

Banking Management System



तत् त्वं पूषन् अपावृणु
केन्द्रीय विद्यालय संगठन

Kendriya Vidyalaya Tinsukia

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Session: 2021-2022

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Project Logbook

Project Name: Banking Management System

School Name: Kendriya Vidyalaya Tinsukia

Year/Class: 2021-2022 XII (A)

Teacher's Name: Arvind Agarwal

Team Member Names:

- Abhijit Kumar Singh (Lead)
- Shashikant Yadav
- Khushi Yadav

Introduction about the Program

A banking management system is the system on which the entire banking sector depends on. Whether it be “offline banking” or “online banking” both rely heavily on the banking management system.

A banking management system can be broken down into simple components, which are:

- 1 Front-end
- 2 Server (Database)
- 3 Back-end

The front-end deals with the GUI (usually) to make the system interactive, and to also ease the workload. A good front-end needs to look good as well as be simple.

The server (Database) holds the data that is usually required by every day-to-day activity. Like the name and address of the user.

The Back-end works much like an API (Application Programming Interface), and often acts as a link between Front-end and the Server.

Team Roles

Role	Role Descriptor	Team Member Name
Leader + Researcher + Documentation Writing + Coder	Dividing the workload to other members, coordination, making sure that things get done in time, and conducting research whenever a problem occurs. Analyzing the code, and writing the documentation. Coding to handle exceptions and errors.	Abhijit Kumar Singh
Coder + Documentation Writing	Coding the front-end functions. Analyzing the code, and writing the documentation.	Shashikant Yadav
Coder + Synopsis Writing	Coding the back-end functions. Making the synopsis.	Khushi Yadav

Project Plan

Phase	Task	Actual Start Date	Actual End Date	Who is responsible	Notes/Remarks
Preparing the project	Coursework, readings	September 1, 2021	September 3, 2021	Abhijit Kumar Singh	We understood what the project was all about.
	Set up team folder on a shared drive	September 1, 2021	September 1, 2021	Shashikant Yadav	To increase performance, we chose Github to share code and other resources.
Defining the problem	Background reading	September 2, 2021	September 4, 2021	Abhijit Kumar Singh	We all read the various sample topics presented and brainstormed the topics.
	Team meetings to discuss issues and select an issue for the project	September 4, 2021	September 6, 2021	Abhijit Kumar Singh	We set up a meeting at 5:00 pm IST for two days to take everyone's opinion and chose the topic
Brainstorming	Conducting a team meeting to generate ideas for a solution	September 6, 2021	September 6, 2021	Khushi Yadav	We held an hour long meeting to generate ideas and came up with our solution
Designing the solution	Team meeting to design the solution	September 6, 2021	September 9, 2021	Shashikant Yadav	Multiple meetings were held to discuss how the solution would be implemented in its final form.

Collecting and preparing data	Team meetings to discuss data requirements	September 6, 2021	September 8, 2021	Abhijit Kumar Singh	We scoured the list of possible tools required and strike the unnecessary ones after a two day long discussion.
Prototyping	Data collection	September 9, 2021	September 12, 2021	Abhijit Kumar Singh	We went on various places to look for data that might help us in the making of our approach.
	Data preparation and labeling	September 12, 2021	September 15, 2021	Khushi Yadav	After collecting the data, we took some time to analyze it and sorted it out to our needs and divided it amongst ourselves.
Prototyping Testing	Creating application and perform the desired operations	September 6, 2021	September 30, 2021	Khushi Yadav	We created a rough sketch, then a flowchart to ease our production. Soon after we started coding our program.
	Write a program to initiate actions based on the result of the model	September 16, 2021	October 4, 2021	Shashikant Yadav	We gave our project a final look and added some improvements and optimization.

Communication Plan

During the making of this project, we followed the following communication plans:

- 1) Holding online Zoom meetings every Sunday to update one's progress.
- 2) Keeping Saturdays free for online meetings, in case any problem occurs in between the making.
- 3) Sharing the code via GitHub, so that everyone can look and independently work on the project.
- 4) Updating the code, along with the changes made to ease understanding.
- 5) Frequently using messaging apps like Whatsapp to update about progress and problems occurred.

Meeting 1

Held on: September 3

Attended by: Abhijit Kumar Singh, Shashikant Yadav, Khushi Yadav

Absentees: None

Purpose of the meeting: To discuss the topics presented and have a concise idea on the various issues.

Items discussed:

- 1) List of various topics presented.**
- 2) Ways of approaching each topic.**
- 3) Issues that might occur during production.**

Things to do:

- 1) Analyze the topics and think which topic suits the team best.**
- 2) To divide up the workload.**
- 3) To select a Group Leader.**

Meeting 2

Held on: September 6

Attended by: Abhijit Kumar Singh, Shashikant Yadav, Khushi Yadav

Absentees: None

Purpose of the meeting: To select a topic, divide the workload and choose a Group Leader.

Items discussed:

- 1) Problems faced while coming up with solutions for various topics.**
- 2) How the workload will be divided.**
- 3) Division of the group on the basis of skills and assignment of team roles.**

Things to do:

- 1) Think of the solution for the topic.**
- 2) Make a prototype and test it.**
- 3) Pave our way on how to approach the solution.**

Meeting 3

Held on: September 9

Attended by: Abhijit Kumar Singh, Shashikant Yadav, Khushi Yadav

Absentees: None

Purpose of the meeting: To come up with the solution for the topic as well as the way to approach it.

Items discussed:

- 1) Various problems faced by an average Indian while banking.**
- 2) Things an average Indian would want in a Banking Management System.**
- 3) Ways to counter the various issues as well as the way to approach them.**
- 4) Prototype creation and testing.**

Things to do:

- 1) Create a prototype for each component. (Front-end, Server and Back-end)**
- 2) Test the prototype.**
- 3) Note down the issues with the prototype and come up with the solutions.**

Problem Definition

The banking sector has many issues from which common people suffer every day. Some of them include:

- 1) Failure to update passbook due to lack of bar codes.
- 2) Too much sophisticated process involved to check account details, and update changes.
- 3) Slow and non-interactive way for communicating with the system.

These issues matter to us as:

- 1) People have to wait for hours in line to update their passbooks, and get the bar codes for automatic entries.
- 2) Not many are familiarized with “Online Banking” and find it too difficult.
- 3) Those who do understand, find the current system too primitive.

Brainstorming

Idea 1	Creating a way to encode account details on account number
Idea 2	Creating an encrypted file to store data which can be only viewed by the user
Idea 3	Creating a method to recover an account. To make a questionnaire based on the account details to prove the authenticity of the user.
Idea 4	Creating a simple GUI for easy interaction

After discussing more deeply, we came up with the following ideas:

- 1 Encoding basic account details in the account number.
- 2 Creating an encrypted file for each account holder.
- 3 Storing away account credentials and linking them to ease access
- 4 Ask a series of questions to validate the authenticity of the user; allowing him/her to recover the account.

Data

Data needed	Data source	Data owner	Permission to use the data	Ethical considerations/ Problems
Have				
Details required during standard account opening procedure.	SBI Bank Account Opening Form	SBI	The form is publically available.	None.
Various account types and interest offered by banks.	RBI's website along with various other sites.	RBI, SBI, HDFC, Axis, BOI	The information is listed publicly on their websites.	None
Want/Need				
User data collected by various banks	Surveys conducted, app data sent to the banks, etc	SBI, HDFC, Axis, BOI, other banks	No.	Most of the time this data contains info that could be used to track individuals, compromising privacy.
Nice to have				
A well documented site for PySlide6.	PySlide2 Documentation	Qt	The documentation is publically available.	PySlide2 and PySlide6 are different.

Prototype

The prototype is made using the following tools:

- 1 Python
- 2 Tkinter
- 3 MySQL

During production, the prototype was tested in CL (Command Line) without the Front-end, and when both the Back-end, and the Server (Database) were tested, a new prototype using the Tkinter module was made. During the first few days, we used a CSV file instead of the MySQL database to gain some stable code base.

The prototype had many missing features like showing previous transactions, no way to recover a lost account as well as no 2FA (Two-Factor Authentication).

During the production, we had several ideas to improve the quality of the final product by implementing some minor while other major changes like using an email instead of the Unique ID to log in. We also looked at various APIs to help reduce the workload, and tried to implement them and failed. Thus dropping the idea to implement them into the prototype and get familiarized with the APIs and implement them in the final product.

Methodology/Diagram

The production pipeline which was finalized during the meetings served no purpose since our lack of understanding of various components needed to make the polished model.

After learning quite a few things from the prototype and scrapping everything I could from the prototype and created a new git branch and started a new project.

I replaced Tkinter with Qt using the PySlide6 module as Tkinter had, what one classmate called “ancient” look, to make it a bit modern.

I optimized our code and removed reluctant code and started documenting our code. Researching was a key part as we did it while I was working on the final build.

For email, I have thought of using Flask to send verification or use AUTH0 to not deal with all the hassle with the various commands and code.

Though as we had planned earlier, everything went haywire and I as a leader dropped everything and started from scratch.

There were quite a few factors that lead to my this decision, some of were as follows:

1. Lack of support from the other members; Failing to meet their roles.
2. As the codebase grew larger, maintaining the code became harder and with only me contributing to the APIs, Front-end, and Backend the code grew out of control and was too buggy and bloated.
3. Incorrect prediction made regarding the completion of the project, the project was supposed to end three months prior to submission, but only one month is left as of 08/02/22.

After writing more than 7000+ lines of code, a new repository was created with only one goal in mind. Drop anything unnecessary and focus on the key features.

This means, there will be no email verification and email recovery method, instead I have implemented RSA key pair for the security.

As for the GUI, I have also dropped it, and went fully CLI.

One of the most notable changes is the shift from MySQL to Mariadb, an open-source alternative to MySQL. I chose Mariadb due to its open-source nature (MySQL is maintained by Oracle while Mariadb is maintained by the community). This also means I will use the mariadb connector instead of mysql connector.

The codebase has shrunk to only 1000 lines of code, and is actually well-documented than before with less clunky and bloated code.

All the repositories still exist on Github.com and are available for anyone to use and modify however they seem fit.

Hardware Used

Various systems were used in the making of this project:

Sl. No	Operating System/ Service	CPU	Ram
1	Linux Mint 20.1	Pentium (R) N3540 @2.16GHz	2 GB DDR3
2	Linux Mint 20.1	Pentium (R) N3540 @2.16GHz	4 GB DDR3
3	Windows 10 Pro	Pentium (R) N3540 @2.16GHz	4 GB DDR3
4	Google Collab	Xeon(R) CPU @ 2.00GHz	12.6 GB DDR4
5	Windows 10	Ryzen 7 3600X	8 GB DDR4
6	Arch Linux	Pentium (R) N3540 @2.16GHz	4 GB DDR3

Software Used

Softwares used in building the prototype are:

- 1) Python 3.9: The core language of the prototype
- 2) Pycharm Community Edition: IDLE used to make the prototype.
- 3) Kite Autocomplete integration: Shorten our time and assist while coding.
- 4) Tabnine Autocomplete integration: Shorten our time and assist while coding.
- 5) CSV Reader: A Pycharm extension; Presents the contents of the csv file in a simple way to help understand the flow and find out errors.
- 6) MySQL: A RDBMS.
- 7) Tkinter: Tkinter is a Python binding to the Tk GUI toolkit. It is the standard Python interface to the Tk GUI toolkit, and is Python's de facto standard GUI. Tkinter is included with standard GNU/Linux, Microsoft Windows and mac OS installs of Python.
- 8) Git: Git is software for tracking changes in any set of files, usually used for coordinating work among programmers collaboratively developing source code during software development. Its goals include speed, data integrity, and support for distributed, non-linear workflows.
- 9) GitHub: GitHub, Inc. is a provider of Internet hosting for software development and version control using Git. It offers the distributed version control and source code management functionality of Git, plus its own features. It provides access control and several collaboration features such as bug tracking, feature requests, task management, continuous integration and wikis for every project. Headquartered in California, it has been a subsidiary of Microsoft since 2018.
- 10) Github Copilot: GitHub Copilot is an artificial intelligence tool developed by GitHub and OpenAI to assist users of Visual Studio Code, Neovim, and JetBrains IDEs by autocompleting code. It was first announced by GitHub on 29 June 2021.

Software Used

Software used in building the final product are:

1. Python 3.10.2 (A high-level easy to use scripting language)
2. 15.1 Distrib 10.6.5-MariaDB (An open-source fork of MySQL with additional features)
3. Visual Studio Code (A proprietary text editor by Microsoft) #Check VSCodium
4. Neofetch (An open-source text editor, fork of VIM)
5. DBeaver 21.3.3.202201242151 (Free and open-source multi-platform database tool)
6. Git (Git is a free and open source distributed version control system)
7. fish - the friendly interactive shell (An open-source shell with smart and user-friendly command line shell for macOS, Linux with autocompletion, and many more useful features)
8. MyCLI (An open-source Terminal Client for MySQL with AutoCompletion and Syntax Highlighting)

Python Modules used during production were:

1. hashlib for sha3_512 (Used to store passwords)
2. mariadb (A connector for mariadb written in C)

References

1. <https://stackoverflow.com/questions/2623418/how-do-i-insert-data-from-a-python-dictionary-to-mysql>
2. <https://www.pythontutorial.net/python-basics/python-check-if-file-exists/>
3. <https://www.geeksforgeeks.org/eval-in-python/>
4. <https://www.geeksforgeeks.org/create-table-using-tkinter/>
5. <https://www.pythontutorial.net/tkinter/tkinter-separator/>
6. <https://developers.google.com/gmail/api/quickstart/python>
7. <https://dba.stackexchange.com/questions/176899/mysql-column-value-to-indicate-2-possible-options>
8. <https://pycryptodome.readthedocs.io/en/latest/src/examples.html#generate-public-key-and-private-key>
9. <https://www.digitalocean.com/community/tutorials/how-to-create-a-new-user-and-grant-permissions-in-mysql>
10. <https://forums.linuxmint.com/viewtopic.php?f=47&t=364431&p=2116297&hilit=keccak#p2116297>
11. <https://www.geeksforgeeks.org/encrypt-and-decrypt-files-using-python/>
12. <https://duckduckgo.com/>
13. <https://stackoverflow.com/>

Thank you

I am really grateful to everyone who has contributed to any of the above specified projects that were used in the making of this project, without any one of them this entire project would be much harder to make and test.