ROHINI COLLEGE OF ENGINEERING AND TECHNOLOGY

PALKULAM, KANYAKUMARI DISTRICT

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

NAAN MUDHALVAN

PROJECT TITLE :

CLIMATE TRACK SMART USING BLOCKCHAIN

TEAM ID : NM2023TMID06771

TEAM MEMBER	NM ID
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SHENBAGA JANANI.A.S	FADA6318D9E98E3932148E0751268986
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Project Report Format

1.INTRODUCTION

1.1Project Overview

Climate TrackSmart is an innovative blockchain-based solution aimed at addressing the critical challenges of climate change and environmental accountability. The project leverages blockchain technology to create a transparent, secure, and immutable system for tracking, verifying, and incentivizing sustainable practices and carbon reduction efforts.

1.2Purpose

1)Transparency and Trust: Climate TrackSmart aims to create a transparent and trustworthy platform for tracking and validating environmental data. Blockchain's immutable ledger ensures that all recorded information is tamperproof and can be independently verified, fostering trust among participants.

2)Verification of Sustainable Practices: By using smart contracts, ClimateTrackSmart can automate the verification of sustainability efforts. This helps ensure that actions taken to reduce carbon emissions and promote environmental responsibility are accurately recorded and authenticated.

3)Incentivizing Sustainable Behavior: The project intends to encourage individuals and organizations to engage in sustainable practices by offering rewards and incentives. These rewards can be in the form of blockchain-based tokens, providing tangible benefits for environmentally responsible actions.

4)Collaboration and Data Sharing: Climate TrackSmartpromotes collaboration between different stakeholders, including individuals, businesses, governmental bodies, and environmental organizations. It facilitates the sharing of environmental data and best practices, creating a collective effort to combat climate change.

5)Empowering Individuals and Organizations: The platform empowers individuals and organizations to take control of their environmental impact. By tracking and measuring their carbon footprint and other sustainability efforts, users can make informed decisions to reduce their environmental impact.

2.LITERATURE SURVEY

2.1Existing problem

1)Data Accuracy and Trust: Ensuring the accuracy of data recorded on the blockchain can be a challenge. Without accurate data, the verification and tracking mechanisms may be compromised, leading to incorrect assessments of environmental actions.

2)Data Integration: Integrating data from various sources, including IoT devices, sensors, and government databases, can be complex. Inconsistent data formats and standards can hinder the seamless flow of information into the blockchain system.

3)Scalability: As more users and organizations join the platform, the blockchain network may face scalability issues. High transaction volumes can lead to slower processing times and increased costs.

4)Regulatory Compliance: Different regions and countries may have varying regulations and standards for tracking and verifying environmental data. Ensuring compliance with these regulations can be challenging, especially in a global context.

5)User Adoption: Encouraging individuals and organizations to actively use the platform and accurately input their environmental data can be a hurdle. Users may be hesitant to share sensitive information or may lack the technical knowledge to participate effectively.

2.2 References

1) https://www.mural.co/templates/empathy-map-canvas

2) https://www.mural.co/templates/empathy-map-canvas

3) https://metamask.io/

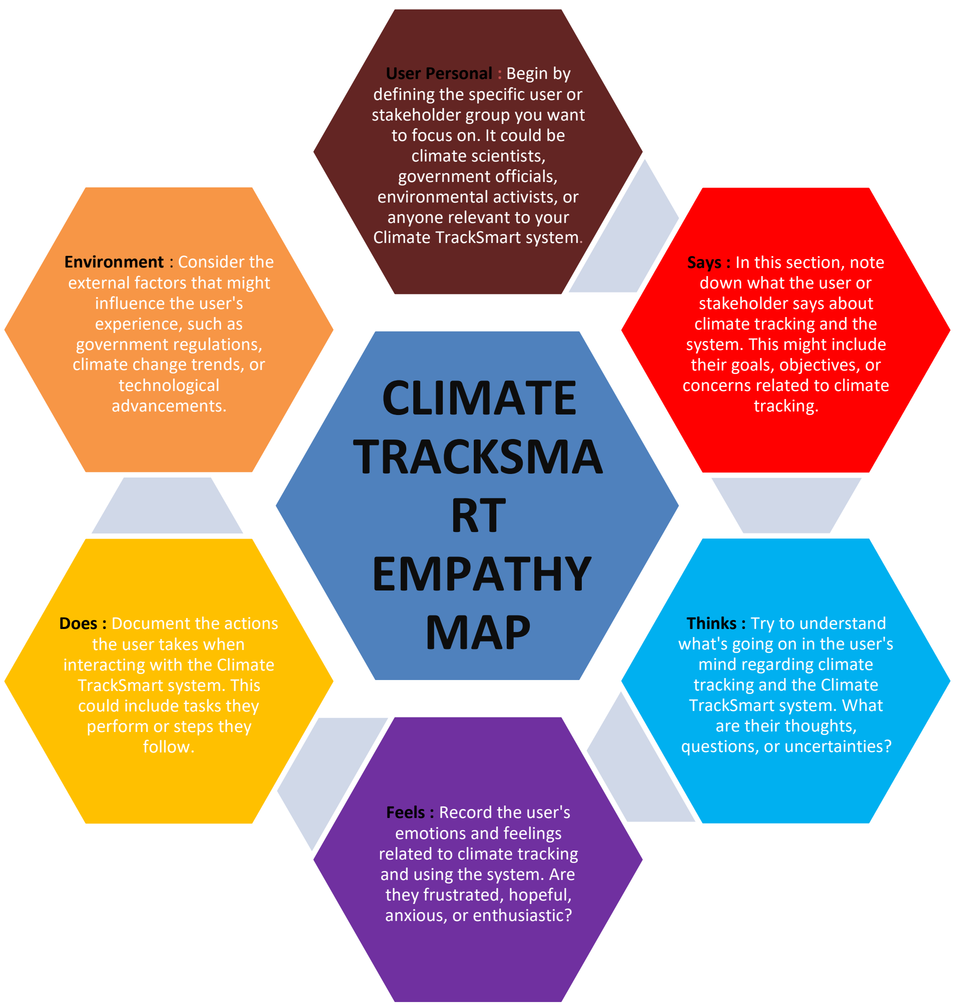
2.3 Problem Statement Definition

In the face of escalating climate change and environmental degradation, there is an urgent need for a transparent and secure system to track, verify, and report critical climate-related data and actions.

Existing methods for monitoring and managing climate initiatives lack the trust, security, and interoperability required for global collaboration. Additionally, the lack of transparency andaccountability in tracking climate efforts hinders the accurate measurement of progress towards international climate goals, such as the Paris Agreement.To address these challenges, the 'Climate Tracksmart' project seeks to leverage blockchain technology to develop a decentralized, tamper-proof, and efficient system for tracking and verifying climate-related data, including carbon emissions, renewable energy production, reforestation efforts, and other environmental initiatives.

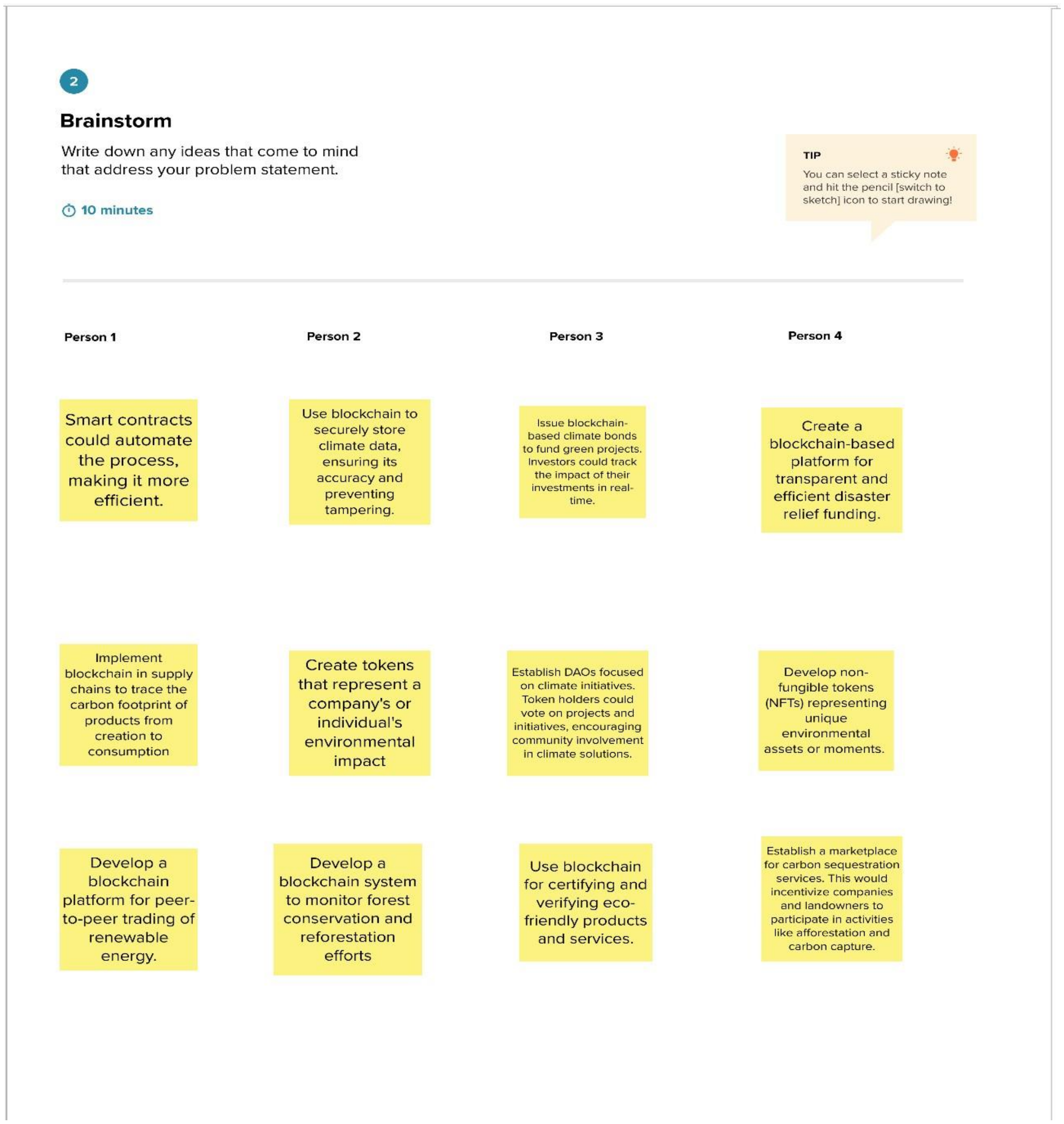
3.IDEATION & PROPOSED SOLUTION

3.1Empathy Map Canvas

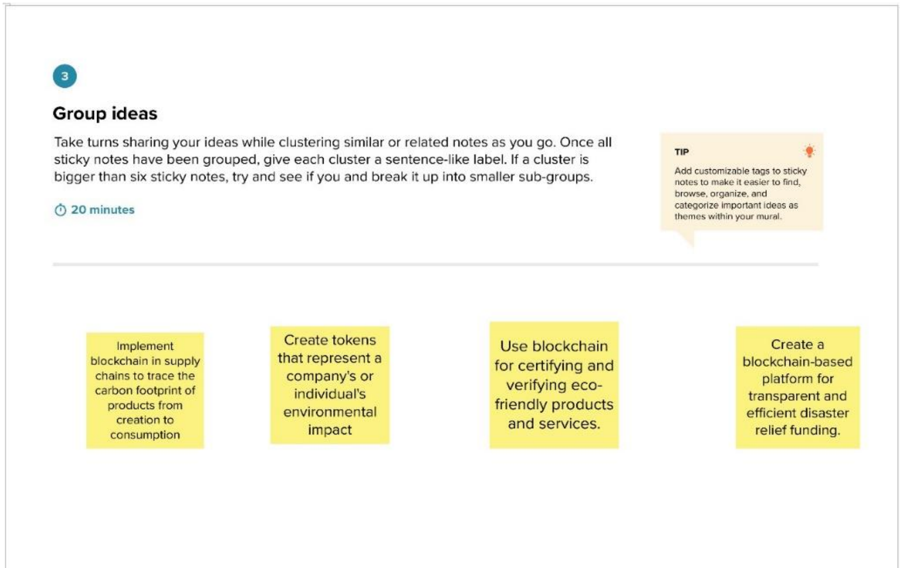


3.2Ideation& Brainstorming

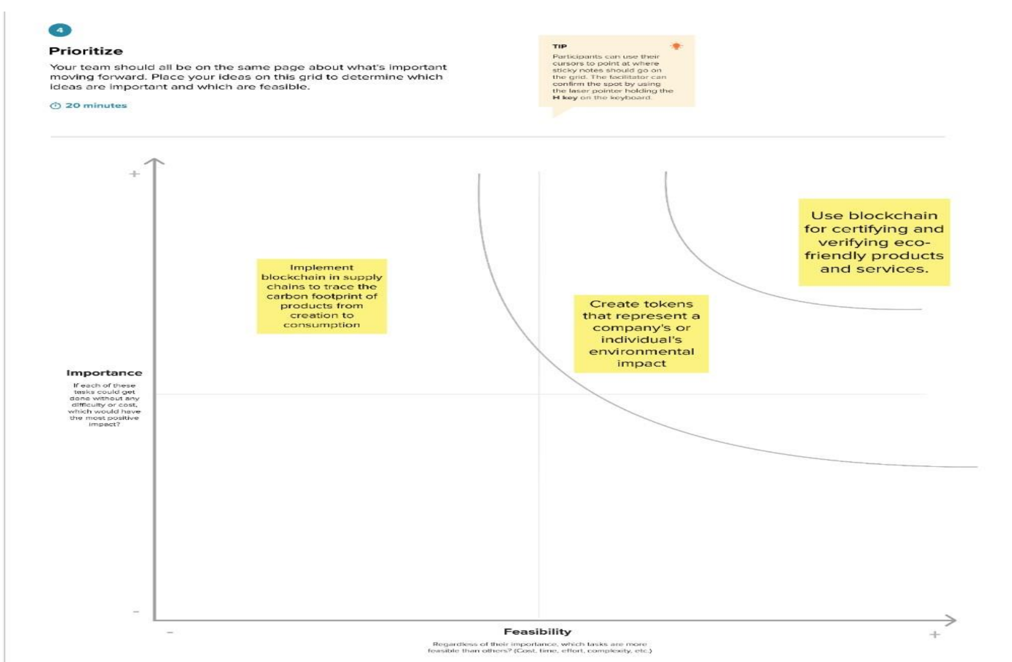
Team Gathering, Collaboration and Select the Problem Statement



Brainstorm, Idea Listing and Grouping



Idea Prioritization



4.REQUIREMENT ANALYSIS

4.1 Functional requirement

1)Data Collection:

Ability to collect climate-related data from various sources, such as weather stations, satellites, and IoT devices.

2)Data Verification:

Verification mechanisms to ensure the authenticity and accuracy of the collected data.

3)Transparency:

Transparent storage and access to climate data, allowing for public and private access to relevant information.

4)Data Integrity:

Ensuring the data remains tamper-proof and secure using blockchain technology.

5)Smart Contracts:

Implementing smart contracts for automating actions based on predefined conditions, such as triggering alerts or payments.

6)Decentralization:

Distributed ledger to avoid a single point of failure and ensure data redundancy.

7)Traceability:

Ability to trace the source and history of climate data, ensuring accountability.

8)User Access:

User-friendly interfaces for users to access and analyze climate data.

9)Notifications:

Real-time notifications and alerts for critical climate events or anomalies.

10)Analytics:

Data analytics tools for in-depth analysis and visualization of climate data.

4.2 Non-Functional requirements

1.Security and Privacy:

The system must ensure the highest level of data security and privacy to protect sensitive climate-related information.It should use strong encryption and access control mechanisms to prevent unauthorized access to data.

2.Performance:

The system must be able to handle a high volume of transactions efficiently, with low latency and minimal downtime.

Response times for data retrieval and verification should be within acceptable limits.

3.Scalability:

The system should be scalable to accommodate future growth in data and user activity.It must support a growing number of participants and climate initiatives without a significant drop in performance.

4.Reliability:

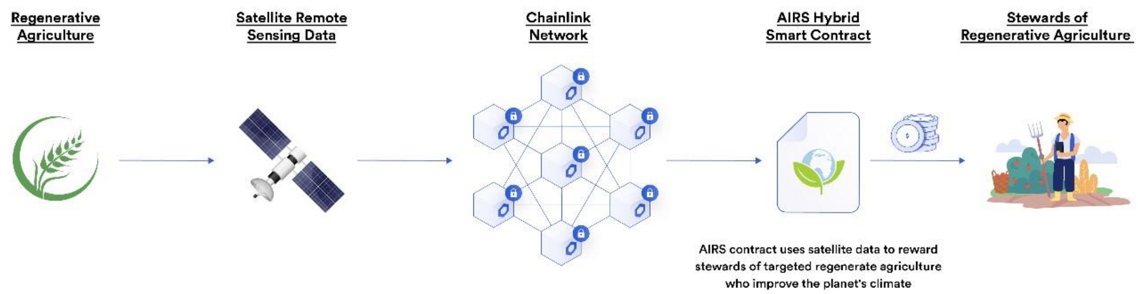
The system must have a high level of reliability, with built-in redundancy and fault-tolerant mechanisms.It should be resilient to hardware failures and network issues.

5.Interoperability:

The blockchain platform used should be compatible with widely accepted standards to ensure interoperability with other systems and data sources.It should support common APIs for easy integration with external applications.

5. PROJECT DESIGN

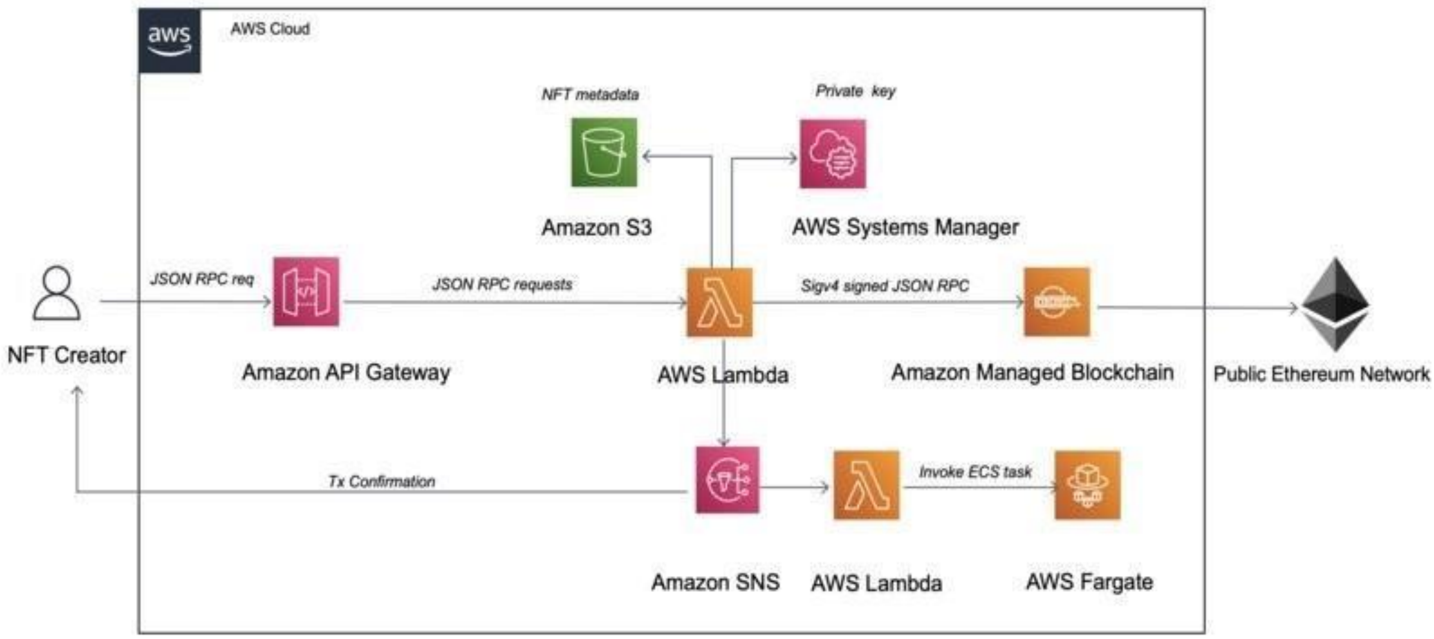
5.1Data Flow Diagrams



User Stories:

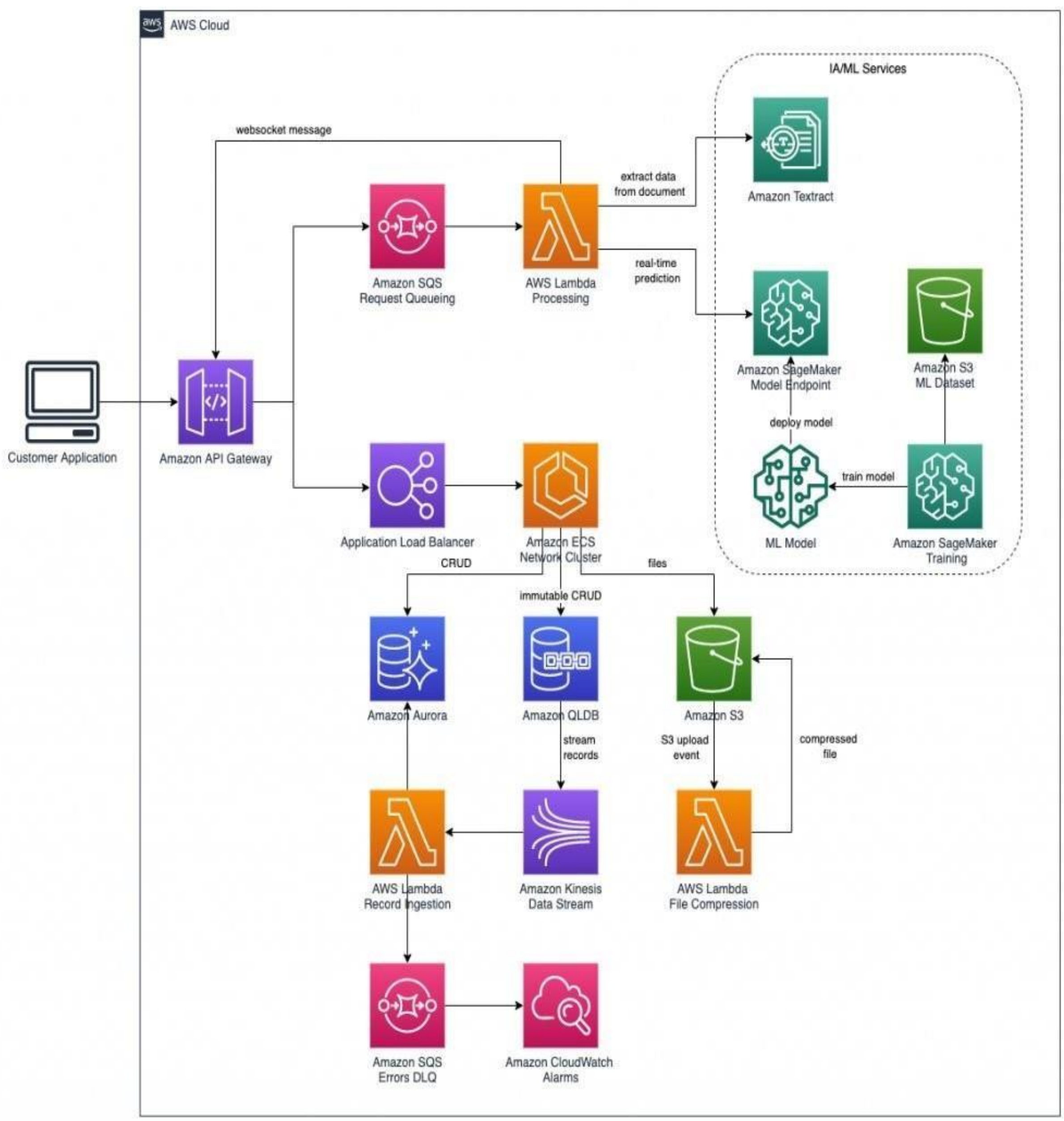
User Story	Functional Requirements	User Story Number	User Story/Task	Acceptance Criteria	Priority	Team Members
Collect climate data	Data Collection:	1	I want to integrate IOT devices with block chain.	Collect	High	Ananthi.R
Verify climate data	Data Verification:	2	I want a mechanism to verify the authenticity of climate data,	Verify	Medium	Ashika.S
Provide transparent access to climate data	Transparency:	3	I want the block chain based climate tracking system to provide transparent access to climate data	Transfer	Medium	Shenbaga Janani.A.S
Ensuring data integrity in climate data	Data Integrity:	4	I want to ensure the data integrity of climate related information	Security	Low	Dhivya.T

5.2Solution Architecture

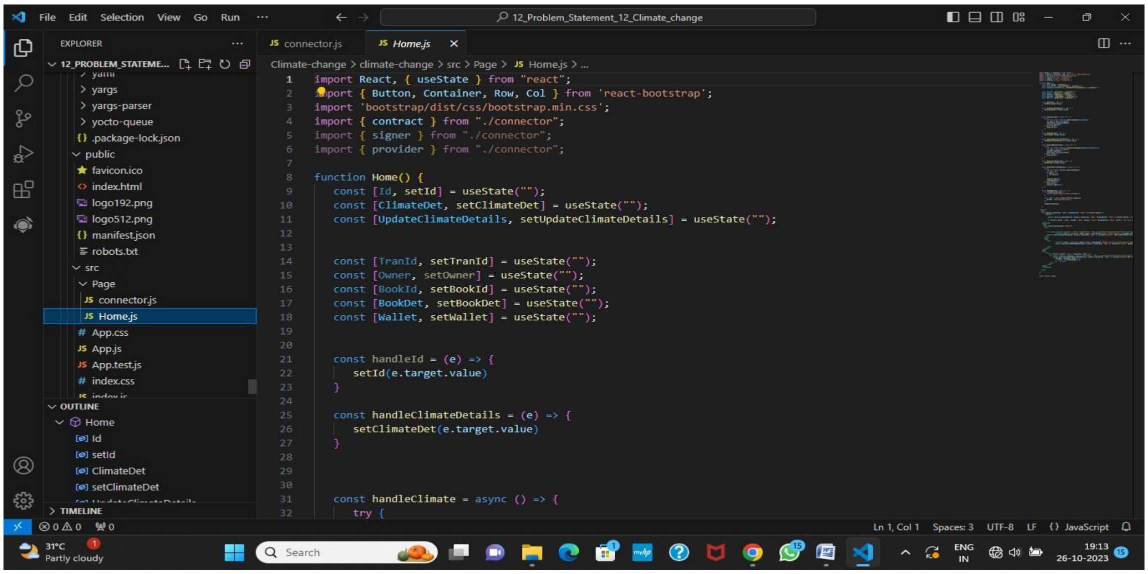


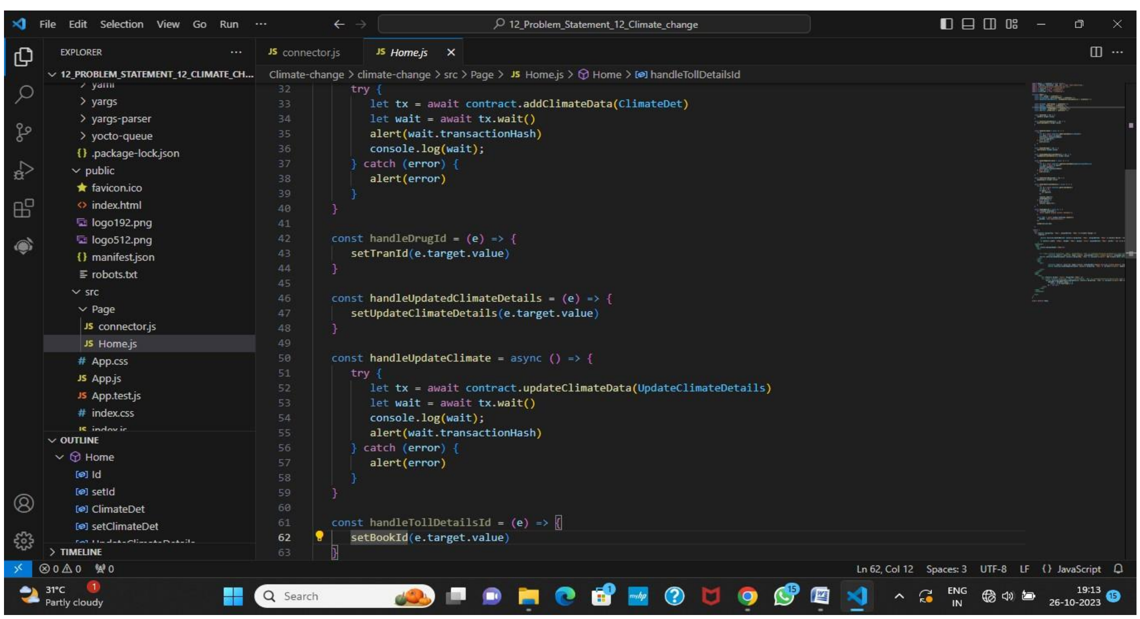
6. PROJECT PLANNING & SCHEDULING

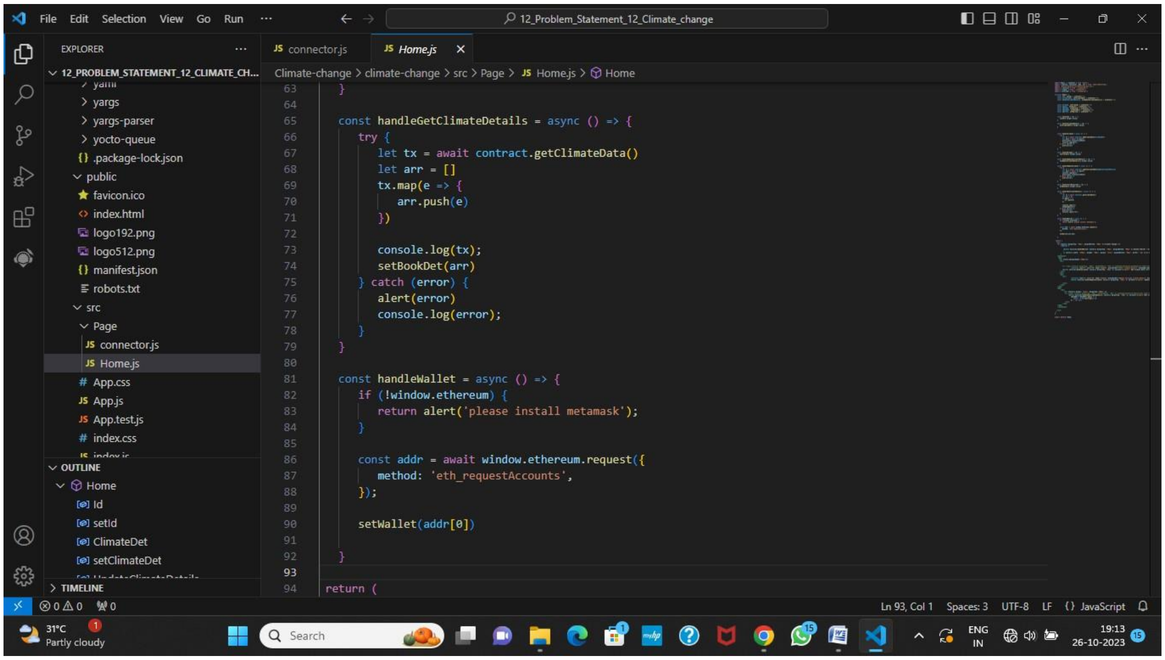
6.1Technical Architecture



7. CODING & SOLUTIONING (Explain the features added in the project along with code)






12_Problem_Statement_12_Climate_change
connector.js
Home.js
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}

const handleGetClimateDetails = async () => {
try {
let tx = await contract.getClimateData()
let arr = []
tx.map(e => {
arr.push(e)
})

console.log(tx);
setBookDet(arr)
} catch (error) {
alert(error)
console.log(error);
}
}

const handleWallet = async () => {
if (!window.ethereum) {
return alert('please install metamask');
}

const addr = await window.ethereum.request({
method: 'eth_requestAccounts',
});

setWallet(addr[0])

}

return (
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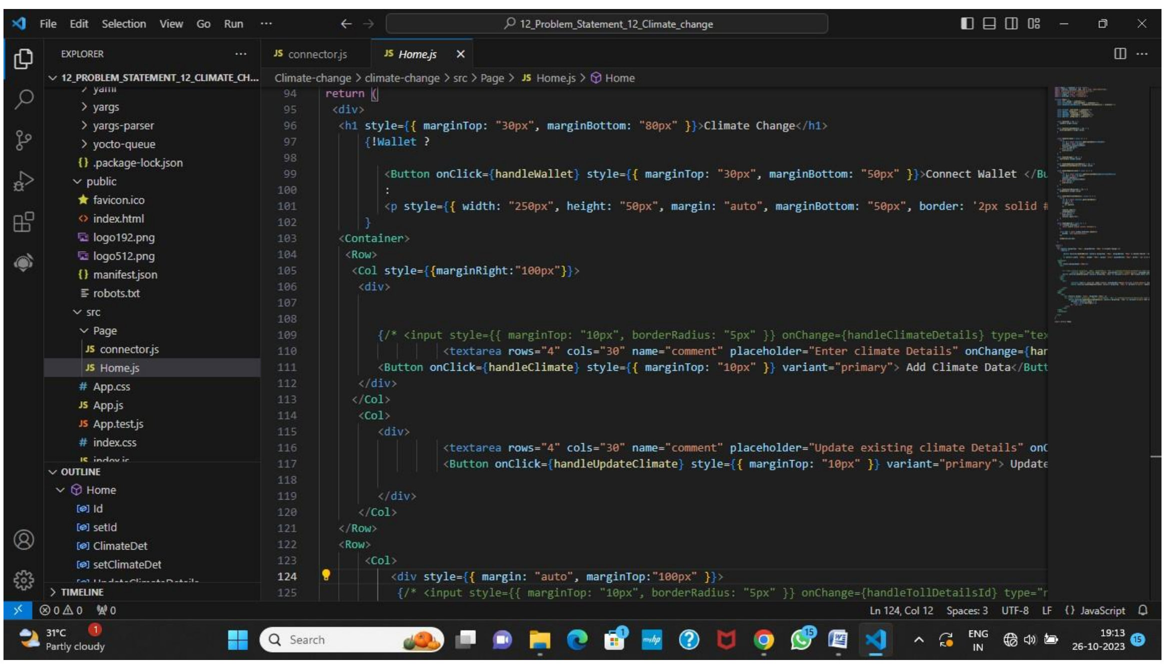
JavaScript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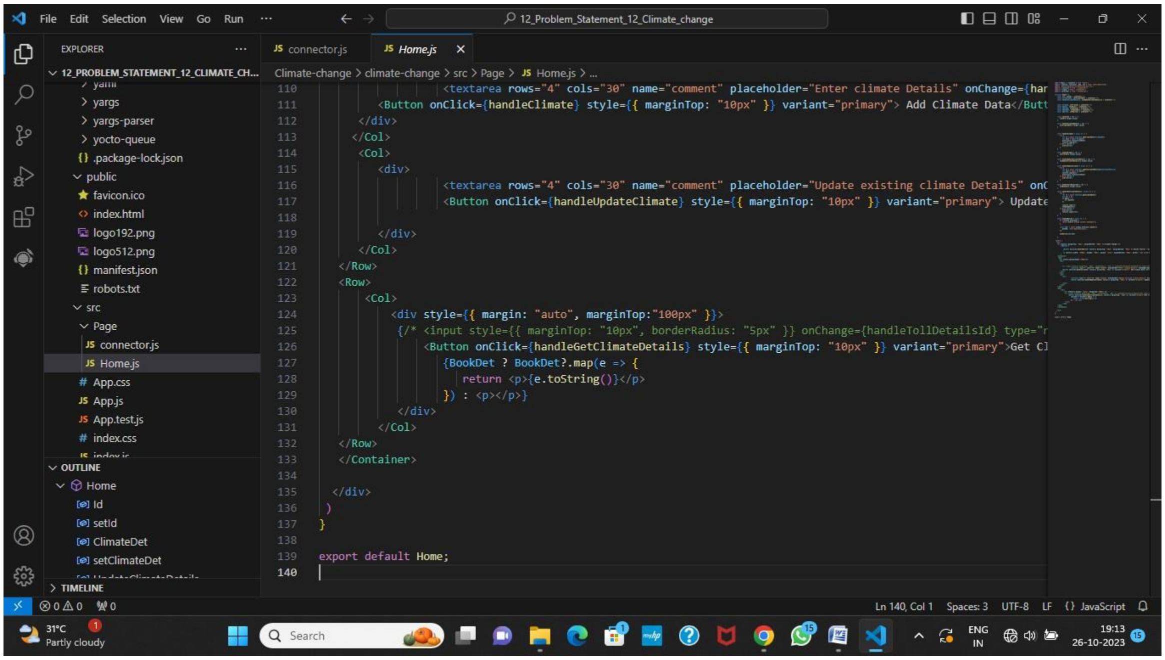
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return <p>{e.toString()}</p>
}) : <p></p>}
</div>
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)
}
export default Home;
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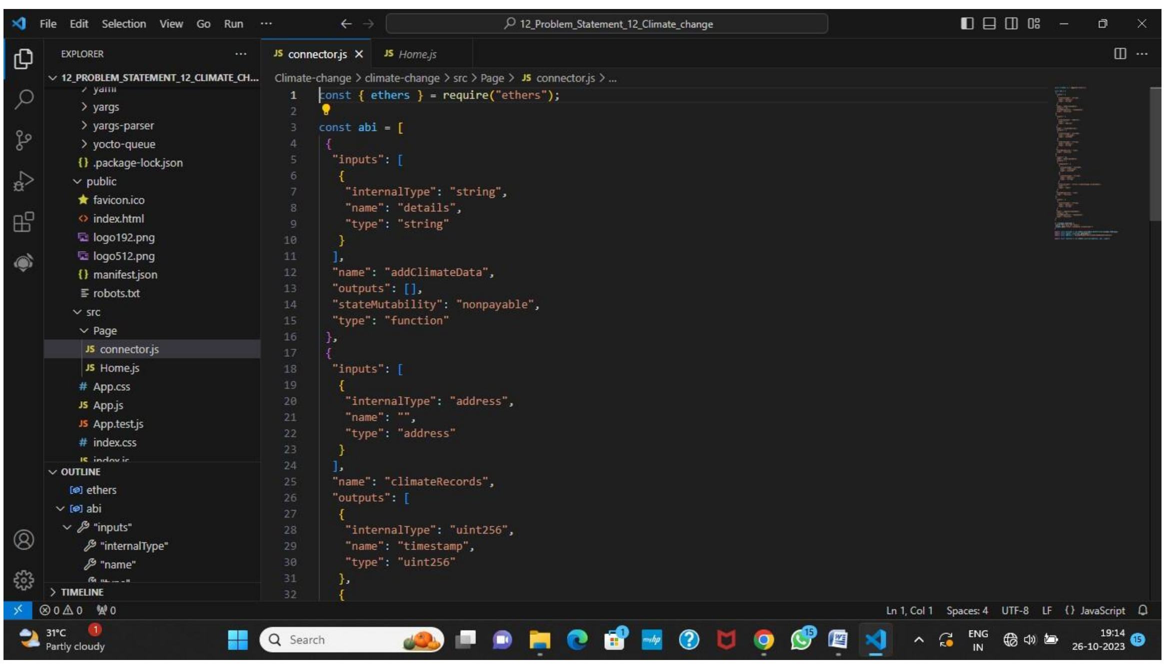
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"name": "details",
"type": "string"
}
],
"name": "addClimateData",
"outputs": [],
"stateMutability": "nonpayable",
"type": "function"
},
{
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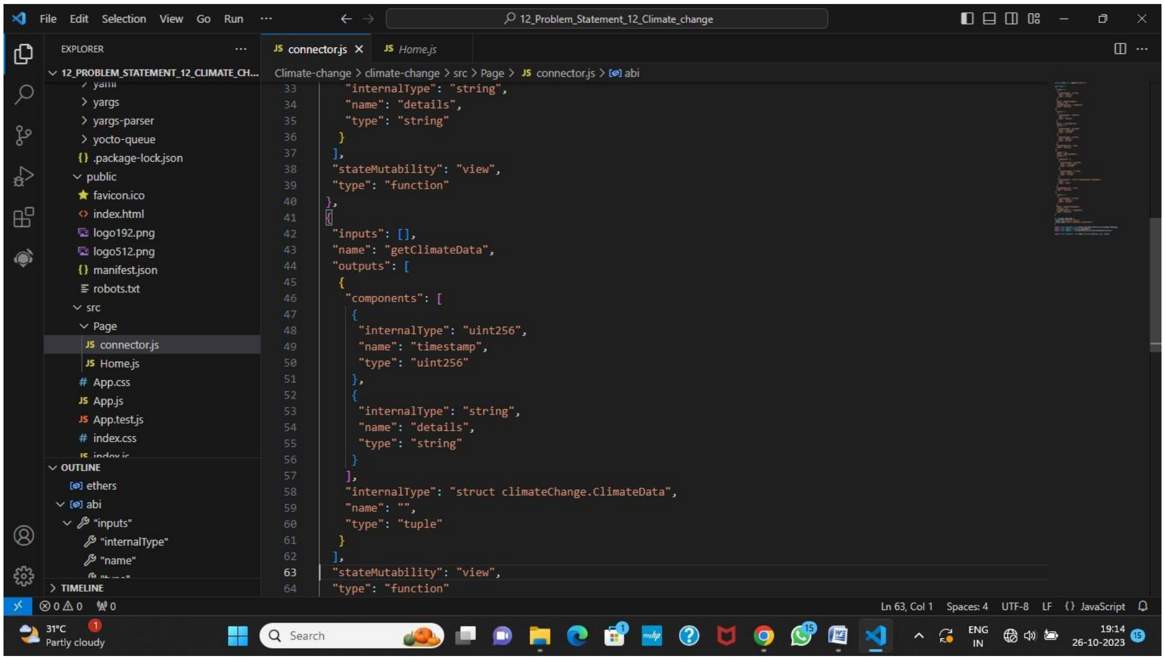
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favicon.ico
index.html
logo192.png
logo512.png
manifest.json
robots.txt
src
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App.css
App.js
App.test.js
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"name"
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"type": "tuple"
}
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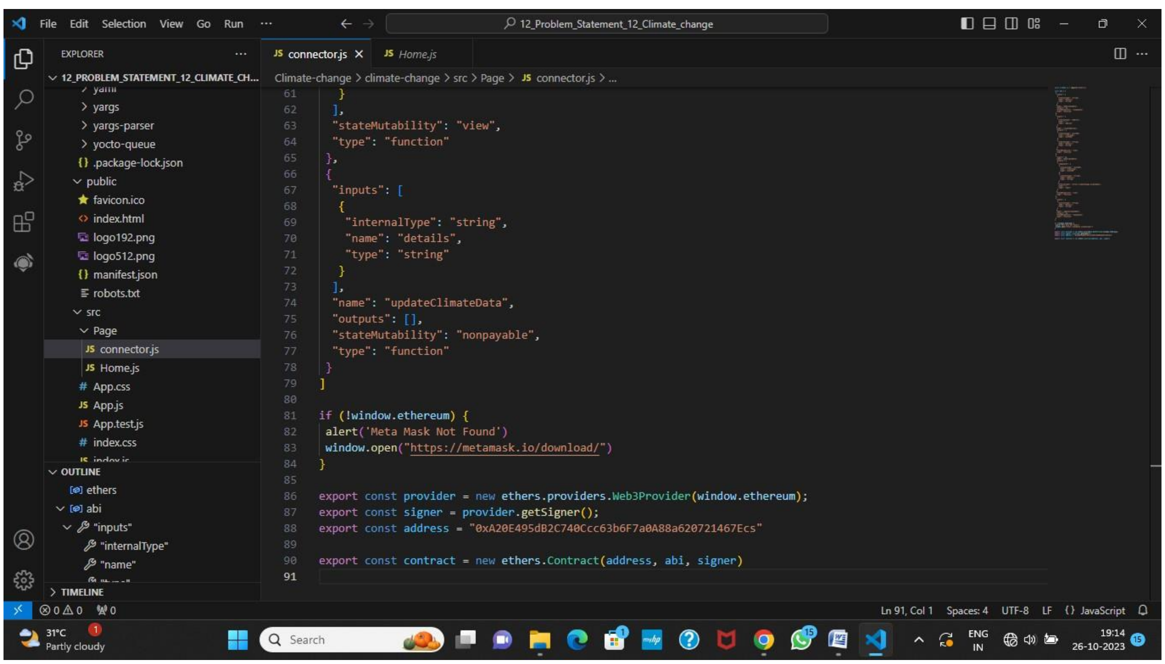
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}
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"stateMutability": "view",
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{
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{
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"outputs": [],
"stateMutability": "nonpayable",
"type": "function"
}
]
if (!window.ethereum) {
alert('Meta Mask Not Found')
window.open("https://metamask.io/download/")
}
export const provider = new ethers.providers.Web3Provider(window.ethereum);
export const signer = provider.getSigner();
export const address = "0xA20E495dB2C740Ccc63b6F7a0A88a620721467Ecs"
export const contract = new ethers.Contract(address, abi, signer)
Ln 91, Col 1 Spaces: 4 UTF-8 LF {} JavaScript
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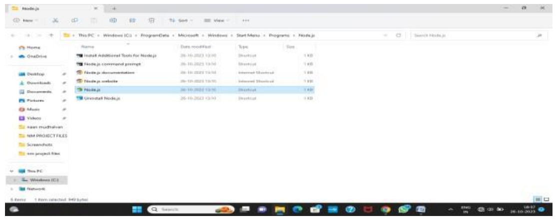
8.PERFORMANCE TESTING

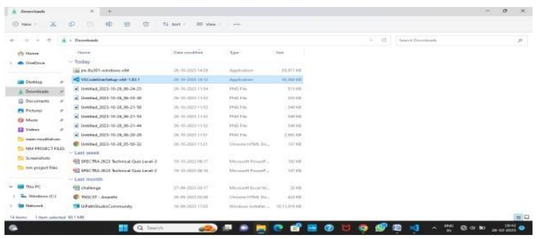
1)Information gathering:

(Setup all the Prerequisite)

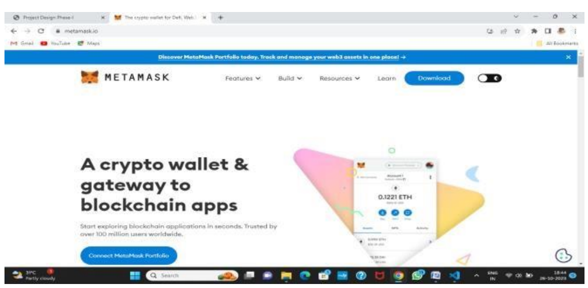
1. download node.js : Node.js



2. download vs code: Li4nk

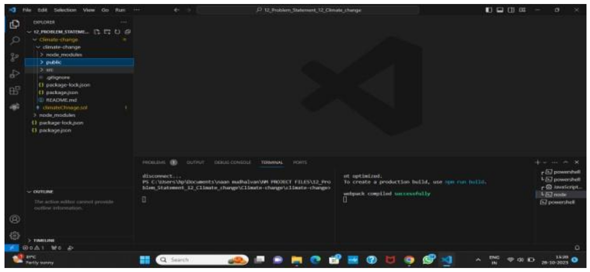


3.download metamask :https://metamask.io/



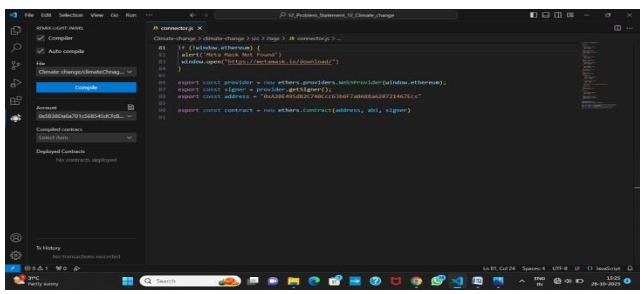
2)Extract the zip files:

(Open to vs code)



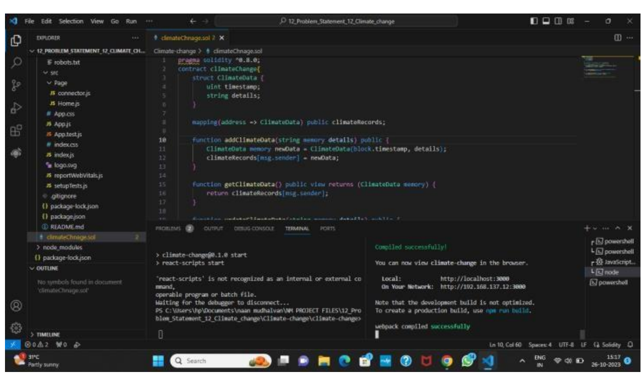
3) Remix Ide platform exploring:

(Deploy the smart contract code .Deploy and run the transaction. By selecting the environment - inject the MetaMask)



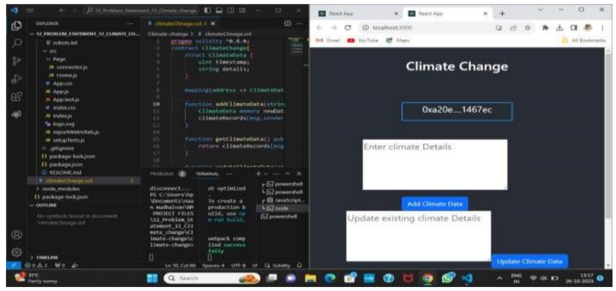
4) Open file explorer:

(Open the extracted file and click on the folder. Open src, and search for utiles. Open cmd enter commands. 1.npm install 2.npm bootstrap 3.npmstart)



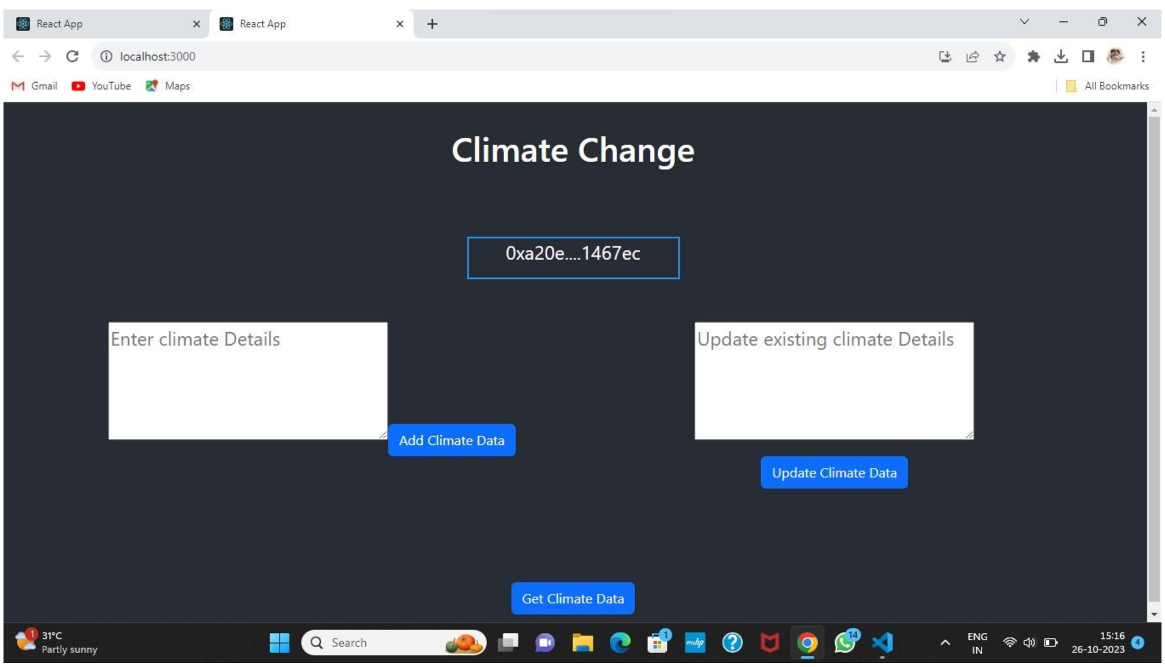
5) Localhost Ip address:

(copy the address and open it to chrome so you can see the front end of your project)



9.RESULTS

9.1Output Screenshots



10.ADVANTAGES & DISADVANTAGES ADVANTAGES:

1)Transparency and Trust:

Blockchain's decentralized and immutable ledger ensures transparency and trust in climate data. All stakeholders can access and verify information, reducing the risk of data manipulation and fraud.

2)Data Integrity:

Blockchain's cryptographic hashing and consensus mechanisms protect data from tampering. Climate data, emissions records, and sustainability initiatives can be securely recorded and tracked, ensuring their accuracy and reliability.

3)Traceability and Accountability:

Climate initiatives and carbon offset projects can be traced throughout their lifecycle. This traceability enhances accountability for organizations and governments, helping to ensure they meet their climate goals and commitments.

4)Efficient Carbon Markets:

Blockchain can streamline the trading of carbon credits and offsets. Smart contracts can automatically execute transactions when predefined conditions are met, reducing administrative overhead and facilitating a more efficient carbon market.

5)Decentralization:

The decentralized nature of blockchain reduces the reliance on a single entity, which can lead to greater resilience and less susceptibility to fraud or manipulation.

DISADVANTAGES:

1)Scalability:

Blockchain networks, especially public ones, can experience scalability issues when dealing with a high volume of transactions and data. This can lead to slower transaction processing times and increased costs.

2)Energy Consumption:

Many blockchain networks, such as Bitcoin and Ethereum, are energy-intensive due to their consensus mechanisms. This high energy consumption could counteract the environmental benefits of climate tracking initiatives, especially if powered by fossil fuels.

3)Complex Implementation:

Implementing blockchain technology for climate tracking can be complex and require significant technical expertise. Many organizations may struggle with the initial setup and ongoing maintenance.

4) Integration Challenges:

Integrating blockchain with existing systems and data sources can be challenging and expensive. It may require significant changes to existing processes and infrastructure.

5)Security Concerns:

While blockchain is considered secure, it's not immune to cyberattacks. Smart contracts and blockchain networks can be vulnerable to bugs and vulnerabilities that could lead to security breaches.

11.CONCLUSION

In conclusion, the use of blockchain technology for smart climate tracking holds significant promise in addressing pressing environmental challenges, but it is not without its complexities and challenges. By harnessing the advantages of transparency, data integrity, and accountability, blockchain can play a pivotal role in improving the monitoring and management of climate-related data and initiatives. It offers the potential to revolutionize how we track and manage environmental information, including carbon emissions, sustainability projects, and carbon markets.

However, it is essential to recognize and address the disadvantages and challenges associated with implementing blockchain for climate tracking. Issues related to scalability, energy consumption, integration, security, privacy, and regulation must be carefully considered and mitigated.

12.FUTURE SCOPE

1)Carbon Markets and Trading:

Blockchain can facilitate efficient and transparent carbon credit trading, enabling organizations to buy and sell carbon credits in a secure and automated manner. This can create a more dynamic and robust carbon INKmarket.

2)Supply Chain Sustainability:

Blockchain can be used to track and verify the sustainability of products throughout their entire supply chain. This can help consumers make informed choices and hold companies accountable for their environmental impact.

3)Renewable Energy Certificates (RECs):

Using blockchain, renewable energy certificates can be securely tracked, ensuring that the energy generated from renewable sources is accurately accounted for and credited to the appropriate entities.

4) Climate-Linked Financial Instruments:

Blockchain can be used to createinnovative financial instruments, such as green bonds or climate-linked derivatives, that are directly tied to environmental performance metrics. This could attract more investment in sustainable projects.

5)Automated Compliance and Reporting:

Smart contracts can automatically verify and report on compliance with environmental regulations and commitments. This reduces administrative burdens and ensures accuracy in reporting.

6)Climate-Resilient Supply Chains: Block chain can enable the tracking of climate-related risks in supply chains, allowing businesses to make informed decisions about adapting to climate change impacts.

13. APPENDIX Source Code

Project Demo Link :
https://drive.google.com/file/d/1JslRqcCKqk_DOyGvWZWwtmhW_vjzT8Jq/view?usp=drivesdk