

A Java-Based Model for Student Academic Performance Evaluation Using Object-Oriented Design Principles

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Abstract: *This study presents the design and implementation of a Java-based framework for assessing student academic performance within an object-oriented programming paradigm. The primary objective is to illustrate disciplined software construction through a modular and logically organized program architecture. Each student is modeled as an encapsulated entity comprising identification attributes and subject-specific academic records, with controlled access mechanisms to preserve data integrity. The system supports flexible object initialization via both default and parameterized constructors, with dynamic instantiation achieved through structured runtime user input. The evaluation process employs well-defined methods to compute aggregate scores and assign grades according to predefined criteria. Recursive techniques are utilized for cumulative score calculations. Shared institutional statistics are maintained through static data members, while static methods provide performance summaries at the collective level. Method overloading enables alternative evaluation strategies without altering the structural design. Object interaction is demonstrated through the passing and returning of objects in methods. An inner class encapsulates grading logic to ensure cohesion, and object lifecycle behavior is illustrated through the controlled application of the finalize() mechanism.*

Keywords: Student performance evaluation, Java programming, object-oriented design, modular software architecture, encapsulation, recursion, constructor overloading, static members.

