Project Report Format

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INTRODUCTION:

A smart railway station is **a station area that uses different types of electronic Internet of things (IOT) sensors to collect data and using that data to better improve efficiency, mobility and sustainability**. It mainly includes. smart management, smart infrastructure, and smart mobility.

PROJECT OBJECTIVE:

The Corporate aim of the Indian Railways is **to commit itself to ensuring that all its activities are managed to the highest level of safety which is pragmatic and reasonably practicable to achieve.**

PURPOSE:

Rail transport (also known as train transport) is a means of transport that **transfers passengers and goods on wheeled vehicles running on rails**, which are incorporated in tracks.

LITERATURE SURVEY:

Smart sensors and analytics across the train engine, coaches, and tracks allow rail systems to be remotely checked and repaired before a small issue magnifies into huge trouble.

EXISTING PROBLEM:

Some of the defects include **worn out rails, weld problems, internal defects, corrugations and rolling contact fatigue (RCF) initiated problems such as surface cracks, head checks, squats, spalling and shelling.**

REFERENCE:

The SMART-RAIL project **aims to improve the freight rail services offered to the shippers by focusing on making improvements on the five main aspects.**

PROBLEM STATEMENT DEFINITION:

Poor traffic predictions.
Cost of fuel.
Poor weather predictions.
The cost of fleet maintenance.
A lack of skilled drivers.
Poor routing strategies.

IDEATION AND PROPOSED SOLUTIONS:

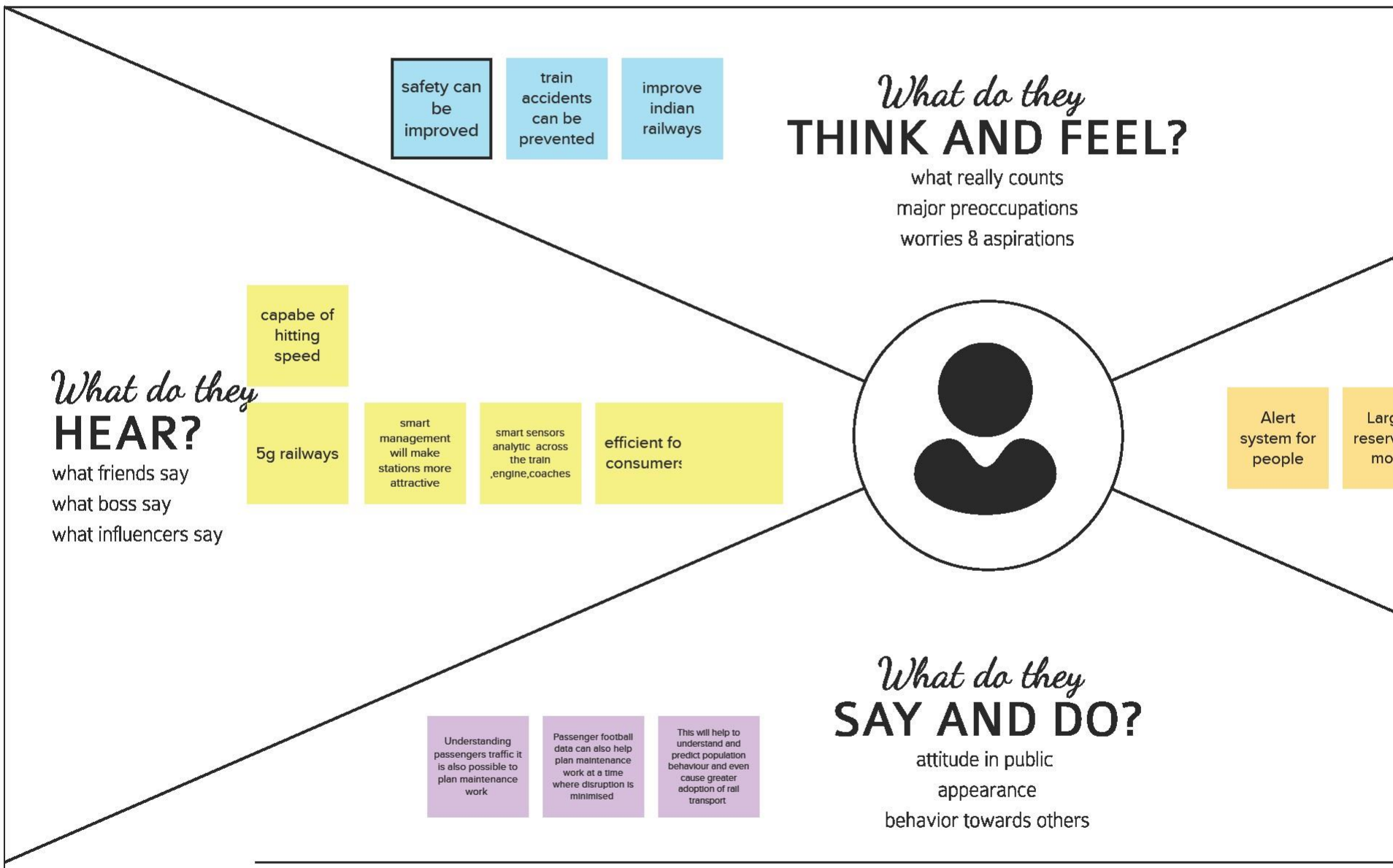
EMPATHY MAP:

Empathy Map Canva

Gain insight and understanding on solving customer problems.

1

Build empathy and keep your focus on the user by putting yourself in thei

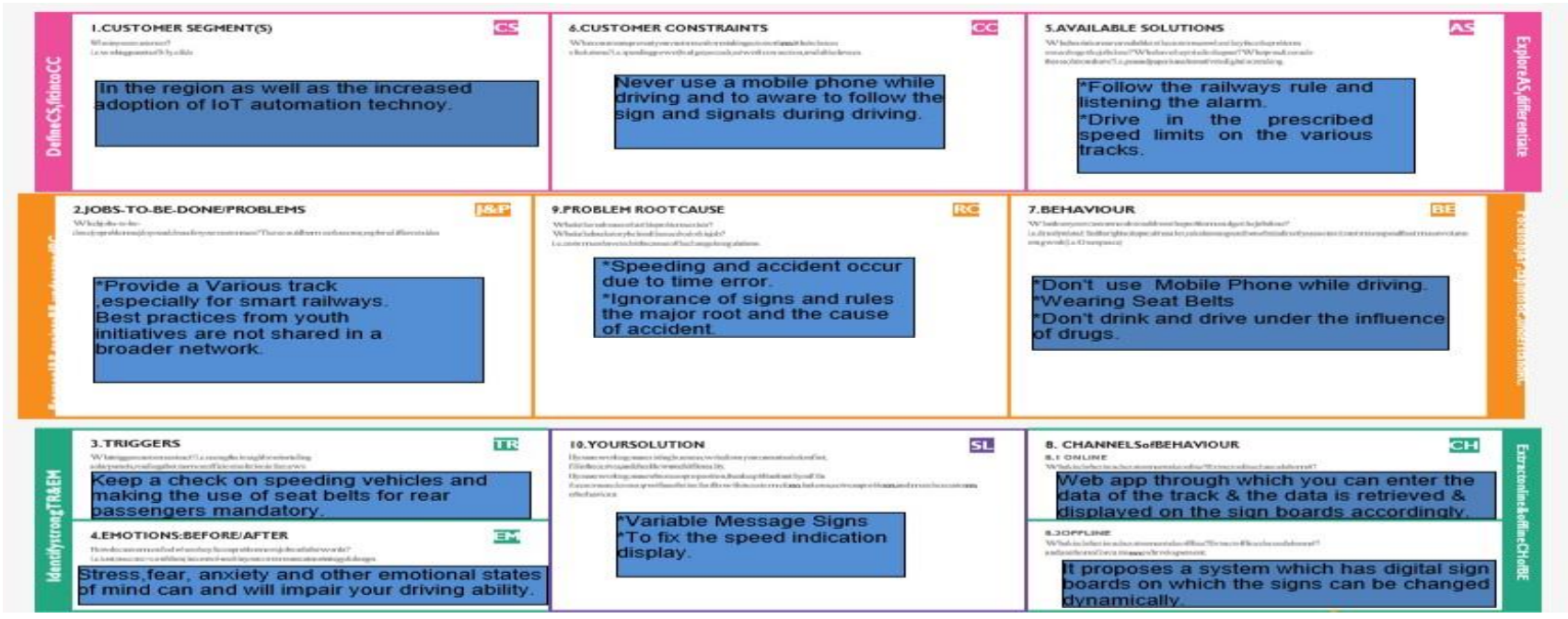


IDEATION AND BRAIN STORMING:

PROPOSED SOLUTION:

S.NO	PARAMETRE	DESCRIPTION
1.	Problem Statement	Railway accidents,attack on railways.A sensor is fixed on track .
2.	Solution Description	People safety by easily sharing alarms.Thermal and visual imaging.
3.	Uniqueness	3D Laser Scanners,Digital Twin Models
4.	Social Impact	Increased soil erosion ,habitat destruction
5.	Business Model	Smart sensors can be used to track important assest,manage passenger flow and enable predictive maintenance
6.	Scalability of the solution	Distributed monitoring offers a solution that ensures your systems remain easy.

PROBLEM SOLUTION FIT:



REQUIREMENT ANALYSIS:

FUNCTIONAL REQUIREMENT:

FR.NO	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR 1	User Registration	There is a need to apply registration intelligent computerised systems for the operation and control of complex environments.
FR 2	User Confirmation	Recent confirmation in sensors and condition monitoring technologies have led to continuous data collection and evaluation.
FR 3	Web Application	Application identify of faults proactively

		and elimination of necessary maintenance interventions.
FR 4	**Configuration to Device**	**It collects configuration and analyses the device data to prevent breakdowns.**
FR 5	**Data Base**	**Sensor and scanning database.**
FR 6	**Python**	**IBM IOT Platform.**

NON FUNCTIONAL REQUIREMENT:

FR NO	Non-Functional Requirement	Description
FR 1	**Usability**	**Estimation of the remaining useful life of an asset to ascertain the probability of its mission accomplishment.**
FR 2	**Security**	**Operation of railways is secured centrally-monitored and controlled through operations control systems.**
FR 3	**Reliability**	**A reliable CMMS should be user-friendly, fast, reactive and flexible.**
FR 4	**Performance**	**The digital railway performance is focussed mainly on digital signalling technology, which aims to enhance safety and speed up train movement in a congested network.**
FR 5	**Availability**	**A journey planner available could recommend the fastest or most comfortable current trip allowing for road conditions to the station.**
FR 6	**Scalability**	**Scalability and railway automation solutions are crucial to detect and signal whether line sections.**

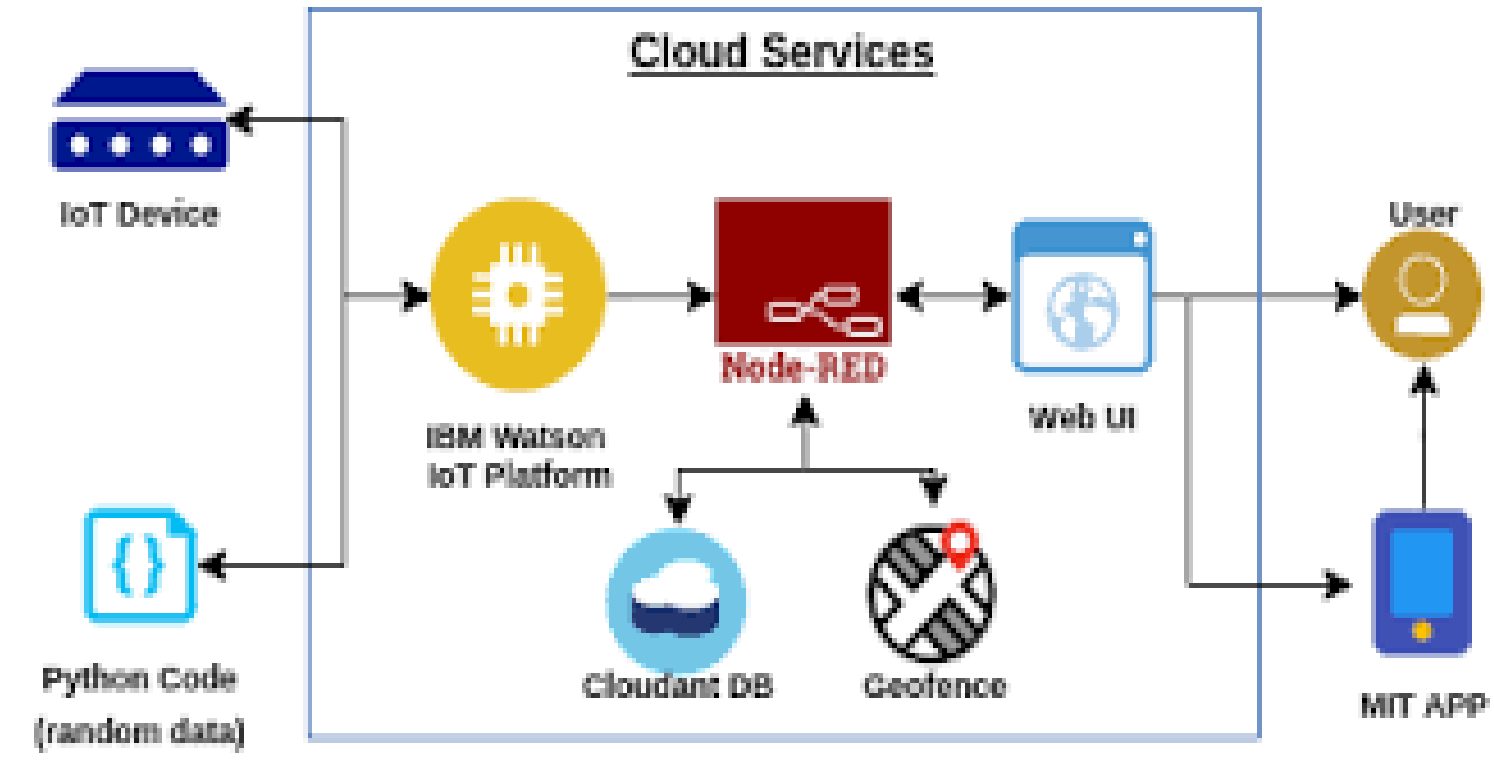
PROJECT DESIGN:

DATA FLOW DIAGRAM
Data flow diagrams:
Smart railways is a technologically advanced approach to efficiently manage railway operations through sharing of rail data across rail infrastructure components such as passengers, control centres ticketing department and freight .

User stories
Use the below template to list all the user stories for the product.

User Type	Functional requirement (epic)	user story number	Use story /task	Acceptance cretria	Priority	Mobile use
Customer (mobile user)	**Registraion**	**USN 1**	**Automation ofloading/unloading.use of intelligent gate system.Automatic couplig**	**Improve basic and safe devolepment**	**HIGH**	**SPRINT 1**
		USN 2	**Railway Manitance strateiges.Optimizaton of maintance timing.Organizational changes**	**It is nessary to adhere to the use of indepentant**	**HIGH**	**SPRINT 1**
		USN 3	**Grates of automation in train operation.ATO system architecture.ATOsystem functional requirement**	**Green low carbon ,energy saving**	**LOW**	**SPRINT 2**
		USN 4	**Elecronic dynamic weighing scales.Mulifunctional intelligent gate system**		**MEDIUM**	**SPRINT 1**
		USN 5	**Directly and simultaneously .though container yards .automation of loading /unloding**		**HIGH**	**SPRINT 1**

SOLUTION AND TECHNICAL ARCHITECTURE:



USER STORIES

S.NO	COMPONENT	DESCRIPTION	TECHNOLOGY
1.	User interface	User interacts with the web application through this particular technology	Node red,MIT app inverter
2.	Application logic 1	To develop a script for Ticket booking with GPS monitoring system	python
3.	Application logic 2	In order to access the cloud platform	IBM watson service
4.	Application logic 3	To build conversational interface with any application and devices	IBM Watson service
5.	Cloud data base	To store the data in the cloud services	IBM DB2,IBM

PROJECT PLANNING AND SCHEDULING:

SPRINT	Functional Requirement (Epic	User Story Number	User Story / Task	Story Points	Priority	Team Members
SPRINT 1	LOGIN	USN 1,USN 2	Here User means further trend development until the system is saturated article limitation is possible.	20	High	GOWSALYA
SPRINT 2	LOGIN	USN 3	User is maintenance based on the monitoring of the condition of the railway components	20	Low	AISHWARYA
SPRINT 3	DASHBOARD	USN 4	Efficiency of scheduling and increased energy efficiency and cost savings,increase the capacity of the railway network	20	Medium	MALATHI
SPRINT 4	DASHBOARD	USN 5	Single stop inspection at joint border crossing is a solution where only one common border station between the neighbouring countries is designed as a joint border control checkpoint	20	HIGH	JASMINE

SPRINT DELIVERY SCHEDULE:

S.NO	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End 24	Sprint Release Date (Actual)

1.	20	6 Days	24 OCT 2022	29 OCT 2022	20	29 Oct 2022
2.	20	6 Days	31 OCT 2022	05 NOV 2022	20	05 Nov 2022
3.	20	6 Days	07 NOV 2022	12 NOV 2022	20	12 Nov 2022
4.	20	6 Days	14 NOV 2022	19NOV 2022	20	19 Nov 2022

CODING & SOLUTIONING :

FEATURE:

IoT technologies help railways successfully manage passenger safety, operational efficiency, and the passenger experience. Smart sensors can be used to track important assets, manage passenger flow, and enable predictive maintenance.

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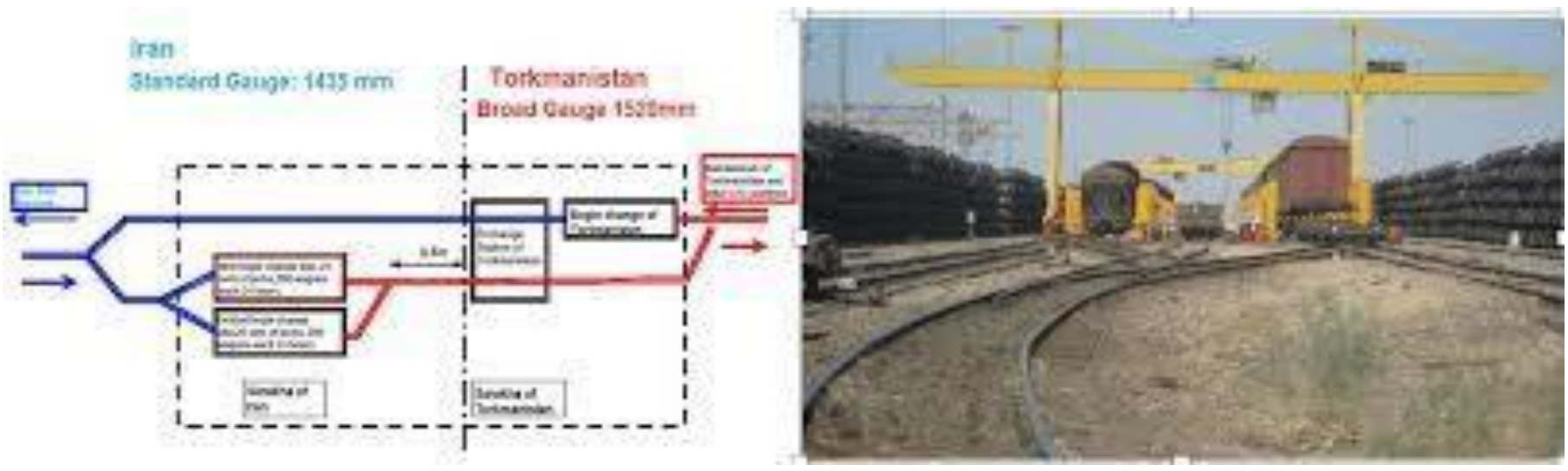
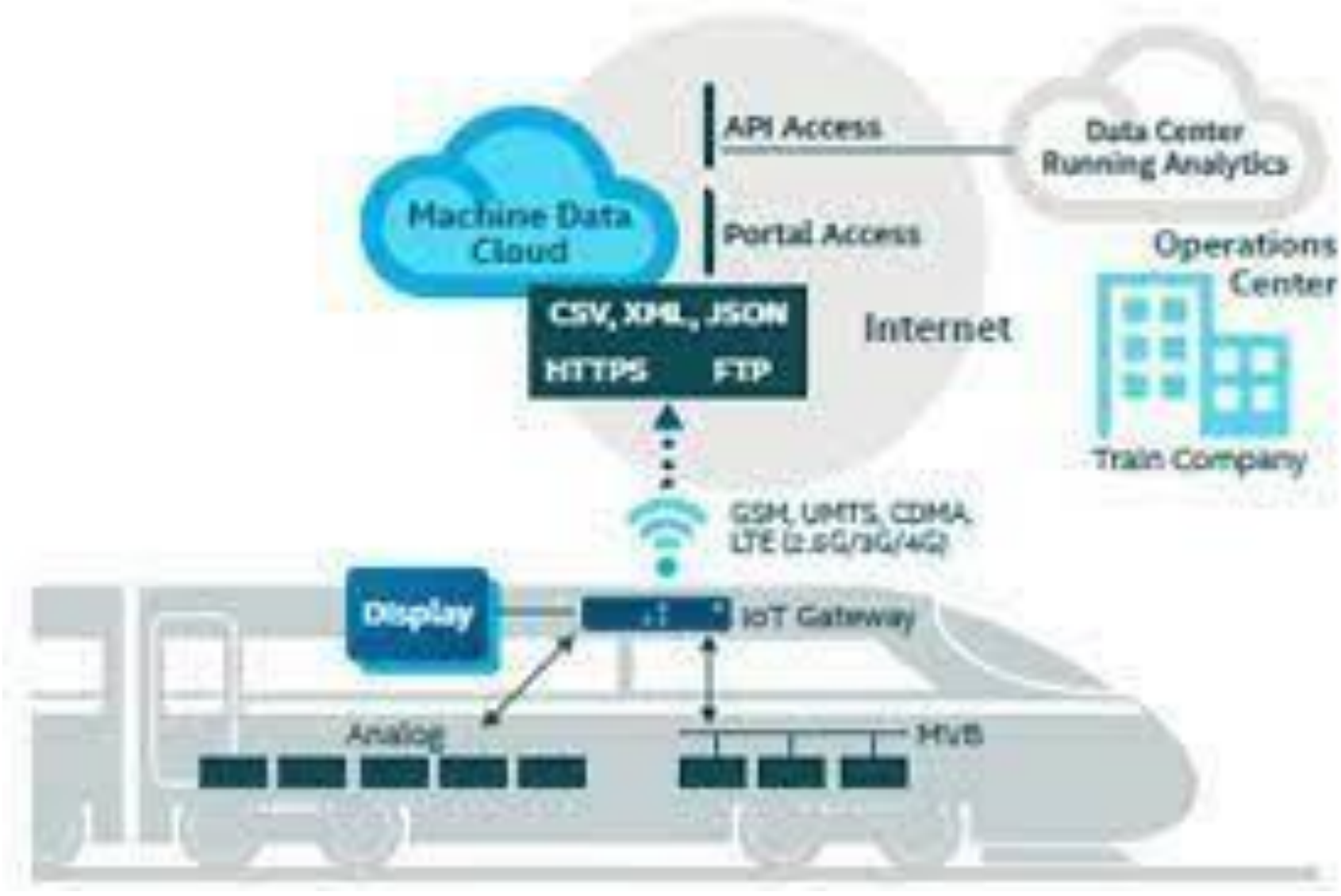
Smart sensors can be used to track important assets, manage passenger flow, and enable predictive maintenance.

Operators that modernize their core technology and transportation infrastructure and integrate Internet of Things (IoT) technology, artificial intelligence (AI), and deep learning capabilities will benefit from rich data and insights that can help tackle the challenges of today—increasing demand, legacy infrastructure capacity limitations, and growing passenger experience expectations.

Today, railways are more important than ever as country and city governments are being asked to find innovative ways to safely get back to business post-COVID, meet the changing needs of their citizens, address urban population increases, and reduce their environmental impact.

Data Base:

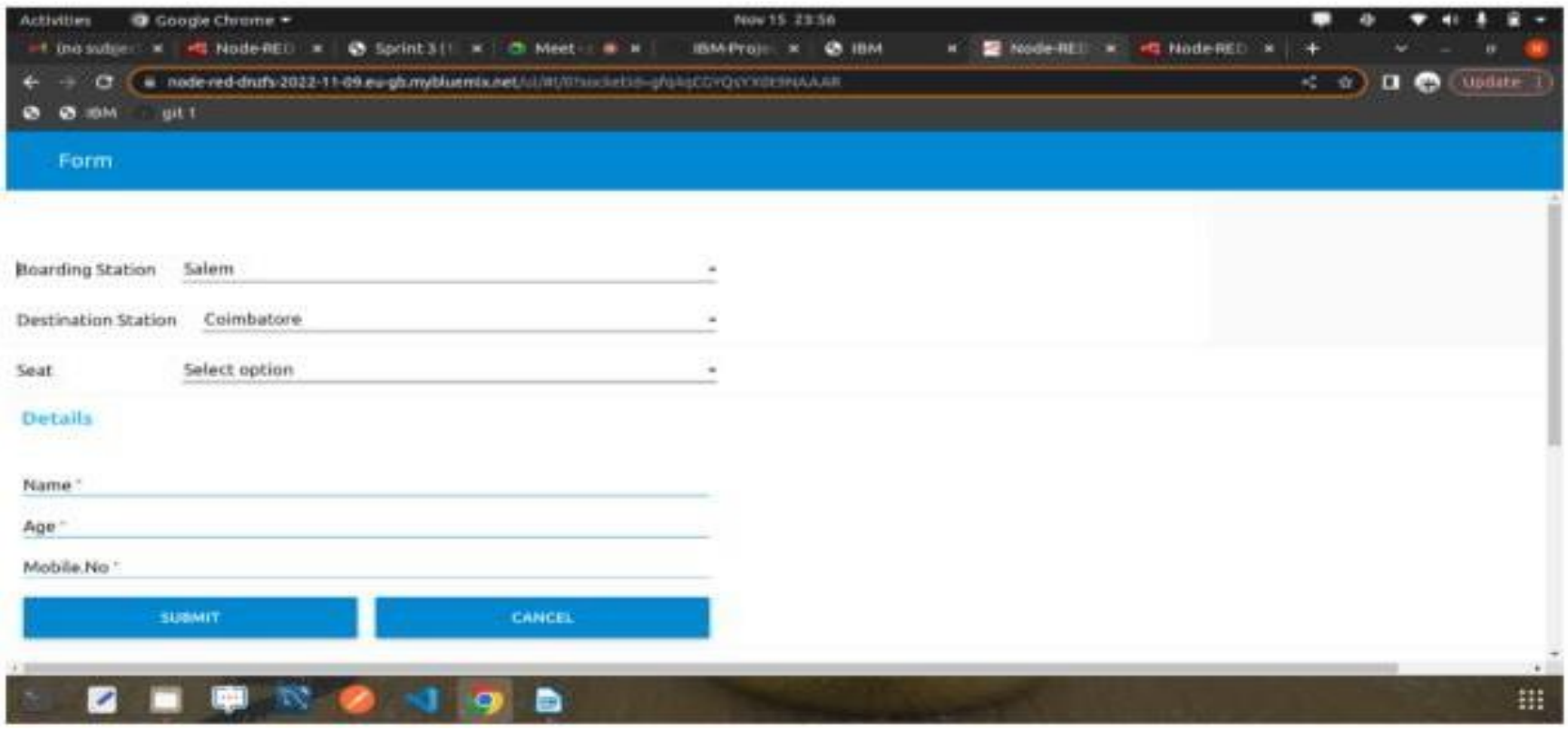




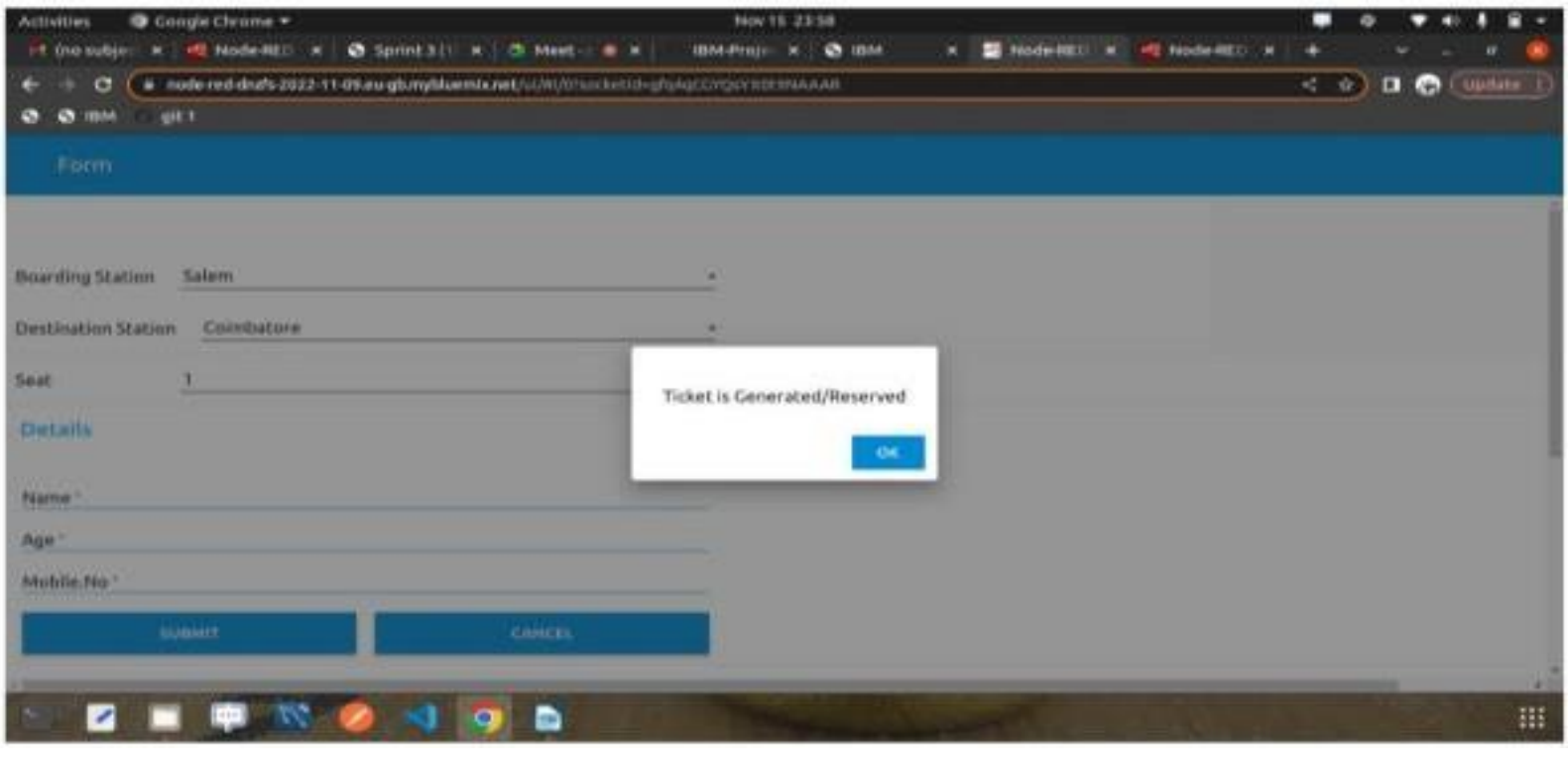
TESTING:

TEST CASE

TESTING THE WEB UI

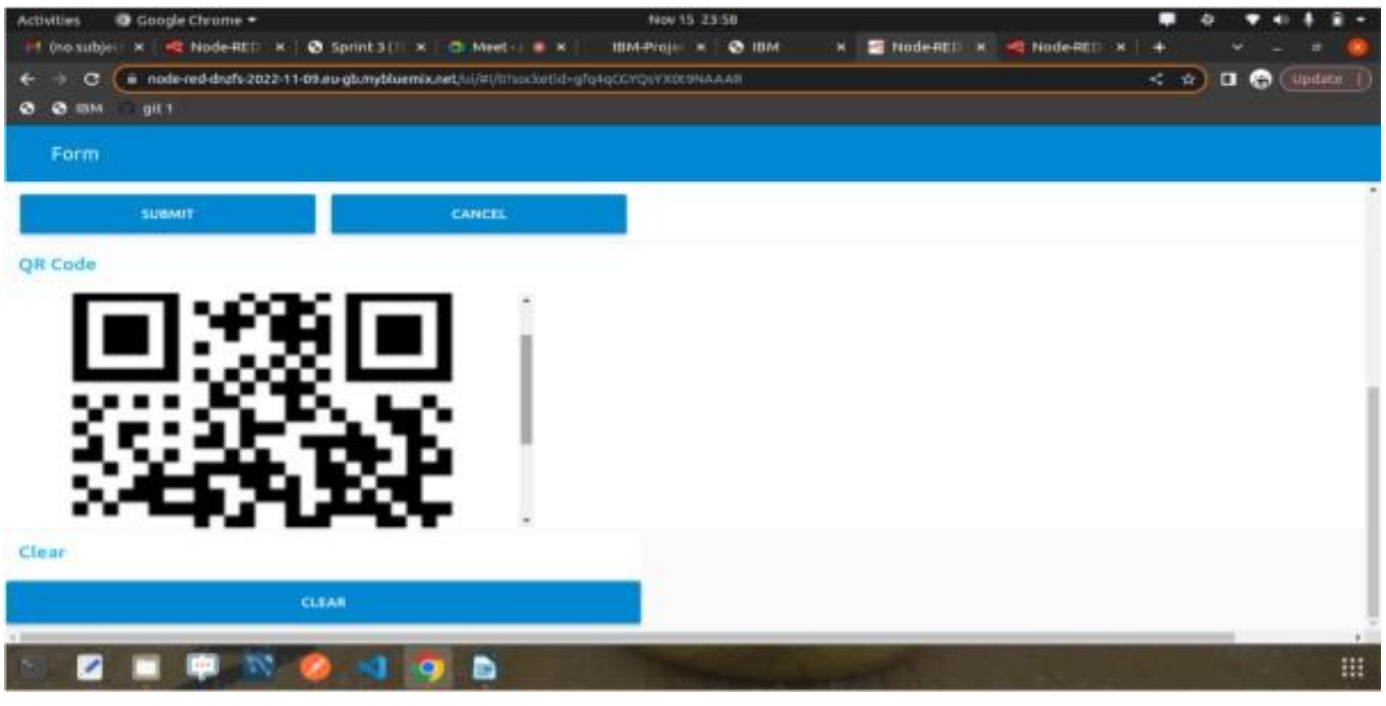


TESTING FOR TICKET RESERVATION

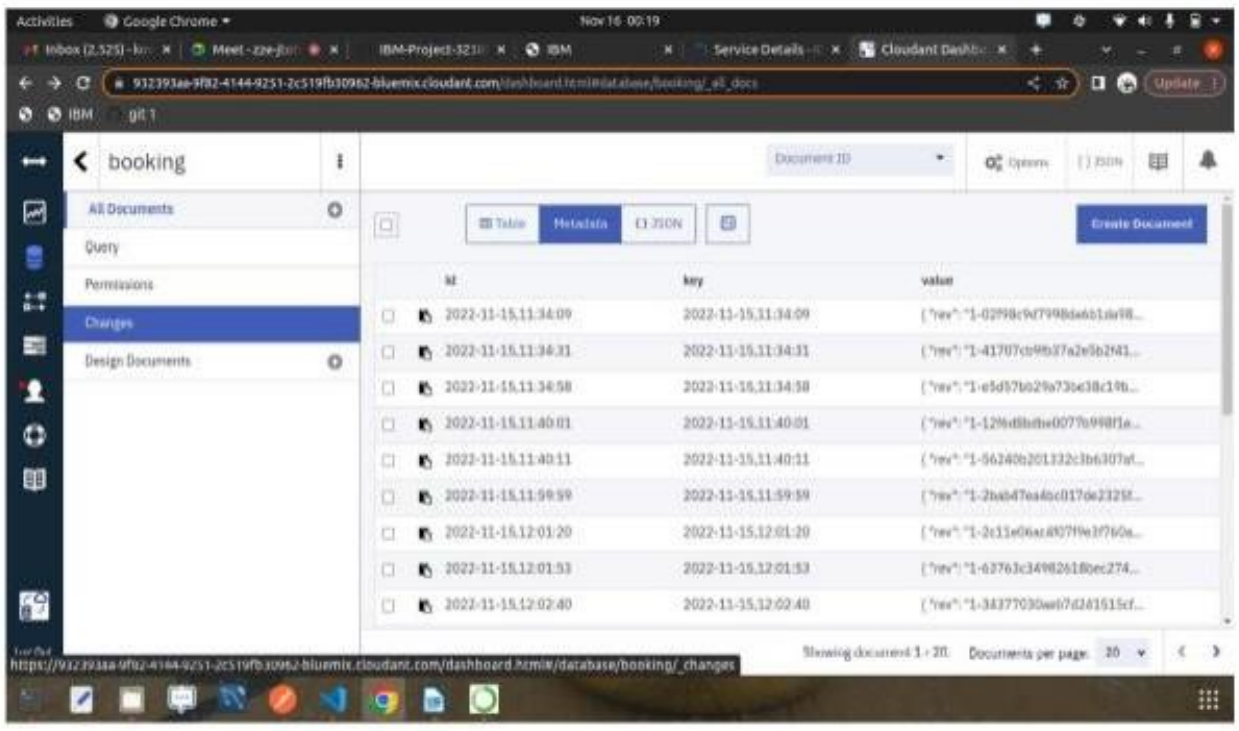


USER ACCEPTANCE TESTING:

TESTING FOR QR CODE

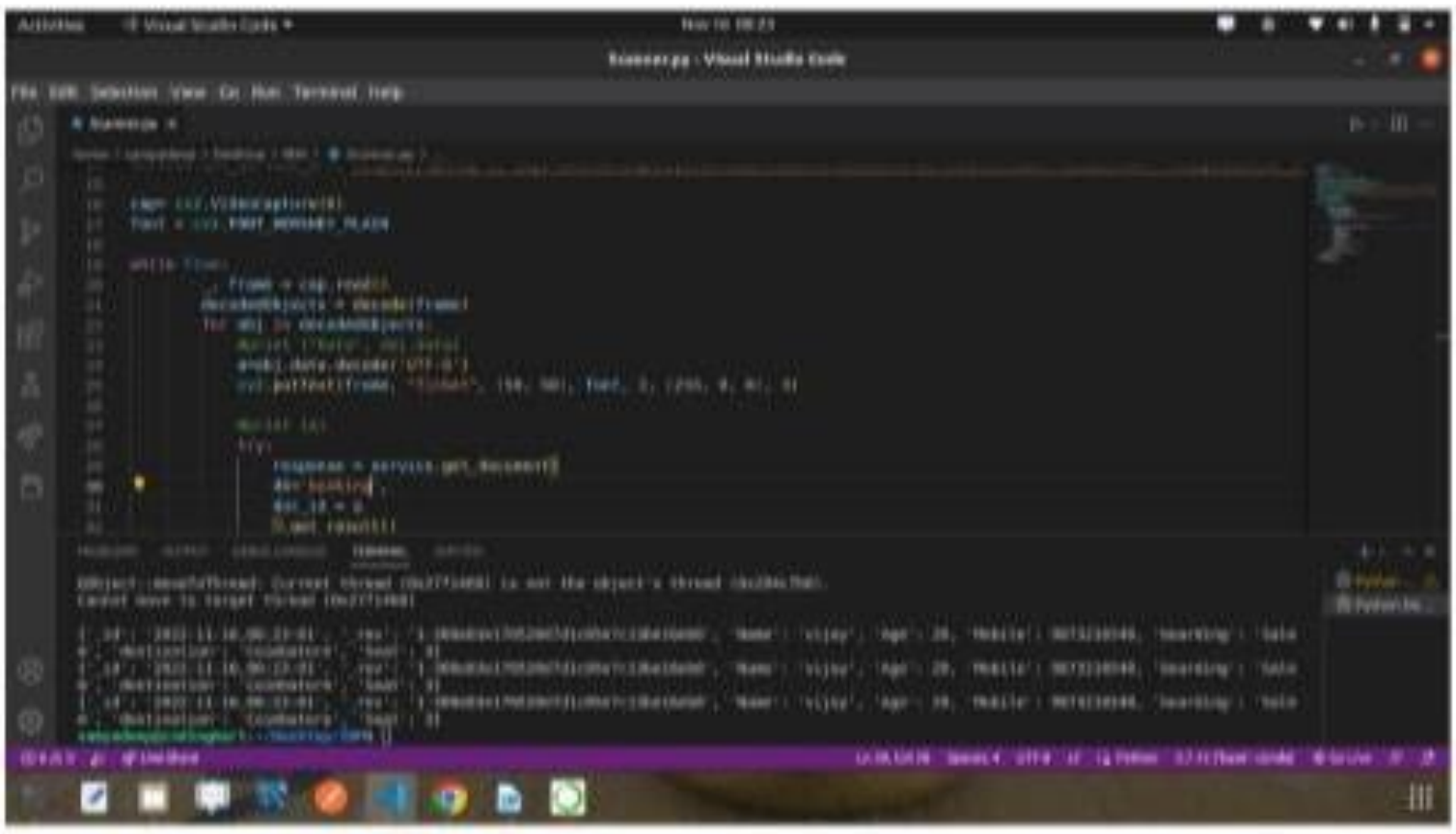


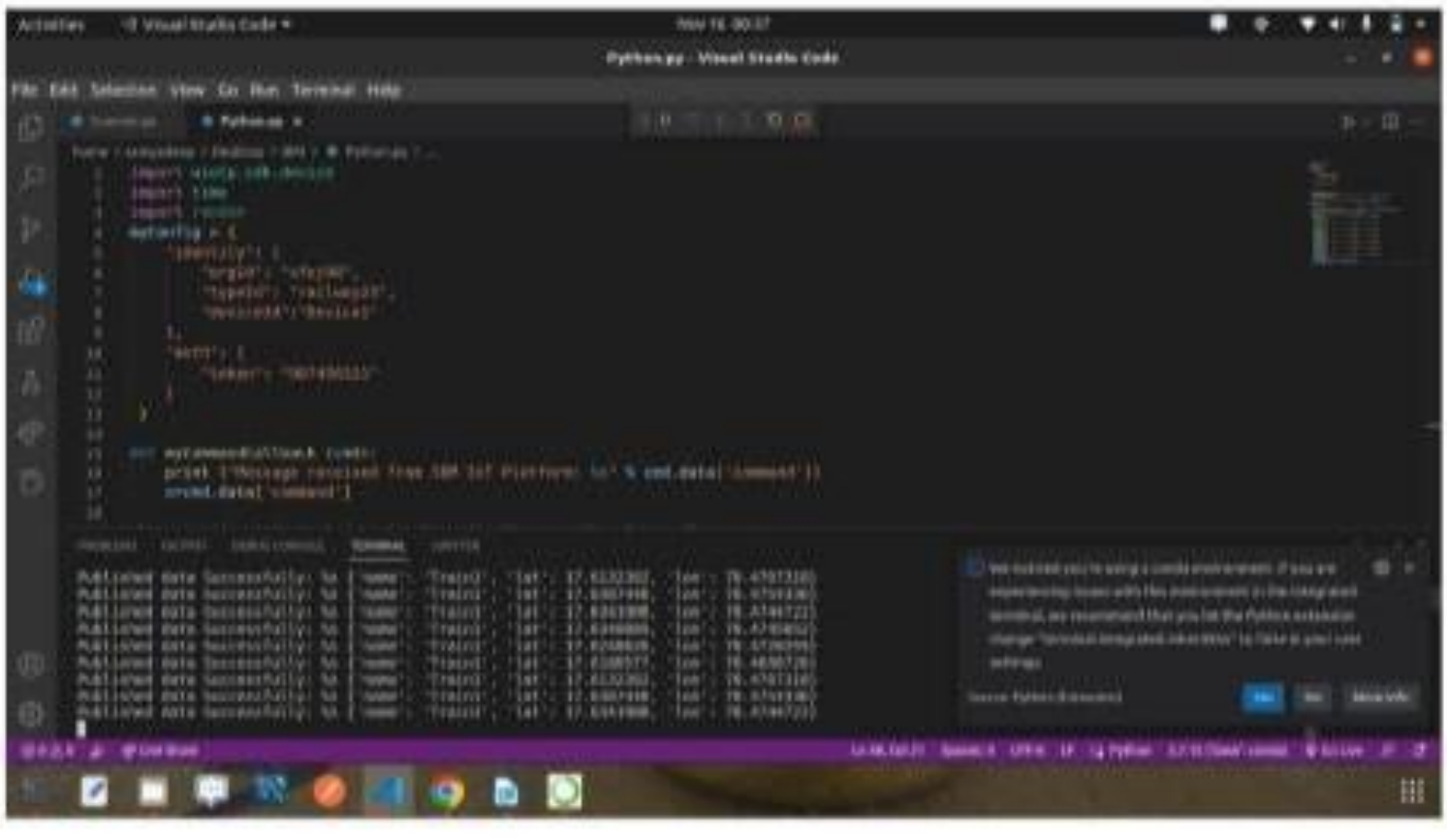
TESTING FOR SORTING DATABASE:



RESULTS:

PERFOMANCE METRICS:





ADVANTAGES:

* Railways can carry a large number of passengers and goods.
*They are an environment friendly means of transport.
*Railways has reduced the time of travel to a few hours between two places.

*Railways are a relatively cheap means of transport.

DISADVANTAGES:

Costly if the routes are small

Train parts are pretty old

Unsuitable for perishable and fragile item

CONCLUSION:

Encourage implementing Complete Streets for all road users. » Increase use of traffic calming measures. » Improve road and sidewalk lighting and road signage. » Increase number of sobriety check points. » Support bicycle infrastructure and increase safe bicycling facilities. » Support distracted driving/cell phone.

The Indian railways face certain challenges like **ticketless travelling by the passengers, damage or theft of railway property, and the inability to maintain the punctuality of trains**.

FUTURE SCOPE

Indian Railways have prepared a National Rail Plan (NRP) for India – 2030. The Plan is to **create a 'future ready' Railway system by 2030**. The NRP is aimed to formulate strategies based on both operational capacities and commercial policy initiatives to increase modal share of the Railways in freight to 45%.

APPENDIX:

SOURCE CODE:

Standard/parameter	Sigfox	LoRa
Communication	Predominantly uplink, with limited downlink capability	Bidirectional
Data rate	100 bps	10 kbps
Coverage	Depends on your project's locality, but Sigfox is more ubiquitous	
Rural range	30 – 50 km	15 – 20 km
Urban range	3 – 10 km	2 – 5 km
Packet size	12 bytes upstream, 8 bytes downstream	Max 256 bytes, depending on network provider
Devices per access point	1 M	100 K
Messages per day	Up to 140 uplink, (7 per hour), 4 downlink	Up to 84 upstream, 12 downstream, depending on provider
Cost structure	Based on number of IoT devices connected	Depends on network provider, or if you build your own network
Prototyping/starter kit costs	€60 - 100	€75 - 400
Radio module costs	€5 - 10	€10 - 35
Setup and API	Relatively simple	More complex, granular, better control and optimisation
Topology	Star	Star
Communication jamming resistance	High	High
Risk	VC funded	Semtech is a stable chip company

GITHUB &PROJECT DEMO LINK:

https://drive.google.com/file/d/19ZD8qC8EwddzMCgFpZC3EeCRvrEtf284/view?usp=share_link