A PROJECT REPORT

on

Ai Enabled Fintech B2B Invoice Management Application

Submitted to

KIIT Deemed to be University

In Partial Fulfilment of the Requirement for the Award of

BACHELOR'S DEGREE IN
INFORMATION TECHNOLOGY
BY

Riya Rani Mandal 1906493

UNDER THE GUIDANCE OF
Riddhi Agarwal
Vivek Suman
Affiliation

SCHOOL OF COMPUTER ENGINEERING
KALINGA INSTITUTE OF INDUSTRIAL TECHNOLOGY
BHUBANESWAR, ODISHA - 751024
April 2022

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KIIT Deemed to be University

School of Computer Engineering
Bhubaneswar, ODISHA 751024

CERTIFICATE

This is certify that the project entitled

Ai Enabled Fintech B2B Invoice Management Application

submitted by

Riya Rani Mandal 1906493

is a record of bonafide work carried out by them, in the partial fulfilment of the requirement for the award of Degree of Bachelor of Engineering (Computer Science & Engineering OR Information Technology) at KIIT Deemed to be university, Bhubaneswar. This work is done during year 2022-2023, under our guidance.

Date: 15/04/2022

Riddhi Agarwal
Vivek Suman

Acknowledgements

I am overjoyed and honoured to extend our heartfelt gratitude to our project supervisors, **Riddhi Agarwal and Vivek Suman**, for their superb advice during our project work. His sincerity, dedication, hard work,and meticulous attention to detail have endeared him to many people.We've found you to be a tremendous source of inspiration. Sir, please accept our heartfelt gratitude for your unwavering support and assistance.We were shown patience. We'd want to express our gratitude to him in particular for his patience and assistance.we are meticulously revising all of our writings

Riya Riya Mandal (1906493)

ABSTRACT

B2B stands for business-to-business. Businesses work on a credit basis with one another. When a buyer company orders products from a seller company, the seller company sends an invoice to the buyer company. This products invoice includes information such as the details of the goods purchased and when they should be paid. The buyer company must pay the balance due before the deadline. In real-world settings, however, invoices are not always cleared, that is, paid in full by the due date (The payment date is the date on which a client clears the payment for an invoice.) The project is split into two sections.

A Machine Learning Model is created in the first phase of this project to predicted the payment date. In the second half of the project a full stack InvoiceManagement Application is built using ReactJs, JDBC, Java and JSP. In this application a responsive Receivables Dashboard is built. Here we can visualize the Data in the form of grids , perform searching operations on the invoices , modify data in the editable fields of the grid and download data of selected rows in predefined templates.

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Chapter 1

Introduction

Fintech (Financial Technology) is a phrase that refers to software and other current technologies that are utilised by companies to provide automated and better financial services. The way we manage our funds has evolved as a result of rapid and inventive innovation, such as Mobile Payments.

The B2B world is not the same as the B2C or C2C worlds. Businesses work on a credit basis with one another. When a buyer company orders products from a seller company, the seller company sends an invoice to the buyer company. This products invoice comprises a variety of facts, such as the details of the goods purchased and when they should be paid.

Seller business interacts with various businesses and sells goods to all of them at various times. Hence, the seller business needs to keep track of the total amount it owes from all the buyers. This involves keeping track of all invoices from all the buyers. Each invoice will have various importantfields like a payment due date, invoice date, invoice amount, baseline date, etc.

The buyer business needs to clear its amount due before the due date. However, in real-world scenarios, the invoices are not always cleared i.e. paid in full by the due date (The date on which a customer clears the payment for an invoice is called the payment date).

Chapter 2

Basic Concepts

Accounts Receivable represents money owed by entities to the firm on the sale of products orservices on credit. In most business entities, accounts receivable is typically executed by generating an invoice and either mailing or electronically delivering it to the customer, who, in turn, must pay it within an established time frame, called credit terms or payment terms.

In the ideal world, the buyer business should pay back within the stipulated time (ie the Payment Term). However, in the real world, the buyer business seldom pays within their established time frame, and this is where the Account Receivables Department comes into the picture.

Every business consists of a dedicated Account receivables Department to collect and track the payment of invoices.

It consists of an Account receivables team that is responsible for :

i. Collecting payments from customers for their past due to invoices
ii. Sending reminders and follow-ups to the customers for payments tobe made
iii. Looking after the entire process of getting the cash inflow
iv. Help the company get paid for the services and products supplied

2.1 Domain :

Domains covered by our projects are :

Front-end: The frontend part of this project has been developed on ReactJs, Material UI

Back-end: JDBC, Java, JSP, SQLyog has been used for backend part

Ml: For performing prediction operation it uses an ML model which is based on Python & Scikit-Learn

Flask : Flask is used for communicating between Frontend and the ML model

Data : We were given an invoice data collection with prior payment history and buyer behaviour. The ML model forecasts when a client will pay an invoice based on prior payment trends. Based on the estimated payment date, the algorithm also forecasts which ageing bucket the invoice belongs to.

2.2 Technology :

The technology used for this projects are

Machine Learning :

- Pandas
- Numpy
- Matplotlib
- Scikit-learn

Front-end:

- HTML
- CSS
- Java Script
- React.js
- Material UI

Back-end:

- Java
- Servlets
- JDBC
- JSP
- Mysql

2.3 Software :

Software Stack for Development :

Front-end : VS-Code Editor

Back-end : Eclipse, Apache Tomcat Server (9.0.6), MySql DB, SQL-Yog

Rest Api - Postman

Machine Learning : Jupyter Notebook

Chapter 3

Problem Statement / Requirement Specifications

The project's major goal is to handle the Account Receivable department in a simple, seamless, and efficient manner. Customers will be able to pay for previous invoices through the account managers. They might send consumers reminders and follow-ups to ensure that payments are made on time. They may handle the full process of obtaining cash inflow as well as assisting the company in receiving payment for the services and products provided.

3.1 Project Planning :

● To build a Machine Learning Model to predict the payment date of associate degree invoice once it gets created within the system.

● Categorize the invoice into totally different buckets supported the expected payment date. The objectives of the half of the winter billet project are:

● To build a full-stack Invoice Management Application mistreatment ReactJs, JDBC, Java, and JSP.

● Build a responsive assets Dashboard.

● Visualize information within the kind of grids.

● Perform looking out operations on the invoices.

● Modify information within the editable fields of the grid.

● Download information of elite rows in predefined templates.

3.2 Project Analysis :

Till now we have made a responsive dashboard that will help to manage the account receivable department in an effective way, but it is manual, not automated, which means wehave to find the customer from the table grid manually and send reminders to them for payment and another purpose. So we can make an AI model which will automatically send reminderswhen required. And we can also add a voice detection feature so that one can operate it without contact. We are eager to implement these features in the project shortly.

3.3 System Design :

3.3.1 Design Constraints :

Software Stack for Development :

Front-end : VS-Code Editor
Back-end : Eclipse, Apache Tomcat Server (9.0.6), MySql DB, SQL-Yog
Rest Api - Postman
Machine Learning : Jupyter Notebook

Setup Packages :

Front-end : mui/material, mui/lab, mui/x-data-grid, mui/icons-material , axios, chart-js, date-fns, yup, formik,
Back-end : gson, mysql-connector/j (added to classmodule in build-path)
ML : pandas, numpy, matplotlib, scikit-learn

3.3.2 System Architecture OR Block Diagram :

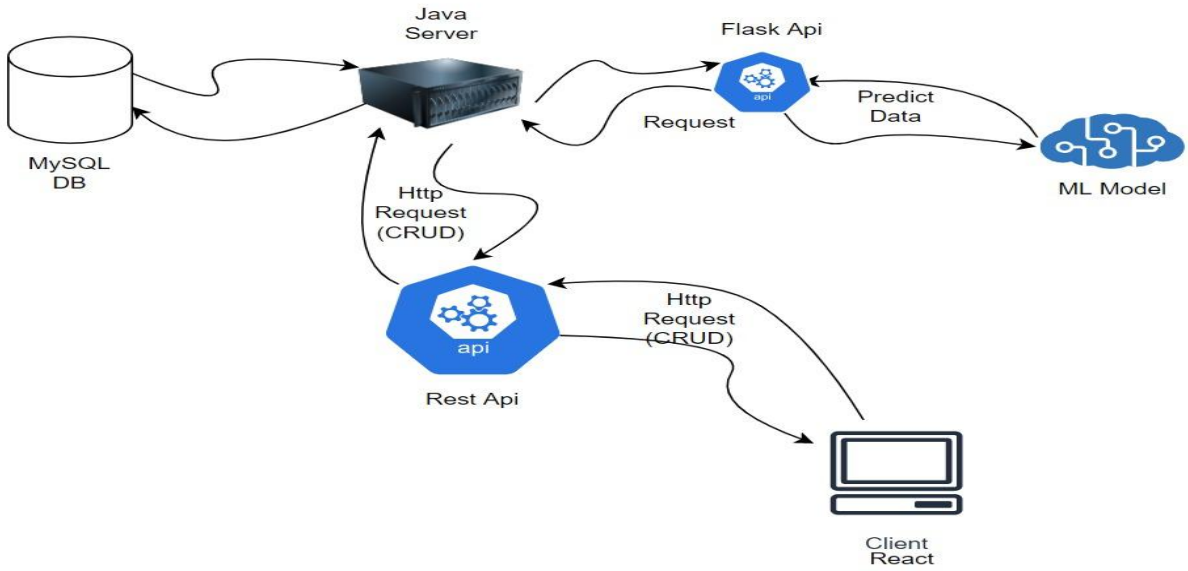


Fig 1 : Architecture Block Diagram
Server is connected to MySQL DB and is connected to Client(ReactJs) through the REST api(end-points) and can do CRUD operation which is reflected in the database. The predict operation is connected to the database through Flask and through Rest it is connected to Client.

Chapter 4

Implementation

4.1 Methodology OR Proposal

ML Part we used several models to find out the best.

We found out metric parameters as:
i) MSE score
R2 score

We found our best model as Extreme Gradient Boost Regression.

Back-end Part :
We created servlets according to CRUD operation and used route in XML which served as REST api which acts like medium to connect client.

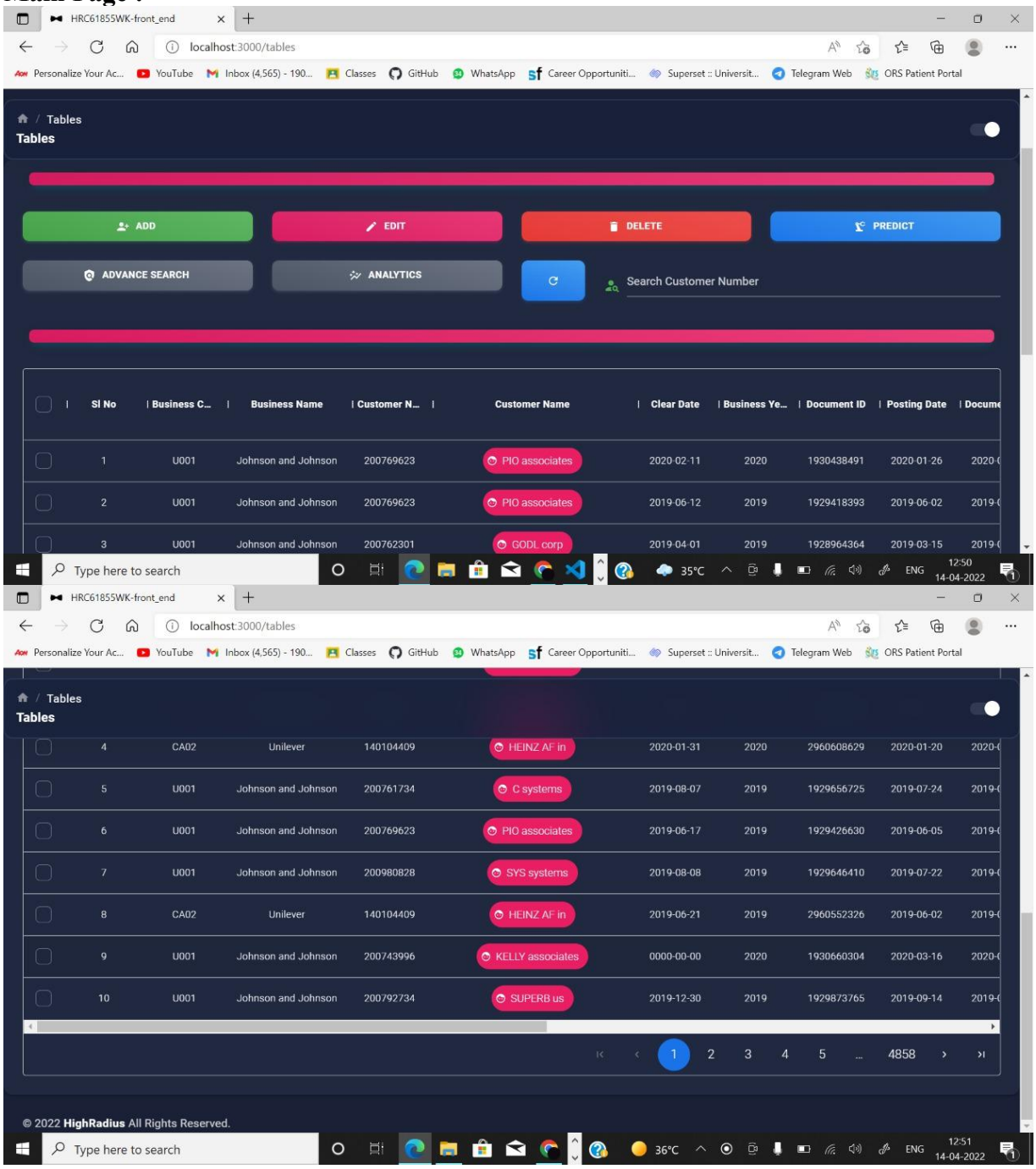
Front-end Part(React) :
CRUD operation using axios and, display grid format and using material-ui

4.2 Testing OR Verification Plan

Test ID	Test Case Title	Test Condition	System Behavior	Expected Result
T01	Add Data	Add a new data field	Add data to Db	Data Added Successfully
T02	Edit Data	Editing an existing data field	Edit Data in DB	Data field Edit successfully
T03	Delete Data	Deleting an existing data field	Remove data from DB	Data field Deleted successfully
T04	Advance search	Search Data on Condition	Search Data	Data found
T05	Analytics	Calculate percentage data on criteria	Percentage Data	Show Chart

4.3 Screenshots

Main Page :



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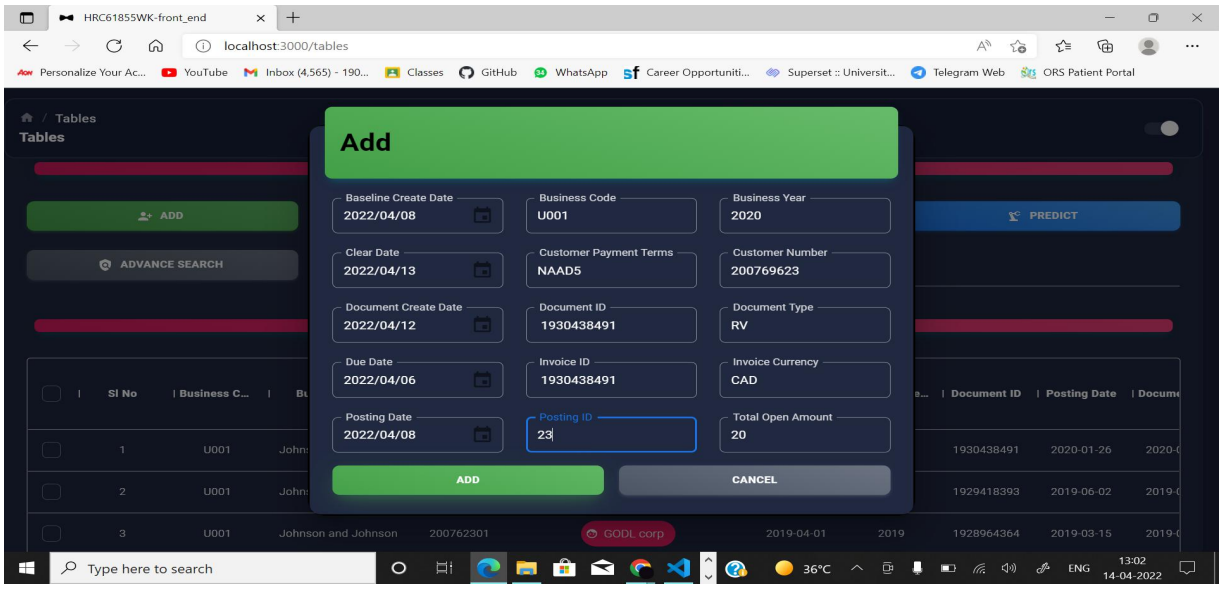
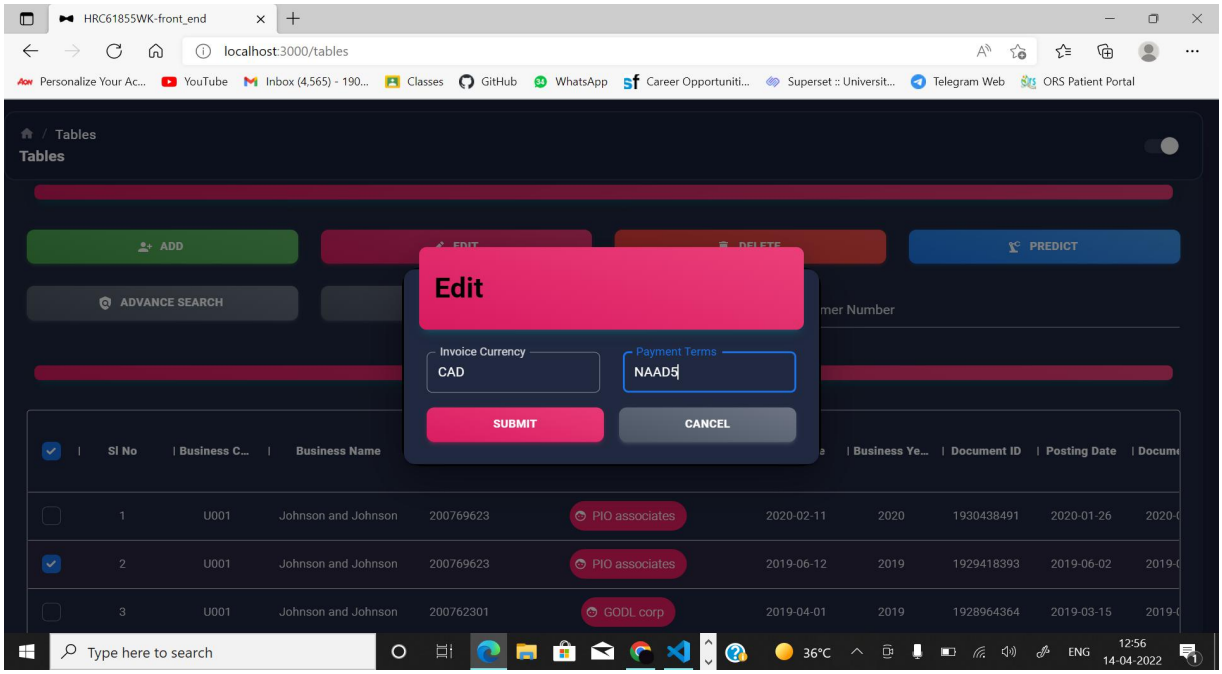
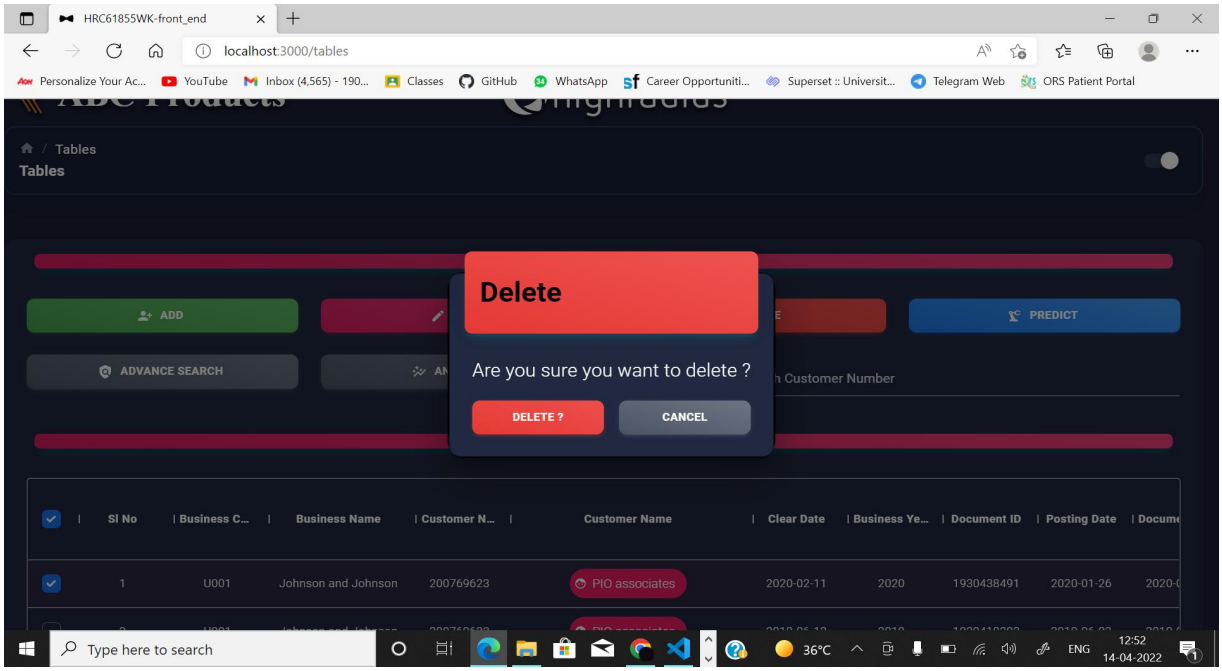


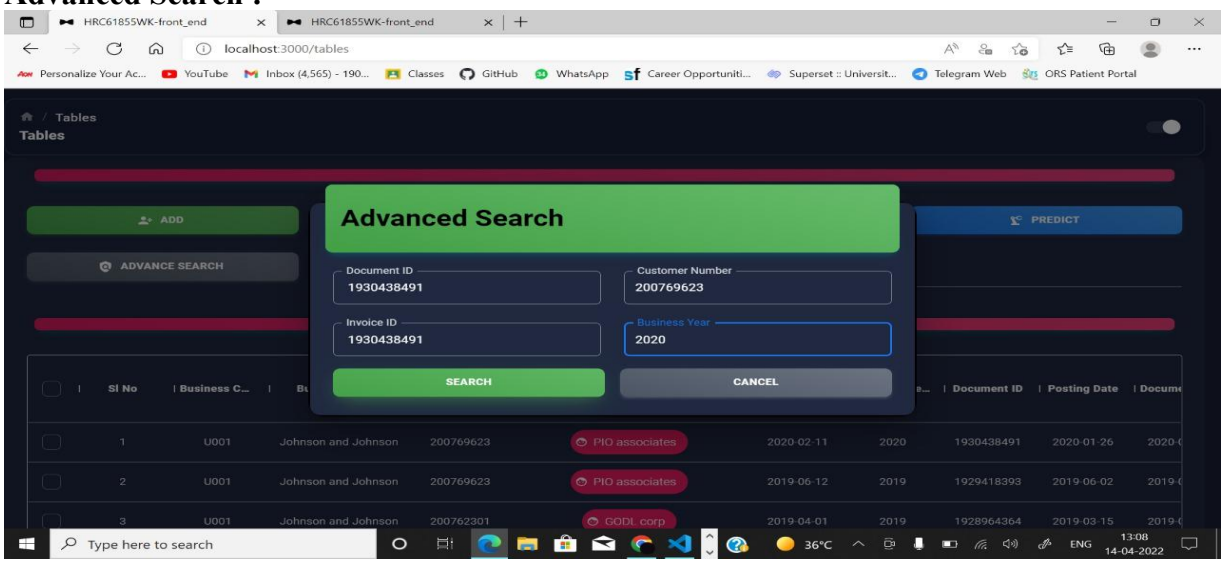
Edit Data :



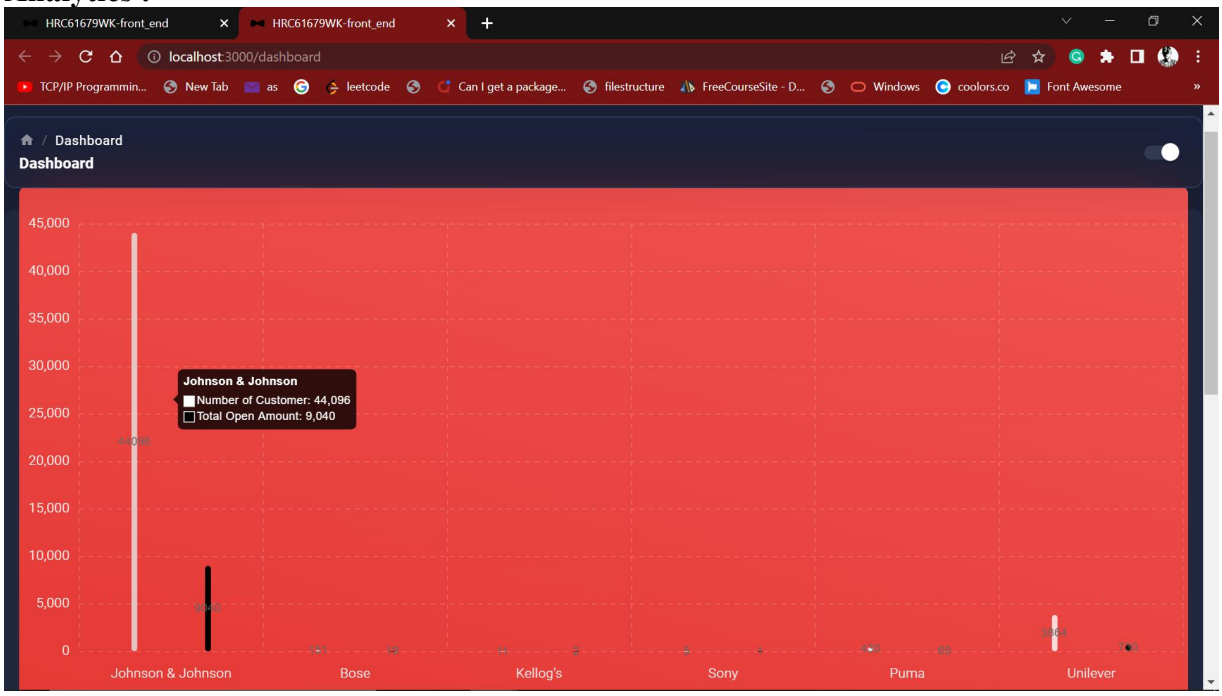
Delete Data :

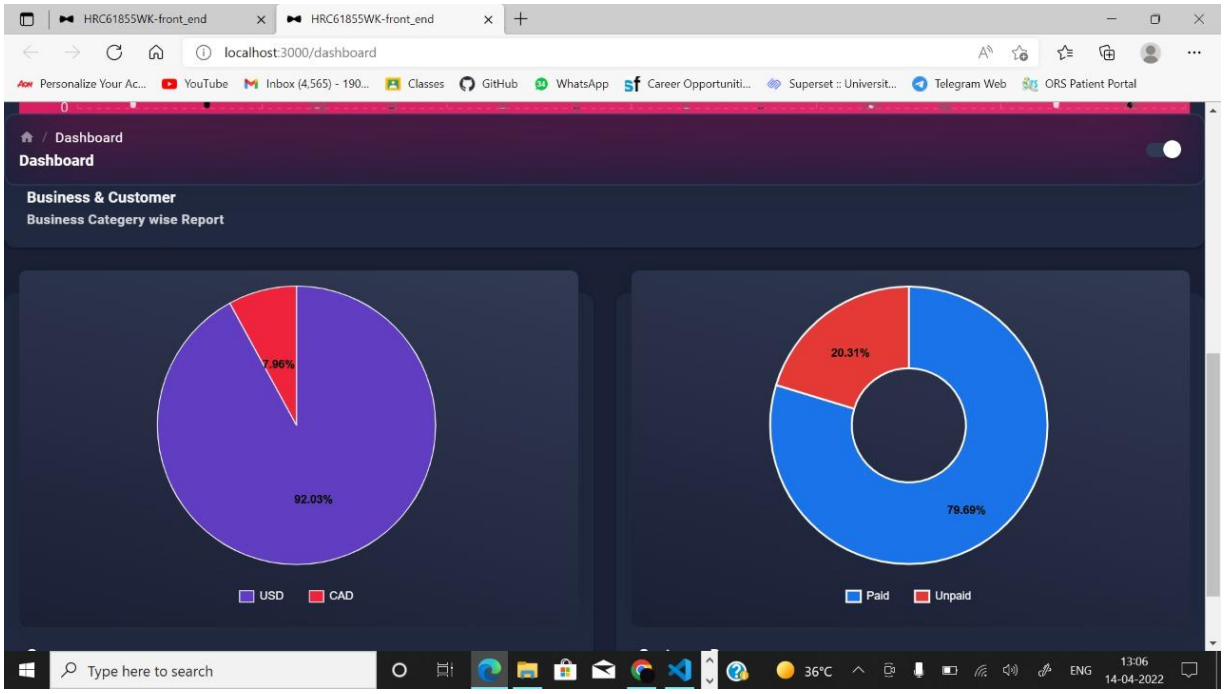


Advanced Search :



Analytics :


HRC61679WK-front_end
localhost:3000/dashboard
Dashboard
Dashboard
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Johnson & Johnson
Number of Customer: 44,096
Total Open Amount: 9,040
Johnson & Johnson
Bose
Kellog's
Sony
Puma
Unilever


HRC61855WK-front_end
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Dashboard
Dashboard
Business & Customer
Business Categery wise Report
7.96%
92.03%
USD
CAD
20.31%
79.69%
Paid
Unpaid
Type here to search
36°C
ENG
13:06
14-04-2022

Chapter 5

Standards Adopted

5.1 Design Standards

It is divided into 2 parts

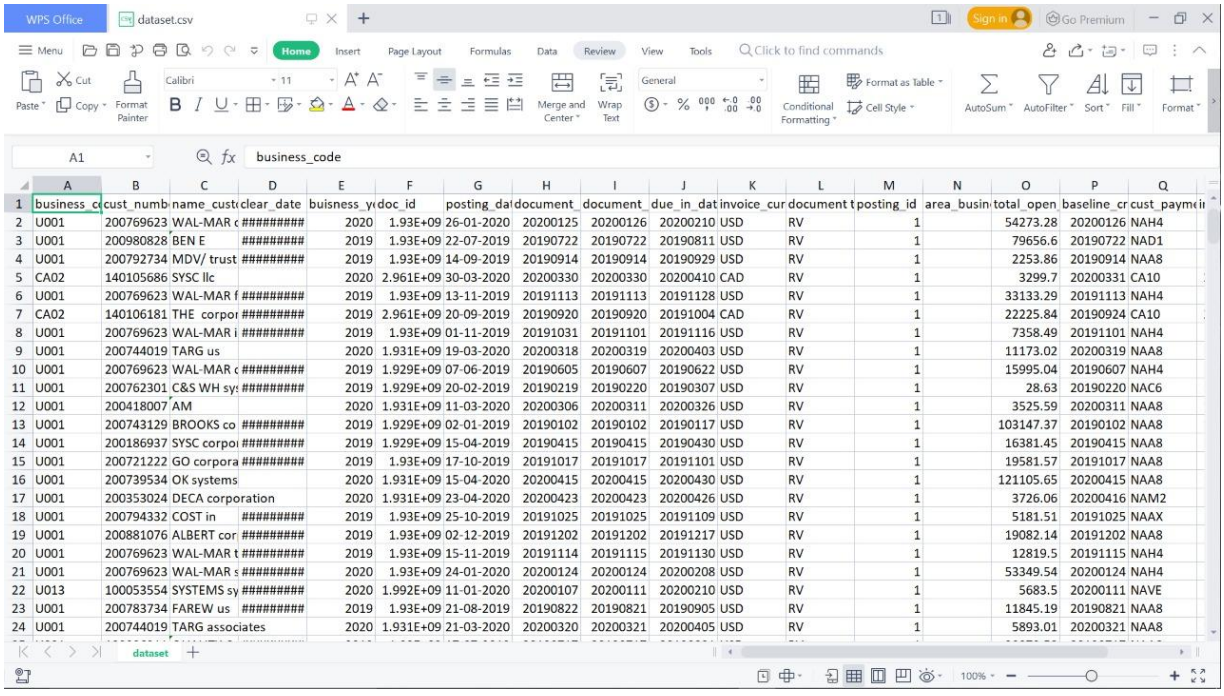
1. **Data Loading in DB**:
a. We have been provided an invoices dataset which is used to parse,process, and load in the provided database schemas.

2. **UI Representation of the data**:
a. Build a responsive UI that can display the invoice data loaded from the database.
b. The UI supports searching and infinite scrolling operations.
c. The UI supports editing some editable fields, adding a new row to the grid, deleting rows from the grid, and downloading selected records from the grid in the predefined template(s).

Data Loading in DB

First we have loaded data from the provided CSV file to Database

CSV File



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	business_c	cust_numb	name_cust	clear_date	buisness_y	doc_id	posting_da	document_	document_	due_in_dat	invoice_cur	document t	posting_id	area_busin	total_open	baseline_cr	cust_payme
2	U001	200769623	WAL-MAR c	#########	2020	1.93E+09	26-01-2020	20200125	20200126	20200210	USD	RV	1		54273.28	20200126	NAH4
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15	U001	200721222	GO corpora	#########	2019	1.93E+09	17-10-2019	20191017	20191017	20191101	USD	RV	1		19581.57	20191017	NAA8
16	U001	200739534	OK systems		2020	1.931E+09	15-04-2020	20200415	20200415	20200430	USD	RV	1		121105.65	20200415	NAA8
17	U001	200353024	DECA corporation		2020	1.931E+09	23-04-2020	20200423	20200423	20200426	USD	RV	1		3726.06	20200416	NAM2
18	U001	200794332	COST in	#########	2019	1.93E+09	25-10-2019	20191025	20191025	20191109	USD	RV	1		5181.51	20191025	NAAX
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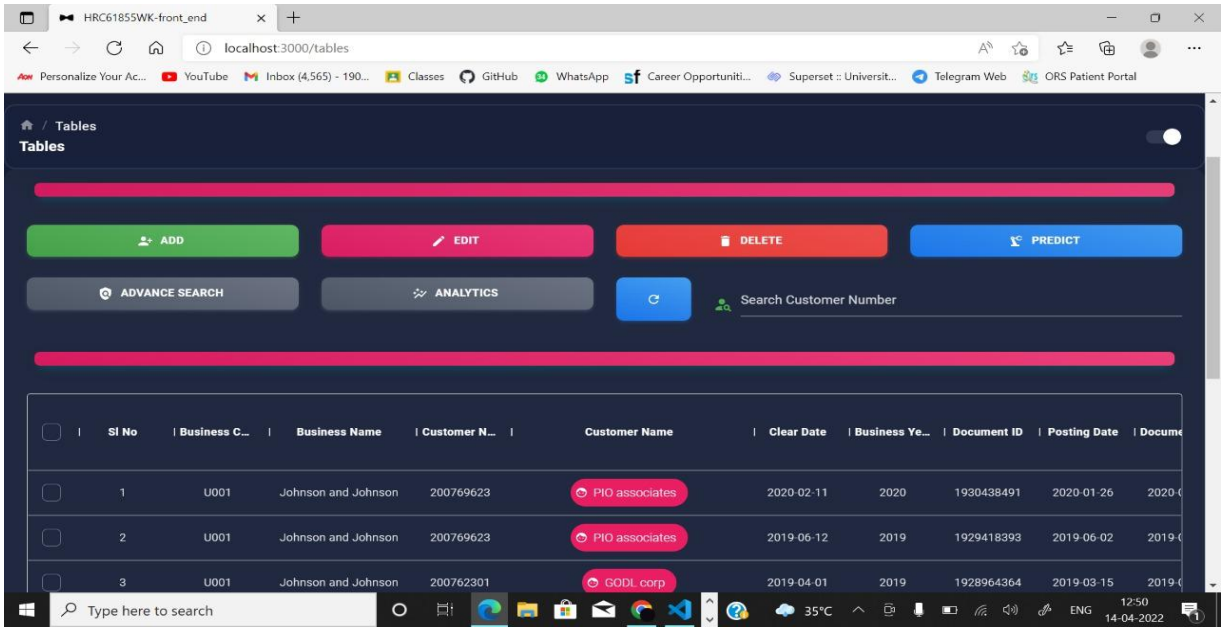
LAYOUT DESIGN



Header Section:

The header consists of :

i. Account name logo <ABC Products>on the left,

ii. The HighRadius Logo is in the center.

Grid Panel Section:

- The header of the grid will have a Predict button on the top right corner followed by a ViewCorrespondence Button, an Add Button, an Edit Button, a Delete Button, Advance search Button, Analytics Button,Refresh Button and a Search Bar.

The second portion is the table with customer invoice data as rows

Functionality

- The Predicted Payment Date and Predicted Aging Bucket columns will remain blankby default.
- Clicking on the Predict button after selecting one or more rows will auto-populate the twocolumns with the values derived from the ML model.
- The grid will also have a Select all and Deselect All functionality to select one ormore records.
- The past due invoices should have the due date marked in red in the grid.
- The third portion is the vertical scroll bar. The grid should support infinite scrolling.
- A loading icon animation should be displayed while the records are loading.

The grid should be sortable by two columns- due date and invoice amount in ascending and descending order

Modal View: There are 6 different modal views in our application. Those are :

- Add
- Delete
- Edit
- Analytics
- Advanced Search
- Predict

Add button:

• It is used for adding new field values to the grid.

• The Add button will be in the enabled state if no row is selected.

• Whenever one or more rows are selected, the Add button will still remain activated.

After clicking on the Add button, a pop-up window will appear with all the fields for which values need to be added along with a Cancel and an Add button. The user should be able to type in the values, except for the date of the invoice for which there should be a calendar view from where the user is able to select the required date, month, and year, The user should fill in all the required fields before adding. If the user tries to click on add before all mandatory fields are filled, the user will not be able to add.

Edit button:

• It is used for editing the editable field values in the grid.

• Edit button should be disabled at first and should enable only one checkbox is

selected

A user should be able to select a row and then click on the Edit button.

• The fields which can be edited are the Invoice Currency and Customer

Payment Terms fields. Without selecting any row, the Edit button should remain disabled.

Delete Button :

Clicking on the delete button will allow the user to delete records from the grid.
When the user selects one or more rows, the delete button gets enabled.
A pop-up should be displayed on clicking delete to confirm that the user wants to delete the selected records permanently.
Once the user clicks on the delete button, the row(s) should be removed from the grid in the UI and should remain persistent

Refresh Button :
Refreshes the data in the data table

Predict Button :
Predicts the payment date of selected Invoices with the help of the Predict button.

Advanced Search Button :

Clicking on this button will help the user to perform an advanced search on the data based on the following four fields:

1. Document Id-(doc_id)
2. Customer No-(cust_number)
3. Invoice No-linvoice_id)
4. Business Year- (buisness_year)

5.2 Coding Standards

Coding standards are collections of coding rules, guidelines, and best practices. Few of the coding standards are:-

1.Write as few lines as possible.
2.Use appropriate naming conventions.
3.Segment blocks of code in the same section into paragraphs.
4.Use indentation to marks the beginning and end of control structures. Clearly specify the code between them.
5.Don’t use lengthy functions. Ideally, a single function should carry out a single task.
6.Not making too much data types as Global data.
7.The coding style should be such that it is easily understandable by everyone.

Chapter 6

Conclusion & Future Scope

6.1 Conclusion

The project's major goal is to handle the Account Receivable department in a simple, seamless, and efficient manner. Account managers will be able to collect payments for past due invoices from consumers. They might send consumers reminders and follow-ups to ensure that payments are made on time. They may handle the full process of obtaining cash inflow as well as assisting the company in receiving payment for the services and products provided.

Any tool or platform that controls sales, orders, inventory, and fulfilment, as well as the people, procedures, and partnerships required for products to reach the customers who purchased them, is known as an order management system.In this project, I have built an AI-Enabled Fin Tech B2B Order Management Application using regression model to predict payment of order will be delayed or not. The root mean square errorof the model turned out to be 6.73. The same has been then deployed using Flask Framework and React JS for front end.

6.2 Future Scope

Till now we have made a responsive dashboard that will help to manage theaccount receivable department in an effective way, but it is manual, not automated, whichmeans we have to find the customer from the table grid manually and send reminders to them for payment and another purpose. So we can make an AI model which will automatically send reminders when required. And we can also add a voice detection feature so that one can operate it without contact. We are eager to implement these features in the project shortly.

The accuracy of the model can be increased and the same can be deployed in the cloud tomake it available to a larger audience.

References

Recommended Components To Use:

Typography - https://material-ui.com/components/typography/#typography
Buttons - https://material-ui.com/api/button/.
Grid - https://material-ui.com/components/grid/#grid
Modal - https://material-ui.com/components/tables/#table.
Cards Base - https://material-ui.com/components/paper/#paper.
Inputs - https://material-ui.com/components/text-fields/#text-field.Checkbox - https://material-ui.com/components/checkboxes/.
Dropdown - https://material-ui.com/components/selects/#select
Snackbar - https://material-ui.com/components/snackbars/#snackbar.
DataGrid - https://material-ui.com/components/x-datagrid/.

Important Links:
Icons - https://material-ui.com/components/material-icons/.Java Docs - https://docs.oracle.com/en/java/.
ReactJs Docs - https://reactjs.org/docs/hello-world.html

External Links:

https://stackoverflow.com/

https://www.geeksforgeeks.org/

https://www.tutorialspoint.com/

https://www.youtube.com/

SAMPLE INDIVIDUAL CONTRIBUTION REPORT:

Ai Enabled Fintech B2B Invoice Management Application

Riya Rani Mandal 1906493

Abstract: B2B stands for business-to-business. Businesses work on a credit basis with one another. When a buyer company orders products from a seller company, the seller company sends an invoice to the buyer company. This products invoice includes information such as the details of the goods purchased and when they should be paid. The buyer company must pay the balance due before the deadline. In real-world settings, however, invoices are not always cleared, that is, paid in full by the due date (The payment date is the date on which a client clears the payment for an invoice.) The project is split into two sections. A Machine Learning Model is created in the first phase of this project to predicted the payment date. In the second half of the project a full stack InvoiceManagement Application is built using ReactJs, JDBC, Java and JSP. In this application a responsive Receivables Dashboard is built. Here we can visualize the Data in the form of grids , perform searching operations on the invoices , modify data in the editable fields of the grid and download data of selected rows in predefined templates.

Full Signature of Project Mentor:

Riddhi Agarwal , Vivek Suman

Full signature of the student:

Riya Riya Mandal

PLAGIARISM REPORT