Smart Pour

GROUP 16

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Problem & Solution

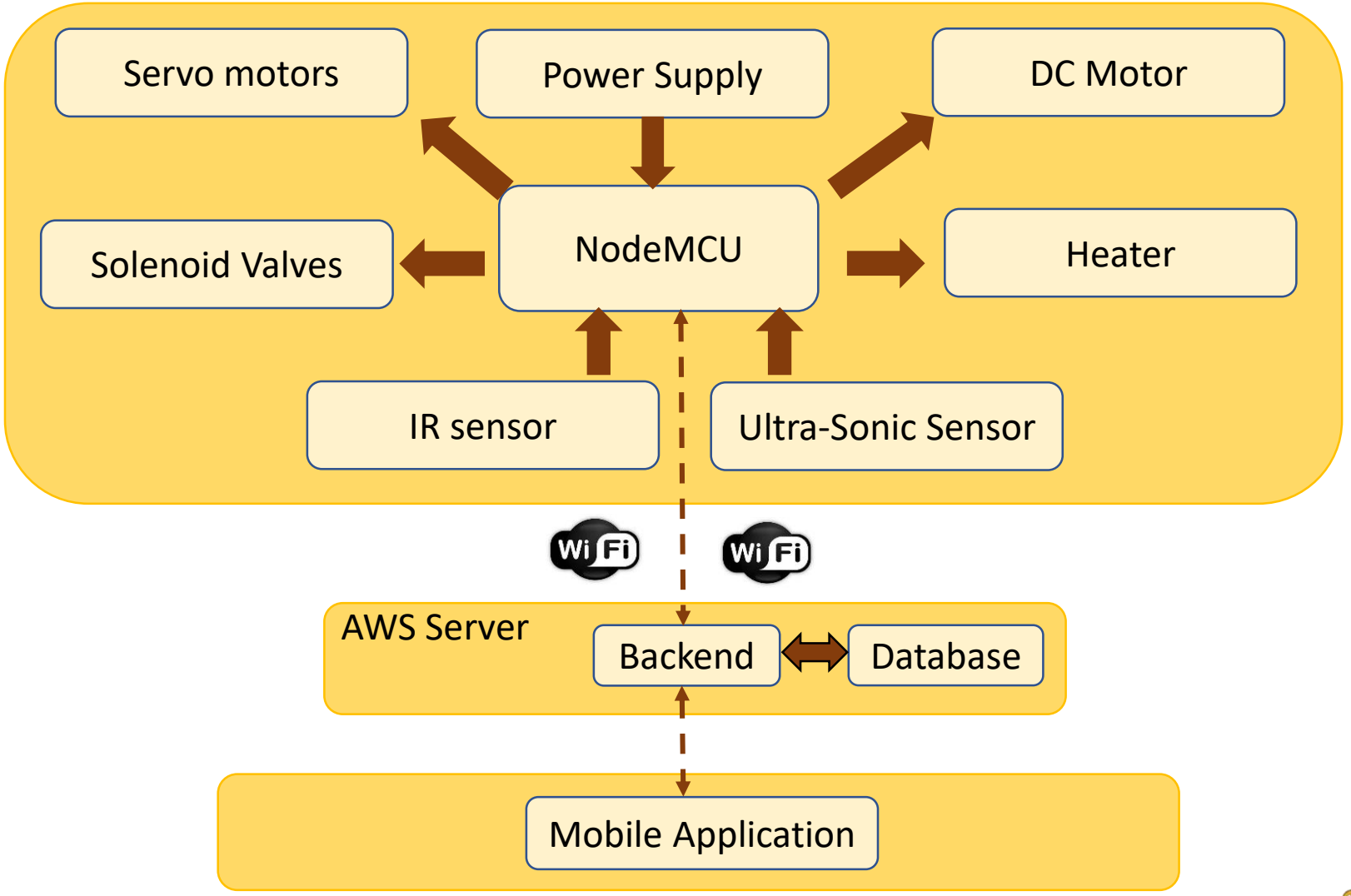
Busy Schedules

Long queues in cafeterias

Inability to get coffee according to the preference

An automated coffee machine that can be controlled through a mobile application – **"Smart Pour"**

Solution Block Diagram



- Use the database to track ingredients.

- Has a manual working mode.

- The design can be extended to be operated via battery.

- The same design can be repeated to make different drinks.

- The mobile application is authorized through passwords.

- Using strategies to prevent overheating components due to the boiling unit.

Mainly there are three parts

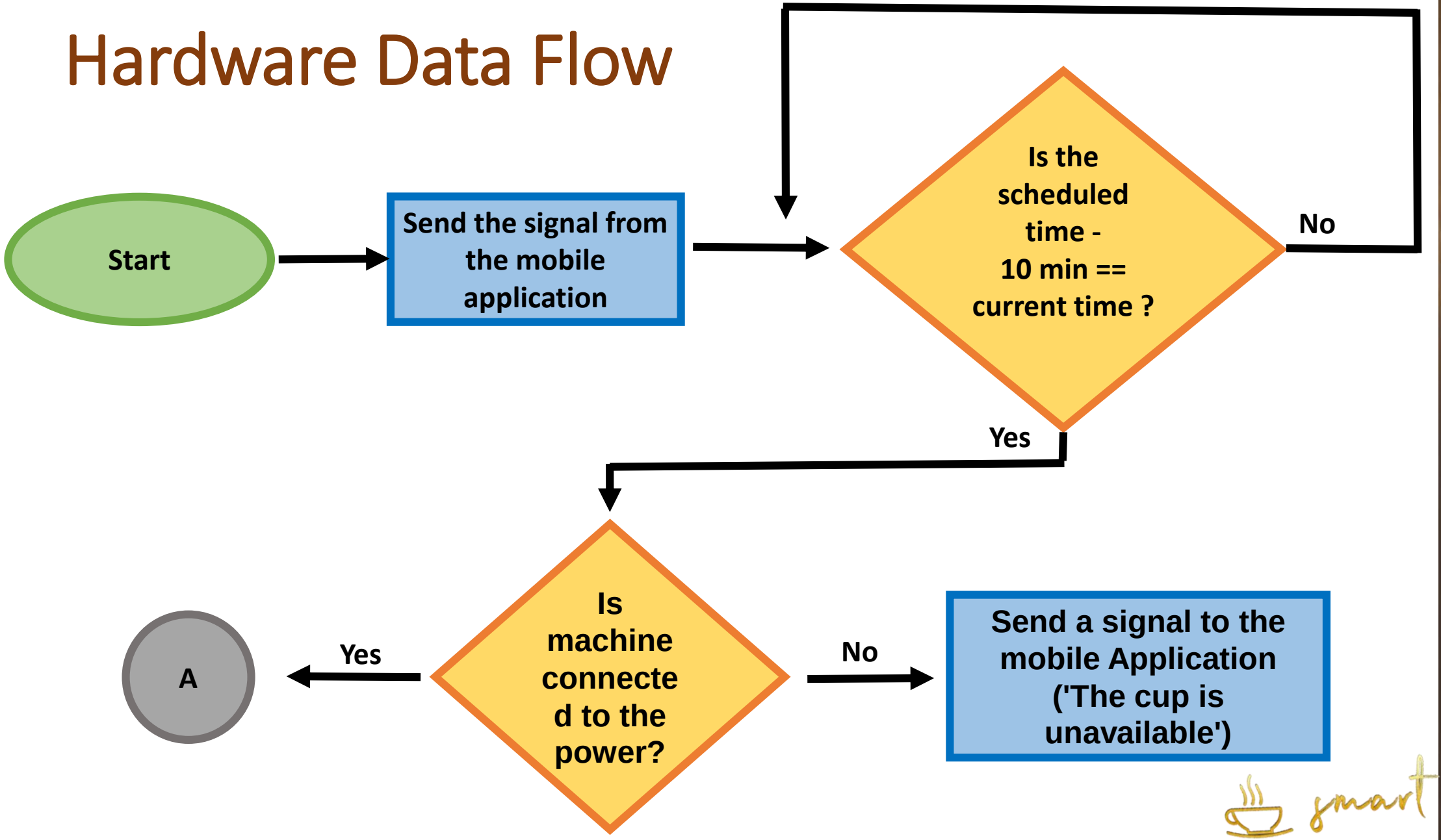
Hardware Node

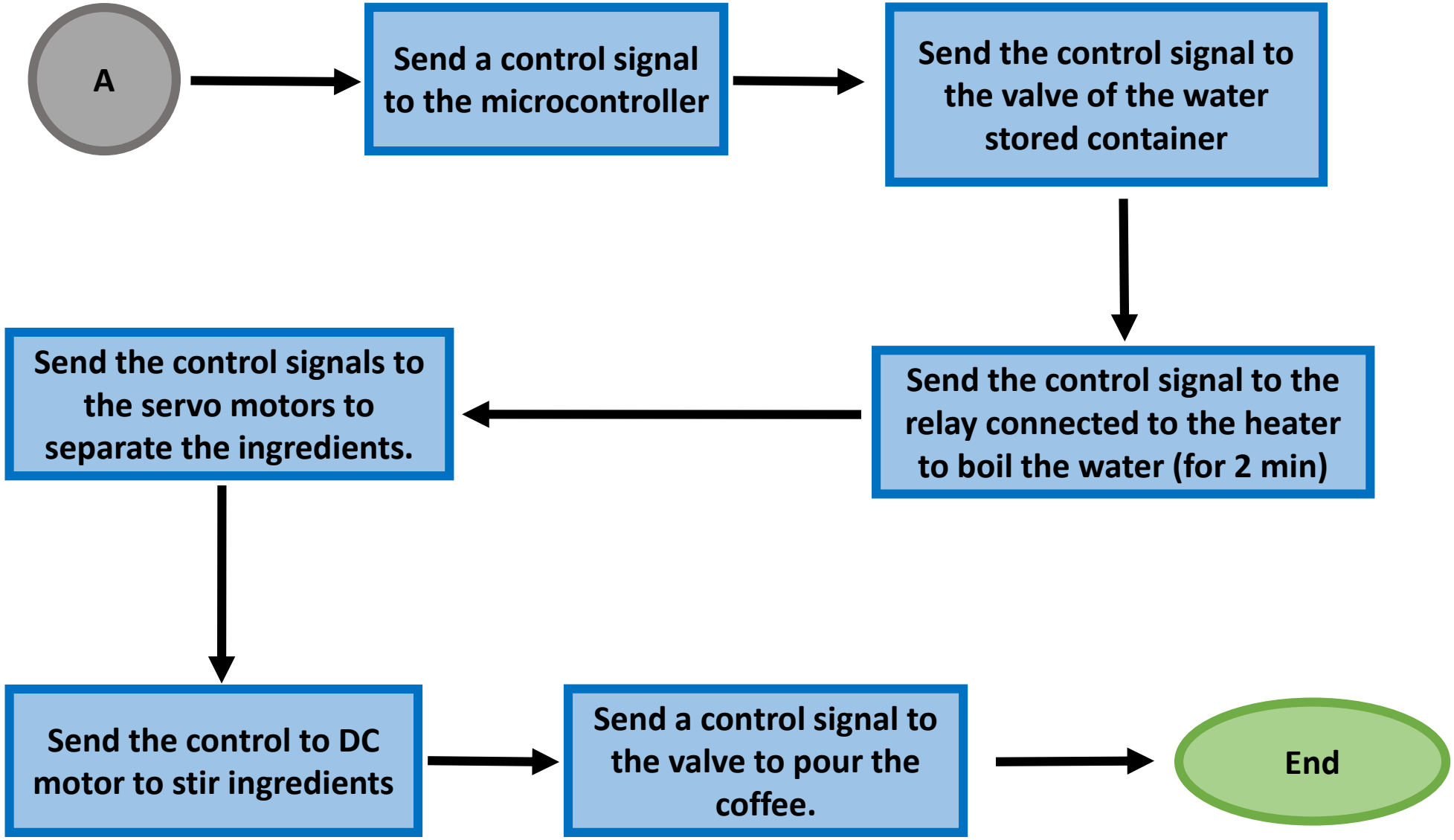
Mobile Application

Server and the Database

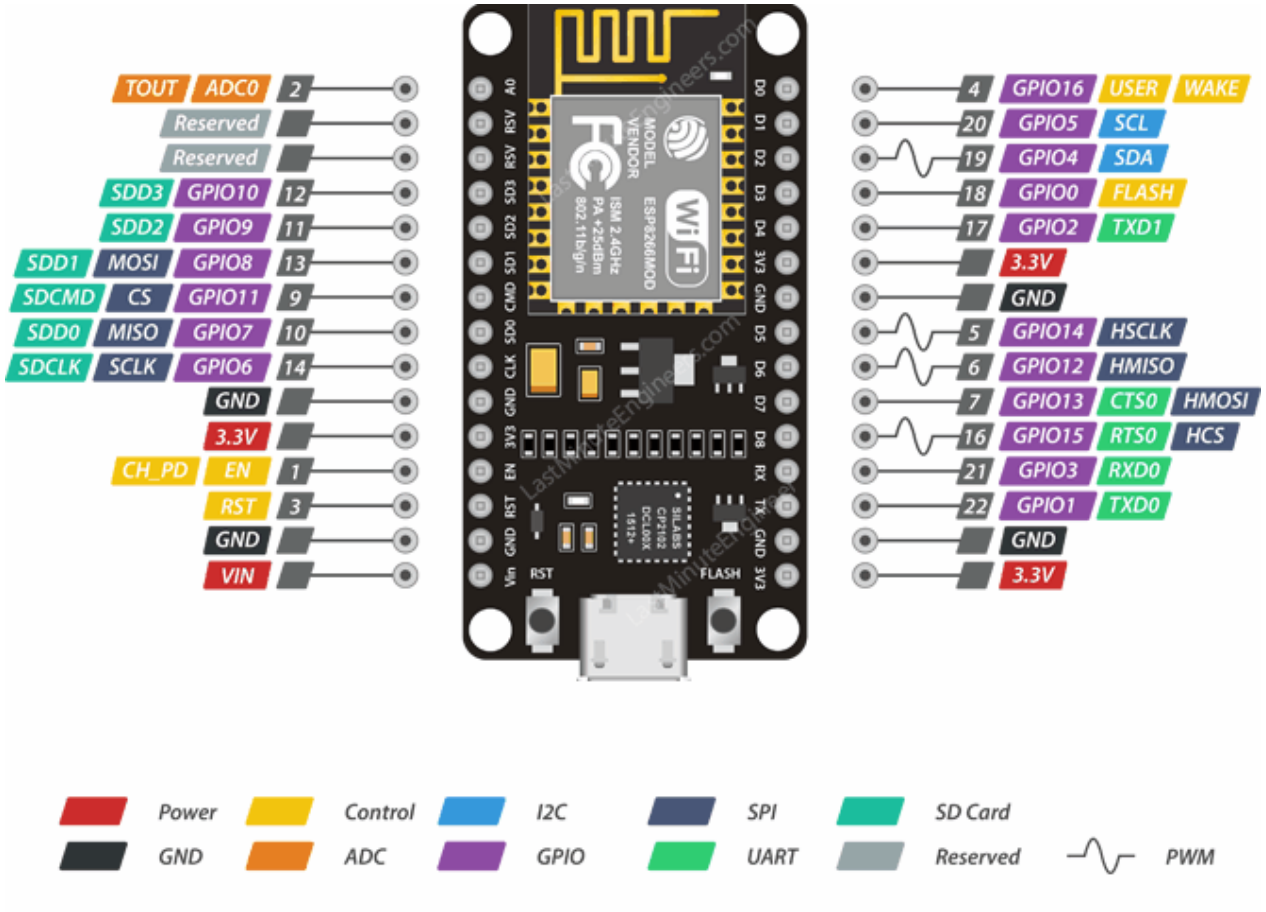
HARDWARE

Hardware Data Flow




A
Send a control signal to the microcontroller
Send the control signal to the valve of the water stored container
Send the control signal to the relay connected to the heater to boil the water (for 2 min)
Send the control signals to the servo motors to separate the ingredients.
Send the control to DC motor to stir ingredients
Send a control signal to the valve to pour the coffee.
End

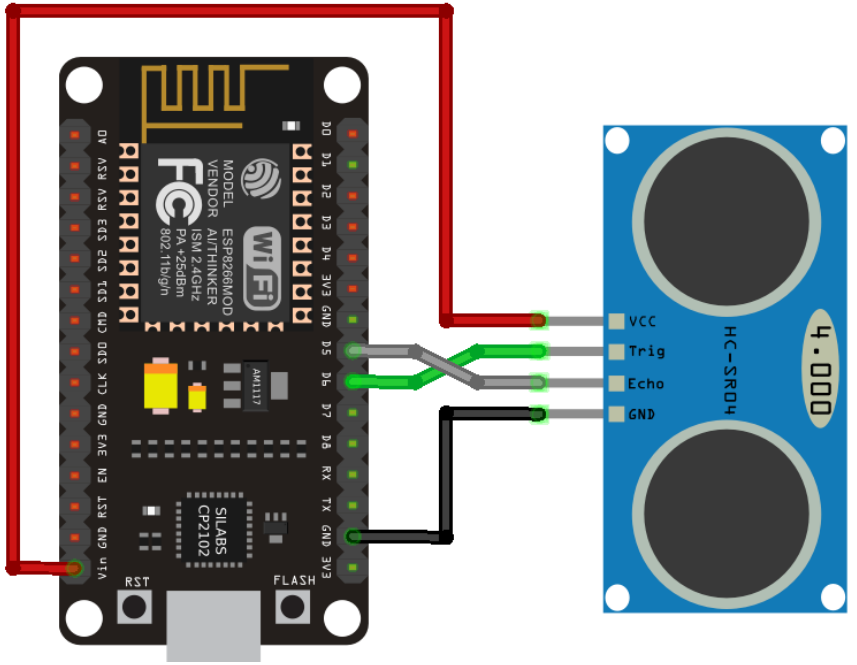
Microcontroller – NodeMCU ESP8266 12E



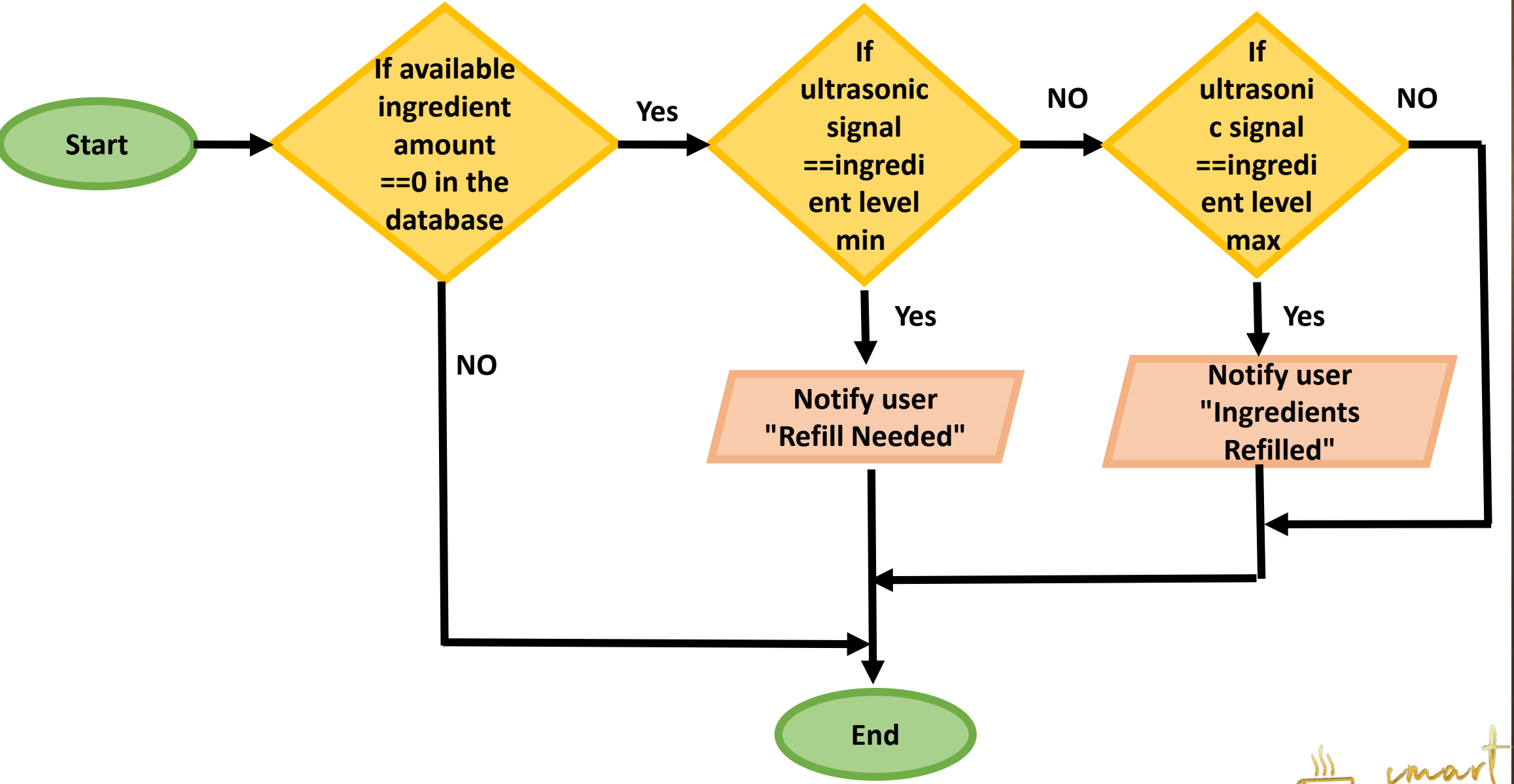
- Operating Voltage : 3.3 V
- Flash Memory : 4 MB
- Available Interfaces:
  - 3.3 V Power Pin
  - 16 GPIO Pins
- Built in Units : WIFI module
- Clock speeds : 80MHz
- Programming Language : C
- Network Protocol : TCP

Ultra-Sonic Sensor

Model: HC-SR04
Power : 5V
Interface : Trigger input pin and Echo output pin to suitable GPIO pins in NodeMCU
Maximum Range : 4 meters
Minimum Range : 2 cm
Ranging Accuracy : 3mm



Refill Process



Servo Motors

Power : 5 V

Interface : PWM enabled pins (pin 0-16)

Range : 0° to 180° (360°)

With the PWM signal, the control is,

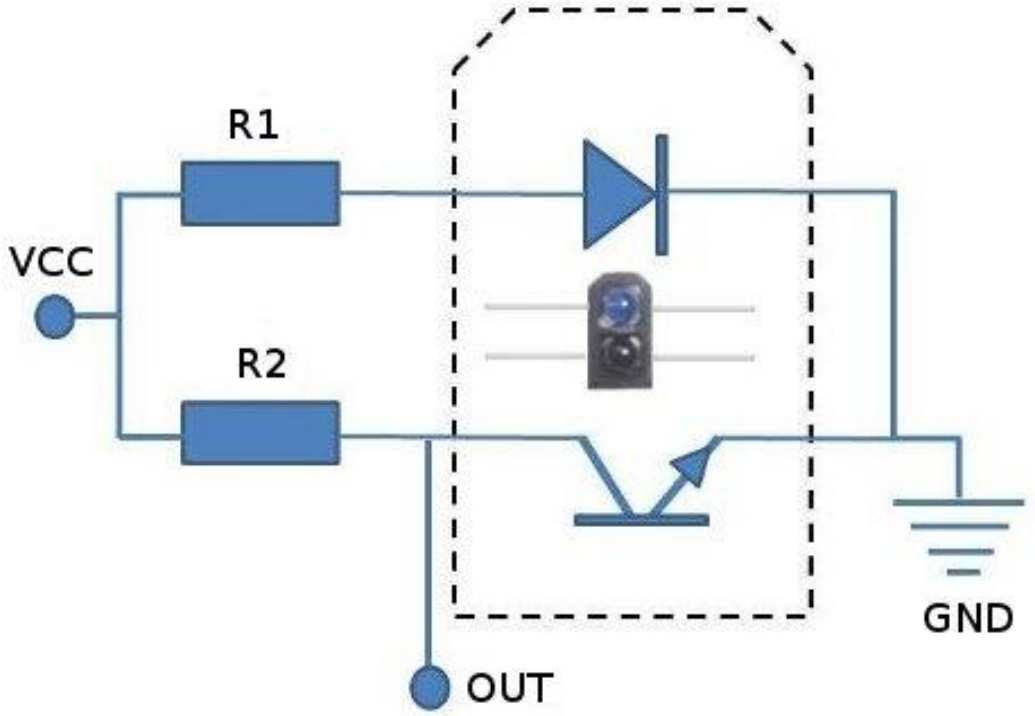
- 0 degrees for a pulse width of 1ms
- 90 degrees with a pulse width of 1.5 ms
- 180 degrees with a 2 ms pulse width

Positioning Accuracy : +/- 1°

Reflective Optical Sensor

Model : TCRT 5000
Power : 5 V
Peak operating distance: 2.5 mm
Operating range : 0.2 mm to 15 mm
Hardware calibration

Interface :



Heater

Power : 230V
Interface : Connected to a NodeMCU GPIO pin through a relay component

Solenoid valves

Power : 12V
Interface : 12V from the transform and the other terminal to GPIO

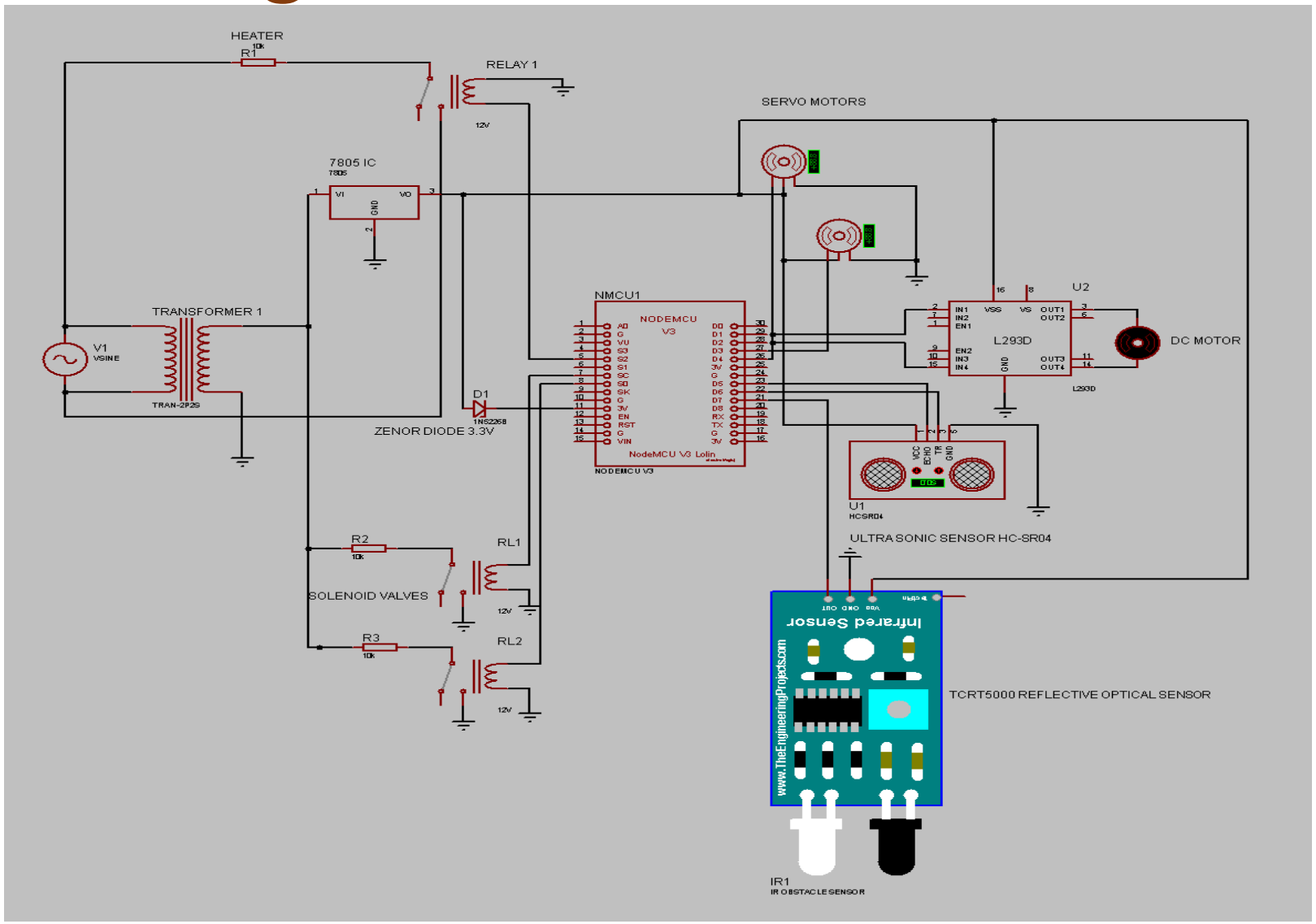
DC Motor

Power : 5 V

Interface : Connected to the board via L293D or relay

Frequency : 200 rpm

Circuit Diagram



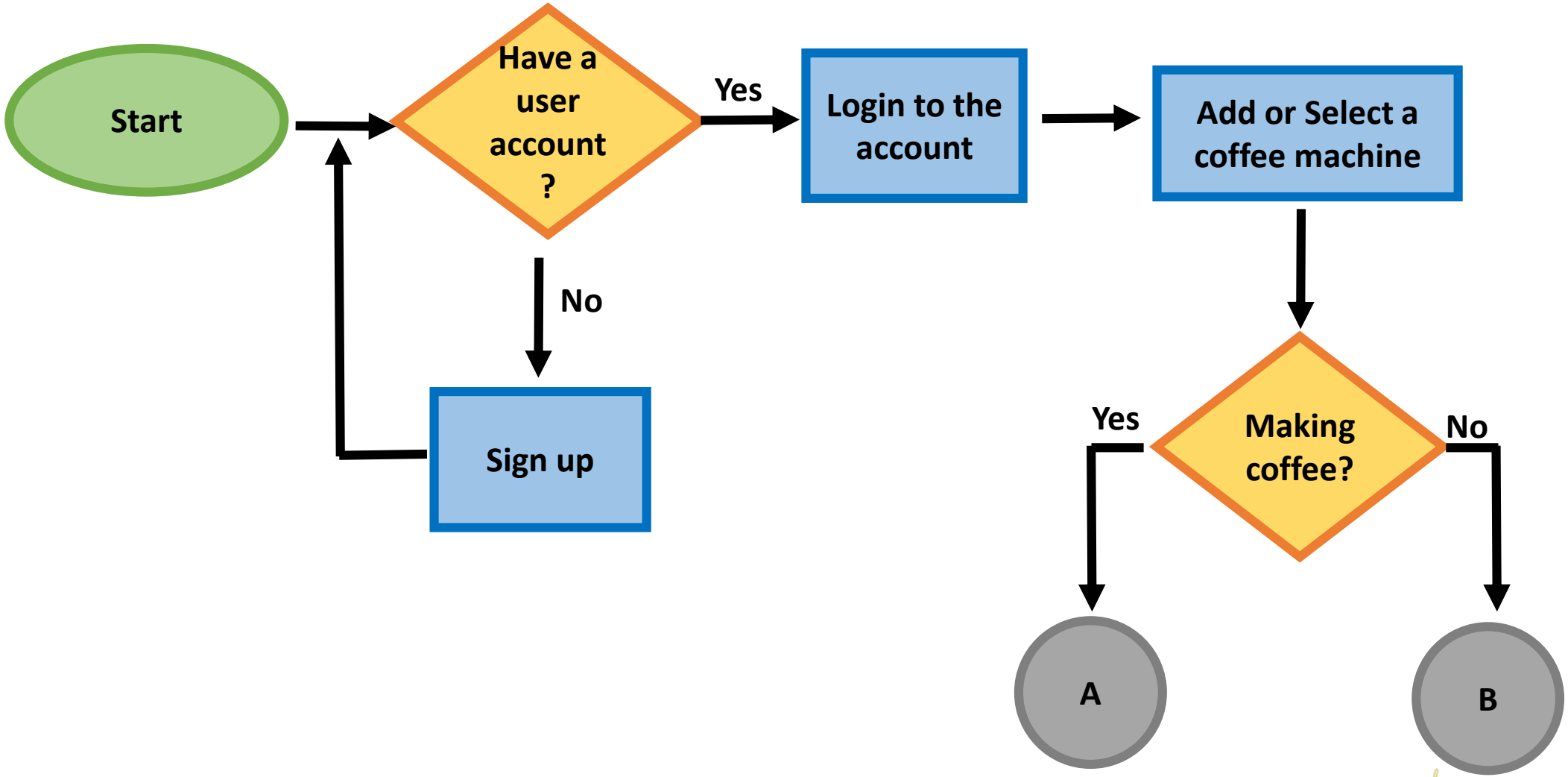
Bill of Materials

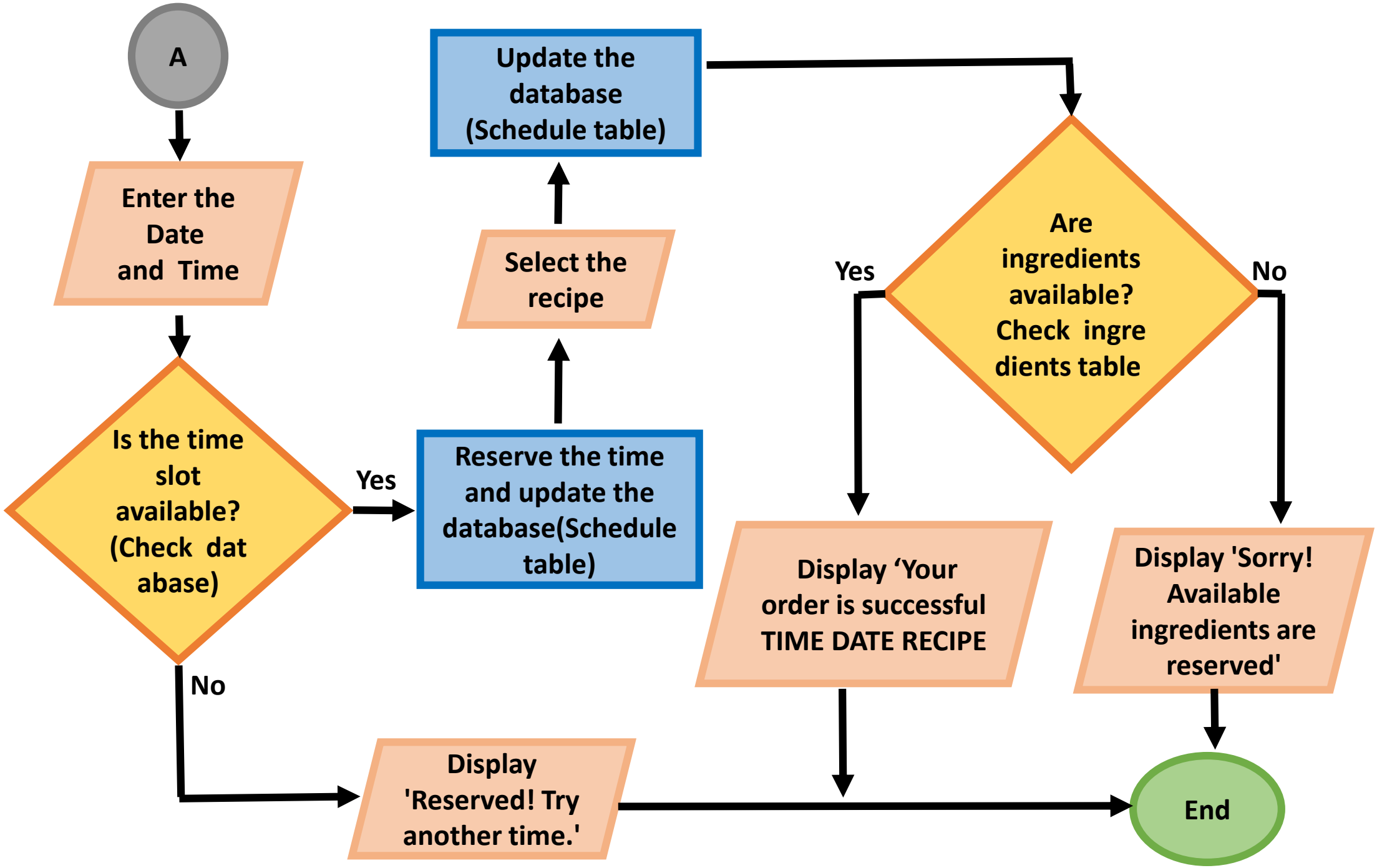
Item Name	Quantity	Unit Price(LKR)	Total Cost (LKR)
NodeMCU ESP8266 12E	1	985	985
Heater	1	400	400
DC Motor	1	95	95
Relay	3	60	180
Valves	2	690	1380
Servo Motor	2	350	700
TCRT5000L Reflective Optical Sensor	1	175	175
Ultra-sonic Sensor	3	165	495
Containers	4	250	1000
12V 1A Full-wave Transformer	1	550	550
Others			1000
			6960

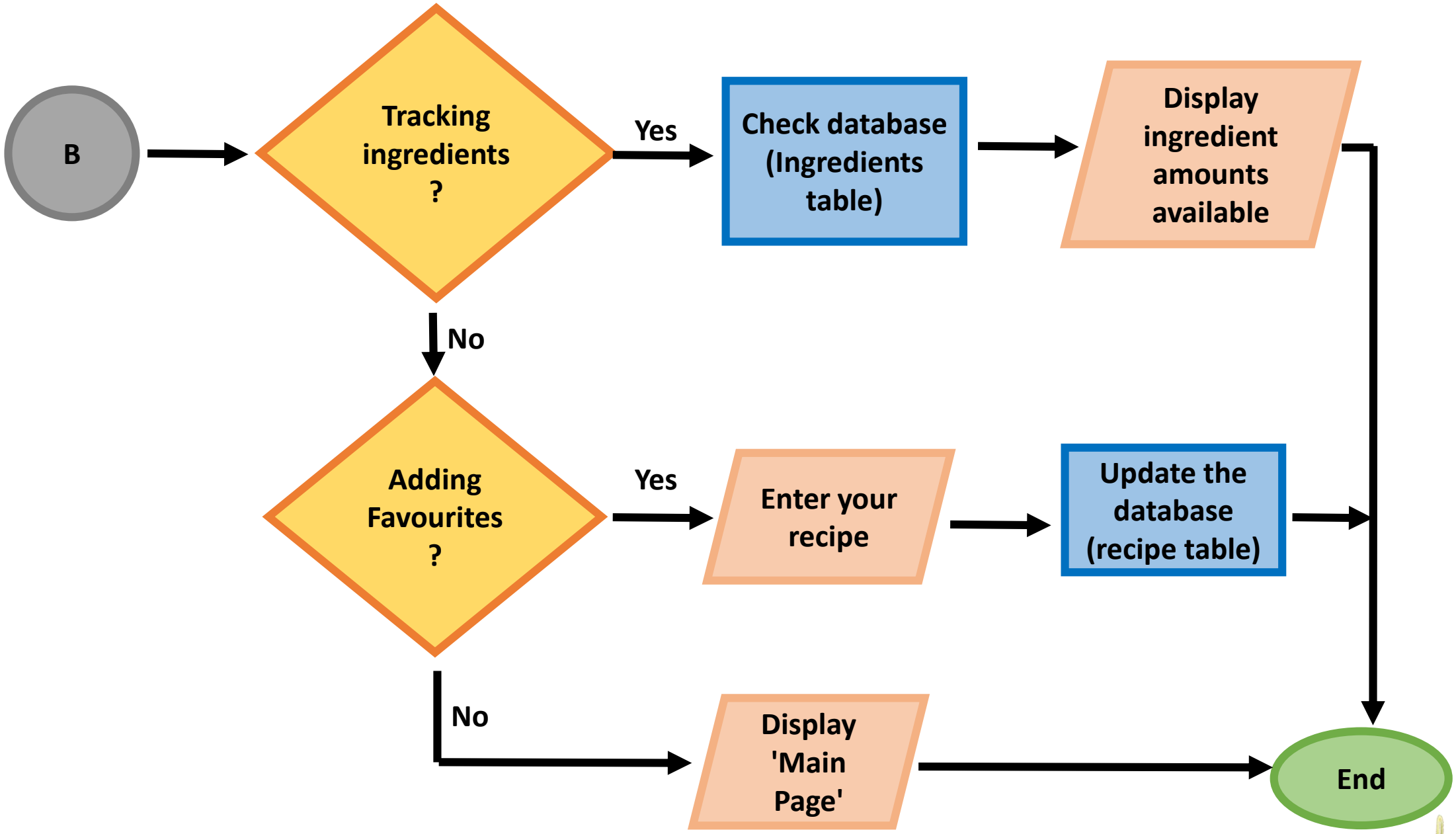
FRONT-END

BACK-END

Software Data Flow

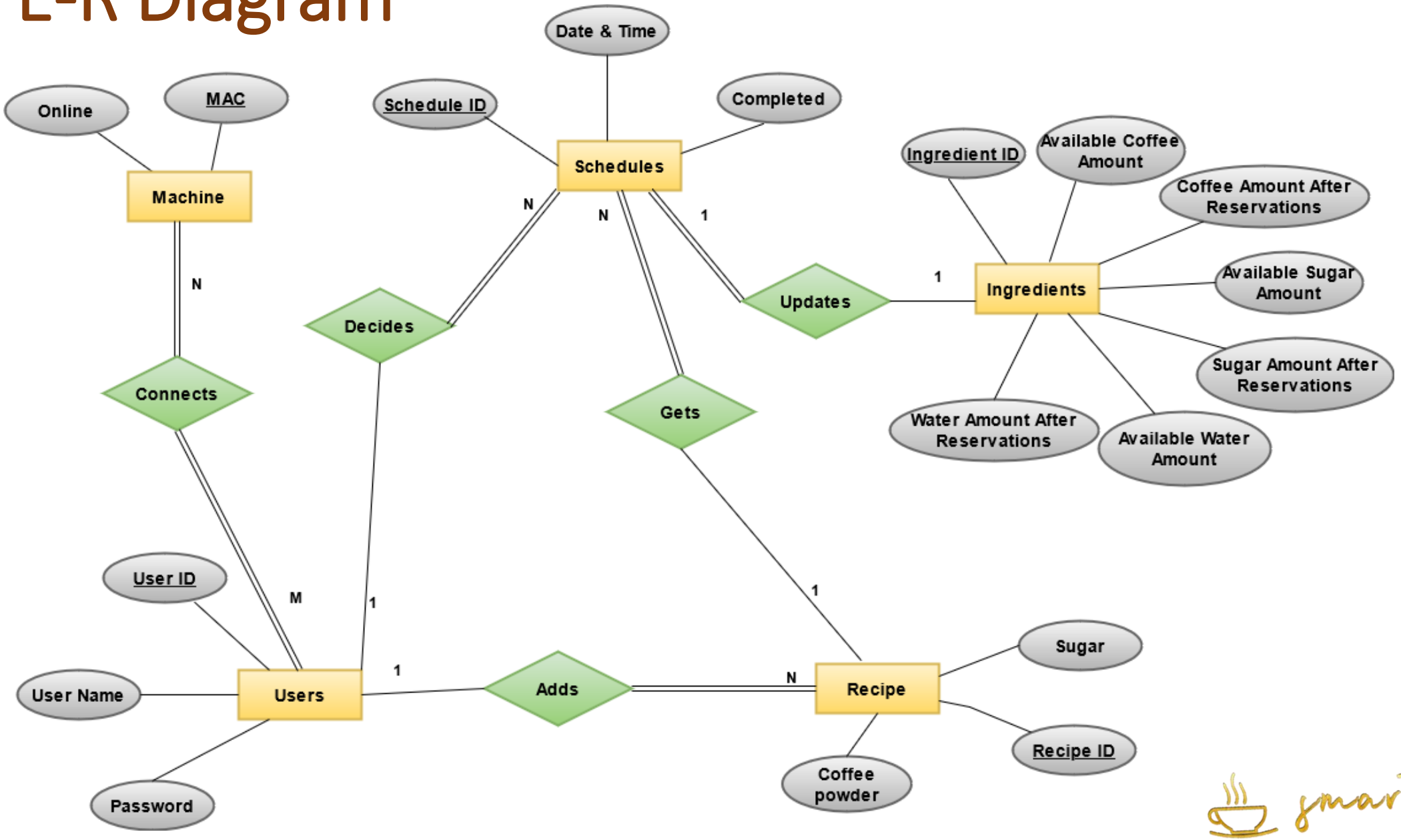



A
Enter the Date and Time
Is the time slot available? (Check dat abase)
Yes
No
Reserve the time and update the database(Schedule table)
Select the recipe
Update the database (Schedule table)
Are ingredients available? Check ingre dients table
Yes
No
Display 'Your order is successful TIME DATE RECIPE
Display 'Sorry! Available ingredients are reserved'
Display 'Reserved! Try another time.'
End


B
Tracking ingredients ?
Yes
Check database (Ingredients table)
Display ingredient amounts available
No
Adding Favourites ?
Yes
Enter your recipe
Update the database (recipe table)
No
Display 'Main Page'
End

BACK END

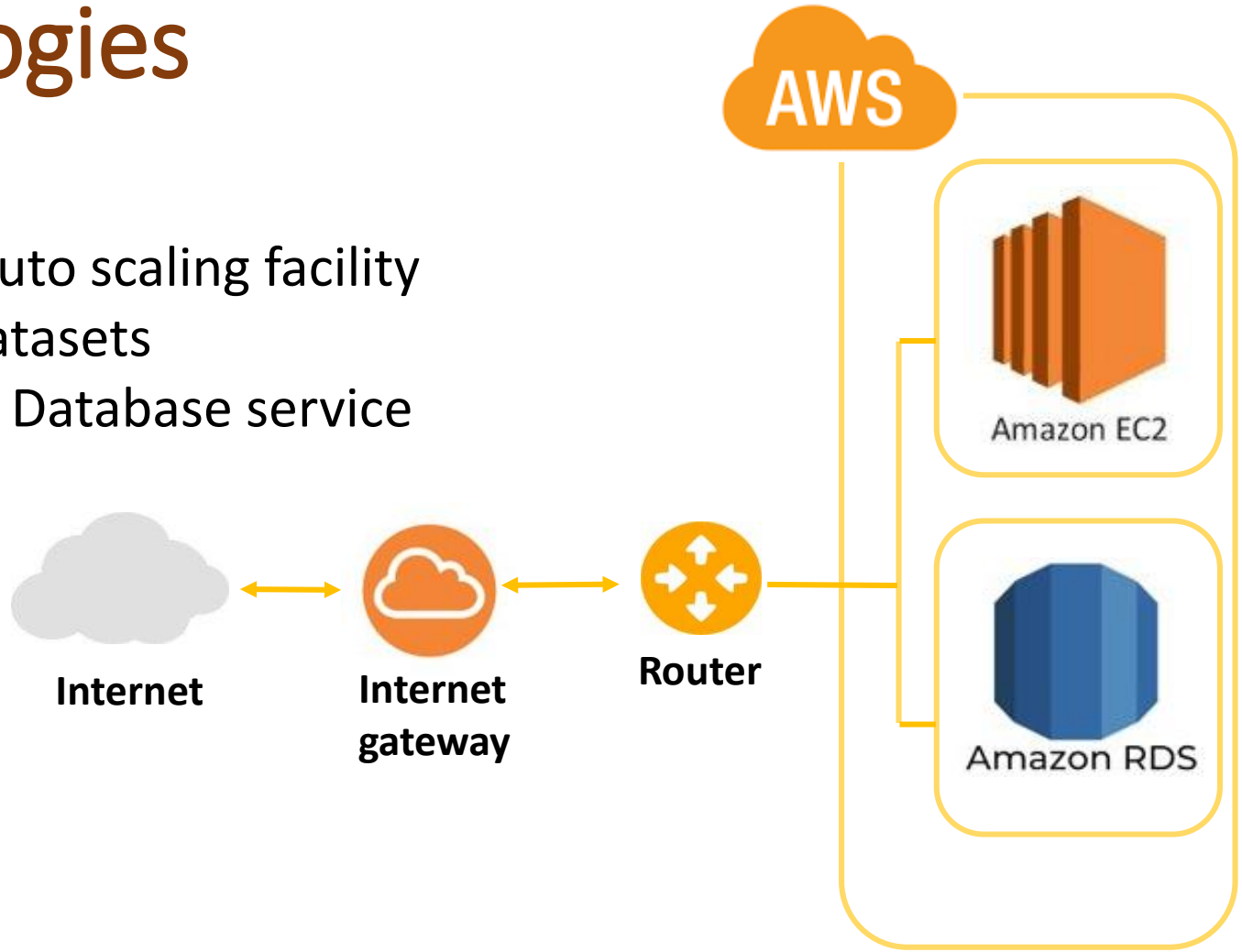
E-R Diagram


Date & Time
Online
MAC
Schedule ID
Completed
Schedules
Machine
Ingredient ID
Available Coffee Amount
Coffee Amount After Reservations
Available Sugar Amount
Sugar Amount After Reservations
Water Amount After Reservations
Available Water Amount
Ingredients
Updates
Decides
Connects
Gets
N
N
1
1
N
1
User ID
M
1
1
1
User Name
Users
Adds
N
Recipe
Sugar
Recipe ID
Coffee powder
Password

Back End Technologies

AWS – EC2 Server

- Elastic load balancing and Auto scaling facility
- Easy when handling large datasets
- Provides Amazon Relational Database service



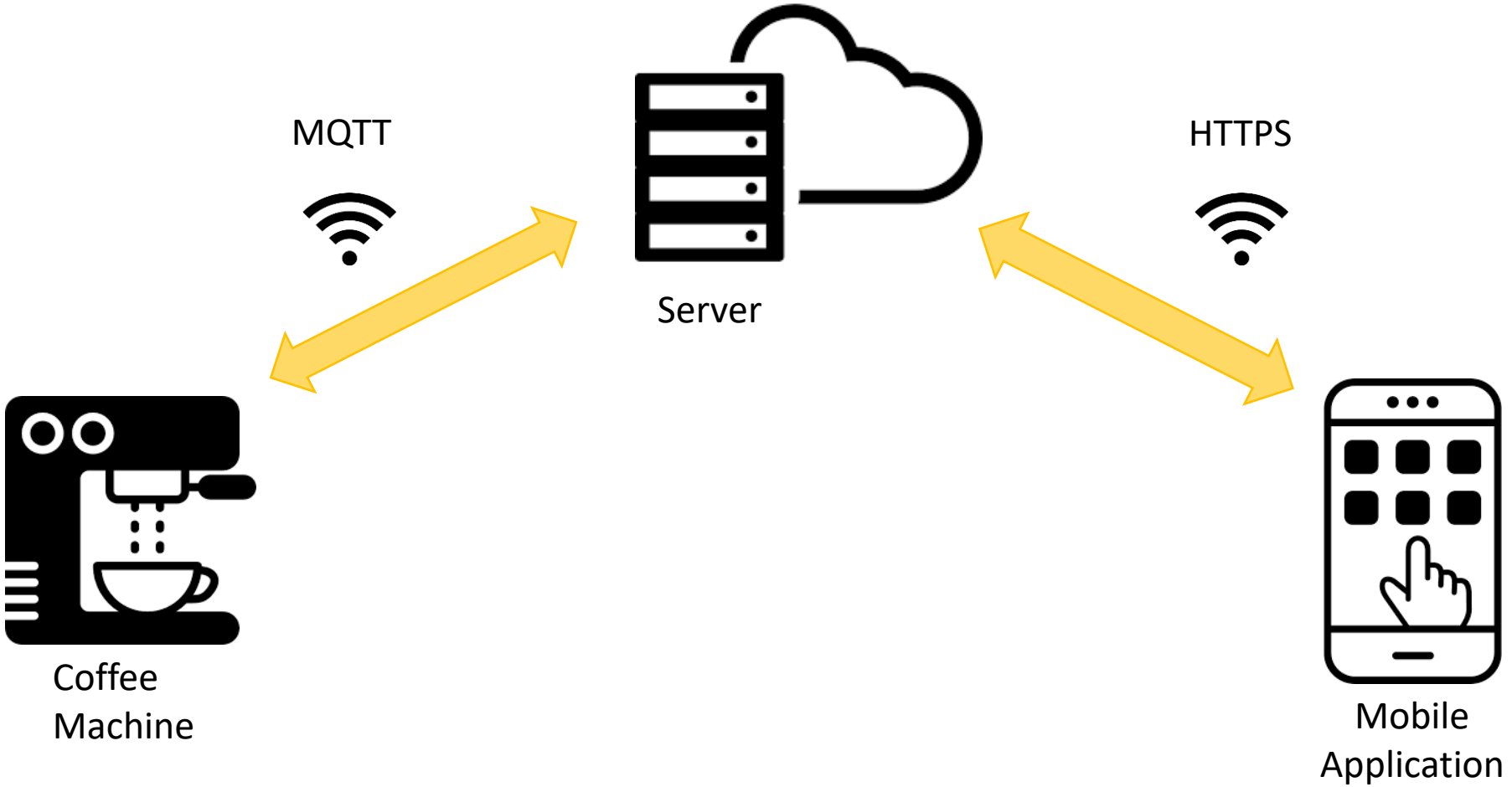
Language

- Java
- MySQL

Storage

- Cloud storage
- MySQL Amazon RDS
  - Fast performance, high availability, and security , Ability to take backups

Network Technologies



Network Protocols

MQTT

- Light weight and Efficient
- Support for Unreliable Networks
- Scalable
- Security Enabled

HTTPS

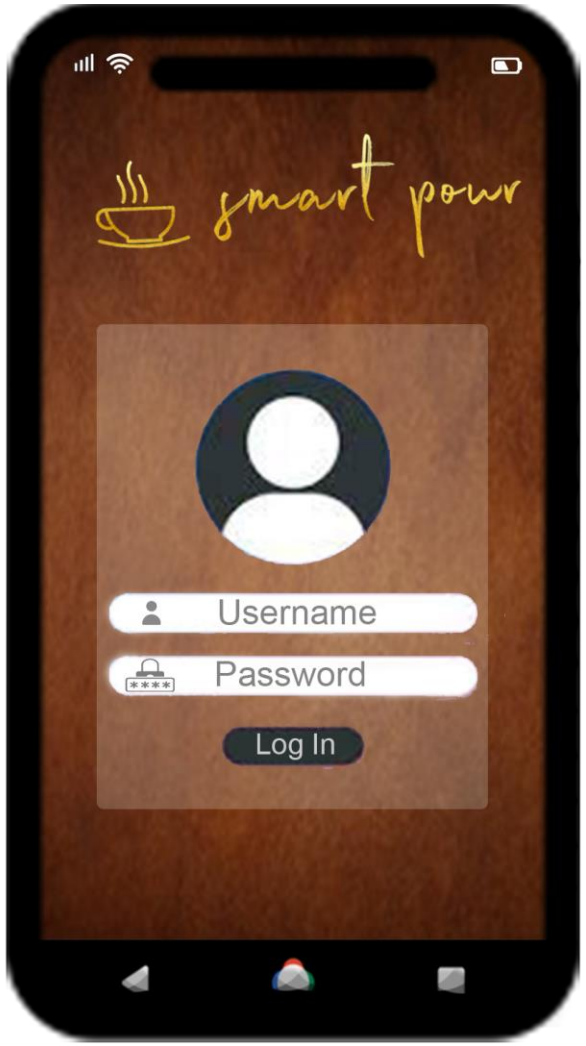
- Encryption using TLS/SSL
- Data Integrity
- Protection
- Verification
- Reliability

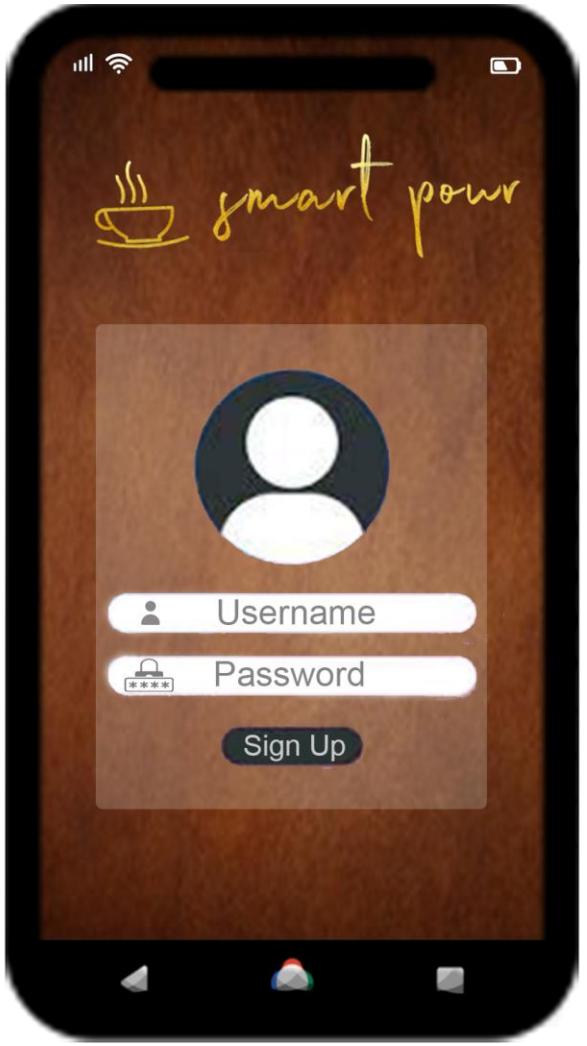
Dart

FRONT END

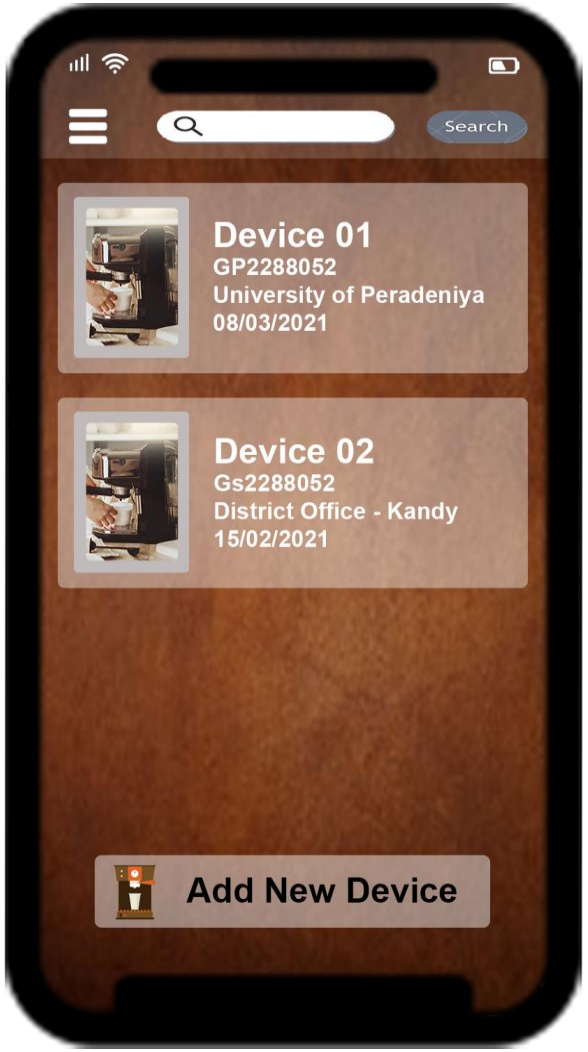
UI


smart pour
Coffee making at your fingertips
LOGIN
SIGN UP


smart pour
Username
Password
Log In


smart pour
Username
Password
Sign Up

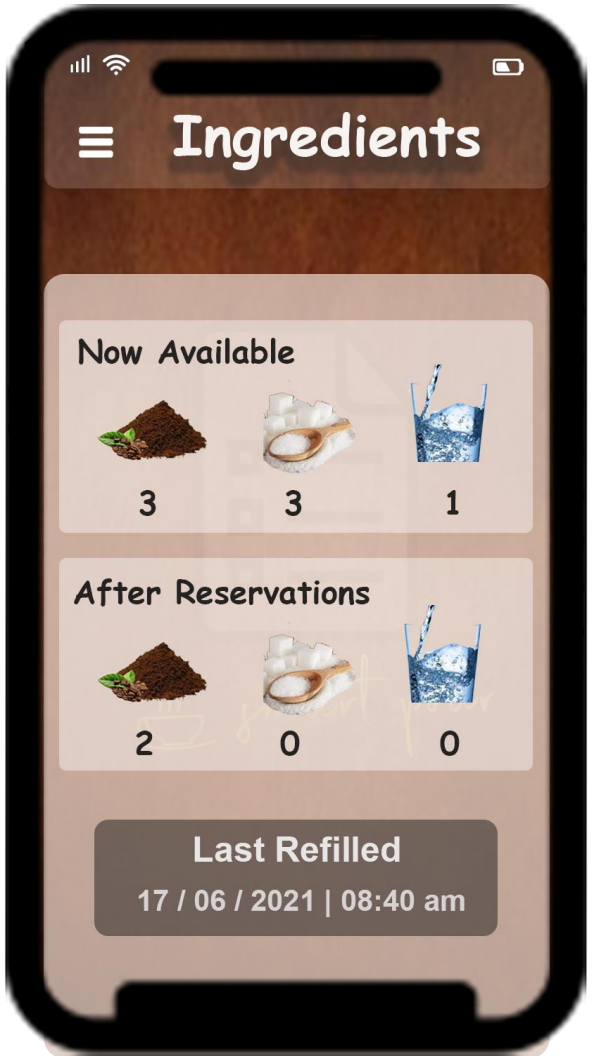
UI

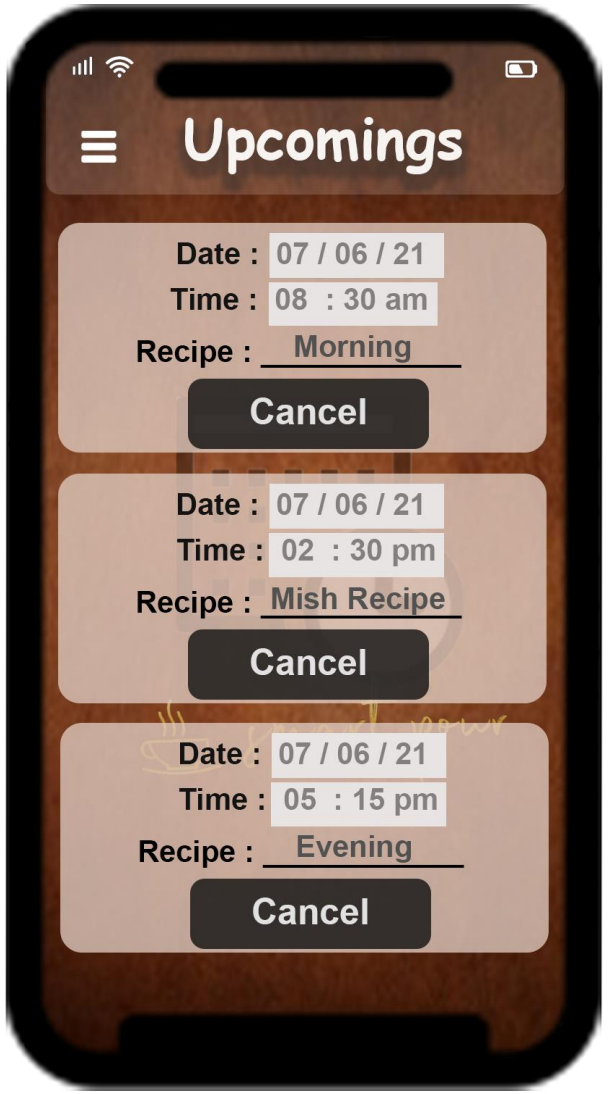

Search
Device 01
GP2288052
University of Peradeniya
08/03/2021
Device 02
Gs2288052
District Office - Kandy
15/02/2021
Add New Device


smart powr
Schedule Now !
Ingredients
Upcomings
Favourites


Schedule Now !
Recipe :
Date : DD / MM / YY
Time : 00 : 00 pm
Confirm

UI


Ingredients
Now Available
3
3
1
After Reservations
2
0
0
Last Refilled
17 / 06 / 2021 | 08:40 am


Upcomings
Date : 07 / 06 / 21
Time : 08 : 30 am
Recipe : Morning
Cancel
Date : 07 / 06 / 21
Time : 02 : 30 pm
Recipe : Mish Recipe
Cancel
Date : 07 / 06 / 21
Time : 05 : 15 pm
Recipe : Evening
Cancel


Favourites
Anne
Coffee 2
Sugar 1
smart powr
Add New +

Front End Technologies

Flutter

- High productivity
- 'Flutter chart package' for data visualization

Security

- Security and Authentication plugins

User experience

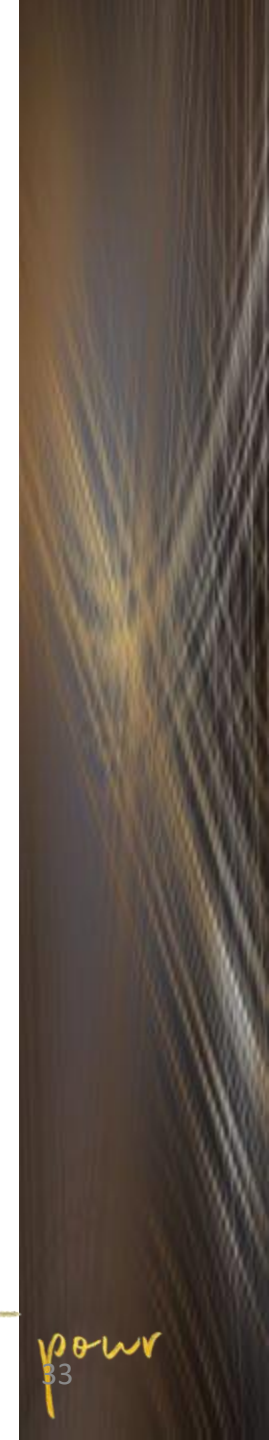
- Handling multiple coffee machines
- Saving option for favourite recipes

Language

- Dart

Failure Handling

- ✓ Preventing multiple scheduling at the same time.
- ✓ Permitting the scheduling for sufficient ingredients available.
- ✓ Starting coffee making only if there is a cup to pour.
- ✓ Sending a broadcast to all the users when the ingredients are empty.



Software Testing

Unit Testing

- Log in & Signup
- Sensor modules

Integration Testing

- Updating the database after cancelling a schedule
- Getting the upcoming Schedule details

End to End Testing

- Making a coffee while updating the database

Tools


THANK
YOU !


Q
A