A Brief History

The object-oriented paradigm took its shape from the initial concept of a new programming approach, while the interest in design and analysis methods came much later.

- The first object-oriented language was Simula Simulationofrealsystems that was developed in 1960 by researchers at the Norwegian Computing Center.
- In 1970, Alan Kay and his research group at Xerox PARK created a personal computer named Dynabook and the first pure object-oriented programming language OOP - Smalltalk, for programming the Dynabook.
- In the 1980s, Grady Booch published a paper titled Object Oriented Design that mainly presented a design for the programming language, Ada. In the ensuing editions, he extended his ideas to a complete object-oriented design method.
- In the 1990s, Coad incorporated behavioral ideas to object-oriented methods.

The other significant innovations were Object Modelling Techniques OMT by James Rumbaugh and Object-Oriented Software Engineering OOSE by Ivar Jacobson.

Object-Oriented Analysis

Object-Oriented Analysis OOA is the procedure of identifying software engineering requirements and developing software specifications in terms of a software system’s object model, which comprises of interacting objects.

The main difference between object-oriented analysis and other forms of analysis is that in object-oriented approach, requirements are organized around objects, which integrate both data and functions. They are modelled after real-world objects that the system interacts with. In traditional analysis methodologies, the two aspects - functions and data - are considered separately.

Grady Booch has defined OOA as, “Object-oriented analysis is a method of analysis that examines requirements from the perspective of the classes and objects found in the vocabulary of the problem domain”.

The primary tasks in object-oriented analysis OOA are:

- Identifying objects
- Organizing the objects by creating object model diagram
- Defining the internals of the objects, or object attributes
- Defining the behavior of the objects, i.e., object actions
- Describing how the objects interact

The common models used in OOA are use cases and object models.

Object-Oriented Design

Object-Oriented Design OOD involves implementation of the conceptual model produced during object-oriented analysis. In OOD, concepts in the analysis model, which are technology-independent, are mapped onto implementing classes, constraints are identified and interfaces are designed, resulting in a model for the solution domain, i.e., a detailed description of how the system is to be built on concrete technologies.

The implementation details generally include:

- Restructuring the class data if necessary,
Grady Booch has defined object-oriented design as “a method of design encompassing the process of object-oriented decomposition and a notation for depicting both logical and physical as well as static and dynamic models of the system under design”.

**Object-Oriented Programming**

Object-oriented programming (OOP) is a programming paradigm based upon objects having both data and methods that aims to incorporate the advantages of modularity and reusability. Objects, which are usually instances of classes, are used to interact with one another to design applications and computer programs.

The important features of object-oriented programming are:

- Bottom-up approach in program design
- Programs organized around objects, grouped in classes
- Focus on data with methods to operate upon object’s data
- Interaction between objects through functions
- Reusability of design through creation of new classes by adding features to existing classes

Some examples of object-oriented programming languages are C++, Java, Smalltalk, Delphi, C#, Perl, Python, Ruby, and PHP.

Grady Booch has defined object-oriented programming as “a method of implementation in which programs are organized as cooperative collections of objects, each of which represents an instance of some class, and whose classes are all members of a hierarchy of classes united via inheritance relationships.”