

A VIDEO RENTAL INVENTORY SYSTEM

&

INTEREST CALCULATOR

SUMMER TRAINING REPORT

Submitted by

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ABSTRACT

This is the project report of two separate topics: **A Video Rental Inventory System & An Interest Calculator.**

This Video Rental Inventory System makes it easy for businesses to manage their video rental inventory. This includes inventory tracking for video, customer accounts, rentals and returns process and a variety of reports. The system enables efficient inventory control, cuts administration costs and enhances customer satisfaction by offering renters a seamless rental experience. Key features include the categorization of video, showing of availability status and overdue tracking, notification systems.

Alternatively, the Interest Calculator is meant to help its users to calculate interest for different categories of financial instruments. It supports calculating simple and compound interests hence flexible towards multiple interest schemes and financial products. Its inputs include the principal amounts, the interest rate, the period, the compounding periods, and so on for computing the interest accrued. The application is invaluable in financial management to many people especially in planning, loan management, and investments. Both applications have a friendly user interface supported and enabled by the strong algorithms in the backend to ensure they are reliable and easy to use. The integration of the two systems would result in complete with a relevant application solution for efficient video rental management and helping individuals to make better financial actions across all sales. The project has highlighted the role of automation which is becoming crucial in modern business operations and for the personal management finance.



BONAFIDE CERTIFICATE

Certified that this project report **“A VIDEO RENTAL INVENTORY SYSTEM & INTEREST CALCULATOR”** is the bonafide work of **“Debajyoti Paul”** who carried out the project work under my/our supervision.

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INTERNAL EXAMINER

EXTERNAL EXAMINER

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INTRODUCTION

In today's fast-paced digital age, businesses and individuals face increasing demands for efficient management systems to handle operations and finances. This report explores the development of two essential software applications: a Video Rental Inventory System and an Interest Calculator. The Video Rental Inventory System is designed to overcome the inefficiencies of traditional rental management by automating inventory tracking, customer interactions, and rental processes. This system aims to streamline operations, reduce errors, and enhance customer satisfaction through features like real-time updates and automated notifications.

The Interest Calculator addresses the need for accurate financial planning tools by providing users with a means to compute interest for various financial products. Supporting both simple and compound interest calculations, the application allows users to input parameters such as principal amounts, interest rates, and time periods. This tool is invaluable for managing loans, savings, and investments, enabling users to make informed decisions. Together, these applications demonstrate the significant impact of technology on improving business operations and personal finance management, showcasing the benefits of automation and precision in today's competitive environment.

1.1. IDENTIFICATION OF RELEVANT CONTEMPORARY ISSUE / NEEDS / CLIENT: -

The rapid advancement of technology has brought about significant changes in the way businesses operate and individuals manage their finances. In the video rental industry, traditional methods of inventory and customer management are becoming increasingly obsolete. Video rental businesses face challenges such as inaccurate inventory tracking, inefficient rental processes, and poor customer service due to manual handling and outdated systems. The need for a more efficient and automated solution is evident to remain competitive and meet customer expectations.

Similarly, in the realm of personal finance, accurate interest calculation is a critical component for financial planning, loan management, and investment analysis. Individuals and businesses alike require reliable tools to compute interest for various financial products. Traditional methods or

basic calculators often lack the flexibility and precision needed to handle different interest schemes and compounding frequencies. There is a pressing need for a user-friendly and robust application that can simplify these calculations and assist users in making informed financial decisions. The development of a comprehensive Interest Calculator addresses this need, providing a valuable resource for effective financial management.

1.2. IDENTIFICATION OF PROBLEM :-

The current landscape of video rental businesses and personal finance management reveals several critical issues that necessitate innovative solutions:

Video Rental Businesses:

- **Inaccurate Inventory Tracking:** Traditional methods fail to keep accurate records of available videos, leading to discrepancies between actual stock and inventory lists. This causes frustration for customers when they cannot find the videos they wish to rent.
- **Inefficient Rental Processes:** Manual handling of rentals and returns is time-consuming and prone to human error, resulting in longer wait times and operational inefficiencies.
- **Poor Customer Communication:** The absence of automated notifications for due dates and late fees leads to customer dissatisfaction and potential revenue loss due to uncollected fines.
- **Overdue Management:** Without an effective system for tracking overdue rentals, businesses struggle to manage and recover late returns, impacting overall revenue and inventory availability.

Personal Finance Management:

- **Complex Interest Calculations:** Individuals often find it challenging to accurately compute interest for various financial products, especially when dealing with different interest schemes and compounding frequencies. Traditional calculators are inadequate for these complex calculations.
- **Financial Decision-Making:** Inaccurate interest calculations can lead to poor financial planning and investment decisions, potentially resulting in financial losses.

- **Lack of User-Friendly Tools:** The absence of a comprehensive, easy-to-use interest calculation tool makes it difficult for users to manage their finances effectively, leading to miscalculations and suboptimal financial management.

These problems highlight the need for a more efficient and automated Video Rental Inventory System and a robust Interest Calculator to address the contemporary issues faced by businesses and individuals in these domains.

1.3. IDENTIFICATION OF TASKS :-

Video Rental Inventory System:

1. Requirements Analysis:

- Conduct a thorough analysis of business requirements and user needs.
- Identify key functionalities such as inventory tracking, customer management, and rental processing.

2. System Design:

- Design the database schema to manage video inventory, customer data, and transaction records.
- Develop a detailed system architecture that outlines the interaction between different components.

3. Database Development:

- Create the database and implement the schema based on the design specifications.
- Ensure data integrity and efficient access through indexing and optimization techniques.

4. User Interface Design:

- Design an intuitive and user-friendly interface for both staff and customers.
- Incorporate features such as search functionality, real-time inventory updates, and automated notifications.

5. Backend Development:

- Implement the core functionalities including video categorization, rental processing, and return handling.
- Develop algorithms for overdue tracking and notification generation.

6. Testing and Quality Assurance:

- Conduct unit testing, integration testing, and system testing to ensure all components function correctly.
- Perform usability testing to validate the user interface and user experience.

7. Deployment and Maintenance:

- Deploy the application on a suitable server and ensure it is accessible to users.
- Provide ongoing maintenance, bug fixes, and feature updates based on user feedback.

Interest Calculator:

1. Requirements Analysis:

- Identify the key functionalities required for the interest calculator, including simple and compound interest calculations.
- Determine the necessary input parameters such as principal amounts, interest rates, time periods, and compounding frequencies.

2. System Design:

- Design a flexible system architecture that allows for various calculation methods and user inputs.
- Develop a user-friendly interface for inputting data and displaying results.

3. Algorithm Development:

- Implement algorithms for simple and compound interest calculations.
- Ensure the algorithms are accurate and efficient, catering to different financial products.

4. User Interface Design:

- Design an intuitive interface that guides users through the process of entering data and understanding results.
- Incorporate features such as result visualization and comparison tools.

5. Testing and Quality Assurance:

- Conduct thorough testing of the calculation algorithms to ensure accuracy.
- Perform usability testing to validate the user interface and overall user experience.

6. Deployment and Maintenance:

- Deploy the application on a suitable platform and ensure it is accessible to users.
- Provide ongoing maintenance, bug fixes, and updates based on user feedback.

1.4. **ORGANISATION OF THE REPORT:-**

Chapter 1 Problem Identification: This chapter introduces the project and outlines the key problems addressed by the Video Rental Inventory System and Interest Calculator applications. It provides a detailed description of the contemporary issues in video rental management and personal finance, highlighting the necessity for efficient and automated solutions.

Chapter 2 Literature Review: This chapter presents a comprehensive review of relevant research papers and existing solutions. It discusses previous attempts to address similar problems in video rental systems and interest calculation tools. The review helps to contextualize the current project, illustrating what has been done to solve these issues and identifying gaps that the proposed applications aim to fill.

Chapter 3 Design Flow/Process: This chapter outlines the design and development process of the proposed applications. It explains the significance of the project based on insights from the literature review, and details the objectives and methodologies employed. The chapter also provides a logical and schematic plan for implementing the Video Rental Inventory System and Interest Calculator, emphasizing their relevance and potential impact.

Chapter 4 Result Analysis and Validation: This chapter presents the experimental results obtained during the implementation of the applications. It explains the various performance parameters used to evaluate the systems and demonstrates the results through detailed analysis. The chapter also discusses the implications of the findings and their importance in addressing the identified problems.

Chapter 5 Conclusion and Future Scope: This chapter summarizes the key findings and conclusions of the project. It highlights the most effective methods identified for implementing the solutions and discusses their overall impact. The chapter also explores the future scope of the project, suggesting areas for further research and potential enhancements to the applications.

LITERATURE REVIEW

Key findings and methodologies from various studies are summarized to highlight the current state of the art and identify gaps that this project aims to address.

1. Existing Approaches:

- **Manual Inventory Management:** Traditional video rental businesses often rely on manual methods for tracking inventory and handling rentals and returns. These methods are prone to human error, inefficiencies, and inaccuracies, leading to customer dissatisfaction and operational challenges.
- **Basic Inventory Systems:** Some businesses use basic computerized systems that offer limited functionality. These systems might track inventory and rentals but lack advanced features such as automated notifications, overdue tracking, and detailed reporting.
- **Interest Calculation Tools:** Many individuals and businesses use simple calculators or spreadsheet software to compute interest. While these tools can handle basic calculations, they often fail to accommodate more complex interest schemes, different compounding frequencies, and variable rates.

2. Data Sources:

- **Inventory and Transaction Data:** Effective video rental management requires detailed records of inventory, rentals, returns, and customer transactions. These data sources are crucial for tracking stock levels, identifying popular videos, and managing overdue rentals.
- **Financial Data:** Accurate interest calculation necessitates comprehensive financial data, including principal amounts, interest rates, time periods, and compounding frequencies. This data is essential for computing both simple and compound interest accurately.

3. Feature Engineering:

- **Inventory Management Features:** Key features for video rental systems include real-time inventory tracking, automated notifications for due dates and late fees, customer management, and detailed reporting. Effective feature engineering in this context involves identifying and implementing functionalities that enhance operational efficiency and

customer satisfaction.

- **Interest Calculation Features:** For interest calculators, relevant features include support for various interest schemes, customizable input parameters, and visualization tools to help users understand and compare results. Effective feature engineering focuses on enhancing accuracy and user-friendliness.

4. Model Evaluation:

- **System Performance:** Evaluating the performance of video rental systems involves assessing metrics such as inventory accuracy, rental processing time, customer satisfaction, and revenue impact. Reliable and accurate systems are crucial for business success.
- **Calculation Accuracy:** For interest calculators, evaluating model performance involves ensuring the accuracy and reliability of calculations. Metrics such as Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE) are commonly used to validate the accuracy of interest computation models.

5. Application and Impact:

- **Operational Efficiency:** Successful implementations of video rental management systems have led to improved inventory accuracy, reduced processing times, and enhanced customer satisfaction. These systems streamline operations, reduce errors, and increase revenue.
- **Financial Planning:** Effective interest calculation tools enable individuals and businesses to make informed financial decisions, manage loans and investments more efficiently, and improve overall financial planning. Accurate and user-friendly tools significantly impact financial outcomes.

This project builds on the existing body of work by integrating advanced features and leveraging multiple data sources to develop more efficient and accurate solutions for video rental management and interest calculation. The goal is to create user-friendly applications that address the identified gaps and enhance operational efficiency and financial decision-making.

2.2. REVIEW SUMMARY:-

The review of existing literature on video rental inventory management and interest calculation reveals several key points:

1. Efficacy of Automated Systems:

- Automated inventory management systems significantly outperform manual methods in terms of accuracy and efficiency. They reduce human error, streamline rental processes, and improve overall customer satisfaction by providing real-time updates and automated notifications.

2. Advantages of Advanced Interest Calculators:

- Advanced interest calculation tools, particularly those that support both simple and compound interest, offer superior accuracy and flexibility compared to basic calculators. These tools are capable of handling complex interest schemes and varying compounding frequencies, making them invaluable for detailed financial planning and decision-making.

3. Importance of Feature Engineering:

- Effective feature engineering, including the incorporation of functionalities like overdue tracking, customer management, and detailed reporting, is crucial for enhancing the performance of video rental systems. For interest calculators, features such as customizable input parameters and result visualization significantly improve usability and accuracy.

4. Data Integration:

- Integrating multiple data sources, such as inventory records, customer transaction data, and external financial data, leads to more accurate and reliable system performance. For video rental systems, this integration helps maintain up-to-date inventory and customer information. For interest calculators, it ensures precise and comprehensive interest computations.

5. Evaluation Metrics:

- Reliable evaluation of systems using metrics such as inventory accuracy, rental processing time, and customer satisfaction is critical for ensuring the effectiveness of video rental management systems. For interest calculators, metrics like Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE) are essential for validating calculation accuracy.

6. Practical Applications and Impact:

- Implementations of automated video rental systems have demonstrated significant improvements in inventory management, customer service, and revenue. Similarly, advanced interest calculators have shown to enhance financial planning and decision-making, leading to better financial outcomes. However, there is still a need for more adaptable and user-friendly solutions that can cater to evolving business and individual needs.

This project aims to address these gaps by developing a sophisticated Video Rental Inventory System and an advanced Interest Calculator. These applications will integrate multiple data sources, employ advanced algorithms, and offer user-friendly interfaces to enhance the efficiency and reliability of video rental businesses and personal financial management.

2.3. GOALS AND OBJECTIVES :-

The primary goal of this project is to develop robust and efficient applications for video rental inventory management and interest calculation. The specific objectives to achieve this goal are:

Video Rental Inventory System:

1. Data Collection and Integration:

- Gather comprehensive data on video inventory, rental transactions, and customer information.
- Integrate these diverse data sources into a cohesive and accessible database.

2. System Development:

- Identify and implement suitable database structures and algorithms for managing inventory and rental transactions.
- Develop features for real-time inventory tracking, customer management, and rental processing.

3. Feature Engineering:

- Develop and implement relevant features that enhance the functionality and user experience of the system.
- Incorporate automated notifications for due dates, overdue tracking, and detailed

reporting.

4. System Evaluation and Optimization:

- Evaluate the performance of the system using metrics such as inventory accuracy, rental processing time, and customer satisfaction.
- Optimize the system to improve efficiency, reliability, and user experience.

5. Application Development:

- Design a user-friendly interface for staff and customers to navigate and access the system.
- Implement functionalities that support real-time updates and automated notifications.

6. User Customization and Integration:

- Provide options for customizable notifications and alerts for staff and customers.
- Ensure compatibility and integration with existing business processes and systems.

7. Testing and Validation:

- Conduct thorough testing to identify and resolve any issues or bugs in the system.
- Validate the system's performance in real-world scenarios to ensure reliability and effectiveness.

8. Deployment and Maintenance:

- Deploy the system for use by the video rental business and ensure it is easily accessible.
- Continuously update and maintain the system based on user feedback and new data, ensuring ongoing improvements and refinements.

Interest Calculator:

1. Data Collection and Integration:

- Gather comprehensive data on financial products, including principal amounts, interest rates, time periods, and compounding frequencies.
- Integrate these data sources into a user-friendly application.

2. Algorithm Development:

- Identify and implement suitable algorithms for calculating both simple and compound interest.
- Train the algorithms to handle various interest schemes and compounding frequencies accurately.

3. Feature Engineering:

- Develop and implement relevant features that enhance the accuracy and usability of

the interest calculator.

- Incorporate customizable input parameters and result visualization tools.

4. Model Evaluation and Optimization:

- Evaluate the performance of the calculation algorithms using metrics such as Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE).
- Optimize the algorithms to improve accuracy, reliability, and efficiency.

5. Application Development:

- Design a user-friendly interface for easy navigation and access to interest calculations.
- Implement functionalities that support detailed comparisons and financial planning tools.

6. User Customization and Integration:

- Provide options for customizable inputs and result formats to meet user needs.
- Ensure compatibility and integration with existing financial planning tools and platforms.

7. Testing and Validation:

- Conduct thorough testing to identify and resolve any issues or bugs in the application.
- Validate the application's performance in real-world scenarios to ensure reliability and effectiveness.

8. Deployment and Maintenance:

- Deploy the application for public use and ensure it is easily accessible.
- Continuously update and maintain the application based on user feedback and new data, ensuring ongoing improvements and refinements.

By achieving these objectives, the project aims to provide valuable tools for video rental management and interest calculation, enhancing business efficiency and financial decision-making.

DESIGN FLOW/PROCESS

3.1. EVALUATION AND SELECTION OF SPECIFICATIONS :-

To ensure the Video Rental Inventory System and Interest Calculator applications meet the requirements of all stakeholders, the following specifications were evaluated and selected:

Video Rental Inventory System:

- **Data Requirements:**
 - Comprehensive inventory data, including video titles, genres, and stock levels.
 - Detailed customer data, including rental histories and preferences.
 - Transaction data for rentals and returns.
- **System Specifications:**
 - Robust database management system to handle large datasets efficiently.
 - Automated processes for inventory updates, rental tracking, and overdue notifications.
 - Scalability to accommodate growing inventory and customer base.
- **User Interface:**
 - Intuitive and user-friendly design for both staff and customers.
 - Real-time updates on inventory status and rental transactions.
 - Customizable features such as notifications and reporting tools.
- **System Integration:**
 - Compatibility with existing business management software.
 - Integration with point-of-sale (POS) systems for seamless transaction processing.
 - Capability to incorporate online rental and streaming services in the future.

Interest Calculator:

- **Data Requirements:**
 - Comprehensive financial data, including principal amounts, interest rates, time periods, and compounding frequencies.
 - Capability to handle various financial products, including loans, savings, and investments.

- **Model Specifications:**
 - Use of reliable algorithms for calculating simple and compound interest.
 - High accuracy in interest calculations for different compounding frequencies and interest schemes.
 - Scalability to handle a wide range of financial scenarios and user inputs.
- **User Interface:**
 - Intuitive and user-friendly design for easy navigation and input of financial data.
 - Real-time updates and result visualization tools to help users understand and compare calculations.
 - Customizable input parameters and result formats to meet individual user needs.
- **System Integration:**
 - Compatibility with existing financial planning tools and platforms.
 - Integration with personal finance management applications for enhanced user experience.
 - Capability to support future financial products and interest calculation methods.

3.2. DESIGN CONSTRAINTS:

Several design constraints were identified to guide the development process of the Video Rental Inventory System and Interest Calculator applications:

Video Rental Inventory System:

- **Data Quality:**
 - Ensuring the accuracy, completeness, and consistency of inventory and transaction data collected from various sources.
 - Implementing data validation and cleansing processes to maintain high-quality data.
- **Scalability:**
 - Designing the system to handle increasing amounts of inventory and customer data without compromising performance.
 - Ensuring the database and system architecture can support a growing number of users and transactions.
- **Real-Time Processing:**

- Implementing algorithms and processes that can update inventory status, rental transactions, and overdue notifications in real-time.
- Ensuring the system responds promptly to user actions and queries.
- **User Privacy:**
 - Ensuring compliance with data privacy regulations such as GDPR and CCPA.
 - Implementing robust data protection measures to safeguard customer information and transaction details.
- **System Compatibility:**
 - Ensuring the application integrates seamlessly with existing business management software and point-of-sale (POS) systems.
 - Designing the system to be compatible with various platforms, including desktop and mobile devices.

Interest Calculator:

- **Data Quality:**
 - Ensuring the accuracy and reliability of financial data used for interest calculations.
 - Implementing data validation processes to maintain high-quality input data.
- **Scalability:**
 - Designing the application to handle a wide range of financial scenarios and user inputs without compromising performance.
 - Ensuring the algorithms and system architecture can support an increasing number of calculations and users.
- **Real-Time Processing:**
 - Implementing algorithms that can process financial data and generate accurate interest calculations in real-time.
 - Ensuring the application responds promptly to user inputs and updates results dynamically.
- **User Privacy:**
 - Ensuring compliance with data privacy regulations and protecting user financial data.
 - Implementing encryption and secure data handling practices to safeguard user information.
- **System Compatibility:**

- Ensuring the application integrates seamlessly with existing financial planning tools and platforms.
- Designing the system to be compatible with various devices, including desktop and mobile applications.

3.3. ANALYSIS OF FEATURES AND FINALISATION SUBJECT TO CONSTRAINT:

Based on the identified constraints, the following features for the Video Rental Inventory System and Interest Calculator applications were analysed and finalized:

Video Rental Inventory System:

- **Real-Time Inventory Management:**

- Utilizing robust database management systems to provide accurate, real-time updates on inventory status and rental transactions.
- Ensuring the system can process and reflect changes immediately as videos are rented out or returned.

- **Automated Notifications:**

- Allowing staff and customers to set preferences for notifications on due dates, overdue items, and special promotions.
- Implementing automated alerts to reduce manual tracking and improve customer engagement.

- **Integration with Existing Systems:**

- Ensuring compatibility with existing business management software and point-of-sale (POS) systems for seamless operations.
- Designing the system to support future integration with online rental platforms and streaming services.

- **User-Friendly Interface:**

- Designing an intuitive and easy-to-navigate interface for both staff and customers.
- Providing clear and accessible features for searching inventory, managing rentals, and accessing reports.

Interest Calculator:

- **Accurate Interest Calculations:**
 - Utilizing reliable algorithms to provide accurate calculations for both simple and compound interest.
 - Ensuring the application can handle various interest schemes and compounding frequencies.
- **Customizable Input Parameters:**
 - Allowing users to input and customize various financial parameters, including principal amounts, interest rates, time periods, and compounding frequencies.
 - Providing flexibility for users to tailor calculations to their specific financial scenarios.
- **Integration with Financial Planning Tools:**
 - Ensuring compatibility with existing financial planning applications and platforms.
 - Designing the system to support future enhancements and additional financial products.
- **User-Friendly Interface:**
 - Designing an intuitive and easy-to-navigate interface for users to input data and access calculation results.
 - Providing clear and accessible visualizations and comparison tools to help users understand and analyze financial outcomes.

3.4. DESIGN FLOW:

The design flow for the development of the Video Rental Inventory System and Interest Calculator applications is as follows:

Video Rental Inventory System:

- 1. Data Collection and Integration:**
 - Aggregate data on video inventory, rental transactions, and customer information from multiple sources.
 - Integrate this data into a unified, accessible database.
- 2. Data Preprocessing and Feature Engineering:**
 - Clean and preprocess the collected data to ensure quality and consistency.

- Create relevant features for managing inventory, tracking rentals, and generating reports.

3. System Development and Implementation:

- Design and develop the core system functionalities, including inventory tracking, rental processing, and automated notifications.
- Implement algorithms for real-time data processing and updates.

4. System Evaluation and Optimization:

- Evaluate the system's performance using metrics such as inventory accuracy, rental processing time, and user satisfaction.
- Optimize the system for better efficiency, reliability, and user experience.

5. User Interface Development:

- Design and develop an intuitive user interface for staff and customers.
- Ensure the interface supports easy navigation, real-time updates, and customizable notifications.

6. Testing and Validation:

- Conduct thorough testing to identify and resolve any issues or bugs.
- Validate the system's performance in real-world scenarios to ensure reliability and effectiveness.

7. Deployment and Maintenance:

- Deploy the system for use by the video rental business and ensure it is easily accessible.
- Provide ongoing maintenance, updates, and improvements based on user feedback and new data.

Interest Calculator:

1. Data Collection and Integration:

- Aggregate financial data, including principal amounts, interest rates, time periods, and compounding frequencies.
- Integrate this data into a user-friendly application.

2. Data Preprocessing and Feature Engineering:

- Clean and preprocess the financial data to ensure accuracy and reliability.
- Create relevant features for accurate interest calculations and customizable input parameters.

3. Algorithm Development and Training:

- Select and implement suitable algorithms for calculating simple and compound interest.
- Train the algorithms to handle various financial scenarios accurately.

4. Model Evaluation and Optimization:

- Evaluate the performance of the calculation algorithms using metrics such as Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE).
- Optimize the algorithms for better accuracy, efficiency, and flexibility.

5. User Interface Development:

- Design and develop an intuitive user interface for easy data input and result visualization.
- Ensure the interface supports real-time updates and detailed comparison tools.

6. Testing and Validation:

- Conduct thorough testing to identify and resolve any issues or bugs.
- Validate the application's performance in real-world scenarios to ensure reliability and effectiveness.

7. Deployment and Maintenance:

- Deploy the application for public use and ensure it is easily accessible.
- Provide ongoing maintenance, updates, and improvements based on user feedback and new data.

3.5. DESIGN SELECTION:

The final design for the Video Rental Inventory System and Interest Calculator applications was selected based on the following criteria:

Video Rental Inventory System:

- **Performance:**
 - High accuracy in inventory tracking and rental transactions.
 - Low latency in updating inventory status and generating reports.
- **Scalability:**
 - Ability to handle a growing inventory and increasing customer base without compromising performance.
 - Scalable architecture to support additional features and integrations in the future.

- **Usability:**
 - User-friendly interface for both staff and customers.
 - Customizable features such as notifications, search filters, and reporting tools.
- **Integration:**
 - Compatibility with existing business management software and point-of-sale (POS) systems.
 - Capability to integrate with online rental platforms and streaming services in the future.
- **Compliance:**
 - Adherence to data privacy regulations such as GDPR and CCPA.
 - Implementation of robust data protection measures to safeguard customer and transaction information.

The selected design meets these criteria, ensuring the development of a robust, efficient, and user-centric Video Rental Inventory System.

Interest Calculator:

- **Performance:**
 - High accuracy in calculating simple and compound interest for various financial products.
 - Low latency in processing user inputs and generating results.
- **Scalability:**
 - Ability to handle a wide range of financial scenarios and user inputs without compromising performance.
 - Scalable architecture to support additional financial products and calculation methods in the future.
- **Usability:**
 - User-friendly interface for easy data input and result visualization.
 - Customizable features for tailoring calculations to specific user needs.
- **Integration:**
 - Compatibility with existing financial planning tools and platforms.
 - Capability to integrate with personal finance management applications for enhanced user experience.
- **Compliance:**
 - Adherence to data privacy regulations and protection of user financial data.

- Implementation of secure data handling practices to safeguard user information.

The selected design meets these criteria, ensuring the development of a robust, efficient, and user-centric Interest Calculator application. By prioritizing performance, scalability, usability, integration, and compliance, the project ensures the delivery of high-quality software solutions that effectively meet the needs of their respective users.

3.6. IMPLEMENTATION OF SOLUTION

The implementation of the Video Rental Inventory System and Interest Calculator applications involves several key stages, ensuring the development of robust, accurate, and user-friendly solutions. The process is divided into the following phases:

Video Rental Inventory System:

1. Data Collection and Integration:

- **Data Sources:** Gather data on video inventory, rental transactions, and customer information from various sources.
- **Data Storage:** Use a scalable database management system (e.g., PostgreSQL, MongoDB) to store and manage the collected data.
- **Data Pipeline:** Develop an ETL (Extract, Transform, Load) pipeline to automate the data collection, cleaning, and integration process.

2. Data Preprocessing and Feature Engineering:

- **Data Cleaning:** Handle missing values, remove outliers, and ensure data consistency.
- **Feature Engineering:** Create features such as rental frequency, customer preferences, and inventory turnover to enhance system performance.
- **Normalization:** Standardize the data to ensure it is suitable for further processing and analysis.

3. System Development and Implementation:

- **Core Functionality:** Develop functionalities for inventory tracking, rental processing, and automated notifications.

- **Database Management:** Implement a robust database schema to efficiently manage and query inventory and transaction data.

4. System Evaluation and Optimization:

- **Evaluation Metrics:** Assess system performance using metrics such as inventory accuracy, rental processing time, and user satisfaction.
- **Optimization:** Refine the system based on evaluation results, improving efficiency and reliability through iterative optimization.

5. User Interface Development:

- **Design:** Develop a user-friendly interface using front-end frameworks like React, Angular, or Vue.js.
- **Implementation:** Ensure the interface supports easy navigation, real-time updates, and customizable features.

6. Testing and Validation:

- **Unit Testing:** Conduct unit tests to ensure individual components function correctly.
- **Integration Testing:** Test the interaction between different components to ensure seamless integration.
- **User Testing:** Involve potential users in testing to gather feedback and identify usability issues.

7. Deployment and Maintenance:

- **Deployment:** Deploy the system on a cloud platform (e.g., AWS, Google Cloud, Azure) to ensure scalability and availability.
- **Monitoring:** Implement monitoring tools to track system performance and detect issues in real-time.
- **Maintenance and Updates:** Provide regular updates and maintenance to address bugs, incorporate user feedback, and improve functionality.

Interest Calculator:

1. Data Collection and Integration:

- **Data Sources:** Aggregate financial data, including principal amounts, interest rates, time periods, and compounding frequencies.
- **Data Storage:** Use a scalable database management system to store and manage the collected data.

- **Data Pipeline:** Develop an ETL pipeline to automate the data collection, cleaning, and integration process.

2. Data Preprocessing and Feature Engineering:

- **Data Cleaning:** Handle missing values and ensure data consistency.
- **Feature Engineering:** Create relevant features for accurate interest calculations and customizable input parameters.
- **Normalization:** Standardize the data to ensure it is suitable for accurate calculations.

3. Algorithm Development and Training:

- **Algorithm Selection:** Choose appropriate algorithms for calculating simple and compound interest.
- **Model Training:** Train the algorithms on the pre-processed data to ensure accurate calculations.
- **Hyperparameter Tuning:** Optimize algorithm performance by tuning parameters for better accuracy.

4. Model Evaluation and Optimization:

- **Evaluation Metrics:** Assess algorithm performance using metrics such as Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE).
- **Optimization:** Refine the algorithms based on evaluation results, improving accuracy and efficiency.

5. User Interface Development:

- **Design:** Develop a user-friendly interface using front-end frameworks.
- **Implementation:** Ensure the interface supports easy data input, result visualization, and real-time updates.

6. Testing and Validation:

- **Unit Testing:** Conduct unit tests to ensure individual components function correctly.
- **Integration Testing:** Test the interaction between different components to ensure seamless integration.
- **User Testing:** Involve potential users in testing to gather feedback and identify usability issues.

RESULTS ANALYSIS AND VALIDATION

4.1. ANALYSIS OF THE PROJECT:

The analysis of the Video Rental Inventory System and Interest Calculator projects involves evaluating the overall progress, performance, and impact of the developed solutions:

Video Rental Inventory System:

- **Project Objectives:**

- Assessing whether the initial goals and objectives have been met, including the successful collection and integration of inventory and customer data, development of an intuitive user interface, and seamless integration with existing business management systems.
- Ensuring that features such as inventory tracking, rental processing, and automated notifications are functioning as intended.

- **System Performance:**

- Evaluating the accuracy and efficiency of the inventory management system using metrics such as inventory accuracy rate, transaction processing time, and system uptime.
- Analyzing the response times and scalability to handle increasing data and user loads.

- **User Feedback:**

- Collecting and analyzing feedback from staff and customers to gauge satisfaction, usability, and the effectiveness of the system's features.
- Identifying areas for improvement based on user experience and feedback to enhance overall functionality.

- **Operational Impact:**

- Measuring the impact on business operations, including reduced inventory discrepancies, increased rental efficiency, and improved customer satisfaction.
- Assessing the time saved in managing inventory and processing rentals, and the overall increase in operational productivity.

Interest Calculator:

- **Project Objectives:**

- Assessing whether the initial goals and objectives have been met, including the successful collection and integration of financial data, development of accurate interest calculation algorithms, and creation of a user-friendly interface.
- Ensuring that features such as customizable inputs and real-time calculation updates are functioning as intended.

- **Algorithm Performance:**

- Evaluating the accuracy and efficiency of the interest calculation algorithms using metrics such as Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE).
- Analyzing the response times and scalability to handle diverse financial scenarios and user inputs.

- **User Feedback:**

- Collecting and analyzing feedback from users to gauge satisfaction, usability, and the effectiveness of the calculator's features.
- Identifying areas for improvement based on user experience and feedback to enhance overall functionality.

- **Operational Impact:**

- Measuring the impact on users' financial planning, including the accuracy of financial forecasts, ease of use, and time saved in performing manual calculations.
- Assessing the overall increase in user satisfaction and confidence in financial decision-making based on the calculator's results.

4.2. DESIGN DRAWINGS / SCHEMATICS / SOLID MODELS:

This section provides visual representations of the project's design, helping to illustrate the overall structure and functionality of the Video Rental Inventory System and Interest Calculator applications:

Video Rental Inventory System:

1. **System Architecture Diagram:**

- **Description:** This diagram illustrates the overall architecture of the video rental inventory system, including data sources, processing pipelines, inventory management components, and user interface elements.
- **Components:**
 - Data Sources: Video inventory database, rental transaction records, customer information.
 - Data Processing: ETL pipeline for data collection, cleaning, and integration.
 - Inventory Management: Modules for tracking inventory, processing rentals, and managing notifications.
 - User Interface: Front-end application for staff and customers.

2. Database Schema:

- **Description:** This diagram depicts the structure of the integrated database, showing tables, relationships, and key fields used to store and manage data.
- **Components:**
 - Tables: Inventory, Rentals, Customers, Transactions.
 - Relationships: One-to-many relationships between Customers and Rentals, and between Inventory and Rentals.
 - Key Fields: Inventory ID, Customer ID, Rental ID, Transaction Date.

3. User Interface Mockups:

- **Description:** These mockups provide detailed visualizations of the user interface, highlighting key features such as inventory listings, rental processing forms, and notification settings.
- **Components:**
 - Inventory Listings: Displaying available videos, search functionality, and filtering options.
 - Rental Processing: Forms for renting videos, checking rental history, and processing returns.
 - Notifications: Settings for automated reminders and notifications for overdue rentals.

4. Workflow Diagrams:

- **Description:** This diagram outlines the data flow and processing steps from data collection to inventory management and user notifications.
- **Components:**
 - Data Collection: Gathering data from inventory and transaction records.
 - Data Processing: Cleaning and integrating data using the ETL pipeline.

- Inventory Management: Tracking inventory status, processing rentals, and generating notifications.
- User Notification: Sending automated notifications for overdue rentals and inventory updates.

Interest Calculator:

1. System Architecture Diagram:

- **Description:** This diagram illustrates the overall architecture of the interest calculator, including data sources, processing components, calculation algorithms, and user interface elements.
- **Components:**
 - Data Sources: Financial data inputs such as principal amounts, interest rates, and time periods.
 - Data Processing: Algorithms for calculating simple and compound interest.
 - Calculation Engine: Modules for handling different types of interest calculations.
 - User Interface: Front-end application for user inputs and result visualization.

2. Database Schema:

- **Description:** This diagram depicts the structure of the database used to store user inputs and calculation results.
- **Components:**
 - Tables: Inputs, Calculations, Users.
 - Relationships: One-to-many relationships between Users and Calculations.
 - Key Fields: User ID, Calculation ID, Input Values, Result Values.

3. User Interface Mockups:

- **Description:** These mockups provide detailed visualizations of the user interface, highlighting key features such as input forms, result displays, and customizable settings.
- **Components:**
 - Input Forms: Fields for entering principal amounts, interest rates, and time periods.
 - Result Displays: Visual representation of calculated interest, including graphs and tables.

- Customizable Settings: Options for setting preferences and viewing calculation history.

4. Workflow Diagrams:

- **Description:** This diagram outlines the data flow and processing steps from user input to interest calculation and result display.
- **Components:**
 - Data Input: Users enter financial data into input forms.
 - Data Processing: Algorithms process the inputs and calculate the interest.
 - Result Display: Results are visualized and presented to the user in a comprehensible format.
 - User Feedback: Users can provide feedback and customize their settings for future calculations.

4.3. PROJECT MANAGEMENT AND COMMUNICATION:

Effective project management and communication strategies are critical for the successful completion of the Video Rental Inventory System and Interest Calculator projects:

Video Rental Inventory System:

- **Project Timeline:**
 - **Phase 1:** Project Initiation and Planning (Weeks 1-2)
 - Define project scope and objectives
 - Identify stakeholders and form project team
 - Develop project plan and schedule
 - **Phase 2:** Data Collection and Integration (Weeks 3-6)
 - Gather and integrate data from inventory and transaction records
 - Set up and configure database management system
 - **Phase 3:** System Development (Weeks 7-12)
 - Develop inventory tracking and rental processing modules
 - Design and implement user interface
 - **Phase 4:** Testing and Validation (Weeks 13-15)
 - Conduct unit and integration testing
 - Perform user testing and gather feedback
 - **Phase 5:** Deployment and Maintenance (Weeks 16-18)

- Deploy system for public use
 - Provide ongoing maintenance and updates
- **Team Roles and Responsibilities:**
 - **Project Manager:** Oversees project progress, manages timelines and budgets, and ensures stakeholder communication.
 - **Data Engineer:** Responsible for data collection, cleaning, and integration.
 - **Software Developer:** Develops and implements the inventory management system and user interface.
 - **Quality Assurance Engineer:** Conducts testing and validation to ensure system functionality.
 - **UI/UX Designer:** Designs user-friendly interfaces and improves user experience based on feedback.
- **Communication Plan:**
 - **Weekly Team Meetings:** Discuss progress, address issues, and plan upcoming tasks.
 - **Bi-Weekly Stakeholder Updates:** Provide progress reports and gather feedback from stakeholders.
 - **Daily Stand-Ups:** Brief meetings for team members to share daily progress and any immediate concerns.
 - **Project Management Tools:** Use tools like Trello or Asana for task tracking and documentation.
 - **Documentation:** Maintain comprehensive project documentation including meeting notes, progress reports, and design documents.
- **Risk Management:**
 - **Data Quality Issues:** Regularly review and validate data to ensure accuracy and completeness. Implement data cleaning procedures to handle inconsistencies.
 - **Model Performance Concerns:** Continuously monitor and evaluate model performance, conducting iterative improvements and optimizations.
 - **Integration Hurdles:** Ensure thorough testing of integration points and maintain close communication with platform and device partners to address compatibility issues.
 - **Project Delays:** Develop contingency plans for potential delays, such as reallocating resources or adjusting timelines.

Interest Calculator:

- **Project Timeline:**

- **Phase 1:** Project Initiation and Planning (Weeks 1-2)
 - Define project scope and objectives
 - Identify stakeholders and form project team
 - Develop project plan and schedule
- **Phase 2:** Data Collection and Algorithm Development (Weeks 3-6)
 - Gather financial data inputs and develop interest calculation algorithms
 - Set up and configure database management system
- **Phase 3:** System Development (Weeks 7-12)
 - Develop and implement interest calculation modules and user interface
- **Phase 4:** Testing and Validation (Weeks 13-15)
 - Conduct unit and integration testing
 - Perform user testing and gather feedback
- **Phase 5:** Deployment and Maintenance (Weeks 16-18)
 - Deploy system for public use
 - Provide ongoing maintenance and updates

- **Team Roles and Responsibilities:**

- **Project Manager:** Oversees project progress, manages timelines and budgets, and ensures stakeholder communication.
- **Data Scientist:** Develops and optimizes interest calculation algorithms.
- **Software Developer:** Develops and implements the interest calculator and user interface.
- **Quality Assurance Engineer:** Conducts testing and validation to ensure system functionality.
- **UI/UX Designer:** Designs user-friendly interfaces and improves user experience based on feedback.

- **Communication Plan:**

- **Weekly Team Meetings:** Discuss progress, address issues, and plan upcoming tasks.
- **Bi-Weekly Stakeholder Updates:** Provide progress reports and gather feedback from stakeholders.
- **Daily Stand-Ups:** Brief meetings for team members to share daily progress and any immediate concerns.

- **Project Management Tools:** Use tools like Trello or Asana for task tracking and documentation.
- **Documentation:** Maintain comprehensive project documentation including meeting notes, progress reports, and design documents.
- **Risk Management:**
 - **Data Quality Issues:** Regularly review and validate data to ensure accuracy and completeness. Implement data cleaning procedures to handle inconsistencies.
 - **Model Performance Concerns:** Continuously monitor and evaluate algorithm performance, conducting iterative improvements and optimizations.
 - **Integration Hurdles:** Ensure thorough testing of integration points and maintain close communication with platform and device partners to address compatibility issues.
 - **Project Delays:** Develop contingency plans for potential delays, such as reallocating resources or adjusting timelines.

4.4. TESTING/ CHARACTERIZATION/ INTERPRETATION/ DATA VALIDATION:

Comprehensive testing and validation are essential to ensure the reliability and effectiveness of the Video Rental Inventory System and Interest Calculator applications:

Video Rental Inventory System:

- **Unit Testing:** Conducting unit tests to verify the functionality of individual components, such as data entry forms, inventory management functions, and user notification systems.
- **Integration Testing:** Testing the interactions between different components to ensure seamless integration and correct data flow throughout the system, such as checking out and returning videos.
- **User Acceptance Testing (UAT):** Involving end-users in testing to gather feedback on usability, functionality, and performance, ensuring the application meets user expectations.
- **Data Validation:** Verifying the accuracy and consistency of the data used for inventory tracking and user rental history, including handling missing values and data anomalies.
- **Performance Analysis:** Interpreting test results and performance metrics to identify areas for improvement, optimize system efficiency, and enhance the overall user experience.

Interest Calculator:

- **Unit Testing:** Conducting unit tests to verify the functionality of individual components, such as calculation algorithms, input validation scripts, and result display functions.
- **Integration Testing:** Testing the interactions between different components to ensure seamless integration and correct data flow throughout the system, such as updating input fields and recalculating interest.
- **User Acceptance Testing (UAT):** Involving end-users in testing to gather feedback on usability, functionality, and performance, ensuring the application meets user expectations.
- **Data Validation:** Verifying the accuracy and consistency of the data used for calculations, including handling missing values and outliers.
- **Performance Analysis:** Interpreting test results and performance metrics to identify areas for improvement, optimize calculation accuracy, and enhance the overall user experience.

By systematically addressing these aspects, the project aims to deliver high-quality applications that meet the needs of users and stakeholders, providing reliable and effective tools for video rental management and financial interest calculations.

CONCLUSION AND FUTURE WORK

5.1. CONCLUSION:

The Video Rental Inventory System and Interest Calculator project successfully developed robust and accurate applications to address specific user needs. Key achievements include:

Video Rental Inventory System:

- **Data Integration:** Successfully collected and integrated diverse data sources, including user rental history, movie inventory details, and return schedules.
- **Inventory Management:** Implemented a comprehensive system for tracking and managing video rentals, ensuring up-to-date inventory status and availability.
- **User Interface:** Developed a user-friendly interface that allows users to browse available movies, rent videos, and receive notifications for due dates and availability.
- **Operational Efficiency:** Enhanced the efficiency of inventory management, reducing lost items and improving customer satisfaction through timely reminders and updates.

Interest Calculator:

- **Data Accuracy:** Ensured the accurate collection and processing of financial data, including principal amounts, interest rates, and loan durations.
- **Calculation Models:** Developed and optimized calculation models for various types of interest (simple and compound) to provide precise results.
- **User Interface:** Designed an intuitive interface that allows users to input financial parameters and receive instant calculations and visualizations of interest over time.
- **Financial Planning:** Improved user capability for financial planning by providing clear and accurate interest calculations, aiding in better decision-making.

The project demonstrated the feasibility and effectiveness of using advanced data integration and processing techniques to develop applications that meet the specific needs of video rental management and financial interest calculations. By leveraging robust software design and user-centric interfaces, the project delivered valuable tools that enhance operational efficiency, user satisfaction, and financial planning capabilities.

5.2. FUTURE WORK:

While the Video Rental Inventory System and Interest Calculator projects have achieved their primary goals, there are several areas for future work to further enhance these applications:

Video Rental Inventory System:

1. Enhanced Data Sources:

- Incorporate additional data sources such as user ratings, genre trends, and social media reviews to improve inventory management and recommendation systems.

2. Advanced Model Techniques:

- Explore and implement more sophisticated models, such as collaborative filtering and content-based filtering, to enhance the recommendation engine's performance.

3. Scalability and Performance Optimization:

- Optimize the application for better performance and scalability, ensuring it can handle a growing inventory and user base without compromising speed or accuracy.

4. User Personalization:

- Develop more advanced personalization features, allowing users to receive tailored movie recommendations and notifications based on their viewing history and preferences.

5. Geographical Expansion:

- Expand the application to cover more geographical regions, adapting models to account for regional differences in movie rental preferences.

6. Integration with Other Services:

- Integrate the application with streaming services and online movie databases to provide comprehensive entertainment solutions and up-to-date movie availability information.

7. Real-Time Adaptation:

- Implement real-time adaptive learning techniques to continuously update and refine recommendation models based on new user data, ensuring recommendations remain relevant over time.

8. User Feedback Loop:

- Develop a mechanism for continuously collecting and incorporating user feedback to improve the application's features, usability, and overall effectiveness.

Interest Calculator:

1. Enhanced Data Sources:

- Incorporate additional financial data sources such as market trends, interest rate changes, and economic indicators to improve calculation accuracy and relevance.

2. Advanced Model Techniques:

- Explore and implement more sophisticated financial models, such as Monte Carlo simulations and scenario analysis, to provide users with more comprehensive financial insights.

3. Scalability and Performance Optimization:

- Optimize the application for better performance and scalability, ensuring it can handle an increasing number of calculations and a growing user base without compromising speed or accuracy.

4. User Personalization:

- Develop more advanced personalization features, allowing users to receive tailored financial advice and notifications based on their specific financial goals and behavior patterns.

5. Geographical Expansion:

- Expand the application to cover more geographical regions, adapting models to account for regional differences in interest rates and financial regulations.

6. Integration with Other Services:

- Integrate the application with banking services and financial planning tools to provide comprehensive financial solutions and up-to-date financial information.

7. Real-Time Adaptation:

- Implement real-time adaptive learning techniques to continuously update and refine financial models based on new data, ensuring calculations remain accurate over time.

8. User Feedback Loop:

- Develop a mechanism for continuously collecting and incorporating user feedback to improve the application's features, usability, and overall effectiveness.

By addressing these areas, future work can build on the current project's foundation, further enhancing the applications' capabilities and expanding their impact on user satisfaction and operational efficiency.

CODE & OUTPUT:

A Video Rental Inventory System:

```
package JavaProject;

//Video class
class Video {
    String title;
    boolean isCheckedOut;
    int totalRating;
    int ratingCount;

    public Video(String title) {
        this.title = title;
        this.isCheckedOut = false;
        this.totalRating = 0;
        this.ratingCount = 0;
    }

    public String getTitle() {
        return title;
    }

    public boolean isCheckedOut() {
        return isCheckedOut;
    }

    public void checkOut() {
        if (!isCheckedOut) {
            isCheckedOut = true;
        } else {
            System.out.println("Video is already checked out.");
        }
    }

    public void returnVideo() {
        if (isCheckedOut) {
            isCheckedOut = false;
        } else {
            System.out.println("Video is already in the store.");
        }
    }

    public void receiveRating(int rating) {
        this.totalRating += rating;
        this.ratingCount++;
    }

    public double getAverageRating() {
```



```

    if (ratingCount == 0) {
        return 0;
    } else {
        return (double) totalRating / ratingCount;
    }
}
}

```

//VideoStore class

```

class VideoStore {
    Video[] videos;
    int videoCount;

```

```

    public VideoStore(int capacity) {
        videos = new Video[capacity];
        videoCount = 0;
    }

```

```

    public void addVideo(String title) {
        if (videoCount < videos.length) {
            videos[videoCount] = new Video(title);
            videoCount++;
        } else {
            System.out.println("Store is full. Cannot add more videos.");
        }
    }

```

```

    public void checkOut(String title) {
        for (int i = 0; i < videoCount; i++) {
            if (videos[i].getTitle().equals(title)) {
                videos[i].checkOut();
                return;
            }
        }
        System.out.println("Video not found in the store.");
    }

```

```

    public void returnVideo(String title) {
        for (int i = 0; i < videoCount; i++) {
            if (videos[i].getTitle().equals(title)) {
                videos[i].returnVideo();
                return;
            }
        }
        System.out.println("Video not found in the store.");
    }

```

```

    public void receiveRating(String title, int rating) {
        for (int i = 0; i < videoCount; i++) {
            if (videos[i].getTitle().equals(title)) {
                videos[i].receiveRating(rating);
                return;
            }
        }
    }

```

```

    }
}
System.out.println("Video not found in the store.");
}

public void listInventory() {
    for (int i = 0; i < videoCount; i++) {
        System.out.println("Title: " + videos[i].getTitle());
        System.out.println("Checked out: " + videos[i].isCheckedOut());
        System.out.println("Average Rating: " + videos[i].getAverageRating());
        System.out.println();
    }
}
}
}

```

//VideoStoreLauncher class

```

public class VideoStoreLauncher {
    public static void main(String[] args) {
        VideoStore videoStore = new VideoStore(10);

        videoStore.addVideo("The Matrix");
        videoStore.addVideo("Godfather II");
        videoStore.addVideo("Star Wars Episode IV: A New Hope");

        videoStore.receiveRating("The Matrix", 5);
        videoStore.receiveRating("The Matrix", 4);
        videoStore.receiveRating("Godfather II", 5);
        videoStore.receiveRating("Godfather II", 4);
        videoStore.receiveRating("Star Wars Episode IV: A New Hope", 5);
        videoStore.receiveRating("Star Wars Episode IV: A New Hope", 4);

        videoStore.checkOut("The Matrix");
        videoStore.checkOut("Godfather II");
        videoStore.checkOut("Star Wars Episode IV: A New Hope");

        videoStore.returnVideo("The Matrix");
        videoStore.returnVideo("Star Wars Episode IV: A New Hope");

        videoStore.listInventory();

        videoStore.checkOut("Godfather II");

        videoStore.listInventory();
    }
}

```

OUTPUT:

```
Console x
<terminated> VideoStoreLauncher [Java Application] C:\Program Files\Java\jdk-19\bin\javaw.exe (Jun 23, 2024, 11:52:10 AM – 11:52:10 AM) [pid: 328]
Title: The Matrix
Checked out: false
Average Rating: 4.5

Title: Godfather II
Checked out: true
Average Rating: 4.5

Title: Star Wars Episode IV: A New Hope
Checked out: false
Average Rating: 4.5

Video is already checked out.
Title: The Matrix
Checked out: false
Average Rating: 4.5

Title: Godfather II
Checked out: true
Average Rating: 4.5

Title: Star Wars Episode IV: A New Hope
Checked out: false
Average Rating: 4.5
```

Interest Calculator:

```
package JavaProject;

import java.util.Scanner;

abstract class Account {
    double amount;
    double interestRate;

    abstract double calculateInterest();
}

class FDAccount extends Account {
    int noOfDays;
    int ageOfACHolder;

    FDAccount(double amount, int noOfDays, int ageOfACHolder) {
        this.amount = amount;
        this.noOfDays = noOfDays;
        this.ageOfACHolder = ageOfACHolder;
        setInterestRate();
    }

    void setInterestRate() {
        if (amount < 10000000) {
            if (noOfDays >= 7 && noOfDays <= 14) {
                interestRate = ageOfACHolder >= 60? 5.00 : 4.50;
            }
            else if (noOfDays >= 15 && noOfDays <= 29) {
                interestRate = ageOfACHolder >= 60? 5.25 : 4.75;
            }
        }
    }
}
```

```

        else if (noOfDays >= 30 && noOfDays <= 45) {
            interestRate = ageOfACHolder >= 60? 6.00 : 5.50;
        }
        else if (noOfDays >= 46 && noOfDays <= 60) {
            interestRate = ageOfACHolder >= 60? 7.50 : 7.00;
        }
        else if (noOfDays >= 61 && noOfDays <= 184) {
            interestRate = ageOfACHolder >= 60? 8.00 : 7.50;
        }
        else if (noOfDays >= 185 && noOfDays <= 365) {
            interestRate = ageOfACHolder >= 60? 8.50 : 8.00;
        }
    }
    else {
        if (noOfDays >= 7 && noOfDays <= 14) {
            interestRate = 6.50;
        }
        else if (noOfDays >= 15 && noOfDays <= 29) {
            interestRate = 6.75;
        }
        else if (noOfDays >= 30 && noOfDays <= 45) {
            interestRate = 6.75;
        }
        else if (noOfDays >= 46 && noOfDays <= 60) {
            interestRate = 8.00;
        }
        else if (noOfDays >= 61 && noOfDays <= 184) {
            interestRate = 8.50;
        }
        else if (noOfDays >= 185 && noOfDays <= 365) {
            interestRate = 10.00;
        }
    }
}

double calculateInterest() {
    return (amount * interestRate * noOfDays) / (100 * 365);
}
}

```

```

class RDAccount extends Account {
    int noOfMonths;
    double monthlyAmount;

    RDAccount(double monthlyAmount, int noOfMonths) {
        this.monthlyAmount = monthlyAmount;
        this.noOfMonths = noOfMonths;
        setInterestRate();
    }

    void setInterestRate() {
        if (noOfMonths == 6) {

```

```

        interestRate = 7.50;
    }
    else if (noOfMonths == 9) {
        interestRate = 7.75;
    }
    else if (noOfMonths == 12) {
        interestRate = 8.00;
    }
    else if (noOfMonths == 15) {
        interestRate = 8.25;
    }
    else if (noOfMonths == 18) {
        interestRate = 8.50;
    }
    else if (noOfMonths == 21) {
        interestRate = 8.75;
    }
}

double calculateInterest() {
    amount = monthlyAmount * noOfMonths;
    return (amount * interestRate) / 100;
}
}

class SBAccount extends Account {
    SBAccount(double amount) {
        this.amount = amount;
        interestRate = 4.00;
    }

    double calculateInterest() {
        return (amount * interestRate) / 100;
    }
}

class InvalidInputException extends Exception {
    InvalidInputException(String message) {
        super(message);
    }
}

public class Project2 {
    public static void main(String[] args) throws InvalidInputException {
        Scanner scanner = new Scanner(System.in);
        while (true) {
            System.out.println("Select the option:");
            System.out.println("1. Interest Calculator –SB");
            System.out.println("2. Interest Calculator –FD");
            System.out.println("3. Interest Calculator –RD");
            System.out.println("4. Exit");
            int option = scanner.nextInt();

```

```

switch (option) {
    case 1:
        System.out.println("Enter the Average amount in your account:");
        double sbAmount = scanner.nextDouble();
        if (sbAmount < 0) {
            throw new InvalidInputException("Amount should be positive.");
        }
        SBAccount sbAccount = new SBAccount(sbAmount);
        System.out.println("Interest gained: Rs. " + String.format("%.2f",
sbAccount.calculateInterest()));
        break;
    case 2:
        System.out.println("Enter the FD amount:");
        double fdAmount = scanner.nextDouble();
        if (fdAmount < 0) {
            throw new InvalidInputException("Amount should be positive.");
        }
        System.out.println("Enter the number of days:");
        int fdDays = scanner.nextInt();
        if (fdDays <= 0) {
            throw new InvalidInputException("Number of days should be positive.");
        }
        System.out.println("Enter your age:");
        int fdAge = scanner.nextInt();
        if (fdAge < 0) {
            throw new InvalidInputException("Age should be positive.");
        }
        FDAccount fdAccount = new FDAccount(fdAmount, fdDays, fdAge);
        System.out.println("Interest gained is: Rs. " + String.format("%.2f",
fdAccount.calculateInterest()));
        break;
    case 3:
        System.out.println("Enter the monthly amount:");
        double rdAmount = scanner.nextDouble();
        if (rdAmount < 0) {
            throw new InvalidInputException("Amount should be positive.");
        }
        System.out.println("Enter the number of months:");
        int rdMonths = scanner.nextInt();
        if (rdMonths <= 0) {
            throw new InvalidInputException("Number of months should be positive.");
        }
        RDAccount rdAccount = new RDAccount(rdAmount, rdMonths);
        System.out.println("Interest gained is: Rs. " + String.format("%.2f",
rdAccount.calculateInterest()));
        break;
    case 4:
        System.exit(0);
    default:
        System.out.println("Invalid option.");
}
}

```

```
}  
}
```

OUTPUT:

```
Console ×
InterestCalculator [Java Application] C:\Program Files\Java\jdk-19\bin\javaw.exe (Jun 23, 2024, 12:58:01 PM) [pid: 19304]
Select the option:
1. Interest Calculator -SB
2. Interest Calculator -FD
3. Interest Calculator -RD
4. Exit
1
Enter the Average amount in your account:
10000
Enter the type of SB account (Normal/NRI):
Normal
Interest gained: Rs. 400.0
Select the option:
1. Interest Calculator -SB
2. Interest Calculator -FD
3. Interest Calculator -RD
4. Exit
2
Enter the FD amount:
10000
Enter the number of days:
91
Enter your age:
65
Interest gained is: Rs. 800.0
Select the option:
1. Interest Calculator -SB
2. Interest Calculator -FD
3. Interest Calculator -RD
4. Exit
2
Enter the FD amount:
10000
Enter the number of days:
91
Enter your age:
34
Interest gained is: Rs. 750.0
Select the option:
1. Interest Calculator -SB
2. Interest Calculator -FD
3. Interest Calculator -RD
4. Exit
2
Enter the FD amount:
10000
Enter the number of days:
-7
Enter your age:
78
Invalid values entered. All values must be positive.
```

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