Personal Assistance For Seniors Who Are Self-Reliant
PROJECT REPORT

Team ID	**PNT2022TMID31307**
Project Name	**Personal Assistance for Seniors who are self reliant**

1.INTRODUCTION:

1.1.Project Overview

Elderly people tend to forget which pill should be taken at what time. And also there is much burden placed on the caregivers. This makes the caregivers and also the patients frustrated.

We developed a Web application integrated with IoT device to provide scheduled voice output and display the medicine name on a microcontroller during intake time.

1.2.Purpose

- To carter to the needs of the elderly lacking physical assistance during their course of medication.
- To provide better quality of life for individuals with chronic disabilities and their caregivers.

2.LITERATURE SURVEY

2.1.Existing Problem

The existing methodologies include various gadgets available to assist patients in taking their medication either by simplifying administration or by assisting them in remembering to do so.

Pill reminder charts, drug diaries,calendar clocks, telephone prompting service, multi compartment compliance aids (MCAs), talking labels, voice reminders, watch reminders, daily pill boxes, and automated pill dispensers are just a few examples.

2.2.References

- B. B. Singh, GSM Based Automatic Pill Dispenser, vol. 7, no. 4, pp. 10694-10695, 2017.
- S. Shinde, N. Bange, M. Kumbhar and S. Patil, Smart Medication Dispenser, vol. 6, no. 4, pp. 200-204, 2017.
- S. Shinde, T. Kadaskar, P. Patil and R. Barathe, A Smart Pill Box With Remind And Consumption Using IoT, pp. 152-154, 2017.

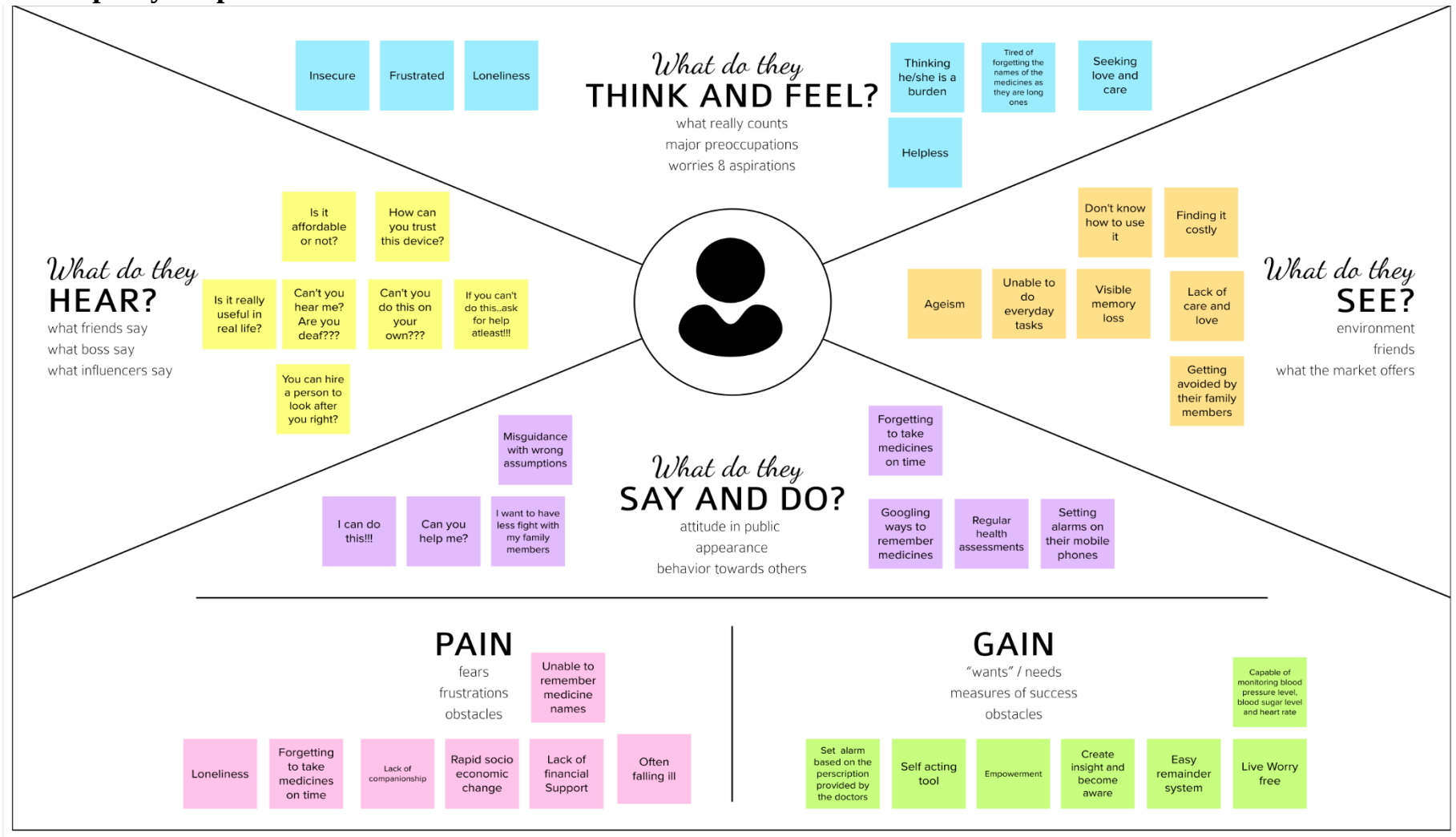
- H. K. Wu, C. M. Wong, P. H. Liu, S. P. Peng, X. C. Wang, C. H. Lin, et al., "A Smart Pill Box with Remind and Consumption Confirmation Functions", Conf. Proc. IEEE Consumer Electronics, pp. 658-659, 2015.
- T. L. Hayes, J. M. Hunt, A. Adami and J. A. Kaye, "An Electronic Pillbox for Continuous Monitoring of Medication Adherence", Conf. Proc. IEEE Eng. Med. Biol. Soc, pp. 6400-6403, 2006.
- S. C. Huang, H. Y. Chang, Y. C. Jhu and G. Y. Chen, "The intelligent pillbox - Design and implementation", Conf. Proc. IEEE Consumer Electronics, pp. 235-236, 2014. 7.P. H. Tsai, T. Y. Chen, C. R. Yu, C. S. Shih and J. W. S. Liu, "Smart Medication Dispenser: Design Architecture and Implementation", IEEE Systems Journal, pp. 99-110, 2010.

2.3.Problem Statement Definition

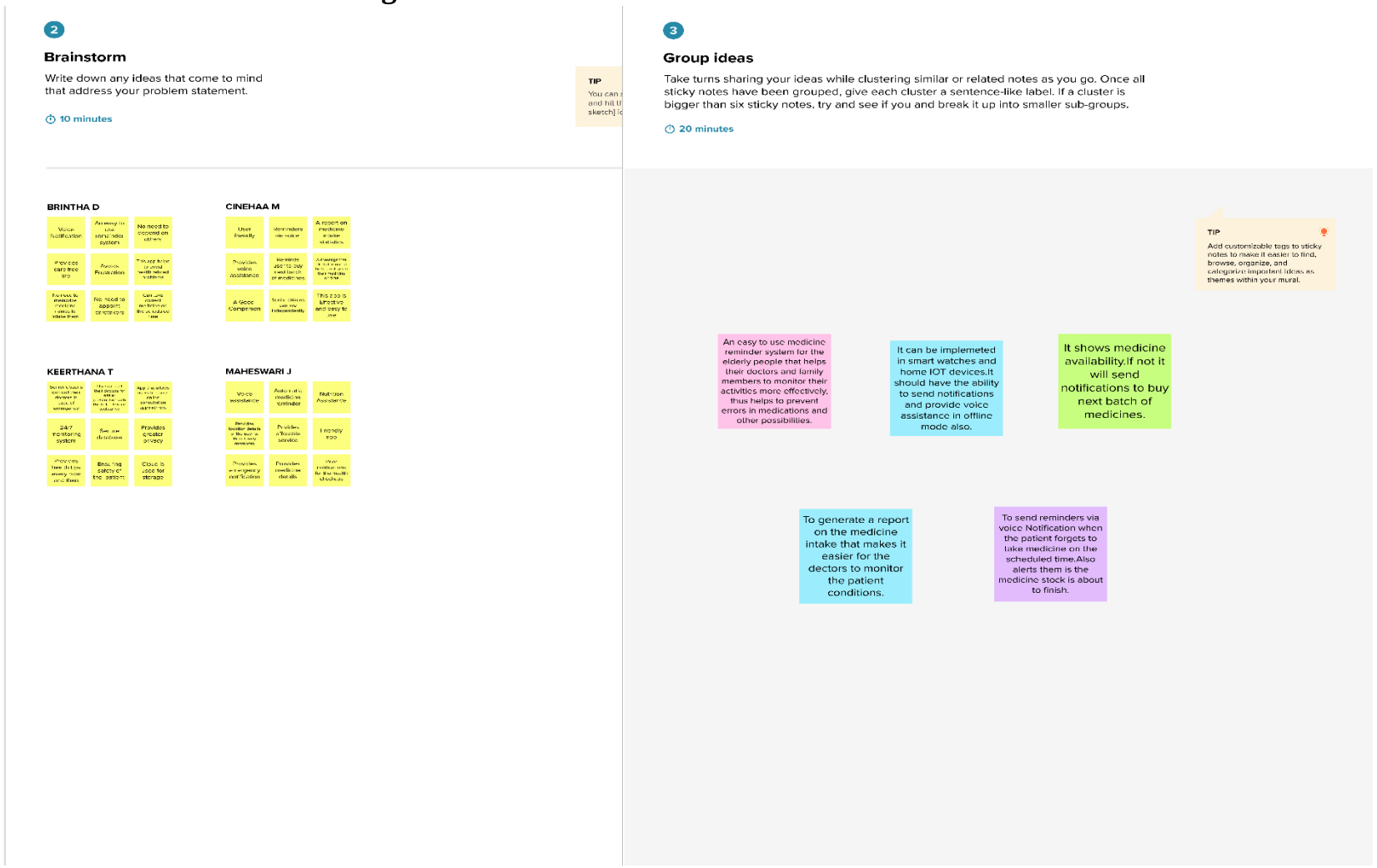
Elderly patients will try to intake medicine on prescribed time but fail to intake medicine on prescribed time because there is no caregiver to remind, Which makes them feel insecure about their health.

3.IDEATION & PROPOSED SOLUTION

3.1.Empathy Map Canvas



3.2.Ideation & Brainstorming

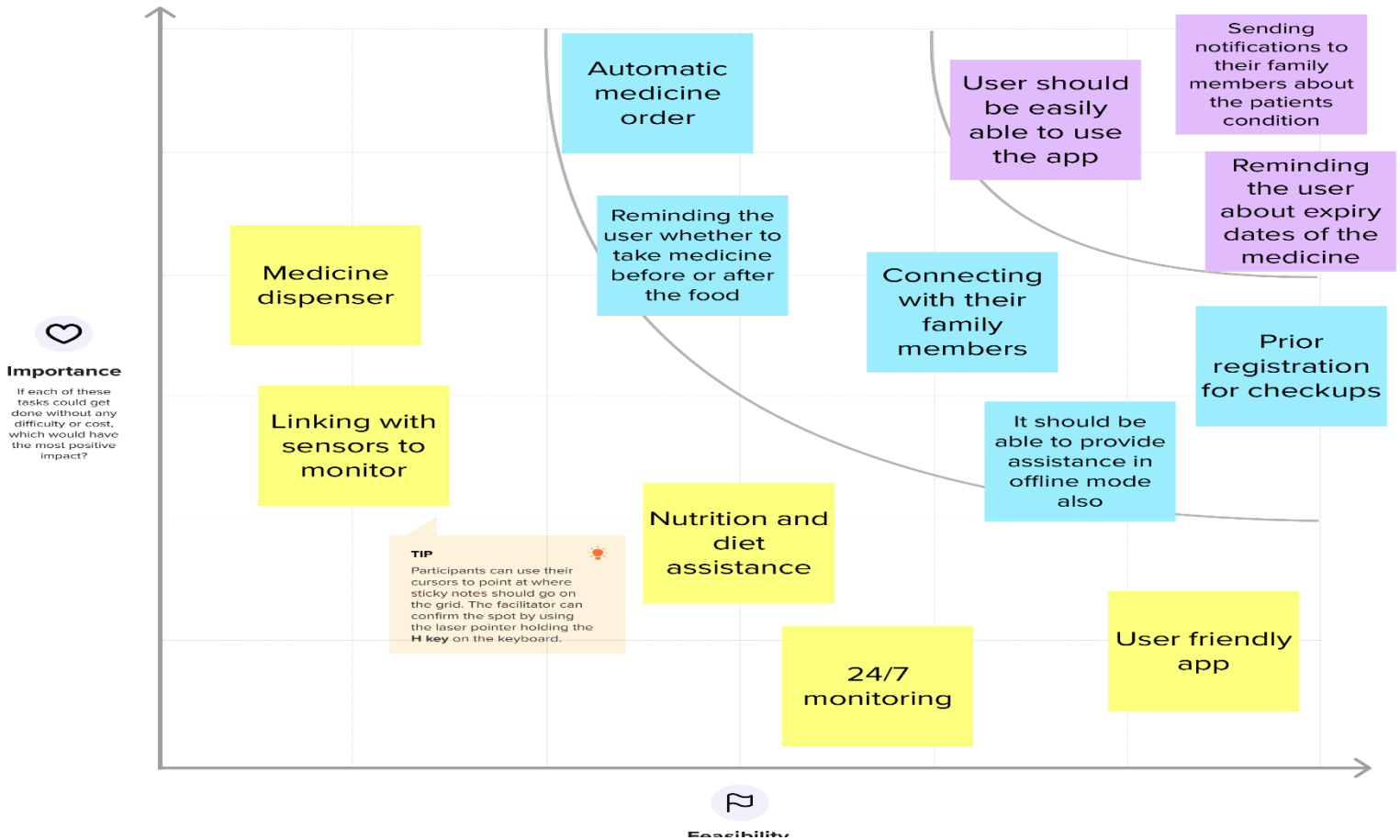


4

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes



3.3.Proposed Solution

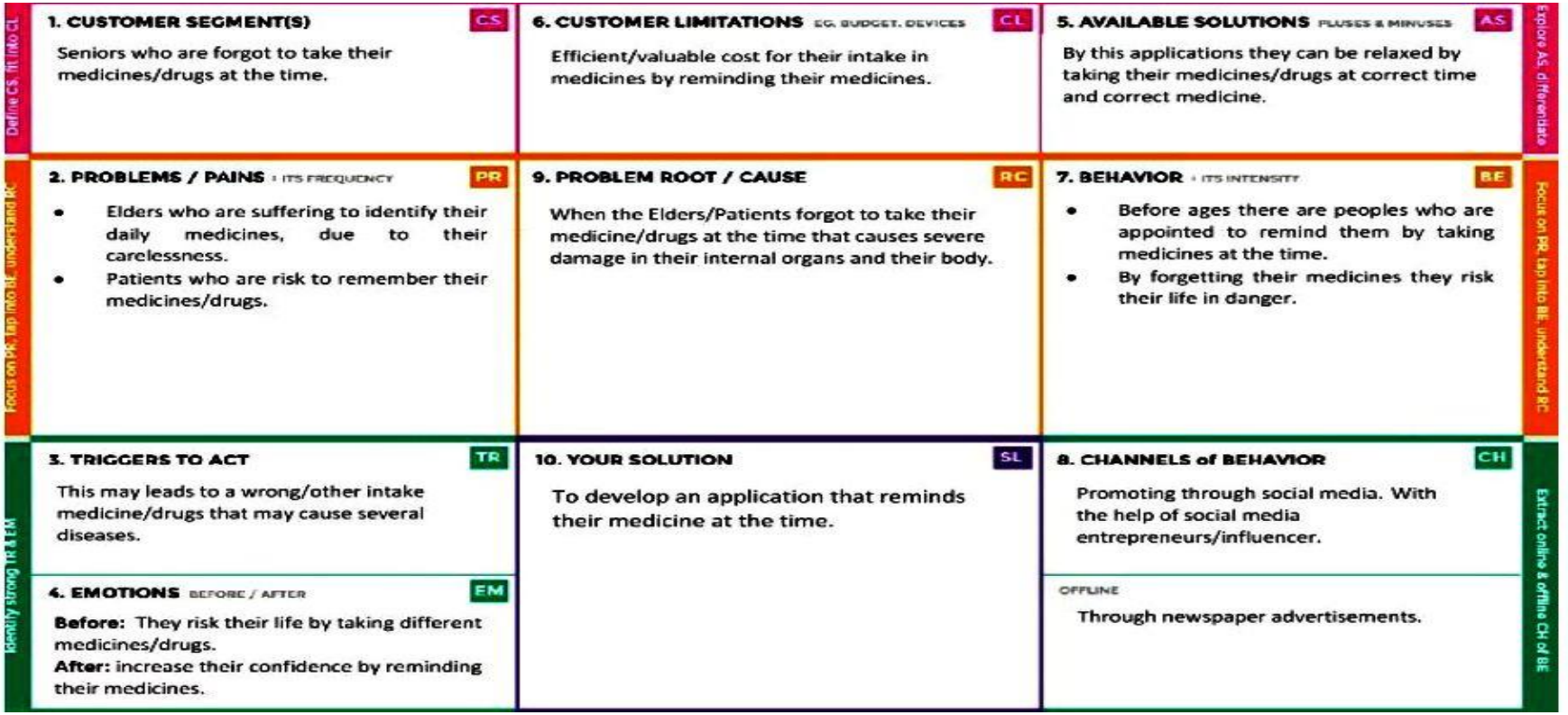
An app is built for the user (caretaker) which enables him to set the desired time and medicine. These details will be stored in the IBM Cloudant DB. If the medicine time arrives the web application will send the medicine name to the IoT Device through the IBM IoT platform. The device will receive the medicine name and notify the user with voice commands.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Sometimes elderly people forget to take their medication at the scheduled time which has been prescribed by their doctors. They also forget which medication to take at that time.It is also difficult for doctors and caregivers to monitor patients around the clock. This medicine reminder system was created to address this issue. A user (caretaker) app is created that allows him to set the appropriate time and medicine
2.	Idea / Solution description	We present a smart Internet of Things-based medication reminder system. The suggested plan was specifically designed for the Android operating system. We use a reminder system for our system, which sounds an alarm when it's time to take your medication. Additionally, the user can set their medication time using an android application. There will be some features in the application that allow the user to learn more specifics about their medication. It keeps track of the medications, allowing the user to adjust how much medication to take within the application.

3.	Novelty / Uniqueness	It is an easy-to-use app that reminds users to take their medications and get them refilled, warns about drug interactions, and assists caregivers in managing Prescriptions for loved ones.
4.	Social Impact / Customer Satisfaction	We constructed these proto-personas, or names, based on the research findings from the user interview. They would be crucial to the rest of the design process. All design decisions may be assessed and re- evaluated using these personas, keeping the user and their perspective in mind.
5.	Business Model (Revenue Model)	There is no one-size-fits-all answer when it comes to business. The model you selected depends on your target market, business

		objectives, and the resources you already have available.
6.	Scalability of the Solution	The user can set the time for their medication. There will be some features in the application that allow the user to learn more specifics about their medication. It keeps track of the medications; it also allows the user to adjust how much medication to take within the application.

3.4 Problem Solution fit:



4.REQUIREMENT ANALYSIS

4.1.Functional requirement

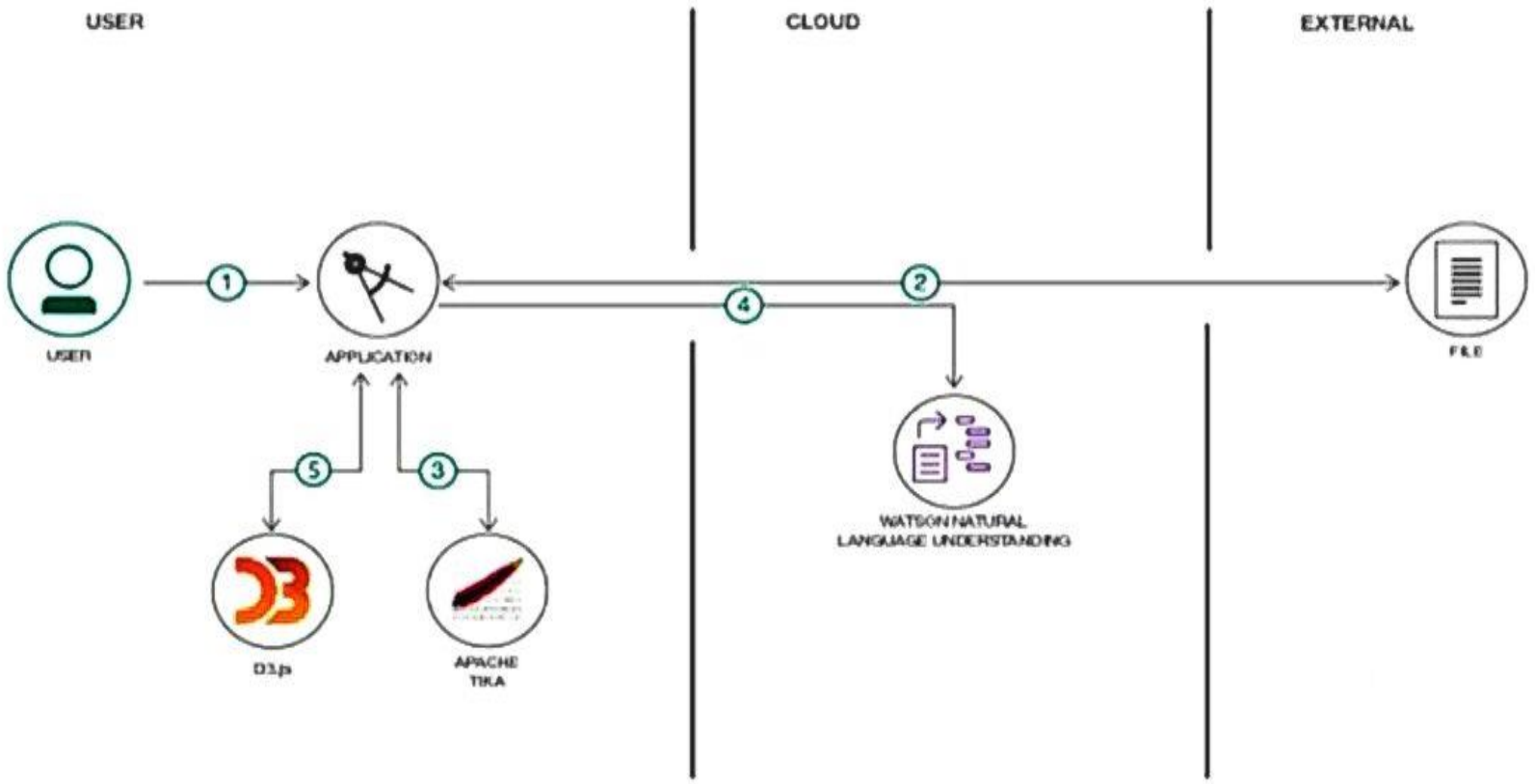
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration has been done through the form in our Application
FR-2	User Confirmation	Confirmation has been done within our Application.
FR-3	Data management	All the data's are stored in the cloud and retrived when it is needed.
FR-4	Internet Connectivity	Users should have a stable internet connection to access the Application.
FR-5	User Input management	All the user's data are gotten with the help of a text field in the dashboard in the app.
FR-6	Acknowledgement	All the data are stored in the cloud via the app and acknowledgment will be given to the user.

4.2.Non-Functional requirement

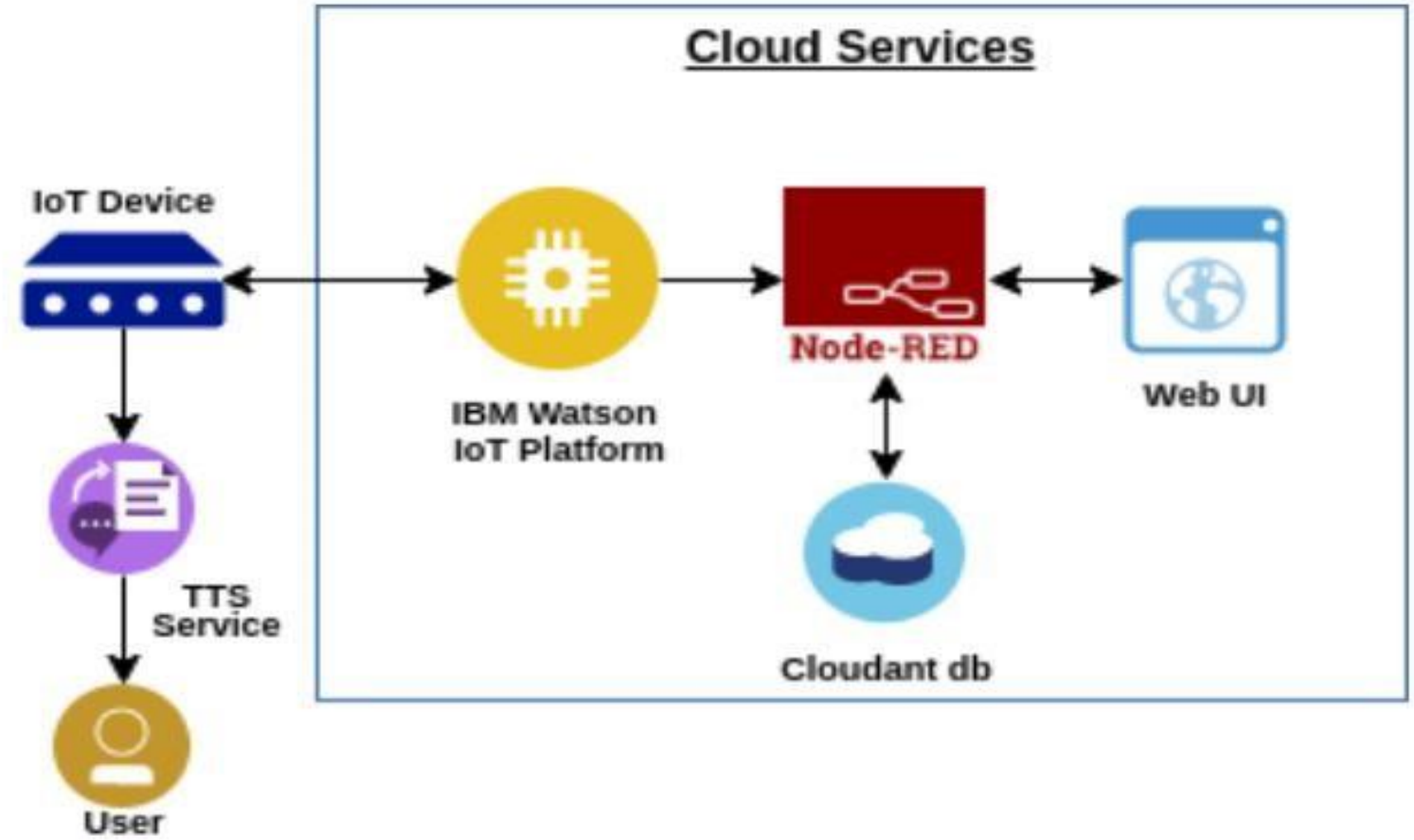
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The Application is created user friendly for the elder peoples to handle it in easy manner
NFR-2	**Security**	Datas that are stored in the cloud is completely secure
NFR-3	**Reliability**	All the datas that are stored in the Cloud is reliable
NFR-4	**Performance**	The Application achieves the IOT concept so the performance is high
NFR-5	**Availability**	The data stored in the cloud is available for all the time, So the users can avail the app all the time.
NFR-6	**Scalability**	The Application is highly scalable even if the users rate will increase

5.Project Design

5.1.Data Flow Diagrams



5.2.Solution & Technical Architecture

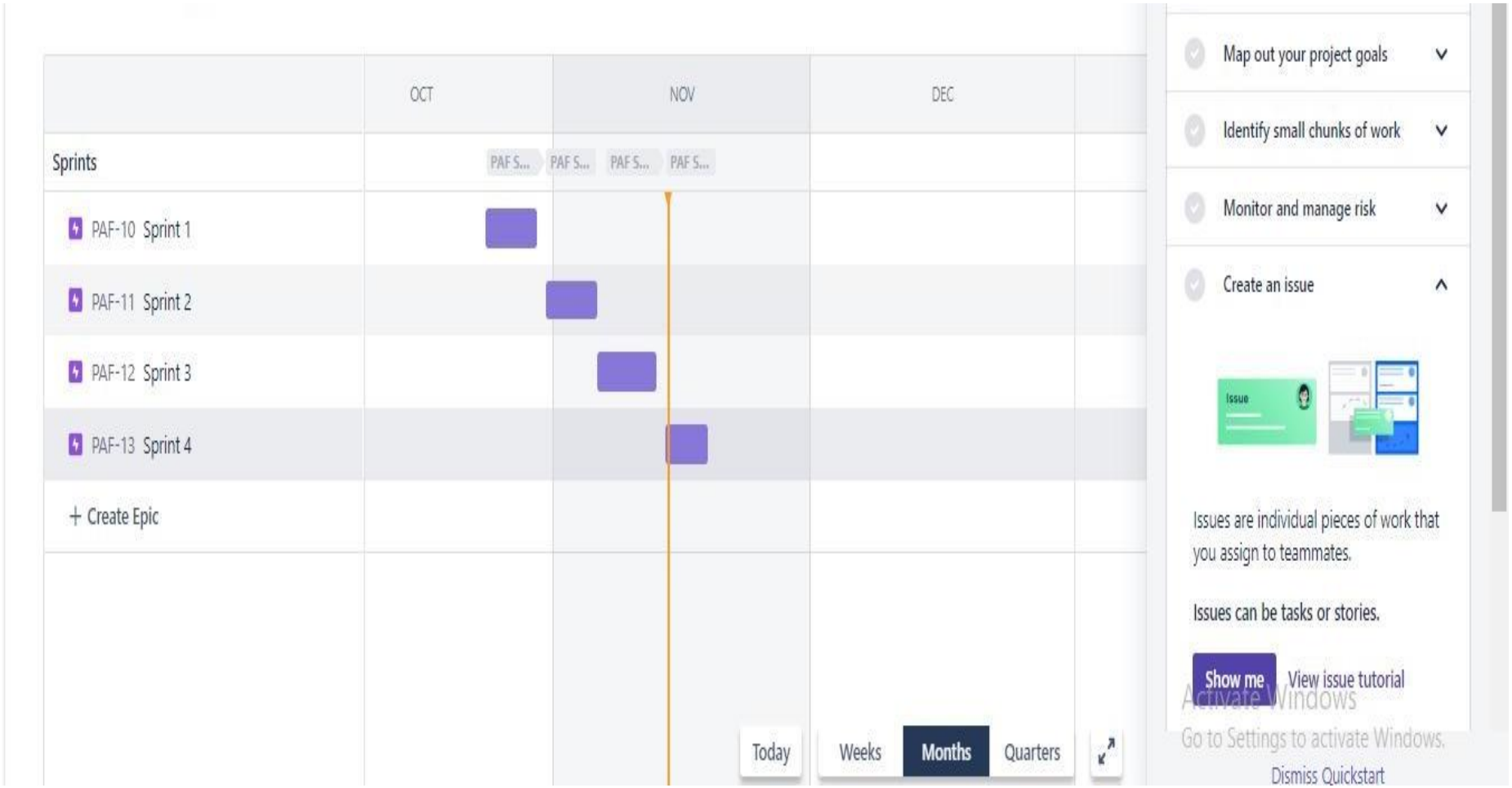


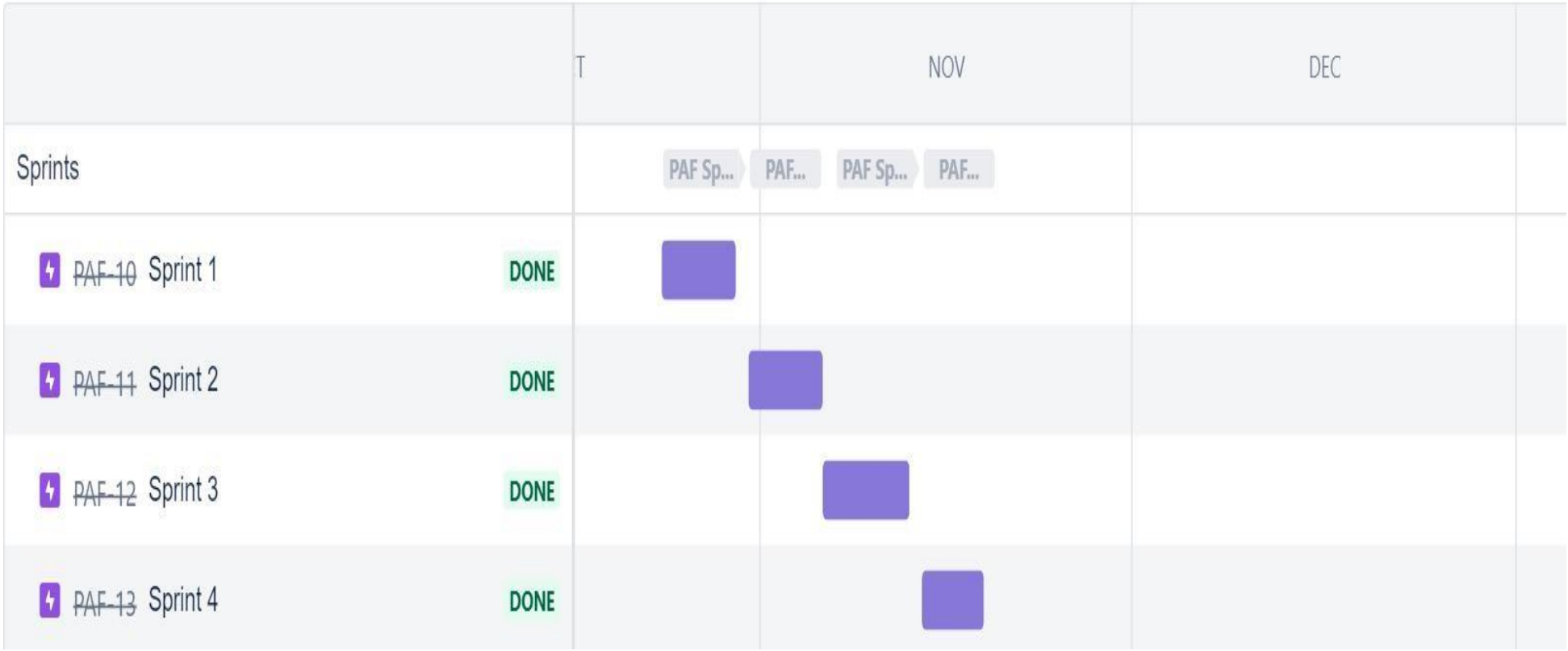
5.3.User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Senior citizen)	Caretaker	USN-1	As a user, I want to take medicines on time so that I can my health.	I want to take medicine on time.	High	Sprint-1
Customer (Mentally idled patient)	Janitor	USN-2	As a user, my patient should maintain good health by consuming medicines on time.	My patient needs to take medicines at proper time.	High	Sprint-2
Customer (Disabled person)	Smart medicine box	USN-3	As a user, I need to take my medicinesat correct time through nearby person via SMS.	I need to take medicines at accuratetime by notification.	Medium	Sprint-4
Customer (Coma patient)	Virtual med kit	USN-4	As a user, my patient medication timeand name should be loaded in database.	My patient's medicine name and time shouldbe in database list.	High	Sprint-2
Customer (Alzheimer patient)	Digital Medicare	USN-5	As a user, I want to take medicines on time by voice commands.	I want to take medicines on time by voice assist. .	Medium	Sprint-3

6.PROJECT PLANNING & SCHEDULING

Sprint Planning & Estimation


OCT
NOV
DEC
Sprints
PAF S...
PAF S...
PAF S...
PAF S...
PAF-10 Sprint 1
PAF-11 Sprint 2
PAF-12 Sprint 3
PAF-13 Sprint 4
+ Create Epic
Today
Weeks
Months
Quarters
Map out your project goals
Identify small chunks of work
Monitor and manage risk
Create an issue
Issue
Issues are individual pieces of work that you assign to teammates.
Issues can be tasks or stories.
Show me
View issue tutorial
Activate Windows
Go to Settings to activate Windows.
Dismiss Quickstart


T
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PAF-10 Sprint 1
DONE
PAF-11 Sprint 2
DONE
PAF-12 Sprint 3
DONE
PAF-13 Sprint 4
DONE

7.CODING & SOLUTIONING

Features

#1 Web UI to schedule medicine name and intake time:

MEDICATION REMAINDER

Medicine name:

Hint for TextBox1

Date:

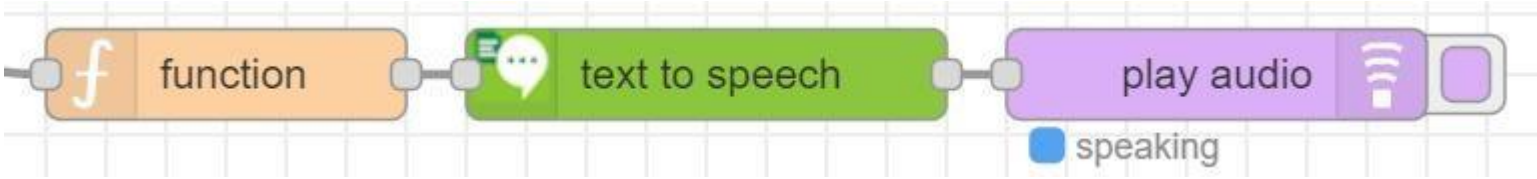
YYYY:MM:DD

Time:

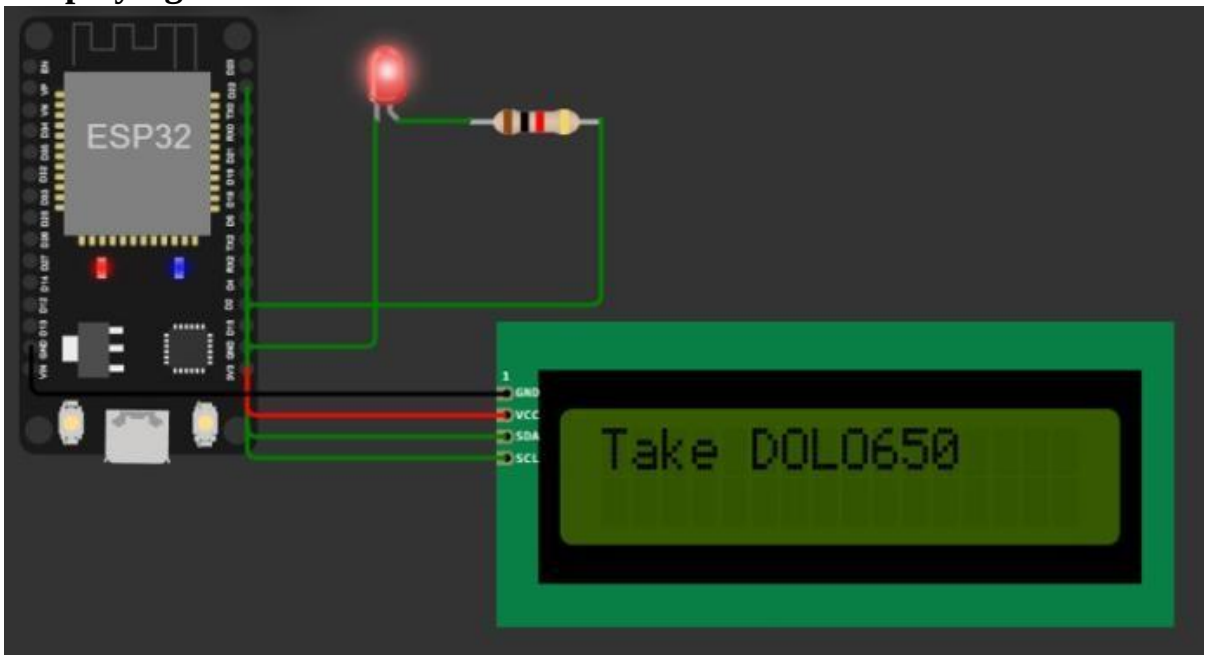
HH:MM

SUBMIT

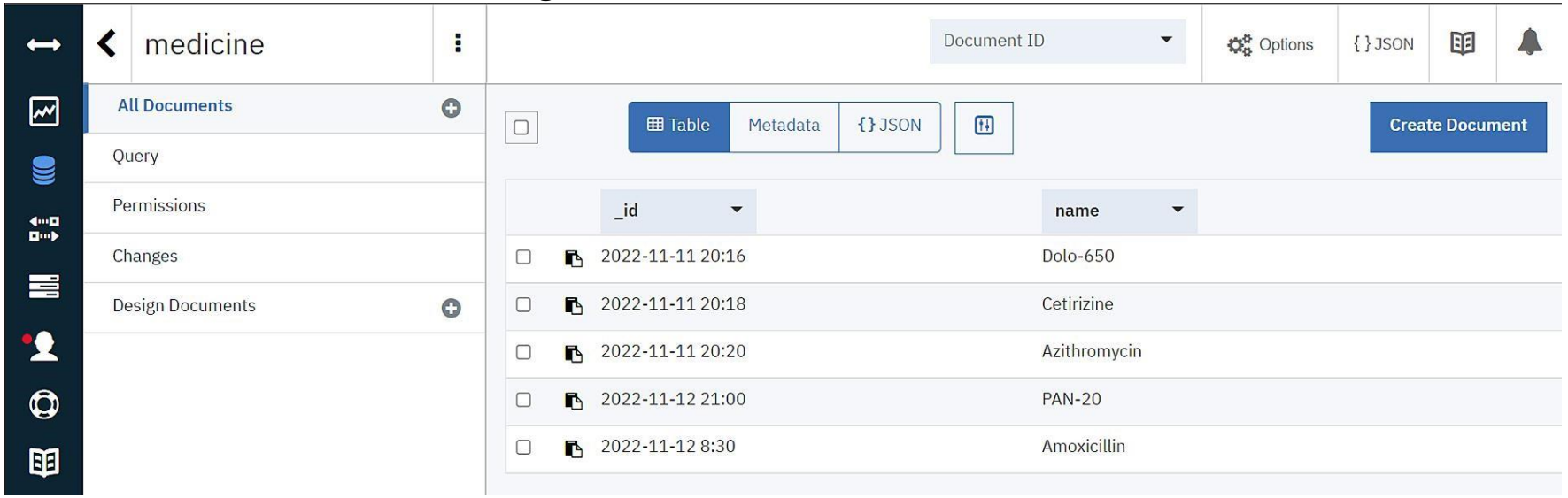
Web page UI
APP UI
#2 Sending the medicine name as Voice output at the scheduled time



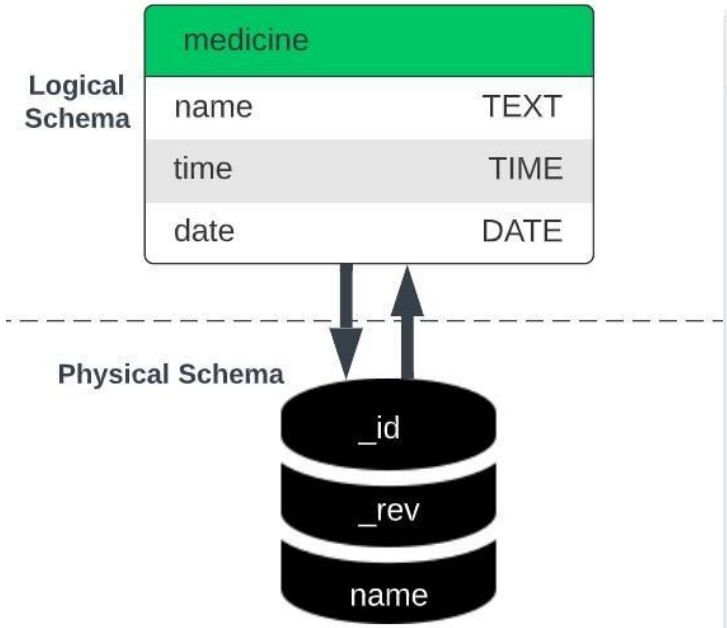
#3 Displaying the medicine name on the IoT device at the scheduled time



#4 Secure data transmission and storage with IBM Cloudant database



Database Schema



id "2022-11-11 20:16"


```
{
 "id": "2022-11-11 20:16",
 "key": "2022-11-11 20:16",
 "value": {
  "rev": "1-4910298aee742c3f200a0e4191701a3a"
 },
 "doc": {
  "_id": "2022-11-11 20:16",
  "_rev": "1-4910298aee742c3f200a0e4191701a3a",
  "name": "Dolo-650"
 }
}
```

8.Testing:

8.1.Test cases Reports:

Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Commnets	TC for Automation(Y/N)	BUG ID	Executed By
LoginPage_TC_OO1	UI	Home Page	Verify whether user is able to access the URL	APP URL	https://node-red-psifx-2022-11-13.au-syd.mybluemix.net/ui/#!/0?socketid=0mz8-FVr6ApBpjFsAAAf	URL	Able to access the URL	failed to access in mobile	Fail	Wrong Browser selected	NO	101	BRINTHA D
LoginPage_TC_OO2	UI	Home Page	Verify whether user is able to access the URL	APP URL	https://node-red-psifx-2022-11-13.au-syd.mybluemix.net/ui/#!/0?socketid=0mz8-FVr6ApBpjFsAAAf	URL	Now User able to access the URL	Able to access in mobile	Pass	Able to access in Chrome and Edge	YES		CINEHAA M
LoginPage_TC_OO3	Functional	Home page	User can enter the data in specified format	APP URL	To have browsers to have enhanced capabilities	URL	enter a data in specified format only	specified input is not received	Fail	Specify the User formats	NO	110	KEERTHANA T
LoginPage_TC_OO4	Functional	Home page	User can enter the data in any format	APP URL	User can enter the data in required format	Time(HH:MM): DATE(YYYY-MM-DD):	User can enter the data in specified format now	Input received properly	Pass	Format specified	YES		MAHESWARI J
CLOUD_STORAGE_TC_005	Functional	Cloud	Verify if User input is stored in the cloud	CLOUD	User is able to access the URL with the given link. User has to enter the data(name,time and date) and click the SUBMIT button.Data to be stored in IBM cloud	MEDICINE NAME: Time(HH:MM) : DATE(YYYY-MM-DD):	User inputs has to be stored in cloud	Failed to storing the inputs	Fail	Cloud not connected properly	YES	111	BRINTHA D
CLOUD_STORAGE_TC_OO6	Functional	Cloud	Verify if User input is	CLOUD	User is able to access the URL with the given link. User has to enter the data(name,time and date) and click the SUBMIT button.Data to be stored in	MEDICINE NAME: Time(HH:MM) : DATE(YYYY-MM-DD):	User inputs has to be stored in cloud	Inputs are stored In the cloud	Pass	Cloud connected properly	YES		CINEHAA M

OUPUT_TC_007	Functional	Iot device	Verify if it reminds the medicine intake to the user	IOT device	Comparing the UTC time and medicine intake time	Real time and medicine intake time	Gives True when both times match	Null	Fail	Check the input	YES	113	KEERTHANA T
OUPUT_TC_007	Functional	Iot device	Verify if it reminds the medicine intake to the user	IOT device	Comparing the UTC time and medicine intake time	Real time and medicine intake time	Gives True when both times match	TRUE	Fail	verified	Yes		MAHESWARI J
TTS_TC_008	Functional	Iot device	Verify if it gives voice notifications	IOT device and TTS	When True it gives a voice notifications	Voice notifications	Voice notifications	Voice notifications service didn't	Fail	In program, commands are as object instead of	NO	121	BRINTHA D
TTS_TC_009	Functional	Iot device	Verify if it gives voice notifications	IOT device and TTS	When True it gives a voice format notifications	Voice notifications	Voice notifications	Voice notifications arrived	Pass	New string functions were added	YES		CINEHAA M
ACK_TC_010	Functional	URL	Verify whether the patient has taken the medicine or not	IOT device	The TAKEN button has been included	The status of the medicine intake	The User clicks the TAKEN button to show that medicine has been taken	Button is unfunctional	Fail	Error occurs due to failure of call and connect function of the "taken " button`	NO	132	KEERTHANA T
ACK_TC_011	Functional	URL	Verify whether the patient has taken the medicine or not	Iot device	The TAKEN button has been included	The status of the medicine intake	The User clicks the TAKEN button to show that medicine has been taken	The Taken status is updated in the cloud	Pass	The status of the medicine intake is updated in the cloud	Yes		MAHESWARI J

8.2.User Acceptance Testing(UAT):

Purpose of Document:

The purpose of this document is to briefly explain the test coverage and open issues of the Personal assistance for seniors who are Self-Reliant project at the time of the release to User Acceptance Testing (UAT).

Defect Analysis:

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	5	3	1	2	11
Duplicate	2	1	0	0	3
External	2	2	0	0	4
Fixed	10	2	3	15	30
Not Reproduced	0	1	0	0	1
Skipped	0	0	2	0	2
Won't Fix	0	2	4	5	11
Totals	19	10	8	22	62

Test Case Analysis:

This report shows the number of test cases that have passed, failed, and untested

Outsource Shipping	0	0	0	0
Exception Reporting	2	0	0	2
Final Report Output	6	0	0	6
Version Control	1	0	0	1

9.Results

9.1.Performance Metrics:

			NFT - Risk Assessment						
S.No	Project Name	Scope/feature	Functional Changes	Hardware Changes	Software Changes	Impact of Downtime	Load/Volume Changes	Risk Score	Justification
1	Personal Assistance For Seniors who are Self-Reliant	Existing	Low	Moderate	Moderate	Causes delay in runtime	>10 to 30%	ORANGE	As we have seen the changes, it adds the setup time

	NFT - Detailed Test Plan				
	S.No	Project Overview	NFT Test approach	Assumptions/Dependencies/Risks	Approvals/SignOff
	1	Personal Assistance For Seniors who are Self-Reliant	LOAD	Dependencies	SignOff

			End Of Test Report					
S.No	Project Overview	NFT Test approach	NFR - Met	Test Outcome	GO/NO-GO decision	Recommendations	Identified Defects (Detected/Closed/Open)	Approvals/SignOff
1	Providing Assistance to Seniors by developing a Software application to remind their medicine intake time	LOAD	MET	Able to Support in Other Platforms	GO	To have browsers to have enhanced capabilities	Closed	Approval

10.ADVANTAGES & DISADVANTAGES

Advantages:

- Helpful for people who have no caretakers.
- Helps people to take medicines on time by voice command.

Disadvantages:

- Elderly people should be aware of how to use the application.
- There is no way to determine what actually happened as it only gives the remainder to take the medicineInternet connection is required.

11.Conclusion

Our project's goal is to see how successful an automated pilldispenser will be in assisting individuals in better self-managing their medications. This might be demonstrated by the following:

- Better quality of life for individuals with chronic disabilities and their caregivers.

- Improved ability to stay self-sufficient at home.
- Social impact on the pharma sector .
- Less dependency on health-care and social-services.

The device is intended for those with memory impairments, and several of the medical diagnoses recorded for trial participants, including Alzheimer's and dementia, the elderly and persons with long-term medical conditions who must take many prescriptions every day, backed up this claim.

In conclusion, we used technology to have a social effect in the pharmaceutical industry.

12.Future scope:

- We will further extend the app where the prescriptions of the patients will be directly uploaded to the database. ● When your medicine runs low, we will reach out to third parties so you can get it delivered at your door.
- Touch sensors can be incorporated on each compartment to track the number of times the compartment has been opened so that refill time can be calculated.

13.APPENDIX

LINKS:

GITHUB: https://github.com/IBM-EPBL/IBM-Project-38594-1660382928

NODE-RED: https://node-red-psifx-2022-11-13.au-syd.mybluemix.net/red/#flow/3f5f4d5d449854ae

WOKWI: https://wokwi.com/projects/348142722743272020

SOURCE CODE:

```
#include <WiFi.h>//library for wifi
#include <PubSubClient.h>//library for MQtt
#include <LiquidCrystal_I2C.h>
#define LED 2
void callback(char* subscribetopic, byte* payload, unsigned int payloadLength);


//-------credentials of IBM Accounts------

#define ORG "ok5c7o"//IBM ORGANIZATION ID
#define DEVICE_TYPE "ESP"//Device type mentioned in ibm watson IOT Platform
#define DEVICE_ID "ESP32"//Device ID mentioned in ibm watson IOT Platform
#define TOKEN "LC!x?+V9etumdVMaSR"//Token
String data3="";


//-------- Customise the above values --------
char server[] = ORG ".messaging.internetofthings.ibmcloud.com";// Server Name
char publishTopic[] = "iot-2/evt/Data/fmt/json";// topic name and type of event perform and format in which data to be send
char subscribetopic[] = "iot-2/cmd/command/fmt/String";// cmd REPRESENT command type AND COMMAND IS TEST OF
FORMAT STRING
char authMethod[] = "use-token-auth";// authentication method
char token[] = TOKEN;
char clientId[] = "d:" ORG ":" DEVICE_TYPE ":" DEVICE_ID;//client id
LiquidCrystal_I2C lcd(0x27,16,2);
//---------------------------------------
```

```
WiFiClient wifiClient; // creating the instance for wificlient
PubSubClient client(server, 1883, callback ,wifiClient); //calling the predefined client id by passing parameter like server id,portand wificredential
void setup()// configureing the ESP32
{
  Serial.begin(115200);
  pinMode(LED,OUTPUT);
  delay(10);
  Serial.println();
  wificonnect();
  mqttconnect();
}

void loop()// Recursive Function
{
  if (!client.loop()) {
    mqttconnect();
  }
}

/*.....retrieving to Cloud.....*/


void mqttconnect() {
  if (!client.connected()) {
    Serial.print("Reconnecting client to ");
```

```
    Serial.println(server); while (!!!client.connect(clientId,
    authMethod, token)) {
      Serial.print(".");
      delay(500);
    }

     initManagedDevice();
     Serial.println();
  }
}
void wificonnect() //function defination for wificonnect
{
  Serial.println();
  Serial.print("Connecting to ");

  WiFi.begin("Wokwi-GUEST", "", 6);//passing the wifi credentials to establish the connection
  while (WiFi.status() != WL_CONNECTED) {
    delay(500);
    Serial.print(".");
  }
  Serial.println("");
  Serial.println("WiFi connected");
  Serial.println("IP address: ");
  Serial.println(WiFi.localIP());
}
```

```
void initManagedDevice() {
  if (client.subscribe(subscribetopic)) {
    Serial.println((subscribetopic));
    Serial.println("subscribe to cmd OK");
  } else {
    Serial.println("subscribe to cmd FAILED");
  }
}

void callback(char* subscribetopic, byte* payload, unsigned int payloadLength)
{

  Serial.print("callback invoked for topic: ");
  Serial.println(subscribetopic);
  for (int i = 0; i < payloadLength; i++) {
    //Serial.print((char)payload[i]);
    data3 += (char)payload[i];
  }

  Serial.println("Please take "+ data3);
  if(data3 != "")
  {
    lcd.init();
    lcd.print("Take"+ data3);
```

```
digitalWrite(LED,HIGH);
delay(20000);
digitalWrite(LED,LOW);

  }
  else {
digitalWrite(LED,LOW);

  }

data3="";

}
```