

“ Happy Green Plants System ,”

Team members:

Mohamed Amine Mbarek

s301215

Sara Gholamhosseinzadeh

s301689

Arman Mohammadgilani

s301000



Project overview

Objective

The objective of the project is to provide intelligent management of irrigation and monitoring for our plants. The anticipated outcomes involve the development of a smart service that oversees the well-being of the plants, regulates their irrigation system, and assesses crucial growth elements such as water levels and temperature.

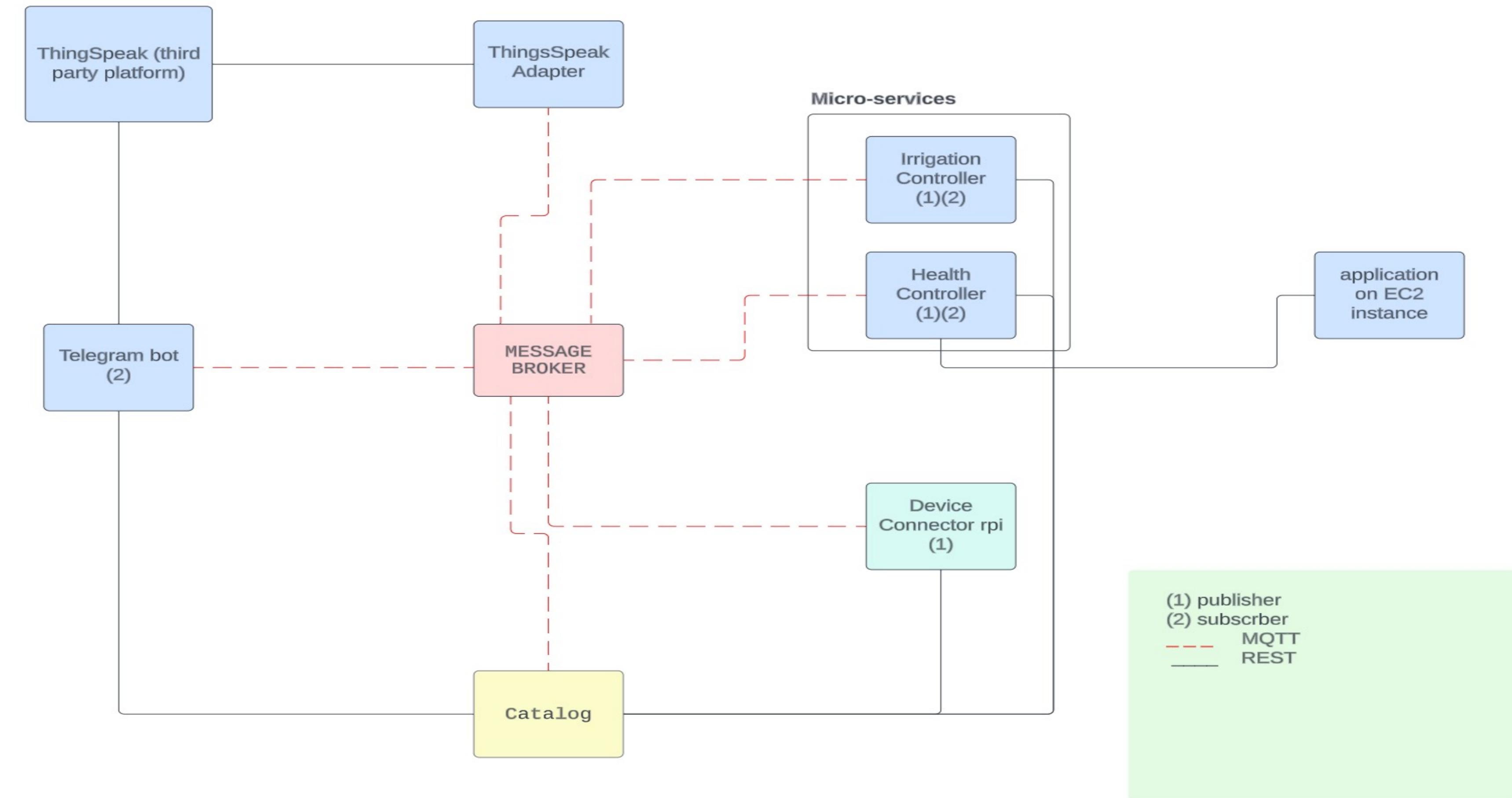
Improve the plant growth



Better assessment the plant's Health Status



System Diagram



System Definition

Catalog

Catalog

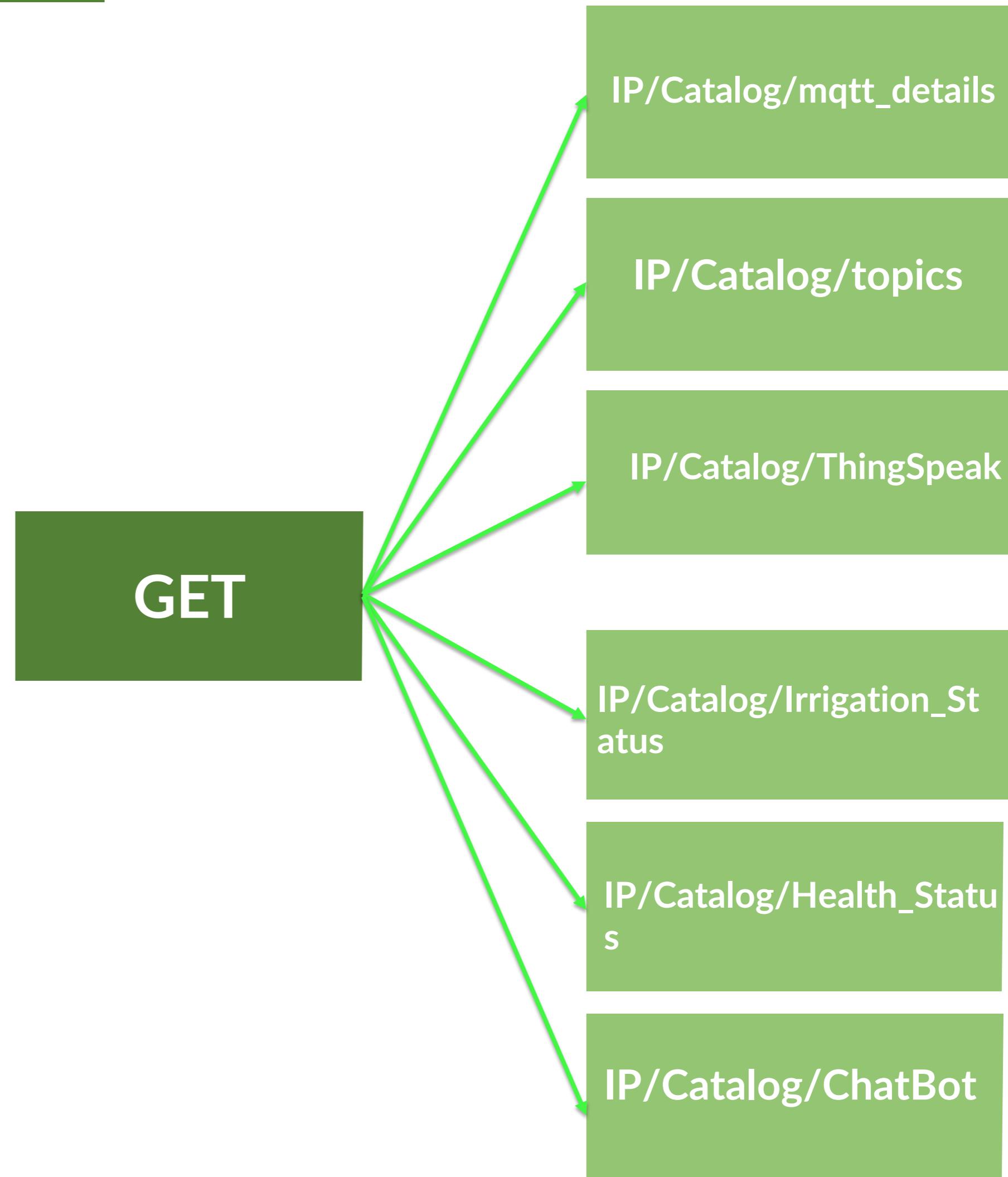
Utilizing the REST communication protocol, it has the ability to communicate with all of the other actors that are present on the platform.

Main Functions:

- ✓ Retrieve (GET)

- ✓ ADD (POST)

- ✓ UPDATE(PUT)



System Definition

Catalog

Catalog

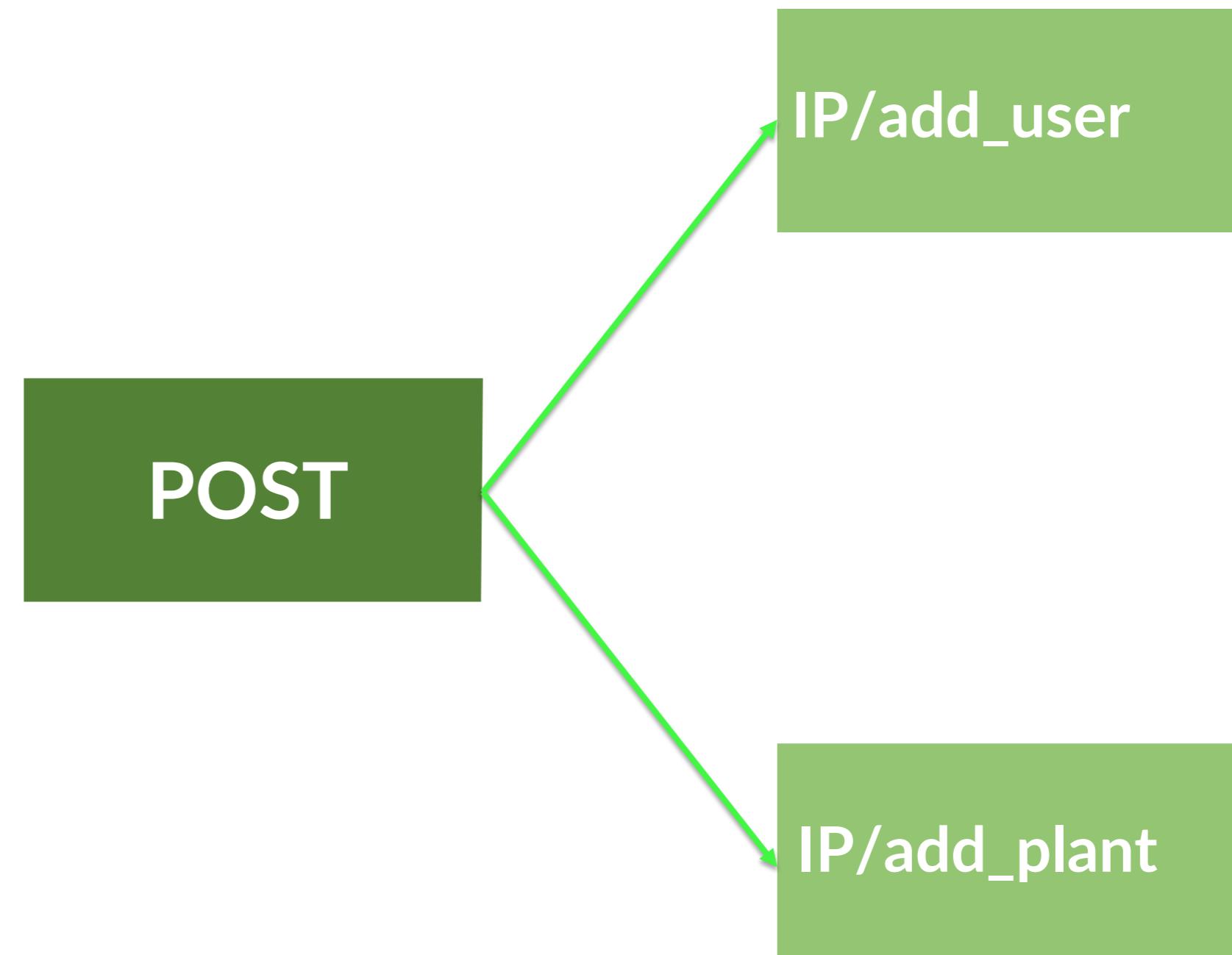
Utilizing the REST communication protocol, it has the ability to communicate with all of the other actors that are present on the platform.

Main Functions:

✓ Retrieve (GET)

✓ ADD (POST)

✓ UPDATE(PUT)

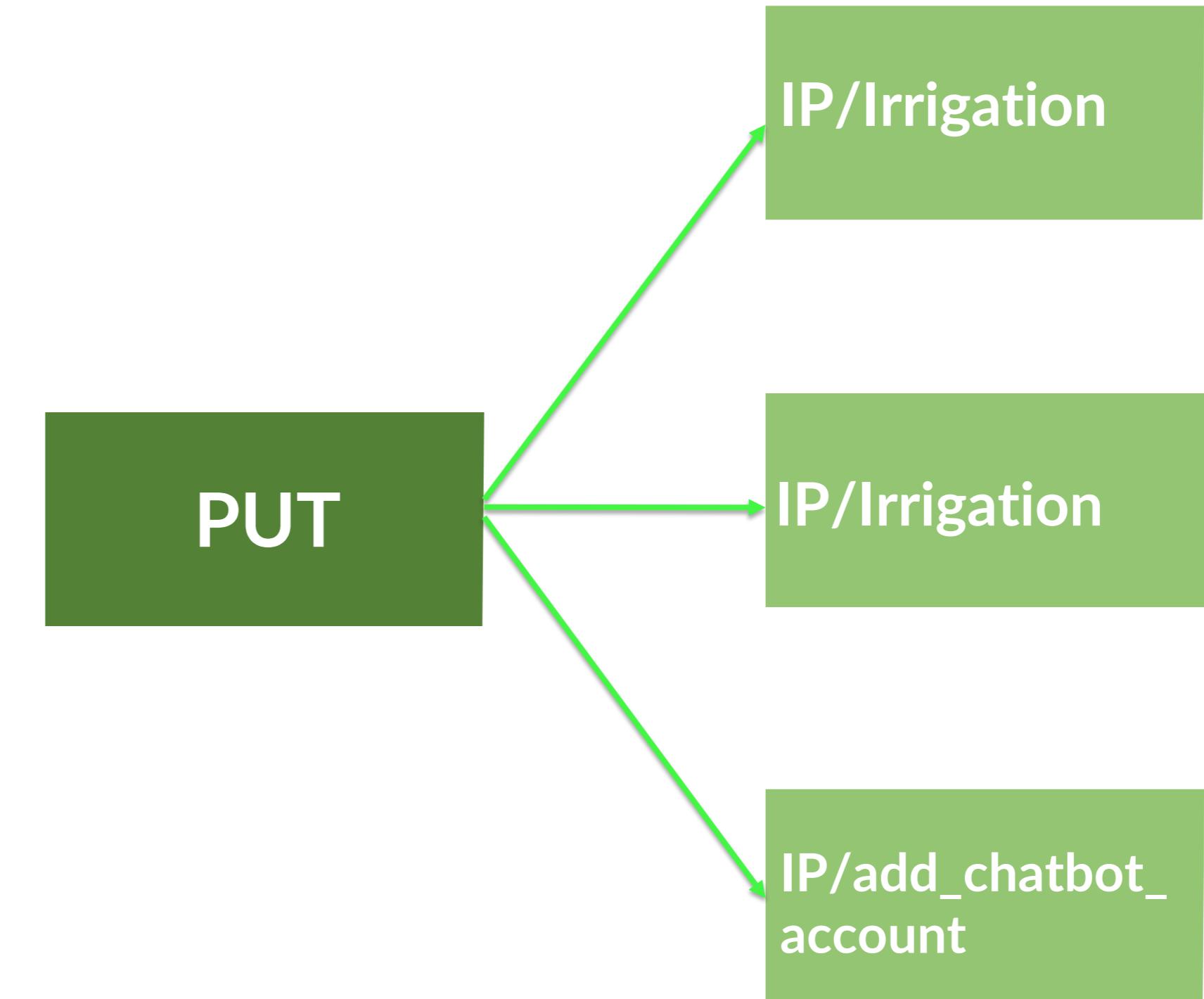


System Definition

Catalog

Catalog

Utilizing the REST communication protocol, it has the ability to communicate with all of the other actors that are present on the platform.



Main Functions:

- ✓ Retrieve (GET)
- ✓ ADD (POST)
- ✓ UPDATE(PUT)

System Definition

Catalog

Catalog

The Catalog JSON file provides information about general configuration, registered devices,
SAMPLE

Catalog ensures that the User's Plants data is always accurate . the devices are properly connected and eliminates any devices that are no longer operational.

System Definition

Device connector

Device Connector

Communication with

Catalog

Using a REST communication to register devices or to update already registered devices.

Health Control

Receives image from the Camera and sends the following Image to a Flask API running in amazon's EC2 .

ThingSpeak Adaptor

Acquires all measurements from the sensors that are made public by Device Connector.

Irrigation Control

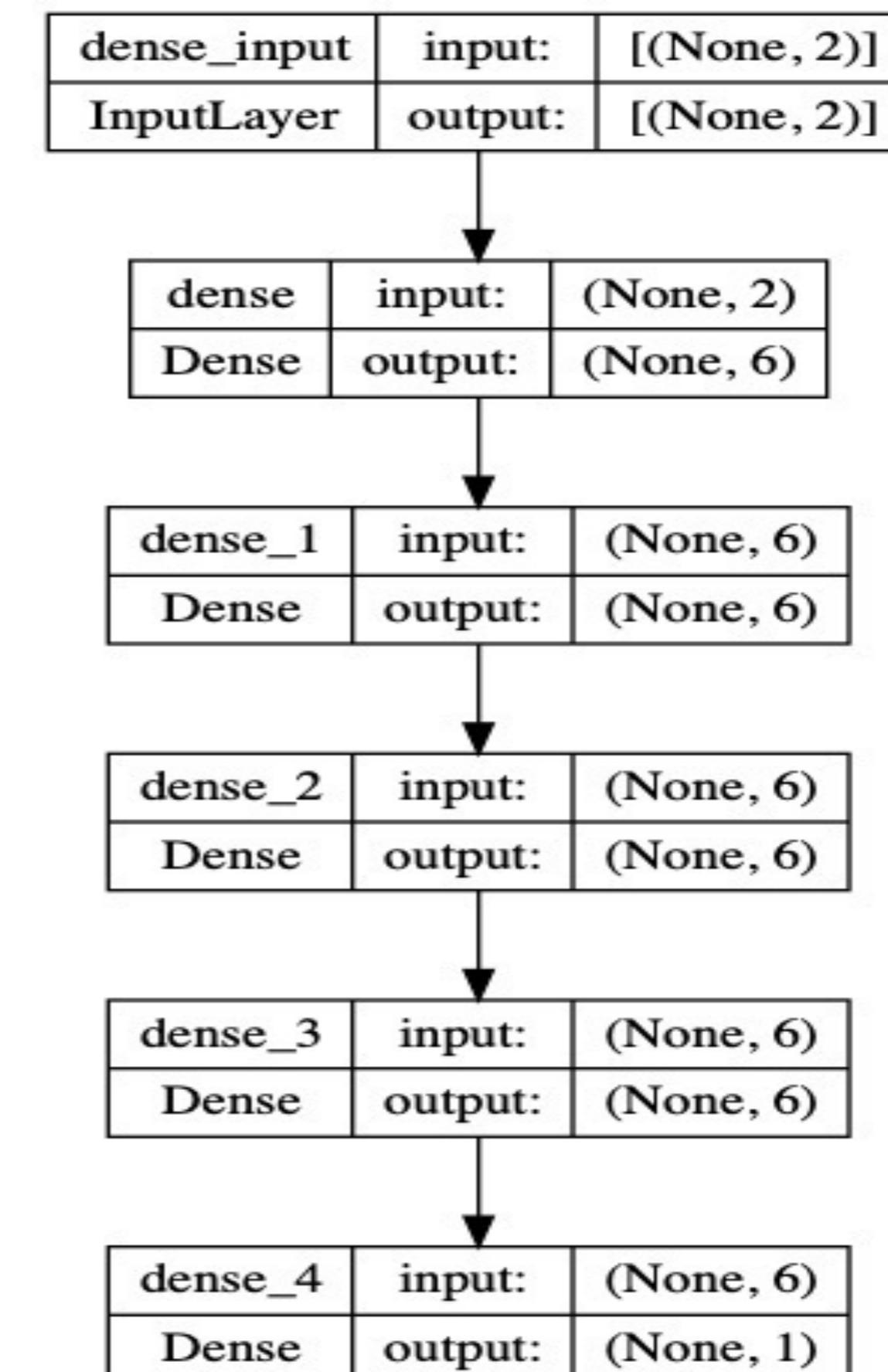
Acquires Data coming from moisture and temperature sensors and passes the following data to a ML pipeline that will provide us with irrigation decision and its duration

System Definition

Irrigation Control

Irrigation Control

Irrigation Control Systems collects moisture and temperature data, which is then transmitted to an ML pipeline. The pipeline starts with a Fully Connected Neural Network to make irrigation decisions. Subsequently, a linear regression model, relying on the plant moisture, is utilized to determine the optimal irrigation time.



System Definition

Health Control

Irrigation Control

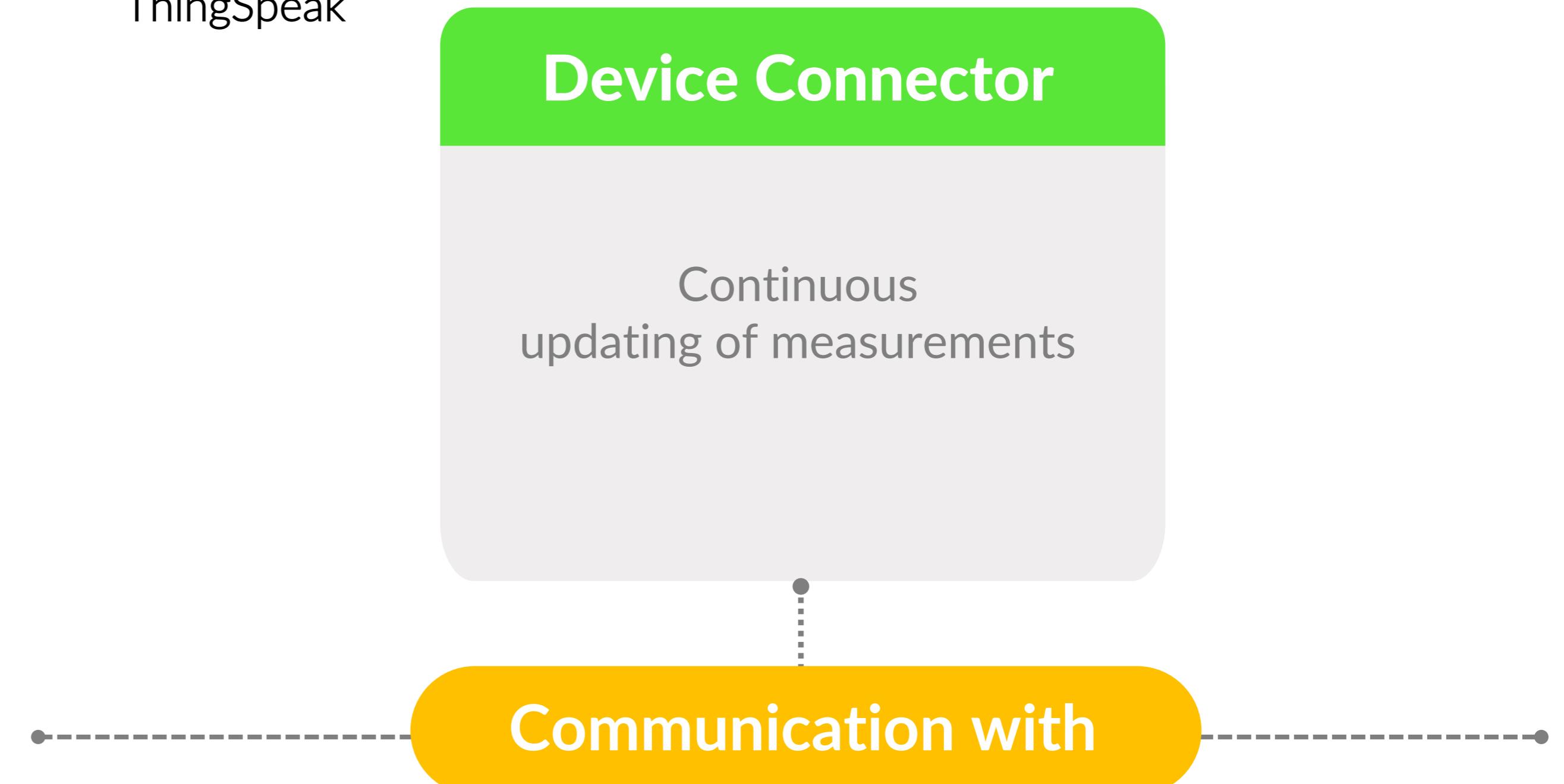
The health control system gathers plant images using a camera and transmits them to a Flask API hosted on an EC2 instance. This is necessary because the Raspberry Pi lacks the necessary processing power and RAM to handle a resource-intensive deep learning model. The initial model involves extracting a cropped image containing a leaf from the original image, which encompasses the entire plant. Subsequently, the cropped image is forwarded to a leaf disease model that utilizes InceptionV3 as its underlying architecture. The aim is to predict the type of disease by analyzing the provided leaf image.

System Definition

ThingSpeak

ThingSpeak

Implemented on the iSupport platform, this platform serves as a database for all measurements obtained from various sensors. It employs the adaptor ThingSpeak Adaptor

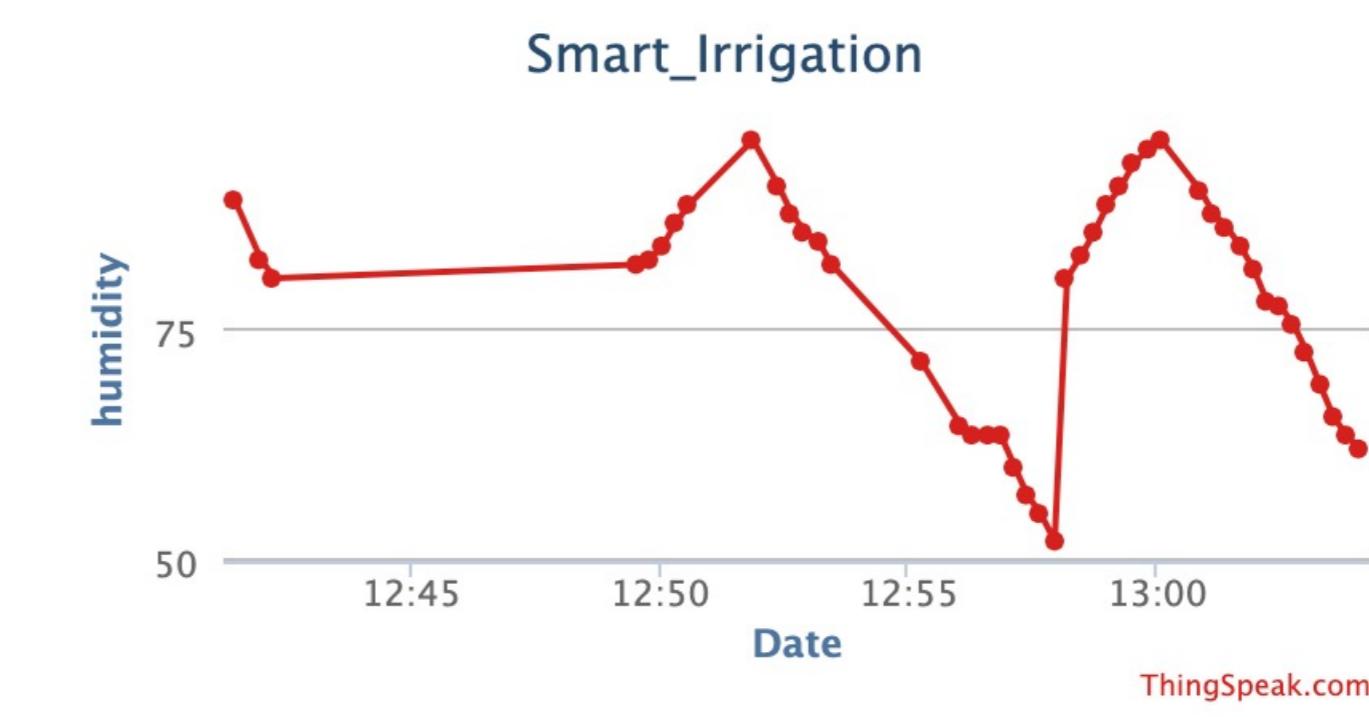
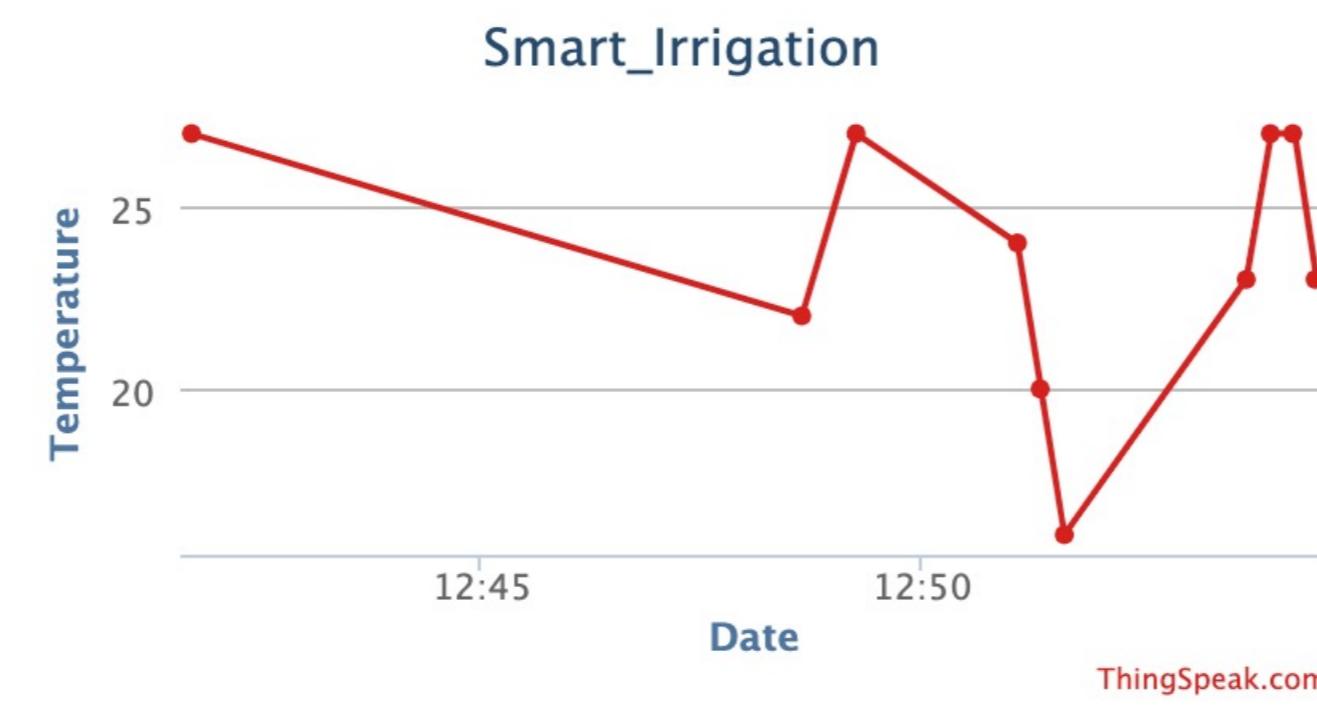
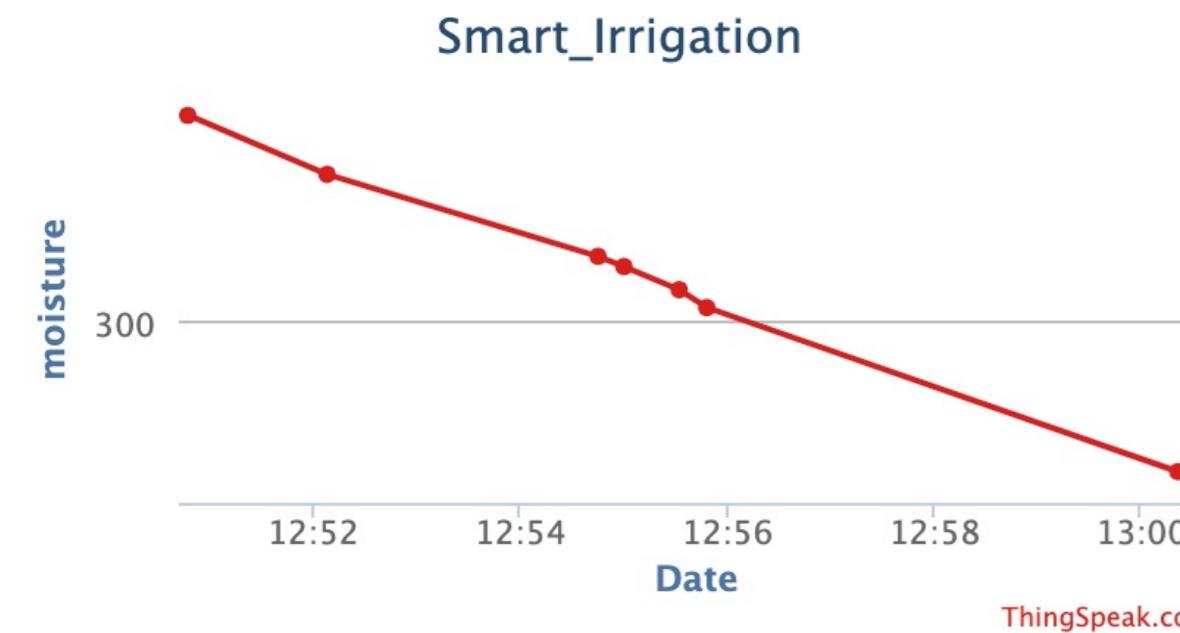


- ✓ Enables communication via MQTT
- ✓ Increases the platform's scalability
- ✓ Enhances component compatibility

System Definition

ThingSpeak

ThingSpeak third part Application User Interface



System Definition

Telegram Bot

Telegram Bot

To inform the user of the Plant Health and Irrigation Status, and to allow the user to remotely irrigate the plant.

/login

By providing his user id and password user can log into his Telegram account

/plant_id

User has to provide the desired plant ID in order to track its status

Health_status

BY typing this command user can assess the health status of his plant

System Definition

Telegram Bot

Telegram Bot

To inform the user of the Plant Health and Irrigation Status, and to allow the user to remotely irrigate the plant.

/irrigation_status

By typing this command user can assess the irrigation status of his chosen plant

/irrigation_status

By typing this command user can switch on/off the water valve for a chosen plant

/logout

By typing this command user can log out from his/her account

Data Security and Confidentiality



- 1 The MQTT communication uses fernet encryption. which provides data confidentiality through symmetric encryption (AES) , plus data integrity and confidentiality with HMAC .
- 2 Every user telegram password is hashed using SHA256 in order to be stored in the catalog .



Thank You!