香港中文大學
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Mini project：Smart farm System

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IEMS5721 PROJECT

Content

01 — Application

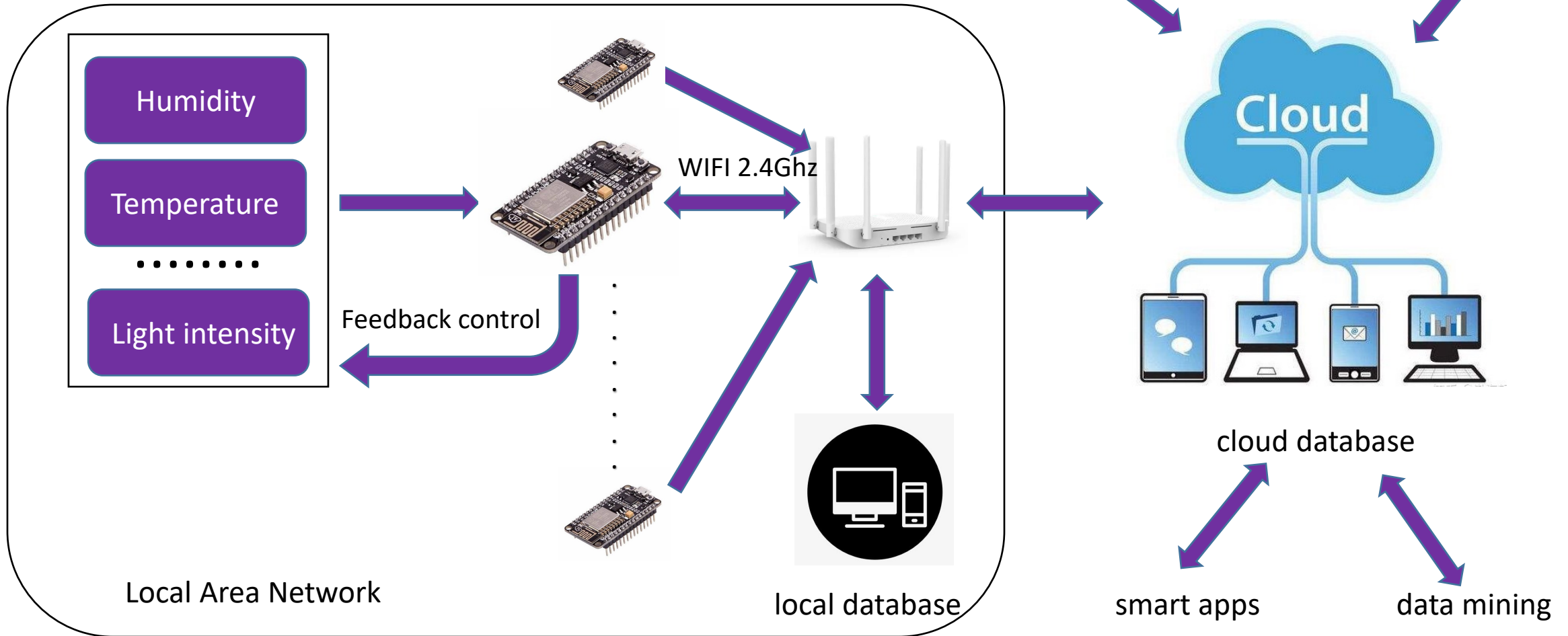02 — Basic structure

03 — Design

04 — Prototype

Application

- High value crops.

- Environmentally sensitive plants.

- Multiple cropping.

- Areas with high labor cost or labor shortage.

Basic structure

Humidity

Temperature

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Light intensity

WIFI 2.4Ghz

Feedback control

Local Area Network

local database

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other smart farm

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Cloud

cloud database

smart apps

data mining

Sensors and key data

- Humidity Sensor:

Provided device

- Light density detector:

Provided device

- Others

Communication protocol to local base station

LPWAN

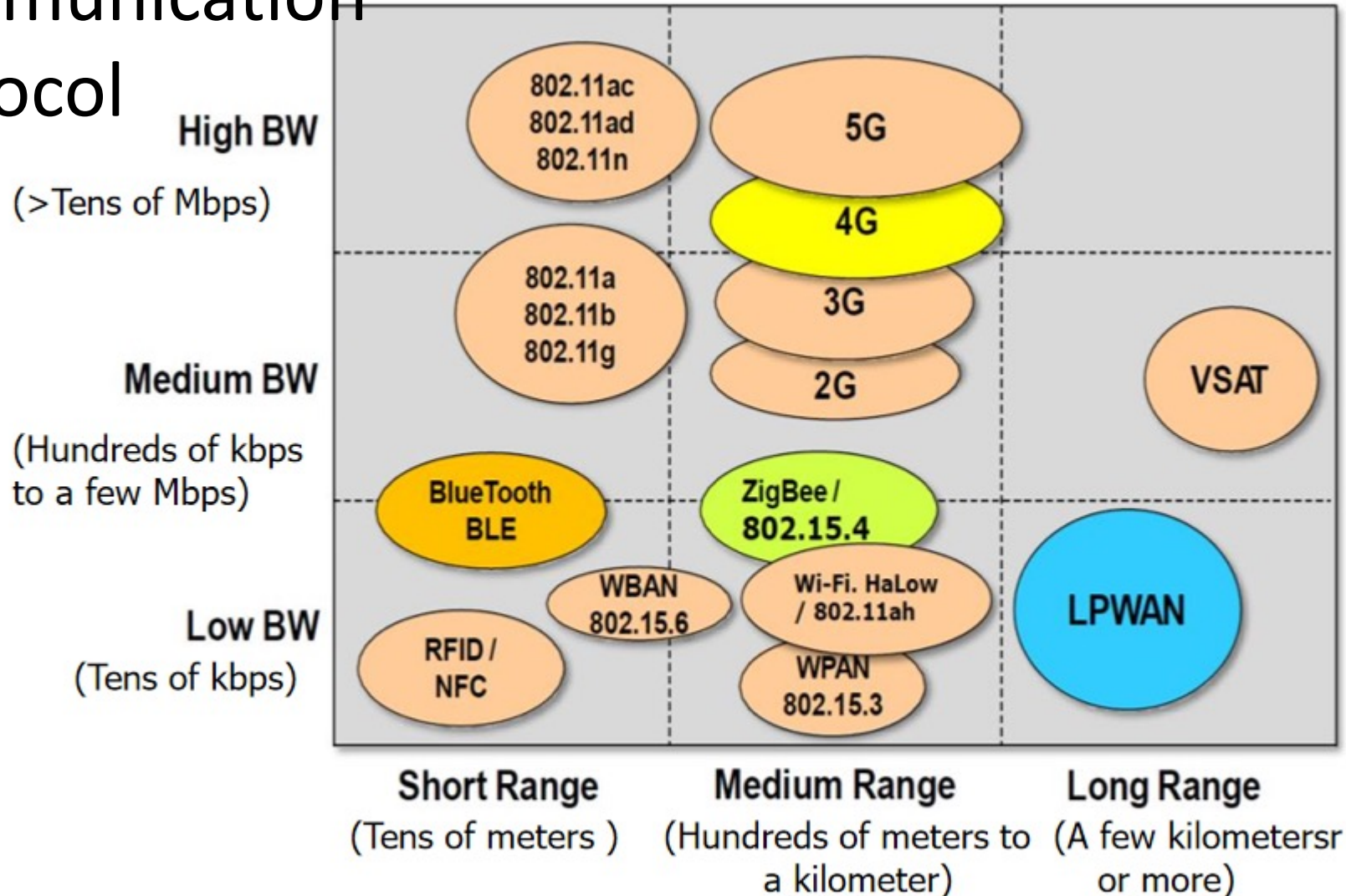- Range   Few kilometers to over 10 km
- Power   Low(Inexpensive batteries for up to 20 years.)
- Cost   Low
- Data rate   0.3 kbit/s to 50 kbit/s

VS

WIFI

- Range   0-100m
- Power   Middle
- Cost   Middle
- Data rate   11-300Mbit/s

VS

ZigBee

- Range   10–100 meters line-of-sight
- Power   low.
- Cost   low
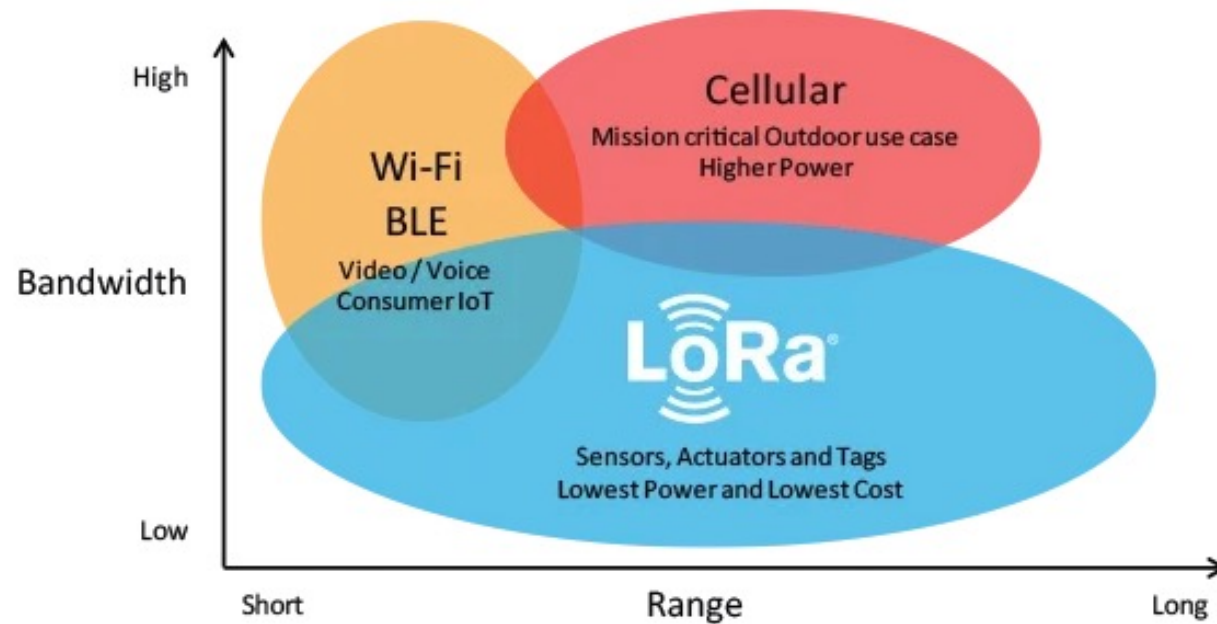- Data rate   250kbit.s

Communication protocol

Communication protocol——chosen:LoRa&LoRaWan

Communication protocol——why?

- Ultra low power - LoRaWAN end devices are optimized to operate in low power mode and can last up to 10 years on a single coin cell battery.

- License free spectrum - Don't have to pay expensive frequency spectrum license fees to deploy a LoRaWAN network.

- High capacity - LoRaWAN Network Servers handle millions of messages from thousands of gateways.
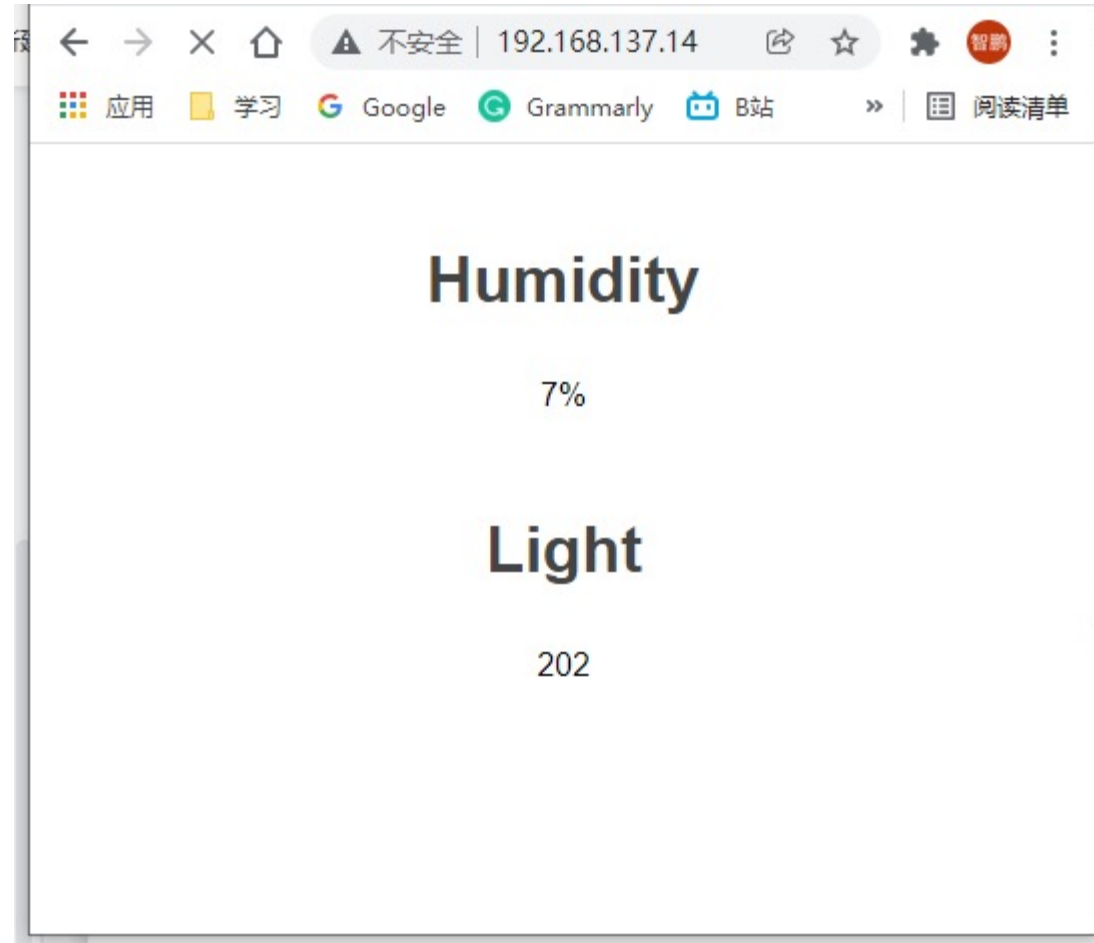
Usage of local data base

- Real-time monitoring

- Basic data integration and processing

- Remote control

- Get planted from the cloud

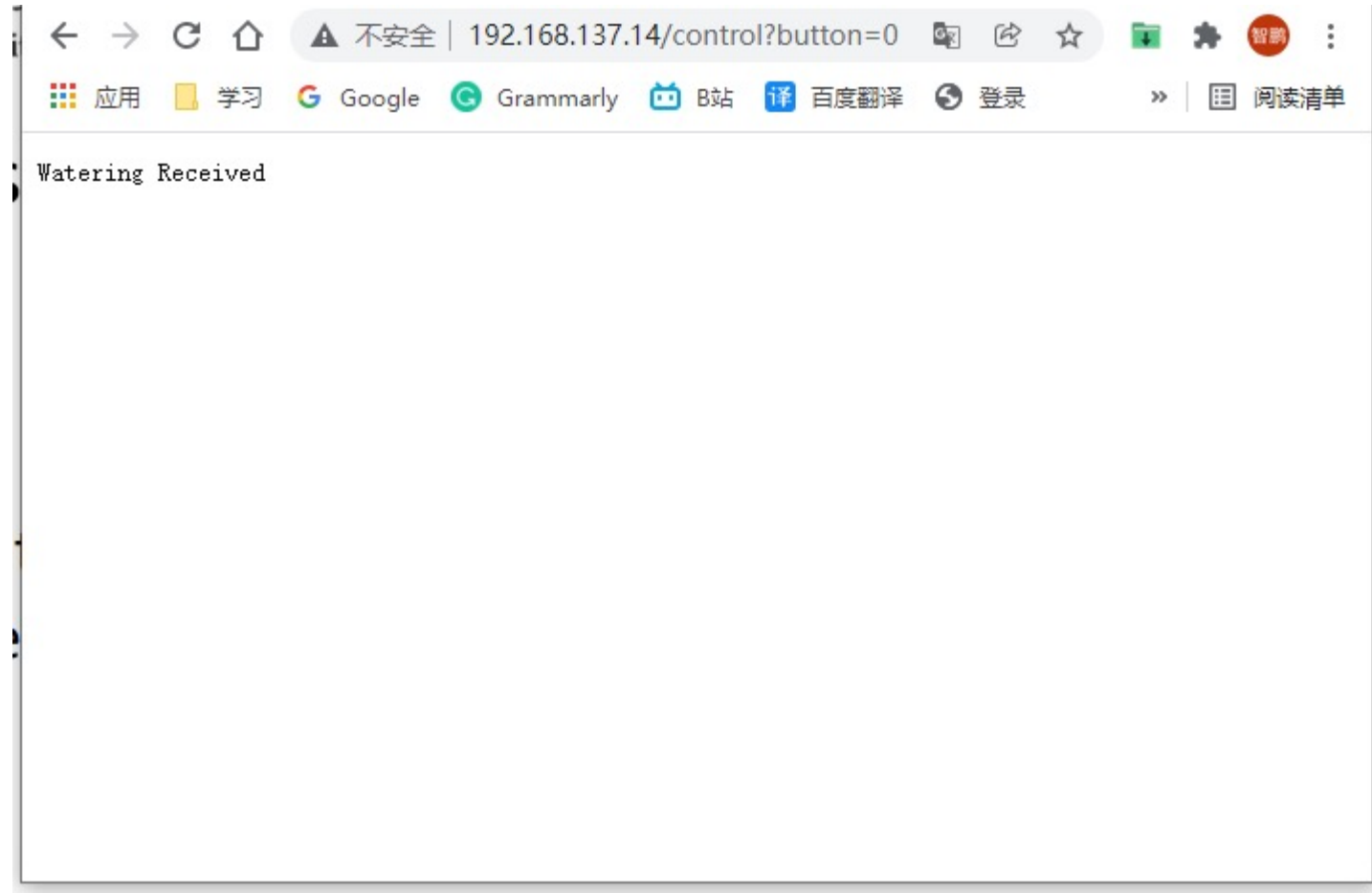# Local database&contral

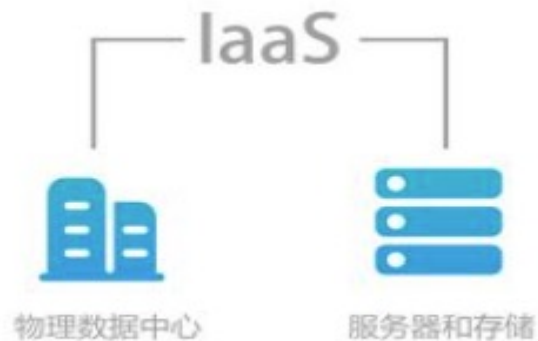·Detecting real-time farm data

Local database&contral

·Remote control in demo

Cloud database

Infrastructure-as-a-Service like:

·Huawei cloud

·Alibaba Cloud

·AWS

Cloud database——why?

·Provide the basis for data mining

·As the backend of smart app

·Provide data consolidation function

Cloud database communicate protocol

5G

- High data rate

- reduce delay

- increase system capacity and large-scale device connection.

Cloud database & Data analysis

Data analysis method

- Statistical Methods

- variation and bias analysis

- Machine Learning

though →
smart APP

Smart farm client

- Planting suggestions

- Storage planning

- Harvest plan

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Cloud database & smart APP

Function

- Remote control

- Cost calculation

- Historical data record query

Prototype