Plant Irrigation System

TSM_MobCom - Team Project Presentation

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Overview

Introduction

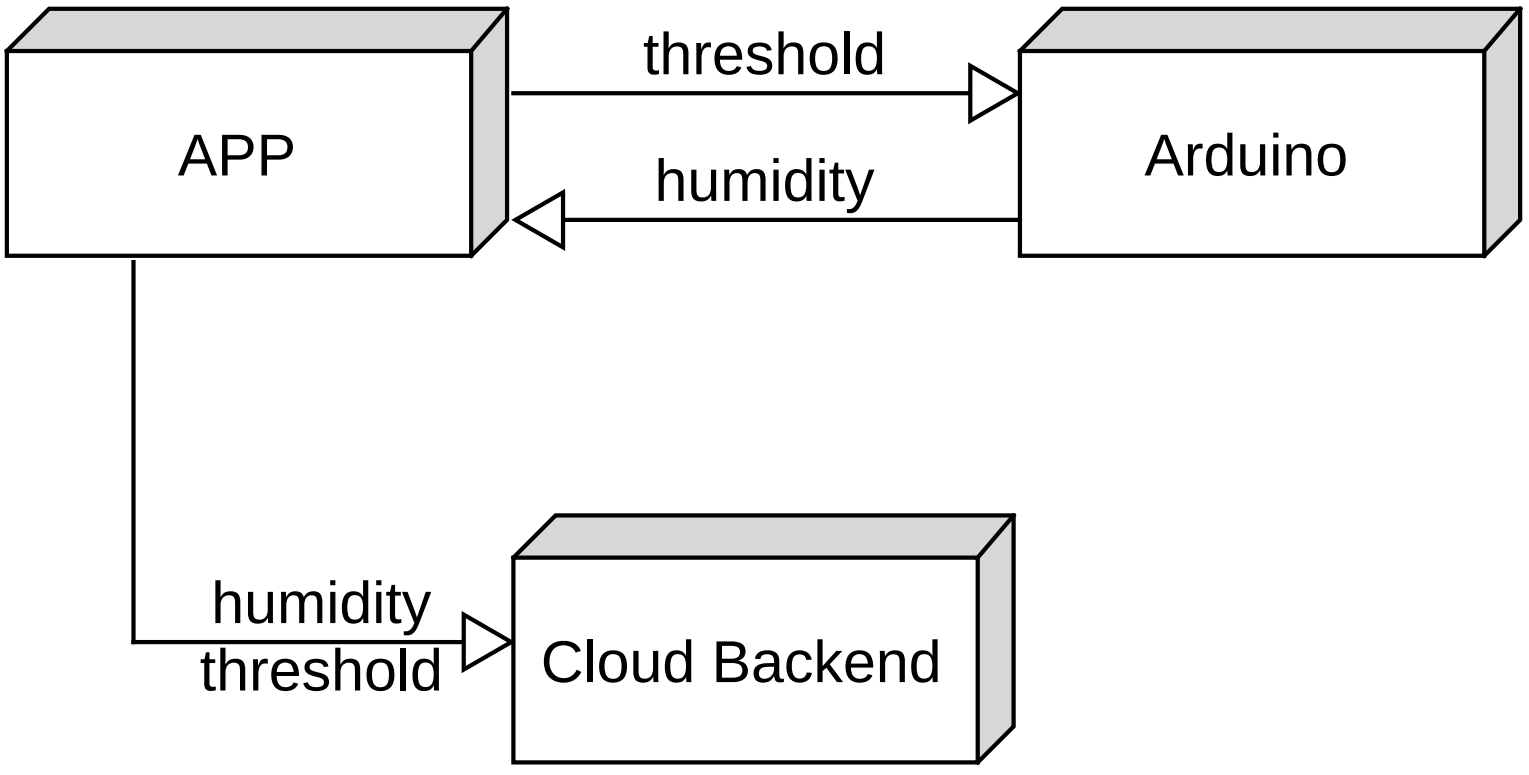
Plant irrigation device that measures the soil humidity and opens a valve, that automatically waters the plant when the required humidity threshold is undershot.

Use Case:

- A user should be able to set a soil humidity threshold for his plant via app.
- When a threshold has been set, the user will be displayed data about the current soil humidity of his plant
- The plant watering is automatically triggered when the humidity is undershot.
- The user only has to refill the water tank from time to time.
- The data is sent to a cloud backend, so that it can be shared between different members of the same household.

System Architecture

Reference Model



System Architecture

HTTP Interface

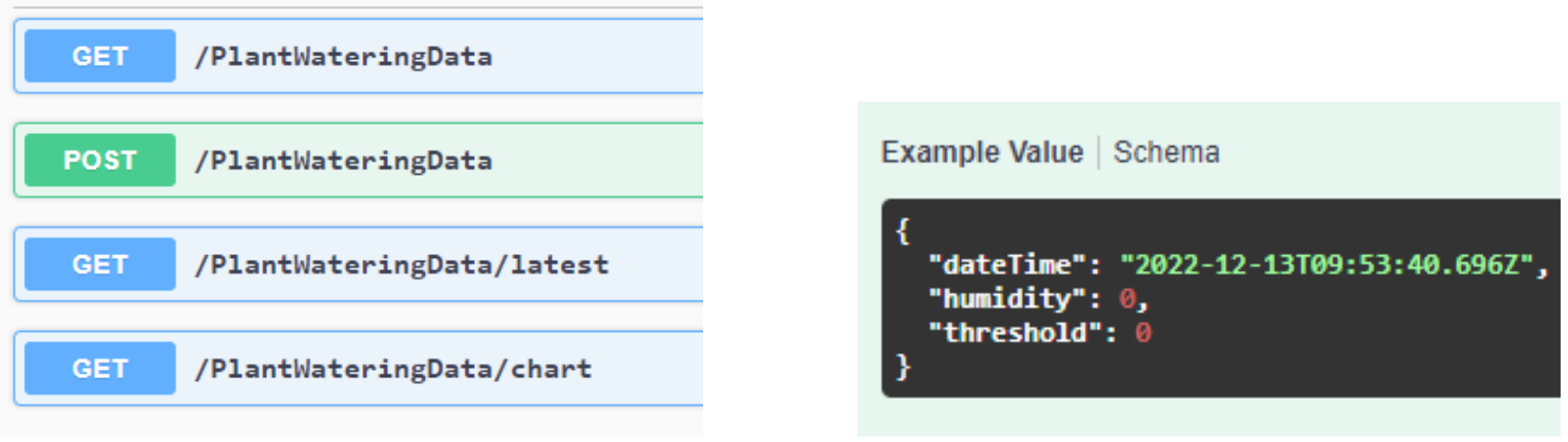


Figure: Cloud Backend Interface with Data format in the POST Method

System Architecture

BLE Interface

plantWateringService, UUID:
DDA50001-106D-4D32-949F-D07461C6C2FA

thresholdCharacteristic, UUID:
DDA50002-106D-4D32-949F-D07461C6C2FA [W]

humidityNotifyCharacteristic, UUID:
DDA50003-106D-4D32-949F-D07461C6C2FA [N]

System Architecture

Navigation

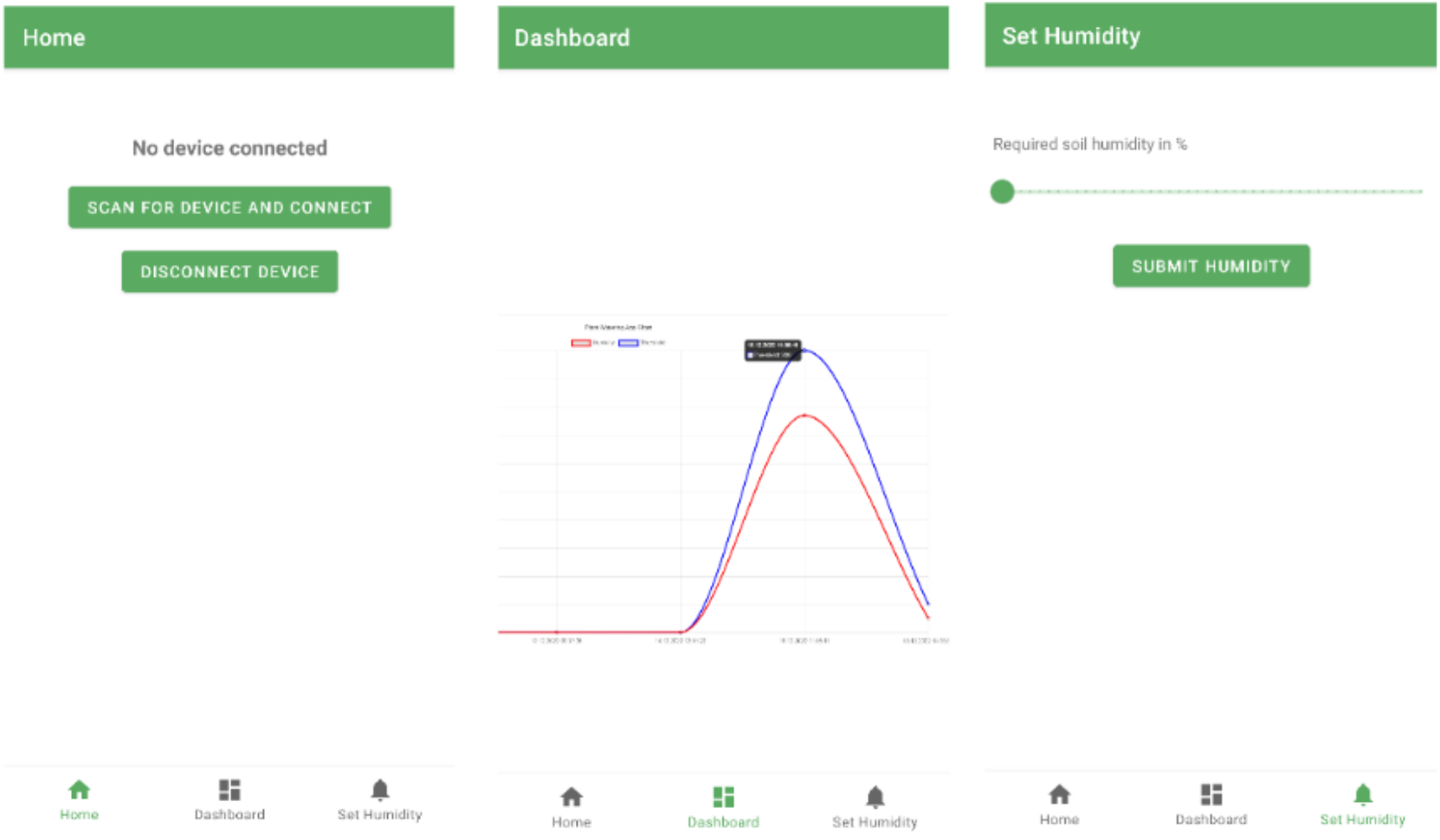


Figure: User Interface

Software Design

Simplified Class Diagram

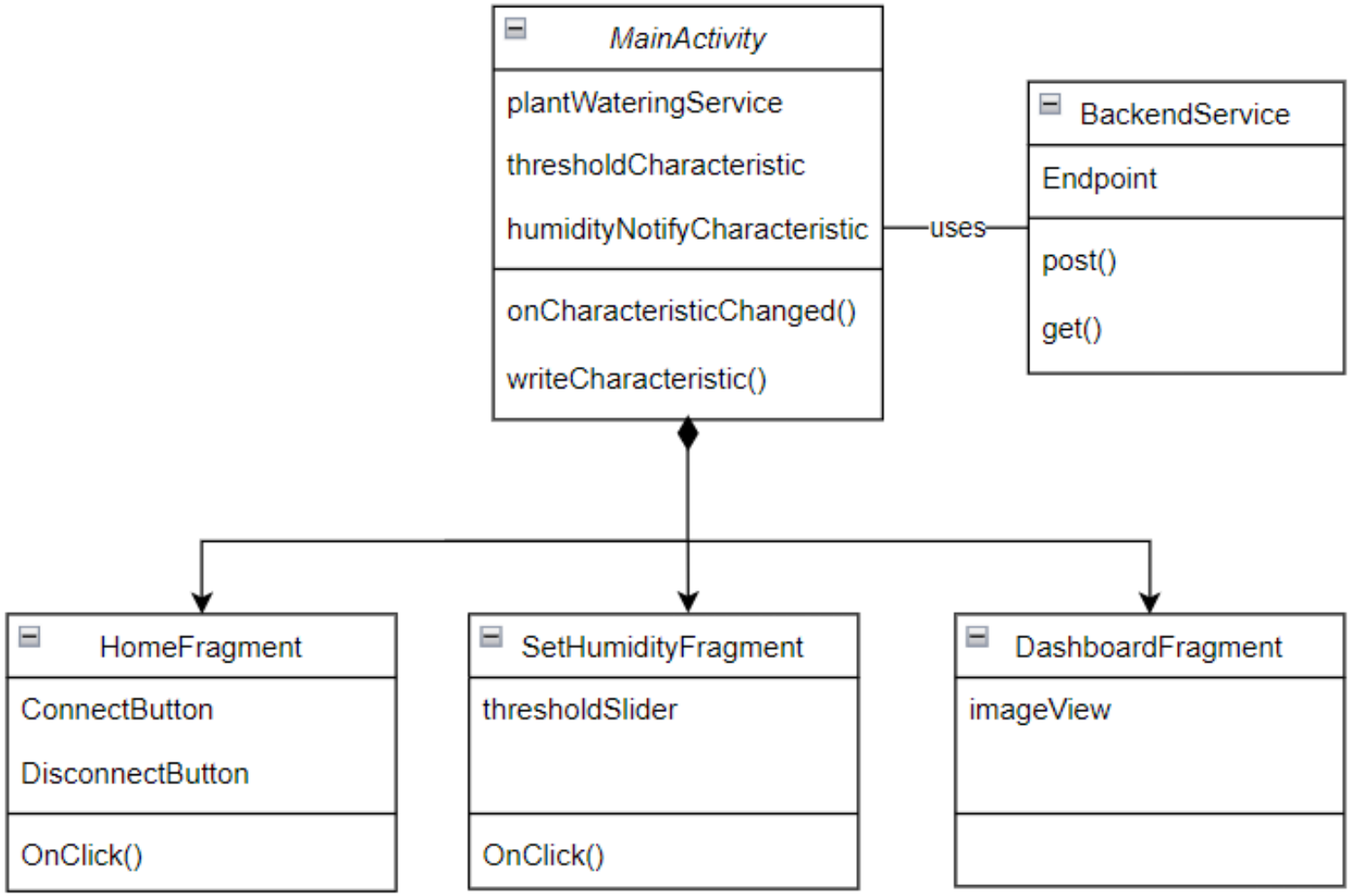
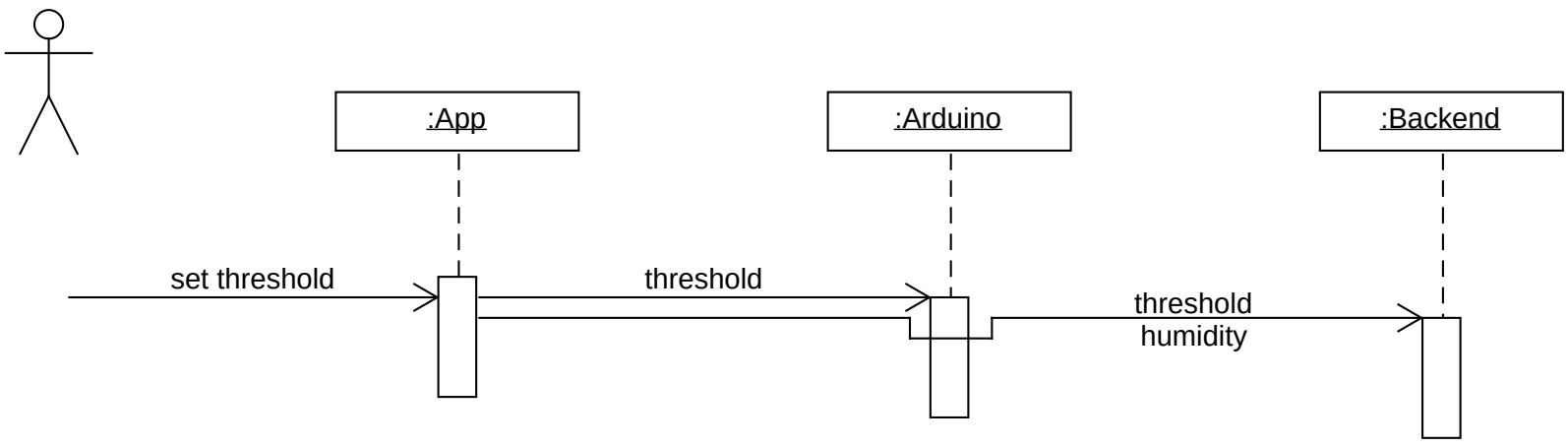


Figure: UML class diagram

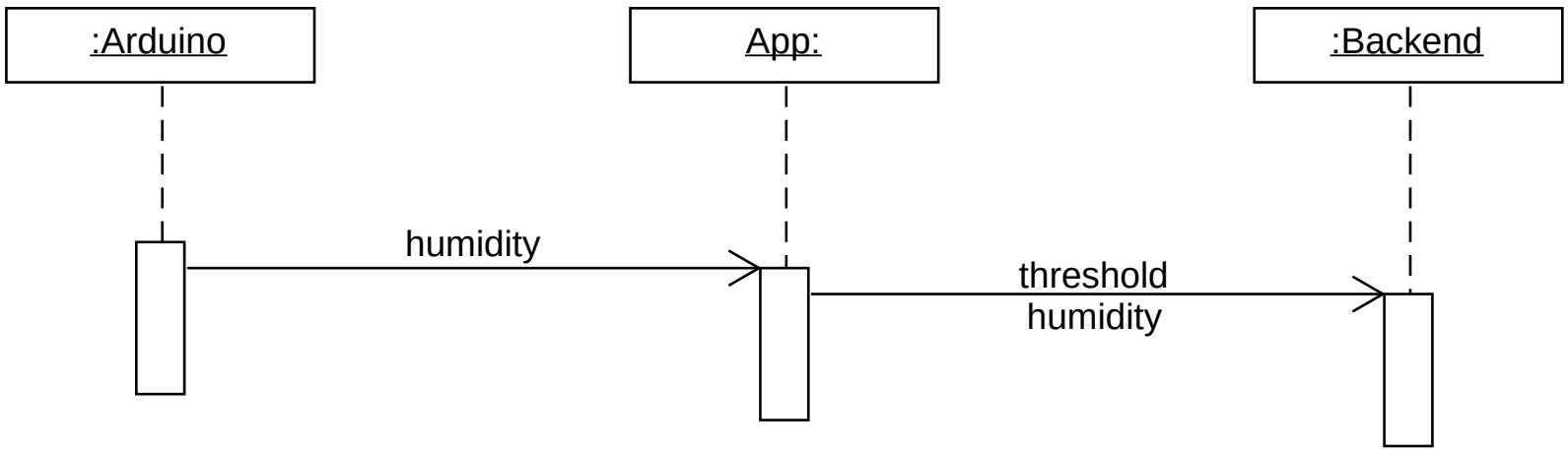
Software Design

Sequence Diagram – Set Threshold



Software Design

Sequence Diagram – Publish Humidity



Code Quality and Testing

Static Code Analysis

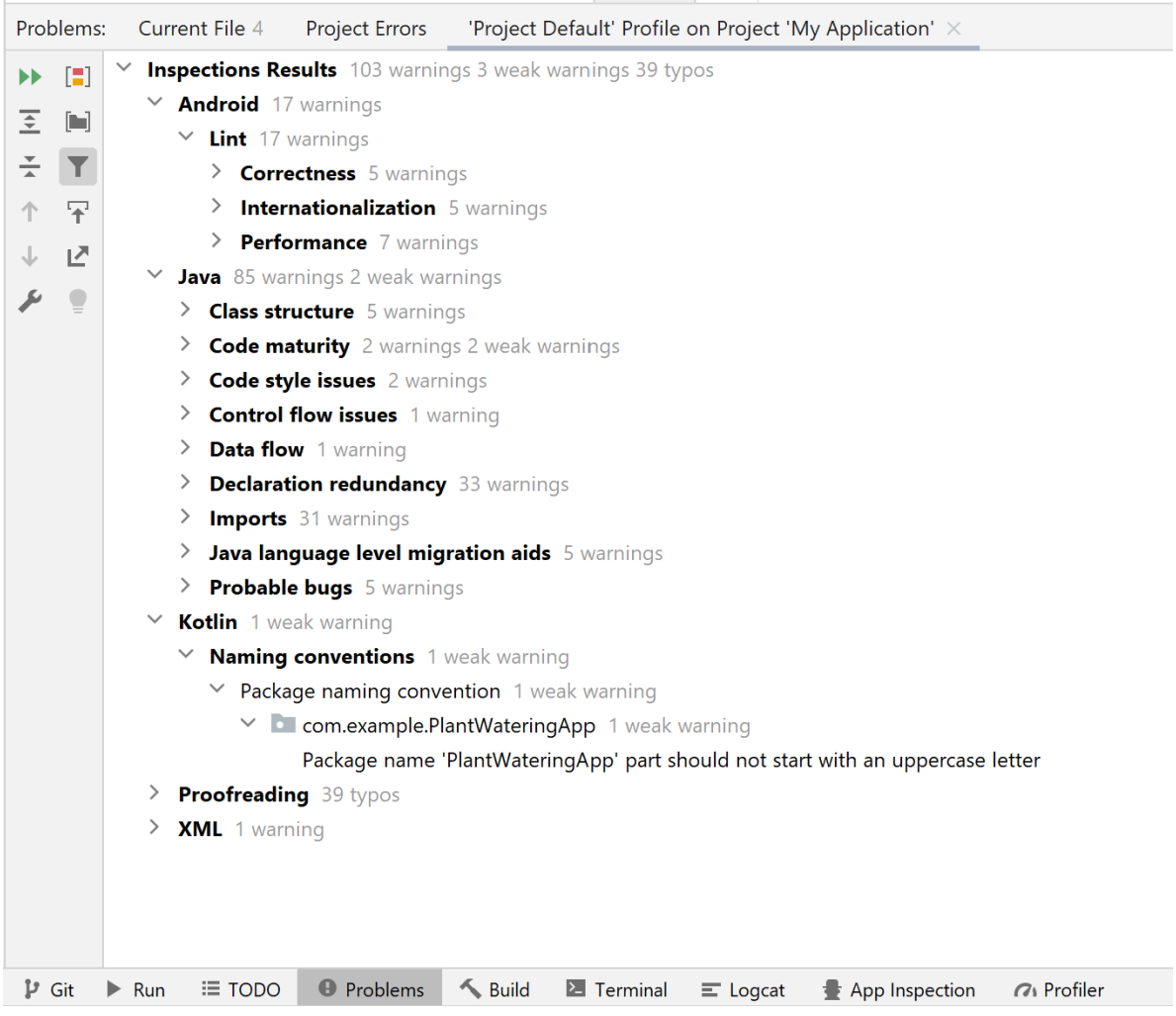


Figure: Static Code Analysis of Android Studio

Code Quality and Testing

Testing Checklist

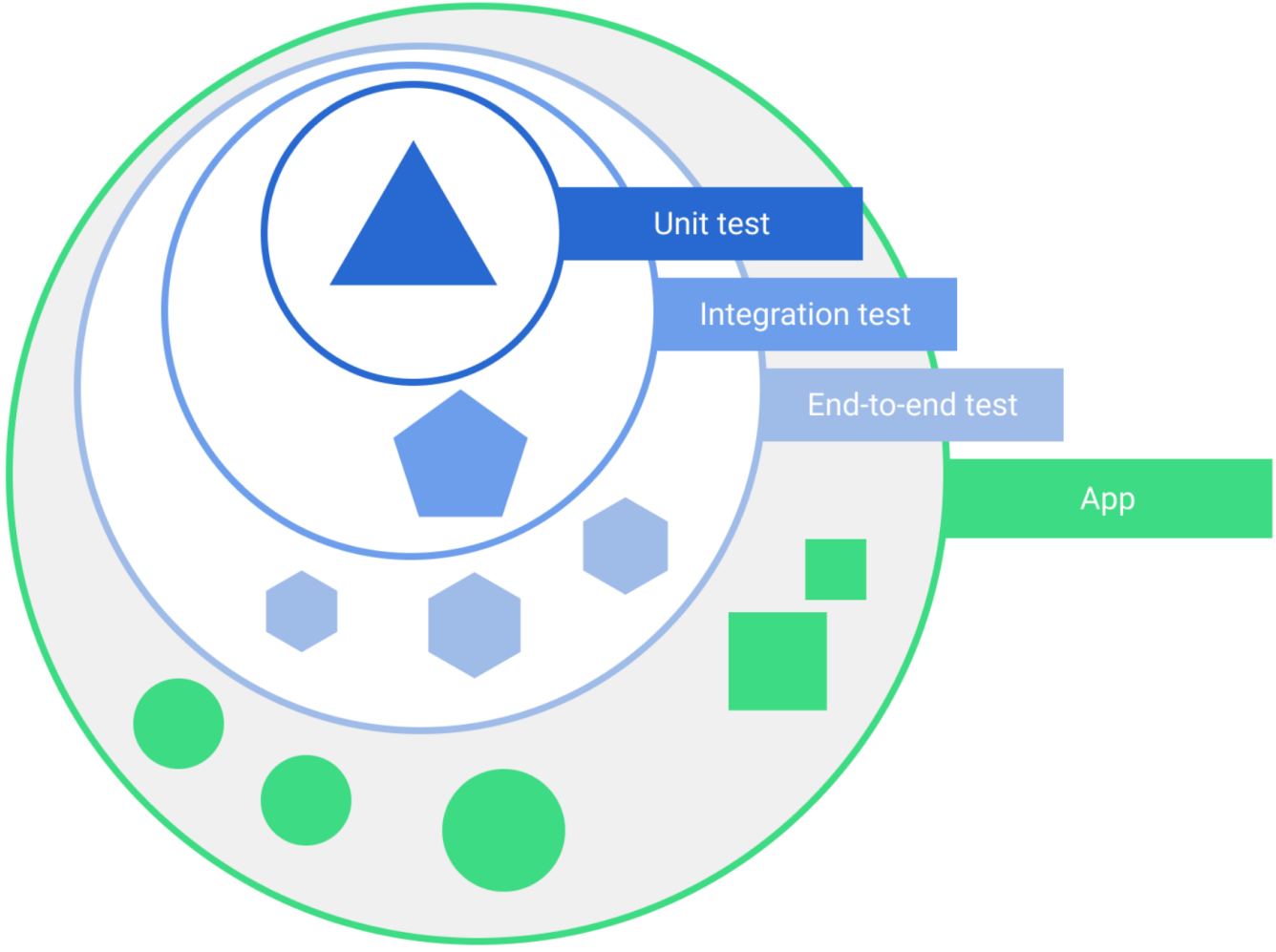


Figure: Source: https://developer.android.com/training/testing/fundamentals

Code Quality and Testing

Technical Issues

- Establishing BLE connection
- Data formats

Code Quality and Testing

Lessons Learned & Achievements

- How to setup a BLE connection
- Program a simple Andorid app
- Set up Arduino and required Hardware

Code Quality and Testing

Outlook

- Measure moisture on multiple points to support raised beds
- Add valves or multiple pump support to water multiple separated plants
- Include weather data to predict if watering will be necessary
- Allow for manual override of the watering system
- Add water measurement for water tank to get notified if it needs refilling