Objective of Tech Track Phase-II

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 in one go. Instead, they get paid in installments. These installments are known as **partial payments**.

Account receivables Department:

1. In the ideal world, the buyer business should payback 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 picture.
2. Every business consists of a dedicated Account receivables Department to collect and track payment of invoices.
3. It consists of a Account receivables team that is responsible for:

- Collecting payments from customers for their past due 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 Application Development:

The objective of the second half of the summer internship project is:

- To build **a full stack Invoice Management Application** using ReactJs, JDBC, Java and JSP.
- Build a **responsive Receivables Dashboard** and a **Customer Details page.**
- **Visualize Data** in the form of interactive charts.
- Perform **Searching and Advanced Searching** operations on the invoices.
- **Modify data** in the editable fields of the grid.
- **Integrate and Deploy the ML Model** for predicting the first partial payment amount and the **Professor Chatbot.**

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 is provided in the functional overview section.

1. **Data Loading in DB:**
    a. You will be provided with a **invoices dataset** which you need to parse, process and load in the provided database schemas.
2. **UI Representation of the data:**

a. Build a responsive UI which can display the invoice data loaded from the database.
b. The UI should support searching and pagination operations.
c. The UI should support editing of some editable fields.

3. **Analytics support in the application:**
   a. Visualize data in the form of interactive clickable bar charts.
   b. Applying crossfilters on the bar graphs ie. clicking on a specific category bar in the chart, should automatically display the corresponding data (related to that category) on the screen.
4. **Deployment of ML Model And Professor Chatbot in the application**
   a. The ML model built earlier as part of the internship needs to be deployed in the application.
   b. Clicking on the Predict button should auto populate the predicted first partial payment amount and predicted payment type in the UI.
   c. The Professor chatbot built previously needs to be integrated into the UI

FUNCTIONAL OVERVIEW

(1) Data Loading in the Database

Below is the sample CSV file screenshot.

account_id	document_numb	company_code	fiscal_year	branch	customer_numbe	fk_customer_ma	document_date_	baseline_date_n	due_date_
60	20000950	\N	\N	\N	999888	-1	05-04-16	\N	\N
60	20000950	\N	\N	\N	999888	-1	05-04-16	\N	\N
60	20000950	\N	\N	\N	999888	-1	05-04-16	\N	\N
60	20000950	\N	\N	\N	999888	-1	05-04-16	\N	\N
60	20000870	\N	\N	\N	999888	-1	05-04-16	\N	\N
60	20000870	\N	\N	\N	999888	-1	05-04-16	\N	\N
60	20000870	\N	\N	\N	999888	-1	05-04-16	\N	\N
60	20000870	\N	\N	\N	999888	-1	05-04-16	\N	\N
60	20001004	\N	\N	\N	999888	-1	05-04-16	\N	\N
60	20001004	\N	\N	\N	999888	-1	05-04-16	\N	\N
60	20001004	\N	\N	\N	999888	-1	05-04-16	\N	\N
60	20001004	\N	\N	\N	999888	-1	05-04-16	\N	\N
60	20000831	\N	\N	\N	999888	-1	05-04-16	\N	\N
60	20000831	\N	\N	\N	999888	-1	05-04-16	\N	\N
60	20000831	\N	\N	\N	999888	-1	05-04-16	\N	\N
60	20000831	\N	\N	\N	999888	-1	05-04-16	\N	\N
60	20103019	\N	\N	\N	999888	-1	11-04-16	\N	\N
60	20103019	\N	\N	\N	999888	-1	11-04-16	\N	\N
60	20103019	\N	\N	\N	999888	-1	11-04-16	\N	\N
60	20103019	\N	\N	\N	999888	-1	11-04-16	\N	\N
60	20000972	\N	\N	\N	999888	-1	05-04-16	\N	\N

- **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:

- Company ID
- Account Header ID
- Document Number
- Document Number Normalised
- Business Code
- Create Year
- Document Line number
- Document Type
- Customer Number
- Customer Number Normalised
- Customer Map ID
- Name Of Customer
- Division
- Document Create Date
- Document Create Date Normalised
- Posting date
- Posting Date Normalised
- Posting ID
- Due In Date
- Due In Date Normalised
- Order create Date
- Order Create Date Normalised
- Baseline Date
- Invoice Date
- Invoice ID
- Invoice ID Normalised
- Total Open Amount
- Total Open Amount Normalised
- Customer Payment Terms
- Area of Business
- Clear Date
- Clear Date Normalised
- Is Open Invoice
- Shipping Date
- Shipping To
- Reason Code

- Discount Due Date Normalised
- Debit Credit Status
- Payment Method
- Payment Amount
- Days past Due date
- Doc Id
- Document Create Date
- Actual Amount Outstanding
- Age of Invoice
- Invoice Currency
- Dispute Amount

(2) UI Representation of the Data:

The UI consists of 2 screens :

a. Screen 1- Receivables Dashboard Page

This is the landing (or launch) page of the application.

It consists of 7 sections:

1. Header
2. AR Statistics Section
3. Analytics Section
4. Search Panel Section
5. Grid Panel Section
6. Professor Window
7. Footer

1. Header Section

The header consists of :

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

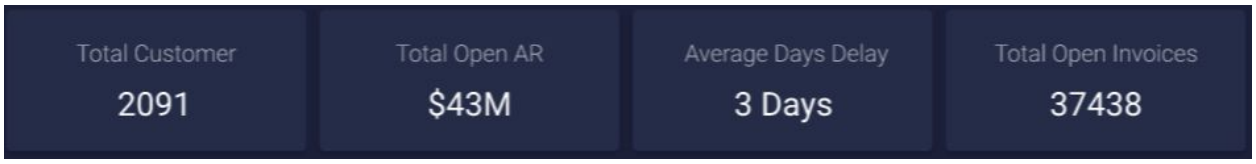
ii. A label strip with **receivables dashboard** text in the middle ,

iii.**Professor** button on the right - Clicking on the Professor button will open up the Professor chatbot window.

2. AR Statistics Section

This section contains 4 cards that display the:

- **Total Customer -** Shows total number of customers for the account
- **Total Open AR** - Shows the total amount outstanding in the Account Receivables
- **Average Days Delay -** Shows the Average Days Delay
- **Total Open Invoices -** Gives the count of total open invoices



3. Analytics Section :

- This section will display the account level analytics by using interactive charts.
- The title of the chart will be **Total Amount by Company Code.**

- The data will be visualized in the form of **clickable horizontal bar charts**.
- Clicking on a particular company code bar, will display the data corresponding to that company code everywhere else on the UI.

4. Search Panel Section

- This section will consist of a **search panel bar** where the customers can be searched on the basis of customer name, customer number and the open amount due.
- Below the search panel, a grid will be displayed that shows the appropriate results after filtering on the search criteria.
- The column names to be displayed on the grid are **Customer Name**, **Customer Number** and **Open Amount**.

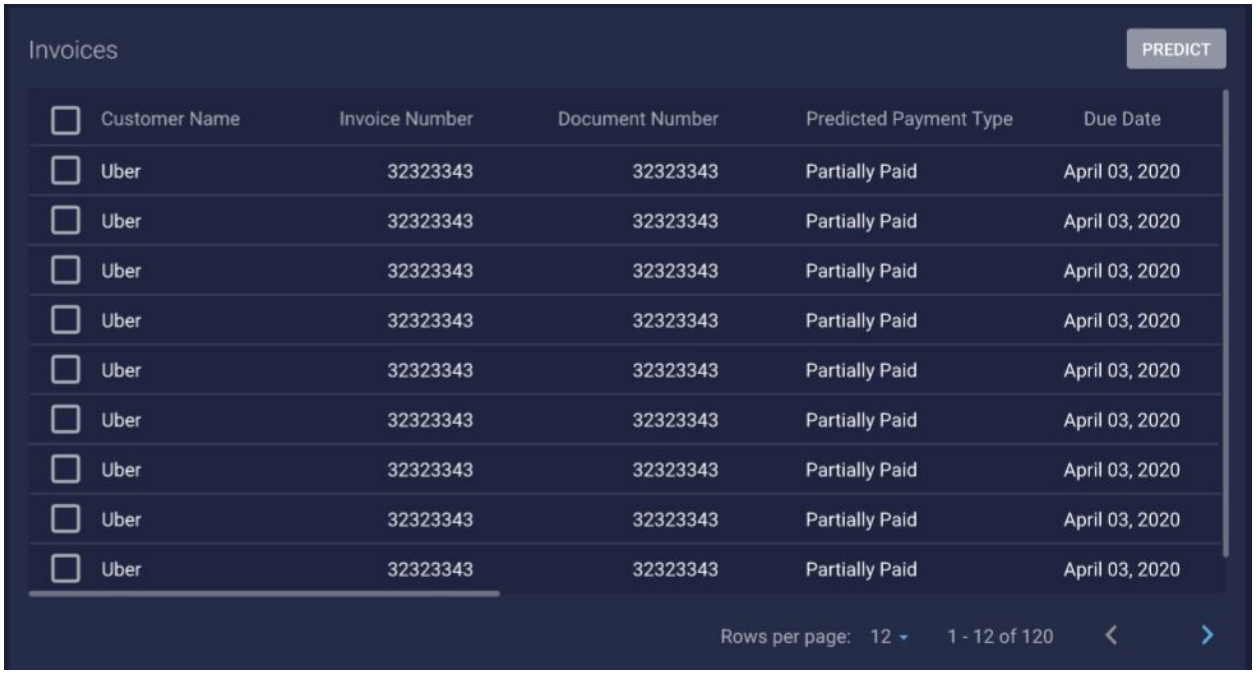
5. Grid Panel Section

The Grid panel section will be divided into 4 portions:

- The header of the grid will have a **Invoices Label** on the left and a **Predict Button** on the top right corner.
- The second portion is the table with customer data as rows and the following columns:

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

1. Company ID
2. Account Header ID
3. Document Number
4. Business Code
5. Document Type
6. Customer Number
7. Customer Map ID
8. Name Of Customer
9. Document Create Date
10. Baseline Date
11. Invoice Date
12. Invoice ID
13. Total Open Amount
14. Customer Payment Terms
15. Clear Date
16. Is Open Invoice
17. Shipping Date
18. Payment Amount
19. Days past Due date
20. Doc Id
21. Document Create Date
22. Actual Amount Outstanding
23. Age of Invoice
24. Invoice Currency
25. Predicted Payment Type
26. Predicted Amount



- The **Predicted Payment Type** and **Predicted Amount columns will remain blank** by default.
- Clicking on the **Predict button** after selecting the one or more rows **will auto populate the two columns with the values derived from the ML model**.
- The grid will also have a **Select all and Deselect All functionality** to select one or more records.
- The third portion is the **horizontal and vertical scroll bar**.
- **10 rows** need to be displayed **on a single page** in the grid.
- The fourth portion refers to **pagination** at the bottom of the grid.
- Pagination will consist of following three components:

  i. **Row Control**- Displays the number of rows per page.

For Eg. If the user selects 5, 5 rows should be displayed on the UI.

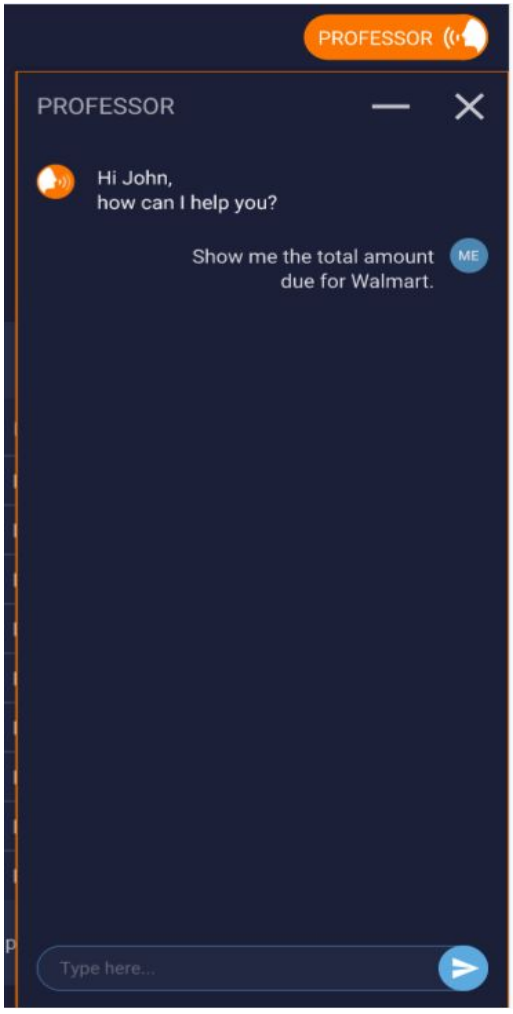
  ii. **Currently active invoices**

  iii. **Previous and Next arrows**

6. Professor Window :

- The Professor icon will be displayed at the top right corner of the screen and will remain static throughout.
- Clicking on the Professor icon will open up the **Professor chatbot window** on the screen.
- The Professor window will have only the **Close (Cross) Button**. [Ignore the Minimize button in snippets]
- It will also contain a **text input bar** with a **send button** at the bottom using which the user can input his question.
- The chatbot will be able to give collections domain specific answers to the user.

For Example: User (types in) : Show me the total amount due for Walmart. Professor : I found that Walmart has a total of $1.2M amount past due.



7. Footer :

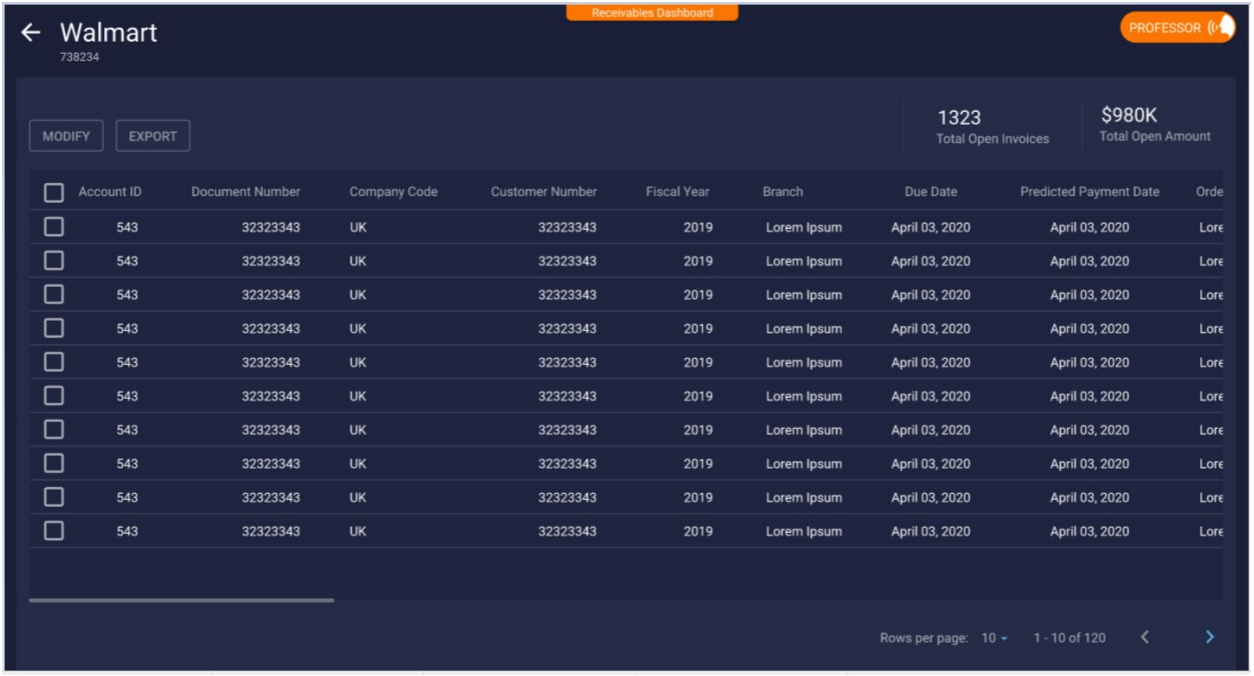
The last portion will be the footer where the Copyright 2020 Highradius.All Rights Reserved text will be displayed.

b. Screen 2- Customer Details Page

Clicking on a particular customer name in the search panel will redirect the user to the details page of that customer.

It consists of 6 sections:

1. Header
2. Modify and Export button
3. Customer AR Statistics Section
4. Grid Panel Section
5. Professor Window
6. Footer



1. Header Section

The header consists of :

i. The **customer name** (eg. Walmart) and **number** (eg.738224) on the left.

ii. A **back arrow** beside the customer name to take the user back to main screen.

iii. A label strip with **receivables dashboard** text in the middle ,

iv. **Professor** button on the right - Clicking on the Professor button will open up the Professor chatbot window.

2. Modify and Export buttons

- These are present side by side towards the left side of the screen.
- Both buttons will remain in disabled state by default.

3. Customer AR Statistics

- These statistics are present side by side towards the right side of the screen.
- The two cards are **Total Open Amount** and count of **Total Open Invoices for the particular customer.**

4. Grid Section

- The grid will be similar to the main screen grid, with the same column names and headers and functionalities, except the Predicted payment amount and predicted payment type columns.
- The grid will have a vertical + horizontal scroll bar and pagination, similar to that of the main screen.

5. Footer

- Footer will remain the same as the main screen footer.

(3) Functionalities in Detail:

Predict Button Functionality :

- The Predict button will remain in **disabled state** if no rows are selected.
- Whenever one or more rows are selected, the Predict button will be activated.
- After clicking on the Predict button, the Predicted Payment Type and Predicted Amount will be populated for the respective records.

Analytics Charts Functionality:

- Each of the bar charts will be **clickable.**
- Clicking on a chart will make it blue - Indicating that the filter has been applied.
- **Cross filters will be applied on the graph** so that clicking on the bar chart will modify and display data related only to that specific selected category on the screen.
- Clicking again on the selection will clear the filter from the screen.

For Example:

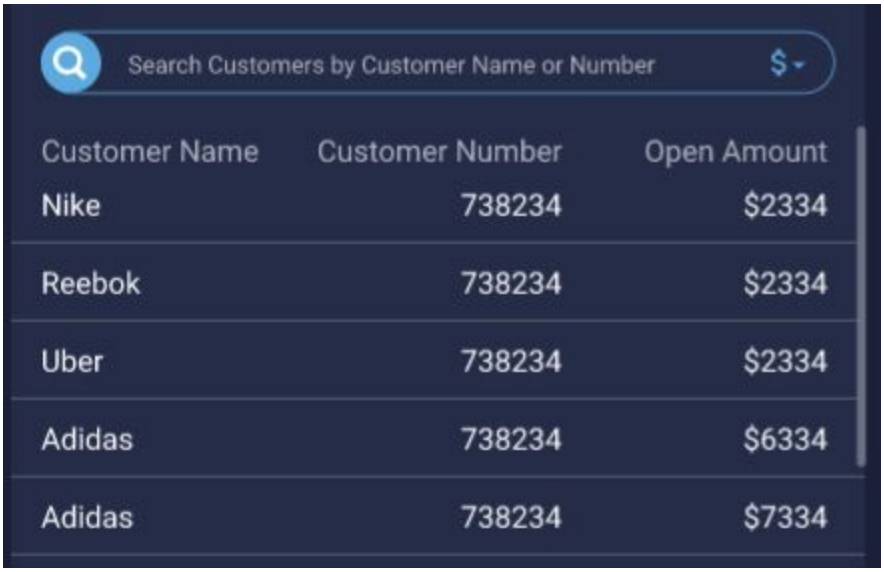
If we click on the UK company code graph, the data will get changed at the following places-

1. **Statistics cards** - The numbers on the cards (**Total Customers, Total Open AR, ADD, Total open Invoices**) will change to show the aggregate count and amount of only the invoices having company code as UK.
2. The **records in the grid** will get filtered to display only the invoices having company code as UK.

Search Panel Functionality:

A. Search using Customer Name or Number (Level I)

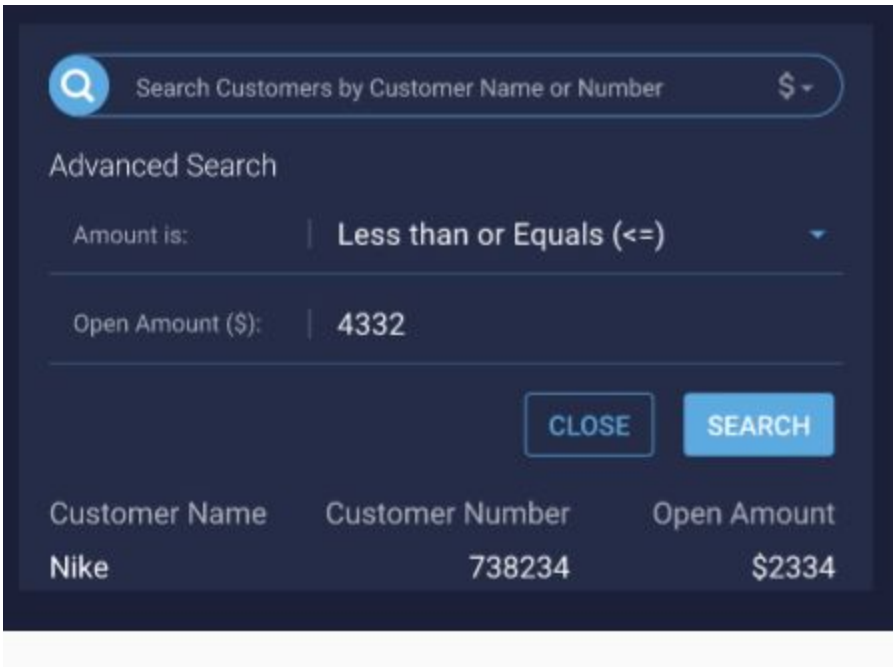
- The level I will be to filter invoices on the basis of **Customer Name or Number** entered in the Search bar.
- Customer Name can be alphanumeric while customer num will always be numeric type.
- When the user hits enter after the input, the respective records will be displayed in the grid below.
- **Clicking on a row will take the user to the details screen of the particular customer.**
- The grid will also have a **vertical scroll bar**.



B. Advanced Search using Open Amount (Level II) [Optional]

- For level II, **Range search on** the basis of **open amount** needs to be implemented.

- Clicking on the  icon will open up the **slidable advanced search panel** below.



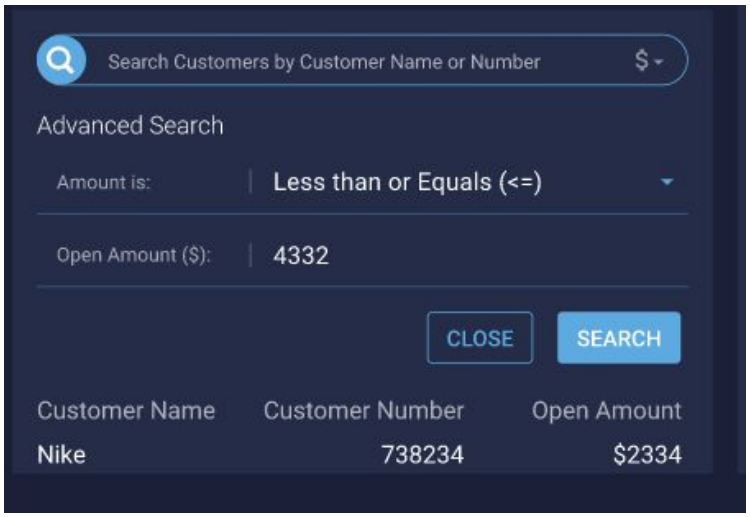
- The panel will have two text fields with labels-
  a. Amount is - This will define the relational operation required by the user. The different values for this attribute is-
  - Less than (<)
  - Greater Than (>)
  - Less Than or Equal To (<=)
  - Greater Than or Equal To (>=)
  - Not Equal To (!=)

  b. Open Amount ($) - The user can enter the specific amount in this field.
- The panel also has **Close** and **Search buttons**.
- Clicking on the close button collapses the advanced search panel back.
- Clicking on the search button also collapses the panel and filters the records with the specified search criteria.
- The placeholder in the search bar is replaced with the text “Customers with Open Amount<relational operator> $ <amount value> ” text and a cross button to reset the search panel.

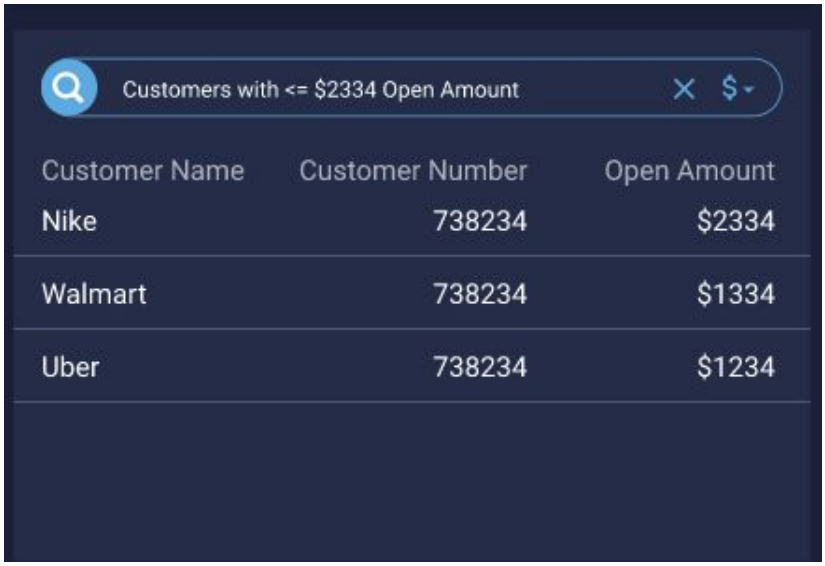
For Example,
If the user wants to search for all records having open amount less than equal to 4332:

Step 1 :

Step 2 :



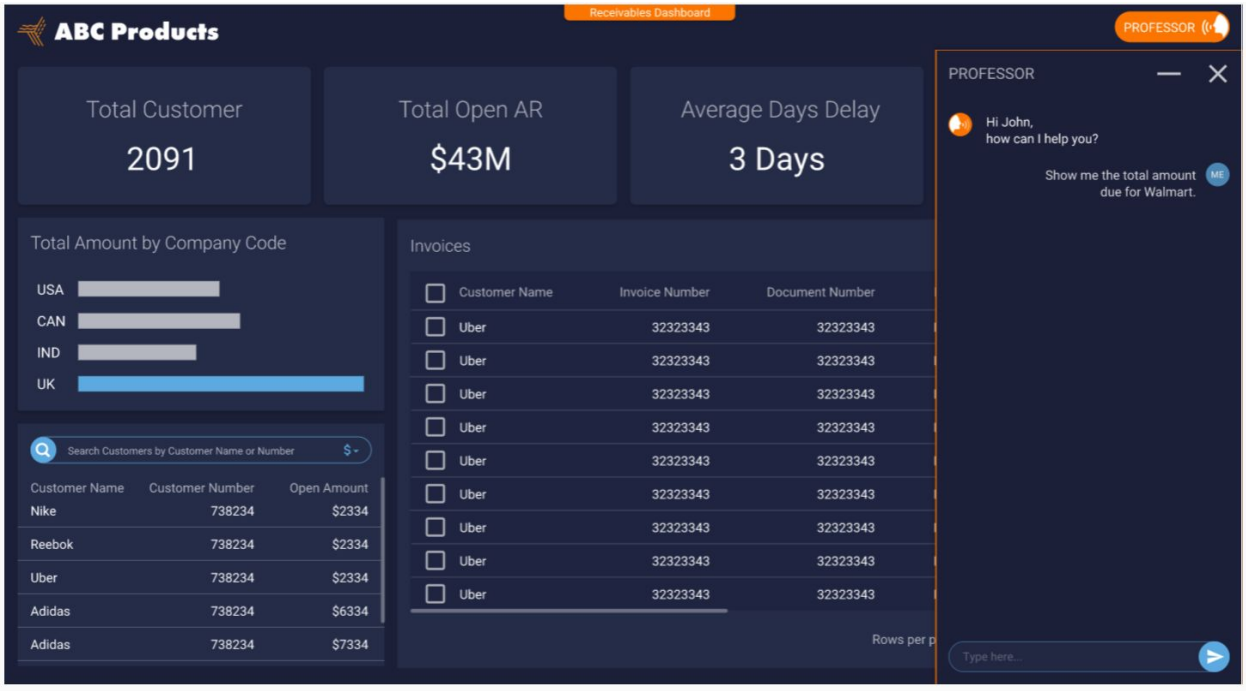
Step 3 :



Professor Chatbot Window Functionality:

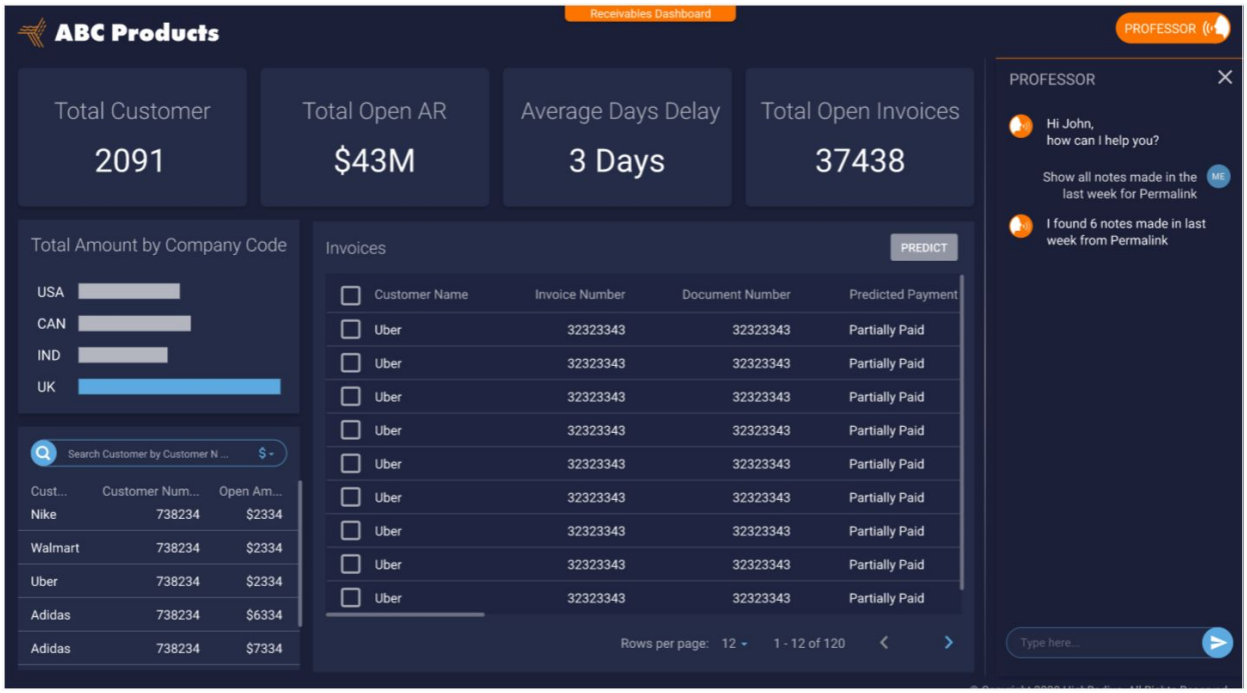
A. Basic Professor (Level 1) :

- The Professor window should pop up over the UI screen being displayed, covering up some of the information displayed on the screen.



Responsive Professor (Level 2) [Optional]:

- The Professor window should appear sideways from the right side.
- The UI screen should shrink responsively to accommodate the Professor window.

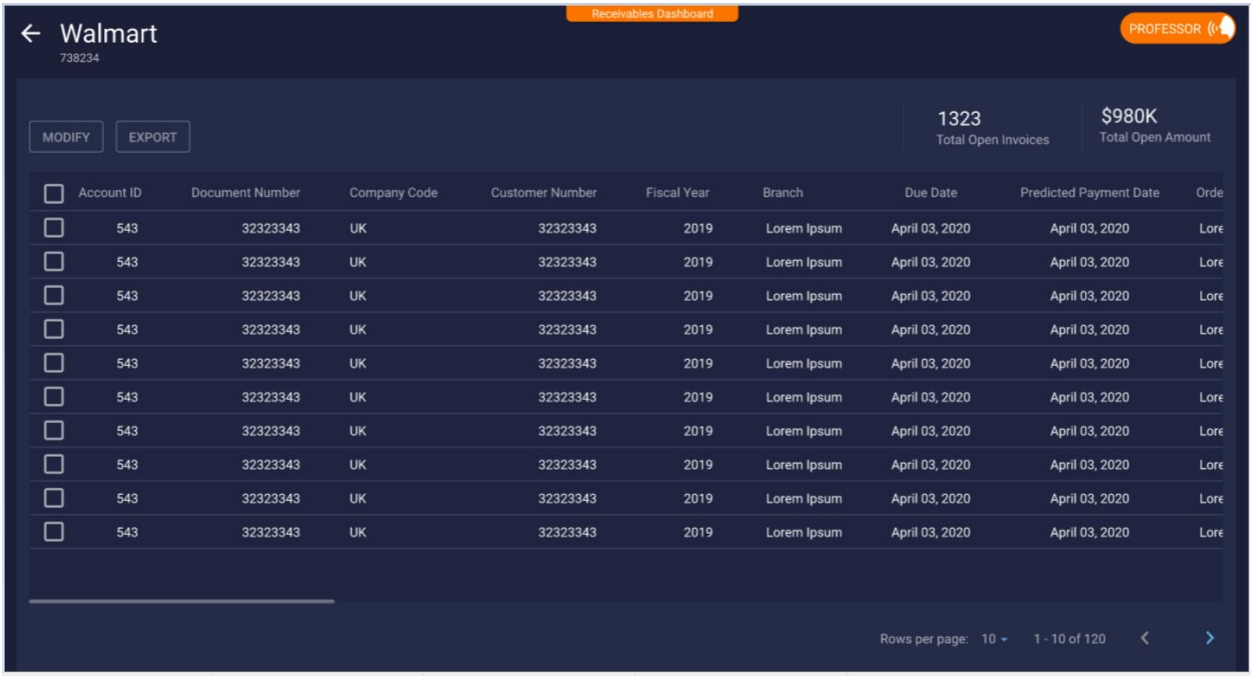


Modify Button Functionality:

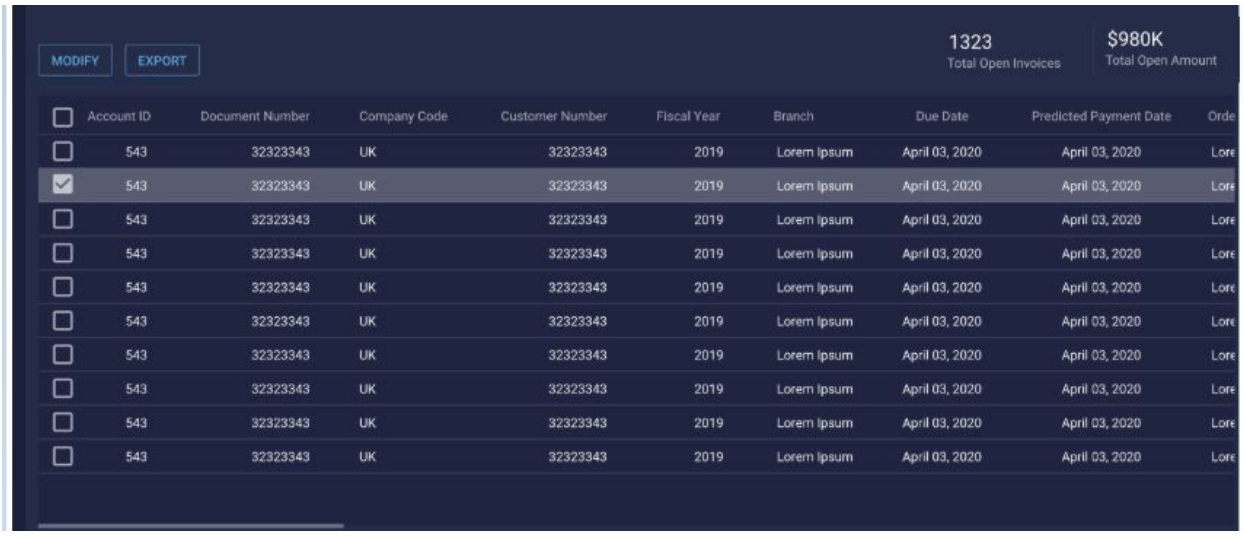
- Clicking on the **modify button** will allow the user to **modify the editable fields** in the data.
- The editable columns are **Open Amount** and **Document Type Columns.**
- The modify button will **remain in disabled state** by default.
- When the **user selects one row**, the modify button gets enabled.
- If user selects multiple rows, modify button will remain disabled.
- Clicking on the Modify button displays a popup window on the screen. The window should contain the Open amount and Document Type headers along with the existing data values for both, a Cancel and a Save button.
- The user should be able to **edit the values.**
- Once the user clicks on the save button, the new values should be displayed in the UI and should remain persistent.
- **Once the Open amount value is edited, the corresponding Total Open Amount value For that customer (displayed at the top) should change as well.**

For Example,
Suppose the Total Open Amount of Walmart is $43M. If the user wants to change the open amount of an invoice having $5M to $2M, the corresponding Total Open Amount should get updated to $40M.

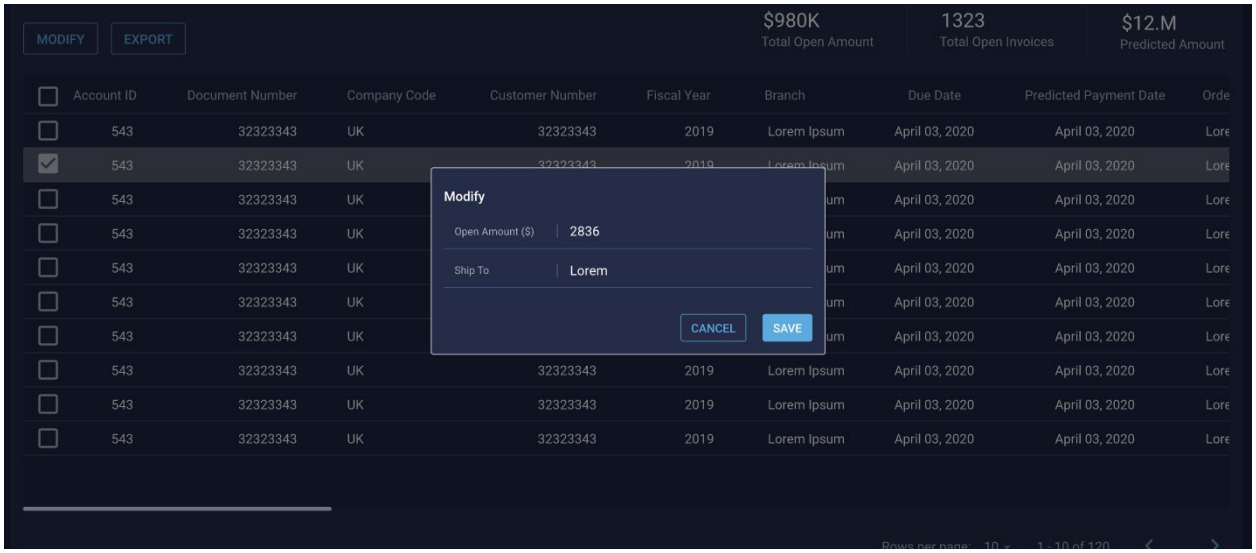
Step 1:



Step 2:



Step 3:



Export Button Functionality:

- Clicking on the export button will allow the user to **download and save the data** of the invoices grid as a CSV file in his local system.
- Export button will remain in disabled state by default.
- If the user selects one or more invoices, data of only those invoices is downloaded as a CSV file.
- If the user selects all invoices, data of the first 1000 invoices is downloaded as a CSV file.**[Level I].**
- As **Level II optional milestone,** 5000 or more invoices can be downloaded as a CSV File.

Week Wise Objective

1. **Week 1**: Workspace Setup, Database Design, Loading Data into Database & Java
2. **Week 2:** Data Loading, HTML, CSS, Javascript, Servlets, ReactJs OverView, Component Life Cycle, React Props & State, Styling React Components, React Axios, React Router & React Redux
3. **Week 3**: React Redux, UI Development, Integrating Highcharts and CrossFilter in the Project with filter functionality & UI Development
4. **Week 4**: UI Development, Deployment & Final Evaluation

Glossary

1. Invoice - A document which 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. Open Invoice - Invoices which are not cleared (payment not done) are called Open Invoices.
3. Closed Invoice - Invoices which are cleared (payment done) are called Closed Invoices.
4. B2B - Business to Business
5. B2C- Business to Consumer
6. C2C - Consumer to Consumer
7. Payment Terms - These indicate the period within which payments should be made and how. These terms are usually included in the invoices generated by companies and sent to customers.Eg Net 30, Net 60