**Report of Advance Programming**

**1. Project Choice Explanation:**

I choose The Library Management System because it helps to manage members and books in a simple way. It also offers features like adding books, issuing, registering members and returning books. This shows how Object-oriented programming (OOP) works in a building as a useful and practical system.

**2. Competitor Analysis:**

There are also other kinds of library systems but this project is very simple and works very well for small schools and libraries. To make it easier and more user friendly we can add a design with buttons and pictures. It can be improved in the future by adding things like a database and a visual interface.

**3. Demonstration of OOP Skills:**

The OOP ideas are used in the project to organize the system and keep it safe and secure. The encapsulation helps to protect data by making it private, while on the other hand, abstraction helps to reduce the complexity and makes the task easier by hiding the details. Although reusing code from other classes and using them in different methods are not used right now. They can be added in the future to improve the system and more features can be added for better functionality.

* **Encapsulation**

private static int count = 1;

private final int id;

private String title;

private String author;

public int getId() {

return id;

}

public String getTitle() {

return title;

}

public String getAuthor() {

return author;

}

* **Abstraction**

public void addBook(Book book) {

books.add(book);

System.out.println("Book added successfully: " + book);

}

* **Polymorphism**

public class MediaItem {

// Common properties for books, DVDs, etc.

public void displayDetails() {

System.out.println("Displaying item details.");

}

}

public class Book extends MediaItem {

// Book-specific code

public void displayDetails() {

System.out.println("Displaying book details.");

}

}

public class DVD extends MediaItem {

// DVD-specific code

public void displayDetails() {

System.out.println("Displaying DVD details.");

}

}

**4. Technology Stack:**

The system is built by using Java, which is very good for organizing the code and also making it easier to use on other different devices. I used tools like ArrayList and HashMap to manage data quickly and easily.

ArrayList helps to store the list of books and members. HashMap is used to link the members to the books they borrow. These tools make it very quick and easy to search, add and manage all the information in the system.

**5. Industry Relevance:**

Actually, this system is built for small schools, libraries and businesses. So they can manage members and books automatically. This means people don’t have time to do everything with their hands, it makes the process faster and very easier because everything is done automatically. It is also very helpful in saving time like borrowing or returning books. This system makes things to run very smoothly without so much effort.

**6. Project Reflection and Conclusion:**

The main challenges are dealing with the wrong inputs and designing the system so it is able to grow very easily, like a user enters a name instead of a number. Another tough challenge was making sure that the system could grow and handle the new features easily to manage and find the information. In the future, we can add other features like login system which is very useful for better security, and also a user friendly system can be created which can make the system more easier to use.