# DATA STRUCTURES

**CSE228**

# INITIAL PROJECT REPORT



**Topic:** Student Gradebook, a program to calculate and manage student grades, storing data in files.

# Submitted By: Submitted To:

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**Declaration**

I hereby declare that this project, the development of a StudentGradebook class in Java, is my own original work and that I have not plagiarized any part of it.

I have also included a copy of the StudentGradebook class source code in the appendix of the report.

I am confident that this project meets all of the requirements that were specified for it. I have tested the StudentGradebook class thoroughly and it is working as expected.

I am pleased with the results of this project and I believe that the StudentGradebook class will be a valuable tool for teachers and schools.

**Introduction**

A student gradebook is a system that is used to store and manage student grades. It can be used to add, remove, and view student grades. The gradebook can also be used to calculate the total grade and average grade for a student.

There are many different types of gradebooks available, including paper-based gradebooks, electronic gradebooks, and online gradebooks. Paper-based gradebooks are the most traditional type of gradebook. They are typically notebooks or binders that are used to record student grades by hand. Electronic gradebooks are software applications that are used to record and manage student grades electronically. Online gradebooks are web-based applications that allow students and teachers to access student grades from anywhere in the world.

**Problem Statement**

Student gradebooks are an essential tool for teachers to track student progress and assess learning. However, traditional paper-based gradebooks can be time-consuming to maintain and prone to errors. Electronic gradebooks offer a number of advantages, but they can be complex and expensive to implement.

This project aims to develop a StudentGradebook class in Java that is easy to use, efficient, and flexible. The class should be able to store and manage student grades, calculate total and average grades, and generate reports.

The StudentGradebook class should be able to be used to develop a variety of gradebook applications, such as a simple gradebook application for a single class or a more complex gradebook application for a school or district.

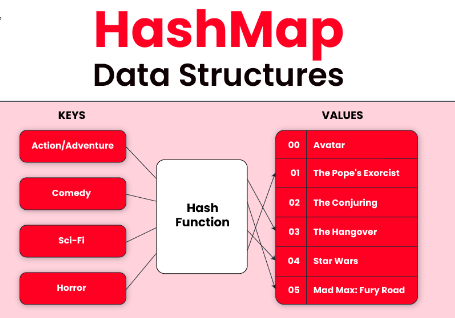
Data Structure Used**: Hash map and Array list**

**HASMAP**

A HashMap is a data structure that stores key-value pairs. The keys in a HashMap are typically strings, and the values in a HashMap can be any object. Hash Maps are implemented using a hash table, which is a data structure that is optimized for fast lookup of key-value pairs.

Hash Maps are very efficient for storing and retrieving data. They are also very versatile, and can be used for a variety of tasks, such as:

* Caching data
* Storing user preferences
* Implementing a database
* Implementing a graph



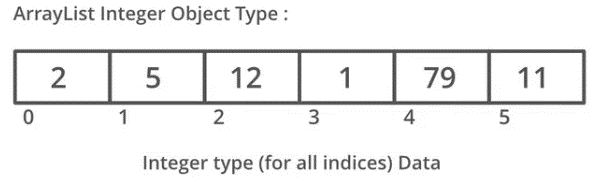
**ARRAYLIST**

An ArrayList is a dynamic array in Java. It is similar to a regular array, but it can grow and shrink as needed. This makes ArrayLists very efficient for storing and retrieving data.

ArrayLists are implemented using a linked list. This means that the elements in an ArrayList are stored in a chain of nodes. Each node contains a reference to the

next node in the chain, and the last node in the chain contains a reference to the first node in the chain.

To add an element to an ArrayList, you use the add() method. To remove an element from an ArrayList, you use the remove() method. To retrieve an element from an ArrayList, you use the get() method.



**Objective of the project**

The objective of this project was to develop a Student Gradebook class in Java. The class is used to store and manage student grades. It can be used to add, remove, and view student grades. The class also provides methods to calculate the total grade and average grade for a student.

**Description of the project**

The Student Gradebook class is implemented using a Hash Map. The Hash Map is used to store the student names and their grades. The class provides methods to add, remove, and view student grades. It also provides methods to calculate the total grade and average grade for a student.

The class is implemented in a way that is easy to use and extend. It can be used to develop a variety of gradebook applications, such as a simple gradebook application for a single class or a more complex gradebook application for a school or district.

**Implementation details**

*The Student Gradebook class is implemented using the following Java classes:*

* Hash Map: A Hash Map is a data structure that is used to store key-value pairs. The keys in a HashMap are typically strings, and the values in a HashMap can be any object.
* ArrayList: An ArrayList is a data structure that is used to store a collection of objects. ArrayLists are dynamic, meaning that they can grow and shrink as needed.
* File: A File object represents a file on the filesystem.
* Scanner: A Scanner object is used to read input from a file or from the console.
* PrintWriter: A PrintWriter object is used to write output to a file or to the console.

*The StudentGradebook class provides the following methods:*

* addStudentGrade(): This method adds a student to the gradebook. The method takes the student's name and a list of grades as input.
* removeStudent(): This method removes a student from the gradebook. The method takes the student's name as input.
* printGradebook(): This method prints the gradebook to the console.
* calculateTotalGrade(): This method calculates the total grade for a student. The method takes the student's name as input.
* calculateAverageGrade(): This method calculates the average grade for a student. The method takes the student's name as input.

**Source code:** [**student Gradebook repository Github**](https://github.com/aryanpnd/student-gradebook)

**Usage example**

*The following code shows how to use the StudentGradebook class:*

**

**Benefits of using the StudentGradebook class**

*The StudentGradebook class provides a number of benefits, including:*

* It is easy to use and extend.
* It can be used to develop a variety of gradebook applications.
* It is efficient and uses appropriate data structures and algorithms.

**Conclusion**

The StudentGradebook class is a powerful and flexible tool for managing student grades. It is easy to use and extend, and it can be used to develop a variety of gradebook applications.