Group 27

Green Core

The Smart Gardner

Team

Supervisor

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Co-Supervisor

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Outline

- Introduction
- Problem Definition
- Goal and Objectives
- Project Scope
- Deliverables
- Functional Requirements
- Quality Attributes
- Feasibility Study
- Progress of the project
- Member Contribution
- High Level System Architecture
- Technologies
- Deployment Plan

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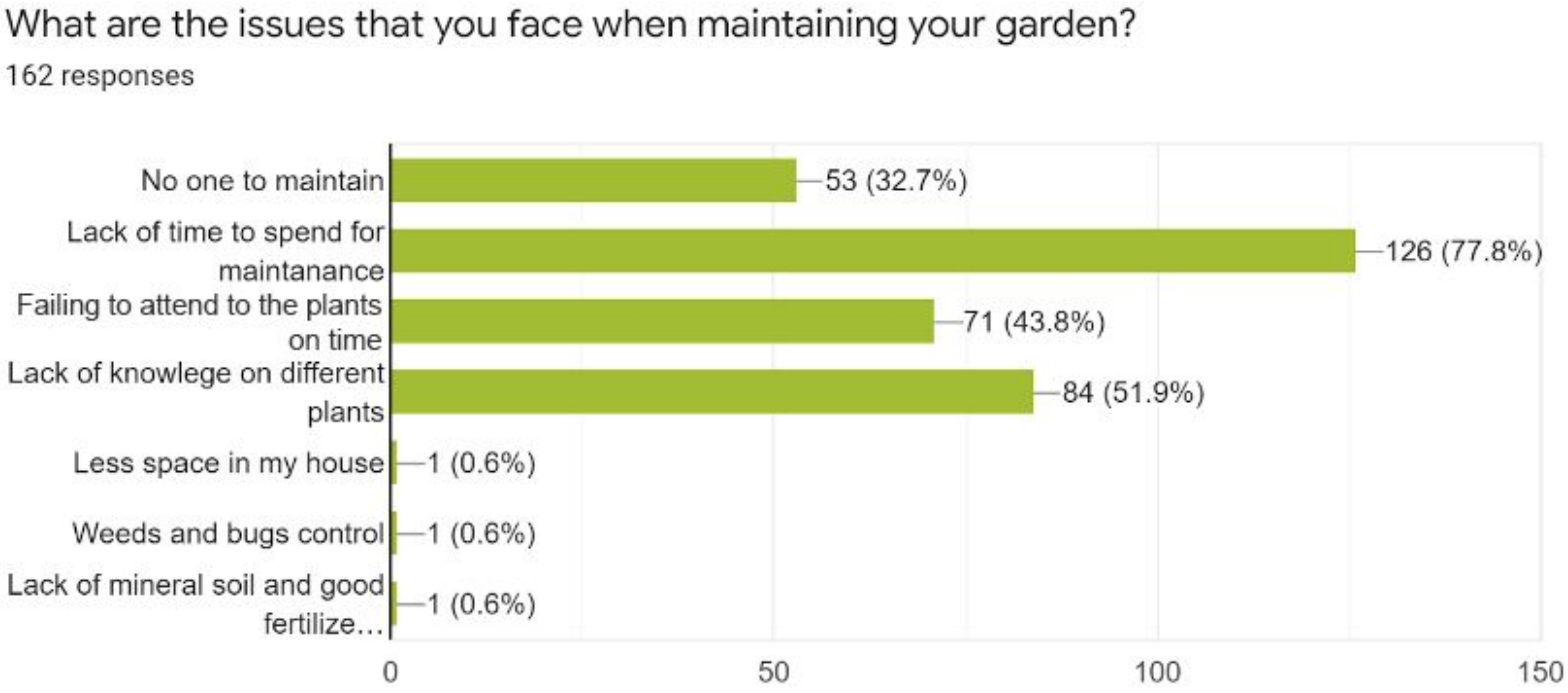
Problem Definition

- People tend to stay at home leisurely for limited time Due to their busy lifestyles.
- Gardening with minimum effort is worth and effective.
- With the pandemic which occurred in recent past, people tend to grow their own produce for sustainability.
- But after this situation people may not have time to take care of their plants due to their busy lifestyle.

Results of the survey



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Introduction

- Green-Core is an automated gardening system consists of both manual and automatic gardening features.
- Enable users to control their garden while they are away from home by using a smartphone.
- Capable of real gardening features such as watering plants.
- System consists of an IoT device and a mobile app for the user and a web app to control inner settings.

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Goal and objectives

Our Goal

Our main goal is to develop a smart garden environment that allows the user to provide a periodic gardening experience via a mobile phone.

Objectives

- People can get fresh vegetables and fruits from their garden with aid of a Mobile App.
- Track the progress of each unit's status.
- Adjust the growing environment remotely and automatically manage the garden lively.
- Get periodic notifications of individual units status via Mobile App.
- Administrator can collect, view data of all gardens via Web App and use them for identifying vulnerable units etc.

Project Scope

Project Scope

In Scope

- Interactive Mobile App that allows user to control water level, light intensity , liquid fertilizer automatically and manually .
- User can monitor soil moisture level, temperature, humidity level using Mobile App.
- Web App can identify vulnerable units and interact with users to resolve issues via a chat module.

Project Scope

Out Scope

- Train a machine learning model using the data gathered by the sensors to predict optimal conditions to grow specific plant types.
- Generating reports regarding useful analytical data.

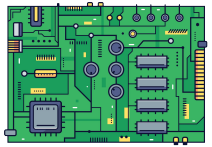
Challenges

- Bug Control System
  - Detecting bugs using motion sensors is practically challenging, because even if the motion of leaves are detected the buzzer will switch on.

Deliverables

- Mobile app

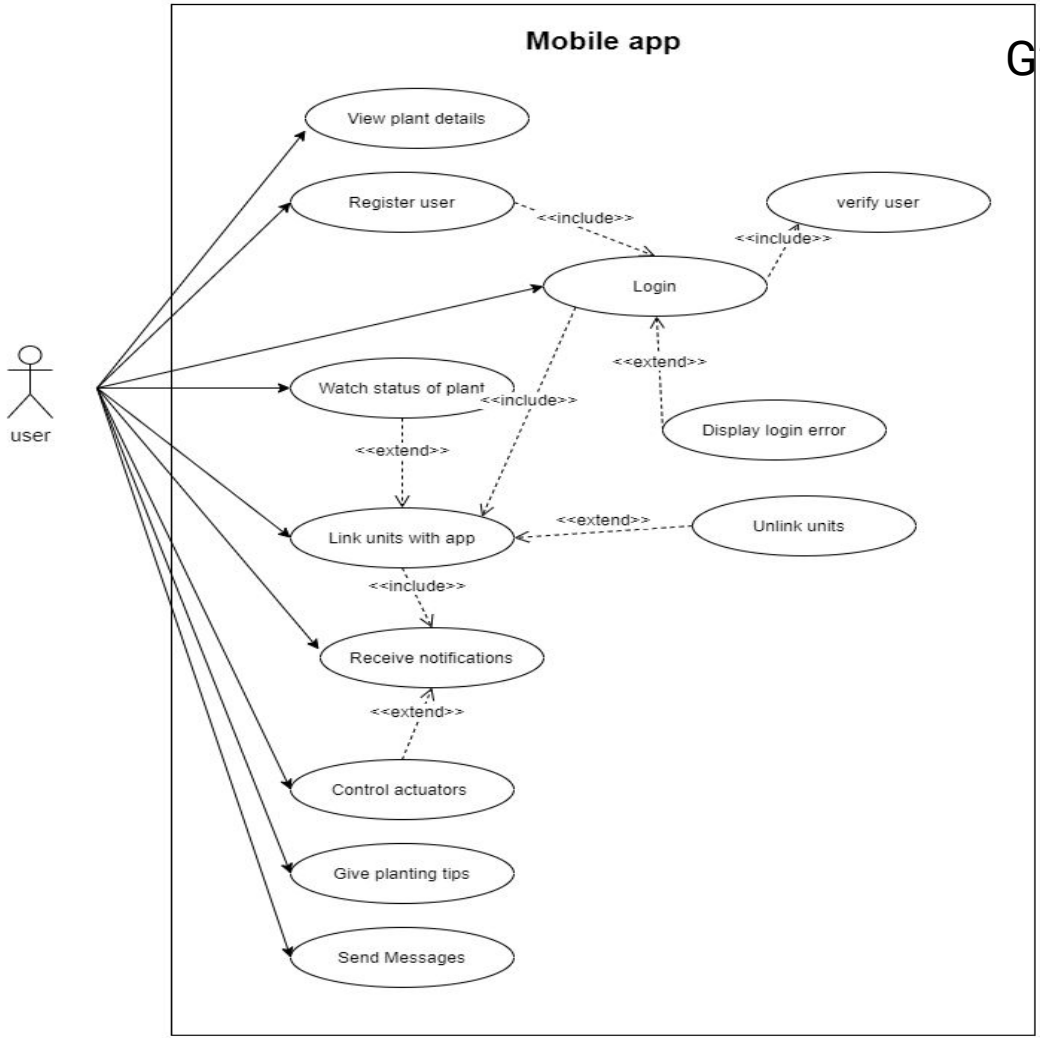
- IoT Device



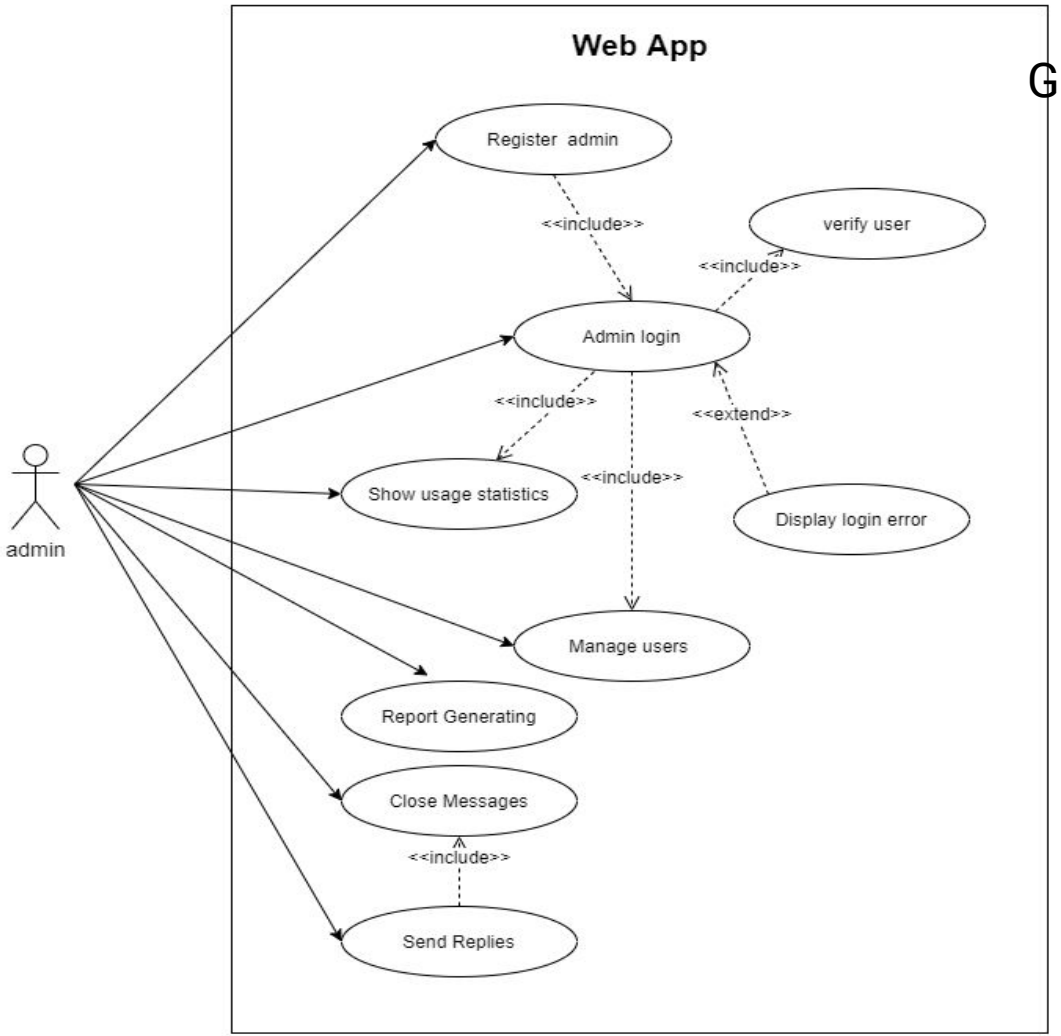
- Web App

Use Case Diagrams

Mobile App


Mobile app
View plant details
Register user
verify user
<<include>>
<<include>>
Login
user
Watch status of plant
<<include>>
<<extend>>
Display login error
<<extend>>
<<extend>>
Link units with app
Unlink units
<<include>>
Receive notifications
<<extend>>
Control actuators
Give planting tips
Send Messages

Web App


Web App
Register admin
<<include>>
verify user
<<include>>
Admin login
<<include>>
<<extend>>
admin
Show usage statistics
<<include>>
Display login error
Manage users
Report Generating
Close Messages
<<include>>
Send Replies

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Functional Requirements

Functional Requirements of the Mobile App

- User can sign up and log into the mobile App and setup account settings.
- App is able to get feedback of IoT units.(Humidity sensor,Light intensity sensor,servo motors,water level sensor and soil moisture sensor)
- Periodic notifications regarding status of the user's garden.
- User can monitor the garden status.(water level,nutrition level and light intensity)
- User can add new units/modules
- Users can contact administrators using the inbuilt chat .

Functional Requirements of the Web App

- User(admin) can sign up and log in.
- User can update profile details.
- View analyzed data(graphs) about gardens.
- View a district wise local map of all the mobile app users garden location.
- Notify about failed or vulnerable units.
- Contact users regarding their issues and issues with their IOT devices(Chat Module).

Functional Requirements of the IoT Device

- Plant Watering System
- Plant Fertilization system
- Light Intensity Control

Quality attributes

Availability

- System will be available on both mobile and web with any internet accessible device.

Usability

- Simple and easy to use interface throughout the mobile and web App.

Dependability

- Backups backend database to a database in the cloud periodically.

Security

- Only administrators can access the web App and
- Only registered users can enter to the mobile app.
- Assumption- Administrator is a trustworthy person.

Maintainability

- Mobile app can be updated easily through Playstore.
- Repairs on the IoT device can be done easily because of the modular nature of the IOT device.

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- Proposed Technologies
- Project Delivery Timeline
- High Level System Architecture
- System Development Methodology

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Feasibility Study

Technical Feasibility

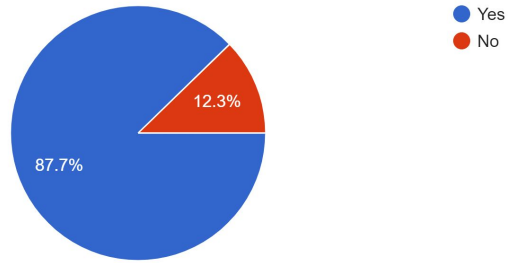
- To satisfy our requirements, IoT device ESP8266 and arduino mega is sufficient along with some sensors such as soil moisture, humidity, etc.
- We use Amazon Web Server(AWS) which is also available for free for a year to host our virtual servers.
- MongoDB , Node.js and Reactjs are Free and Open Source.
- Mobile App will run on any tablet or smartphone with proper backups.
- Web App will run on all major browsers with proper security features.

Operational Feasibility

- Both the mobile App and web App will provide simple and intuitive Interfaces to the user.
- Web based System so that user can enroll with the system at any time any where.
- Almost everyone uses smartphones in their daytoday life so an app is a good way to get notifications about the plantation.

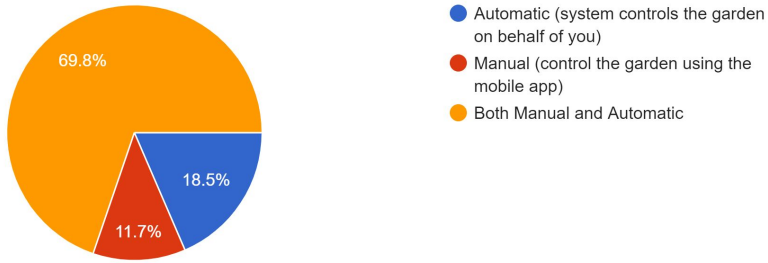
Do you prefer to use an IoT device and a mobile app to control your garden?

163 responses



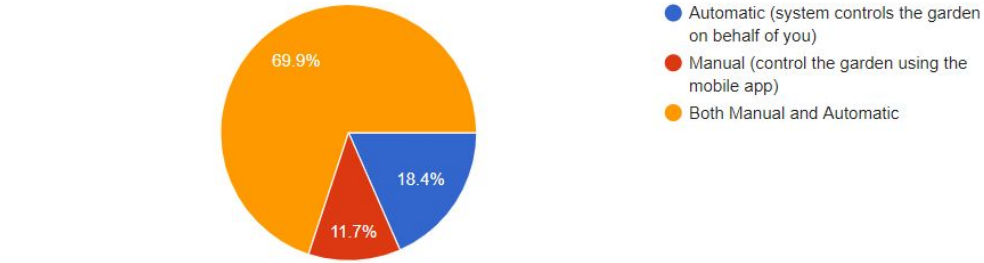
Which type of system do you prefer?

162 responses



Which type of system do you prefer?

163 responses



Is it comfortable for you to get the service of this type of application with the facilities you already have?(WiFi, Mobile devices etc)

163 responses

Economic Feasibility

- The web App is hosted in the AWS free-tier server, which is provided by AWS for free for one year and this bears zero cost for the first year of operation.
- As we use MongoDB for our database which is free and there are 25 Million database operations provided for the free tier.
- We develop IoT device using arduino uno and ESP8266 as they are cost effective (cost will be around 20$ per unit)
- Since it is developed only by a team of university students, development cost also can be factored as none.

Schedule Feasibility (Time Estimation)

- Number of work hours for a member
  - Weekdays = 3*5
  - Weekends = 4*2
- Man-hours per week = (3*5 + 4*2)*6= 138
- Estimated number of weeks = 13
- Estimated total of man hours = 138*13 = 1794

Legal and Ethical Feasibility

- Privacy of information - User details and their garden information will not be exposed at any cost.
- Handling user data - The interest of the user within the system is confidential and will not be sold or used for advertising purposes (AdSense etc.)
- User and IoT device location will be recorded only with the consent of the user.

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Progress of the project

Mobile App

Completed Tasks

- View User profile
- Registration
- Update User Details
- Login
- Link Units
- Chat Module
- Navigation
- View All Units

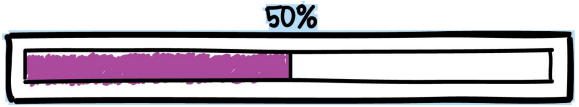
Ongoing Tasks

- Forgot Password
- View Unit Details
- Email Verification
- Alerts

Remaining Tasks

- Control Actuators

Web App



Completed Tasks

- Chat Module
- View All Users
- View All Units
- View Single Unit
- Navigation

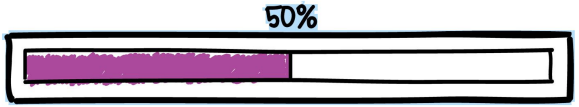
Ongoing Tasks

- Registration
- Login
- View Admin Details
- Update Admin Details
- View Single User

Remaining Tasks

- View All Vulnerable Units
- Unit Location View
- View Single Vulnerable Unit
- Email Verification
- Forgot Password
- Reset Password

IoT Device



Completed Tasks

- Soil moisture detection
- Humidity detection
- Temperature detection
- Light Intensity Control

Ongoing Tasks

- Plant watering system
- Lighting System

Remaining Tasks

- Fertilizing system

Design & Documentation

- System & Database Design - 100%
- Software Requirement Specification - 100%
- User Manual - Not Yet Started

Member Contribution

M.M.H Tharushika - 17001765	Web App ● User Registration ● User Login
H.U.K.M Pabasara - 17020611	Web App ● View Users ● View all Vulnerable Units

J.A.N.C Niroshana - 17001196	Mobile App ● Account settings ● Profile settings ● Link units ● Linked units ● Unit details ● Notifications(Currently developing)

B.A Medawatta	Chat Module - Web App ● View All Messages ● View Single Message ● Reply Message ● View Unread Messages Chat Module - Mobile App ● Send Message ● Reply Message ● View All Messages ● View Single Message Navigation - Web App Sensor detection & Control - IoT Device

K.C Gamage - 17000475	Mobile App ● Splash Screen ● Log in and Log out ● Secure Mobile App all Rest API requests with JWT tokens ● Sign up ● Mobile App Navigation
K.S.A Ahamed - 17020034	Web App ● View units ● View users

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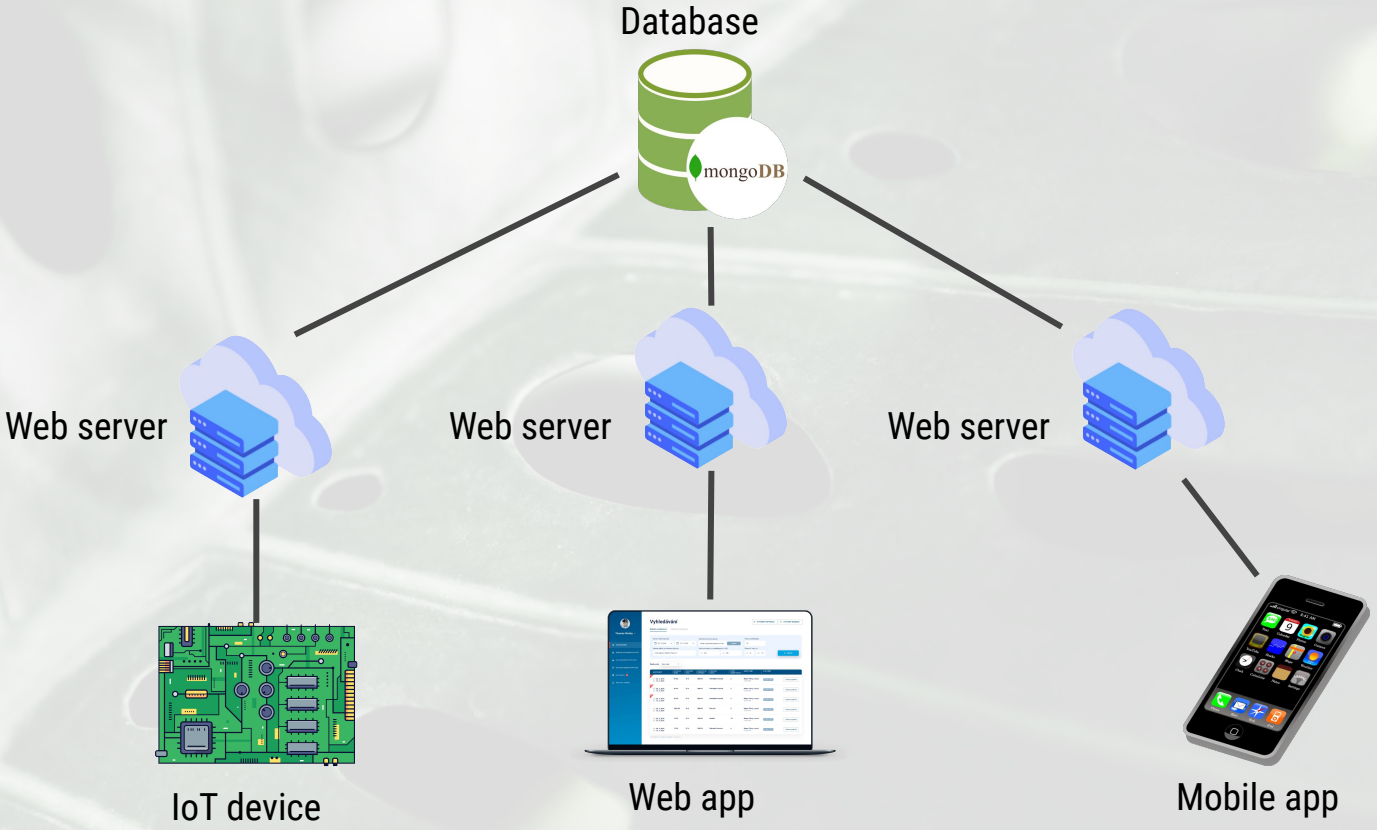
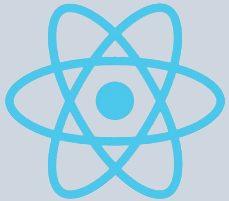
High Level System Architecture


Database
mongoDB
Web server
Web server
Web server
IoT device
Web app
Mobile app

Technologies

Mobile App & Web App

Front End



React JS

React native

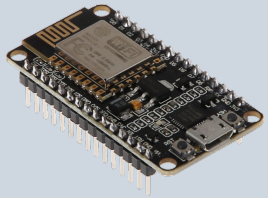
Back End

MongoDB

NodeJS

IoT device

Device



Node MCU

Arduino mega

Back End

MongoDB

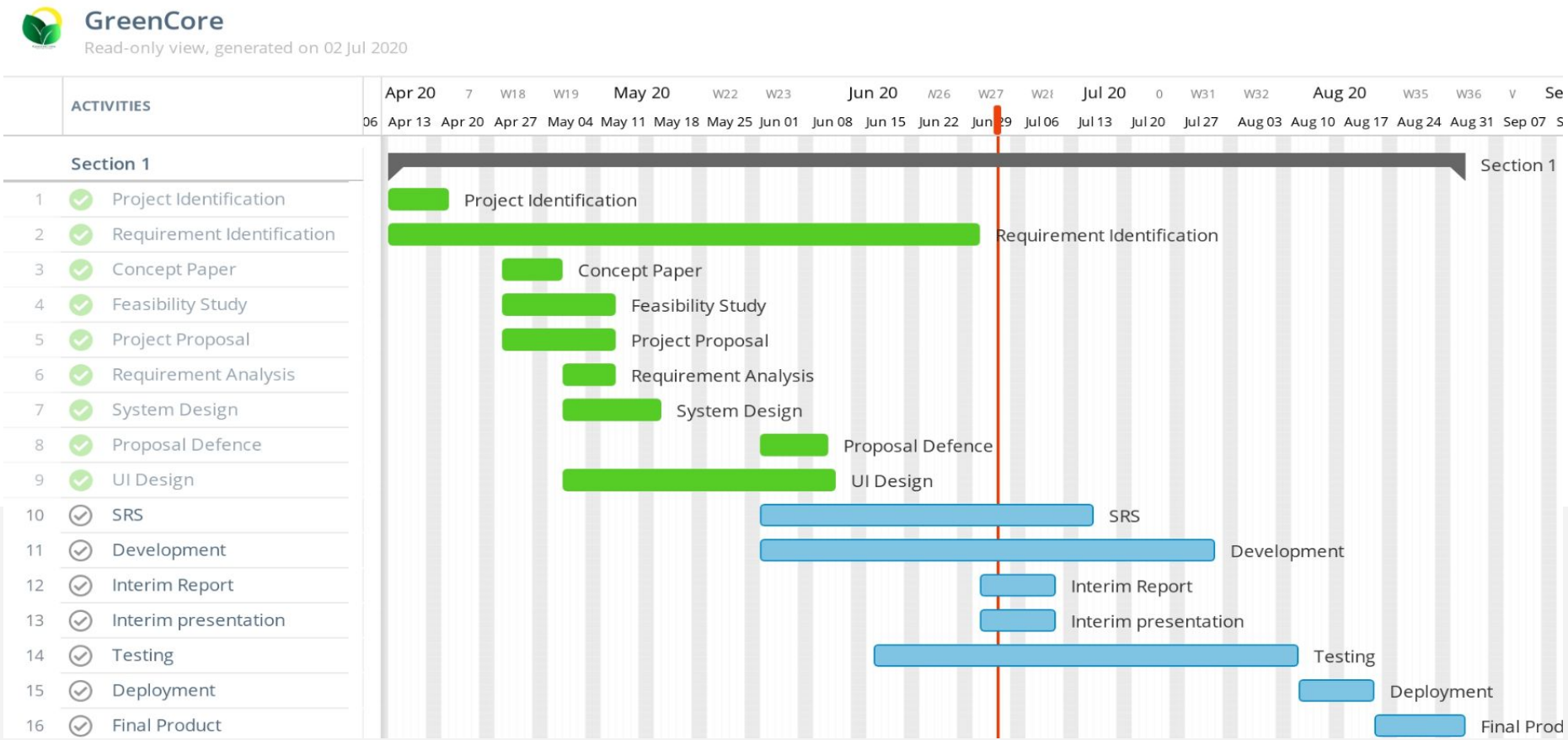
NodeJS

Deployment Plan

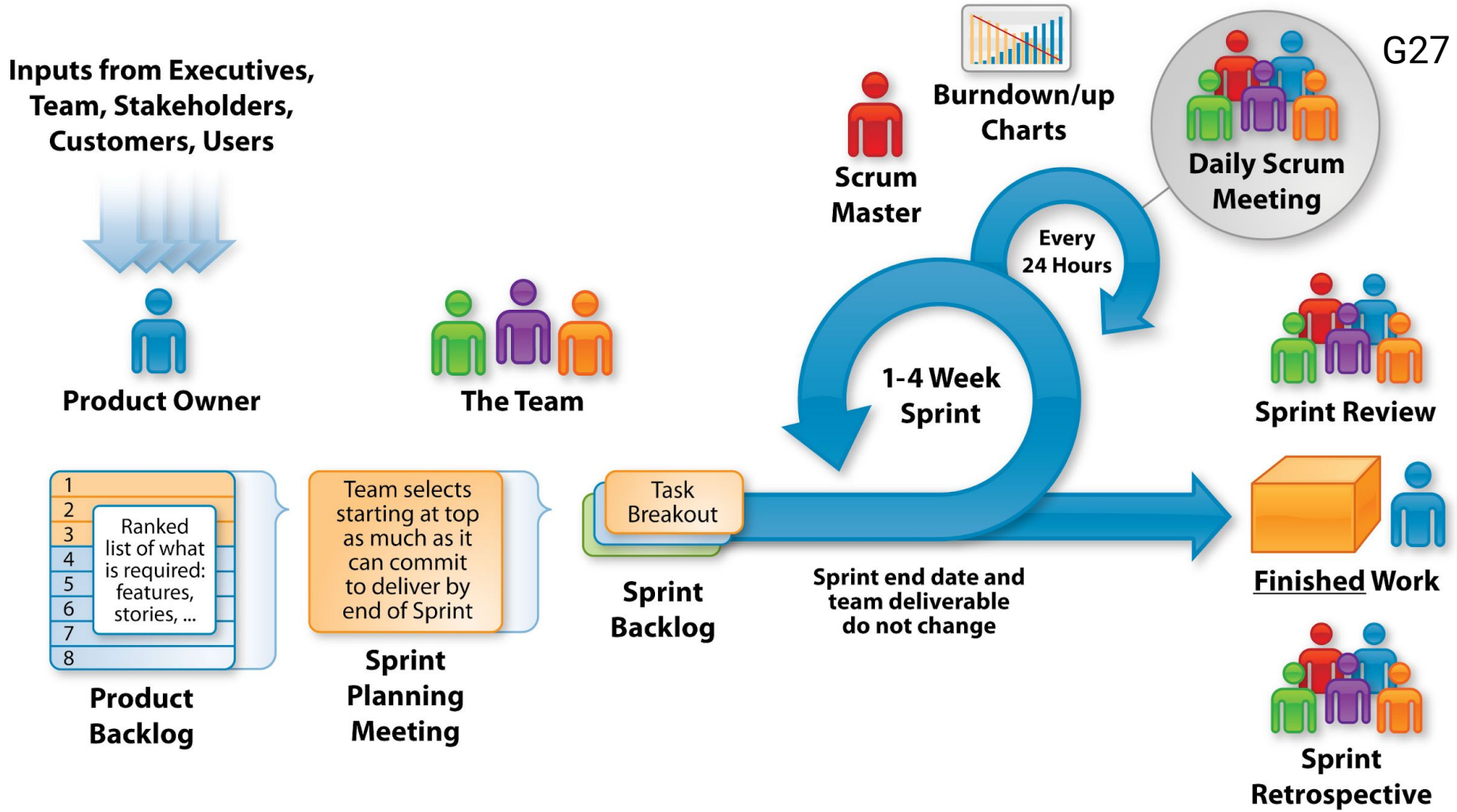
Deployment Plan

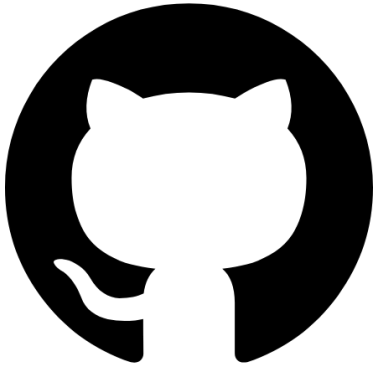
- Testing and deployment will be initially done in a Heroku server
- When the user base grows the servers will be deployed in AWS EC2 instances.

Project Delivery Timeline



System Development Methodology & Project Management


Inputs from Executives, Team, Stakeholders, Customers, Users
Product Owner
The Team
Scrum Master
Burndown/up Charts
Daily Scrum Meeting
Every 24 Hours
1-4 Week Sprint
Sprint Review
1
2
3
4
5
6
7
8
Ranked list of what is required: features, stories, ...
Product Backlog
Team selects starting at top as much as it can commit to deliver by end of Sprint
Sprint Planning Meeting
Task Breakout
Sprint Backlog
Sprint end date and team deliverable do not change
Finished Work
Sprint Retrospective



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Green core Mobile App backend
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IoT Device code of Green-Core
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People 8

Invite someone

Thank You

Demonstration

Any Questions ?