

# Design of a Modular E-Commerce Product Management System Using Object-Oriented Java Class Hierarchies

Mrs. Punashri Patil<sup>1</sup>, Yash Raut<sup>2</sup>, Apurva Ransing<sup>3</sup>, Vedika Patil<sup>4</sup>

Assistant Professor, Department of Information Technology<sup>1</sup>

Under Graduate Student, Department of Information Technology<sup>2,3,4</sup>

AISSMS's Institute of Information Technology, Pune, Maharashtra, India

**Abstract:** *With the rapid growth of online shopping websites and apps, it has become important to design software systems that are scalable, secure, and well-organized. Traditional procedural programming often creates systems where different parts are highly dependent on each other, making them difficult to modify or expand later. In this paper, we present the design and development of an object-oriented e-commerce product management system using Java. The system is built using core OOP concepts such as classes and objects, encapsulation using access modifiers, constructor and method overloading, static members, passing objects as parameters, recursion, and inner classes. A modular structure is created to handle main components like Product, User, Cart, Order, and Admin. Compared to a simple unstructured program, this approach makes the system easier to maintain, reuse, and extend in the future. The implementation also shows efficient handling of objects and better execution of product-related operations. Overall, this project demonstrates that a well-planned class-based design improves reliability and provides a strong foundation for future integration with databases and cloud services. During the implementation of this system practical understanding of the Object-Oriented concepts was gained through real coding and testing the output.*

**Keywords:** Object-Oriented Programming (OOP), Java, E-Commerce System, Class-Based Architecture, Encapsulation, Constructor Overloading, Static Members, Modular Software Design, Recursion, Inner Classes

