Object-Oriented Programming Concepts

Session: 1

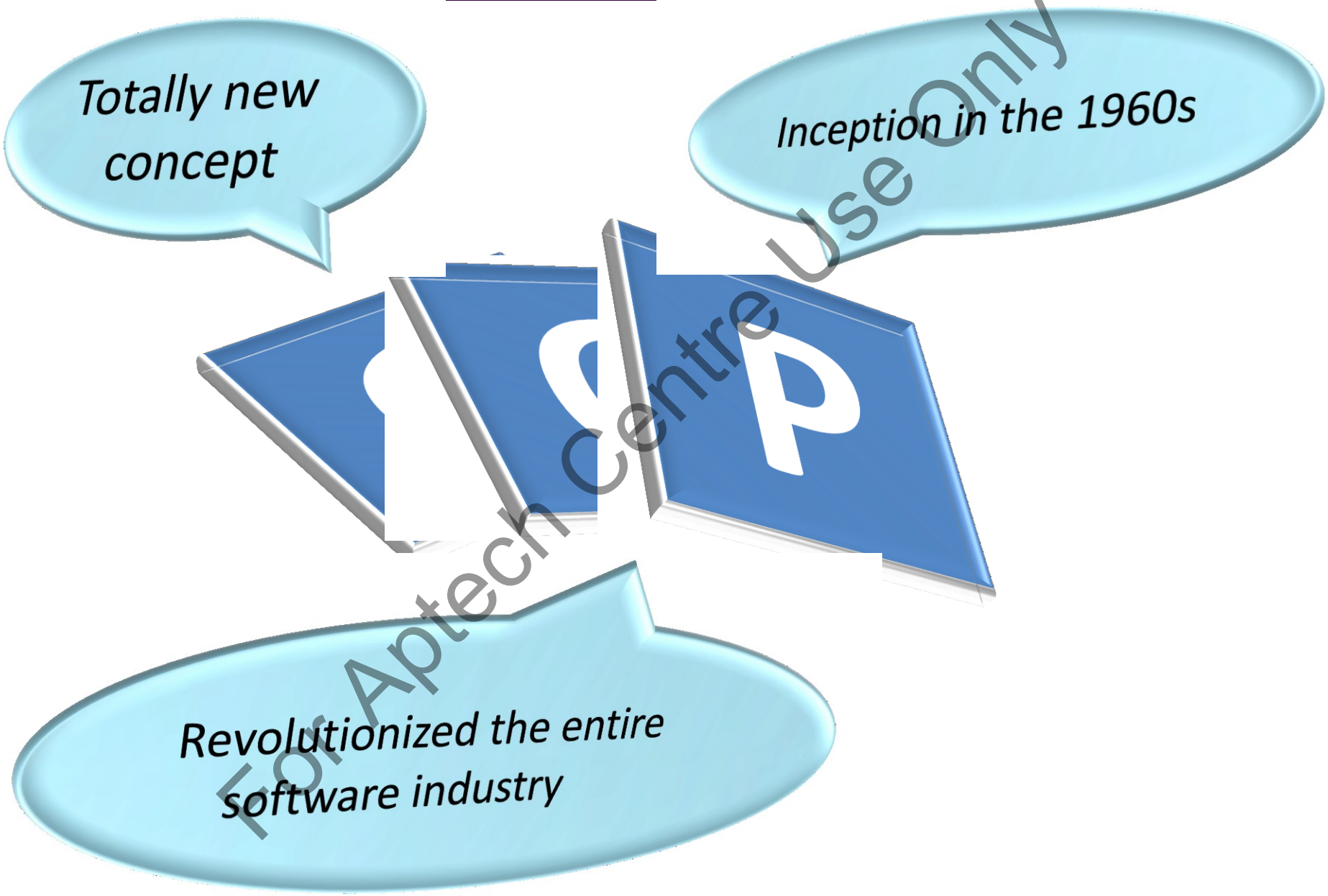
Introduction to

Object-oriented Programming

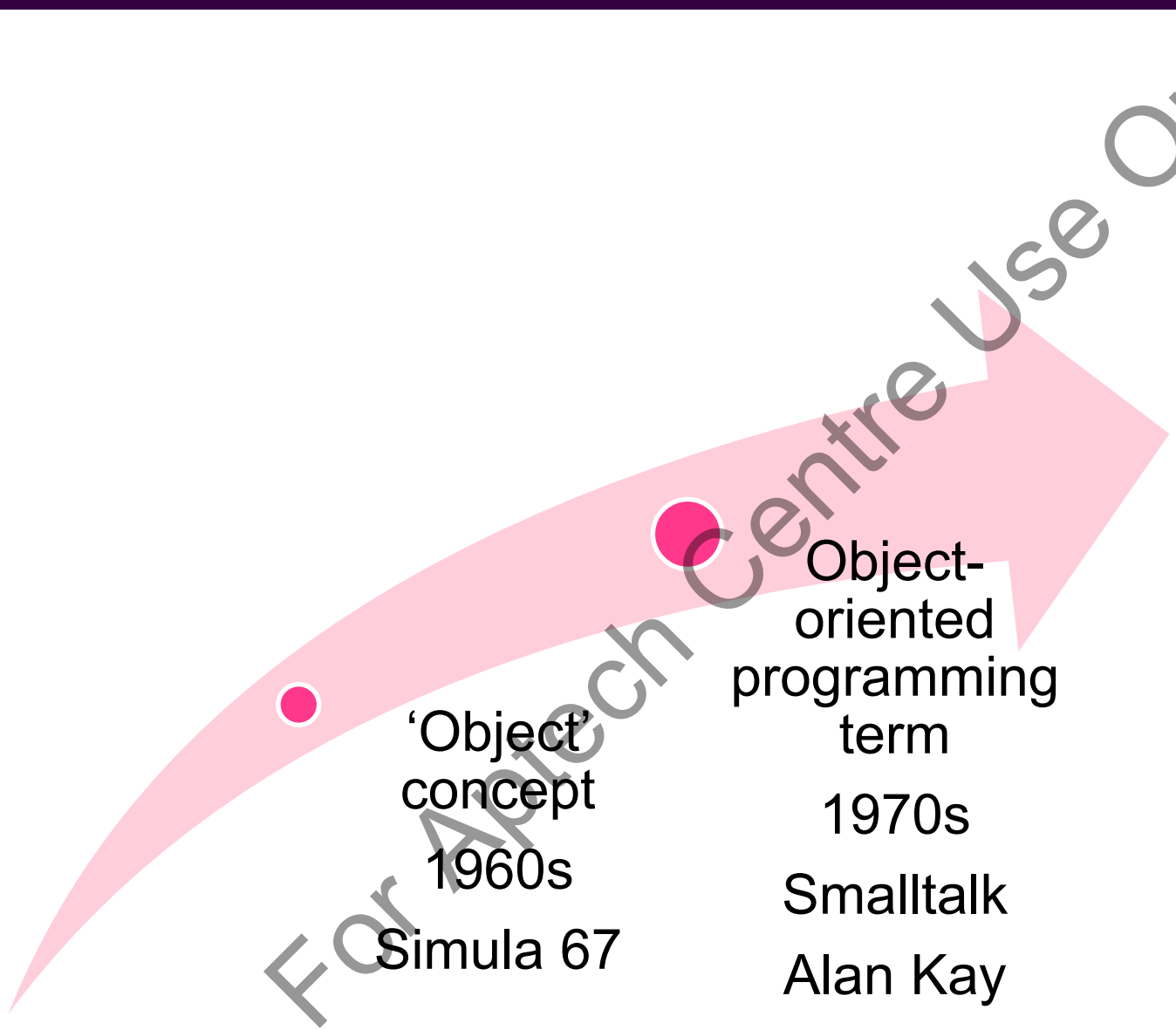
Objectives

- 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

Introduction



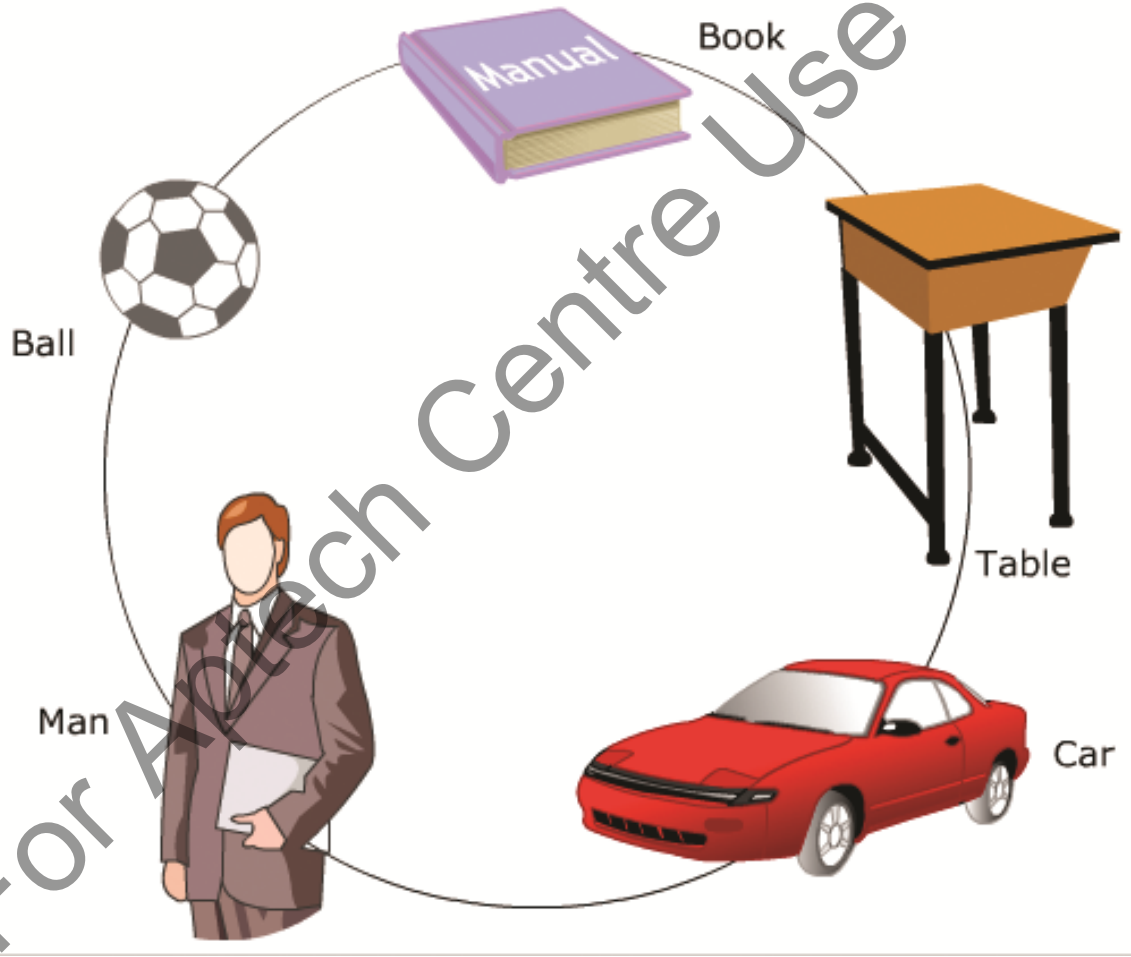
OOP – A New Paradigm in Programming 1-3



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

OOP – A New Paradigm in Programming 2-3

- The figure shows examples of objects in real world.



OOP – A New Paradigm in Programming 3-3

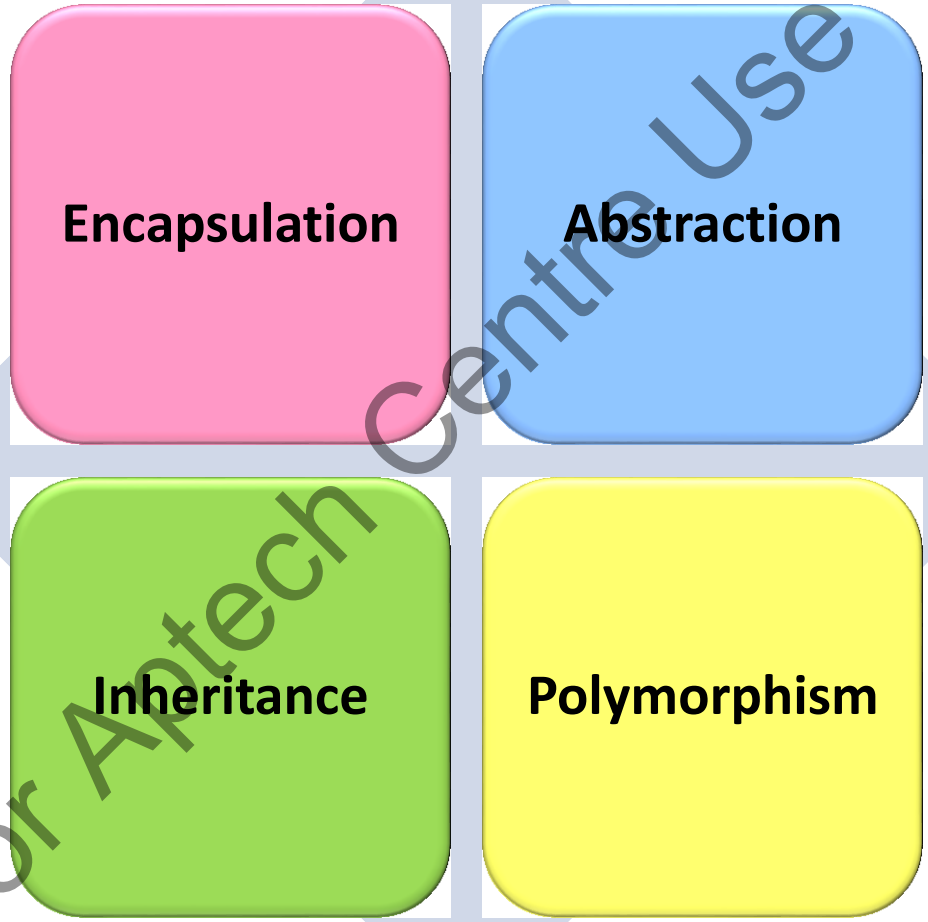
- OOP –
  - Makes use of 'objects'
    - That are data structures
    - Consisting of attributes and behavior along with their interactions
  - For designing computer programs

OOP versus Object-based Programming

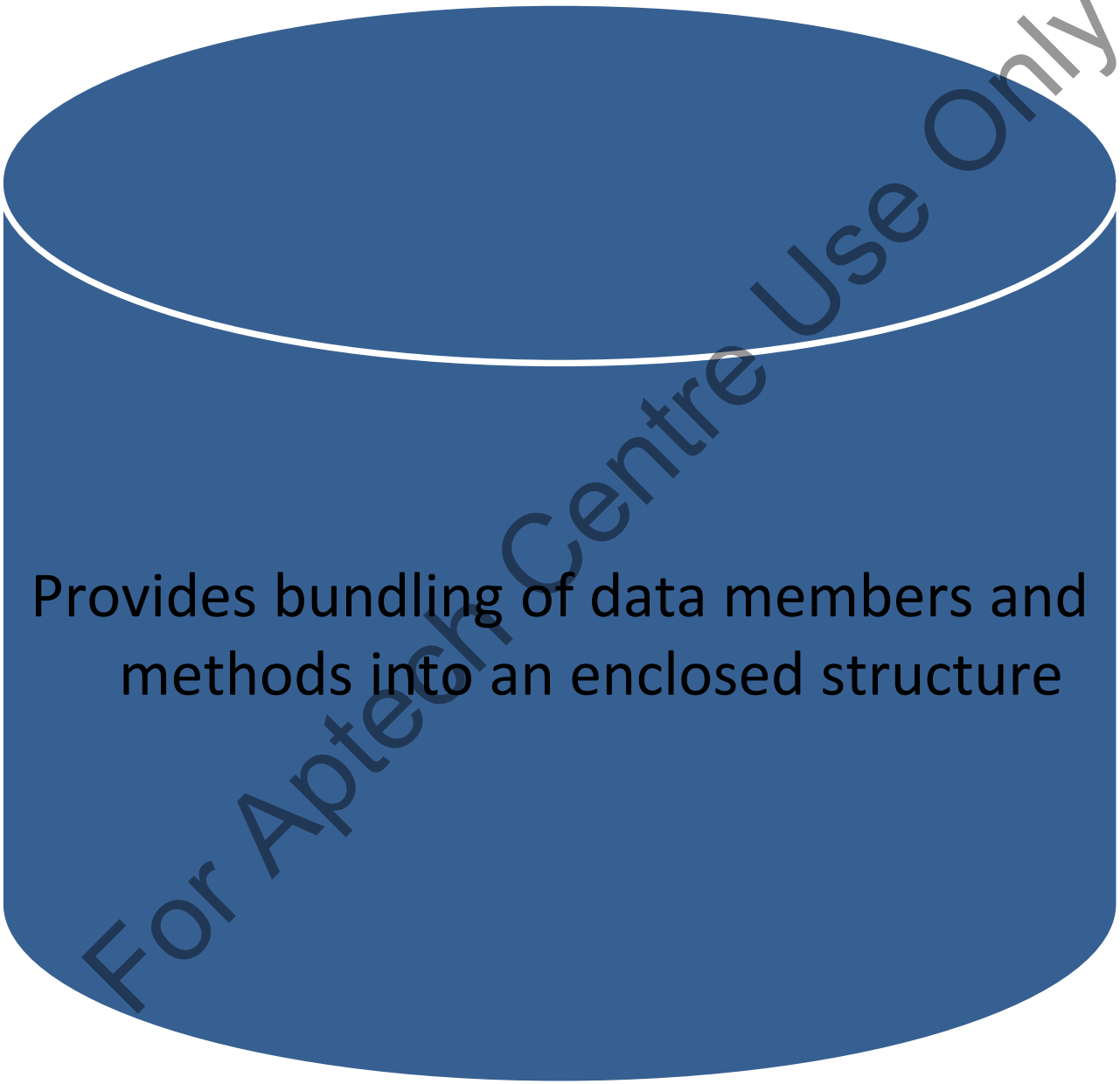
OOP	Object-based Programming
OOP uses a collection of objects that interact with each other to accomplish a task.	Object-based programming is more or less a limited version of OOP.
OOP includes features such as abstraction, encapsulation, inheritance, modularity, and polymorphism.	Object-based programming 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 Concepts

- OOP uses following four programming concepts:

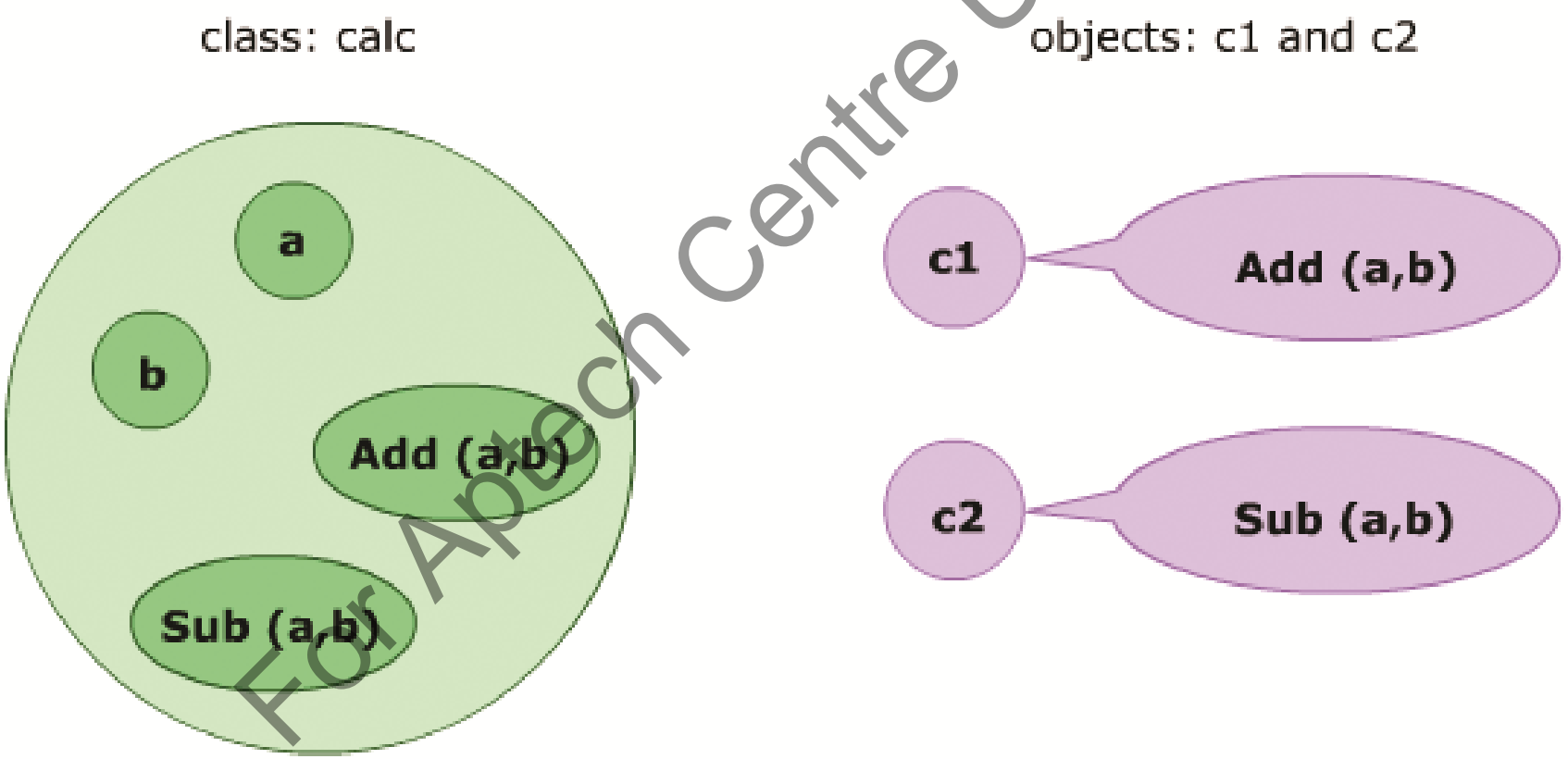


Encapsulation 1-2



Encapsulation 2-2

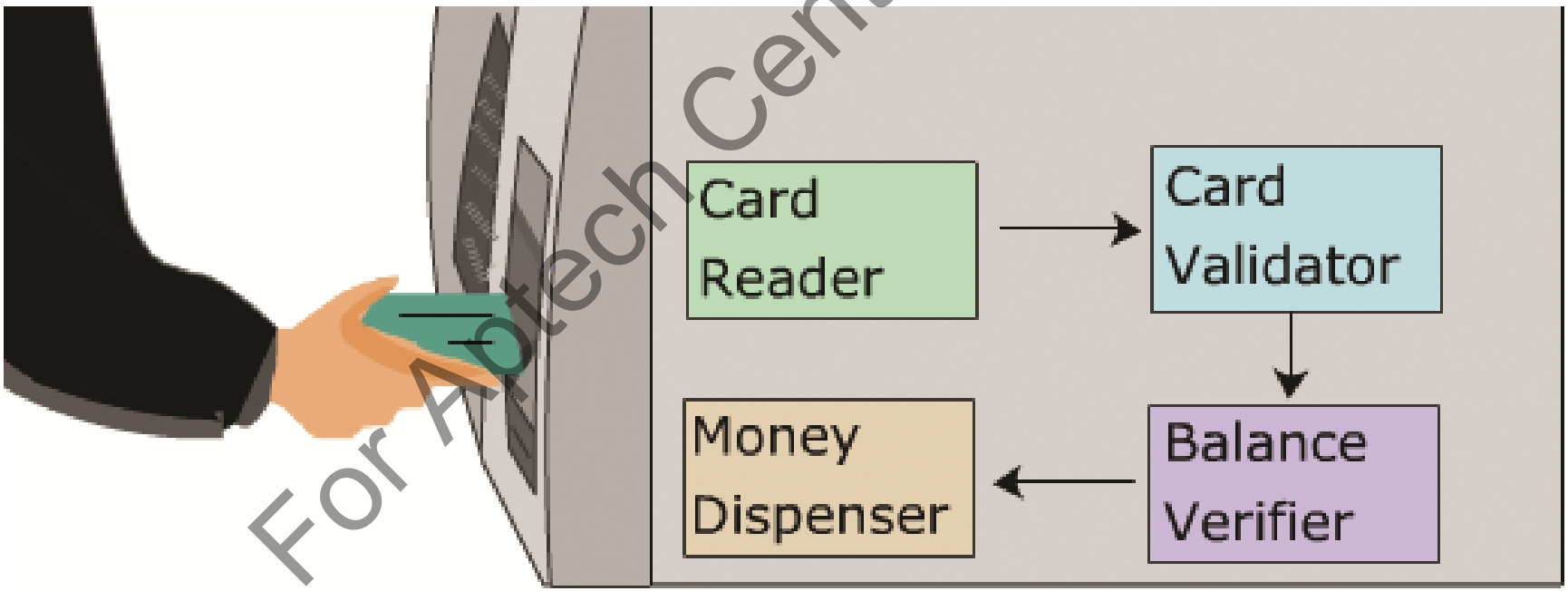
- The figure shows how the data members and methods can be encapsulated.



Abstraction

- Mechanism of showing only the relevant details

- The figure shows an example of abstraction using the ATM machine.

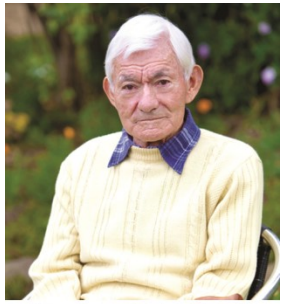


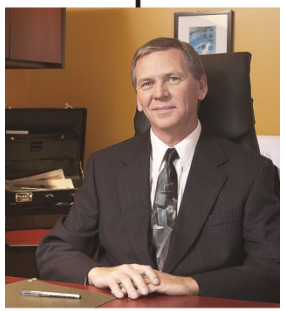
Inheritance

- 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

Poly = Many

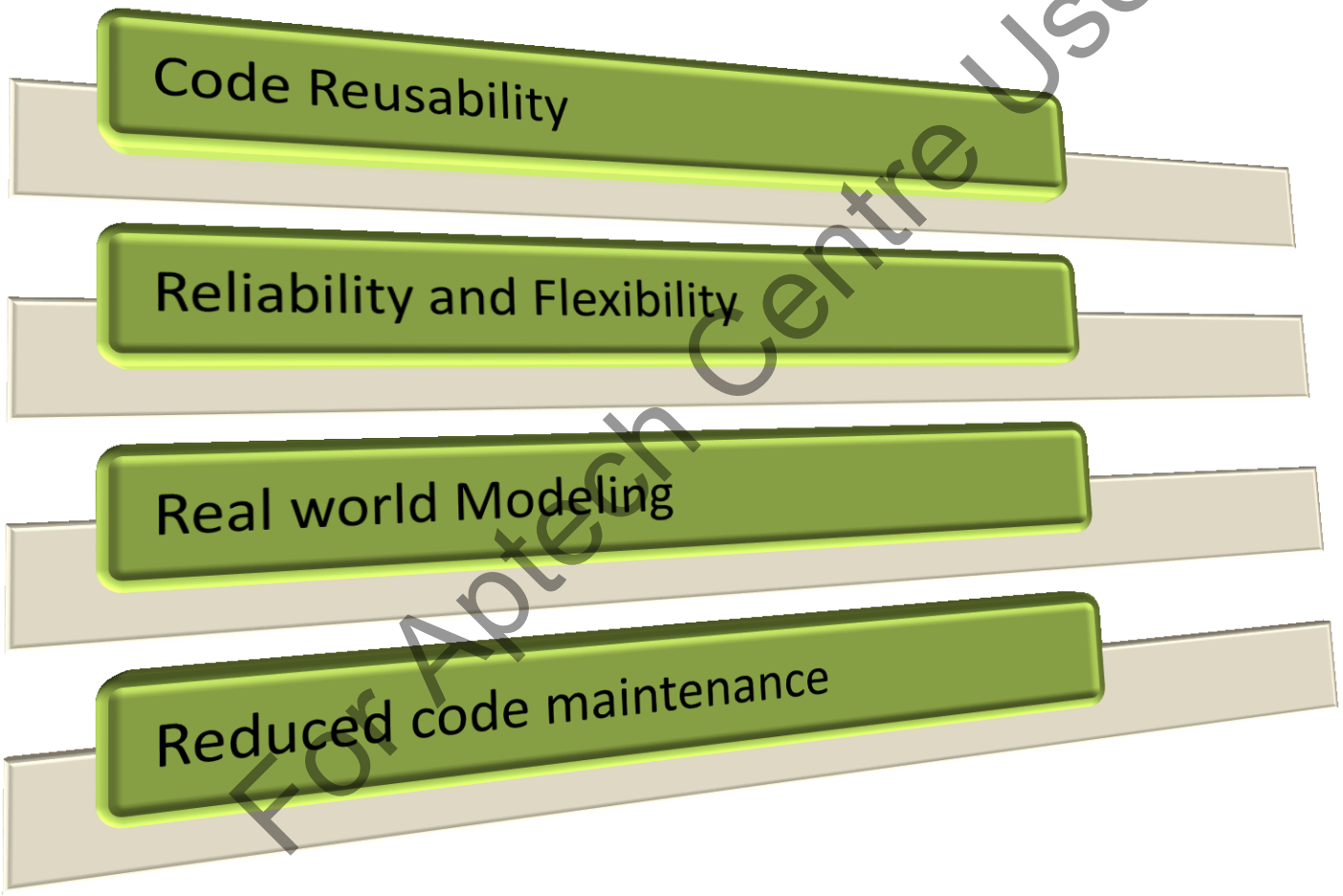
Assigns a different usage or meaning to something in different contexts

Morphos = Forms

Polymorphism in the real world

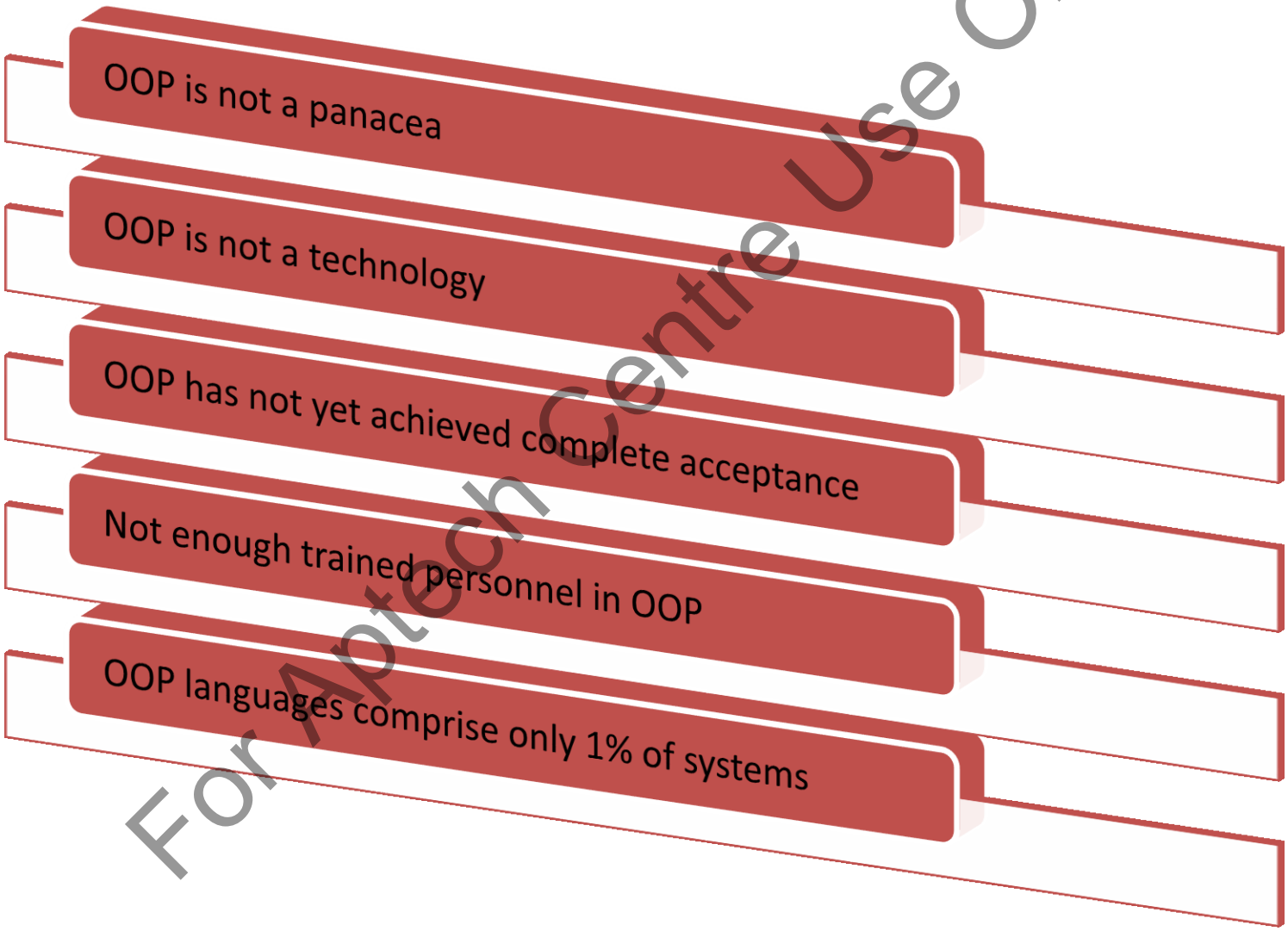
Advantages and Disadvantages of OOP 1-2

- **Advantages**



Advantages and Disadvantages of OOP 2-2

- **Disadvantages**



Summary

- 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.