AI-Enabled FinTech B2B Invoice Management Application

HighRadius

Submitted in partial fulfillment of the requirements for the award of degree of

B Tech

Computer Science and Engineering

Submitted to

Lovely Professional University

Phagwara, Punjab

From 01/28/22 to 04/13/22

SUBMITTED BY

Name of the student: Korrayi Karthik

Registration Number: 11912804

Signature of the student: kkarthik

Contents.

To whom so ever it may concern

I, Korrayi Karthik, 11912804, hereby declare that the work done by me on "AI-Enabled FinTech B2B Invoice Management Application" from January, 2022 to April, 2022, under the supervision of Deepayan Sur, Associate Engineer, HighRadius Technologies Private Limited, and Dr. Sami Anand, Head of Training and Placement cell, Lovely Professional University, Phagwara, Punjab, is a record of original work for the partial fulfillment of the requirements for the award of the degree, B Tech.

Name of the Student (Registration Number)

Korrayi Karthik (11912804)

Signature of the student

kkarthik

Dated: 22-06-2022

To whom so ever it may concern

This is to certify that Korrayi Karthik, 11912804 from Lovely Professional University, Phagwara, Punjab, has worked as a trainee in HighRadius Technologies Private Limited on "AI-Enabled FinTech B2B Invoice Management Application" under my supervision from 01, 2022 to 04, 2022. It is further stated that the work carried out by the student is a record of original work to the best of my knowledge for the partial fulfilment of the requirements for the award of the BTech, Computer Science and Engineering.

Name of External Supervisor	Name of Internal Supervisor
Deepayan Sur	Dr. Sami Anand
Designation of the External Supervisor	Designation of the Internal Supervisor
Associate Software Engineer-1	Head of Training and Placement cell
Signature of the External Supervisor	Signature of the Internal Supervisor

Acknowledgement

I would like to take this opportunity to thank all my sources of aspiration during the course of the internship.

First and foremost, I am grateful Deepayan Sur and Akash Ranjan, who gave an opportunity to work on projects at HighRadius Technologies and for their continuous support during the internship and for their patience, motivation, and immense knowledge. They helped us and guided us throughout the internship and development.

I am also thankful to my senior developers and team leads for their valuable guidance, support, and cooperation extended by them. Then I would like to thank my project team members for their kind cooperation, help and never- ending support.

I am also thankful to Lovely Professional University, Phagwara, Punjab for providing me technical skills and facilities which proved to be very useful for our project.

Korrayi Karthik

11912804

Training Certificate

CHAPTER-1

INTRODUCTION OF THE COMPANY

Company's Vision and Mission

HighRadius is a leading Software-as-a-Service (SaaS) company in the Accounts Receivables space. The HighRadius Integrated Receivables platform optimizes cash flow through the automation of receivables and payments process across cash application, credit, collections, deductions, electronic billing, and payment processing.
HighRadius is the fastest growing SaaS company in the AR/Treasury sector with an average 5-year growth of 75%. In 2020, it became the only Unicorn in our space, and in 2021, it raised $300M in Series C funding, tripling out valuation to $3.1 billion in 14 months.

HighRadius offers cloud-based Autonomous Software for the Office of the CFO. More than 700 of the world's leading companies have transformed their order to cash, treasury and record to report processes with HighRadius. Customers include 3M, Unilever, Anheuser-Busch InBev, Sanofi, Kellogg Company, Danone, Hershey's and many more.

The goal is to help A/R and credit departments adopt innovative processes supported by high levels of automation so they may become more strategic, more streamlined, and more successful. It operates on three core principles: to reduce the total cost of ownership (TCO) of receivables solutions, to deliver a concrete return on investment (ROI) and fast payback periods to our customers, and to provide innovative functionality to the market. HighRadius is trusted by some of the world's largest corporations and is consistently named one of the fastest growing technology companies in Houston, where it is headquartered

HighRadius offers two product lines as well as implementation services. Receivables Cloud and Payments Cloud are SaaS-based solution suites that automate and improve cash application, invoicing, and credit, collections, and deductions management. HighRadius Accelerators are certified solutions for SAP that enhance the automation available in the Receivables Management modules and reside natively in the application.

Origin and growth of company

Co-founded in 2006 by Indian-origin entrepreneur Sashi Narahari, it remained bootstrapped until its first funding round in 2017. Till date, the company has raised $175 million across three rounds, including the $50 million it raised in September 2017.

The software as a service (SaaS) firm, headquartered in Hyderabad and Houston, is the 25th Indian start-up to become a unicorn. HighRadius allows businesses to automate key back-office functions such as trade receivables and treasury management. It uses an AI platform to automate routine financial tasks and for predicting invoice payment dates. Its clients include top companies such as Adidas, Cargill, Danone, Walmart, Johnson & Johnson, and Starbucks.

HighRadius solutions have a proven track record of reducing Days Sales Outstanding (DSO) and bad debt, and increasing operation efficiency, enabling companies to achieve a Return of Investment (ROI) in just a few months.

1.1

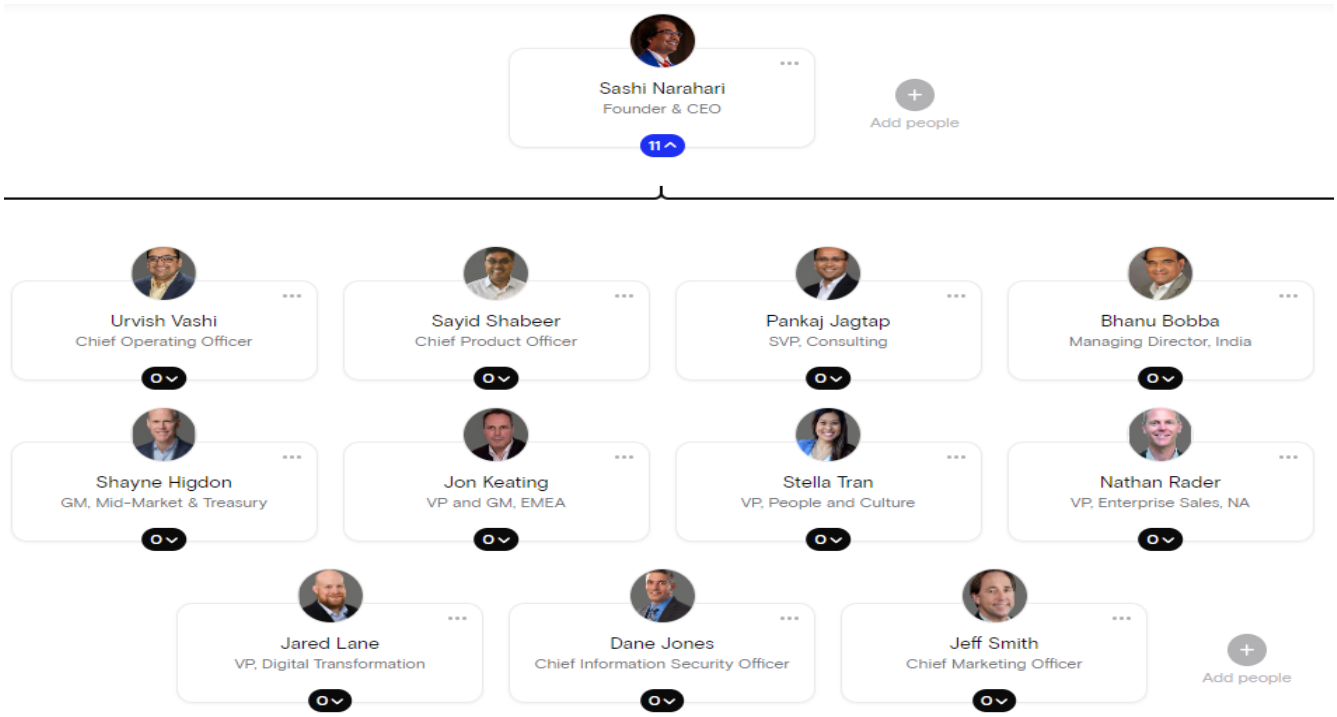
This empower their customers to be able to work more accurately and efficiently, forecast and manage cash, get paid faster, and improve key metrics like Days Sales Outstanding (DSO) and improve working capital availability.

Various departments and their functions

Autonomous Software is data-driven software that continuously morphs its behaviour to the ever-changing underlying domain transactional data. It brings modern digital transformation capabilities like Artificial Intelligence, Robotic Process Automation, Natural Language Processing and Connected Workspaces as out-of-the-box features for the finance & accounting domain.

Finance business stakeholders have been led to believe that they have only two choices: pick an application software vendor that digitizes a paper or Excel-based process to an electronic system of record or choose a middleware platform for AI or RPA to build and maintain in-house, domain-specific capabilities. In contrast, HighRadius Autonomous Software combines the best of both worlds to deliver measurable business outcomes such as DSO reduction, working capital optimization, bad-debt reduction, reduce month close timelines and improve productivity in under six months.

Organization chart of the company



1.2

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CHAPTER-2

INTRODUCTION OF THE PROJECT UNDERTAKEN

Objectives of the work undertaken

The B2B world operates differently from the B2C or C2C world. Businesses work with other businesses on credit. When a buyer business orders goods from the seller business, the seller business issues an invoice for the same. This invoice for the goods contains various information like the details of the goods purchased and when it should be paid. This is known in accounting terminology as “Accounts Receivable”.

“Accounts Receivable represents money owed by entities to the firm on the sale of products or services 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 timeframe, called credit terms or payment terms.”

Scope of the work

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 important fields 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 amount by the due date. The date on which a customer clears the payment for an invoice is called the payment date.

Importance and Applicability

1. In the ideal world, the buyer business should pay back within the stipulated time (i.e., 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.
2. Every business consists of a dedicated Account receivables Department to collect and track payment of invoices.
3. It consists of an Account receivables team that is responsible for:
    - Collecting payments from customers for their past due to invoices.
    - Sending reminders and follow-ups to the customers for payments to be made.
    - Looking after the entire process of getting the cash inflow.
    - Help the company get paid for the services and products supplied.

Quality Assurance

In the working organization, if some department is there to verify the quality of work, they can produce a certificate or guidelines followed.

System Design

Machine learning**:** Environment: Jupyter Notebook

Language: Python

back-end : Environment: Eclipse (Java Enterprise)

Language: Java

front-end: Environment: Visual Studio Code

Language: ReactJS

Database: Environment: SQLYog

Language: SQL Query

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CHAPTER-3

BRIEF DESCRIPTION OF THE WORK DONE

Position of Internship and roles

As a winter internship project, I will be building a web application to help the people working in the Accounts Receivable departments in their day-to-day activities.

I need to build a web application where the users in the Account Receivable department can:

→ View the invoice data from various buyers.
→ See various fields/attributes of the invoice(s) from a particular buyer.
→ Perform Data Pre-processing on the invoice data.
→ Get account-level analytics to easily visualize and interpret data- EDA and Feature Engineering as:
→ Get a prediction of when the invoice is going to get paid.

Activities/equipment handled

The major aspects of the application that needs to be developed. The details for each of the below are provided in the functional overview section.

1) Data Loading in DB: It will be provided with an invoices dataset which you need to parse, process, and load in the provided database schemas.

2) UI Representation of the data: To build a responsive UI that can display the invoice data loaded from the database. The UI should support searching and pagination. The UI should support editing of some editable fields, adding a new row to the grid, deleting rows from the grid and advance search.

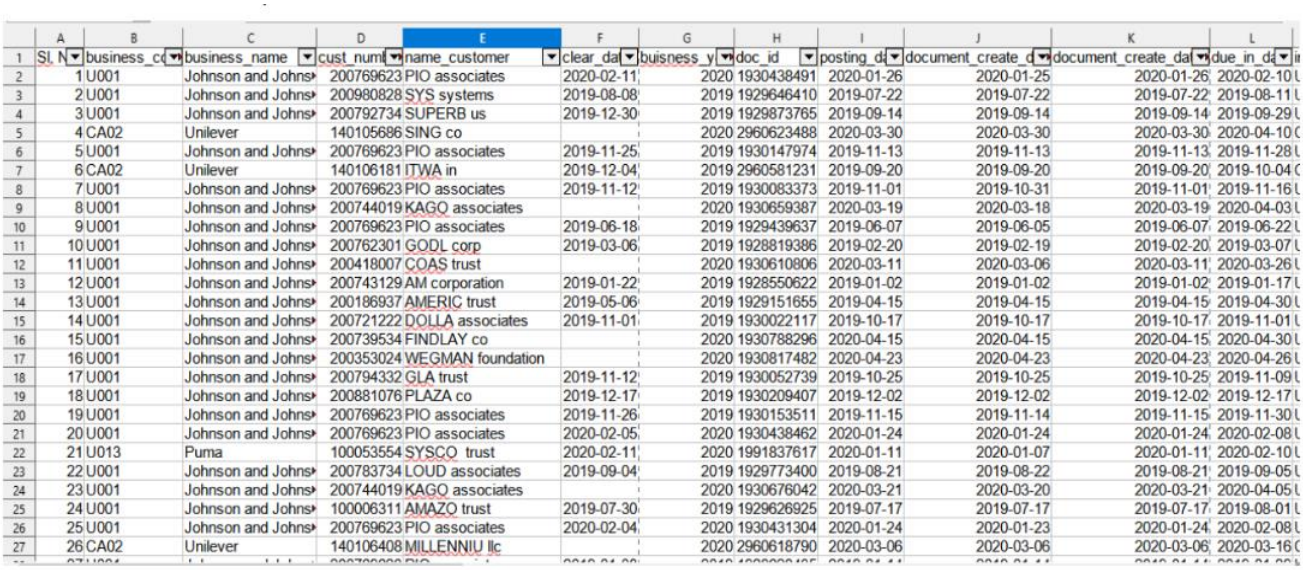
3) AI Support in the application: To Add support for predicting the payment date for one or more invoice(s). UI should have a button to trigger the prediction of the payment date. The payment date needs to be persisted across sessions in the UI.

Challenges faced and how those were tackled

Functional overview: -

1) Data loading in the database;

Below is the sample CSV file screenshot



	A	B	C	D	E	F	G	H	I	J	K	L
1	Sl_N	business_co	business_name	cust_numb	name_customer	clear_dat	buisness_y	doc_id	posting_d	document_create_d	document_create_da	due_in_da
2	1	U001	Johnson and Johns	200769623	PIO associates	2020-02-11	2020	1930438491	2020-01-26	2020-01-25	2020-01-26	2020-02-10
3	2	U001	Johnson and Johns	200980828	SYS systems	2019-08-08	2019	1929646410	2019-07-22	2019-07-22	2019-07-22	2019-08-11
4	3	U001	Johnson and Johns	200792734	SUPERB us	2019-12-30	2019	1929873765	2019-09-14	2019-09-14	2019-09-14	2019-09-29
5	4	CA02	Unilever	140105686	SING co		2020	2960623488	2020-03-30	2020-03-30	2020-03-30	2020-04-10
6	5	U001	Johnson and Johns	200769623	PIO associates	2019-11-25	2019	1930147974	2019-11-13	2019-11-13	2019-11-13	2019-11-28
7	6	CA02	Unilever	140106181	ITWA in	2019-12-04	2019	2960581231	2019-09-20	2019-09-20	2019-09-20	2019-10-04
8	7	U001	Johnson and Johns	200769623	PIO associates	2019-11-12	2019	1930083373	2019-11-01	2019-10-31	2019-11-01	2019-11-16
9	8	U001	Johnson and Johns	200744019	KAGO associates		2020	1930659387	2020-03-19	2020-03-18	2020-03-19	2020-04-03
10	9	U001	Johnson and Johns	200769623	PIO associates	2019-06-18	2019	1929439637	2019-06-07	2019-06-05	2019-06-07	2019-06-22
11	10	U001	Johnson and Johns	200762301	GODL corp	2019-03-06	2019	1928819386	2019-02-20	2019-02-19	2019-02-20	2019-03-07
12	11	U001	Johnson and Johns	200418007	COAS trust		2020	1930610806	2020-03-11	2020-03-06	2020-03-11	2020-03-26
13	12	U001	Johnson and Johns	200743129	AM corporation	2019-01-22	2019	1928550622	2019-01-02	2019-01-02	2019-01-02	2019-01-17
14	13	U001	Johnson and Johns	200186937	AMERIC trust	2019-05-06	2019	1929151655	2019-04-15	2019-04-15	2019-04-15	2019-04-30
15	14	U001	Johnson and Johns	200721222	DOLLA associates	2019-11-01	2019	1930022117	2019-10-17	2019-10-17	2019-10-17	2019-11-01
16	15	U001	Johnson and Johns	200739534	FINDLAY co		2020	1930788296	2020-04-15	2020-04-15	2020-04-15	2020-04-30
17	16	U001	Johnson and Johns	200353024	WEGMAN foundation		2020	1930817482	2020-04-23	2020-04-23	2020-04-23	2020-04-26
18	17	U001	Johnson and Johns	200794332	GLA trust	2019-11-12	2019	1930052739	2019-10-25	2019-10-25	2019-10-25	2019-11-09
19	18	U001	Johnson and Johns	200881076	PLAZA co	2019-12-17	2019	1930209407	2019-12-02	2019-12-02	2019-12-02	2019-12-17
20	19	U001	Johnson and Johns	200769623	PIO associates	2019-11-26	2019	1930153511	2019-11-15	2019-11-14	2019-11-15	2019-11-30
21	20	U001	Johnson and Johns	200769623	PIO associates	2020-02-05	2020	1930438462	2020-01-24	2020-01-24	2020-01-24	2020-02-08
22	21	U013	Puma	100053554	SYSCO trust	2020-02-11	2020	1991837617	2020-01-11	2020-01-07	2020-01-11	2020-02-10
23	22	U001	Johnson and Johns	200783734	LOUD associates	2019-09-04	2019	1929773400	2019-08-21	2019-08-22	2019-08-21	2019-09-05
24	23	U001	Johnson and Johns	200744019	KAGO associates		2020	1930676042	2020-03-21	2020-03-20	2020-03-21	2020-04-05
25	24	U001	Johnson and Johns	100006311	AMAZO trust	2019-07-30	2019	1929626925	2019-07-17	2019-07-17	2019-07-17	2019-08-01
26	25	U001	Johnson and Johns	200769623	PIO associates	2020-02-04	2020	1930431304	2020-01-24	2020-01-23	2020-01-24	2020-02-08
27	26	CA02	Unilever	140106408	MILLENNIU llc		2020	2960618790	2020-03-06	2020-03-06	2020-03-06	2020-03-16

3.1 All the columns of the CSV file need to be loaded into the database

List of all the fields part of dataset are as follows:

- sl_no
- business_code
- business_name
- cust_number
- name_customer
- clear_date
- buisness_year
- doc_id
- posting_date
- document_create_date
- document_create_date.1
- due_in_date
- invoice_currency
- document type
- posting_id
- area_business
- total_open_amount
- baseline_create_date
- cust_payment_terms
- invoice_id
- isOpen
- predicted

3.2

2) UI representation of the data,

The UI consists of a single screen:

3.3 Receivables Dashboard Page

It consists of 2 sections:

→ First Section is the header which comprises the ABC Product logo on the left, the HighRadius Logo in the middle.

→ The second section consists of Predict, Advance Search, Analytics View Add, Delete & Edit, and Search bar.

a) 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.

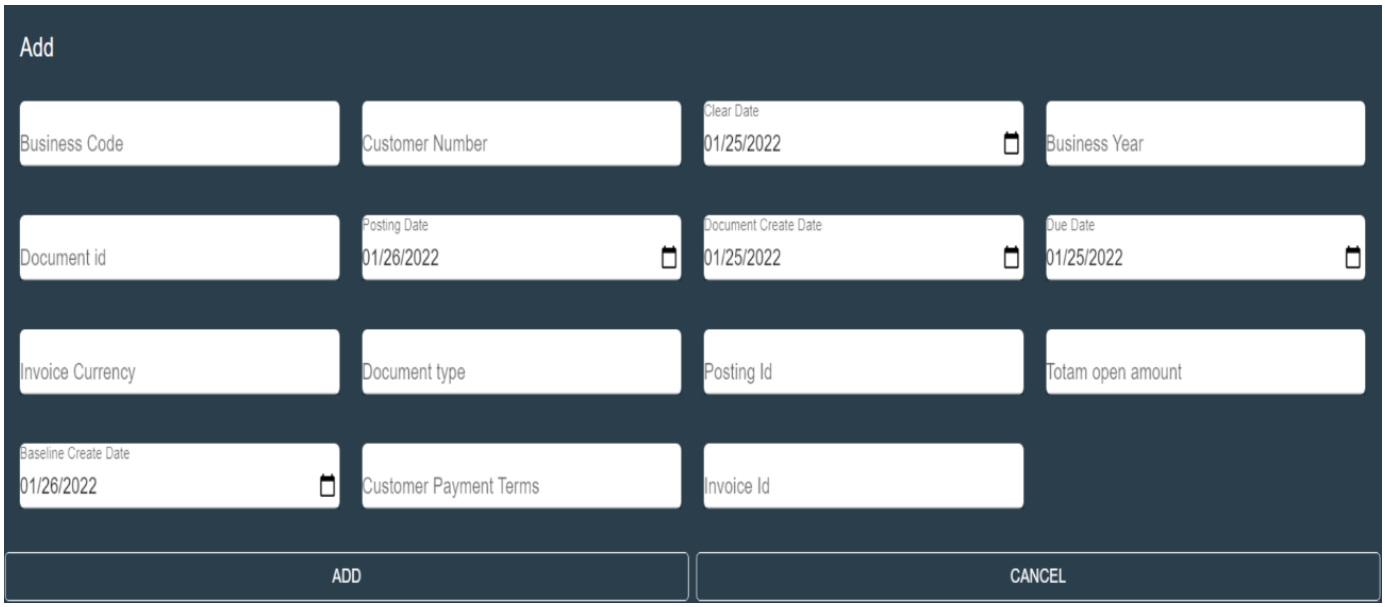
→ Whenever one or more rows are selected, the Add button will still remain activated.

→ 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.

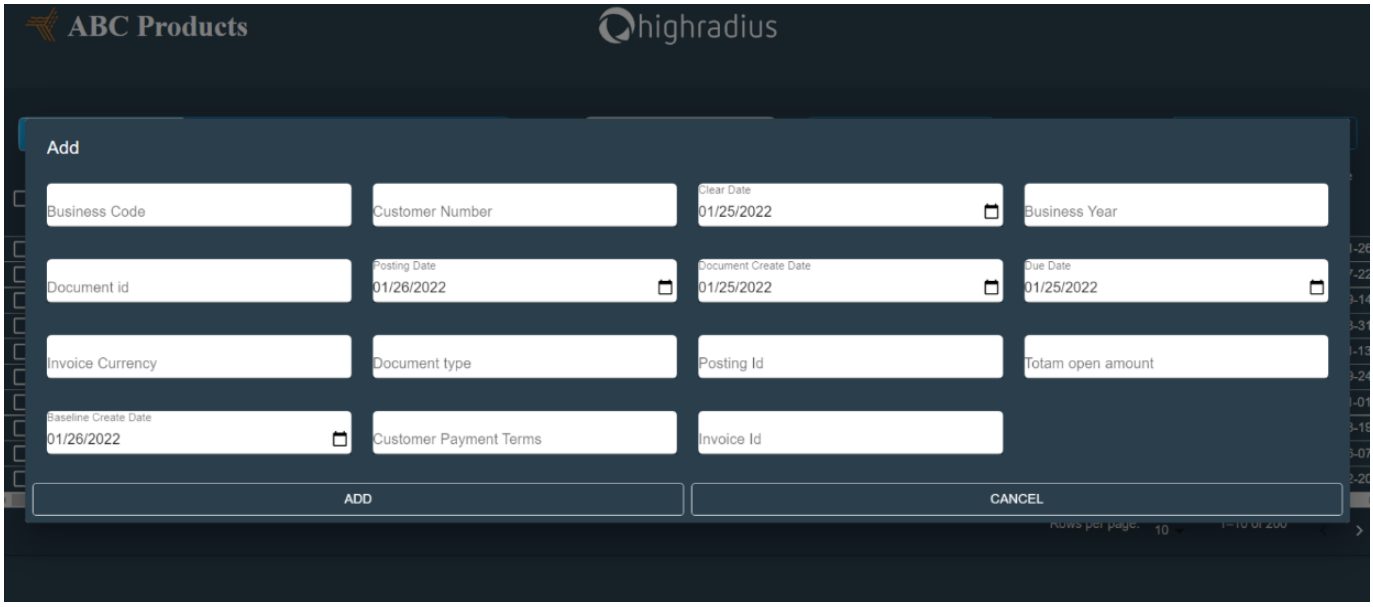
→ The user should fill in all the required fields before adding. If the user tries to click on add before all mandatory fields are filled, the user will not be able to add.

3.4



Full Screen view as

3.5



b) 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.

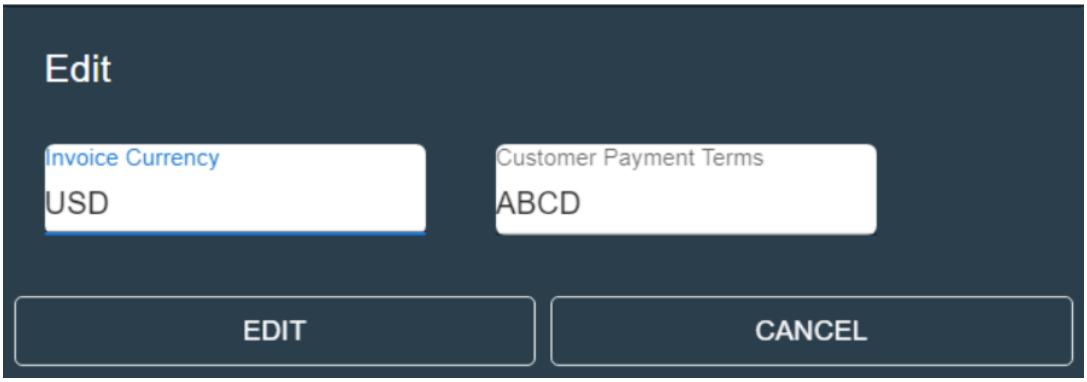
→ Without selecting any row, the Edit button should remain disabled.

→ On clicking the Edit button, a popup should open up with the column header name and existing value.

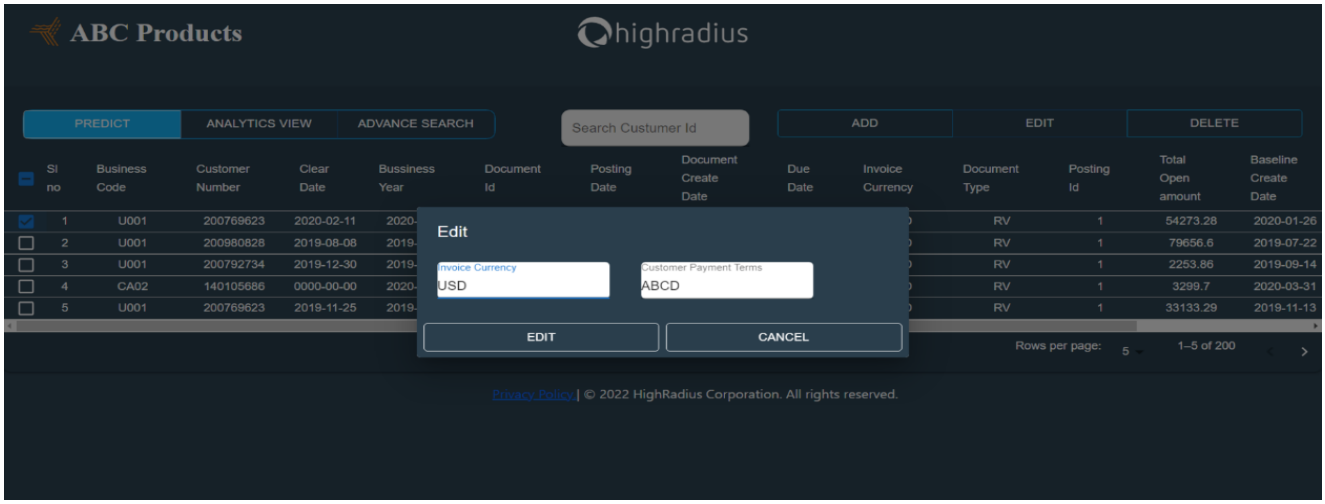
→ The user should be able to edit the existing value.

→ The popup should have a Edit, Cancel as shown in the UI below.

3.6



Full Screen view as



3.7

c) Delete Button:

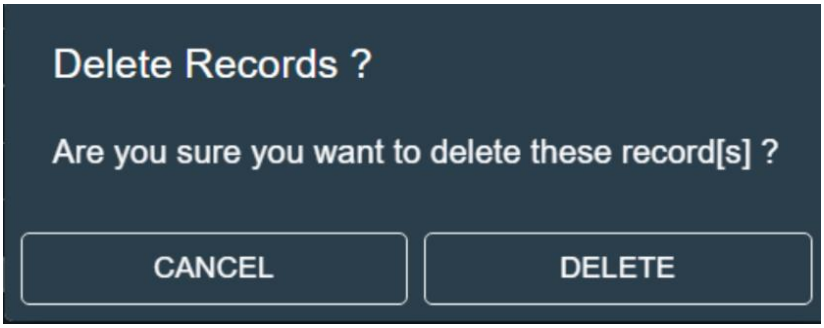
→ Clicking on the delete button will allow the user to delete records from the grid.

→ 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 rows should be removed from the grid in the UI and should remain persistent.

3.8



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Full Screen view as

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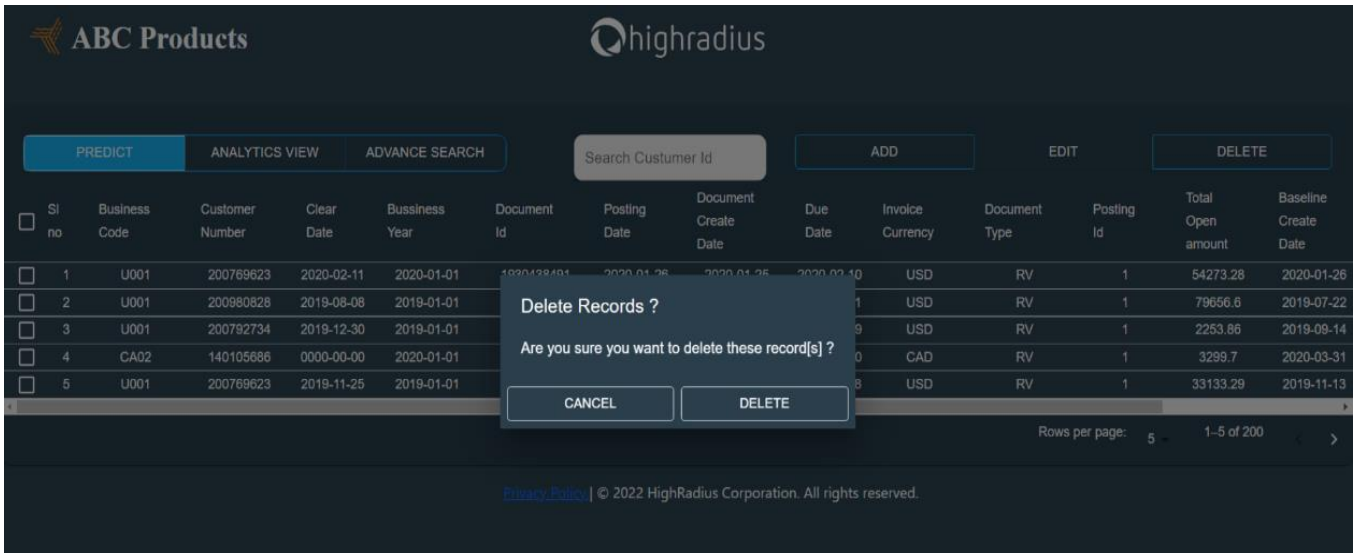


3.9

d) Predict button:

→ Users should be able to predict the payment date of selected Invoices with the help of the Predict button.

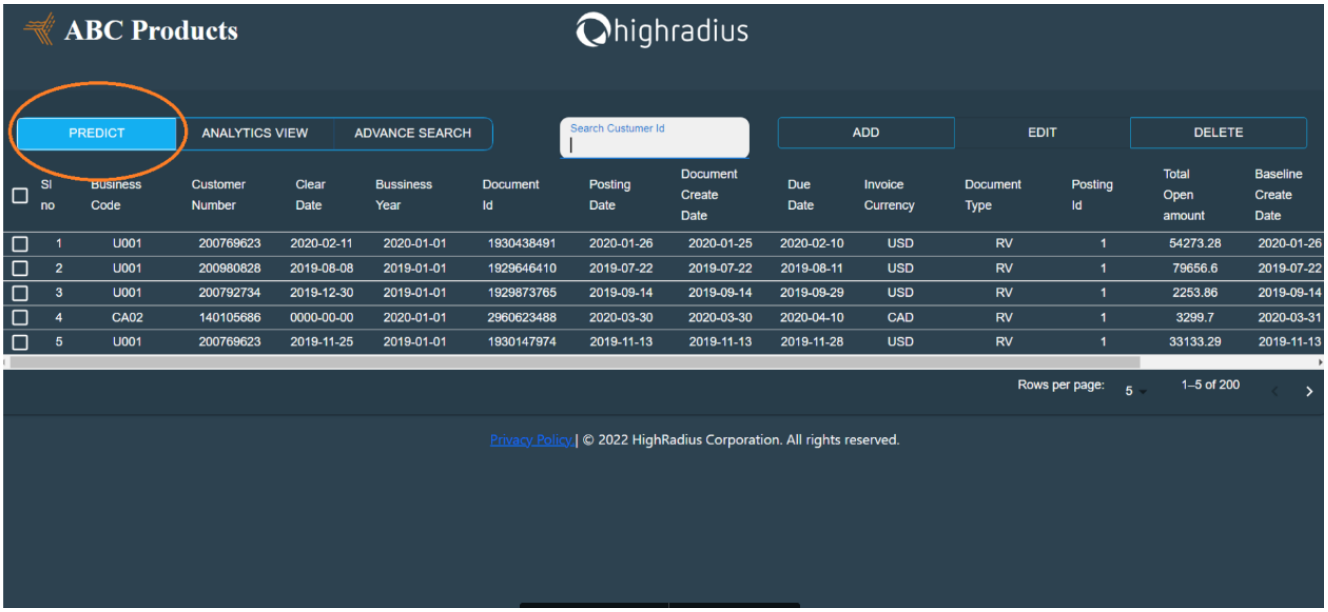
→ Clicking on this button will populate the Predicted Payment Date column on the UI with the predicted dates.

→ When the user selects one or more Invoices and clicks on the Predict button, the Predicted Payment Date column should get populated only for those invoices.

→ The button should get activated only upon selecting any of the Invoice(s).

→ If no Invoice is selected, the button should be in a disabled state.

3.10



e) Advanced Search button:

→ The UI consists of the 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:

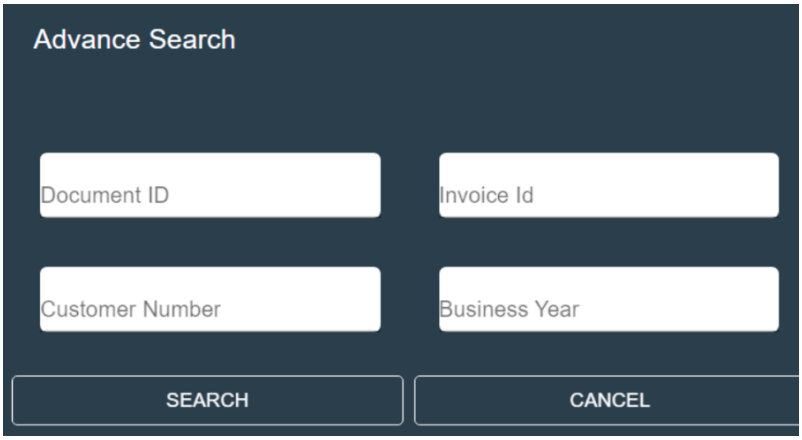
i. Document Id-(doc_id)

ii. Customer No-(cust_number)

iii. Invoice No-(invoice_id)

iv. Business Year- (buisness_year)

3.11



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Full Screen view as

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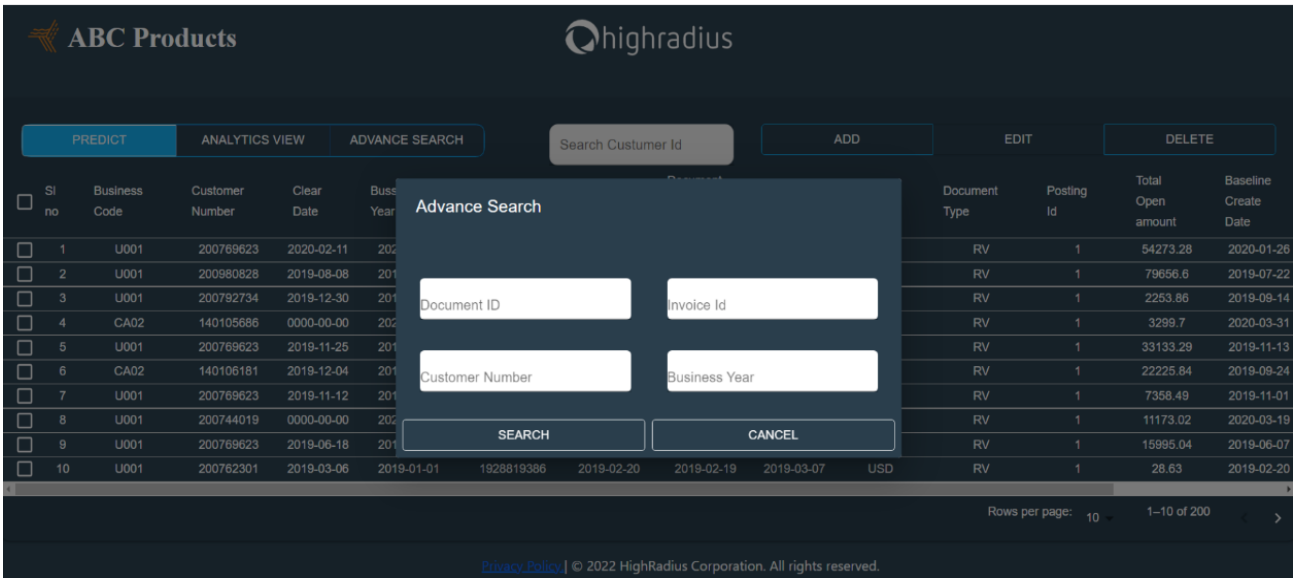
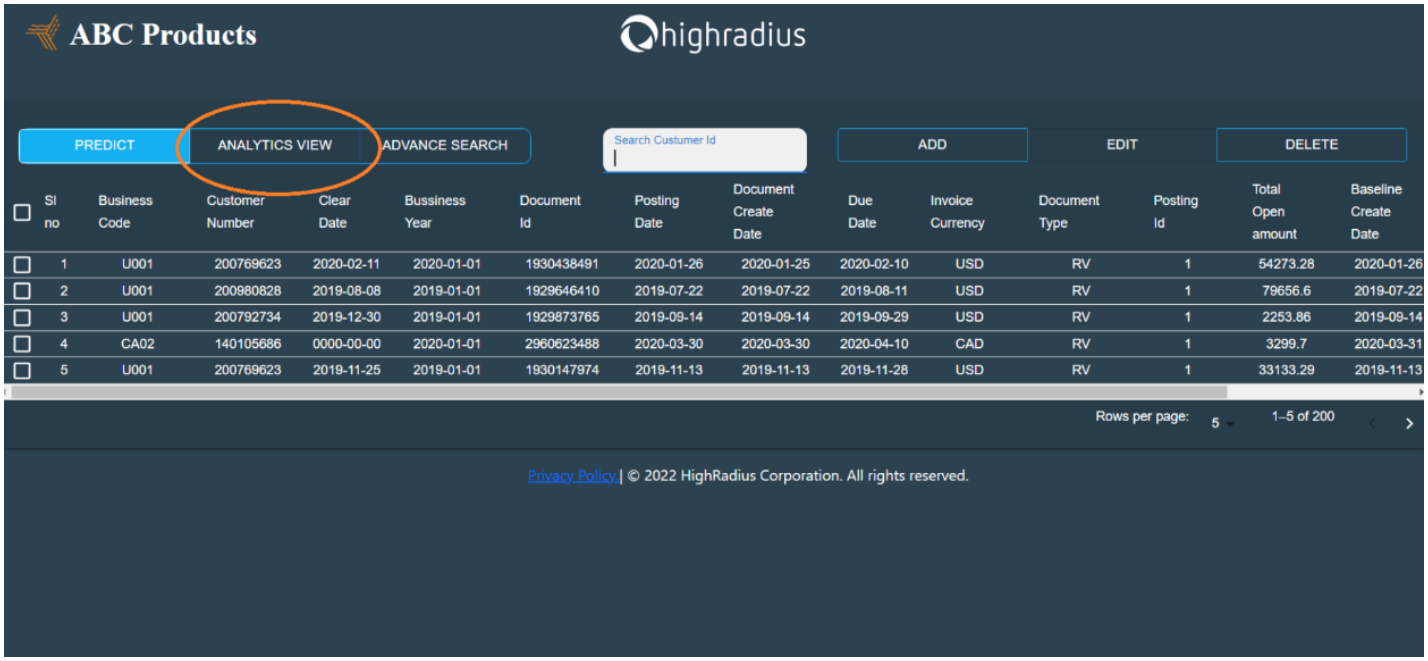


3.12

f) Analytics View:

→ To get insights from the existing data based on user's inputs. The existing parameters would act as key points or outliers for the synthesis of data.

→ So, the analytics view will be a button in UI which responds to a new window on click Event



3.13

The new window contains of parameters:

i. Currency (Multiselect)
ii. Due Date
iii. Baseline Create Date
iv. Clear Date

→ The user will have a privilege to go for single parameter or multi parameter based on their choices and preferences.

→ On submitting the parameters, the web application will open the dialog window which will provide the user with an illustration of a bar graph and pie chart which will be formed based on the parameterized data that the user had selected.

→ The bar graph will be showing data for the total open amount and number of customers for all Business.

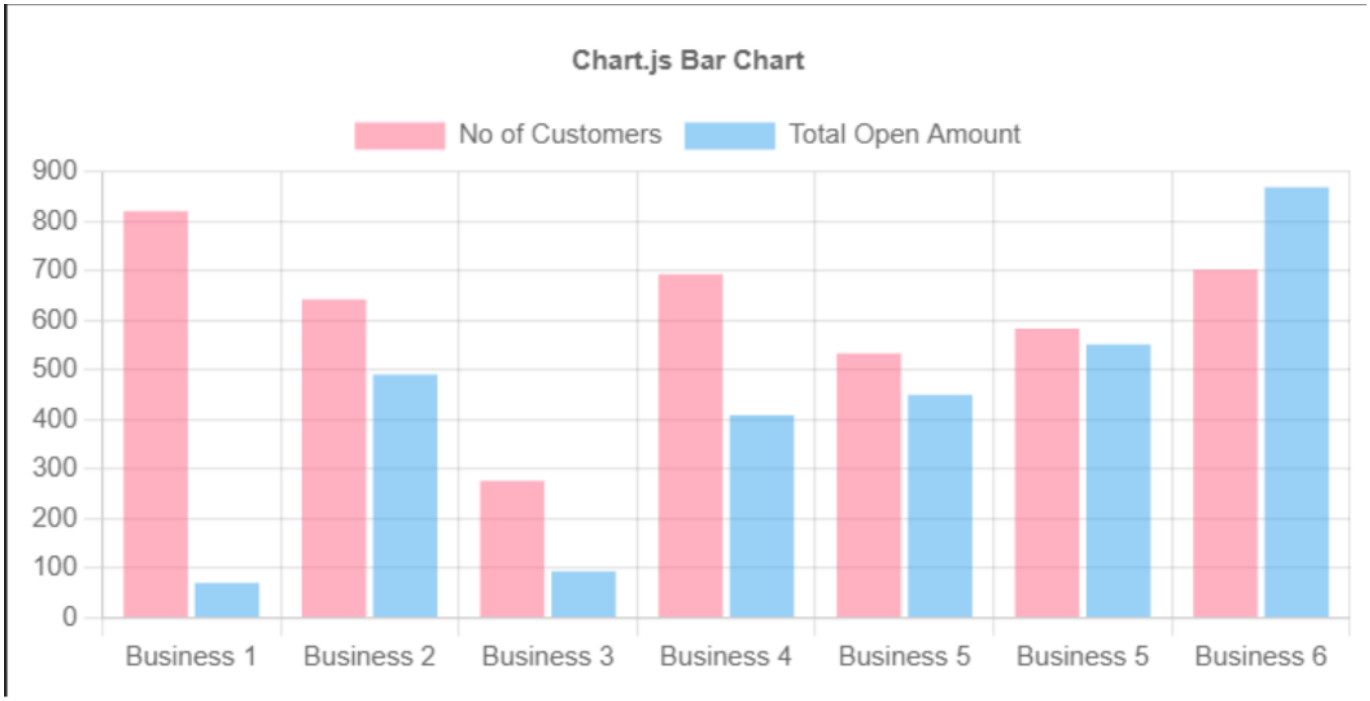
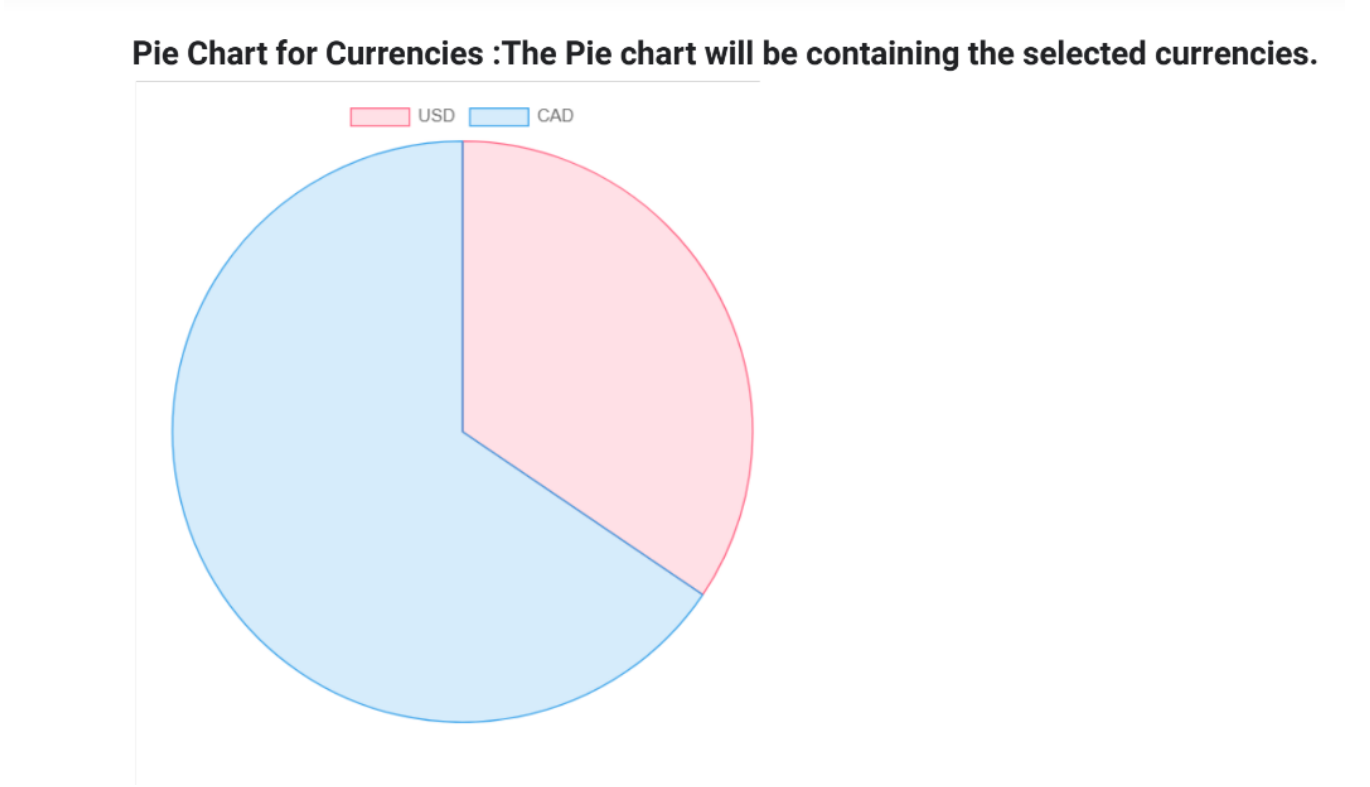


Chart.js Bar Chart
No of Customers
Total Open Amount
900
800
700
600
500
400
300
200
100
0
Business 1
Business 2
Business 3
Business 4
Business 5
Business 5
Business 6

3.14


Pie Chart for Currencies :The Pie chart will be containing the selected currencies.
USD
CAD

3.15

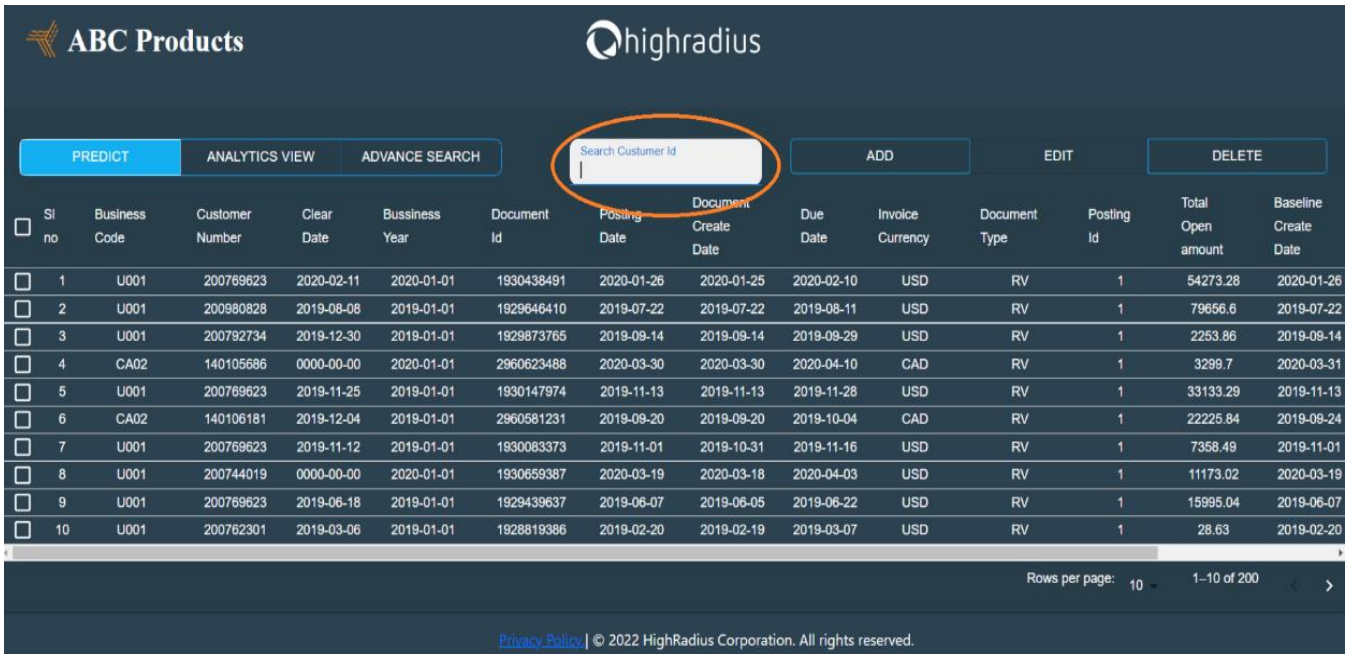
There will be a close button to close the window and redirect the user to the main screen (UI).

The analytics view button would be a simple tool that the user can use to view data based on their preferences and could facilitate decision making.

Searchable fields behavior:

i. Business Year- Text Field
ii. Customer Id-Text Field
iii. Invoice No - Text Field
iv. Document Id - Text Field
v. Customer Id - Equal Search

Users should be able to search for a customer by typing text in the Customer id integer field. Search is not case-sensitive.



3.16

g) Grid Panel Section:

The Seventh Section is the Grid Header section, consisting of all the different column name headers and a Select All and Deselect All functionality. Following are the columns to be displayed in the UI:

1. sl_no
2. business_code
3. cust_number
4. clear_date
5. buisness_year
6. doc_id
7. posting_date
8. document_create_date
9. due_in_date
10. invoice_currency
11. document type
12. posting_id
13. total_open_amount
14. baseline_create_date
15. cust_payment_terms
16. invoice_id

3.17

The Grid panel section will be divided into 3 portions:

→ The header of the grid will have a Predict button on the top left corner followed by an Advance Search Button, an Analytics view, an Add Button, an Edit Button, a Delete Button, and a Search Bar.

→ The name of the grid that is Invoice List will be mentioned in the top left corner of the grid.

→ The second portion is the table with customer invoice data as rows and the following columns,

The list of all the columns to be represented on the UI are as follows:

1. sl_no
2. business_code
3. cust_number
4. clear_date
5. buisness_year
6. doc_id
7. posting_date
8. document_create_date
9. due_in_date
10. invoice_currency
11. document type
12. posting_id
13. total_open_amount
14. baseline_create_date
15. cust_payment_terms
16. invoice_id

The Grid consists of the Grid Rows that contains the required data that is loaded from the CSV File. On a single page, only 10 invoices' data is displayed. Users can select single or multiple rows.

Sl no	Business Code	Customer Number	Clear Date	Bussiness Year	Document Id	Posting Date	Document Create Date	Due Date	Invoice Currency	Document Type	Posting Id	Total Open amount	Baseline Create Date
1	U001	200769623	2020-02-11	2020-01-01	1930438491	2020-01-26	2020-01-25	2020-02-10	USD	RV	1	54273.28	2020-01-26
2	U001	200980828	2019-08-08	2019-01-01	1929646410	2019-07-22	2019-07-22	2019-08-11	USD	RV	1	79656.6	2019-07-22
3	U001	200792734	2019-12-30	2019-01-01	1929873765	2019-09-14	2019-09-14	2019-09-29	USD	RV	1	2253.86	2019-09-14
4	CA02	140105686	0000-00-00	2020-01-01	2960623488	2020-03-30	2020-03-30	2020-04-10	CAD	RV	1	3299.7	2020-03-31
5	U001	200769623	2019-11-25	2019-01-01	1930147974	2019-11-13	2019-11-13	2019-11-28	USD	RV	1	33133.29	2019-11-13
6	CA02	140106181	2019-12-04	2019-01-01	2960581231	2019-09-20	2019-09-20	2019-10-04	CAD	RV	1	22225.84	2019-09-24
7	U001	200769623	2019-11-12	2019-01-01	1930083373	2019-11-01	2019-10-31	2019-11-16	USD	RV	1	7358.49	2019-11-01
8	U001	200744019	0000-00-00	2020-01-01	1930659387	2020-03-19	2020-03-18	2020-04-03	USD	RV	1	11173.02	2020-03-19
9	U001	200769623	2019-06-18	2019-01-01	1929439637	2019-06-07	2019-06-05	2019-06-22	USD	RV	1	15995.04	2019-06-07
10	U001	200762301	2019-03-06	2019-01-01	1928819386	2019-02-20	2019-02-19	2019-03-07	USD	RV	1	28.63	2019-02-20

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3.18

Learning outcomes

- Demonstrate the application of knowledge and skill sets acquired from the course and workplace in the assigned job function.
- Demonstrate the ability to harness resources by analysing challenges and considering opportunities.
- Communicate and collaborate effectively and appropriately with different professionals in the work environment.
- Exhibit critical thinking and problem-solving skills by analysing underlying issues to challenges.

Data Analysis

1. Invoice - A document that is issued by a seller to a buyer when some goods are purchased. The fields which can be part of the invoice are defined below.

2. Advanced Search - A pop-up window, which depicts the illustration that enables the user to search with single or multiple parameter values from the grid.

3. Predict - The predict button is used as a tool to predict the Payment Date of each invoice.

CHAPTER-4

CONCLUSION

- The main purpose of the project is to manage the Account Receivable department in a straightforward, smooth and efficient way. The account managers will be able to collect payments from customers for their past due invoices. Reminders and follow ups can be sent to the customers for payments to be made in a timely manner. They can look after the entire process of getting the cash inflow and also help the company get paid for the services and products supplied.
- Any order management system is a tool or platform that tracks sales, orders, inventory, and fulfillment as well as enables the people, processes, and partnerships necessary for products to find their way to the customers who bought them.
- In this project, an AI-Enabled Fin Tech B2B Order Management Application has been built using regression model to predict if the payment of order will be delayed or not.

.4.1 Future Scope

- Till now the project has a responsive dashboard which will help to manage the account receivable department in an effective way , but it is manual not automated, means we have to find the customer from the table grid manually and send reminder to them for payment and other purpose. Making an AI model which will automatically send reminder when required could be the next step. A voice detection feature can also be added so that one can operate it without contact.
- The accuracy of the model can be increased and the same can be deployed in cloud to make it available to a larger audience.

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REFERENCES

- For all information about the company as; http://www.highradius.com/-
- For information about HighRadius Invoicing Application; RadiusOne AR Suite's eInvoicing App for Mid Sized Businesses (highradius.com)
- For information on orientation as; https://youtu.be/FGOaAjplpW0