FINAL DELIVERABLES

Team ID	PNT2022TMID47521
Project Name	Project – IOT based smart crop protection system for agriculture
Team Leader	B.Rajeshwari
Team Members	S.Muthunandhini, M.Mowniga devi, K.Maheswari

ABSTRACT:

Food is the most important requirement for living beings. The main products of our food come directly or indirectly from agriculture. Now a days security of especially at high frequencies, and the gradual loss of sensitivity to higher agricultural field is very important. Crop damage by birds is a severe problem in most of the areas all over India. Field surveys showed that on an average 36% of the crop were damaged by wild birds. The incident of damage was very high in crop fields adjacent to forest areas, this resulted into direct conflict between people and birds. In everyday life farmers facing different kind of problems in agriculture. In olden days different kind of animals enter into crop they are damaging the fields. For reducing those kinds of problem they are used different kind of technique. Now a day birds are major problem in agriculture. Birds are falling on crop and eating it. In this research paper we are solving some problems. Every animal or group of animal is having a specific range of hearing frequencies. There irritating frequency is estimated by a specific logic. In day life birds creating irritating sounds in agriculture and out sides' fields also. At early morning and evening time birds falling on the crops and eating rice seeds, rabi crops, cons and wheat….etc. so we can create irritating sounds for birds, and then they can flay outside of the field. By using this research idea we can able to reduce mostly affected problem in agriculture.

INTRODUCTION:

This will be an integrative approach in the field of IIOT designed for perceptive Agriculture which are proceeding the arrangements in course of open source and on low powers devices . This project work is to yield monitoring arrangement for farm safety against animal attacks and climate change conditions. Industrial Internet of Things (IIoT) advances is frequently used in smart farming to emphasize the standard of agriculture. This project work contains various sorts of sensors, controllers in addition to positioner on behalf of WSN and ARM Cortex-A board which consumes 700mA or 3W power is the main temperament of the classification. Different sensors like DHT 11 Humidity & Temperature Sensor, PIR Sensor, LDR sensor, HC-SR04 Ultrasonic Sensor and cameras are interfaced with the board. IOT devices stay adept of in case evidence around farming grounds. As soon as the passive infrared sensors (PIR) go High on detecting the motion within a range of 10 meters, the camera will be turned ON which first captures an image and then starts dealing out the image, which will be warehoused onboard as well as in IoT cloud, instantaneously a message will be generated automatically towards the recorded quantity using a SIM900A module to inform about the intrusion with the data of the temperature as well as humidity obtained by dht11 which is a temperature and humidity sensor. If found not to be human after processing the available information the system elevates a buzzer sound, to notify people about the intrusion. Data collected by the sensors will be given to ARM CortexA through the systems which can be wired or communicataion system. The facts in the porter is tested and harmonized with superlative values of data like value of temperature, humidity and soil moisture. If the difference occurred concerning predefined threshold rate formerly announcement sends to the mobile of the farmer or to the website. The result will be generated arranged the database of the farmer's mobile to take the necessary action . The Internet of Things (IOT) is an evolving paradigm that seeks to connect different smart physical components for multi-domain modernization. To automatically manage and track agricultural lands with minimal human intervention, numerous IOT-based frameworks have been introduced. This paper presents a rigorous discussion on the major components, new technologies, security issues, challenges and future trends involved in the agriculture domain. An in-depth report on recent advancements has been covered in this paper. The goal of this survey is to help potential researchers detect relevant IOT problems and, based on the application requirements, adopt suitable technologies. Furthermore, the significance of IOT and Data Analytics for smart agriculture has been highlighted.

LITERATURE SURVEY:

Between 1974 and 1991, the amount of damage caused by sparrows in Japan showed a sharp drop. Since the main crop eaten by sparrows is rice, this probably reflects the decline in the area of paddy fields over that period. Damage by other birds increased, however, especially by the brown-eared bulbul. On the whole, crop damage by birds in Japan is tending to increase.

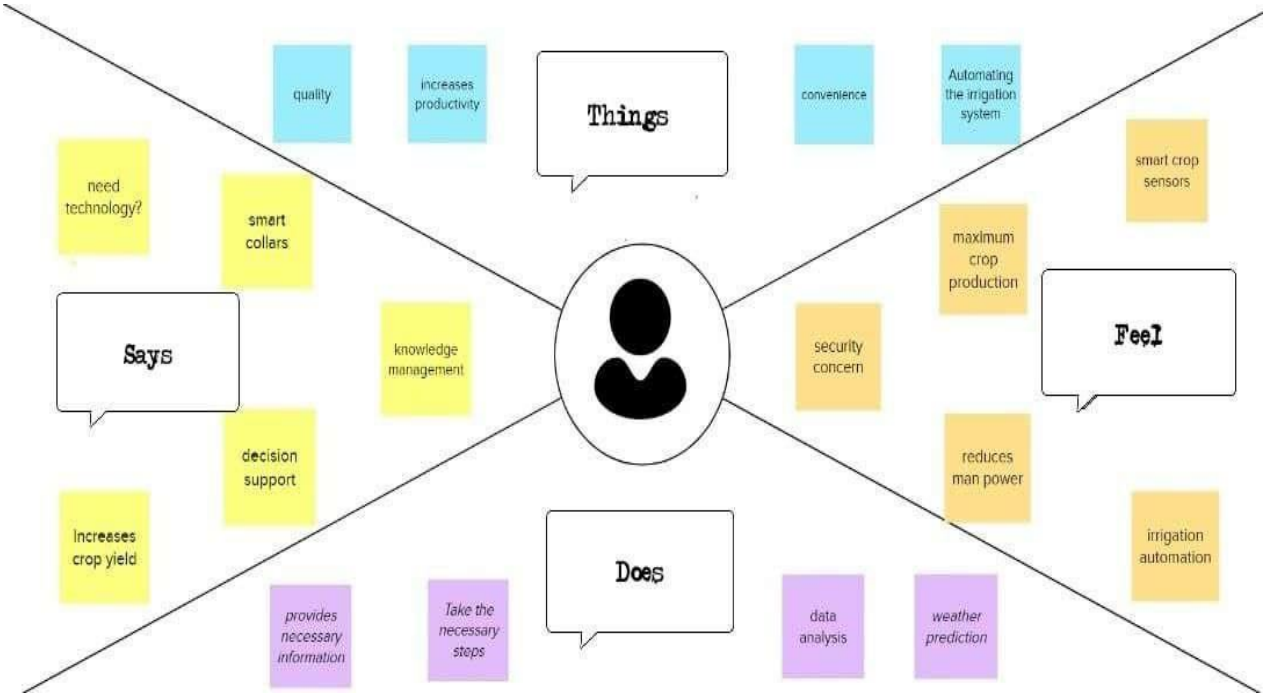
What are the reasons for this? First of all, the number of birds is increasing. Many farmers are using combines to harvest rice and wheat. Quite a large number of grains reaped in this way are left behind in the field. This gives birds an abundant and high-quality food supply that contributes to the increase in numbers, and keeps it stable.

Furthermore, many farmers are beginning to plant rice by direct seeding rather than by transplanting. The sown seed is a food resource for ducks if the paddy fields are flooded and for sparrows and pigeons if the fields are drained.

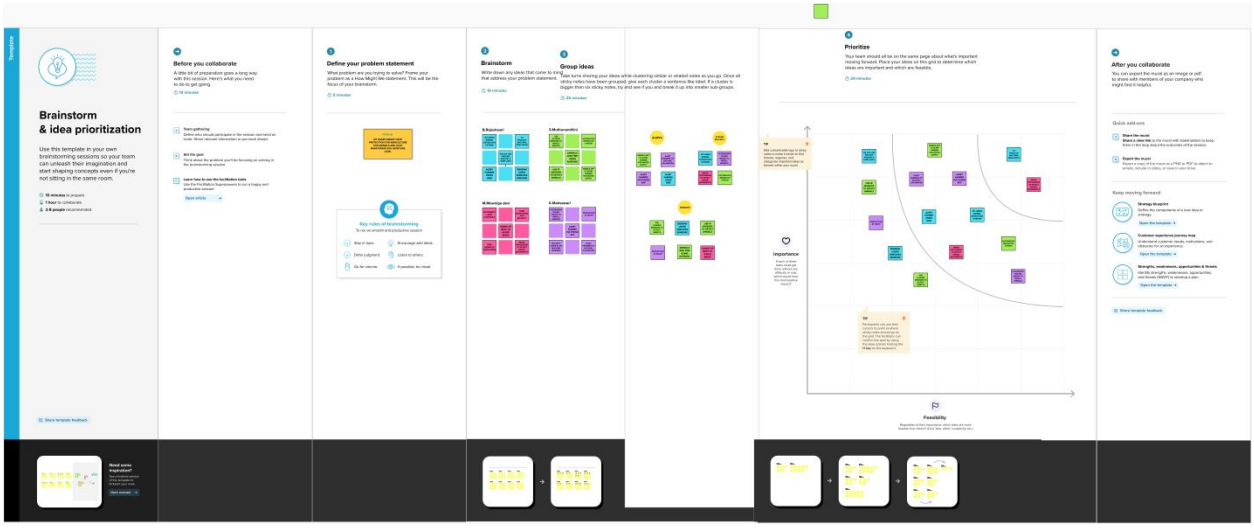
In some cases, damage has occurred to new crops. One example is the brown-eared bulbul, which began to eat the leaves of various kinds of leaf vegetables. Bulbuls were formerly migratory birds, which overwintered in the southern part of Japan and bred in the mountainous and northern regions of Japan. In the 1970s, they became year-long residents and began to cause severe damage to winter cabbage and
other leaf vegetables. In the case of Japanese pear, bird damage became much worse after the introduction of new varieties such as Kosui, which have higher sugar content than traditional varieties.

Sometimes a new pest bird species appears. An example is the Chinese bulbul (Pycnonotus saneness) which appeared in Okinawa for the first time in 1976 and began eating the leaves and fruit of vegetables.

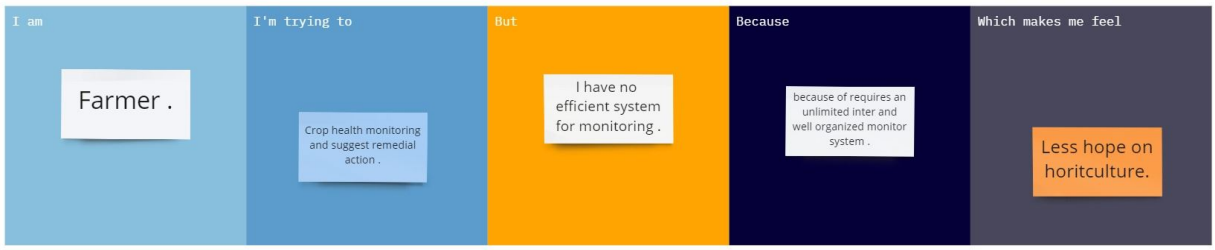
EMPATHY MAP CANVAS



BRAIN STORMING:

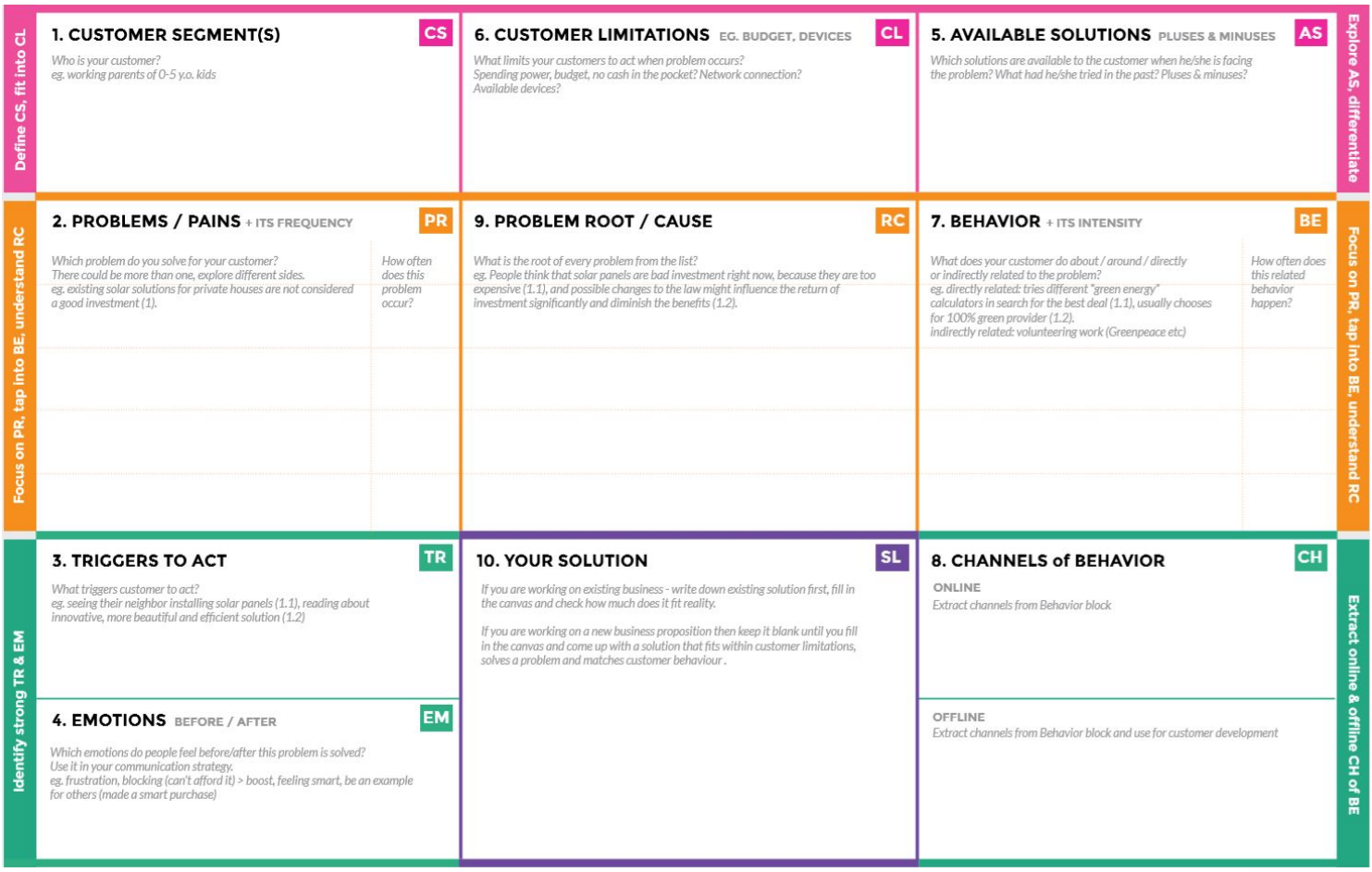


PROBLEM STATEMENT:



Problem Statement (PS)	I am (Customer)	I am trying to	But	Because	Which makes me feel
PS-1	Farmer	To increase productivity	No clarity regarding it	Animals and birds destroy the crops	Worried
PS-2	Farmer	Monitoring the condition of crops	It has some major issues like understanding the technology and updated equipment	It Requires more knowledge regarding latest technology, skills to grasp easily and interest	Annoying and stress full

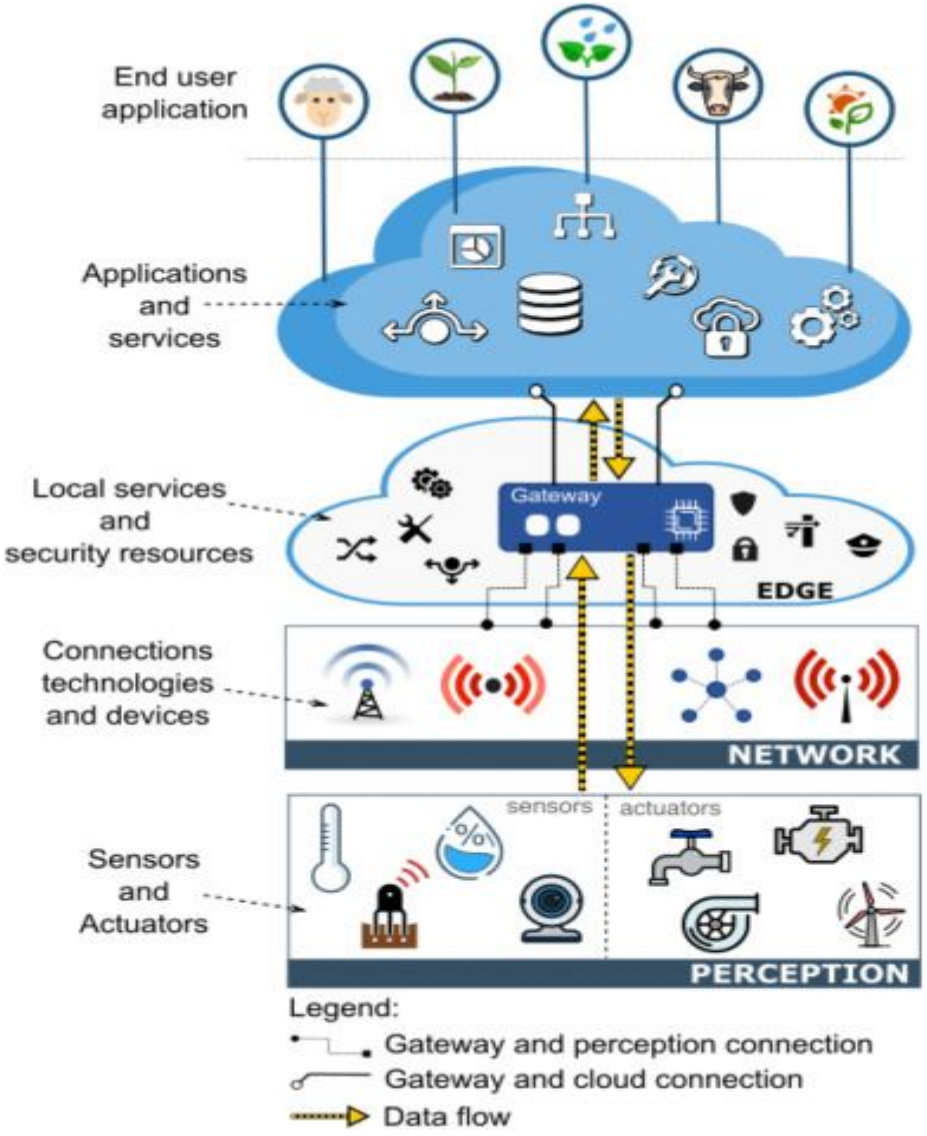
PROBLEM SOLUTION FIT:



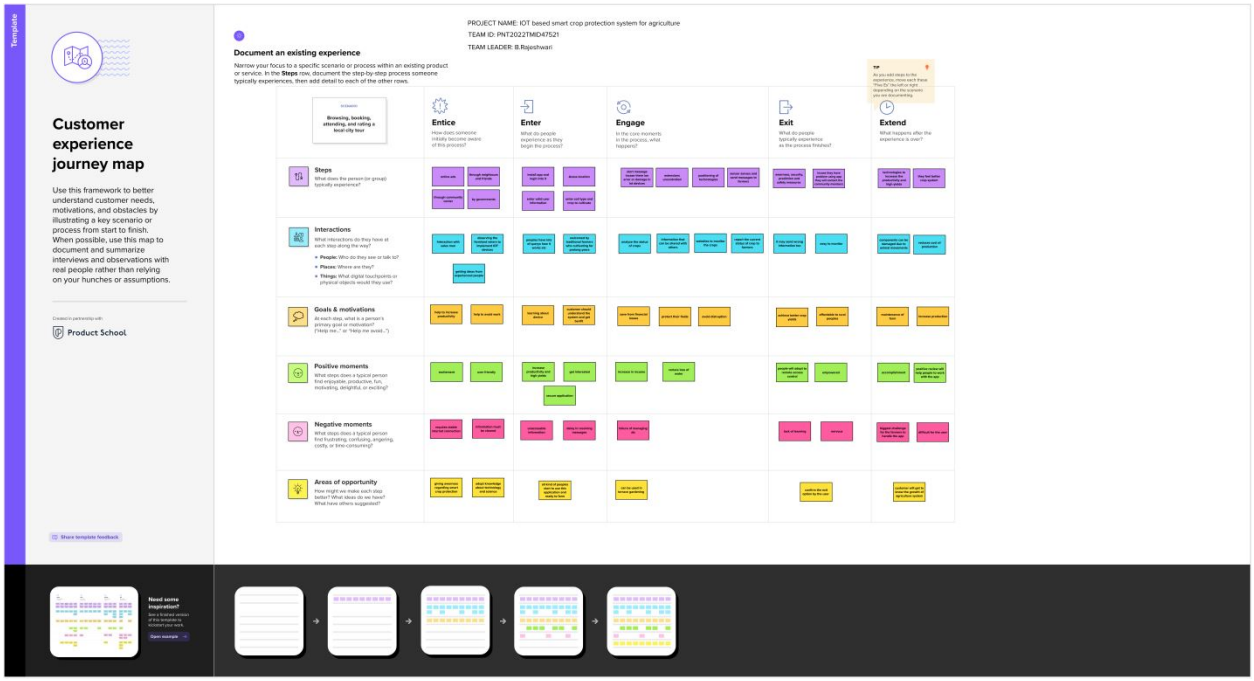
PROPOSED SOLUTION:

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Develop an efficient system & an application that can monitor and alert the users(farmers)
2.	Idea/Solution description	➢ This product helps the field in monitoring the animals other disturbance ➢ In several areas, the temperature sensors will be integrated to monitor the temperature & humidity ➢ If in any area feel dry or wetless is detected by admins, will be notified along with the location in the web application
3.	Novelty/Uniqueness	➢ Fastest alerts to the farmers ➢ The increasing demand for quality food ➢ User friendly
4.	Social Impact/Customer Satisfaction	➢ Easy installation and provide efficient results ➢ Can work with irrespective of fear
5.	Business Model(Revenue Model)	➢ As the product usage can be understood by everyone, it is easy for them to use it properly for their safest organization ➢ The product is advertised all over the platforms. Since it is economical, even helps small scale farming land from disasters.
6.	Scalability of the Solution	➢ Even when the interruption is more, the product sense the accurate location and alerts the farmers effectively

SOLUTION ARCHITECTURE:



CUSTOMER JOURNEY:



DATA FLOW DIAGRAM& USER STORIES:

User Type	Functional requirement (Epic)	User Story number	User Story/Task	Acceptance criteria	Priority	Release
Customer(Mobile user)	Registration	USN-1	User can enter into the web application	I can access my account /dashboard	High	Sprint 1
		USN-2	User can register their credentials like email id and password	I can receive confirmation email & click confirm	High	Sprint 1
	Login	USN-3	User can log into the application by entering email & password	I can login to my account	High	Sprint 1
	Dashboard	USN-4	User can view the temperature	I can view the data given by the device	High	Sprint 2
		USN-5	User can view the level of sensor monitoring value	I can view the data given by the device	High	Sprint 2
Customer(Web user)	Usage	USN-1	User can view the web page and get the information	I can view the data given by the device	High	Sprint 3

Customer	**Working**	**USN-1**	**User act according to the alert given by the device**	**I can get the data work according to it**	**High**	**Sprint 3**
		USN-2	**User turns ON the water motors/Buzzer/Sound Alarm when occur the disturbance on field.**	**I can get the data work according to it**		**Sprint 4**
Customer care Executive	**Action**	**USN-1**	**User solve the problem when some faces any usage issues**	**I can solve the issues when some one fails to understanding the procedure**	**High**	**Sprint 4**
Administration	**Administration**	**USN-1**	**User store every information**	**I can store the gained information**	**High**	**Sprint 4**

SOLUTION REQUIREMENTS:

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Install the app. Signing up with Gmail or phone number Creating a profile. Understand the guidelines.
FR-2	User Confirmation	Email or phone number verification required via OTP.

FR-3	Accessing datasets	Data's are obtained by cloudant DB.
FR-4	Interface sensor	Connect the sensor and the application When animals enter the field , the alarm is generated.
FR-5	Mobile application	It is used to control motors and field sprinklers.

Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	This project's contributes the farm protection through the smart protection system.
NFR-2	**Security**	Data requires secure access to must register and communicate securely on devices and authorized users of the system who exchange information must be able to do.
NFR-3	**Reliability**	Farmers are able to safeguard their lands by help of this technology. They will also benefits from higher crop yields, which will improve our economic situation.
NFR-4	**Performance**	Must provide acceptable response times to users regardless of the volume of data that is stored and the analytics that occurs in background. Bidirectional, near real-time communications must be supported. This requirement is related to the requirement to support industrial and device protocols at the edge.
NFR-5	**Availability**	We can defend the crops against wild animals by creating and implementing resilient hardware and software.
NFR-6	**Scalability**	System must handle expanding load and data retention needs that are based on the upscaling of the solution scope, such as extra manufacturing facilities and extra buildings.

TECHNOLOGY STACK:

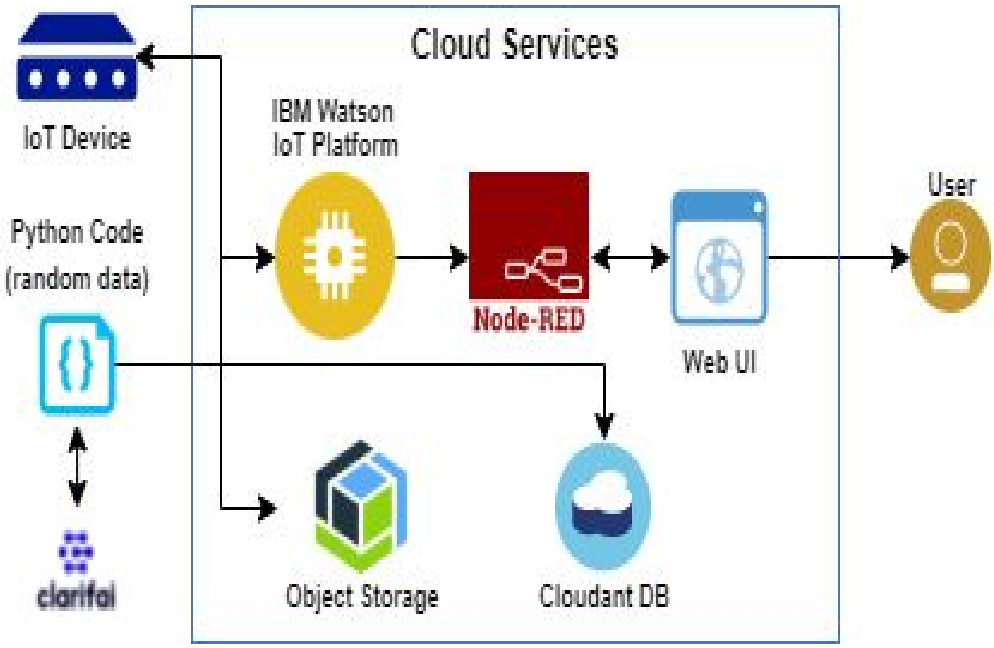


Table-1 : Components & Technologies:

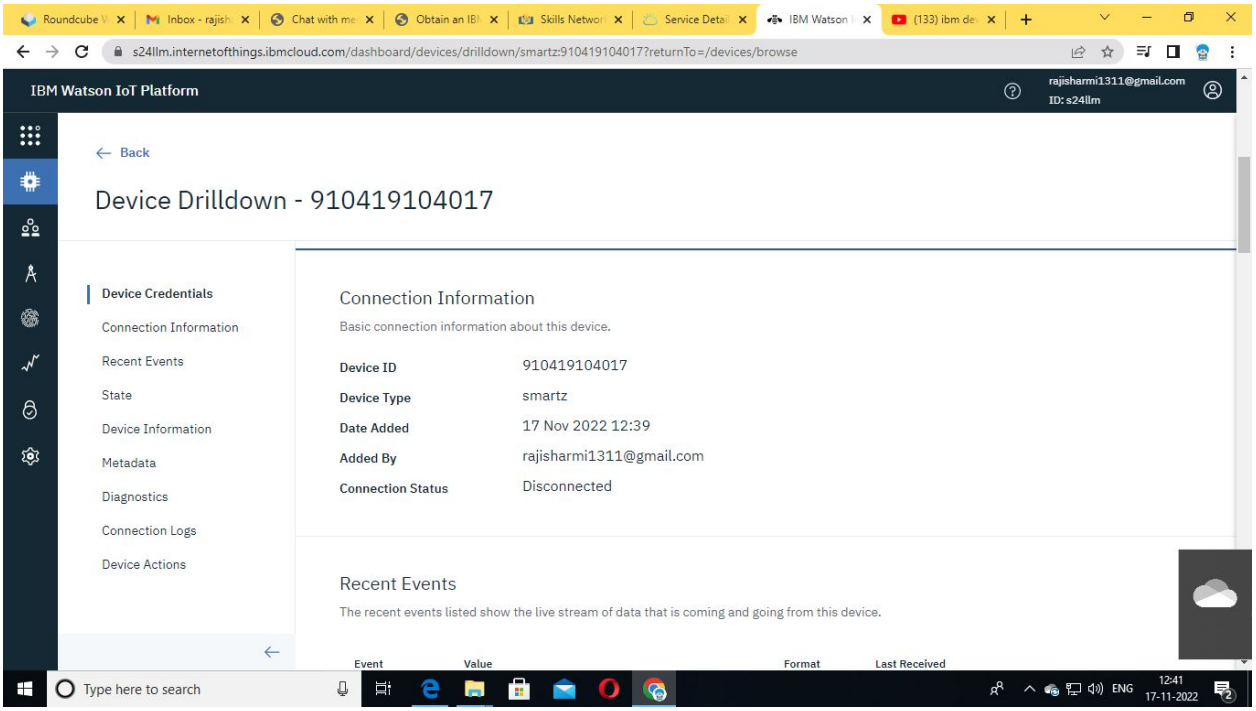
S.No	Component	Description	Technology
1.	User Interface	How user interacts with application e.g. Web UI, Mobile App, Chat bot etc.	HTML, CSS, JavaScript / Angular Js / React Js etc.
2.	Application Logic-1	Logic for a process in the application	Python
3.	Application Logic-2	Logic for a process in the application	IBM Watson/node red
4.	Application Logic-3	Logic for a process in the application	IBM Watson/node red
5.	Database	Data Type, Configurations etc.	My SQL, No SQL, etc.
6.	Cloud Database	Database Service on Cloud	IBM Cloudant.

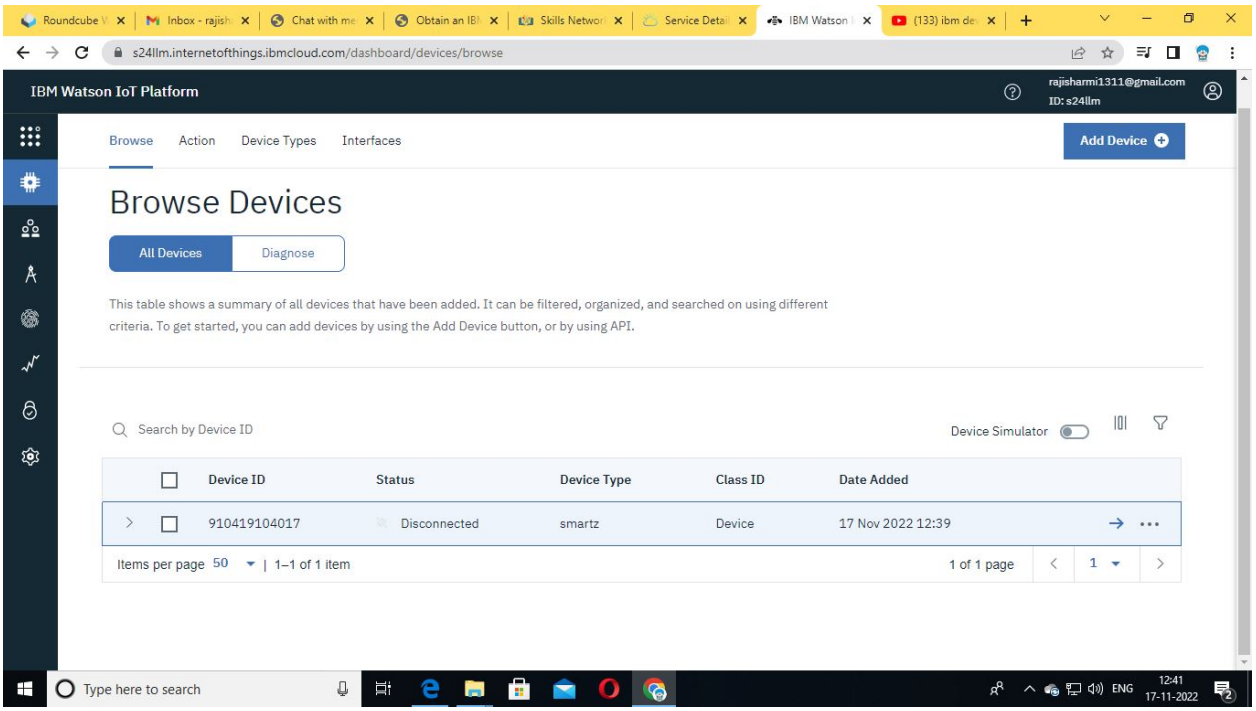
7.	Temperature sensor	Monitor the temperature	TMP36
8.	Humidity sensor	Monitor the humidity	DHT11
9.	Soil moisture sensor	Measure the amount of water in the soil	Soil moisture sensor
10.	Weather monitoring	Monitor the weather	Temperature sensor

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Clarifai, Node- red	Software
2.	Security Implementations	Sensitive and private data must be protected from their protection untill the decision-making and storage stages.	Encryption process
3.	Scalable Architecture	Scalability is a major concern for IOT platform it has been shown that different architectural choices of IOT platform affect system capability and that automatic real time decision making is feasible in an environment composed of dozens of thousand.	Software
4.	Availability	Automatic adjustment of farming equipment made possible by linking information like crops/weather and temperature, humidity etc.	Software
5.	Performance	The ideas of implementing integerated sensors with sensing soil and environmental or ambient parameters in framing will be more efficient for overall monitoring .	Software

CREATE IBM WATSON IOT PLATFORM:

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IBM Watson IoT Platform
rajisharmi1311@gmail.com
ID: s24llm
Browse
Action
Device Types
Interfaces
Add Device
Browse Devices
All Devices
Diagnose
This table shows a summary of all devices that have been added. It can be filtered, organized, and searched on using different criteria. To get started, you can add devices by using the Add Device button, or by using API.
Search by Device ID
Device Simulator
Device ID
Status
Device Type
Class ID
Date Added
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Disconnected
smartz
Device
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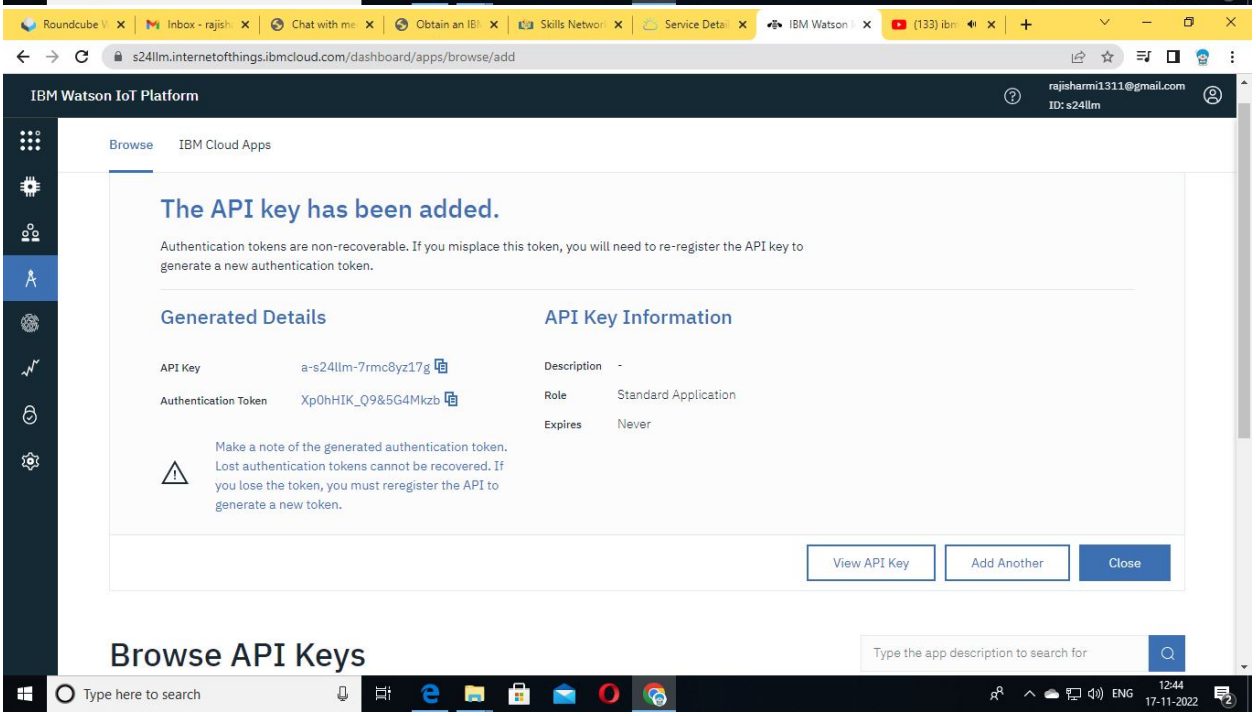
Items per page 50
1–1 of 1 item
1 of 1 page
Type here to search
ENG
12:41
17-11-2022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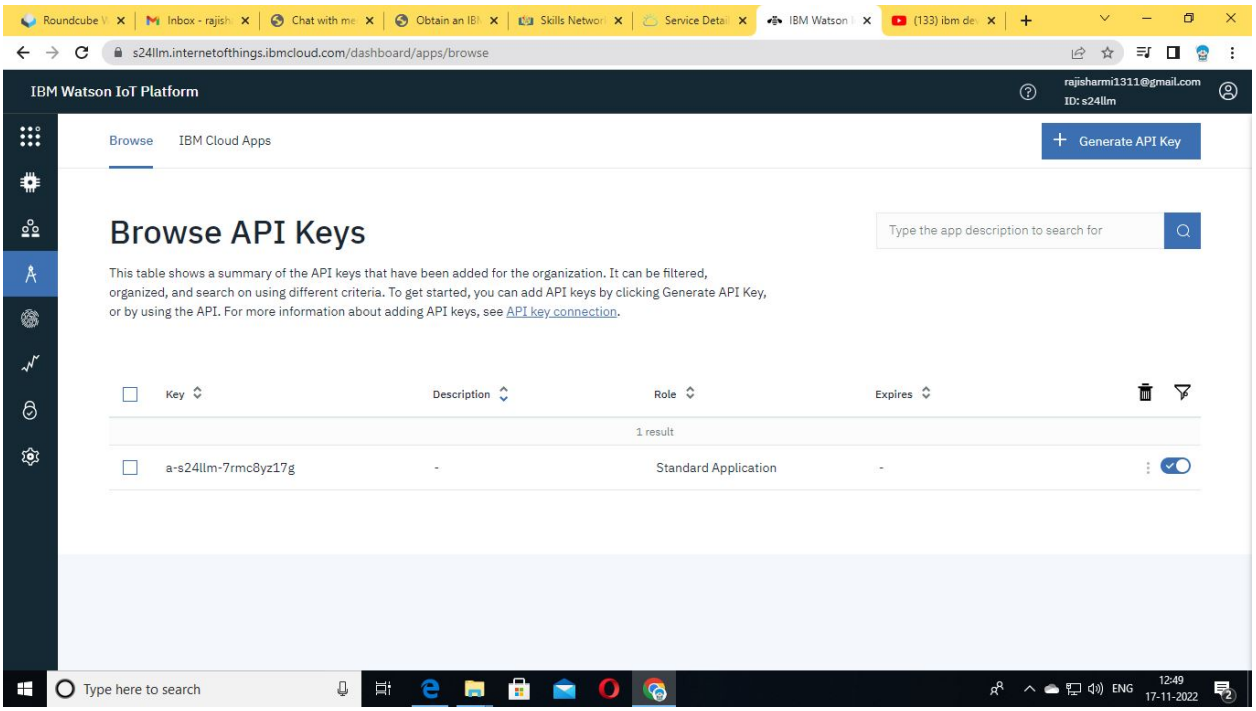
IBM Watson IoT Platform
rajisharmi1311@gmail.com
ID: s24llm
Browse
IBM Cloud Apps
The API key has been added.
Authentication tokens are non-recoverable. If you misplace this token, you will need to re-register the API key to generate a new authentication token.
Generated Details
API Key
a-s24llm-7rmc8yz17g
Authentication Token
Xp0hHIK_Q9&5G4Mkzb
Make a note of the generated authentication token. Lost authentication tokens cannot be recovered. If you lose the token, you must reregister the API to generate a new token.
API Key Information
Description
-
Role
Standard Application
Expires
Never
View API Key
Add Another
Close
Browse API Keys
Type the app description to search for
Type here to search
ENG
12:44
17-11-2022


IBM Watson IoT Platform
rajisharmi1311@gmail.com
ID: s24llm
Browse
IBM Cloud Apps
Generate API Key
Browse API Keys
Type the app description to search for
This table shows a summary of the API keys that have been added for the organization. It can be filtered, organized, and search on using different criteria. To get started, you can add API keys by clicking Generate API Key, or by using the API. For more information about adding API keys, see API key connection.
Key
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Standard Application
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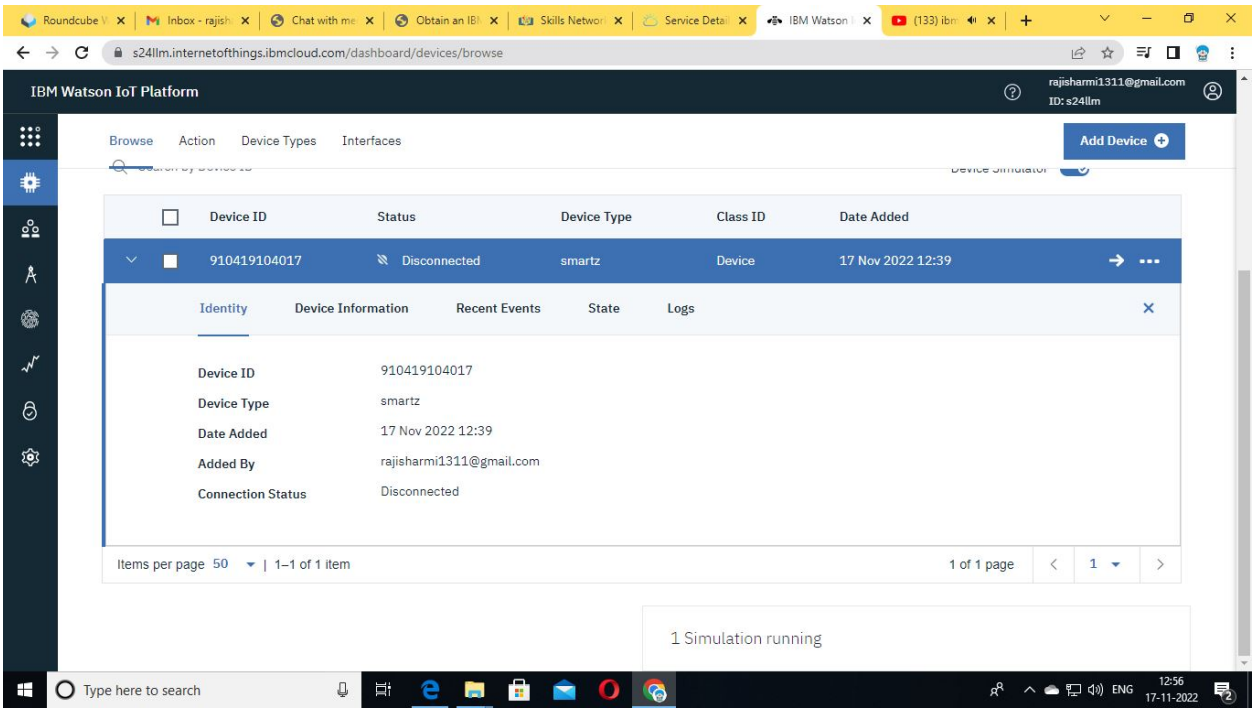
IBM Watson IoT Platform
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ID: s24llm
Browse
Action
Device Types
Interfaces
Add Device
Device ID
Status
Device Type
Class ID
Date Added
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Disconnected
smartz
Device
17 Nov 2022 12:39
Identity
Device Information
Recent Events
State
Logs
Device ID
910419104017
Device Type
smartz
Date Added
17 Nov 2022 12:39
Added By
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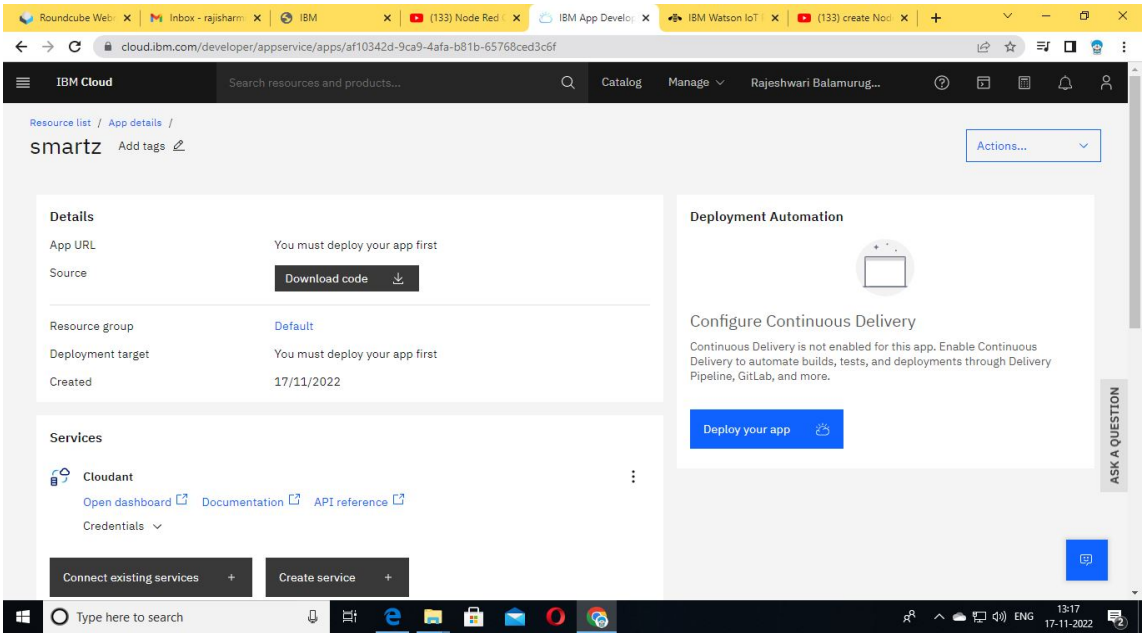
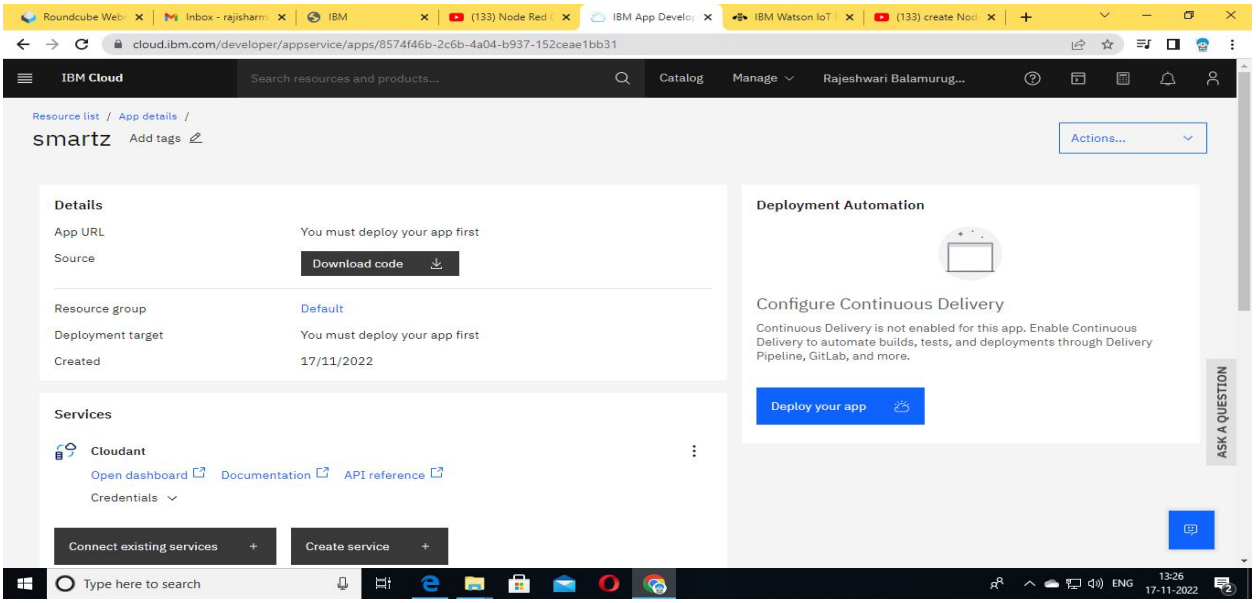
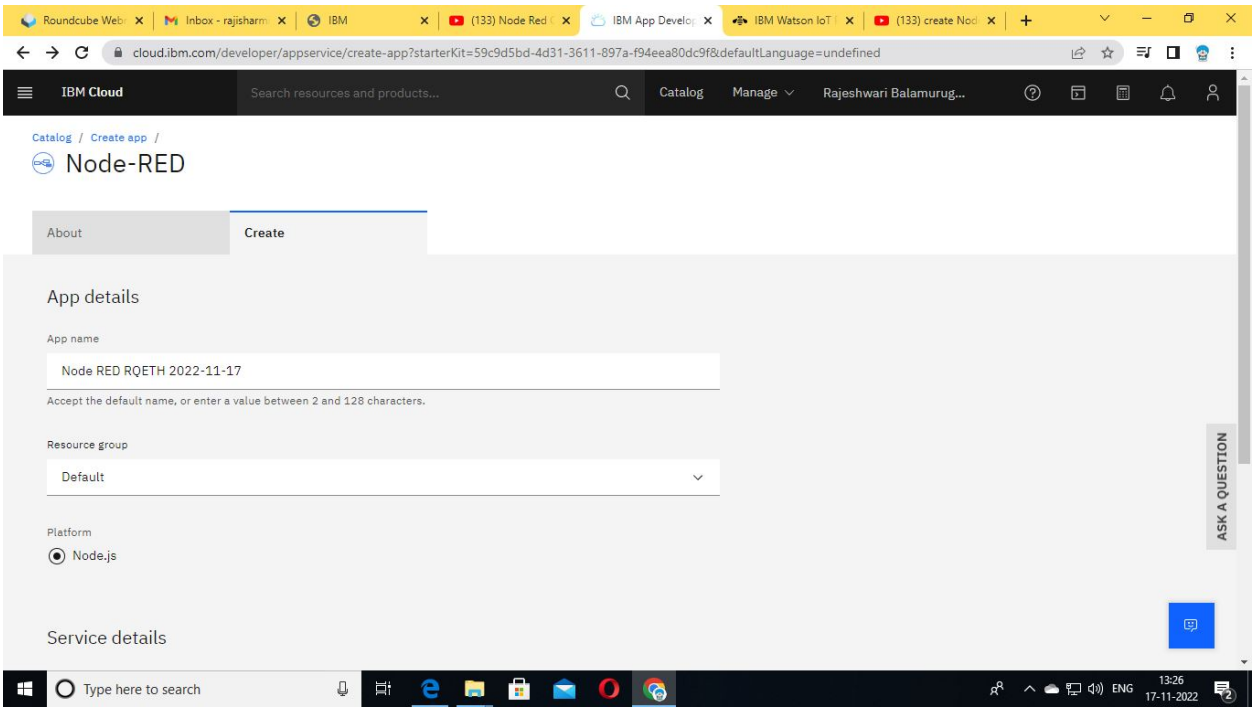
CREATE NODE RED SERVICES:






IBM Cloud
Search resources and products...
Catalog
Manage
Rajeshwari Balamurug...
Catalog / Create app /
Node-RED
About
Create
App details
App name
Node RED RQETH 2022-11-17
Accept the default name, or enter a value between 2 and 128 characters.
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Platform
Node.js
Service details
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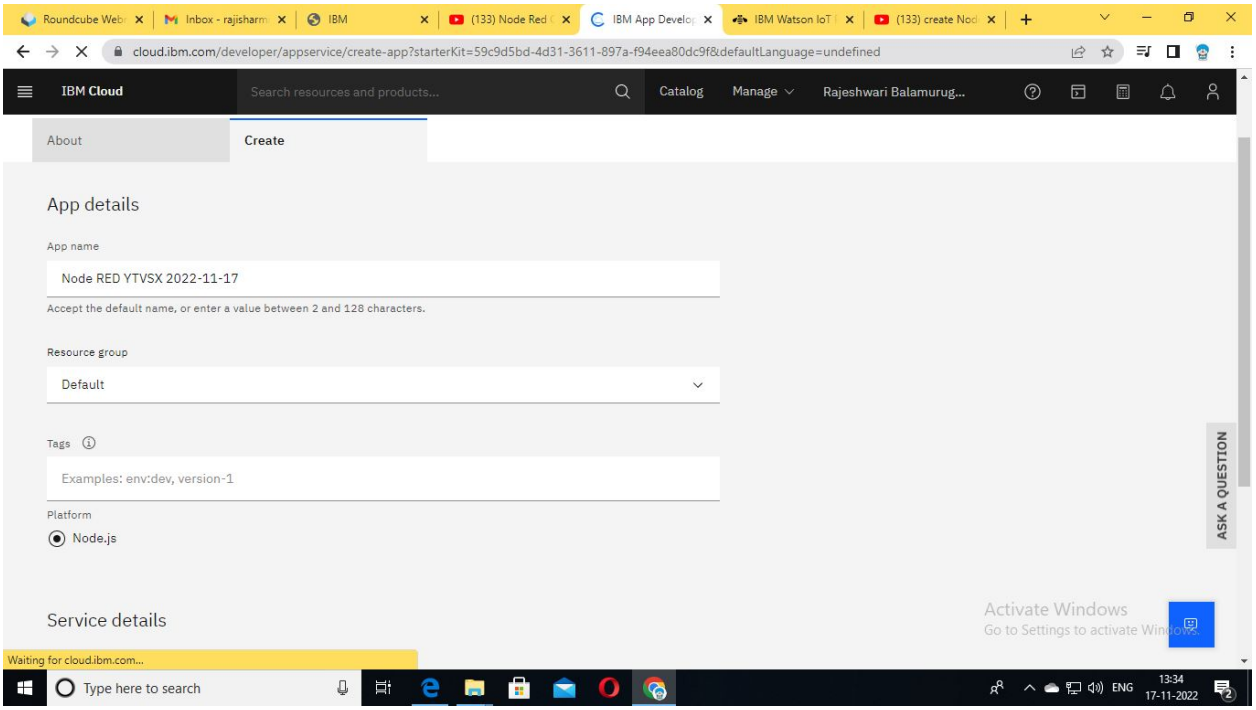
IBM Cloud
Search resources and products...
Catalog
Manage
Rajeshwari Balamurug...
About
Create
App details
App name
Node RED YTVSX 2022-11-17
Accept the default name, or enter a value between 2 and 128 characters.
Resource group
Default
Tags
Examples: env:dev, version-1
Platform
Node.js
Service details
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Activate Windows
Go to Settings to activate Windows.
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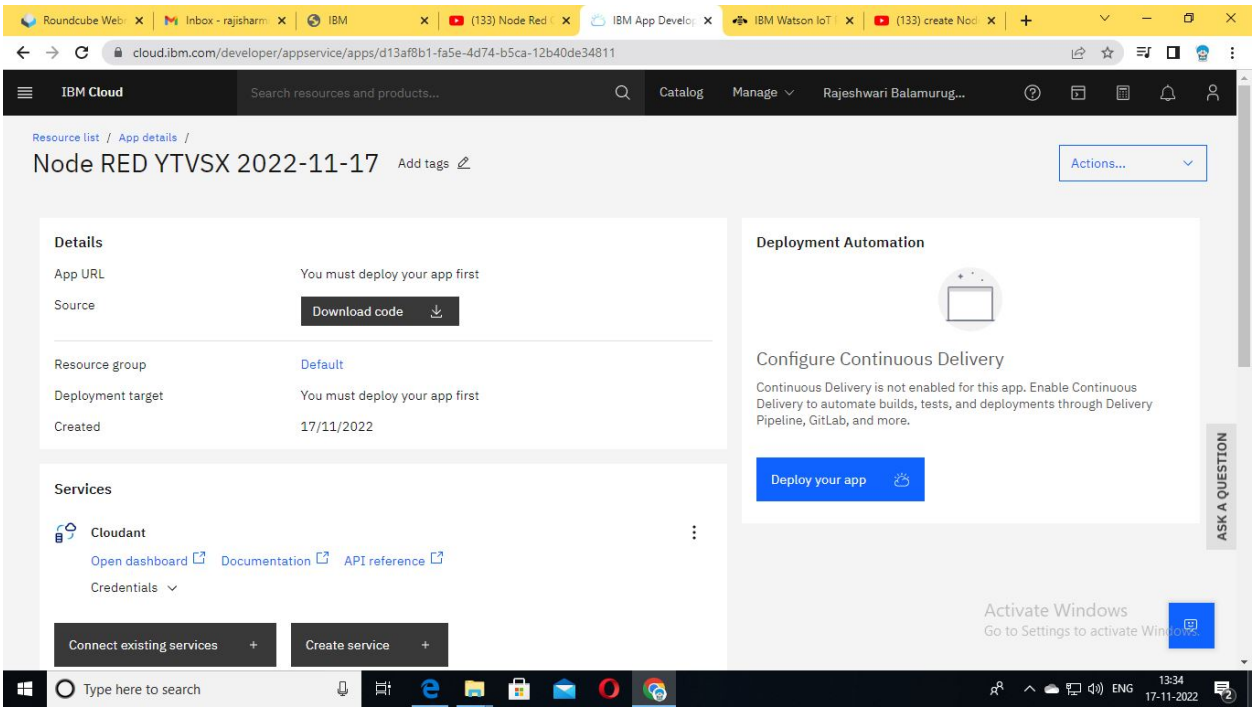
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IBM Cloud
Search resources and products...
Catalog
Manage
Rajeshwari Balamurug...
Resource list / App details /
Node RED YTVSX 2022-11-17
Add tags
Actions...
Details
App URL
You must deploy your app first
Source
Download code
Resource group
Default
Deployment target
You must deploy your app first
Created
17/11/2022
Deployment Automation
Configure Continuous Delivery
Continuous Delivery is not enabled for this app. Enable Continuous Delivery to automate builds, tests, and deployments through Delivery Pipeline, GitLab, and more.
Deploy your app
Services
Cloudant
Open dashboard
Documentation
API reference
Credentials
Connect existing services
Create service
ASK A QUESTION
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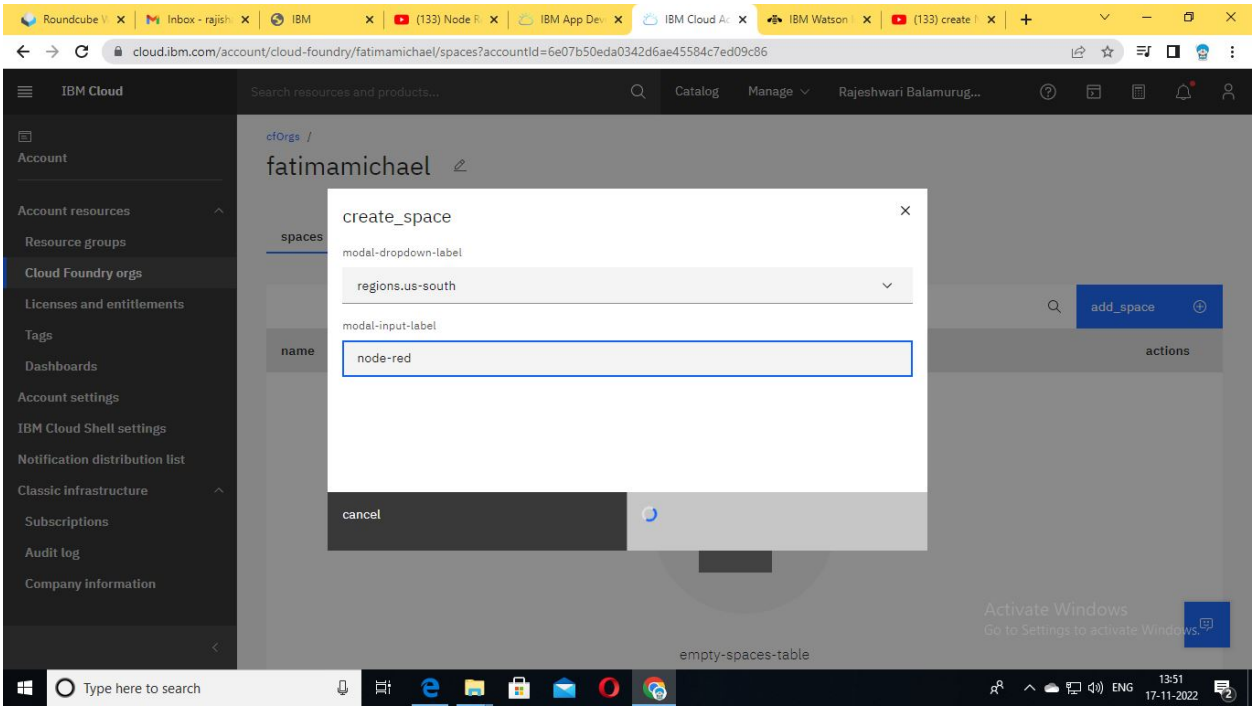
Go to Settings to activate Windows.
Type here to search
ENG
13:34
17-11-2022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IBM Cloud
Search resources and products...
Catalog
Manage
Rajeshwari Balamurug...
Account
Account resources
Resource groups
Cloud Foundry orgs
Licenses and entitlements
Tags
Dashboards
Account settings
IBM Cloud Shell settings
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Subscriptions
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add_space
name
actions
create_space
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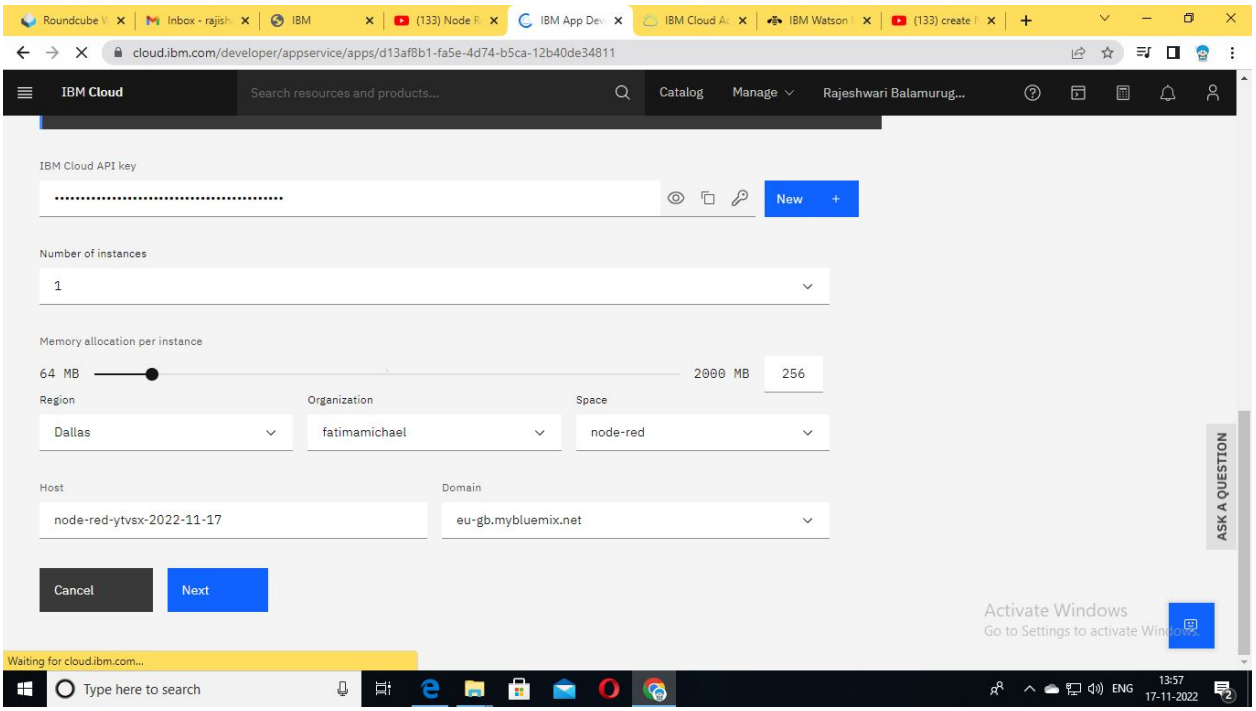
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Search resources and products...
Catalog
Manage
Rajeshwari Balamurug...
IBM Cloud API key
New
Number of instances
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Memory allocation per instance
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2000 MB
256
Region
Dallas
Organization
fatimamichael
Space
node-red
Host
node-red-ytvsx-2022-11-17
Domain
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Cancel
Next
ASK A QUESTION
Activate Windows
Go to Settings to activate Windows.
Waiting for cloud.ibm.com...
Type here to search
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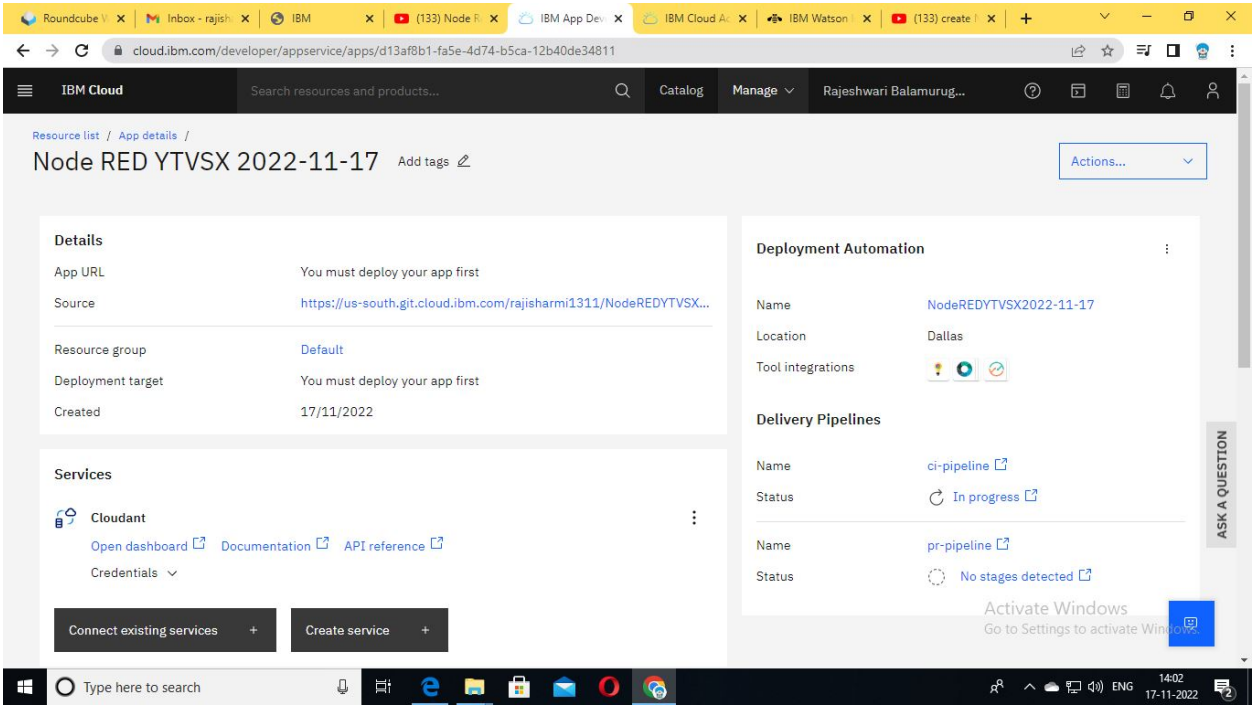
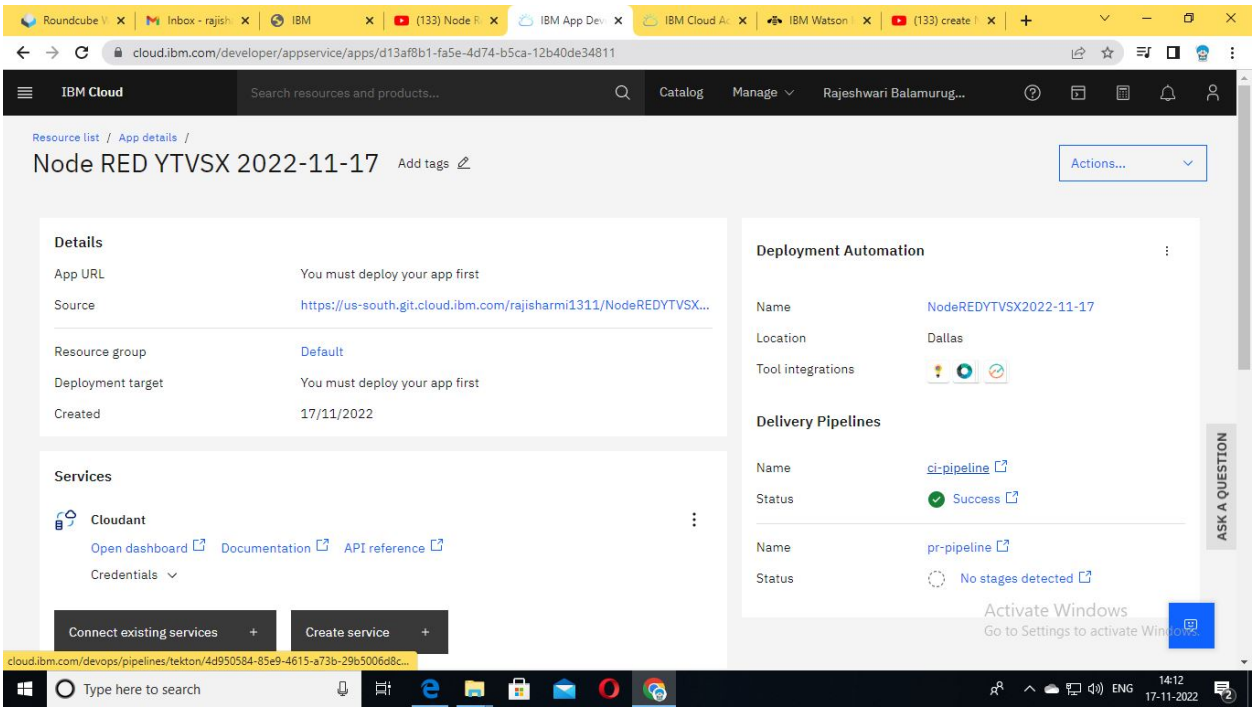
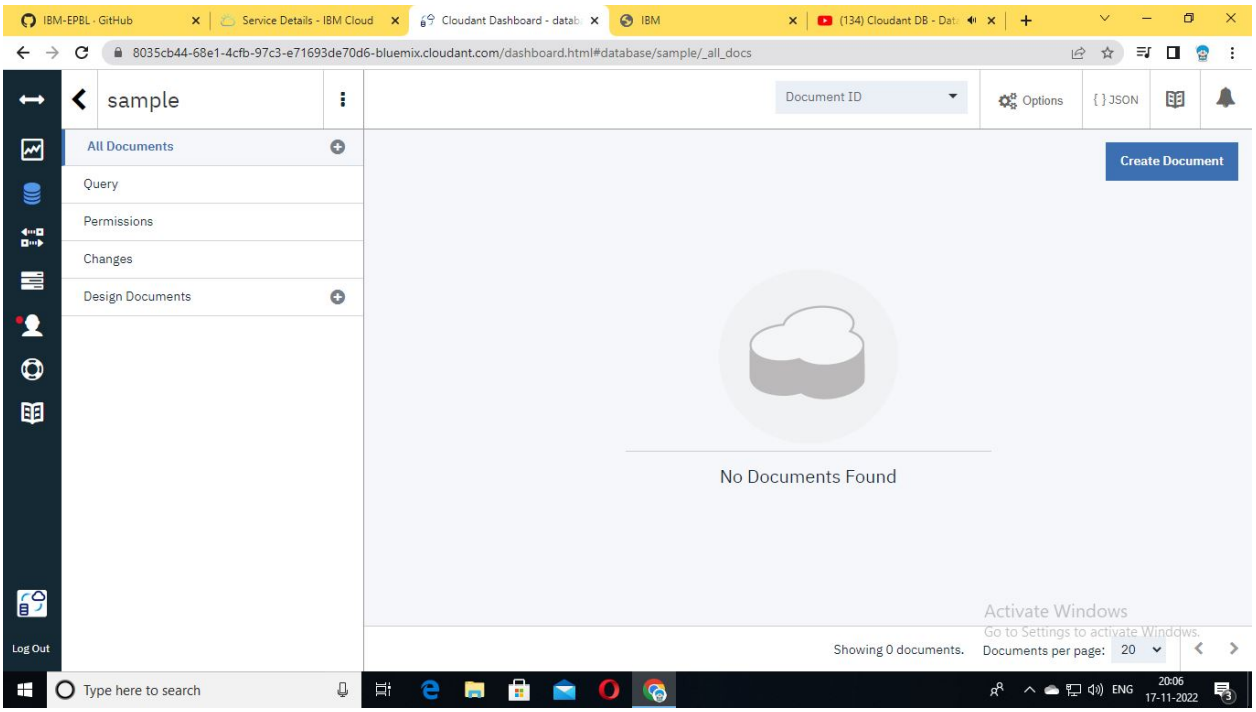
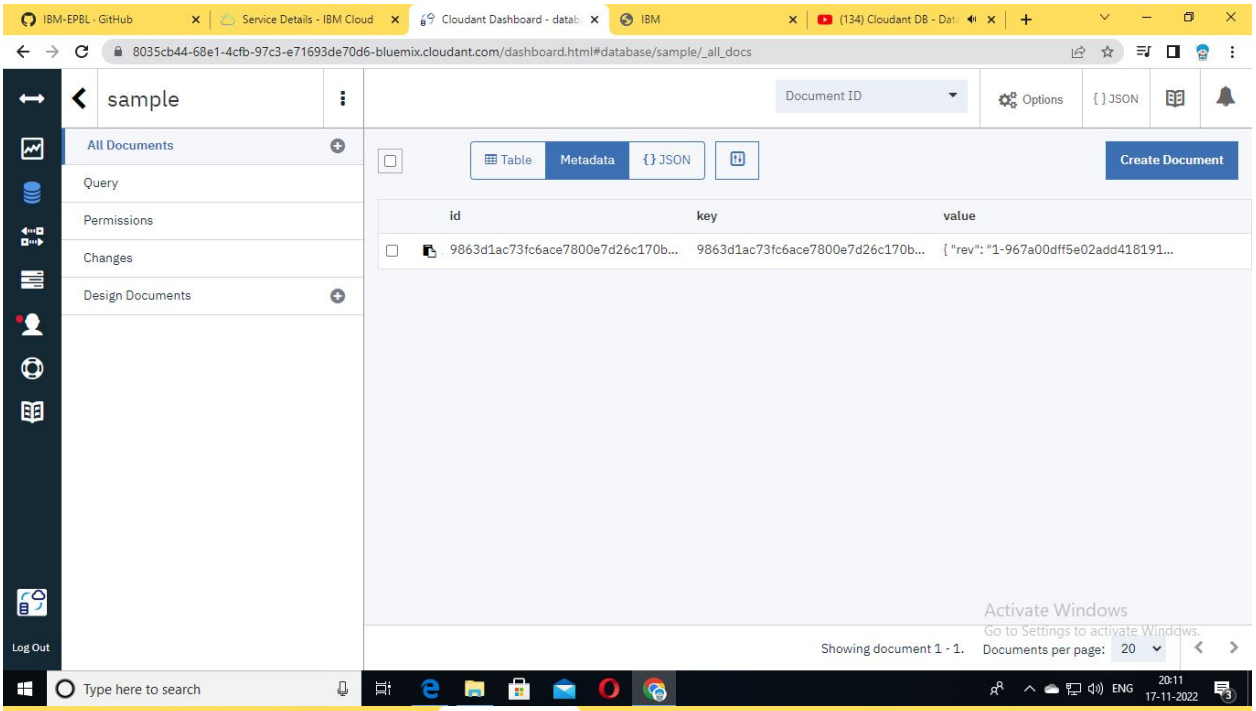
13:57
17-11-2022

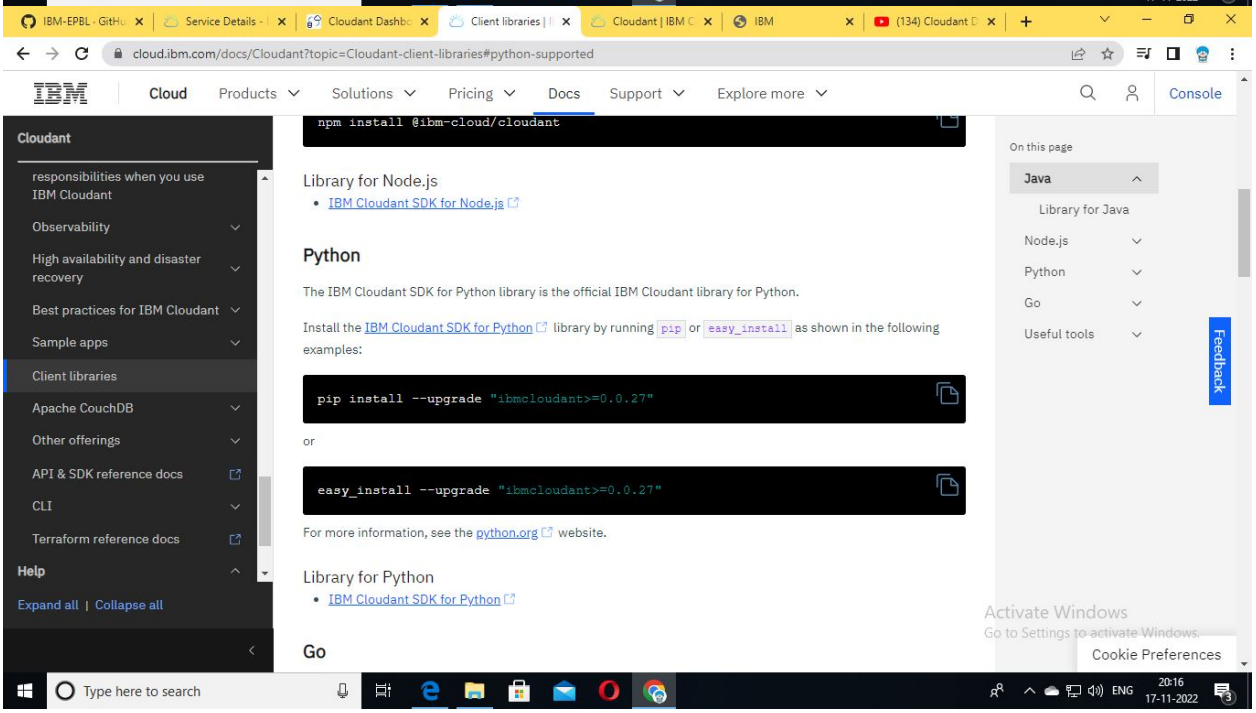

cloud.ibm.com/developer/appservice/apps/d13af8b1-fa5e-4d74-b5ca-12b40de34811
IBM Cloud
Search resources and products...
Catalog
Manage
Rajeshwari Balamurug...
Resource list / App details /
Node RED YTVSX 2022-11-17
Add tags
Actions...
Details
App URL
You must deploy your app first
Source
https://us-south.git.cloud.ibm.com/rajisharmi1311/NodeREDYTVSX...
Resource group
Default
Deployment target
You must deploy your app first
Created
17/11/2022
Services
Cloudant
Open dashboard
Documentation
API reference
Credentials
Connect existing services
Create service
Deployment Automation
Name
NodeREDYTVSX2022-11-17
Location
Dallas
Tool integrations
Delivery Pipelines
Name
ci-pipeline
Status
In progress
Name
pr-pipeline
Status
No stages detected
ASK A QUESTION
Activate Windows
Go to Settings to activate Windows.
Type here to search
ENG
14:02
17-11-2022

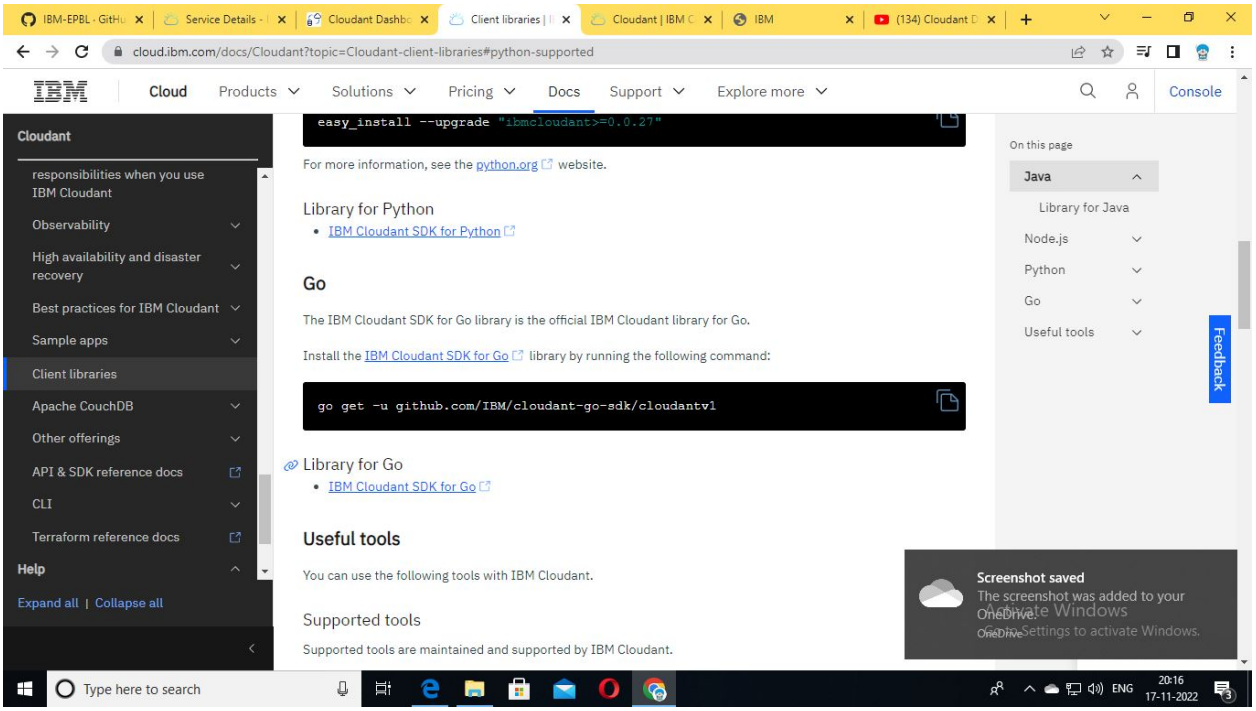


CREATE DATABASE IN CLOUDANT DB:

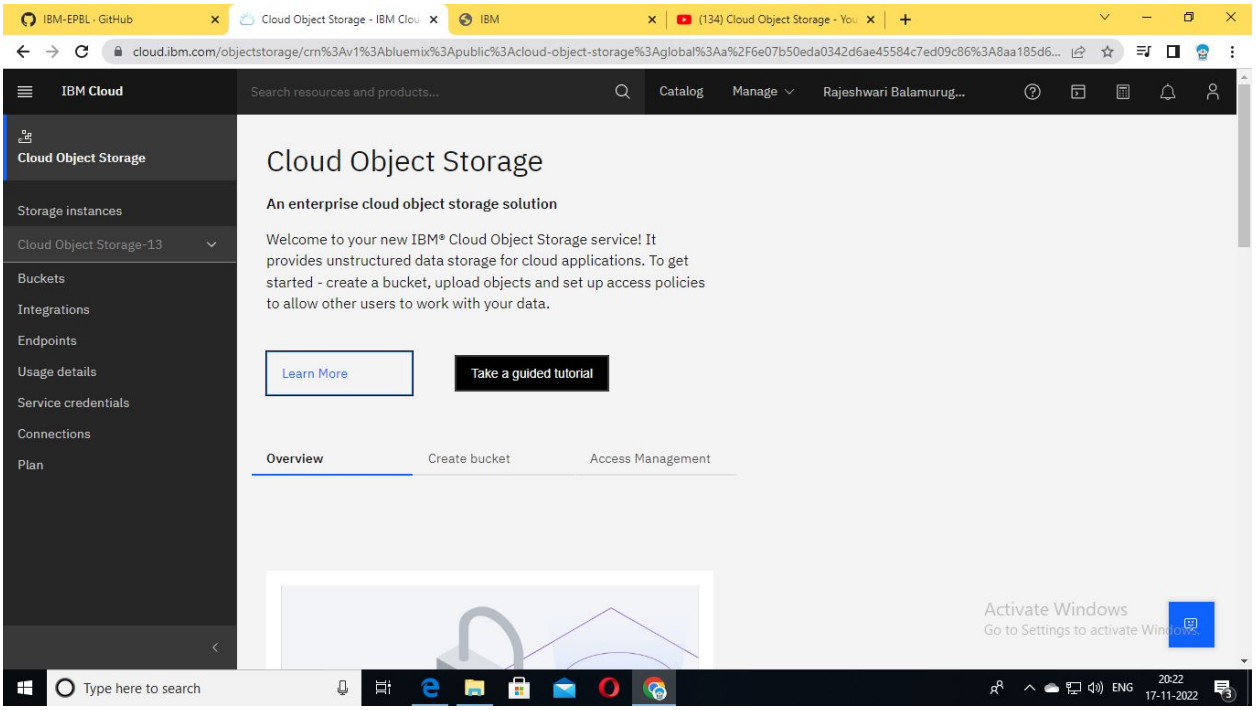


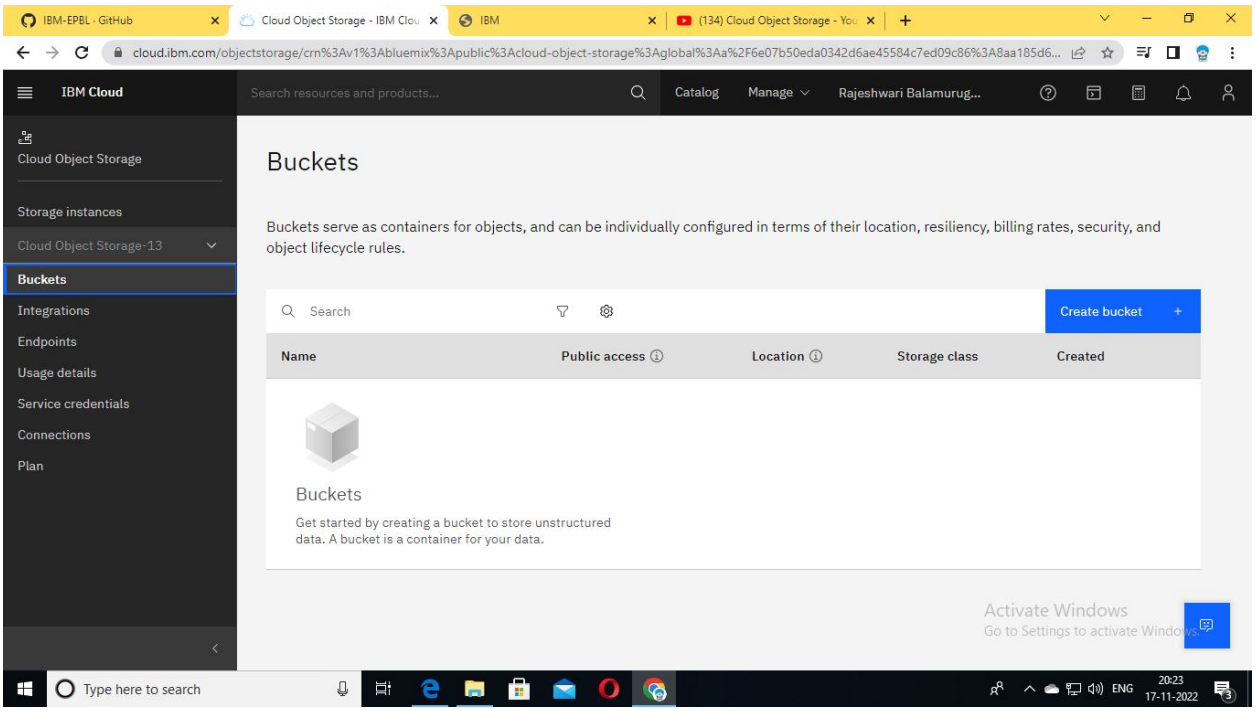

IBM-EPBL - GitHub
Service Details - IBM Cloud
Cloudant Dashboard - datab
IBM
(134) Cloudant DB - Dat
8035cb44-68e1-4cfb-97c3-e71693de70d6-bluemix.cloudant.com/dashboard.html#database/sample/_all_docs
sample
Document ID
Options
{ } JSON
All Documents
Query
Permissions
Changes
Design Documents
Table
Metadata
{} JSON
Create Document
id
key
value
9863d1ac73fc6ace7800e7d26c170b...
9863d1ac73fc6ace7800e7d26c170b...
{ "rev": "1-967a00dff5e02add418191...
Log Out
Activate Windows
Go to Settings to activate Windows.
Showing document 1 - 1.
Documents per page: 20
Type here to search
ENG
20:11
17-11-2022

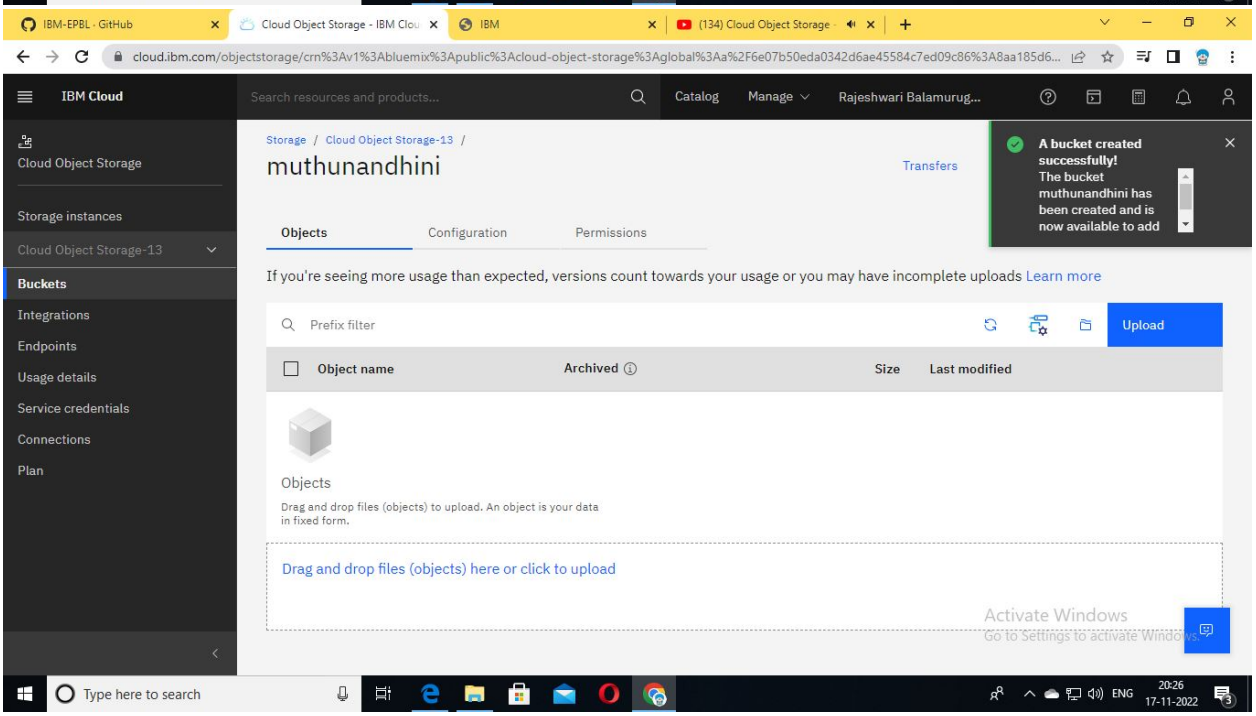

cloud.ibm.com/docs/Cloudant?topic=Cloudant-client-libraries#python-supported
IBM
Cloud
Products
Solutions
Pricing
Docs
Support
Explore more
Console
Cloudant
responsibilities when you use IBM Cloudant
Observability
High availability and disaster recovery
Best practices for IBM Cloudant
Sample apps
Client libraries
Apache CouchDB
Other offerings
API & SDK reference docs
CLI
Terraform reference docs
Help
Expand all | Collapse all
npm install @ibm-cloud/cloudant
Library for Node.js
IBM Cloudant SDK for Node.js
Python
The IBM Cloudant SDK for Python library is the official IBM Cloudant library for Python.
Install the IBM Cloudant SDK for Python library by running pip or easy_install as shown in the following examples:
pip install --upgrade "ibmcloudant>=0.0.27"
or
easy_install --upgrade "ibmcloudant>=0.0.27"
For more information, see the python.org website.
Library for Python
IBM Cloudant SDK for Python
Go
On this page
Java
Library for Java
Node.js
Python
Go
Useful tools
Feedback
Activate Windows
Go to Settings to activate Windows.
Cookie Preferences
Type here to search
ENG
20:16
17-11-2022

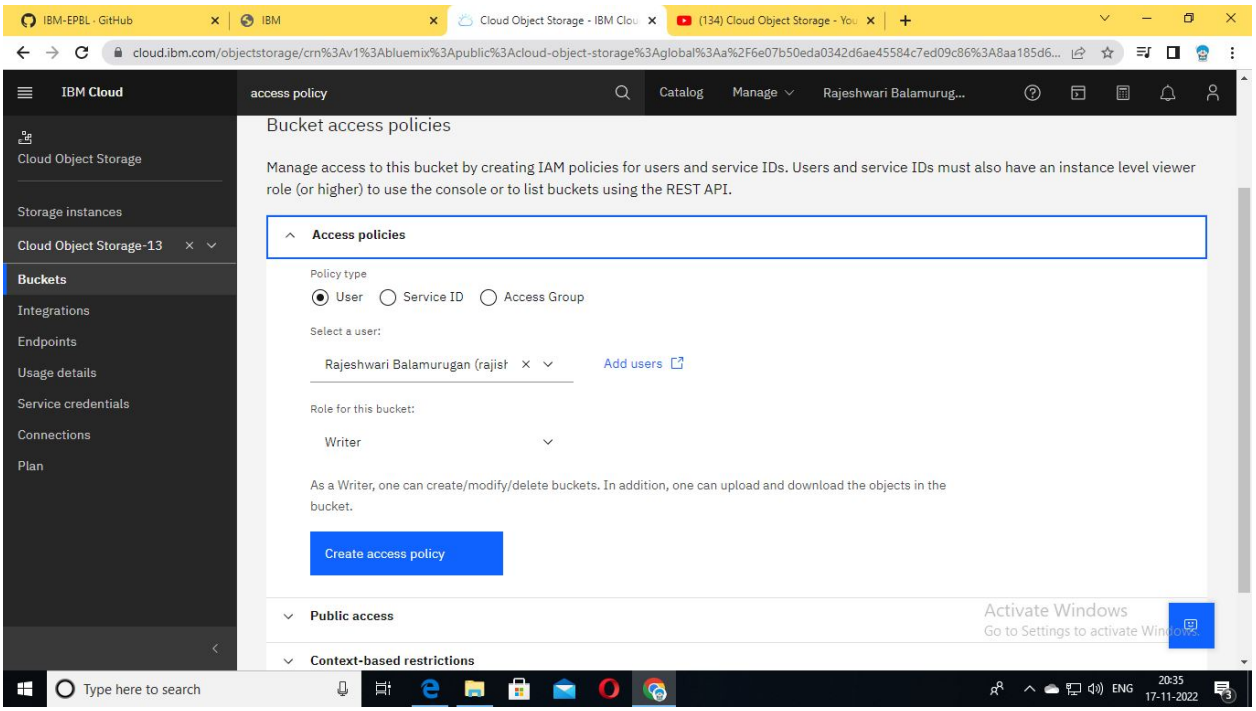


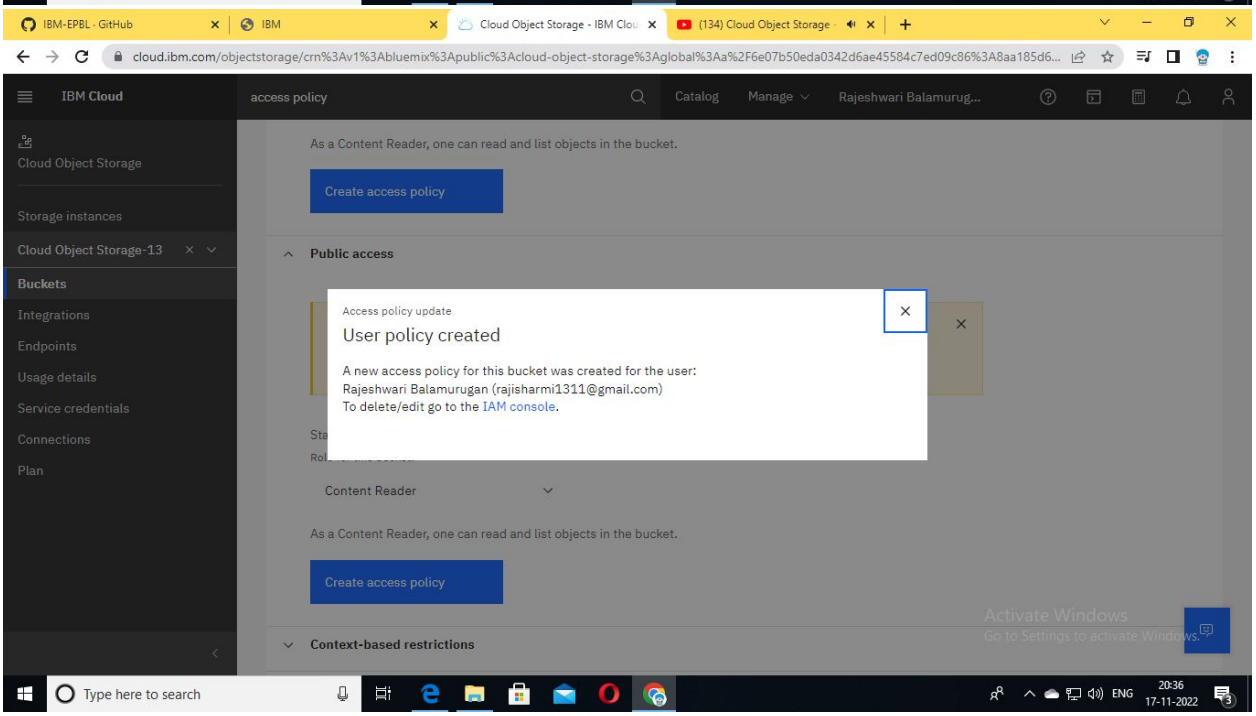
CREATE OBJECT STORAGE DEVICE:

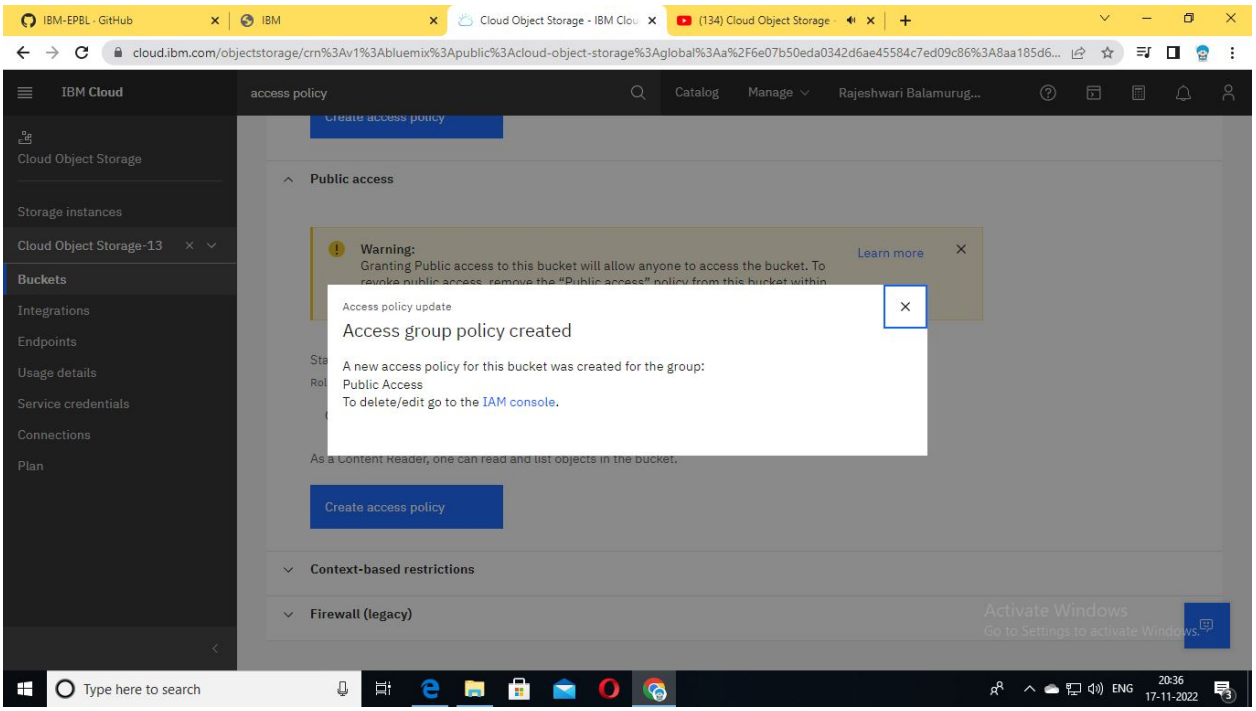


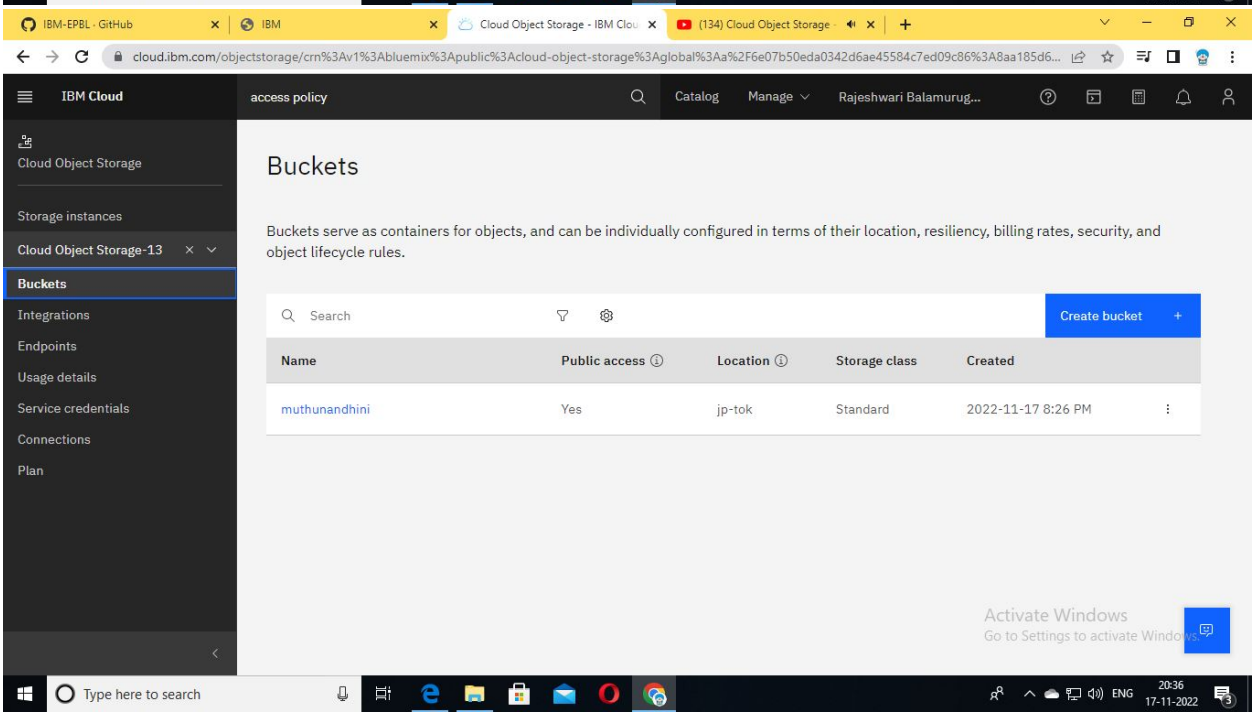

IBM-EPBL - GitHub
Cloud Object Storage - IBM Clou
IBM
(134) Cloud Object Storage - You
cloud.ibm.com/objectstorage/crn%3Av1%3Abluemix%3Apublic%3Acloud-object-storage%3Aglobal%3Aa%2F6e07b50eda0342d6ae45584c7ed09c86%3A8aa185d6...
IBM Cloud
Search resources and products...
Catalog
Manage
Rajeshwari Balamurug...
Cloud Object Storage
Storage instances
Cloud Object Storage-13
Buckets
Integrations
Endpoints
Usage details
Service credentials
Connections
Plan
Buckets
Buckets serve as containers for objects, and can be individually configured in terms of their location, resiliency, billing rates, security, and object lifecycle rules.
Search
Create bucket
Name
Public access
Location
Storage class
Created
Buckets
Get started by creating a bucket to store unstructured data. A bucket is a container for your data.
Activate Windows
Go to Settings to activate Windows.
Type here to search
ENG
20:23
17-11-2022


IBM-EPBL - GitHub
Cloud Object Storage - IBM Clou
IBM
(134) Cloud Object Storage -
cloud.ibm.com/objectstorage/crn%3Av1%3Abluemix%3Apublic%3Acloud-object-storage%3Aglobal%3Aa%2F6e07b50eda0342d6ae45584c7ed09c86%3A8aa185d6...
IBM Cloud
Search resources and products...
Catalog
Manage
Rajeshwari Balamurug...
Cloud Object Storage
Storage instances
Cloud Object Storage-13
Buckets
Integrations
Endpoints
Usage details
Service credentials
Connections
Plan
Storage / Cloud Object Storage-13 /
muthunandhini
Transfers
A bucket created successfully!
The bucket muthunandhini has been created and is now available to add
Objects
Configuration
Permissions
If you're seeing more usage than expected, versions count towards your usage or you may have incomplete uploads Learn more
Prefix filter
Upload
Object name
Archived
Size
Last modified
Objects
Drag and drop files (objects) to upload. An object is your data in fixed form.
Drag and drop files (objects) here or click to upload
Activate Windows
Go to Settings to activate Windows.
Type here to search
ENG
20:26
17-11-2022

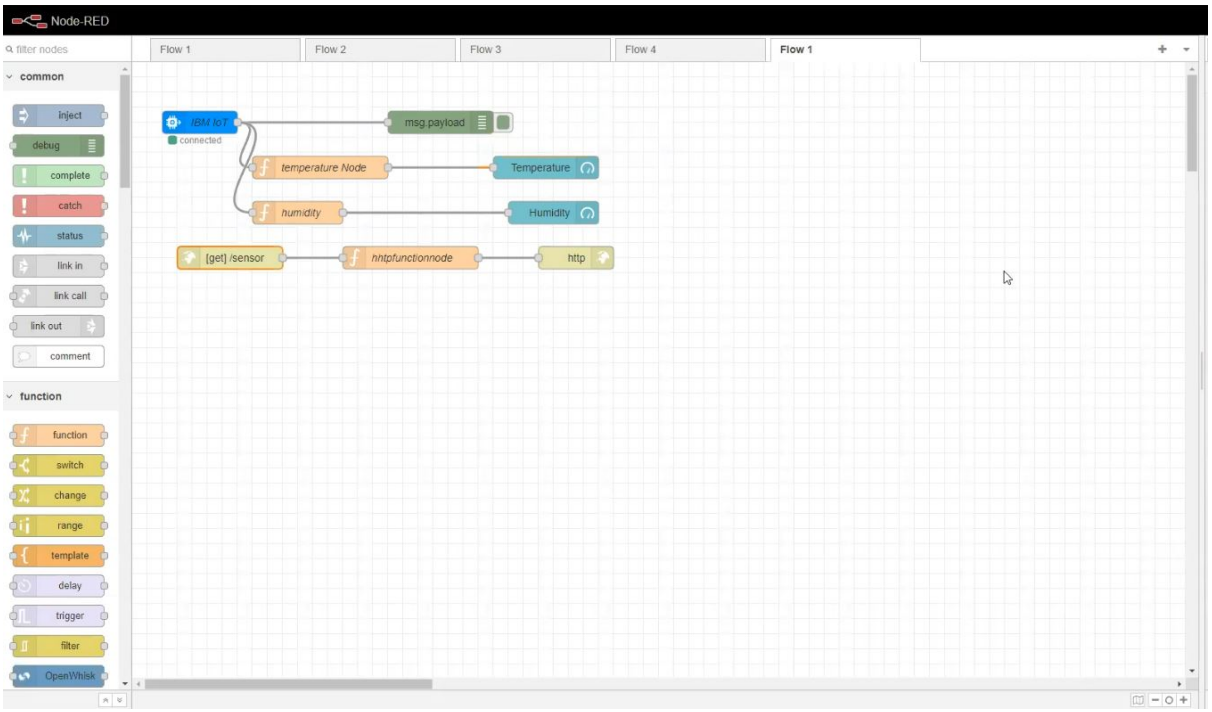

IBM-EPBL - GitHub
IBM
Cloud Object Storage - IBM Clou
(134) Cloud Object Storage - You
cloud.ibm.com/objectstorage/crn%3Av1%3Abluemix%3Apublic%3Acloud-object-storage%3Aglobal%3Aa%2F6e07b50eda0342d6ae45584c7ed09c86%3A8aa185d6...
IBM Cloud
access policy
Catalog
Manage
Rajeshwari Balamurug...
Cloud Object Storage
Storage instances
Cloud Object Storage-13
Buckets
Integrations
Endpoints
Usage details
Service credentials
Connections
Plan
Bucket access policies
Manage access to this bucket by creating IAM policies for users and service IDs. Users and service IDs must also have an instance level viewer role (or higher) to use the console or to list buckets using the REST API.
Access policies
Policy type
User
Service ID
Access Group
Select a user:
Rajeshwari Balamurugan (rajisł
Add users
Role for this bucket:
Writer
As a Writer, one can create/modify/delete buckets. In addition, one can upload and download the objects in the bucket.
Create access policy
Public access
Activate Windows
Go to Settings to activate Windows.
Context-based restrictions
Type here to search
ENG
20:35
17-11-2022

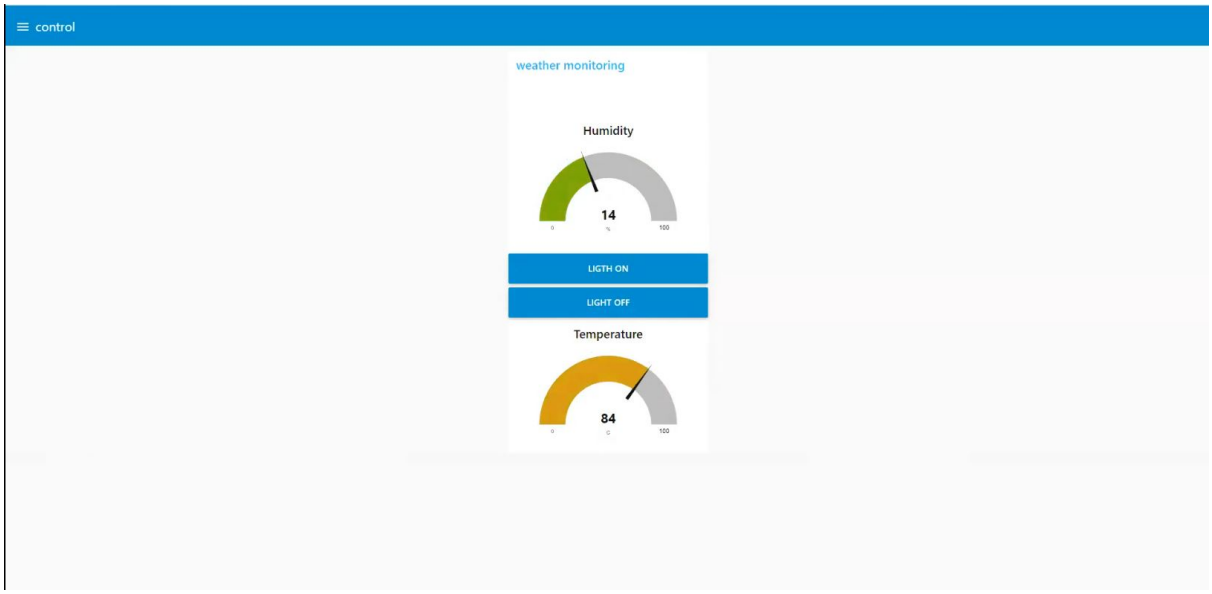

IBM-EPBL - GitHub
IBM
Cloud Object Storage - IBM Clou
(134) Cloud Object Storage -
cloud.ibm.com/objectstorage/crn%3Av1%3Abluemix%3Apublic%3Acloud-object-storage%3Aglobal%3Aa%2F6e07b50eda0342d6ae45584c7ed09c86%3A8aa185d6...
IBM Cloud
access policy
Catalog
Manage
Rajeshwari Balamurug...
Cloud Object Storage
Storage instances
Cloud Object Storage-13
Buckets
Integrations
Endpoints
Usage details
Service credentials
Connections
Plan
As a Content Reader, one can read and list objects in the bucket.
Create access policy
Public access
Access policy update
User policy created
A new access policy for this bucket was created for the user:
Rajeshwari Balamurugan (rajisharmi1311@gmail.com)
To delete/edit go to the IAM console.
Content Reader
As a Content Reader, one can read and list objects in the bucket.
Create access policy
Activate Windows
Go to Settings to activate Windows.
Context-based restrictions
Type here to search
ENG
20:36
17-11-2022





DEVELOP A WEB APPLICATION USING NODE RED:

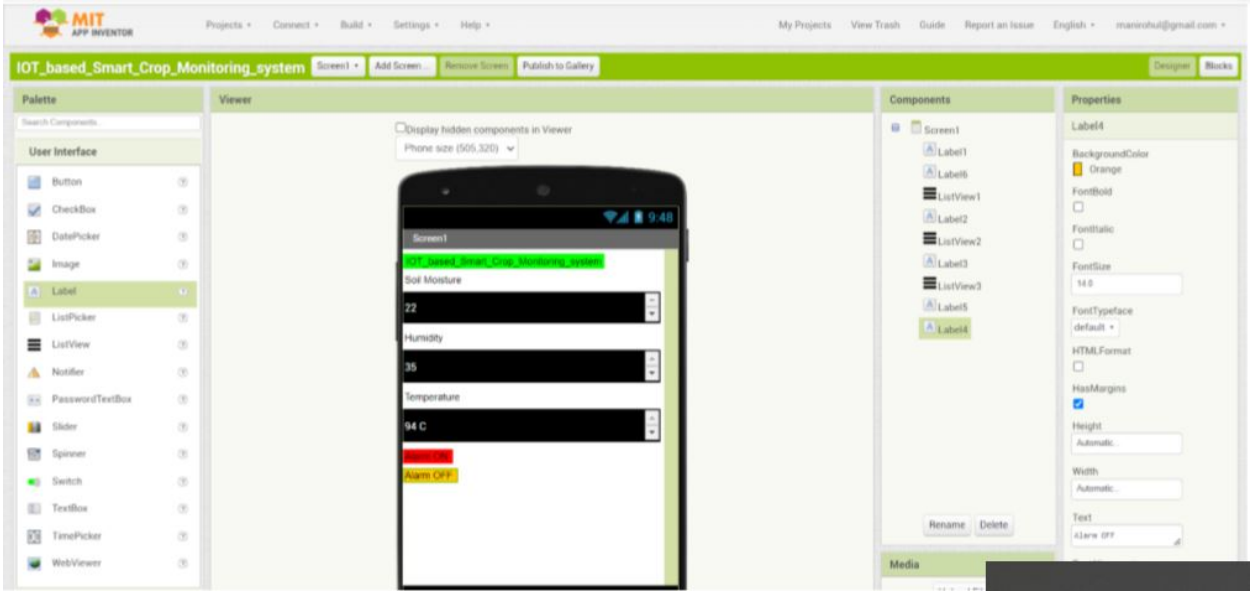




DEVELOP MIT APP:

Step 1: MIT app invertor to design the app

Step 2: customize the app interface to display the values



ADVANTAGES:

- Reduce human work
- Less cost
- More efficient
- Smart work

APPLICATIONS:

- Fields
- Railway station
- Road crossing
- Industrial areas
- Lift

CONCLUSION:

The experimental results are obtained for particular animals like Dog, Cow and Cats. It was successfully tested. It is a new approach in social aspects for wild animal death avoidance and accidents prevention. Animal specific frequency spectrum signals are generated. The specific animals are alerted with these signals of danger and successfully ran away. System can be added on vehicles or trains instead of mounting poles on road side.

DEMO LINK: https://youtu.be/O8oAf_UKH_U