

“AC’S BANK - INTEREST CALCULATION SYSTEM FOR RETAIL BANK ”

A

Project Report

submitted

in partial fulfillment

for the award of the Degree of

Bachelor of Technology

in Department of Information Technology



Project Mentor:

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Team Member Profile: Anand Tripathi

Name: Anand Tripathi

Role: Full Stack Developer

Responsibilities:

- Designed and implemented the complete system architecture.
- Developed and integrated backend APIs with the database.
- Ensured secure and optimized communication between client and server.
- Managed database logic for daily interest calculation and monthly credit.

Team Member Profile: Chetan Prakash Vyas

Name: Chetan Prakash Vyas

Role: Frontend Developer

Responsibilities:

- Created responsive and user-friendly interface.
- Integrated the frontend with backend APIs to ensure seamless user experience.
- Focused on improving visual appeal and navigation of the platform.
- Contributed to overall design consistency and accessibility.

Introduction

- **What is Interest Calculation?**

A retail bank collects deposits from customers and offers interest at a predetermined rate.

- **Objective:**

Automate the daily interest calculation process for accounts with non-zero balances.

- **Significance:**

Ensures accuracy, efficiency, and timely updates in interest calculation and crediting processes.

What We Built

- **Interest Calculation System:** Developed an automated system to calculate daily interest for retail bank accounts.
- **System Highlights:**
 - Accurate daily interest calculation based on user balances.
 - Monthly crediting of cumulative interest to accounts.
 - Seamless integration with the frontend for real-time updates.
- **Key Features:**
 - Daily interest logs for transparent tracking.
 - Real-time balance updates after deposits/withdrawals.
 - Secure user authentication and role-based access control.
- **Tech Stack:**
 - Frontend: React.js
 - Backend: Node.js
 - Database: MongoDB

Business Need

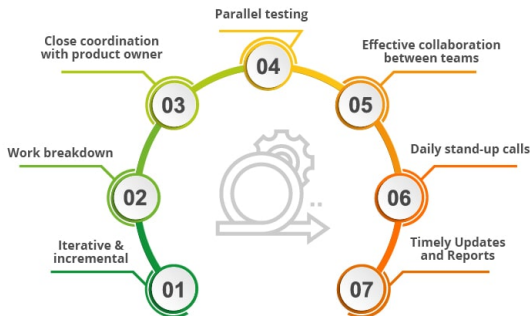
- Banking customers perform deposits and withdrawals daily.
- Banks must calculate interest based on daily balance changes.
- A reliable system is needed to:
 - Track daily balances,
 - Compute interest accurately,
 - Credit interest monthly without delay.

System Objective

- Build a robust system that:
 - ① Calculates interest daily for each account with a balance > 0 .
 - ② Accumulates the interest in a separate table.
 - ③ Credits the cumulative interest to the account on the last day of the month.
- Supports real-time balance updates after deposits or withdrawals.

System Architecture

- **Frontend (React.js):** User interface for customers and admins.
- **Backend (Node.js):** Handles API calls and logic for interest calculations.
- **Database (MongoDB):** Stores customer data, balances, transactions, interest records.



Database Design (MongoDB Collections)

- **Accounts Collection:** Stores user info and current balance.
- **Transactions Collection:** Records daily deposits/withdrawals.
- **Interest Collection:** Maintains daily interest logs.
- **MonthlyCredits Collection:** Records credited interest per month.
- **Daily Interest Collection:** Records credited interest per day.

Interest Calculation Formula

- **Formula:**

$$\text{Daily Interest} = \frac{\text{Annual Rate}}{365} \times \text{Daily Balance}$$

- **Example:**

- Annual Rate = 6%
- Balance = 10,000
- Daily Interest = $(0.06/365) \times 10,000 = 1.64$ approx

Daily Process Implementation

- System runs a scheduled job at midnight.
- Checks balances for all accounts.
- Calculates interest and appends to interest log collection.
- Updates the cumulative monthly interest.

Monthly Process Implementation

- On the last day of each month:
 - 1 Cumulative interest is transferred to customer account.
 - 2 Monthly record is stored in the MonthlyCredits collection.
 - 3 Cumulative interest resets for the next month.

Error Handling

- **Insufficient Data:** Skips accounts with missing balance info.
- **Server Failures:** Uses retries and fallback jobs.
- **Invalid Transactions:** Marked and flagged for admin review.

Security Measures

- Secure HTTP endpoints and user authentication.
- Role-based access control (Admin/User).
- Daily backups and audit logs.
- Data encryption for sensitive user information.

Demonstration 1: User Dashboard

AC's Bank Andy Don Dashboard Logout

Banking Dashboard

Welcome, Andy Don

- Dashboard
- Transaction History
- Deposit/Withdraw

Account Summary

Account Number: XXXX-XXXX-88de
Account Type: Savings Account
Account Status: Active

Welcome, Andy Don

Account Balance \$
\$195.472
[Deposit/Withdraw](#)

Current Interest Rate %
6.00%
Annual Percentage Rate

Daily Interest ↗
\$0.0321
Based on current balance

Monthly Interest 📅
\$0.964
Projected this month

Recent Transactions

[View All](#)

🔴	why dollar May 6, 2025	+\$50.00
🟢	Monthly interest credit May 8, 2025	+\$0.75
🟢	Monthly interest credit Apr 25, 2025	+\$0.71
🟢	Monthly interest credit Apr 23, 2025	+\$0.67

Interest History

🟡	Daily Interest Calculation May 9, 2025	+\$0.0321
📅	Monthly Interest Credit May 8, 2025	+\$0.75
🟡	Daily Interest Calculation May 8, 2025	+\$0.0402
📅	Monthly Interest Credit Apr 25, 2025	+\$0.71

Demonstration 2: Admin Panel

AC's Bank

Anand
 Admin Panel
 [Logout](#)

Admin Control Panel
 Anand Tripathi

[Dashboard](#)

Users

Interest Rates

Account Operations

Admin Dashboard

Total Users
16

Total Balance
\$4,958,158.657

Avg. Interest Rate
5.24%

Monthly Interest Paid
\$18,954,273.703

System Overview

Welcome to the admin dashboard. From here, you can manage users, set interest rates, and perform various account operations.

Recent Activity

- Interest calculated for all active accounts
- Monthly interest credited to users
- New user registrations processed

Quick Actions

- [Run interest calculation manually](#)
- [Generate monthly reports](#)
- [View system logs](#)

AC's Bank

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Demonstration 3: Interest Management

Admin Control Panel
Anand Tripathi

Dashboard

Users

Interest Rates

Account Operations

Interest Rate Management

Default Interest Rate

This rate will be applied to all new accounts and will be used as a reference for individual account rates.

% 3.5

Save Default Rate

Search users by name or email...

NAME	EMAIL	CURRENT BALANCE	CURRENT RATE	NEW RATE	ACTION
Anand	anand@gmail.com	\$1038.05	5.00%	<div>5.00</div>	<div>Save</div>
Andy Don	andy@gmail.com	\$243.25	6.00%	<div>6.00</div>	<div>Save</div>
Yash Mathur	yash@gmail.com	\$92388.82	5.00%	<div>5.00</div>	<div>Save</div>
deepak	deepak@gmail.com	\$620.83	6.00%	<div>6.00</div>	<div>Save</div>
Anirudh Soni	anirudh@gmail.com	\$3047.08	8.35%	<div>8.35</div>	<div>Save</div>

Benefits of the System

- Accurate and transparent interest calculations.
- Zero manual intervention required.
- Improves trust and customer satisfaction.
- Scalable for millions of accounts.

Conclusion

- **Impact:**

Automates a critical banking operation with high accuracy.

- **Scope:**

- ① Dynamic rates based on account type or tenure.
- ② AI-based fraud detection on transactions.
- ③ Integration with SMS/Email alert services.

References

- [GeeksforGeeks](#)
- [MongoDB Documentation](#)
- [Node.js & React.js Official Docs](#)
- [Investopedia \(Interest Rate Concepts\)](#)
- [Google](#)