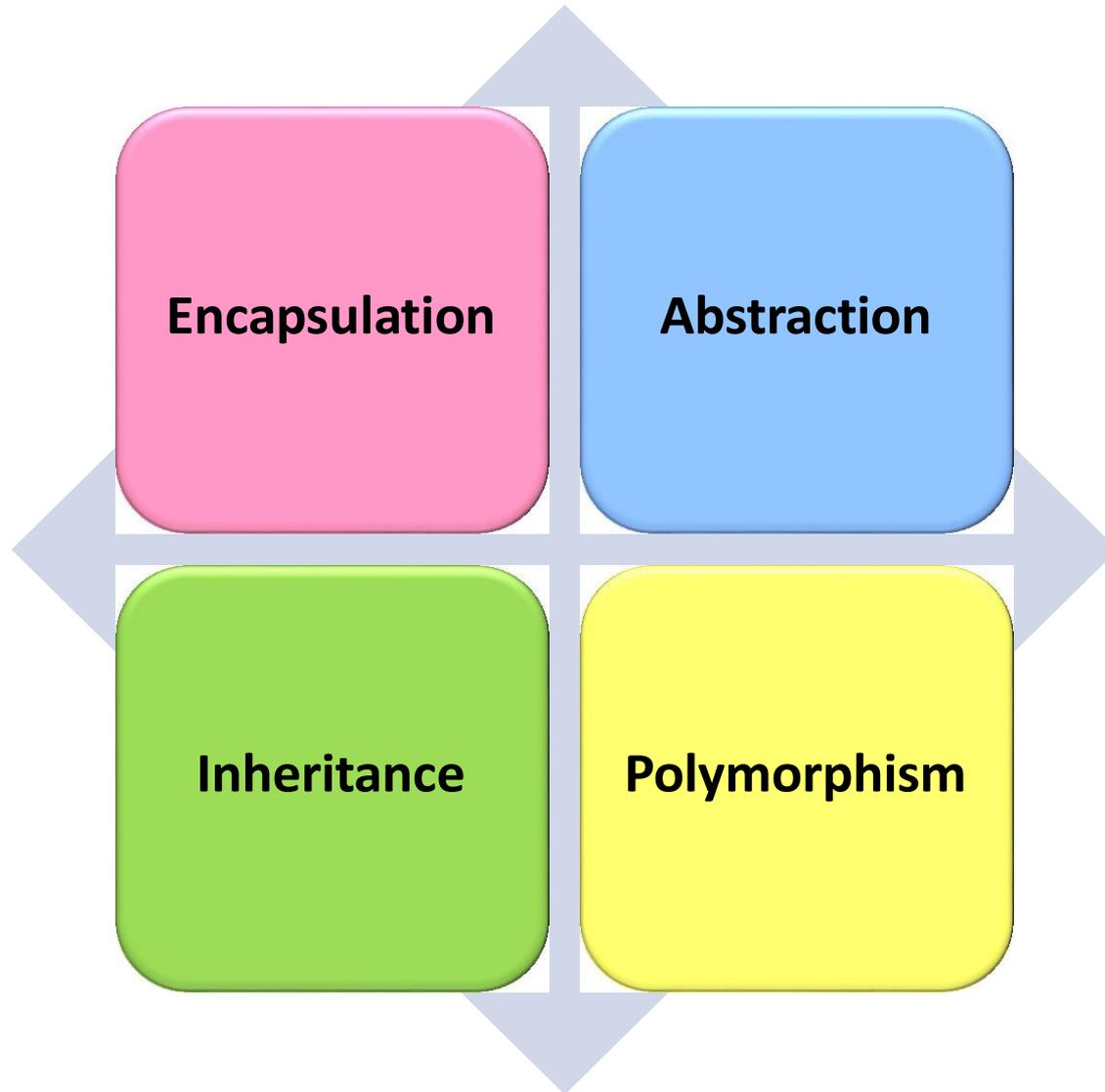
◆ The figure shows how the data members and methods can be encapsulated.

class: calc

objects: c1 and c2
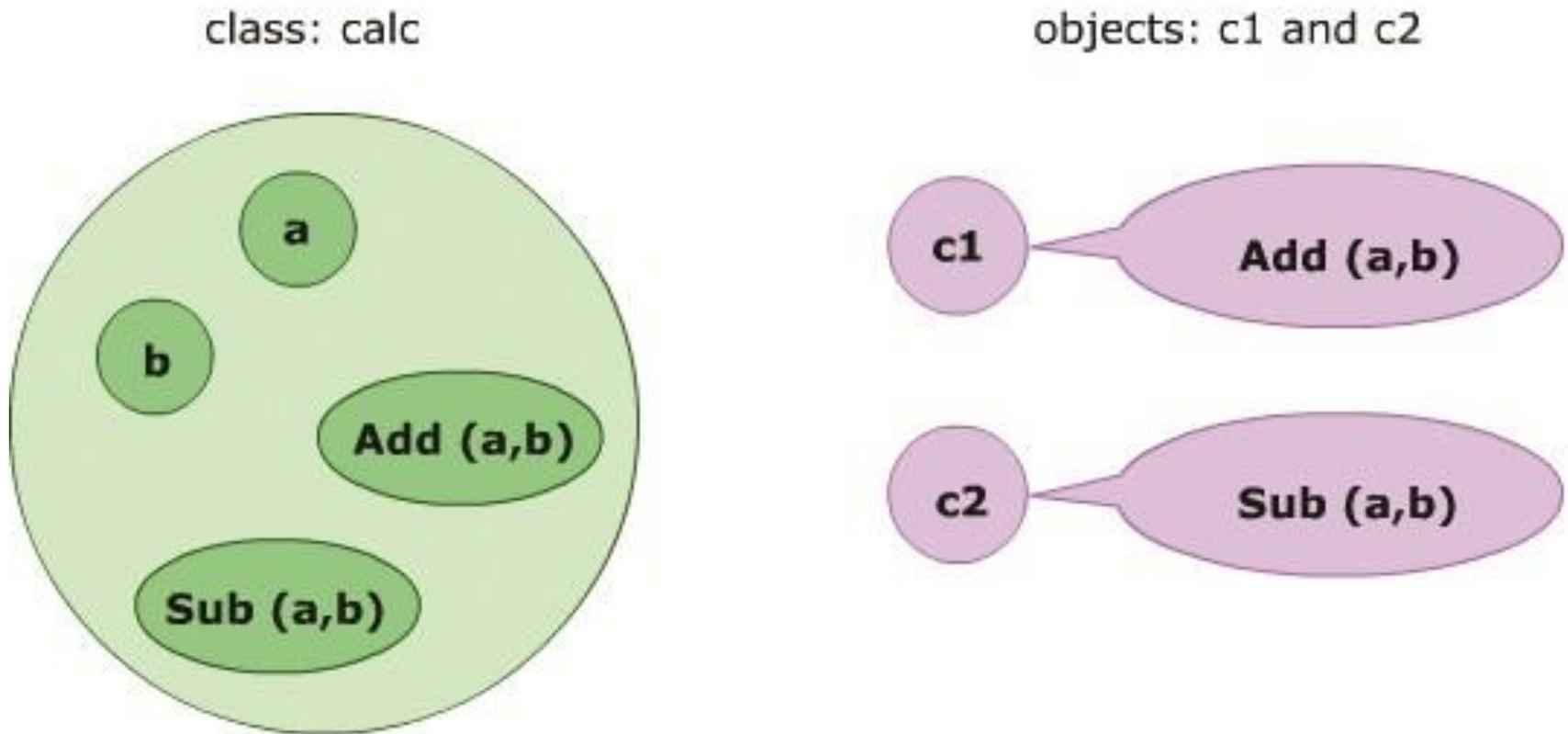
- Mechanism of showing only the relevant details

- The figure shows an example of abstraction using the ATM machine.
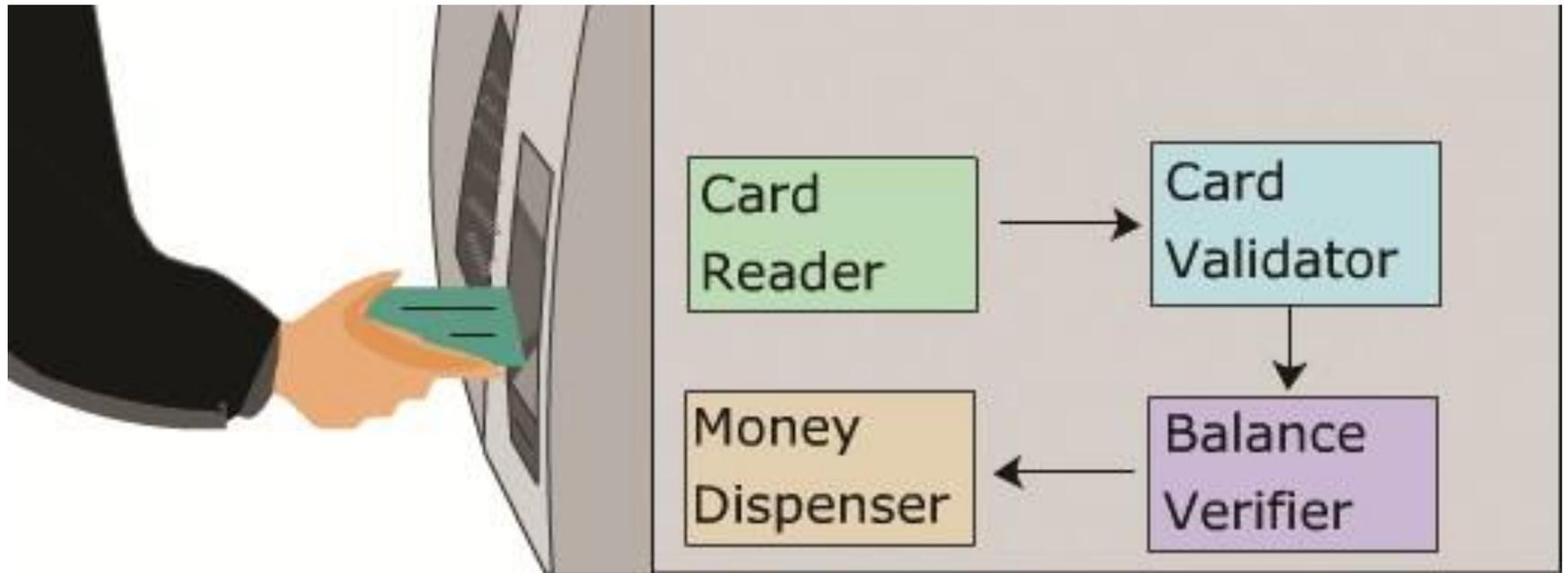
- To pass on characteristics, property, titles, and rights of an individual to his/her successors

- Inheritance helps to
  - Define hierarchical relationships among classes at different levels
  - Give code reusability

- The figure shows that the features and characteristics of grandfather are inherited by father and passed on to his son.

GrandFather

Father
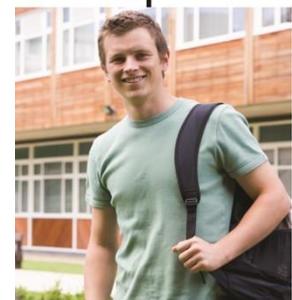
Son

Polymorphism in the real world

Advantages

Code Reusability

Reliability and Flexibility

Real world Modeling

Reduced code maintenance

Disadvantages

OOP is not a panacea

OOP is not a technology

OOP has not yet achieved complete acceptance

Not enough trained personnel in OOP

OOP languages comprise only 1% of systems

- OOP is a new paradigm in programming that designs programs by making use of 'objects', which are a copy of real world entities.

- Encapsulation is a feature used to restrict access to some of the data members by objects.

- Abstraction is a mechanism of showing only the relevant details of a process or artifact and hiding the irrelevant details.

- Inheritance helps to define hierarchical relationships among classes at different levels and enables code reusability.

- Polymorphism is a Greek word which means "many forms" and an object that can appear in different forms is called a polymorph.