Smart Greenhouse

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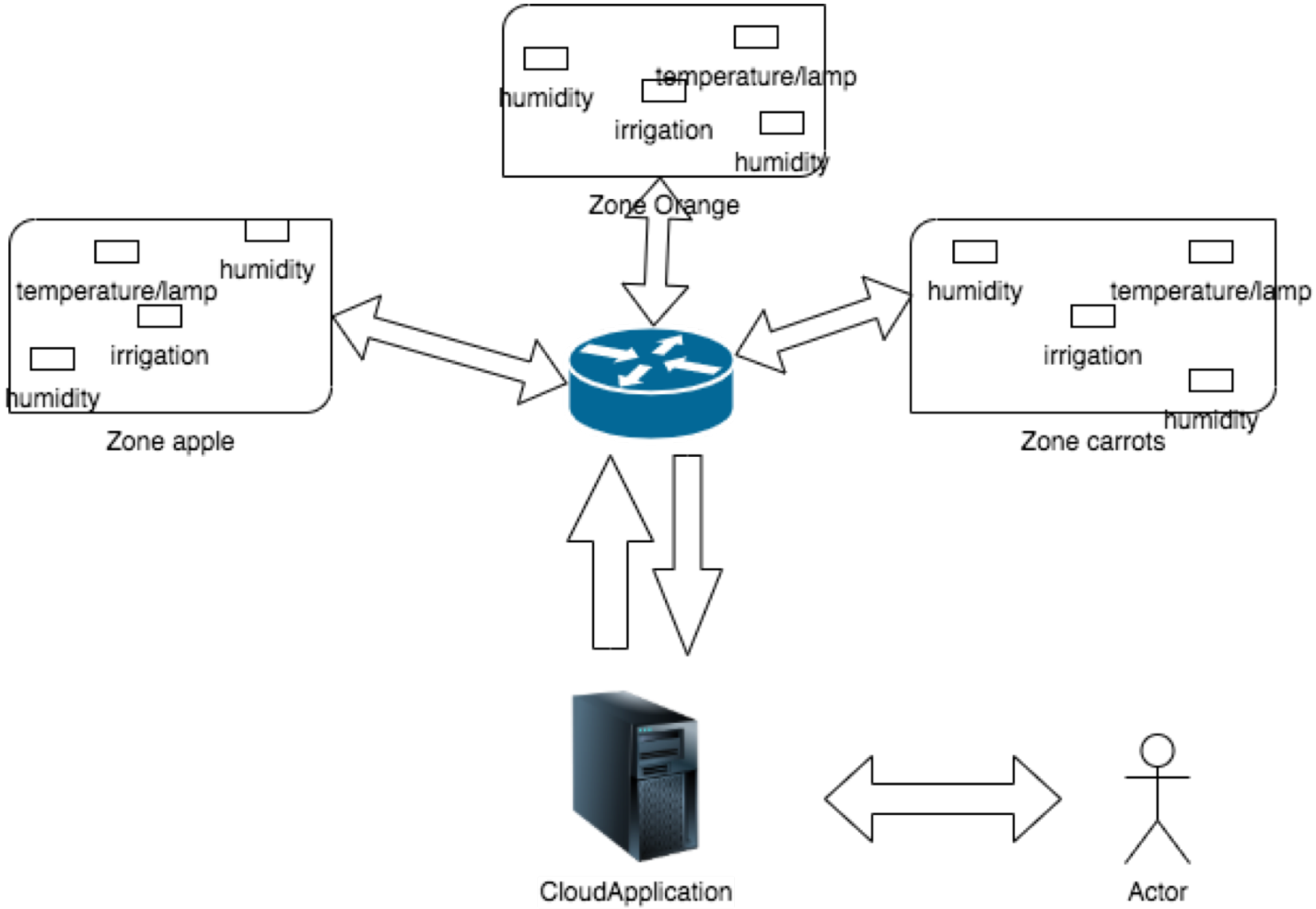
Introduction

This project develops a smart greenhouse based on sensors and actuators organized in **zones.**

Each zone could have different agricultural crops with different characteristics.

The deviceses are able to interface with a cloud application that collects and shows their data and offers to the user the possibility of changing their status.

System structure



Nodes

The system has three type of nodes:

- **Humidity sensor** - constantly collects data about soil humidity.
  - Measured in percentage.
- **Temperature sensor/actuator** - constantly collects data about soil temperature and turn on/off a lamp if temperature is lower than a min value.
  - Measured in Celsius degrees.
- **Irrigation actuator** - controls the irrigation, turning it on or off.
  - Can be setted in *manual mode*, from the application user, or in *automatic mode* from the *humidity sensor*.

Nodes

The resources associated with the nodes implement 2 main request methods:

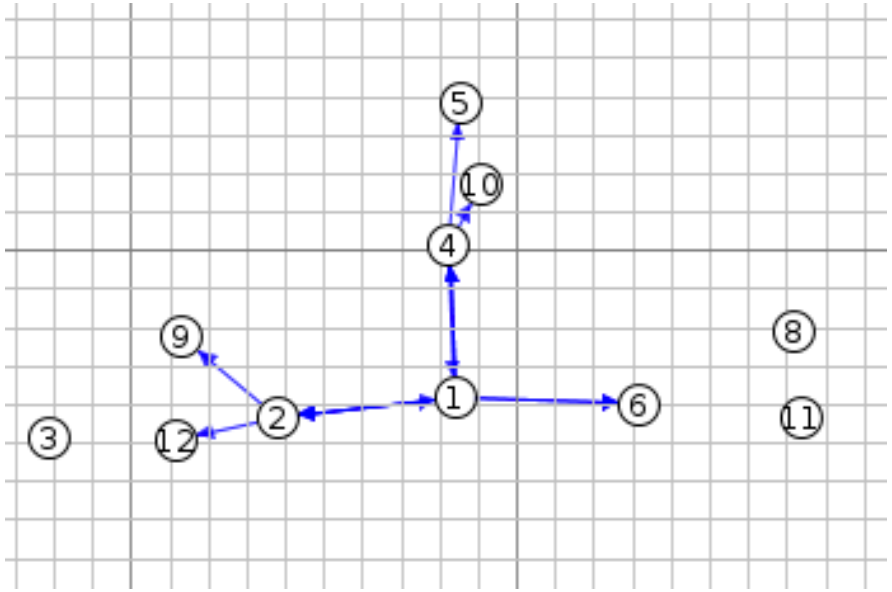
- GET, to send the values recorded by the sensor or the current state for the actuators;
- PUT, to modify values of sensors and actuators.

All the nodes comunicate with Internet by using a **border router**.

Nodes

- User create each zone by adding sensors and actuators on it. For each zone there could be many sensors but only a single actuator.
- If the sensed humidity is lower or higher than user defined thresholds, actuator is switched ON or off automatically.
- If the sensed temperature is lower or higher than user defined thresholds, lamp is switched ON or off automatically.
- As stated before, user can control actuators also manually by starting or stopping them.

Cooja Simulation



Speed limit has been set to 100% for readability purposes. Node 1 is the **border router**.

Cloud Application

The cloud application has:

- A **CoAP server** that:
  - registers the smart nodes and starts monitoring them through the CoAP observing;
  - sends actuators ip to humidity sensors of a specific zone via **lookup;**
- A **command line interface** that the user can exploit to send request to each node of the network.