User Manual

Project:
A World of Things

Client:
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Team:
Funge

Team Members:

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Table 1: Version Table

Version	**Date**	**Description**
0.1	22/05/2016	Vision, scope, architectural requirements and initial architecture design.
0.2	29/07/2016	Creation of separate documents for architecture design, software requirements, testing and user manual. Each populated with the relevant information for the project at this stage.
0.3	11/09/2016	Remake of all documents. Combination of them into a single document. Documents follow guidelines as discussed with lecturer.

Contents

Disclaimer: The system is still under development. All documentation will be updated as the system progresses

1 System Overview

A World of Plants makes use of networked hardware devices to allow users to use the Internet to monitor and control the environment of living plants in real time.

The system has been designed to make independent agriculture a fun and personalised experience. Compete to unlock new rewards or progress at your own leisure. Follow the plant suggestions to-the-letter or follow your own intuition. It's all up to you.

Welcome to A World of Plants.

2 System Configuration

A World of Plants is made up of 3 distinct parts:

- **Plant Box**, where your plants will live and grow. Your sensors will sit here as well.
- **The Cloud**, where all the behind-the-scenes magic takes place. Without this, there would be no data persistence, storage or communication.
- **Web app**, which you'll use to view plant info, interact with plants, and see how far you're progressing.

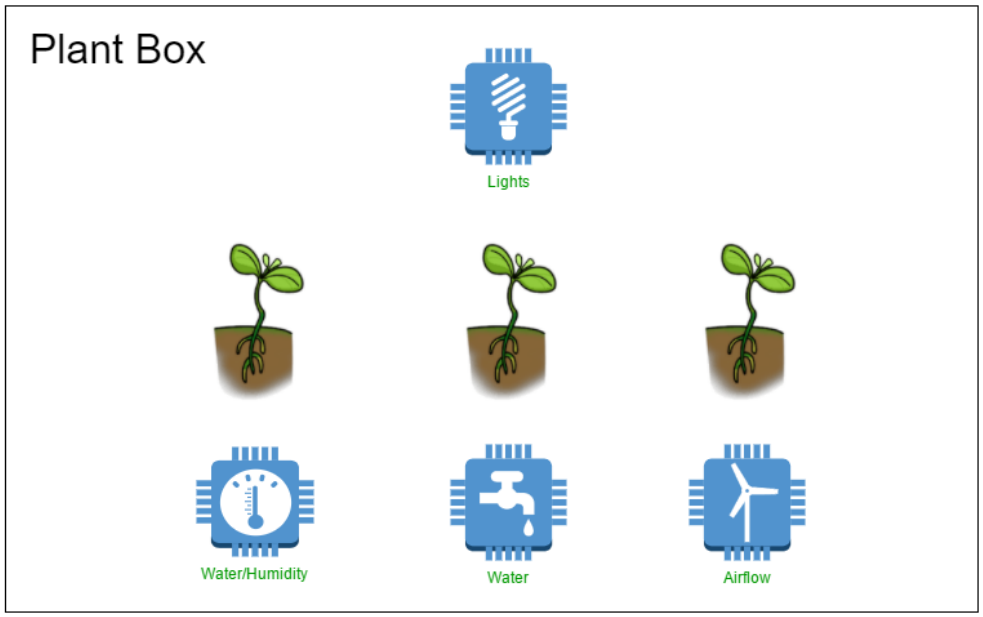

Figure 1: Plant Box

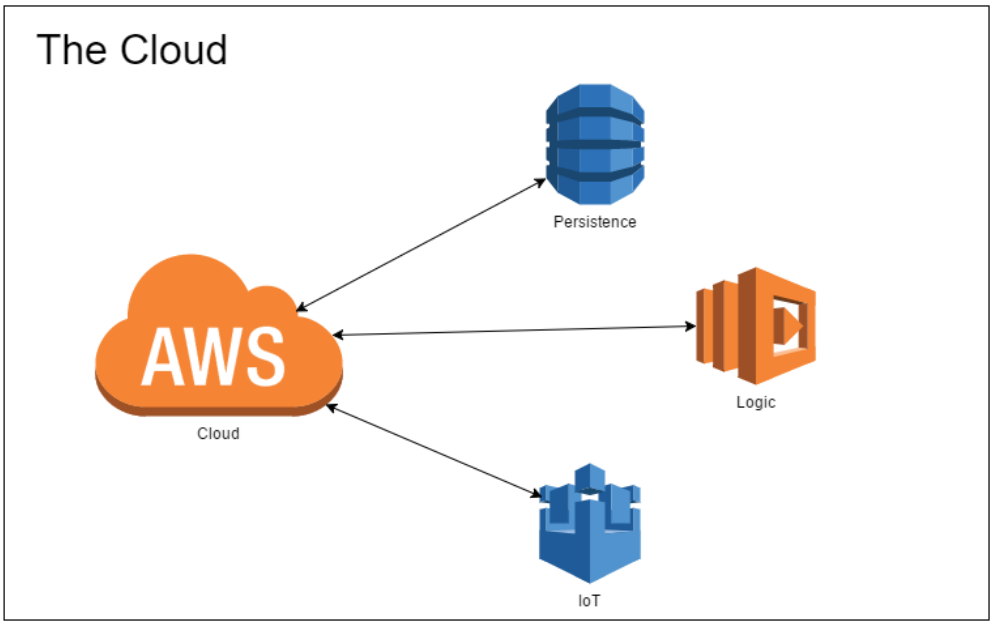

Figure 2: The Cloud

The rest of the User Manual focuses on the Web app.

3 Installation

3.1 User Installation

The software can be found at `http://www.funge.cf`

There is no installation necessary if you are an ordinary user, it is as simple as visiting the above listed website and registering.

Registration can be done as follows:

- Visit `http://funge.cf`
- Select "Need an Account?"
- Enter the relevant details
- After selecting the "Sign Up" button you should be logged in automatically

3.2 Software Developer Installation

The software can be found at `https://github.com/DillonHeins/Funge`

3.2.1 Initial Set Up

- Set up an AWS account by visiting:
  - `https://aws.amazon.com/`
- Download and install the AWS command line interface:
  - Additional information can be located at `https://aws.amazon.com/cli/`
- Install Java Development Kit 8:
  - `http://www.oracle.com/technetwork/java/javase/downloads/jdk8-downloads-2133151.html`
- Install Apache Maven. Instructions on how to download, install and run Maven can be located at:
  - `https://maven.apache.org/`

3.2.2 Java Backend Installation

- Navigate to BackEnd/a-world-of-plants
- Open a command line window on your operating system of choice
- Run the command:
  - `mvn test package`
  - This command will first test the code to ensure it is running accordingly and it will then package the software into a .jar file
- Navigate to BackEnd/a-world-of-plants/target
- In order to upload the .jar to AWS S3 and deploy it to AWS Lambda run the following commands:
  - `aws s3 cp jarname.jar s3://bucket-name`
  - `aws lambda update-function-code --function-name function \--s3-bucket bucket-name --s3-key jarname.jar`

3.2.3 AngularJS Frontend Installation

Navigate to FrontEnd/AWorldOfPlantsApp

- To run the AngularJS App locally:
  - Open a command line interface on your operating system of choice
  - Run the command:

    ```
    * npm install
    ```

  - Navigate to http://localhost:8000 in your browser
- To deploy the AngularJS App to S3 run the command:
  - `aws s3 cp app s3://website.com --recursive --exclude "*.log"`

4 Getting Started

4.1 Landing Page

4.1.1 Logging in

(1) The first page you'll encounter is the login page. If you already have an account, enter your username and password in the appropriate blocks and click "Sign In".
(2) If you'd like to find out more about A World of Plants, you can scroll down to our information page. Scroll back up when you're ready to login or register.
(3) If you have not yet registered, click on "Need an account?" to navigate to the account registration.

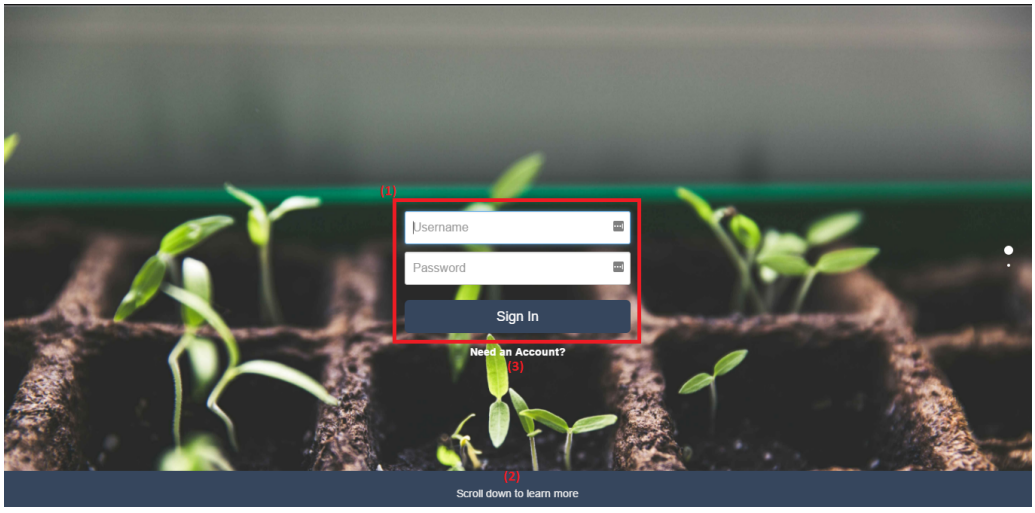

Figure 3: Login Page

4.1.2 Account Registration

(1) If you do not yet have an account, enter your email, the username you'd like to be known by, and your password (twice) and click the "Sign Up" button.
(2) If you already have an account and would like to log in, click on "Have an Account?" to navigate to the user login.

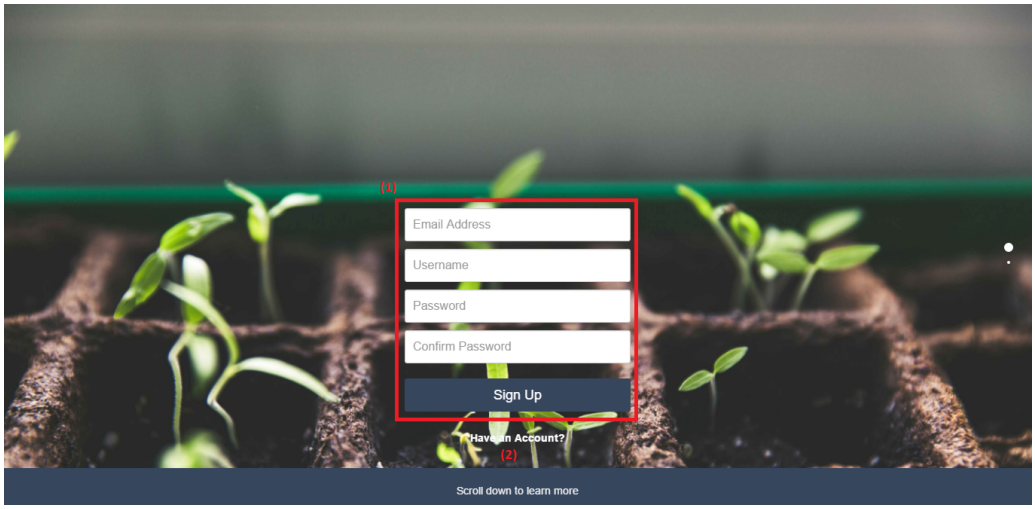

Figure 4: Registration Page

4.2 Main Site

4.2.1 Navbar

All pages on the main site will display the navbar at the top as well as along the left side. The side navbar is used to navigate the web app. To logout, click "Logout" on the top navbar.

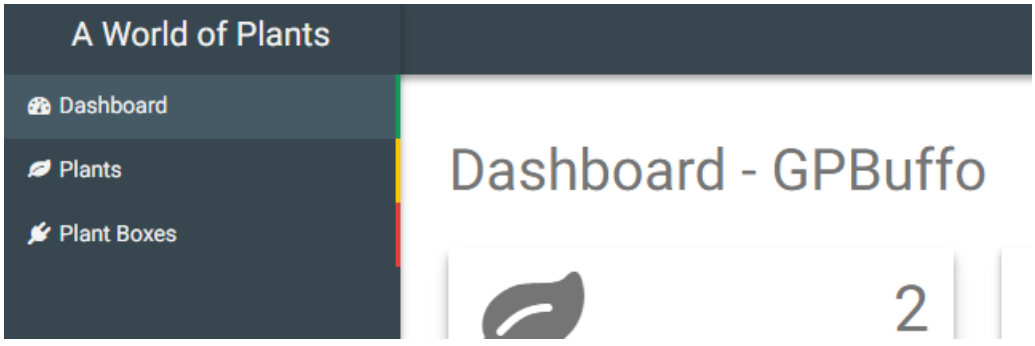

Figure 5: Side Navbar

5 Using the System

It's important to note that the terms "Plant" and "Plant Boxes" in this manual refer to the virtual representations of your own physical plants and plant box devices. When you create a Plant or Plant Box, you are simply associating your real plants and boxes with the system so that they can be monitored and controlled.

5.1 Dashboard

5.1.1 Info Cards

The info cards provide you with valuable information about your plants, plant boxes, points and steak.

Plants shows your current number of plants. Click on the card to view your plants.
Plant Boxes shows your current number of plant boxes. Click on the card to view your plant boxes.
Points shows your current point score. The more you do, the better your score!
Day Streak shows your current day streak. Log in each consecutive day to look after your plants and improve that streak!

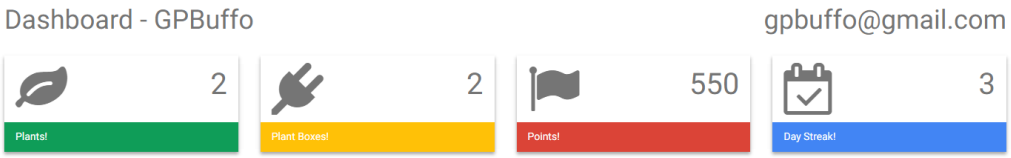

Figure 6: Info Cards

5.1.2 Timeline

The timeline gives you a quick overview of all the activities you have performed. This includes info such as the type of activity, the date the activity was performed and the points associated with the activity. You can also share your timeline activities to any of the supported social media platforms.

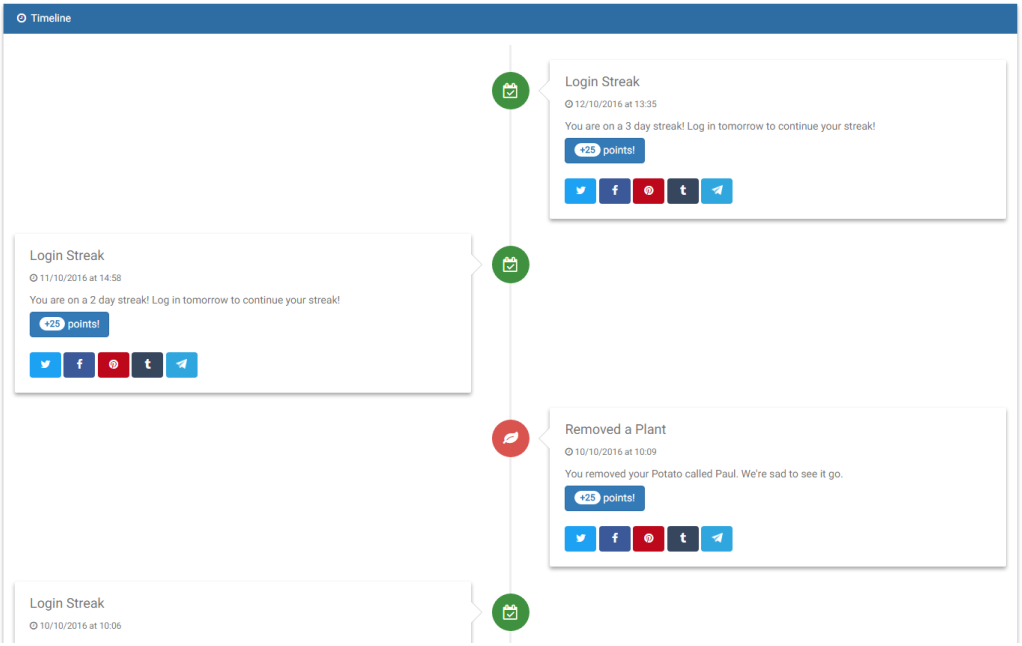

Figure 7: User Timeline

5.2 Plants

To access your plants, click on "Plants" in the sidebar. This page will display a summary of all your current plants.
(1) To add a new plant, click on the "Create New Plant" button on the top right. See Creating a Plant for more information.
(2) To view more information or change some of the details for a specific plant, click anywhere on the card belonging to the plant of your choice. See Plant Details for more information.

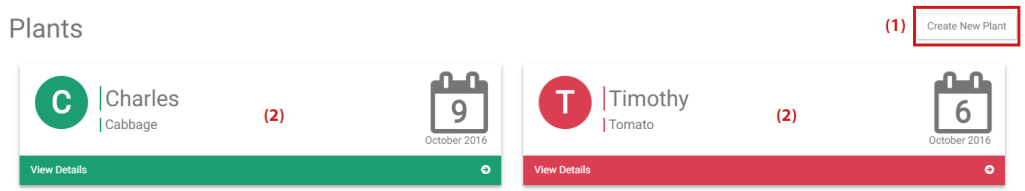

Figure 8: Plants View

5.2.1 Creating a Plant

To create a plant, select an existing plant type or create your own, give your plant a name and choose a colour for its card and then click on "Create".

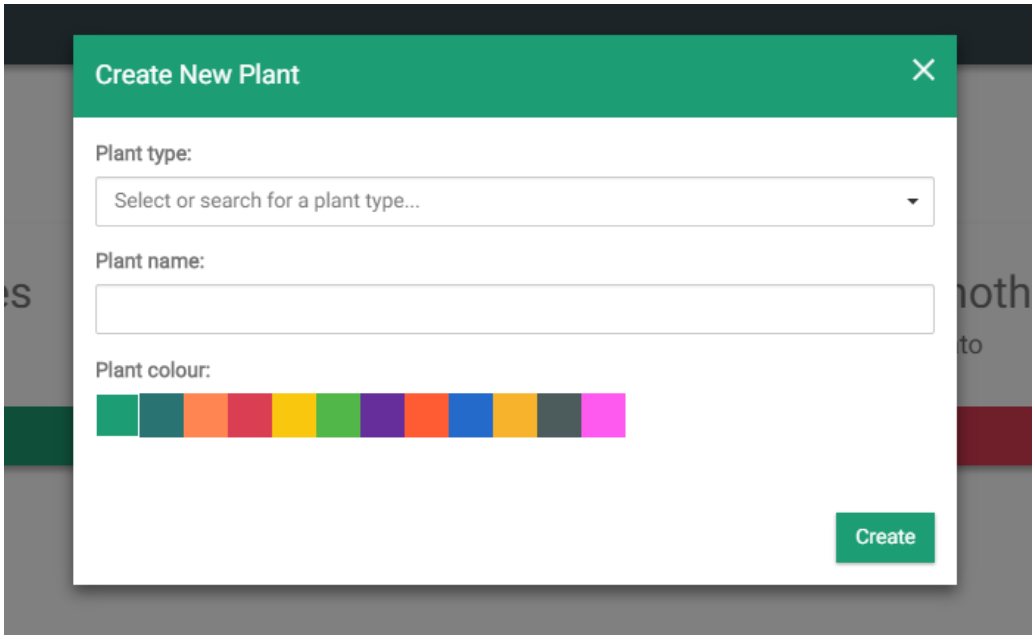

Figure 9: Creating a Plant

5.3 Plant Details

From here you can get an overview of all of your plant's details.
(1) To update plant details such as the plant's name or category, make your desired changes and then click the "Update" button.
(2) If you'd like to delete your plant, click on the red "Delete" button. **This is permanent**, so be careful.

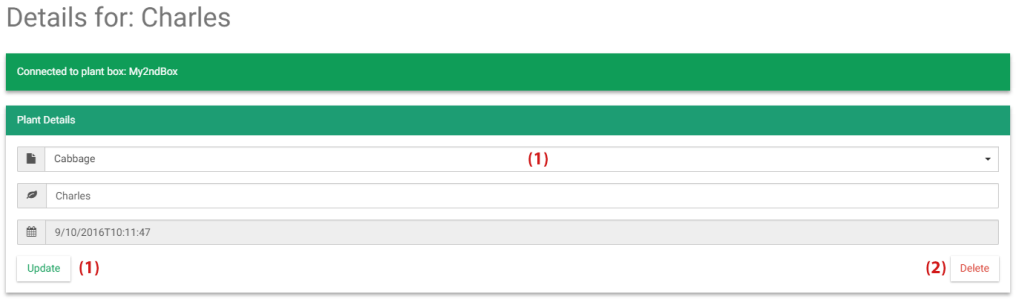

Figure 10: Plant Details

From the Plant Details, you can also view realtime graphs of the currently selected plant's conditions, as well as directly change some of those conditions through the Plant Box.

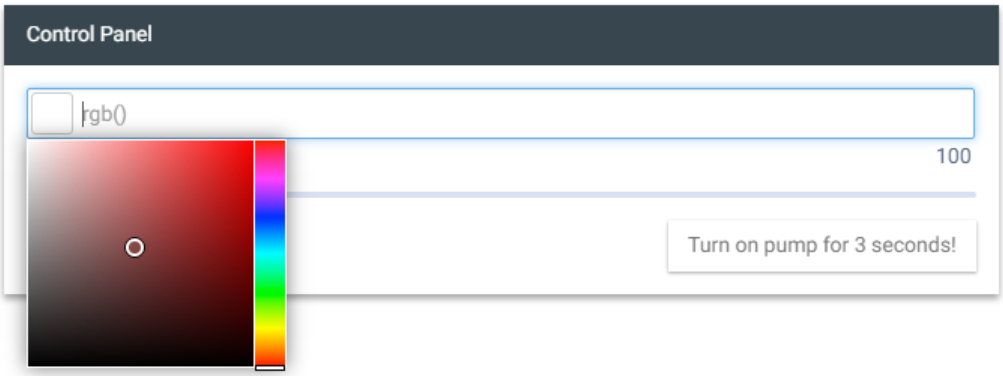

Figure 11: Lights Control

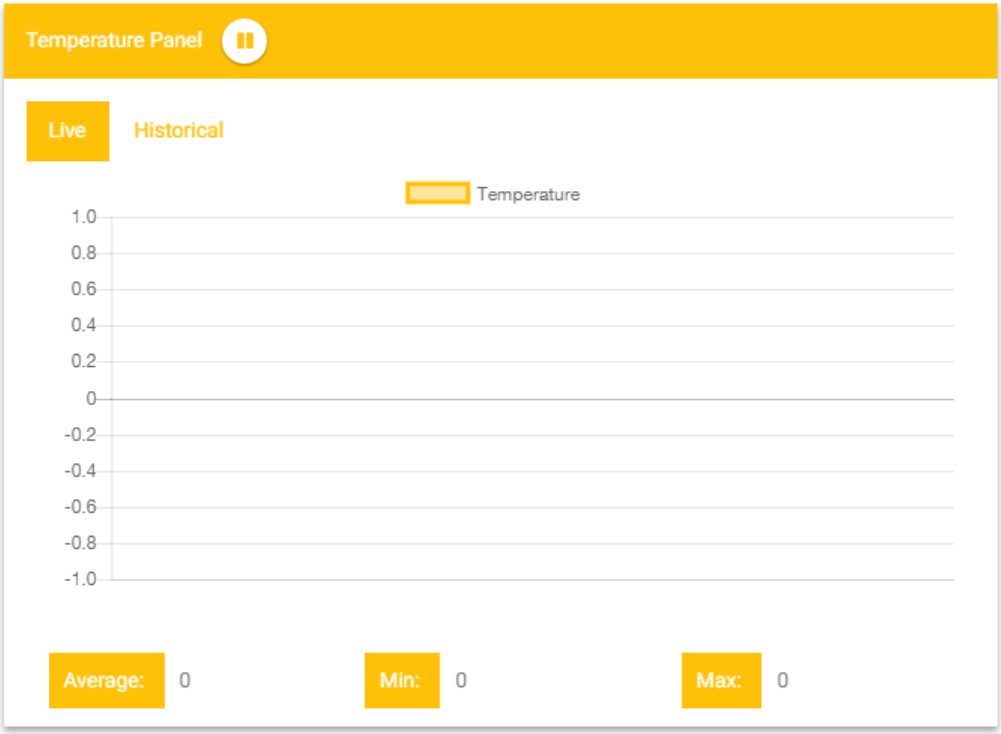

Figure 12: Temperature Graph

5.4 Plant Boxes

To access your Plant Boxes, click on "Plant Boxes" in the sidebar. This page will display all existing Plant Boxes.
(1) To add a new Plant Box, click on the "Create New Plant Box" button on the top right. See Creating a Plant Box for more information.
(2) To update which plant your Plant Box is linked to, choose an existing plant from the dropdown menu and then click the "Update" button.
(3) If you'd like to delete an existing Plant Box, click on the red "Delete" button. **This is permanent**, so be careful.
(4) If you need help with setting up your Plant Box, click on the "Help me" button.

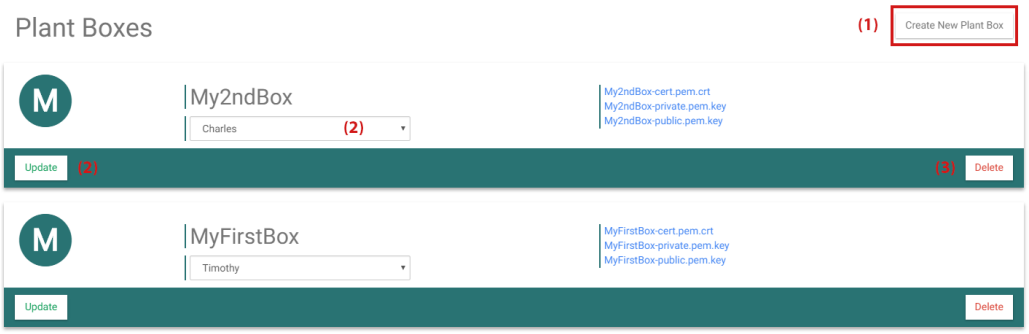

Figure 13: Plant Boxes View

5.4.1 Creating a Plant Box

To create a Plant Box, enter the box's unique name, associate it with an existing plant, choose a colour to make it stand out, and then click on "Create".

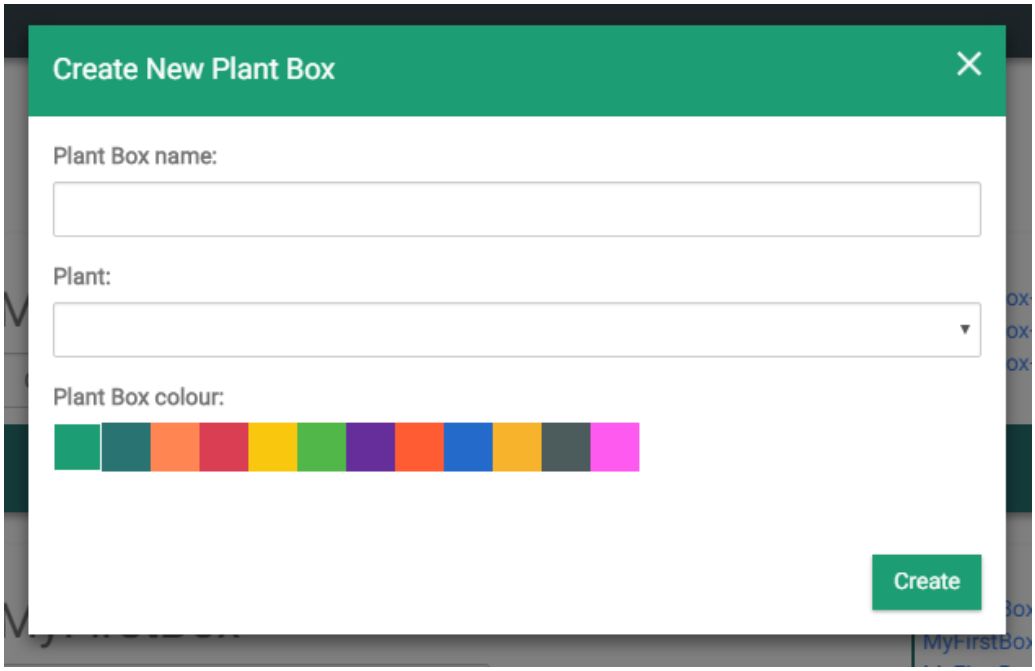

Figure 14: Creating a Plant Box

6 Troubleshooting

6.1 Web-interface Troubleshooting

The system has been designed to return varying HTTP status codes depending on whether an operation was successful or not. If a user would like to see more detail with regard to these codes they may open the developer console on their preferred browser. However, the system automatically responds to these codes and handles them accordingly.

The details of these HTTP status codes are listed below:

- 200 - Success
  - This is the code returned when all operations are functioning as expected
  - The system should continue without any problems or user intervention
- 400 - Client Error
  - This code is associated with bad requests
  - A bad request occurs whenever a request fails validation, i.e. when a client formats the request in a manner that the system was not expecting
  - This could occur when the user enters incorrect details or when a page is requested that does not exist

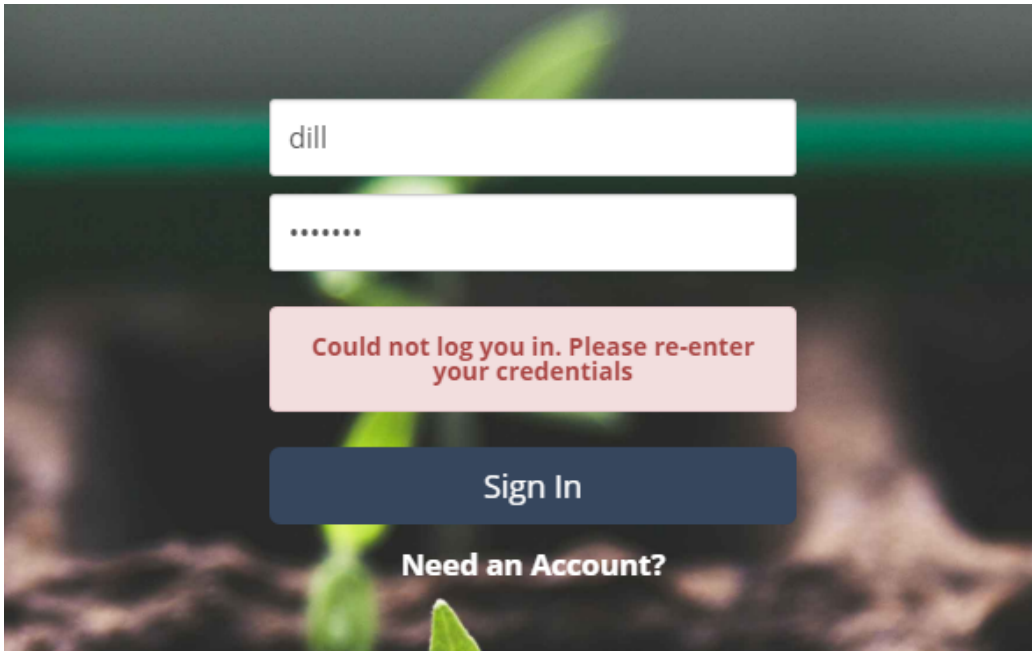

Figure 15: Incorrect User Details Error

- 500 - Server Error
  - This occurs when an internal error occurs on the server. The server will attempt to resolve this issue without user intervention as best as possible
  - The user may be notified if the error affects them
  - Some examples of this error would be:
    * Inability to create a new user in the database
    * Inability to create a new plant or plant box in the database
    * Not all the necessary details have been supplied for the creation of a user/-plant/plant box
    * There is a network error with regard to connecting to the plant box (Note: future functionality will ensure the client continues to retry to connect to the plant box without user intervention)
  - The interface has been designed to ensure all input is validated before being sent through so as to minimise the possibility of these errors occurring

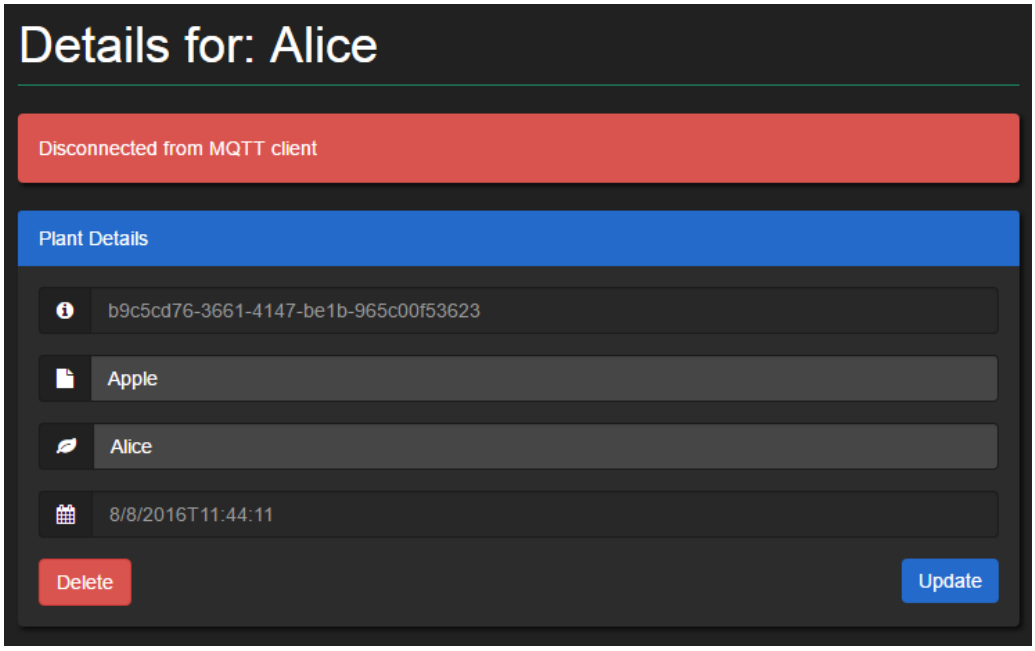

Figure 16: Error Establishing Connection to Plant Box

In conclusion the user will be notified of any errors which they may need to address with detailed descriptions via the interface when the system is unable to handle them itself.

6.2 Plant Box Troubleshooting

6.2.1 Problem: Device cannot connect to AWS IoT platform

Device may not have been set up correctly: Ensure your `aws_iot_config.h` file has been set up with the correct details in terms of the AWS IoT MQTT host, port, etc.

Device does not have the correct certificates and/or keys: Download the corresponding files associated with your Plant Box via the user interface and ensure they are present on your Plant Box's hardware device

6.2.2 Problem: Published messages are not being received

Message formatting may be incorrect: Ensure that the messages being passed from the Plant Box to the MQTT client obey the following format:

```
{
  "state": {
    "desired": {
        "key1": "value1",
        "key2": "value2"
    },
    "reported": {
      "key1": "value1",
      "key2": "value2"
    }
  }
}
```

Plant Box may be disconnected: Ensure you see the message "Successfully connected to MQTT client" on a Plant's Details page

Plant Box may not be powered on: Ensure the Plant Box's hardware device is plugged in and receiving power

6.2.3 Problem: Device not taking readings

Sensors may be plugged into the wrong ports: Ensure that the sensors are plugged into the correct ports on the shield.