# Traffic And Capacity Analytics For Major Ports

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# CHAPTER 1: INTRODUCTION

## 1 .Project Overview:

To regain some of the market, it has lost over past decades and regain market share in some commodities and overcome the challenges and to maintain sustainable growth in all its commodities .Reducing the congestion on rail corridors and improving port connectivity .The development of two Dedicated Freight Corridors across key ports.

## 2 .Purpose:

1. Developed analytics dashboard can be used to track the freight movement patterns across major ports.
2. It can be used to visualize the capacity and to ensure less traffic on the ports.
3. It helps predict delays at the ports due to congestion and makes supply chain efficient. PLATFORM

# CHAPTER 2: LITERATURE SURVEY

## 1. Existing problem:

### Paper 1: Measuring the Capacity of a Port System:

It provides an overview of the academic and institutional research related to this thesis, prior to presenting the methods used for measuring port capacity and evaluating investment decisions under uncertainty, respectively. First, summarize past approaches for measuring port capacity generally, followed by a review of approaches for measuring capacity across the individual components (anchorage, waterway, terminal quay, terminal yard, and intermodal links) that comprise a port system. Second, it will present previous methods utilized to evaluate port infrastructure investments. To reiterate, please note that the primary methodologies – Lagoudis & Rice's methodology for port capacity measurement and de Neufville & Scholtes's methodology for evaluating investment strategies under uncertainty – developed from past research and applied in this thesis.

**Paper 2: Railway capacity analysis:**

In this thesis the symptoms and underlying behaviour of congestion on railways are analysed and discussed. As well as in many other countries, Sweden faces increasing demand for transportation. To meet this new demand, railways play an important role. Today, the capacity of the Swedish rail network is not upgraded at the pace necessary to keep up with the increase in traffic demand. The sensitivity of the railway system rises as the capacity utilisation increases. At some point maximum capacity is reached when the marginal gain of operating one extra train is lower than the costs in terms of longer travel times and increased sensitivity to delays. Several different methodologies are employed in this thesis to analyse capacity. The first uses real data from the Swedish rail network, train operation and delays to analyse how different factors influence available capacity and train delays. Several useful key performance indicators are defined to describe capacity influencing properties of the infrastructure and the rail traffic. The rail network is divided into subsections for which the indicators have been estimated. This makes it possible to discern their different characteristics and identify potential weaknesses. The second approach employs the railway simulation tool RailSys in extensive simulation experiments. This methodology is used to analyse the characteristics of double-track operation. Simulation of several hundred scenarios are conducted to analyse the influence of traffic density, traffic heterogeneity, primary delays and inter-station distance on secondary delays, used timetable allowance and capacity. The analysis gives an in-depth understanding of the mechanisms of railway operation on double-track lines.

**Paper 3: Online Analytical Processing of Port Calls for Decision Support:**

The port call process encapsulates a visitation cycle of a ship to a port and can generate a wealth of data. The real time analysis of port call data can be used to find bottlenecks in the port call process, establish targets based on key performance indicators (KPIs), and to understand how shipping traffic impacts a port's efficiency. This demonstration will showcase a new Power BI interactive report powered by a multidimensional OLAP cube for very fast performance, which is built on top of a data warehouse collecting information from various sources in real time. The report currently visualizes several KPIs and other types of information that can be filtered per port, time-period, vessel type, origin or destination ports,

and various other categories to help manage arrivals, departures, and port operations.

**Paper 4: Capacity Assessment in Freight-Passengers Complex Railway Nodes:**

An integrated approach to node and station operation analysis is possible by means of analytical methods, customized to this scope. Alternatively, the simulation models allow more in-depth analyses aiming at the optimization of the use of capacity. The general goals of the research are the comparison of methods for the assessment of railway lines and nodes' capacity, suitability for specific tasks, and stability of the results under variable scenarios. The comparison is finalised to quantify the relative level of confidence of the concerned literature methods. The work is part of a larger research project with the final goal of identifying the most appropriate approach for the optimization of the network capacity and the setup of specific guidelines. In this framework and perspective, the paper introduces synthetically the methods and applies them systematically to a real complex mixed-traffic network in Trieste, situated in Northeast Italy, including the main passengers and freight stations and a set of lines used for both services. The Potthoff method includes combinatorial procedures able to quantify the utilization rate of single routes, station areas and the station as a whole. This method assumes that trains could arrive at any instant with the same probability within the reference time T; therefore, it does not require an assigned timetable, which simplifies its application.

**Paper 5: Planning of Inter Terminal Transport:**

Nowadays, the major ports around the world usually consist of multiple terminals and service centers which are often run by different operators. Meanwhile, inland terminals have been also developed to reduce port congestion and improve transport efficiency. The integrated planning of inter-terminal transport (ITT) between the seaport and inland terminals helps in providing frequent and profitable services, but also could lead to higher overall planning complexity. Moreover, the ITT system usually involves multiple stakeholders with different or even conflicting interests. Although an increasing number of studies have been conducted in recent years, few studies have summarized the research findings and indicated the directions for future research regarding ITT. This paper provides a systemic review of ITT planning: we examine 77 scientific journal papers to identify what kind of objectives should be achieved in ITT system planning, which

actors should be involved, and what methodologies can be used to support the decision-making process. Based on the analysis of the existing research, several research gaps can be found. For example, the multi-modality ITT systems are rarely studied; cooperation frameworks are needed in the coordination of different actors and quantitative methodologies should be developed to reflect the different actors' financial interests.

## 2.References:


Paper 1: Measuring the Capacity of a Port System:

Author: Jason Bryan Salminen Year: 2013

Paper 2: Railway capacity analysis:

Authors: Anders Lindfeldt Year: 2015

Paper 3: Online Analytical Processing of Port Calls for Decision Support:

Authors: Aidan Worth, Aris Televantos Year: 2022

Paper 4: Capacity Assessment in Freight-Passengers Complex Railway Nodes:

Authors: Kianinejadoshah, A.; Ricci Year: 2022

Paper 5: Planning of Inter Terminal Transport:

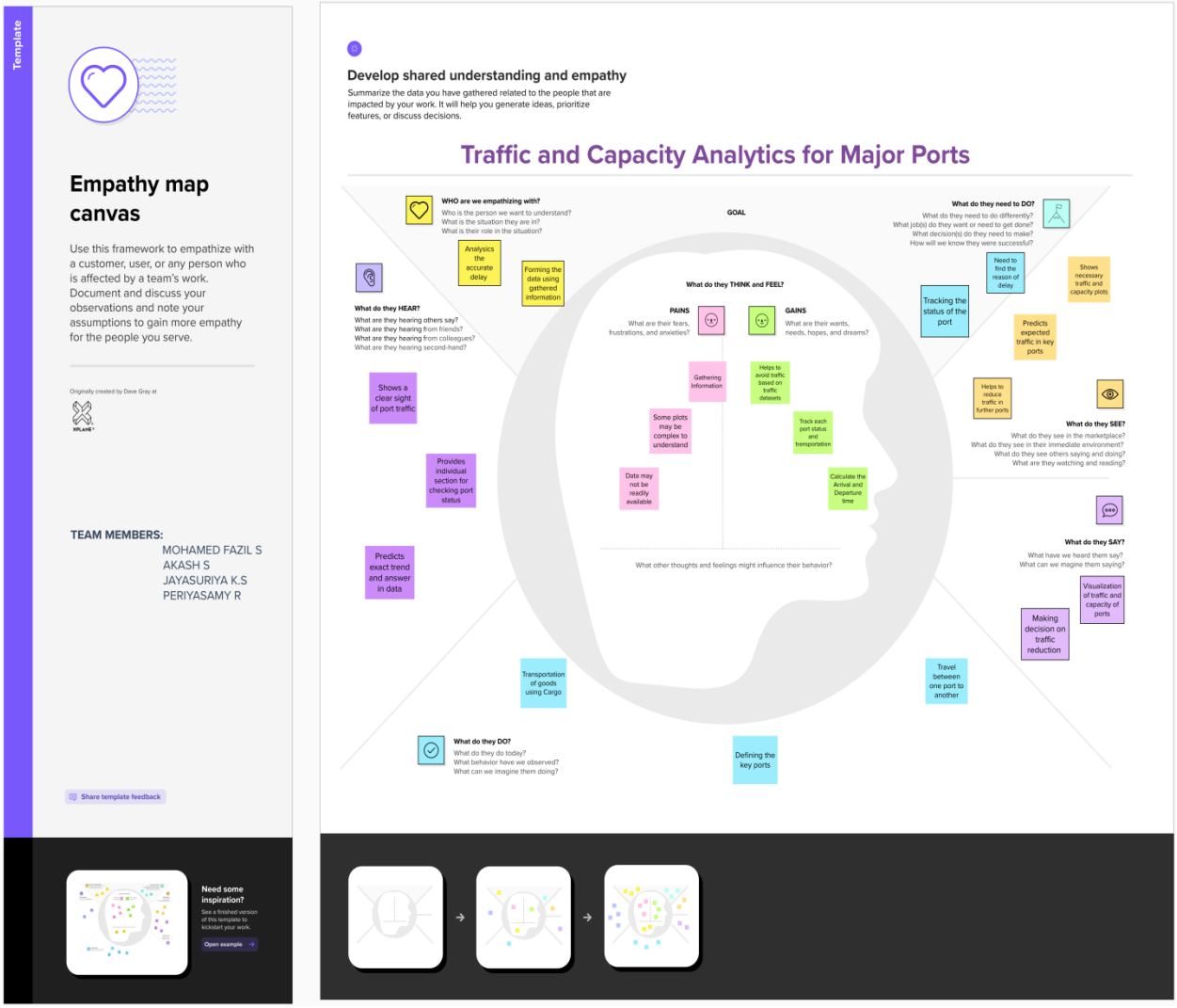
Authors: Bart Wiegmans, Francesco Corman Year: 2022

## 3. Problem Statement Definition:

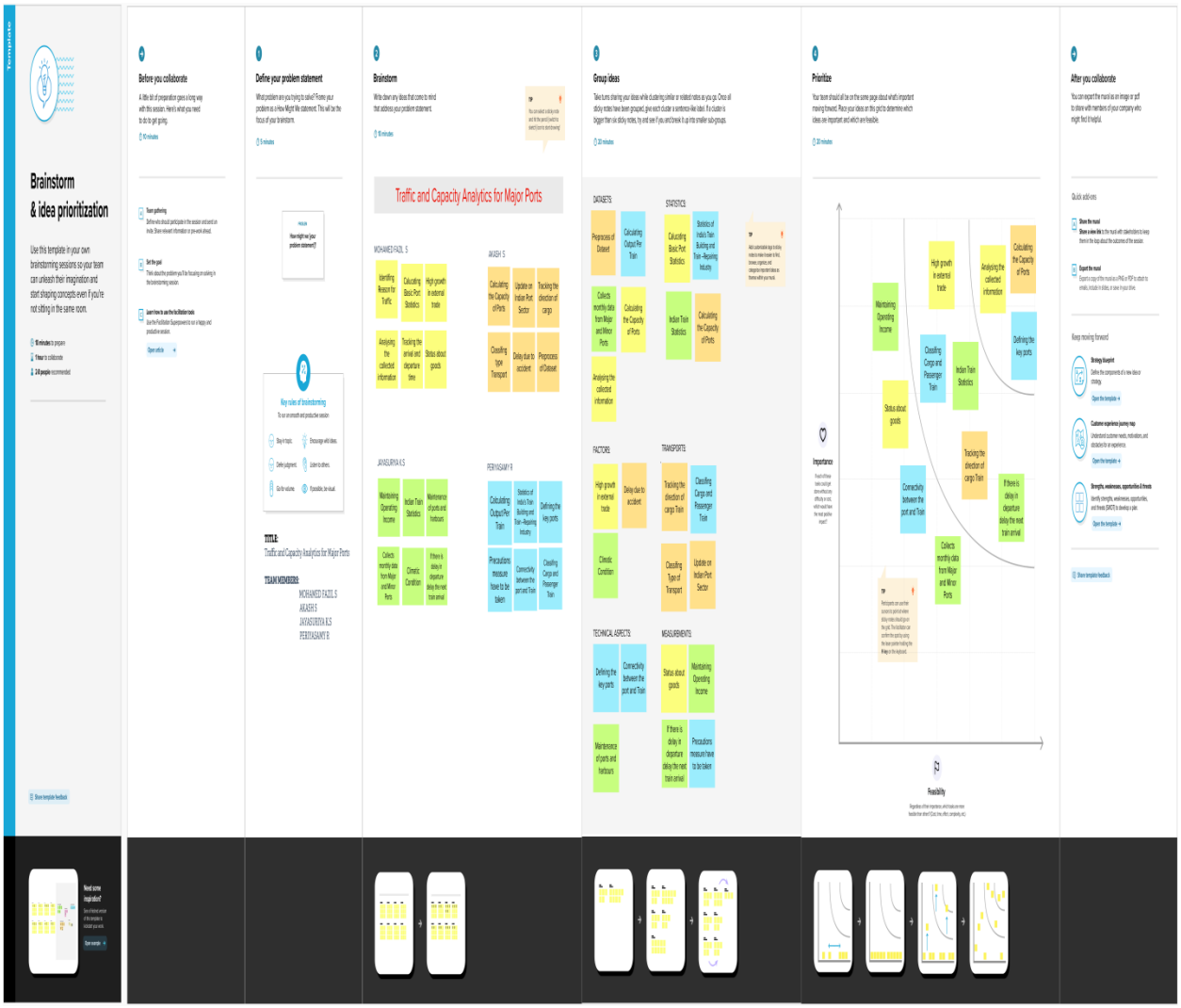
The Indian Railways has a capital base of about Rs. 1 lacs crores and is often referred to as the lifeline of the Indian economy. As it includes transportation of bulk freight and long-distance passengers, traffic and congestion on rail corridors becomes a major challenge. Data analytics can be applied to visualize freight transportation and congestion on rail corridors across major railway ports to get better insight of the working of the port network and to improve the port connectivity.

# CHAPTER 3: IDEATION & PROPOSED SOLUTION

## 1.Empathy Map Canvas:



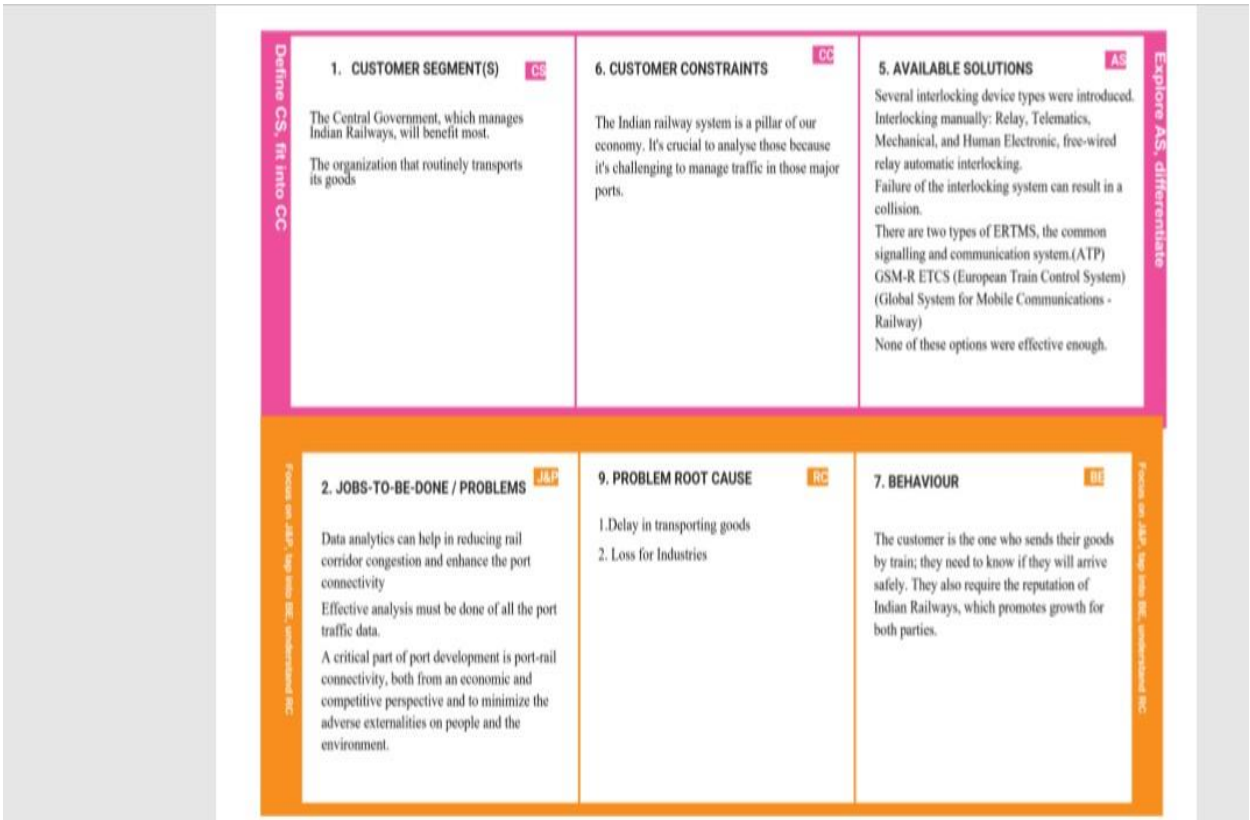
# 2.Ideation & Brainstorming:

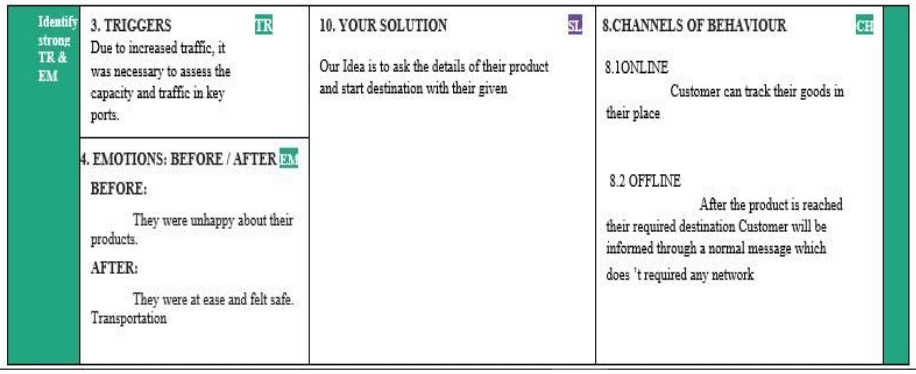


## 3.Proposed Solution:

| SI NO | PARAMETER | DESCRIPTION |
|---|---|---|
| 1 | Problem Statement (Problem To Be Solved) | Improving the connectivity Between the ports and reducing the Traffic between the corridors using analytics |
| 2 | Idea/Solution Description | To decrease the traffic in the major transportation in the bulk freight and long-distance train |
| 3 | Novelty | Traffic survey and assessment of traffic volumes identification of technical and economical viable route |
| 4 | Social Impact/Customer Satisfaction | Necessary resources are provided and decrease the crisis of the open wages in the railway delivery port in different power plants in India |
| 5 | Business Model(Revenue Model) | Railways ports provide for the tracking of the flow of the commodities being transferred from one to another location |
| 6 | Scalability of the Solution | With the establishment of the railway as the development effort and the use of adequate data to increase the economy |

# 4.Problem Solution fit:



# CHAPTER 4: REQUIREMENT ANALYSIS

## 1. Functional requirement:

| SI.NO | Functional Requirement (Epic) | Sub Requirement (Story / Sub-Task) |
|---|---|---|
| 1 | User Registration | Registration through Form<br>Registration through Gmail |
| 2 | User Confirmation | Confirmation via Email |
| 3 | User Input Acceptance | The dashboard accepts user input by means of<br>selecting the location of the ports. |
| 4 | Options for User to filter location of ports | The user can use filter options to view ports by<br>countries. |
| 5 | Visualization of ports. | The dashboard provides various visualization<br>techniques to understand the flow. |
| 6 | Providing Delay Information of trains. | The dashboard is able to provide the user the<br>information like delay of a particular train to the ports. |

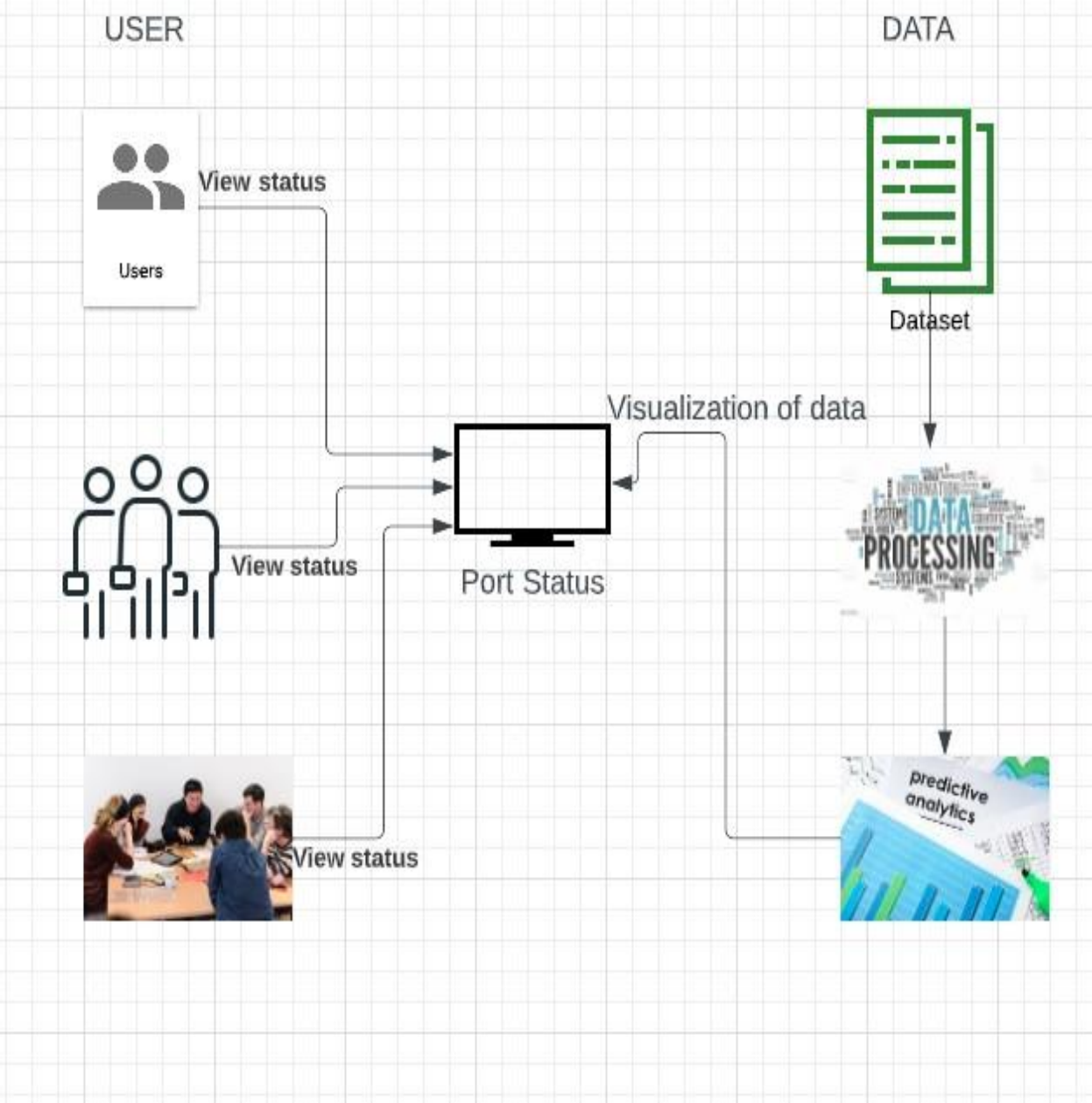
## 2.Non-Functional requirements:

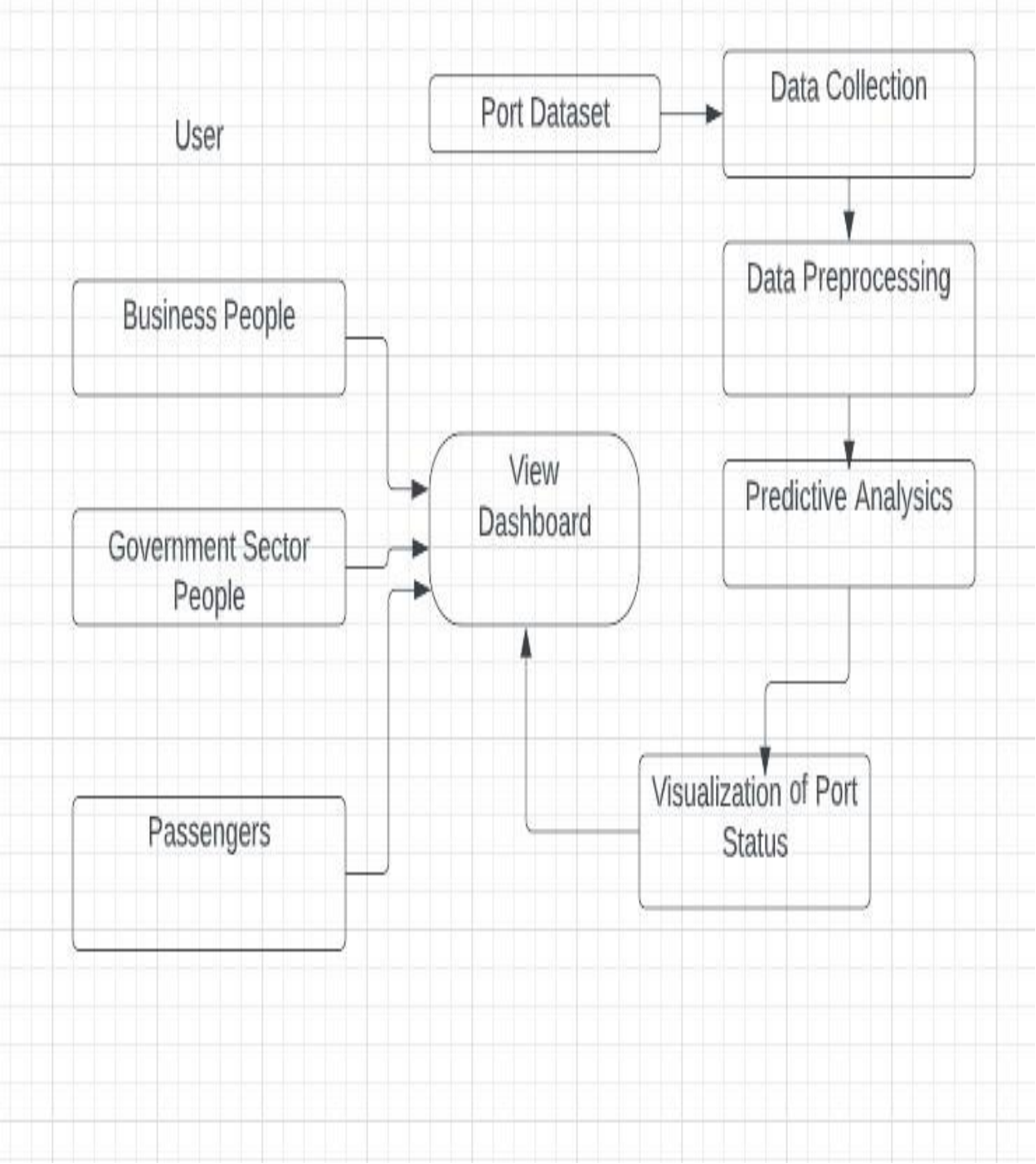
| SI.NO | Non-Functional Requirement | Description |
|---|---|---|
| 1 | Usability | The dashboard is able to provide the users the consistency and the aesthetic they expect. The user can constantly use the dashboard without any flaw in the visual quality. |
| 2 | Security | The dashboard is much secured that the data of the users are kept confidential and also it is not prone to any kind of attacks. |
| 3 | Reliability | The failure rate is minimal and the failure can easily be rectified using the measures. Thus this makes the dashboard much reliable. |
| 4 | Performance | The dashboard gives better performance. It provides the user a convenient and flexible User Interface. |
| 5 | Availability | The dashboard is always available to serve the users. The availability is ensured in such a way that the user can access the dashboard any time anywhere. |
| 6 | Scalability | The dashboard is highly scalable. It can withstand any increase or decrease of loads. |

# CHAPTER 5: PROJECT DESIGN

## 1.Data Flow Diagrams:

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the rightamount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.




User
Port Dataset
Data Collection
Data Preprocessing
Predictive Analysics
Visualization of Port Status
View Dashboard
Business People
Government Sector People
Passengers

## 2.Solution Architecture:

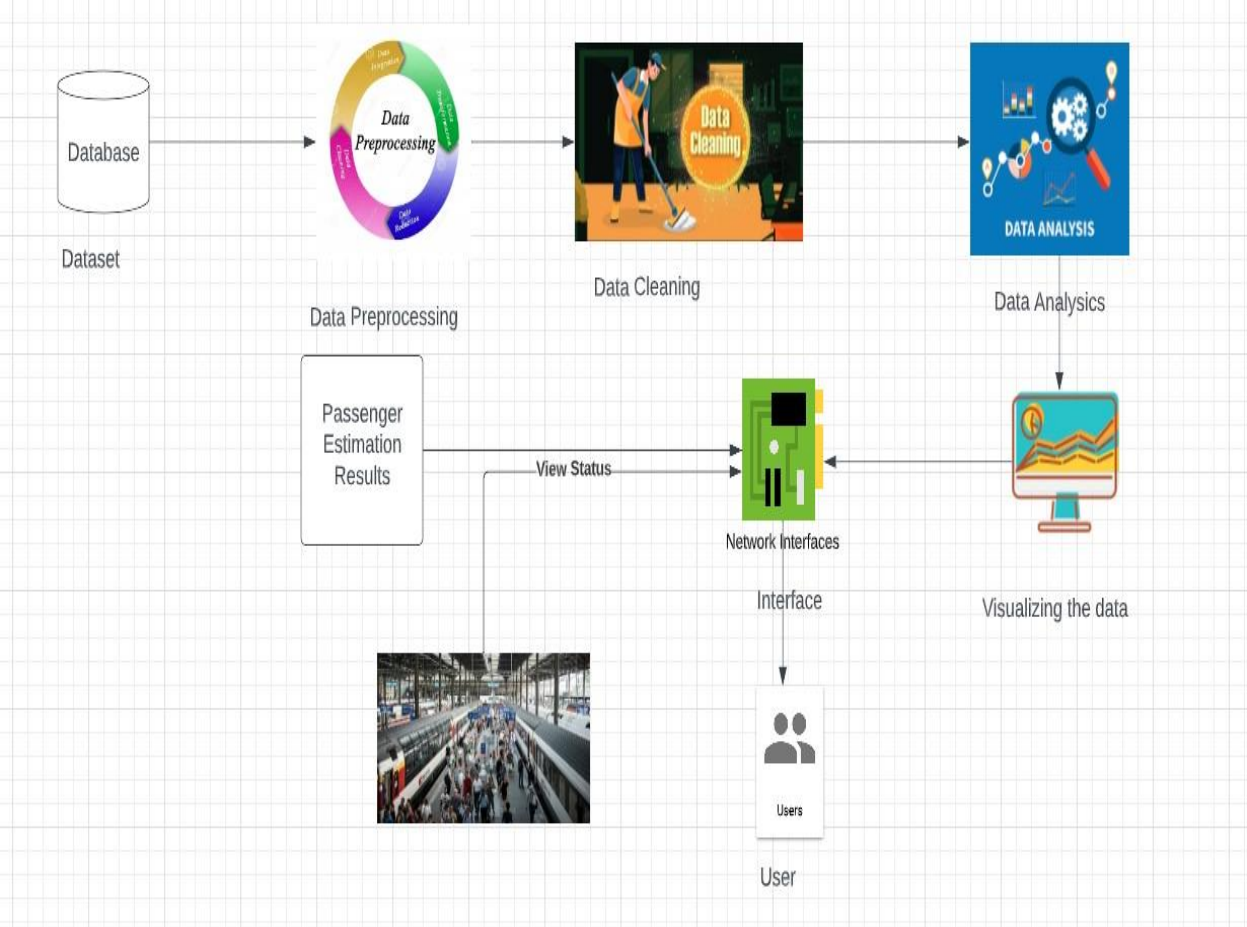
Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

• Find the best tech solution to solve existing business problems.

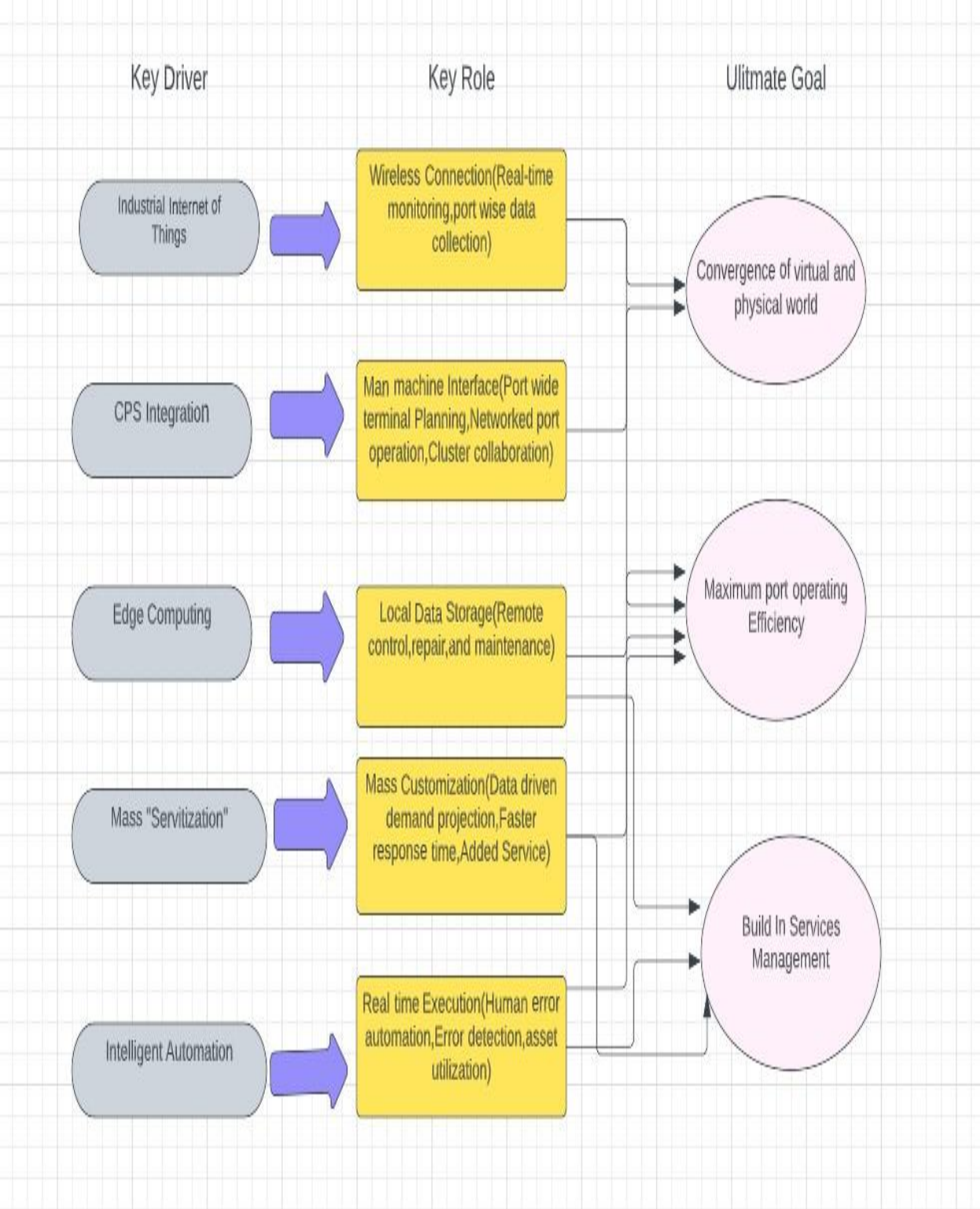
• Describe the structure, characteristics, behaviour, and other aspects of the software to project stakeholders.

• Define features, development phases, and solution requirements.

• Provide specifications according to which the solution is defined, managed, and delivered.



## TECHNICAL ARCHITECTURE:



**3. User Stories:**

| Port Infrastructure and Stack holders | Enabling Technology | Smart Port Services | Smart Port Goals |
|---|---|---|---|
| Rail | Sensors | Port Monitoring | Economic Development |
| Terminals | IOT | Infrastructure Management | Energy Awareness |
| Port Authorities | RFID | Data Analysis | Effective Logistics |
| Shipping Companies | Big Data Technology | Data Prediction | Effective Operation |

## CHAPTER 6: PROJECT PLANNING & SCHEDULING

**1.Sprint Planning & Estimation**:

| DATE | MILESTONE | ASSINEE | STATUS | DESCRIPTION |
|---|---|---|---|---|
| 31.10.22 | Data Collection | MOHAMED FAZIL S<br>AKASH S<br>JAYASURIYA K.S<br><br>PERIYASAMY R | Completed | Data Set for Traffic and Capacity Analysis is collected. |

| | | | | |
|---|---|---|---|---|
| 07.09.22 | Data Pre Processing | MOHAMED FAZIL S<br>AKASH S<br>JAYASURIYA K.S<br><br>PERIYASAMY R | Completed | Preprocessing involves the existing collection of data, preparing the calculation. |
| 14.09.22 | Visualization of the Data | MOHAMED FAZIL S<br>AKASH S<br>JAYASURIYA K.S<br><br>PERIYASAMY R | Completed | Visualization involves plotting dataset using analysis. |
| 21.09.22 | Model Building | MOHAMED FAZIL S<br>AKASH S<br>JAYASURIYA K.S<br><br>PERIYASAMY R | In Process | Using certain algorithm to build the model. |
| 28.09.22 | DashBoard Creation | MOHAMED FAZIL S<br>AKASH S<br>JAYASURIYA K.S<br>PERIYASAMY R | Completed | Dashboard for visualization of the port status. |
| 07.10.22 | Ideration | MOHAMED | | Initialization of |

| | | | | |
|---|---|---|---|---|
| | Phase | FAZIL S<br>AKASH S<br>JAYASURIYA K.S<br>PERIYASAMY R | Completed | Ideration phase |
| 10.10.22 | Project Design Phase-1 | MOHAMED FAZIL S<br>AKASH S<br>JAYASURIYA K.S<br>PERIYASAMY R | Completed | Preparing of solution document includes novelty, feasibility, etc. |
| 12.10.22 | Project Design Phase-2 | MOHAMED FAZIL S<br>AKASH S<br>JAYASURIYA K.S<br>PERIYASAMY R | Completed | Preparing of customer journey map, interaction and experience with application. |
| 31.10.22 | Project Planning Phase | MOHAMED FAZIL S<br>AKASH S<br>JAYASURIYA K.S<br>PERIYASAMY R | Completed | Prepare milestone, Sprint delivery plan. |
| 02.11.22 | Project Development Phase(Sprint) | MOHAMED FAZIL S<br>AKASH S<br>JAYASURIYA K.S | In Process | Development of the each sprint. |

| | | | | |
|---|---|---|---|---|
| | | PERIYASAMY R | | |

**2.Sprint Delivery Schedule:**

Project Tracker, Velocity & Burndown Chart:

| Sprint | Total story point | Duration | Sprint Start date | Sprint End date(Planned) | story point completed | Sprint Release Date |
|---|---|---|---|---|---|---|
| Sprint 1 | 20 | 6 days | 24 Oct 2022 | 29 Oct 2022 | 20 | 29 Oct 2022 |
| Sprint 2 | 20 | 6 days | 31 Oct 2022 | 05 Nov 2022 | 20 | 05 Nov 2022 |
| Sprint 3 | 20 | 6 days | 07 Nov 2022 | 12 Nov 2022 | 20 | 12 Nov 2022 |
| Sprint 4 | 20 | 6 days | 14 Nov 2022 | 19 Nov 2022 | 20 | 19 Nov 2022 |

Velocity:

Imagine we have a 6-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) periteration unit (story points per day)

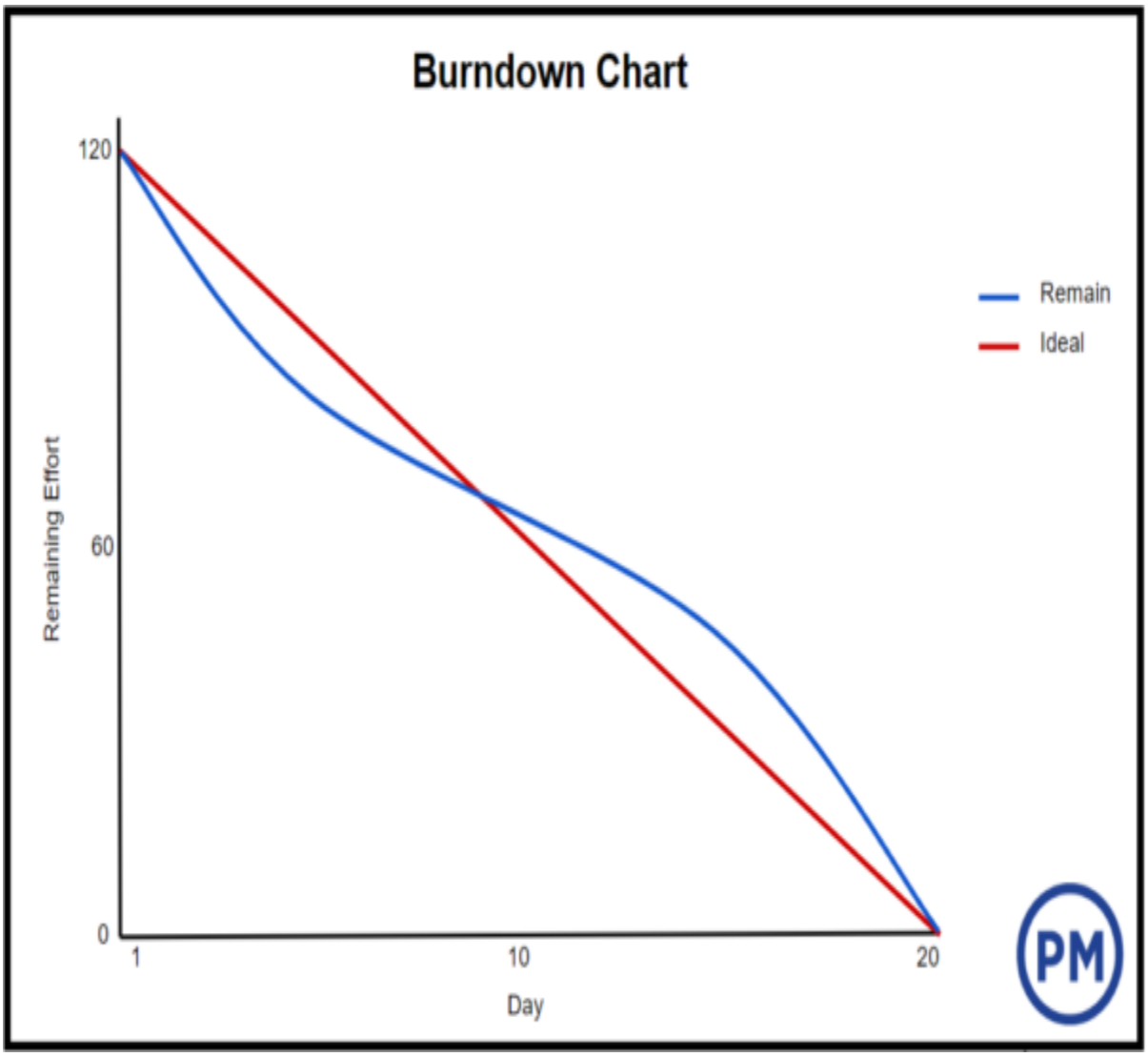
AV=sprint duration/velocity

= 20/6 =3.33

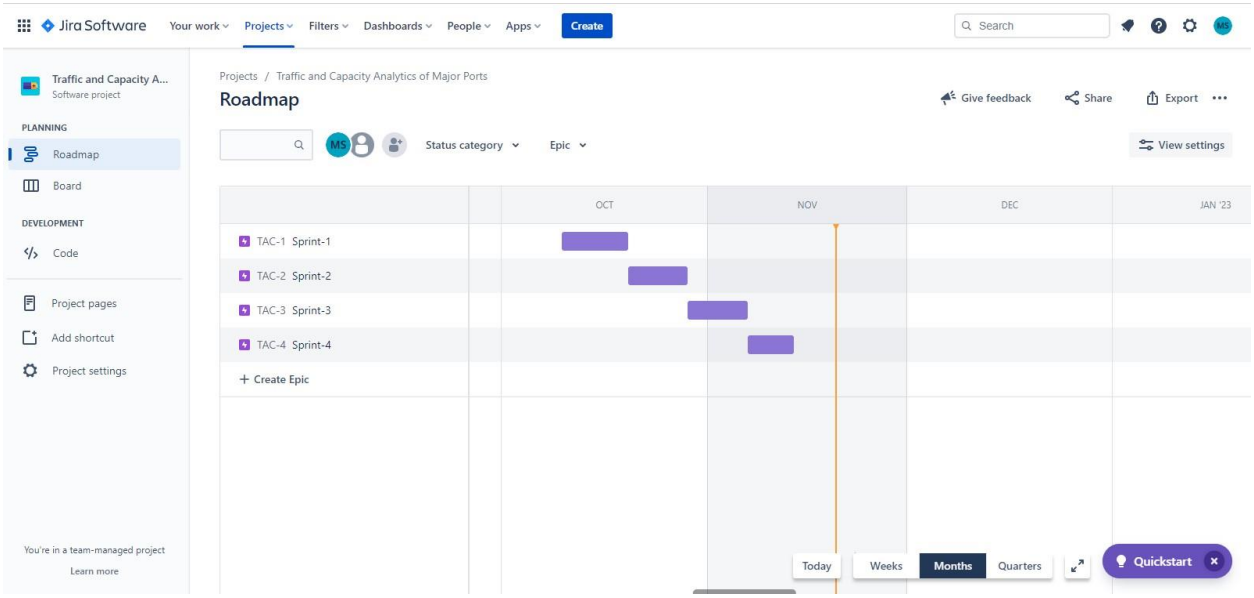
Burndown Chart:

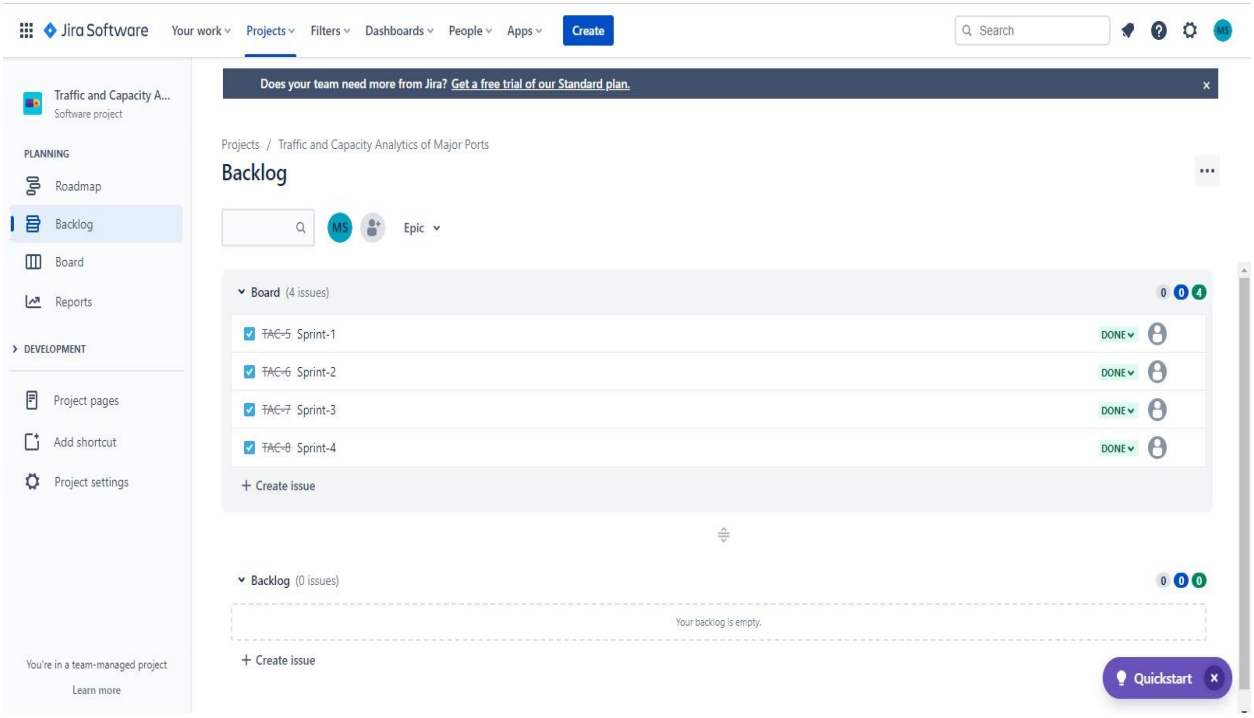
A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies suchas Scrum. However,

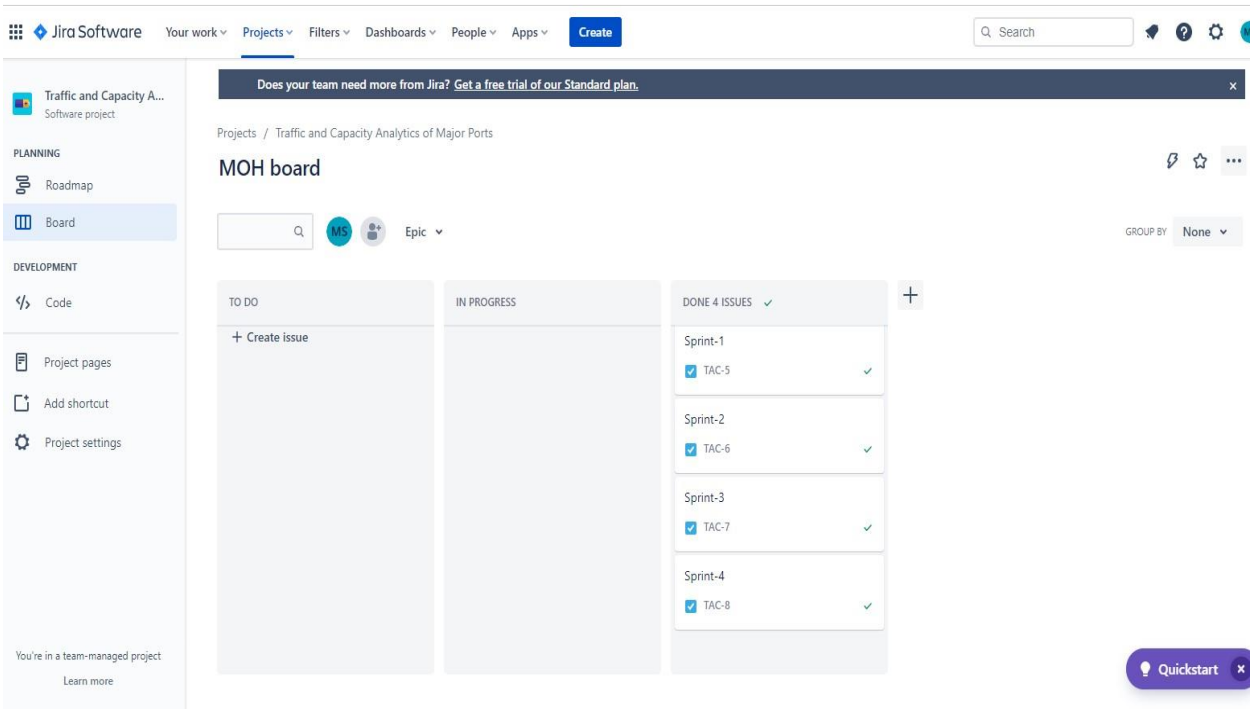
burn down charts can be applied to any project containing measurable progress over time.



# 3.Reports from JIRA:






# CHAPTER 7: CODING & SOLUTIONING

Data Analytics includes 4 modules:
a. Data Collection
b. Data Preparation and Calculation
c. Data Visualization

1. Data Collection:

Data collection is the process of gathering, measuring, and analyzing accurate data from a variety of relevant sources to evaluate outcomes, forecast trends and probabilities. Major data sources used are spreadsheets and csv files.

2. Data Preparation:

Some prevalent challenges faced while collecting data are inconsistent data, ambiguous data, duplicate data, inaccurate data, too much data, etc. To overcome this problem data preparation is done. It is the process of profiling, cleansing, transforming and validating data. ■ Data profiling and cleansing

■ Data structuring

■ Data transformation
■ Data validation

Implementation Details

1. Data analytics for analysing and estimating traffic and capacity on major ports is done by creating various graphs and charts to highlight the insights and visualizations.
2. Plotting different graphs give broad understanding about the data and relationship among the features of data.
3. This supports in creating meaningful dashboards for exploring the data and making future predictions from them.

**CODE:**

Login:

```
<html>
<head>
<title>Login Form Validation</title>
<!-- Include CSS File Here -->
<link rel="stylesheet" href="login.css"/>
<!-- Include JS File Here -->
<script src="login.js"></script>
</head>
<body>
<div class="container">
<div class="main">
<h2>Login Form Validation</h2>
<form id="form_id" method="post" name="myform">
<label>User Name :</label>
<input type="text" name="username" id="username"/><br>
<label>Password :</label>
<input type="password" name="password" id="password"/><br>
<a href='dashboard.html'>
<input type="button" value="Login" id="submit" onclick="validate()"/></a>
<p class="message">not Registered?<a
href="Registartion.html">Register</a></p>
</form>
</div>
</div>
</body>
```

```
</html>
```

Login.css:

```
h2{
background-color: #FEFFED;
padding: 30px 35px;
margin: -10px -50px;
text-align:center;
border-radius: 10px 10px 0 0;
}
hr{
margin: 10px -50px;
border: 0;
border-top: 1px solid #ccc;
margin-bottom: 40px;
}
div.container{
width: 900px;
height: 610px;
margin:35px auto;
font-family: 'Raleway', sans-serif;
}
div.main{
width: 300px;
padding: 10px 50px 25px;
border: 2px solid gray;
border-radius: 10px;
font-family: raleway;
float:left;
margin-top:50px;
}
input[type=text],input[type=password]{
width: 100%;
height: 40px;
padding: 5px;
margin-bottom: 25px;
margin-top: 5px;
border: 2px solid #ccc;
color: #4f4f4f;
font-size: 16px;
border-radius: 5px;
```

```
}
label{
color: #464646;
text-shadow: 0 1px 0 #fff;
font-size: 14px;
font-weight: bold;
}
center{
font-size:32px;
}
.note{
color:red;
}
.valid{
color:green;
}
.back{
text-decoration: none;
border: 1px solid rgb(0, 143, 255);
background-color: rgb(0, 214, 255);
padding: 3px 20px;
border-radius: 2px;
color: black;
}
input[type=button]{
font-size: 16px;
background: linear-gradient(#ffbc00 5%, #ffdd7f 100%);
border: 1px solid #e5a900;
color: #4E4D4B;
font-weight: bold;
cursor: pointer;
width: 100%;
border-radius: 5px;
padding: 10px 0;
outline:none;
}
input[type=button]:hover{
background: linear-gradient(#ffdd7f 5%, #ffbc00 100%);
}
```

Login.js:

```
var attempt = 3; // Variable to count number of attempts.
// Below function Executes on click of login button.
function validate(){
var username = document.getElementById("username").value;
var password = document.getElementById("password").value;
if ( username == "Formget" && password == "formget#123"){
alert ("Login successfully");
window.location = "success.html"; // Redirecting to other page.
return false;
}
// Disabling fields after 3 attempts.
if( attempt == 0){
document.getElementById("username").disabled = true;
document.getElementById("password").disabled = true;
document.getElementById("submit").disabled = true;
return false;
}
}
}
```

Registration:

```
<!DOCTYPE html>
<html lang="en"><head>
<meta charset="utf-8">
<title>JavaScript Form Validation using a sample registration form</title>
<meta name="keywords" content="example, JavaScript Form Validation, Sample
registration form" />
<meta name="description" content="This document is an example of JavaScript
Form Validation using a sample registration form. " />
<link rel="stylesheet" href="style.css">
<script src="main.js"></script>
</head>
<body onload="document.registration.userid.focus();">
<h1>Registration Form</h1>
Use tab keys to move from one input field to the next.
<form name='registration' onSubmit="return formValidation();">
<ul>
<li><label for="userid">User Name:</label></li>
<li><input type="text" name="userid" size="12" /></li><br>
<li><label for="passid">Password:</label></li>
```

```
<li><input type="password" name="passid" size="12" /></li><br>
<li><label for="username">Name:</label></li>
<li><input type="text" name="username" size="50" /></li><br>
<li><label for="address">Address:</label></li>
<li><input type="text" name="address" size="50" /></li><br>
<li><label for="country">Country:</label></li>
<li><select name="country">
<option selected="" value="Default">(Please select a country)</option>
<option value="AF">Australia</option>
<option value="AL">Canada</option>
<option value="DZ">India</option>
<option value="AS">Russia</option>
<option value="AD">USA</option>
</select></li><br>
<li><label for="zip">ZIP Code:</label></li>
<li><input type="text" name="zip" /></li><br>
<li><label for="email">Email:</label></li><br>
<li><input type="text" name="email" size="50" /></li><br><br>
<br>
</ul>
</form>
<a href='login.html'>
<button type="button">Submit</button></a>
</body>
</html>
```

Registration.css:

```
h1 {
margin-left: 70px;
}
form li {
list-style: none;
margin-bottom: 5px;
}

form ul li label{
float: left;
clear: left;
width: 100px;
text-align: right;
margin-right: 10px;
```

```
font-family:Verdana, Arial, Helvetica, sans-serif;
font-size:14px;
}

form ul li input, select, span {
float: left;
margin-bottom: 10px;
}

form textarea {
float: left;
width: 350px;
height: 150px;
}

[type="submit"] {
clear: left;
margin: 20px 0 0 230px;
font-size:18px
}

p {
margin-left: 70px;
font-weight: bold;
}
```

Registartion.js:

```
function formValidation()
{
var uid = document.registration.userid;
var passid = document.registration.passid;
var uname = document.registration.username;
var uadd = document.registration.address;
var ucountry = document.registration.country;
var uzip = document.registration.zip;
var uemail = document.registration.email;
var umsex = document.registration.msex;
var ufsex = document.registration.fsex; if(userid_validation(uid,5,12))
{
if(passid_validation(passid,7,12))
{
```

```
if(allLetter(uname))
{
if(alphanumeric(uadd))
{
if(countryselect(ucountry))
{
if(allnumeric(uzip))
{
if(ValidateEmail(uemail))
{
if(validsex(umsex,ufsex))
{
}
}
}
}
}
}
}
}
return false;

function userid_validation(uid,mx,my)
{
var uid_len = uid.value.length;
if (uid_len == 0 || uid_len >= my || uid_len < mx)
{
alert("User Id should not be empty / length be between "+mx+" to "+my);
uid.focus();
return false;
}
return true;
}

function passid_validation(passid,mx,my)
{
var passid_len = passid.value.length;
if (passid_len == 0 ||passid_len >= my || passid_len < mx)
{
alert("Password should not be empty / length be between "+mx+" to "+my);
```

```
passid.focus();
return false;
}
return true;
}

function allLetter(uname)
{
var letters = /^[A-Za-z]+$/;
if(uname.value.match(letters))
{
return true;
}
else
{
alert('Username must have alphabet characters only');
uname.focus();
return false;
}
}

function alphanumeric(uadd)
{
var letters = /^[0-9a-zA-Z]+$/;
if(uadd.value.match(letters))
{
return true;
}
else
{
alert('User address must have alphanumeric characters only');
uadd.focus();
return false;
}
}

function countryselect(ucountry)
{
if(ucountry.value == "Default")
{
```

```
alert('Select your country from the list');
ucountry.focus();
return false;
}
else
{
return true;
}
}

function allnumeric(uzip)
{
var numbers = /^[0-9]+$/;
if(uzip.value.match(numbers))
{
return true;
}
else
{
alert('ZIP code must have numeric characters only');
uzip.focus();
return false;
}
}

function ValidateEmail(uemail)
{
var mailformat = /^\w+([\.-]?\w+)*@\w+([\.-]?\w+)*(\.\w{2,3})+$/;
if(uemail.value.match(mailformat))
{
return true;
}
else
{
alert("You have entered an invalid email address!");
uemail.focus();
return false;
}
}
```

```
function validsex(umsex,ufsex)
{
x=0;

if(umsex.checked)
{
x++;
} if(ufsex.checked)
{
x++;
}
if(x==0)
{
alert('Select Male/Female');
umsex.focus();
return false;
}
else
{
alert('Form Successfully Submitted');
window.location.reload()
return true;}
}

function formValidation()
{
var uid = document.registration.userid;
var passid = document.registration.passid;
var uname = document.registration.username;
var uadd = document.registration.address;
var ucountry = document.registration.country;
var uzip = document.registration.zip;
var uemail = document.registration.email;
var umsex = document.registration.msex;
var ufsex = document.registration.fsex; if(userid_validation(uid,5,12))
{
if(passid_validation(passid,7,12))
{
if(allLetter(uname))
{
```

```
if(alphanumeric(uadd))
{
if(countryselect(ucountry))
{
if(allnumeric(uzip))
{
if(ValidateEmail(uemail))
{
if(validsex(umsex,ufsex))
{
}
}
}
}
}
}
}
}
return false;

} function userid_validation(uid,mx,my)
{
var uid_len = uid.value.length;
if (uid_len == 0 || uid_len >= my || uid_len < mx)
{
alert("User Id should not be empty / length be between "+mx+" to "+my);
uid.focus();
return false;
}
return true;
}
function passid_validation(passid,mx,my)
{
var passid_len = passid.value.length;
if (passid_len == 0 ||passid_len >= my || passid_len < mx)
{
alert("Password should not be empty / length be between "+mx+" to "+my);
passid.focus();
return false;
}
```

```
return true;
}
function allLetter(uname)
{
var letters = /^[A-Za-z]+$/;
if(uname.value.match(letters))
{
return true;
}
else
{
alert('Username must have alphabet characters only');
uname.focus();
return false;
}
}
function alphanumeric(uadd)
{
var letters = /^[0-9a-zA-Z]+$/;
if(uadd.value.match(letters))
{
return true;
}
else
{
alert('User address must have alphanumeric characters only');
uadd.focus();
return false;
}
}
function countryselect(ucountry)
{
if(ucountry.value == "Default")
{
alert('Select your country from the list');
ucountry.focus();
return false;
}
else
{
```

```
return true;
}
}
function allnumeric(uzip)
{
var numbers = /^[0-9]+$/;
if(uzip.value.match(numbers))
{
return true;
}
else
{
alert('ZIP code must have numeric characters only');
uzip.focus();
return false;
}
}
function ValidateEmail(uemail)
{
var mailformat = /^\w+([\.-]?\w+)*@\w+([\.-]?\w+)*(\.\w{2,3})+$/;
if(uemail.value.match(mailformat))
{
return true;
}
else
{
alert("You have entered an invalid email address!");
uemail.focus();
return false;
}
} function validsex(umsex,ufsex)
{
x=0;

if(umsex.checked)
{
x++;
} if(ufsex.checked)
{
x++;
```

```
}
if(x==0)
{
alert('Select Male/Female');
umsex.focus();
return false;
}
else
{
alert('Form Succesfully Submitted');
window.location.reload()
return true;
}
}
```

Dashboard:

```
<!DOCTYPE html>
<!-- Designined by CodingLab | www.youtube.com/codinglabyt -->
<html lang="en" dir="ltr">
  <head>
    <meta charset="UTF-8">
    <!--<title> Responsiive Admin Dashboard | CodingLab </title>-->
    <link rel="stylesheet" href="style.css">
    <!-- Boxicons CDN Link -->
    <link href='dashboard.css' rel='stylesheet'>
     <meta name="viewport" content="width=device-width, initial-scale=1.0">
   </head>
<body>
  <div class="sidebar">
    <div class="logo-details">
      <i class='bx bxl-c-plus-plus'></i>
      <span class="logo_name">Data Visualization</span>
    </div>
      <ul class="nav-links">
        <li>
          <a href="prepare the Dataset.png" class="active">
            <i class='bx bx-grid-alt' ></i>
            <span class="links_name">Data Prep - Conversion of Data and
Calculations</span>
          </a>
```

```
        </li>
        <li>
          <a href="Port-Wise Traffic Distribution, Port Wise Capacity
Distribution.jpg">
            <i class='bx bx-box' ></i>
            <span class="links_name">Port-wise Traffic Distribution, Port wise
Capacity Distribution</span>
          </a>
        </li>
        <li>
          <a href="Port-Wise Traffic Vs Capacity By Line Chart.jpg">
            <i class='bx bx-list-ul' ></i>
            <span class="links_name">Port-wise Traffic vs Capacity by Line
Chart</span>
          </a>
        </li>
        <li>
          <a href="Port-Wise Traffic Projected Vs Achieved By Column Chart.jpg">
            <i class='bx bx-pie-chart-alt-2' ></i>
            <span class="links_name">Port-wise Traffic Projected vs Achieved by
Column Chart</span>
          </a>
        </li>
        <li>
          <a href="Port-Wise Traffic Projected Vs Achieve By Stacked Column
Chart.jpg">
            <i class='bx bx-coin-stack' ></i>
            <span class="links_name">Port-wise Traffic Projected vs Achieve by
Stacked Column Chart</span>
          </a>
        </li>
        <li>
          <a href="Port-Wise Total Capacity Projects Vs Total Capacity Achieve By
Line And Bar Chart.jpg">
            <i class='bx bx-book-alt' ></i>
            <span class="links_name">Port-wise Total Capacity Projects vs Total
Capacity Achieve by Line and Bar Chart</span>
          </a>
        </li>
        <li>
```

```
        <a href="Port-Wise Traffic Projects Vs Total Projected By Area Chart.jpg">
          <i class='bx bx-user' ></i>
          <span class="links_name">Port-wise Traffic Projects vs Total Projected by
Area Chart</span>
        </a>
      </li>
      <li>
        <a href="Port-Wise Total Capacity Achieve, Traffic Achieved Using
Stacked Bar.jpg">
          <i class='bx bx-message' ></i>
          <span class="links_name">Port-wise Total Capacity Achieve, Traffic
Achieved using Stacked Bar</span>
        </a>
      </li>
      <li>
        <a href="Port-Wise Total Capacity Achieved Using Map.jpg">
          <i class='bx bx-heart' ></i>
          <span class="links_name">Port-wise Total Capacity Achieved using
Map</span>
        </a>
      </li>
      <li>
        <a href="Summary Cards And Visual Using Total Capacity Vs Actual
Capacity Column Chart.jpg">
          <i class='bx bx-cog' ></i>
          <span class="links_name">Summary Cards and Visual using Total
Capacity vs Actual Capacity Column Chart</span>
        </a>
      </li>
      <li class="log_out">
        <a href="login.html">
          <i class='bx bx-log-out'></i>
          <span class="links_name">Log out</span>
        </a>
      </li>
    </ul>
  </div>
  <section class="home-section">
    <nav>
      <div class="sidebar-button">
```

```
      <i class='bx bx-menu sidebarBtn'></i>
      <span class="dashboard">Dashboard</span>
    </div>
    <div class="search-box">
      <input type="text" placeholder="Search...">
      <i class='bx bx-search' ></i>
    </div>
    <div class="profile-details">
      <!--<img src="images/profile.jpg" alt="">-->
      <span class="admin_name">Traffic And Capacity Analytics For Major
Ports</span>
      <i class='bx bx-chevron-down' ></i>
    </div>
  </nav>

  <div class="home-content">
    <div class="overview-boxes">
      <div class="box">
        <div class="right-side">
          <div class="box-topic">Cargo Handled</div>
          <div class="number">679.37</div>
          <div class="indicator">
            <i class='bx bx-up-arrow-alt'></i>
            <span class="text">from FY</span>
          </div>
        </div>
        <i class='bx bx-cart-alt cart'></i>
      </div>
      <div class="box">
        <div class="right-side">
          <div class="box-topic">Cargo Handled%</div>
          <div class="number">4.77</div>
          <div class="indicator">
            <i class='bx bx-up-arrow-alt'></i>
            <span class="text">from FY</span>
          </div>
        </div>
        <i class='bx bxs-cart-add cart two' ></i>
      </div>
      <div class="box">
```

```
    <div class="right-side">
      <div class="box-topic">Container Traffic</div>
      <div class="number">9138</div>
      <div class="indicator">
        <i class='bx bx-up-arrow-alt'></i>
        <span class="text">from FY</span>
      </div>
    </div>
    <i class='bx bx-cart cart three' ></i>
  </div>
  <div class="box">
    <div class="right-side">
      <div class="box-topic">Container Traffic%</div>
      <div class="number">7.32</div>
      <div class="indicator">
        <i class='bx bx-down-arrow-alt down'></i>
        <span class="text">from FY</span>
      </div>
    </div>
    <i class='bx bxs-cart-download cart four' ></i>
  </div>
</div>

<div class="sales-boxes">
  <div class="recent-sales box">
    <div class="title">Recent Sales</div>
    <div class="sales-details">
      <ul class="details">
        <li class="topic">Date</li>
        <li><a href="#">10 Nov 2022</a></li>
        <li><a href="#">10 Nov 2022</a></li>
        <li><a href="#">10 Nov 2022</a></li>
        <li><a href="#">10 Nov 2022</a></li>
        <li><a href="#">10 Nov 2022</a></li>
        <li><a href="#">10 Nov 2022</a></li>
        <li><a href="#">10 Nov 2022</a></li>
        <li><a href="#">10 Nov 2022</a></li>
        <li><a href="#">10 Nov 2022</a></li>
      </ul>
      <ul class="details">
```

```
  <li class="topic">Ports</li>
  <li><a href="#">Chennai</a></li>
  <li><a href="#">Tuticorin</a></li>
  <li><a href="#">Visakhapatnam</a></li>
  <li><a href="#">Paradip</a></li>
  <li><a href="#">Mumbai Paw</a></li>
  <li><a href="#">Kandla</a></li>
  <li><a href="#">Kolkata</a></li>
  <li><a href="#">Ennore</a></li>
   <li><a href="#">Cochin</a></li>
 </ul>
 <ul class="details">
  <li class="topic">Million tonnes</li>
  <li><a href="#">30.45</a></li>
  <li><a href="#">36.45</a></li>
  <li><a href="#">63.54</a></li>
  <li><a href="#">102.01</a></li>
  <li><a href="#">62.83</a></li>
  <li><a href="#">110.10</a></li>
  <li><a href="#">57.83</a></li>
   <li><a href="#">42.06</a></li>
  <li><a href="#">32.02</a></li>
 </ul>
 <ul class="details">
  <li class="topic">Percentage Increased</li>
  <li><a href="#">+1.42</a></li>
  <li><a href="#">-4.32</a></li>
  <li><a href="#">+4.12</a></li>
  <li><a href="#">+14.62</a></li>
  <li><a href="#">-0.35</a></li>
  <li><a href="#">+4.42</a></li>
  <li><a href="#">+13.61</a></li>
   <li><a href="#">+5.28</a></li>
   <li><a href="#">+16.65</a></li>
 </ul>
 </div>
 <div class="button">
  <a href="datafile.csv">See All</a>
 </div>
</div>
```

```
<div class="top-sales box">
  <div class="title">Container Traffic</div>
  <ul class="top-sales-details">
    <li>
    <a href="#">
      <!--<img src="images/sunglasses.jpg" alt="">-->
      <span class="product">Chennai</span>
    </a>
    <span class="price">3.43%</span>
  </li>
  <li>
    <a href="#">
       <!--<img src="images/jeans.jpg" alt="">-->
      <span class="product">Mumbai </span>
    </a>
    <span class="price">2.38%</span>
  </li>
  <li>
    <a href="#">
     <!-- <img src="images/nike.jpg" alt="">-->
      <span class="product">Visakhapatnam</span>
    </a>
    <span class="price">5.56%</span>
  </li>
  <li>
    <a href="#">
      <!--<img src="images/scarves.jpg" alt="">-->
      <span class="product">Thoothukkudi</span>
    </a>
    <span class="price">8.04%</span>
  </li>
  <li>
    <a href="#">
      <!--<img src="images/blueBag.jpg" alt="">-->
      <span class="product">Kolkata</span>
    </a>
    <span class="price">3.04%</span>
  </li>
  <li>
    <a href="#">
```

```
            <!--<img src="images/bag.jpg" alt="">-->
            <span class="product">Paradeep</span>
          </a>
          <span class="price">71.02%</span>
        <li>
          <a href="#">
            <!--<img src="images/addidas.jpg" alt="">-->
            <span class="product">Kandla</span>
          </a>
          <span class="price">95.63</span>
        </li>
<li>
          <a href="#">
           <!--<img src="images/shirt.jpg" alt="">-->
            <span class="product">Mormugao</span>
          </a>
          <span class="price">6.23%</span>
        </li>
        </ul>
      </div>
    </div>
  </div>
 </section>

 <script>
  let sidebar = document.querySelector(".sidebar");
let sidebarBtn = document.querySelector(".sidebarBtn");
sidebarBtn.onclick = function() {
 sidebar.classList.toggle("active");
 if(sidebar.classList.contains("active")){
 sidebarBtn.classList.replace("bx-menu" ,"bx-menu-alt-right");
}else
 sidebarBtn.classList.replace("bx-menu-alt-right", "bx-menu");
}
 </script>

</body>
</html>
```

Dashboard.css

```
/* Googlefont Poppins CDN Link */
```

```
@import
url('https://fonts.googleapis.com/css2?family=Poppins:wght@200;300;400;500;60
0;700&display=swap');
*{
  margin: 0;
  padding: 0;
  box-sizing: border-box;
  font-family: 'Poppins', sans-serif;
}
.sidebar{
  position: fixed;
  height: 100%;
  width: 240px;
  background: #0A2558;
  transition: all 0.5s ease;
}
.sidebar.active{
  width: 60px;
}
.sidebar .logo-details{
  height: 80px;
  display: flex;
  align-items: center;
}
.sidebar .logo-details i{
  font-size: 28px;
  font-weight: 500;
  color: #fff;
  min-width: 60px;
  text-align: center
}
.sidebar .logo-details .logo_name{
  color: #fff;
  font-size: 24px;
  font-weight: 500;
}
.sidebar .nav-links{
  margin-top: 10px;
}
.sidebar .nav-links li{
```

```
  position: relative;
  list-style: none;
  height: 50px;
}
.sidebar .nav-links li a{
  height: 100%;
  width: 100%;
  display: flex;
  align-items: center;
  text-decoration: none;
  transition: all 0.4s ease;
}
.sidebar .nav-links li a.active{
  background: #081D45;
}
.sidebar .nav-links li a:hover{
  background: #081D45;
}
.sidebar .nav-links li i{
  min-width: 60px;
  text-align: center;
  font-size: 18px;
  color: #fff;
}
.sidebar .nav-links li a .links_name{
  color: #fff;
  font-size: 15px;
  font-weight: 400;
  white-space: nowrap;
}
.sidebar .nav-links .log_out{
  position: absolute;
  bottom: 0;
  width: 100%;
}
.home-section{
  position: relative;
  background: #f5f5f5;
  min-height: 100vh;
  width: calc(100% - 240px);
```

```
  left: 240px;
  transition: all 0.5s ease;
}
.sidebar.active ~ .home-section{
  width: calc(100% - 60px);
  left: 60px;
}
.home-section nav{
  display: flex;
  justify-content: space-between;
  height: 80px;
  background: #fff;
  display: flex;
  align-items: center;
  position: fixed;
  width: calc(100% - 240px);
  left: 240px;
  z-index: 100;
  padding: 0 20px;
  box-shadow: 0 1px 1px rgba(0, 0, 0, 0.1);
  transition: all 0.5s ease;
}
.sidebar.active ~ .home-section nav{
  left: 60px;
  width: calc(100% - 60px);
}
.home-section nav .sidebar-button{
  display: flex;
  align-items: center;
  font-size: 24px;
  font-weight: 500;
}
nav .sidebar-button i{
  font-size: 35px;
  margin-right: 10px;
}
.home-section nav .search-box{
  position: relative;
  height: 50px;
  max-width: 550px;
```

```
  width: 100%;
  margin: 0 20px;
}
nav .search-box input{
  height: 100%;
  width: 100%;
  outline: none;
  background: #F5F6FA;
  border: 2px solid #EFEEF1;
  border-radius: 6px;
  font-size: 18px;
  padding: 0 15px;
}
nav .search-box .bx-search{
  position: absolute;
  height: 40px;
  width: 40px;
  background: #2697FF;
  right: 5px;
  top: 50%;
  transform: translateY(-50%);
  border-radius: 4px;
  line-height: 40px;
  text-align: center;
  color: #fff;
  font-size: 22px;
  transition: all 0.4 ease;
}
.home-section nav .profile-details{
  display: flex;
  align-items: center;
  background: #F5F6FA;
  border: 2px solid #EFEEF1;
  border-radius: 6px;
  height: 50px;
  min-width: 190px;
  padding: 0 15px 0 2px;
}
nav .profile-details img{
  height: 40px;
```

```
  width: 40px;
  border-radius: 6px;
  object-fit: cover;
}
nav .profile-details .admin_name{
  font-size: 15px;
  font-weight: 500;
  color: #333;
  margin: 0 10px;
  white-space: nowrap;
}
nav .profile-details i{
  font-size: 25px;
  color: #333;
}
.home-section .home-content{
  position: relative;
  padding-top: 104px;
}
.home-content .overview-boxes{
  display: flex;
  align-items: center;
  justify-content: space-between;
  flex-wrap: wrap;
  padding: 0 20px;
  margin-bottom: 26px;
}
.overview-boxes .box{
  display: flex;
  align-items: center;
  justify-content: center;
  width: calc(100% / 4 - 15px);
  background: #fff;
  padding: 15px 14px;
  border-radius: 12px;
  box-shadow: 0 5px 10px rgba(0,0,0,0.1);
}
.overview-boxes .box-topic{
  font-size: 20px;
  font-weight: 500;
```

```
}
.home-content .box .number{
  display: inline-block;
  font-size: 35px;
  margin-top: -6px;
  font-weight: 500;
}
.home-content .box .indicator{
  display: flex;
  align-items: center;
}
.home-content .box .indicator i{
  height: 20px;
  width: 20px;
  background: #8FDACB;
  line-height: 20px;
  text-align: center;
  border-radius: 50%;
  color: #fff;
  font-size: 20px;
  margin-right: 5px;
}
.box .indicator i.down{
  background: #e87d88;
}
.home-content .box .indicator .text{
  font-size: 12px;
}
.home-content .box .cart{
  display: inline-block;
  font-size: 32px;
  height: 50px;
  width: 50px;
  background: #cce5ff;
  line-height: 50px;
  text-align: center;
  color: #66b0ff;
  border-radius: 12px;
  margin: -15px 0 0 6px;
}
```

```
.home-content .box .cart.two{
   color: #2BD47D;
   background: #C0F2D8;
 }
.home-content .box .cart.three{
   color: #ffc233;
   background: #ffe8b3;
 }
.home-content .box .cart.four{
   color: #e05260;
   background: #f7d4d7;
 }
.home-content .total-order{
  font-size: 20px;
  font-weight: 500;
}
.home-content .sales-boxes{
  display: flex;
  justify-content: space-between;
  /* padding: 0 20px; */
}

/* left box */
.home-content .sales-boxes .recent-sales{
  width: 65%;
  background: #fff;
  padding: 20px 30px;
  margin: 0 20px;
  border-radius: 12px;
  box-shadow: 0 5px 10px rgba(0, 0, 0, 0.1);
}
.home-content .sales-boxes .sales-details{
  display: flex;
  align-items: center;
  justify-content: space-between;
}
.sales-boxes .box .title{
  font-size: 24px;
  font-weight: 500;
  /* margin-bottom: 10px; */
```

```
}
.sales-boxes .sales-details li.topic{
  font-size: 20px;
  font-weight: 500;
}
.sales-boxes .sales-details li{
  list-style: none;
  margin: 8px 0;
}
.sales-boxes .sales-details li a{
  font-size: 18px;
  color: #333;
  font-size: 400;
  text-decoration: none;
}
.sales-boxes .box .button{
  width: 100%;
  display: flex;
  justify-content: flex-end;
}
.sales-boxes .box .button a{
  color: #fff;
  background: #0A2558;
  padding: 4px 12px;
  font-size: 15px;
  font-weight: 400;
  border-radius: 4px;
  text-decoration: none;
  transition: all 0.3s ease;
}
.sales-boxes .box .button a:hover{
  background:  #0d3073;
}

/* Right box */
.home-content .sales-boxes .top-sales{
  width: 35%;
  background: #fff;
  padding: 20px 30px;
  margin: 0 20px 0 0;
```

```
  border-radius: 12px;
  box-shadow: 0 5px 10px rgba(0, 0, 0, 0.1);
}
.sales-boxes .top-sales li{
  display: flex;
  align-items: center;
  justify-content: space-between;
  margin: 10px 0;
}
.sales-boxes .top-sales li a img{
  height: 40px;
  width: 40px;
  object-fit: cover;
  border-radius: 12px;
  margin-right: 10px;
  background: #333;
}
.sales-boxes .top-sales li a{
  display: flex;
  align-items: center;
  text-decoration: none;
}
.sales-boxes .top-sales li .product,
.price{
  font-size: 17px;
  font-weight: 400;
  color: #333;
}
/* Responsive Media Query */
@media (max-width: 1240px) {
  .sidebar{
    width: 60px;
  }
  .sidebar.active{
    width: 220px;
  }
  .home-section{
    width: calc(100% - 60px);
    left: 60px;
  }
```

```
  .sidebar.active ~ .home-section{
    /* width: calc(100% - 220px); */
    overflow: hidden;
    left: 220px;
  }
  .home-section nav{
    width: calc(100% - 60px);
    left: 60px;
  }
  .sidebar.active ~ .home-section nav{
    width: calc(100% - 220px);
    left: 220px;
  }
}
@media (max-width: 1150px) {
  .home-content .sales-boxes{
    flex-direction: column;
  }
  .home-content .sales-boxes .box{
    width: 100%;
    overflow-x: scroll;
    margin-bottom: 30px;
  }
  .home-content .sales-boxes .top-sales{
    margin: 0;
  }
}
@media (max-width: 1000px) {
  .overview-boxes .box{
    width: calc(100% / 2 - 15px);
    margin-bottom: 15px;
  }
}
@media (max-width: 700px) {
  nav .sidebar-button .dashboard,
  nav .profile-details .admin_name,
  nav .profile-details i{
    display: none;
  }
  .home-section nav .profile-details{
```

```
    height: 50px;
    min-width: 40px;
  }
  .home-content .sales-boxes .sales-details{
    width: 560px;
  }
}
@media (max-width: 550px) {
  .overview-boxes .box{
    width: 100%;
    margin-bottom: 15px;
  }
  .sidebar.active ~ .home-section nav .profile-details{
    display: none;
  }
}
  @media (max-width: 400px) {
  .sidebar{
    width: 0;
  }
  .sidebar.active{
    width: 60px;
  }
  .home-section{
    width: 100%;
    left: 0;
  }
  .sidebar.active ~ .home-section{
    left: 60px;
    width: calc(100% - 60px);
  }
  .home-section nav{
    width: 100%;
    left: 0;
  }
  .sidebar.active ~ .home-section nav{
    left: 60px;
    width: calc(100% - 60px);
  }
}
```

## CHAPTER 8: TESTING

### 1.DETECT ANALYSIS:

This result shows the number of resolved or closed bugs at each severity level and how they are resolved.

| Resolution | Severity 1 | Severity 2 | Severity 3 | Severity 4 | Subtotal |
|---|---|---|---|---|---|
| By Design | 8 | 5 | 0 | 3 | 16 |
| Duplicate | 1 | 0 | 4 | 0 | 7 |
| External | 0 | 3 | 5 | 1 | 5 |
| Fixed | 13 | 4 | 3 | 18 | 32 |
| Not Reproduced | 0 | 1 | 0 | 1 | 2 |
| Skipped | 1 | 2 | 0 | 0 | 1 |
| Won't Fix | 0 | 5 | 2 | 1 | 8 |
| Totals | 23 | 14 | 13 | 26 | 75 |

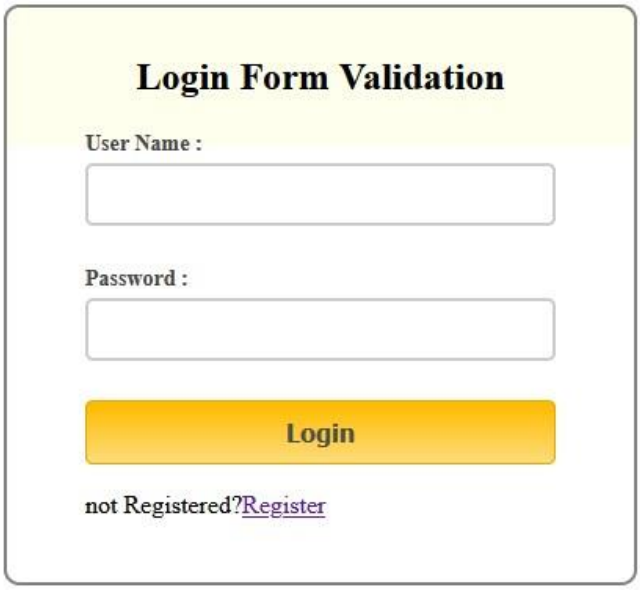
## 2.TESTCASE ANALYSIS :

This report shows number of testcases that have passed, failed and untested.

| Section | Total Cases | Not Tested | Fail | Pass |
|---|---|---|---|---|
| Print Engine | 6 | 0 | 0 | 6 |
| Client Application | 51 | 0 | 0 | 51 |
| Security | 1 | 0 | 0 | 1 |
| Outsource Shipping | 3 | 0 | 0 | 3 |
| Exception Reporting | 6 | 0 | 0 | 6 |
| Final Report Output | 2 | 0 | 0 | 2 |
| Version Control | 1 | 0 | 0 | 1 |

# CHAPTER 9: RESULTS

## 1.Performance Metrics:



# Registration Form

Use tab keys to move from one input field to the next.

User Name:

Password:

Name:

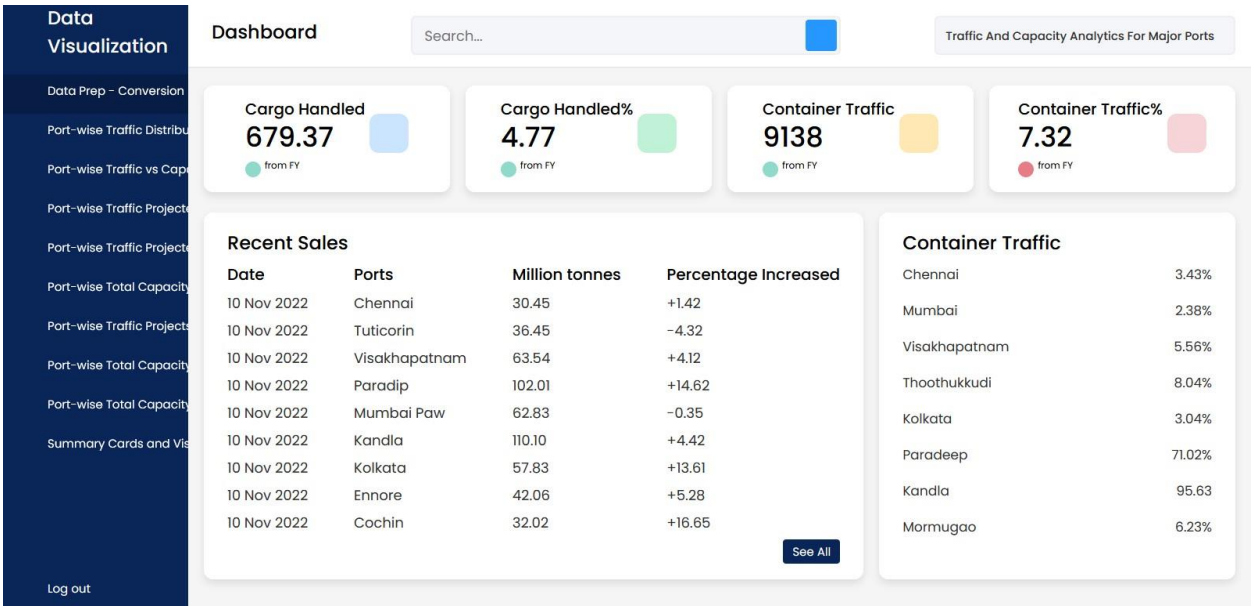
Address:

Country: (Please select a country)

ZIP Code:

Email:

Submit



## CHAPTER 10: ADVANTAGES & DISADVANTAGES

**ADVANTAGES:**

- To regain some of the market, it has lost over past decades and regain market share in some commodities and overcome the challenges and to maintain sustainable growth in all its commodities.
- Reducing the congestion on rail corridors and improving port connectivity.
- The development of two Dedicated Freight Corridors across key ports
- Adequate resources will be provided.
- Businesses using railway ports can easily track.
- Government can use data analytics dashboard to ensure less traffic on the ports.

**DISADVANTAGES:**

- It is difficult to handle port connectivity to identify the congestion.
- It makes the user tensed and frustrated
- Difficult to track the status of rails

## CHAPTER 11: CONCLUSION

The impact of data analytics in port traffic analysis has already made a substantial difference in the ability of traffic in the port. The role of data analytics in this process has continues to grow and expand as more types of data become available. New tools are available that makes the results of the analytics clear and easy for people to access. Realizing the potential of data analytics to transform the rail port connectivity begins by understanding how the technology can be applied. Data analytics holds the key to unlocking this vital information.

## CHAPTER 12: FUTURE SCOPE

The network crises-crosses the nation, binding it together by ferrying freight and passengers across the length and breadth of the country. As the Indian economy moves into a high growth trajectory the Railways have also stepped-up developmental efforts and are preparing themselves for an even bigger role in the future.

## CHAPTER 13: APPENDIX

GITHUB LINK:

https://github.com/IBM-EPBL/IBM-Project-1018-1658334870