Object Oriented Programming (OOP)

Programming Techniques

- **a) Unstructured Programming**
  - (Assembly language programming)

- **b) Procedural Programming**
  - (Assembly language, C programming)

- **c) Object Oriented Programming**
  - (C++, Java, Smalltalk, C#, Objective C)

Programming Techniques

There are different programming techniques:

- Unstructured Programming (Assembly Language).
- Procedural Programming(Basic, Pascal, Fortran, C).
- Object-Oriented Programming (C++, Java).

- **Unstructured Programming**

- This consists of just writing the sequence of commands or statements in the main program, which modifies the state maintained in Global Data. Example: Assembly Language programs.

- **Limitations of Unstructured Programming**
    - a) The data is global and code operates on it
    - b) As the size of code increases, maintenance is a problem
    - c) Does not have independent data for processing
    - d) The concept of local variables did not exist
    - e) Reusability of code was not supported

Procedural Programming

- With procedural programming, you are able to combine sequences of calling statements into one single place.

- A procedure call is used to invoke the procedure.

- After the sequence is processed, flow of control proceeds right after the position where the call was made.

Procedure Program View
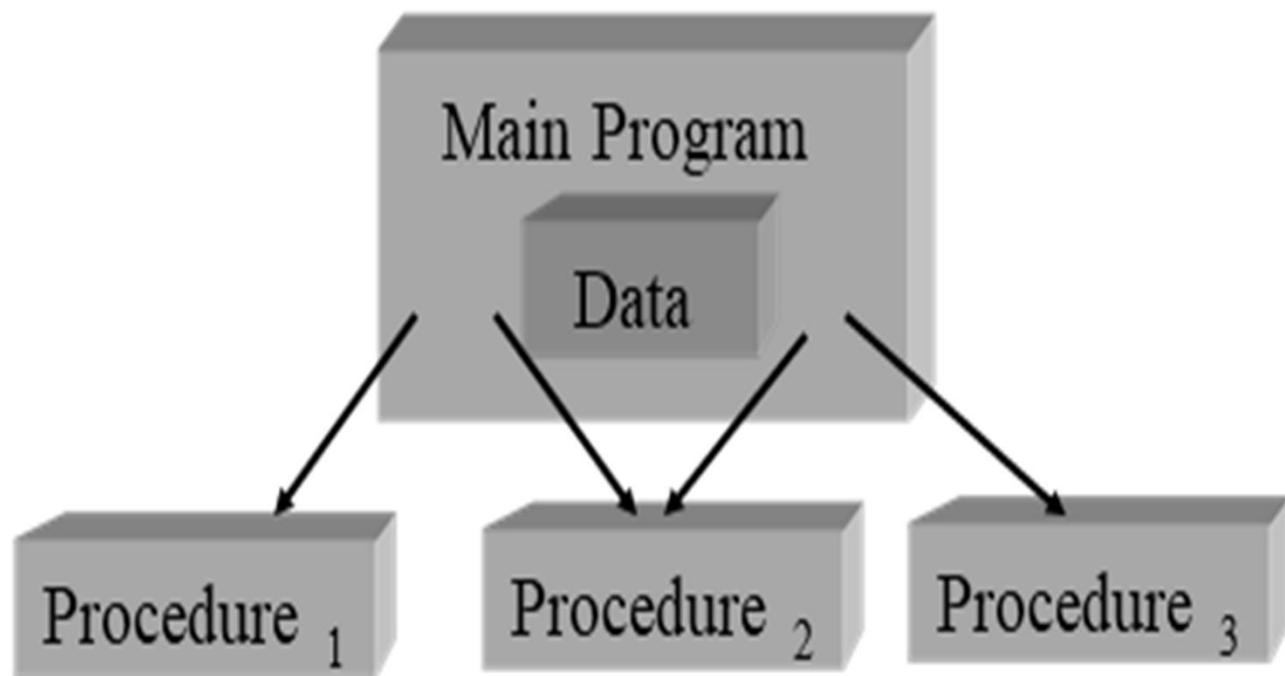
Object-Oriented Programming

- OOP is a technique in which programs are written on the basis of objects. An object is collection of data and functions.

- The fundamental idea behind object oriented programming is to combine both data and functions into a single unit. Such a unit is called object.

- Objects of a program interact by sending messages to each other.

- OOP is based on real world modeling

Object-Oriented Programming Program View
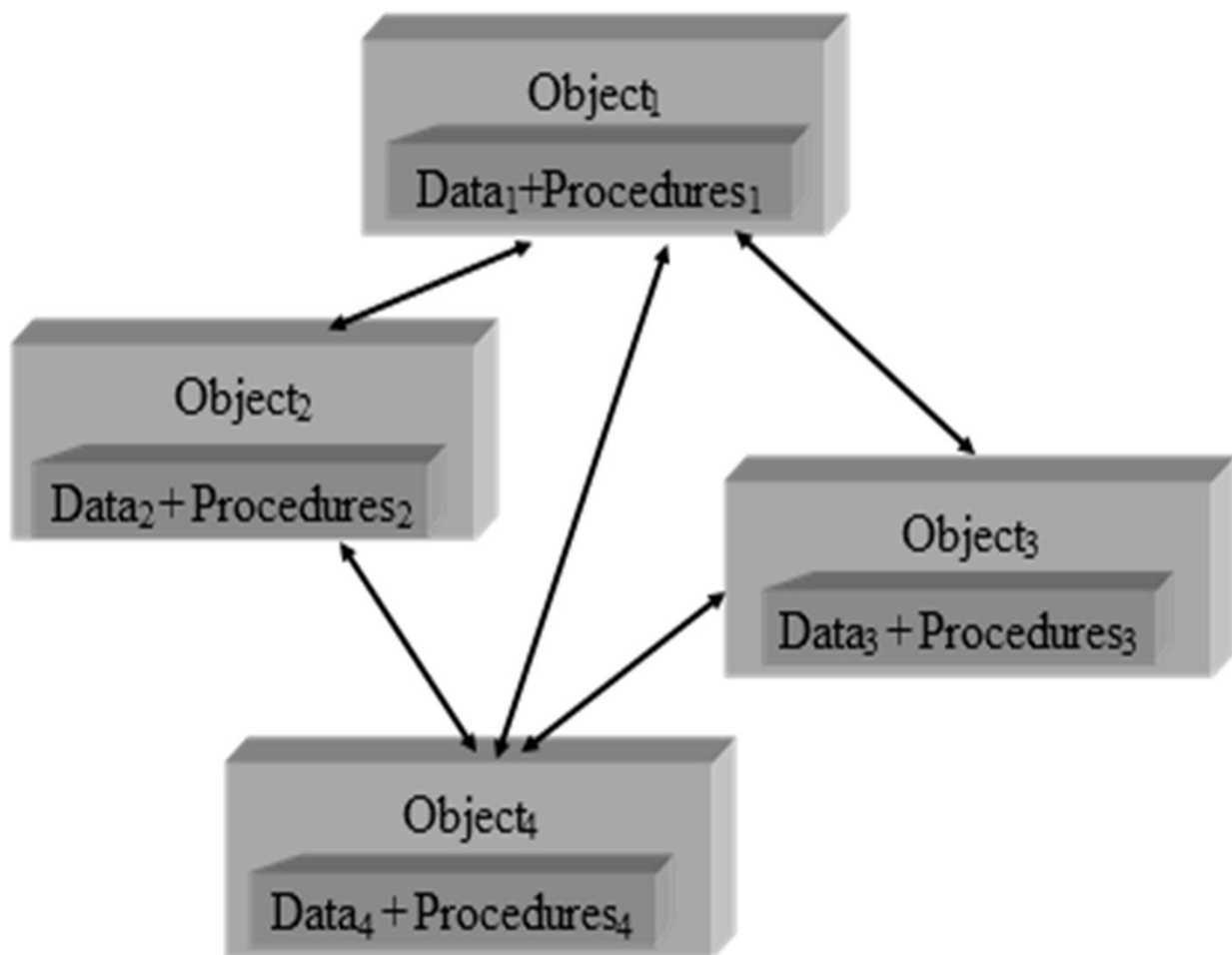
- **Objects**
  - Ali
  - House
  - Car
  - Tree
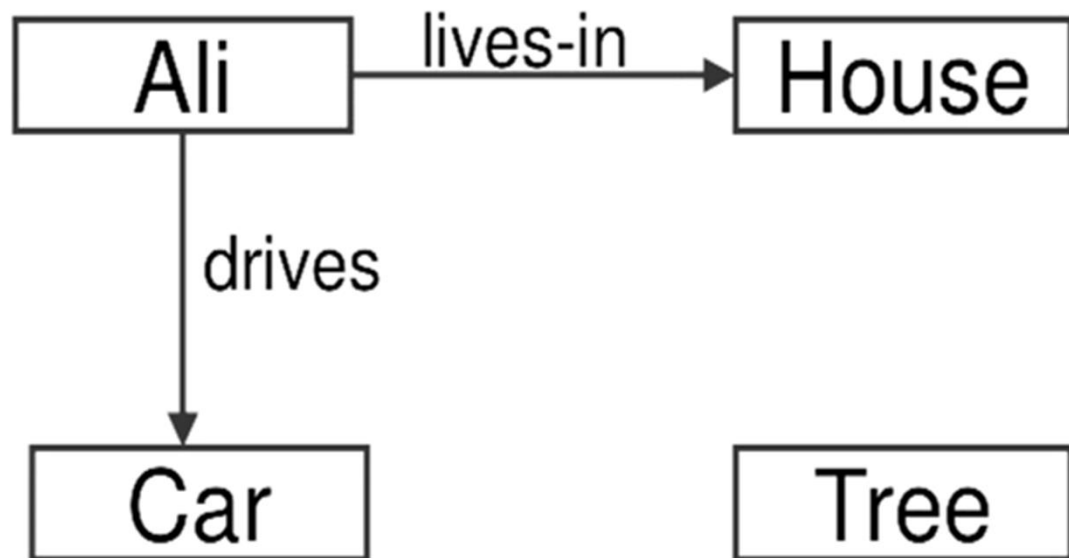
- **Interactions**
  - Ali lives in the house
  - Ali drives the car

What is an Object?

An object is

- Something tangible (Ali, Car)

- Something that can be apprehended intellectually (Time, Date)

... What is an Object?

An object has

- State (attributes)
- Well-defined behaviour (operations)
- Unique identity

Example – Ali is a Tangible Object

- State (attributes)
  - Name
  - Age

- Behaviour (operations)
  - Walks
  - Eats

- Identity
  - His name

Example – Car is a Tangible Object

- State (attributes)
  - Color
  - Model

- Behaviour (operations)
  - Accelerate
  - Start Car
  - Change Gear

- Identity
  - Its registration number

Example – Time is an Object Apprehended Intellectually

- State (attributes)
    - Hours
    - Seconds
    - Minutes

- Behaviour (operations)
    - Set Hours
    - Set Seconds
    - Set Minutes

- Identity
    - Would have a unique ID in the model

Example – Date is an Object Apprehended Intellectually

- State (attributes)
  - Year
  - Day
  - Month

- behaviour (operations)
  - Set Year
  - Set Day
  - Set Month

- Identity
  - Would have a unique ID in the model