The objective of Tech Track (Java and React-Js)

Build an AI-Enabled FinTech B2B Invoice Management Application.

Business Overview

Introduction to B2B Operations:

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.”***

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 ie. 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**.

Account receivables Department:

1. 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.
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.

Problem Statement for ML:

As a winter internship project, you will be building a web application to help the people working in the Accounts Receivable departments in their day-to-day activities. You 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.
- Get a prediction of when the invoice is going to get paid.

Problem Statement for Web Application Development:

The objective of the Web Application Development internship project is:

- To build **a Full-stack Invoice Management Application** using ReactJs, JDBC, Java, Servlets.
- Build a **responsive Receivables Dashboard.**
- **Visualize Data** in the form of grids.
- **Visualize Data** in the form of graphs.
- Perform **Searching** operations on the invoices.
- **Add & Edit data** in the editable fields of the grid.
- **Delete data** of selected rows in predefined templates.

React Web App

The mandatory features are compulsory tasks and the optional features are for extra credit points, which will give you an added advantage.

Mandatory Features	Optional Features
1. UI Creation 2. Grid Creation 3. Grid Data Loading 4. Crud Operation a) Add b) Edit c) Delete 5. Pagination 6. Advanced Search	1. Predict Button activation with Grid Data 2. Shortcut search button on Grid for Customer Id 3. Sorting columns 4. View - Analytics

HIGH-LEVEL REQUIREMENTS OF APPLICATION

Specifically, below are 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:
   - You 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:
   - 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:
   - 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.

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_da	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

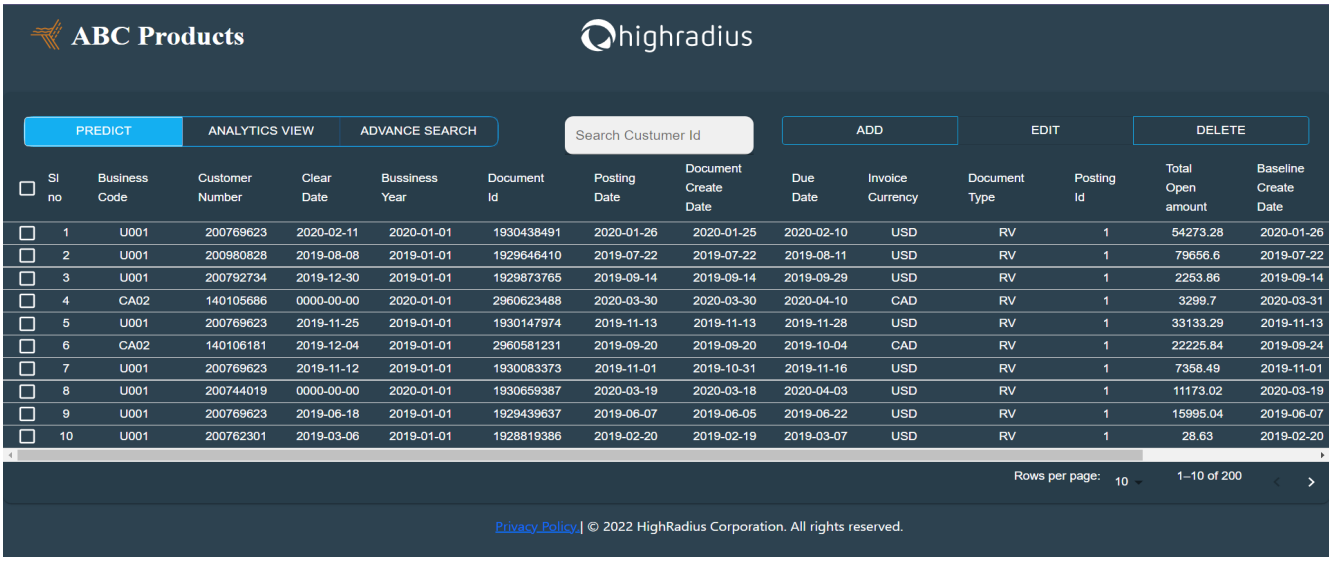
- **All the Columns of the CSV file need to be loaded into the DB.**

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

(2) UI Representation of the Data:

The UI consists of a single screen :



Receivables Dashboard Page

It consists of 2 sections:

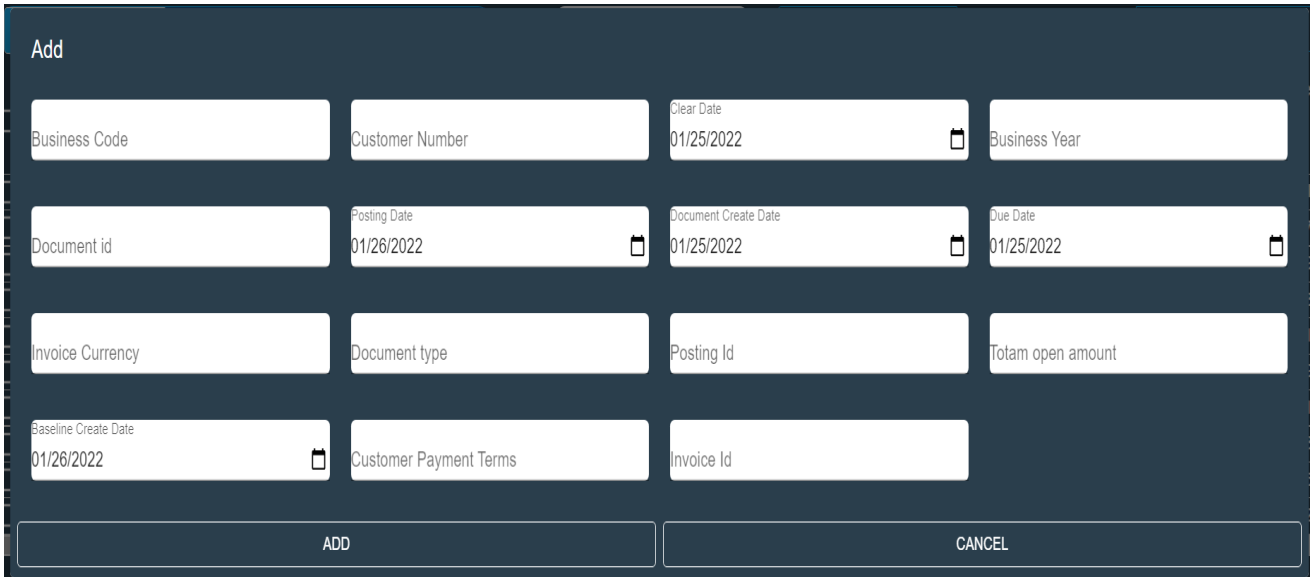
Header:

a. First Section is the header which comprises the **ABC Product logo on the left, the Highradius Logo in the middle**

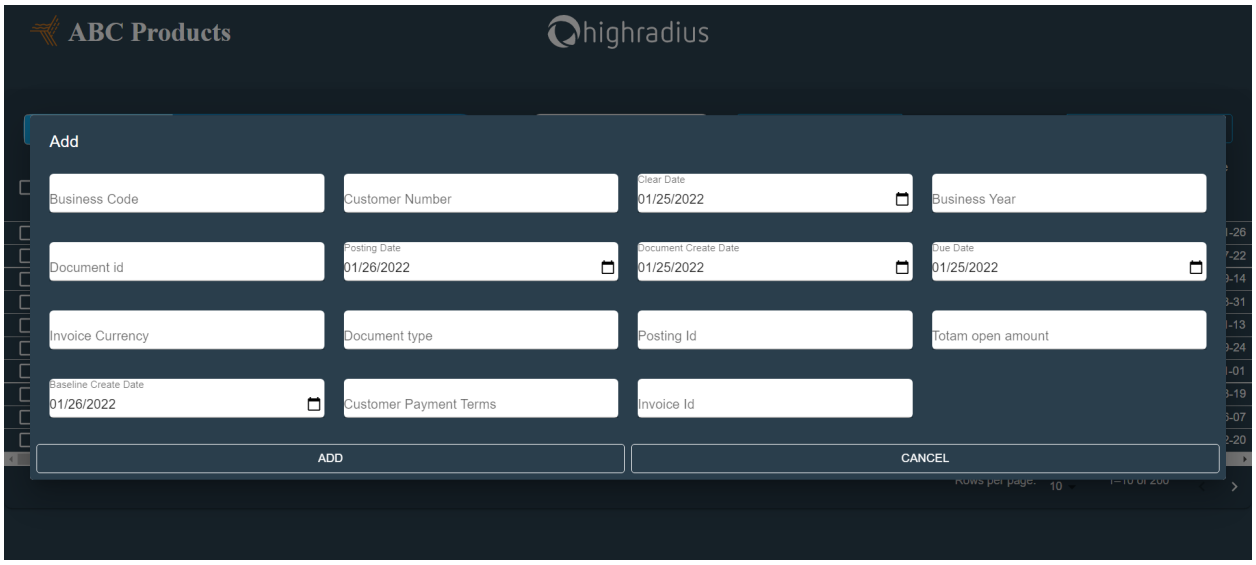
b. The second section consists of **Predict, Advance Search, Analytics View Add, Delete & Edit, and Search bar.**

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.



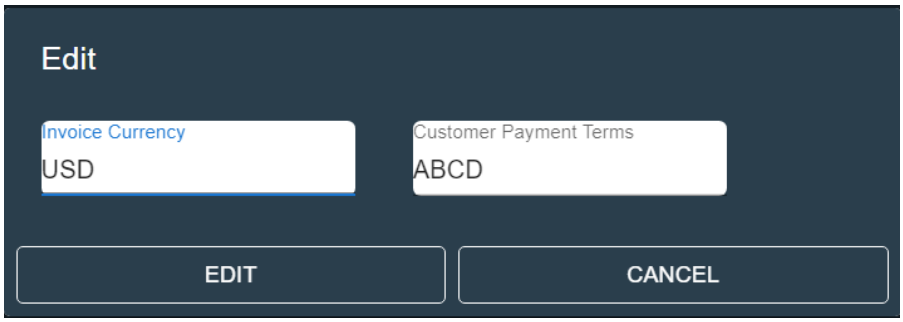
Full-Screen View



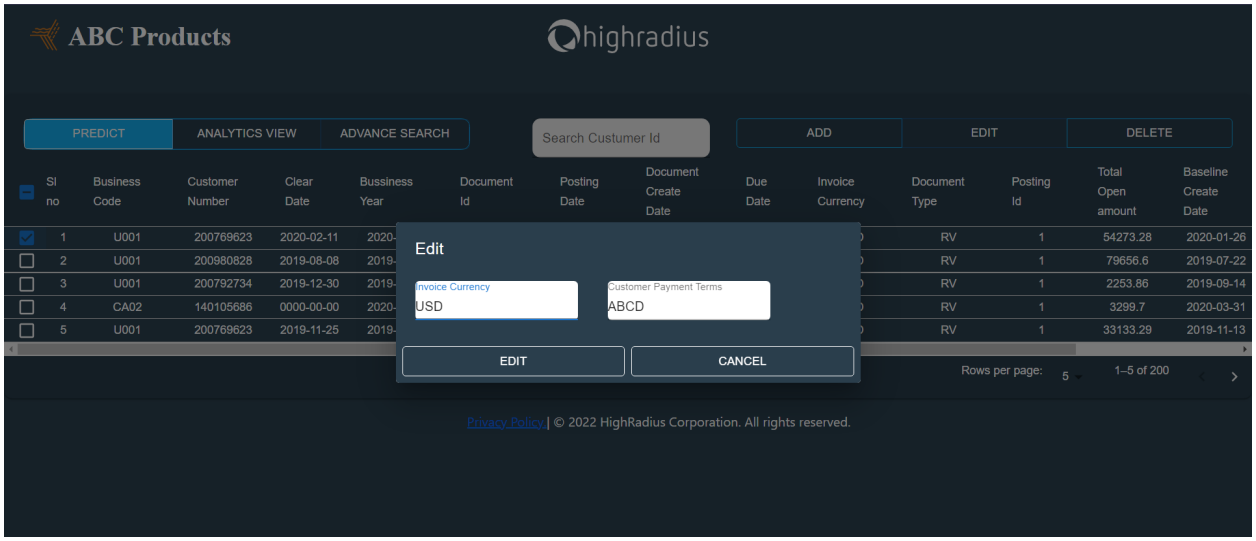
Edit button:

- 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.

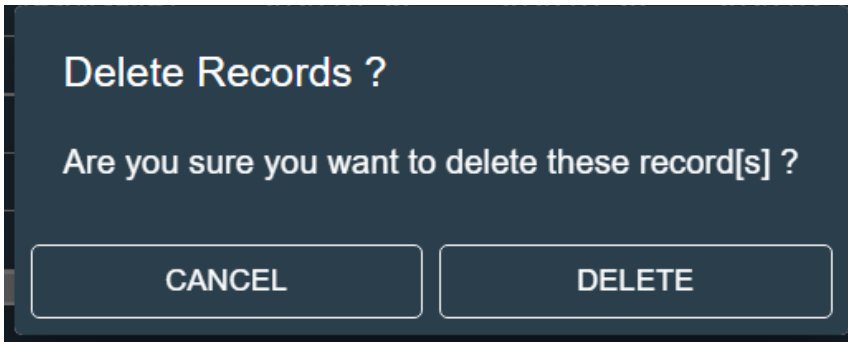


Full-Screen View

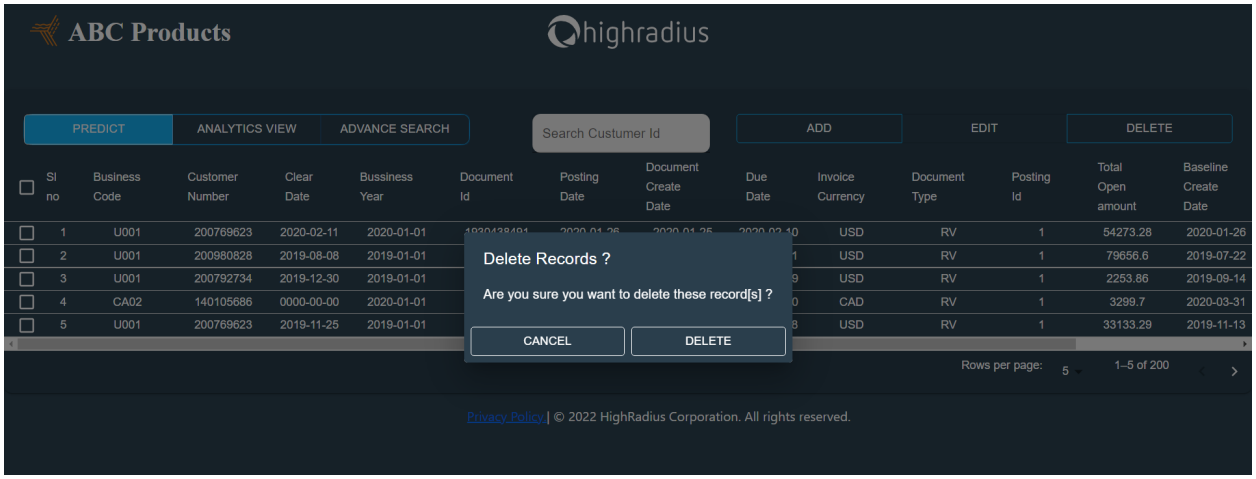


Delete Button :

- 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.

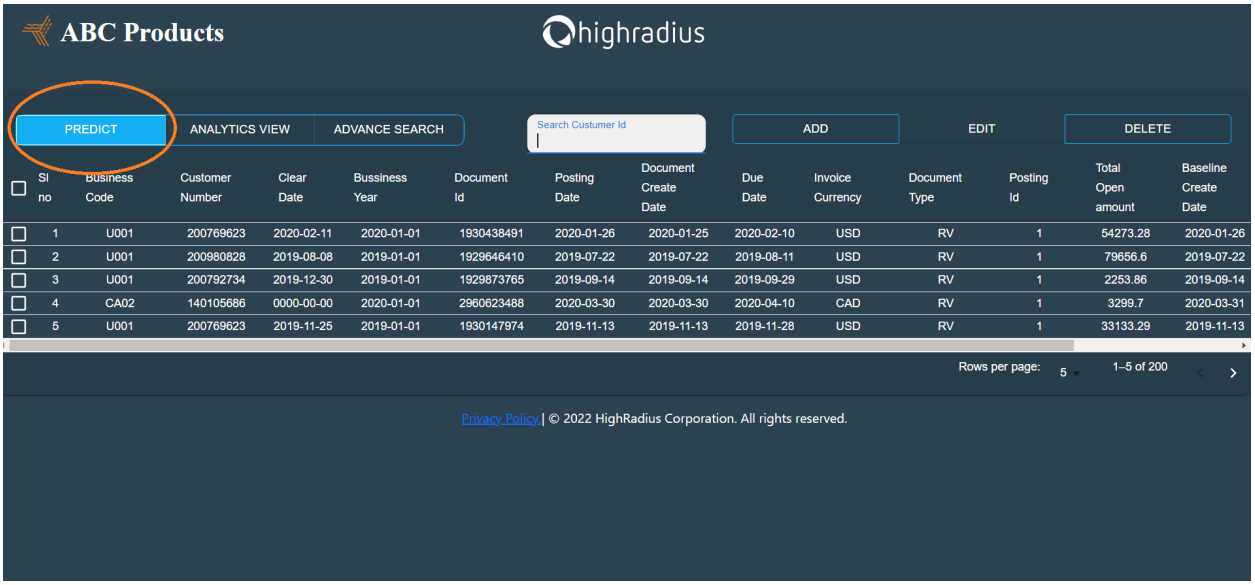


Full-Screen View



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.

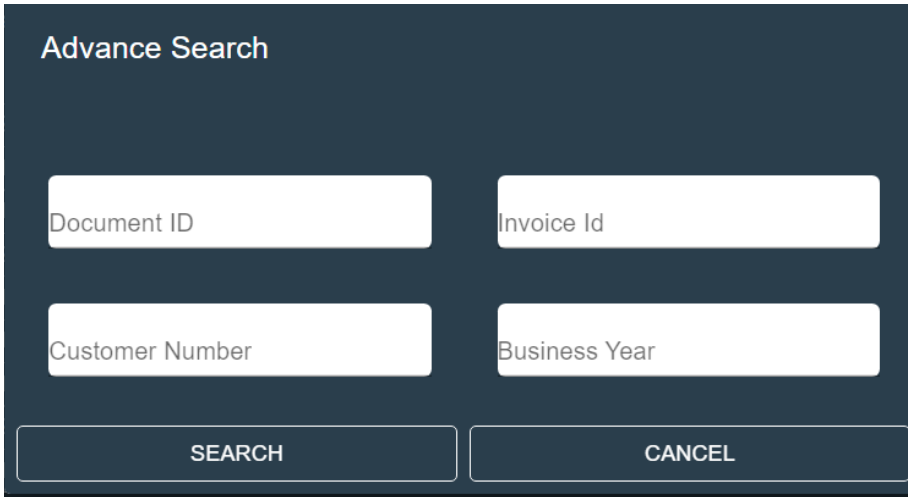


Advanced Search button:

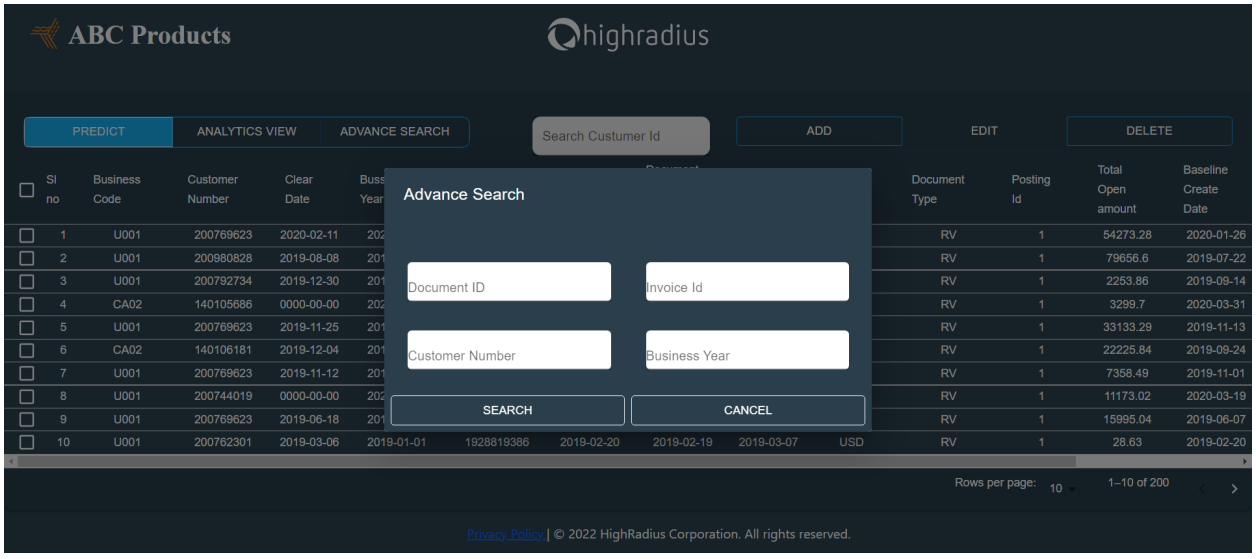
The UI consists of the **Advanced Search** button.

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

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

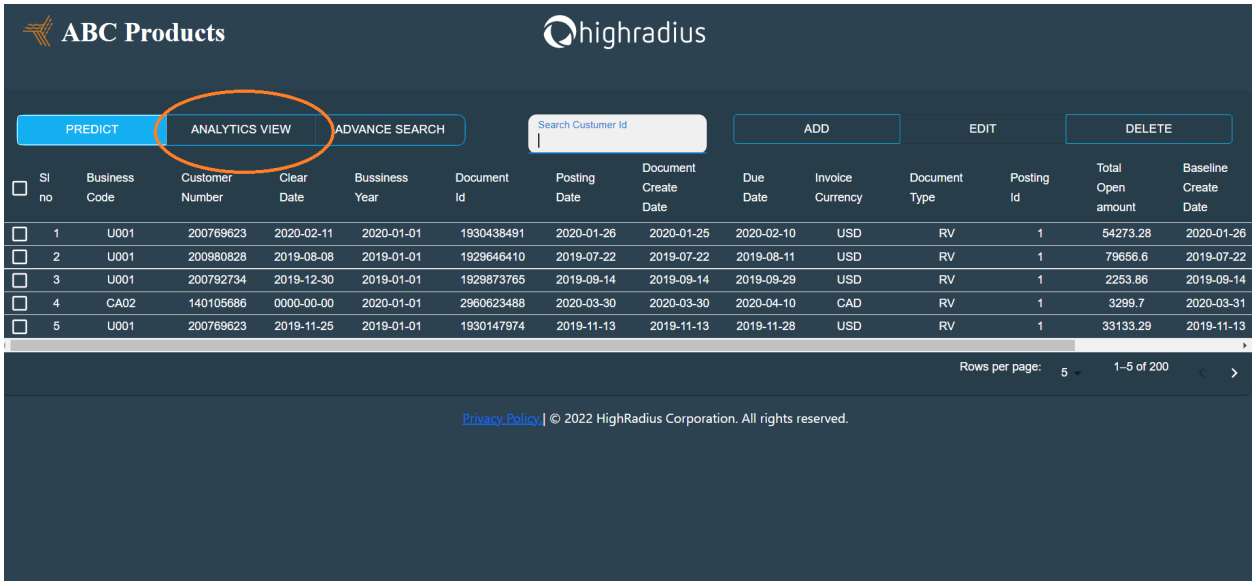


Full-Screen View



Analytics View: (Optional Task)

To get insights from the existing data based on users 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

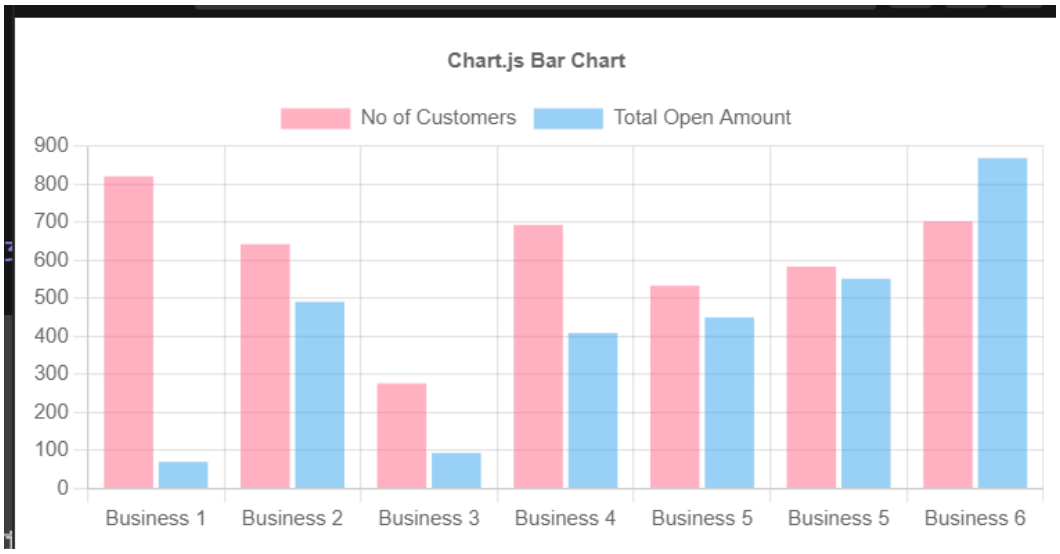


The new window contains of parameters:
Currency (Multiselect)
Due Date
Baseline Create Date
Clear Date

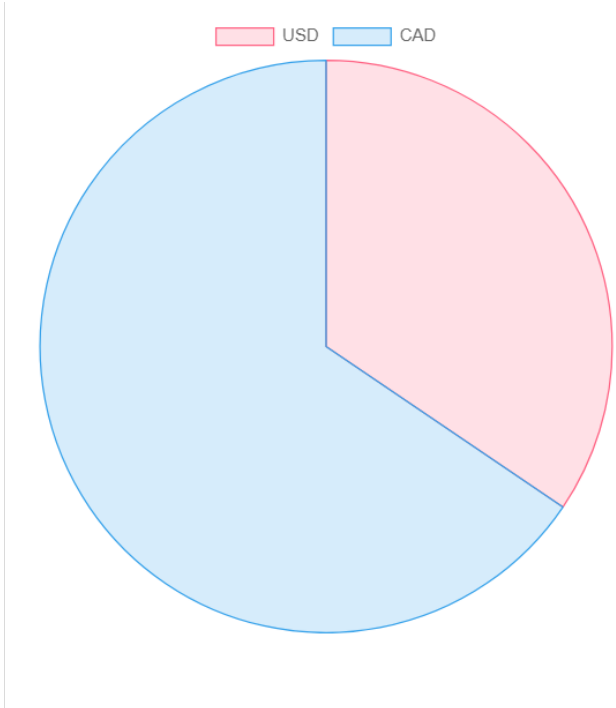
The user will have a privilege to go for single parameter or multi parameter based on their choices and preferences.

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.



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



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:

a.Business Year- Text Field

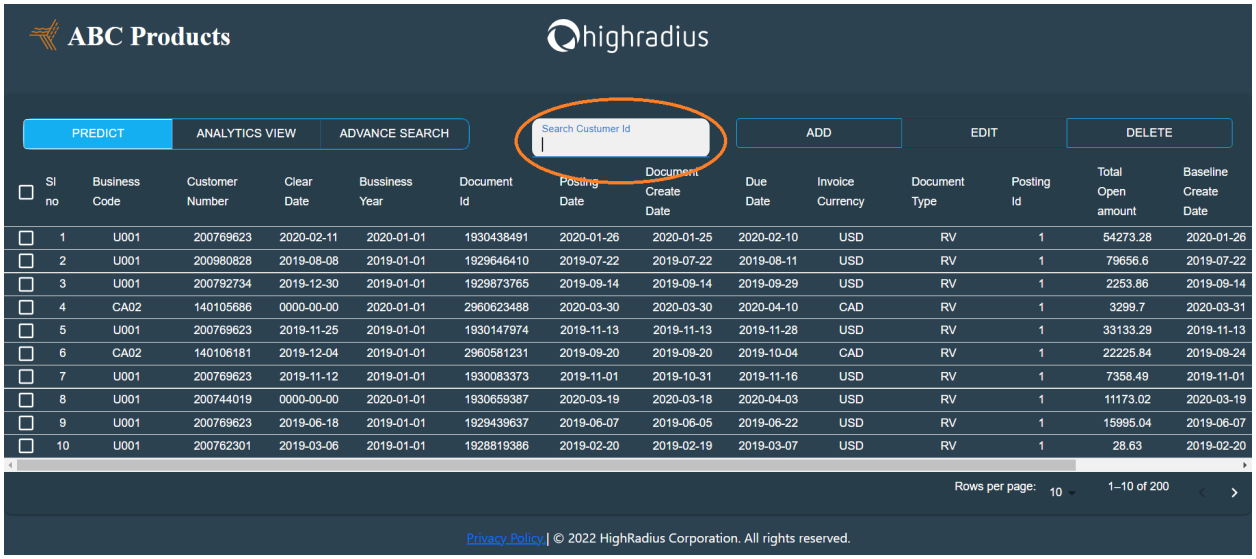
b.Customer Id-Text Field

c.Invoice No - Text Field

d.Document Id - Text Field

e.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.



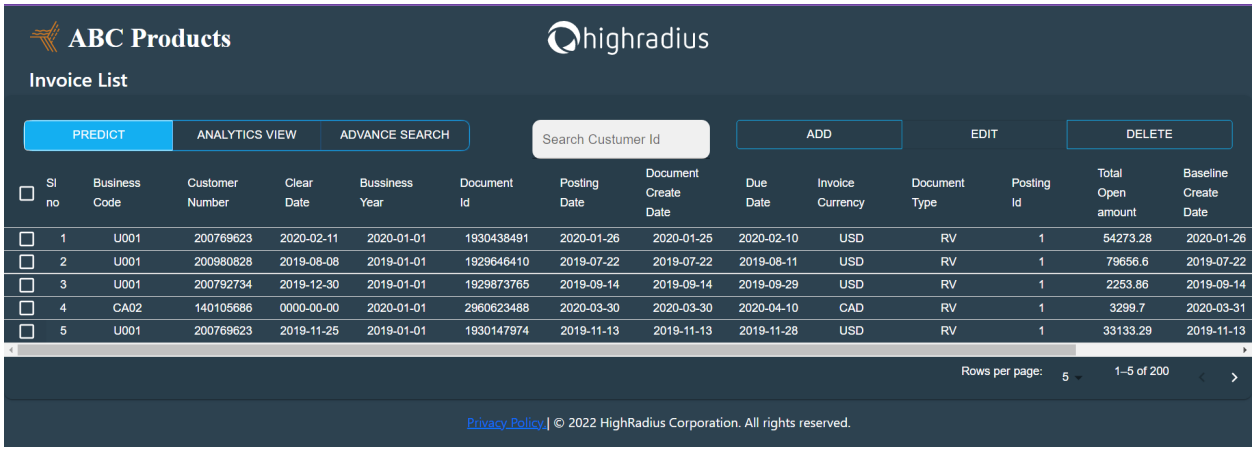
Grid Panel Section:

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



The Grid panel section will be divided into 3 portions:

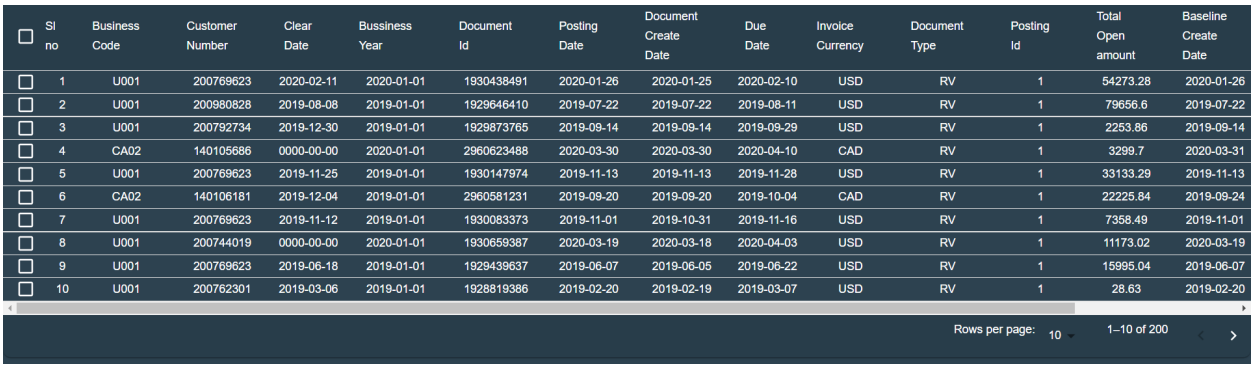
- The header of the grid will have a **Predict button** on the top left corner followed by an **Advance Search Button**,an **Analytics view,** an **Add Button**, an **Edit Button**, a **Delete Button,** and a **Search Bar**.
- The name of the grid that is Invoice List will be mentioned in the top left 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

Rows per page: 10 1–10 of 200

Sorting & Searching

1. **Sorting:**
   Sorting should be performed on all the columns:
2. Clicking on the column headers should sort the values of the whole grid
   a. First click - Ascending
   b. Second click - Descending

   Column headers should have a double arrow symbol near the column name to indicate they can be sorted.

Horizontal Scroll Bar

The **Horizontal Scroll Bar** which can be used to scroll across the screen to access the data in various columns.

Footer

The Grid consists of the **Footer** which will have the following three parts:

- 'Viewing <starting count> - < end count> of <total count>' text on left. It shows invoices currently active.

  Example1: Viewing 1-10 of 500 means that the user is seeing 1-10 Invoices present on the page out of the total number of invoices which is 500.

- Pagination arrows with text ' <present page number> of <total page number> ' in center. Clicking on the back arrow takes the user to the previous page. Clicking on the next arrow takes the user to the next page. Back arrow should be disabled when the user is on the first page and the next arrow should remain disabled if the user is on the last page.

  Example2: 2 of 50 means that the user is currently on 2ndd page and seeing invoices 11-20 out of the total 500 invoices.

- 'Copyright 2022 Highradius.All Rights Reserved.' in the middle.

AI support for the prediction of payment date

1. As part of this project, you need to predict the Payment Date of each invoice.
2. In order to achieve this, there should be a button named **"Predict"** present on the UI besides the **"Advance Search"** button.
3. Users can select one or more **invoices** and click on the **"Predict"** button to predict the payment dates of those selected invoices.
4. Once the button is clicked, the **Predicted Payment Date** column should get populated with the predicted dates derived from the ML model.
5. **The "Predict"** button should remain disabled if no invoices are selected.

Glossary

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.