Arduino AT Mega + Ethernet Shield, MQTT, Mosquitto Broker, Ensemble

Connected vending machine

Connected vending machine

Benefits

- Remote control
  - Out of Stock products, price changes..
- Remote maintenance
  - Temperatrue sensors, vibration sensors, etc.
- RFID Keys for payment
  - Autentication, Server-side balance management (prevents key copies and theft)
- Purchasing data (Time and Date, consumer) for data mining
- Special offers
  - happy hour, 3x2,
  - Offer on products (like sandwiches) before they expire

- **Publish/Subscribe protocol**
- On top of TCP/IP
- Light messaging
- Designed for communication for remote sites
  - Tiny footprint for client library
  - Limited bandwidth usage

- **MQTT Brokers**
  - HiveMQ (propietary)
  - Mosquitto (Open Source)

- **Client Libraries**
- Eclipse PAHO (java)
- C Library for Arduino

Venduino, MQTT, Ensemble

Mgmt Interface

Ensemble

paho

MQTT Broker

mosquitto

MQTT Venduino Topics

Publishes

- Venduino/Ens/CARD
  - Asks Details for an RFID Card
- Venduino/Ens/BUY
  - Notifies a purchase
- Venduino/Ens/STATUS -> “ONLINE”

Suscribes

- Venduino/Dev/A#
  - Venduino/Dev/A/CARD
    - Details for an RFID Card
      - ID | CustomerName | Balance
  - Venduino/Dev/A/PRICE
    - Price change Notification
  - Venduino/Dev/A/OFFER
    - Offer Notification

MQTT Ensemble Topics

Ensemble

Publishes (Business Operation)

- Venduino/Dev/A/CARD
  - Details reply for an RFID card
- Venduino/Dev/A/PRICE
  - Price change notification
- Venduino/Dev/A/OFFER
  - Special Offer notification

Suscribes (Business Service)

- Venduino/Ens/CARD
  - Details request for an RFID Card
- Venduino/Ens/BUY
  - Notification of a purchase
- Venduino/Ens/STATUS -> “ONLINE”

Venduino: MQTT messages

Venduino/Ens/CARD ID=XX-XX-XX-XX

Venduino/A/CARD Jordi | $30

Venduino/Ens/BUY CardID | TRAY 2

mosquitto

Ensemble

paho

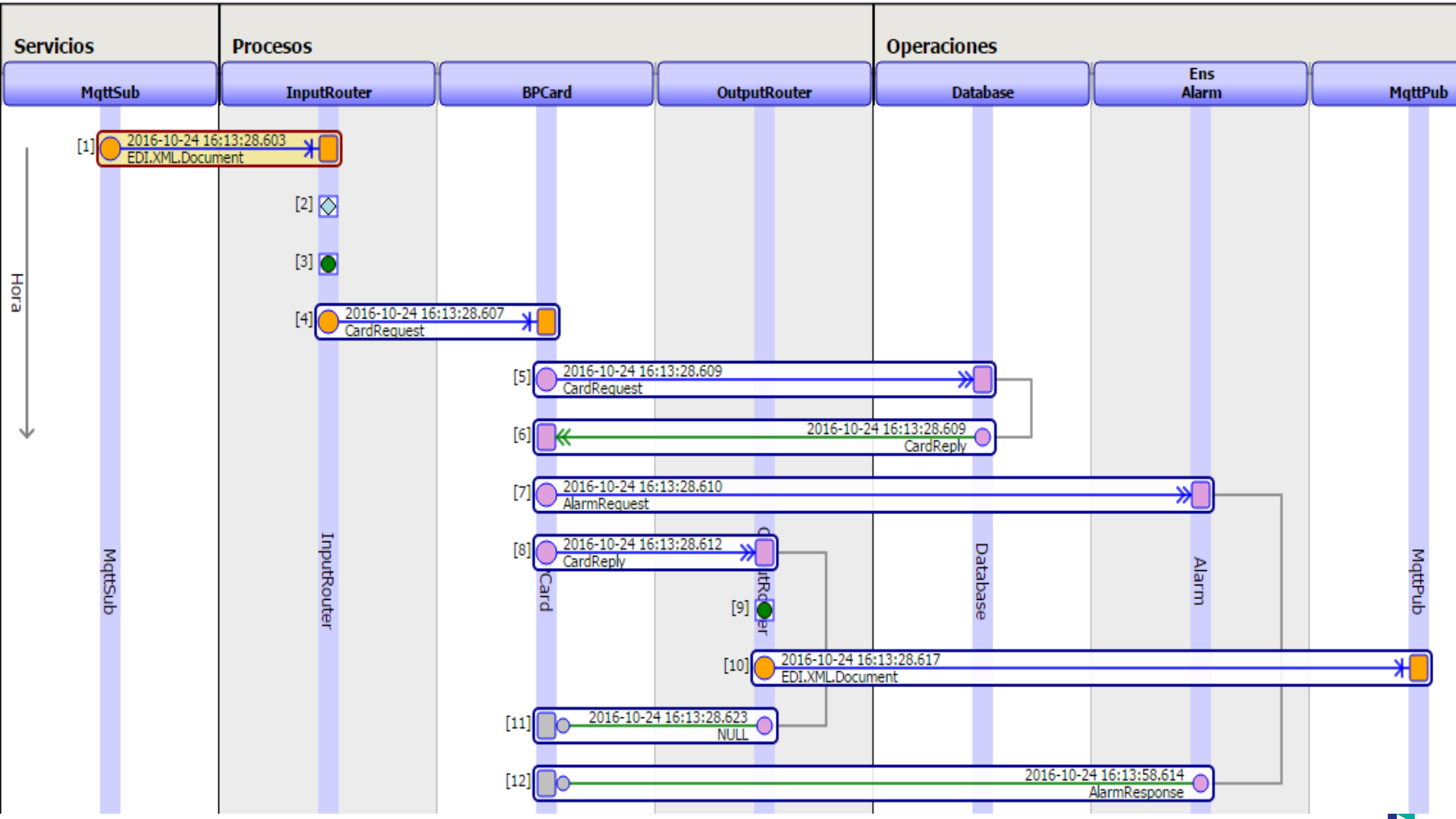
Venduino/A/OFFER $1

Venduino/A/PRICE $3

Ensemble Production

- **JavaInitiator**: Allows to define Ensemble Components in Java (BS y BO)
- **MqttSub**: Business Service (Java) that subscribes to MQTT Topics
- **MqttPub**: Business Operation (Java) that sends messages to the MQTT Broker
- **BPCard**: Busines Process that processes messages from RFID Card

Ensemble Messages: Venduino/Ens/CARD



Arduino: MQTT Library

```
#include <PubSubClient.h>
PubSubClient client(ethClient);

//---Initialize
client.setServer(MqttServer, MqttServerPort);
client.connect(MQTTClientName);

//---Subscribe
void callback(char* topic, byte* payload, unsigned int length) { … }
client.setCallback(callback);
client.subscribe(topic);

//---Publish
client.publish(topic,content);
```


Venduino Connected to Ensemble through MQTT

Venduino: Casing and Idea by Ryan Bates:

http://www.retrobuiltgames.com/the-build-page/arduino-vending-machine/

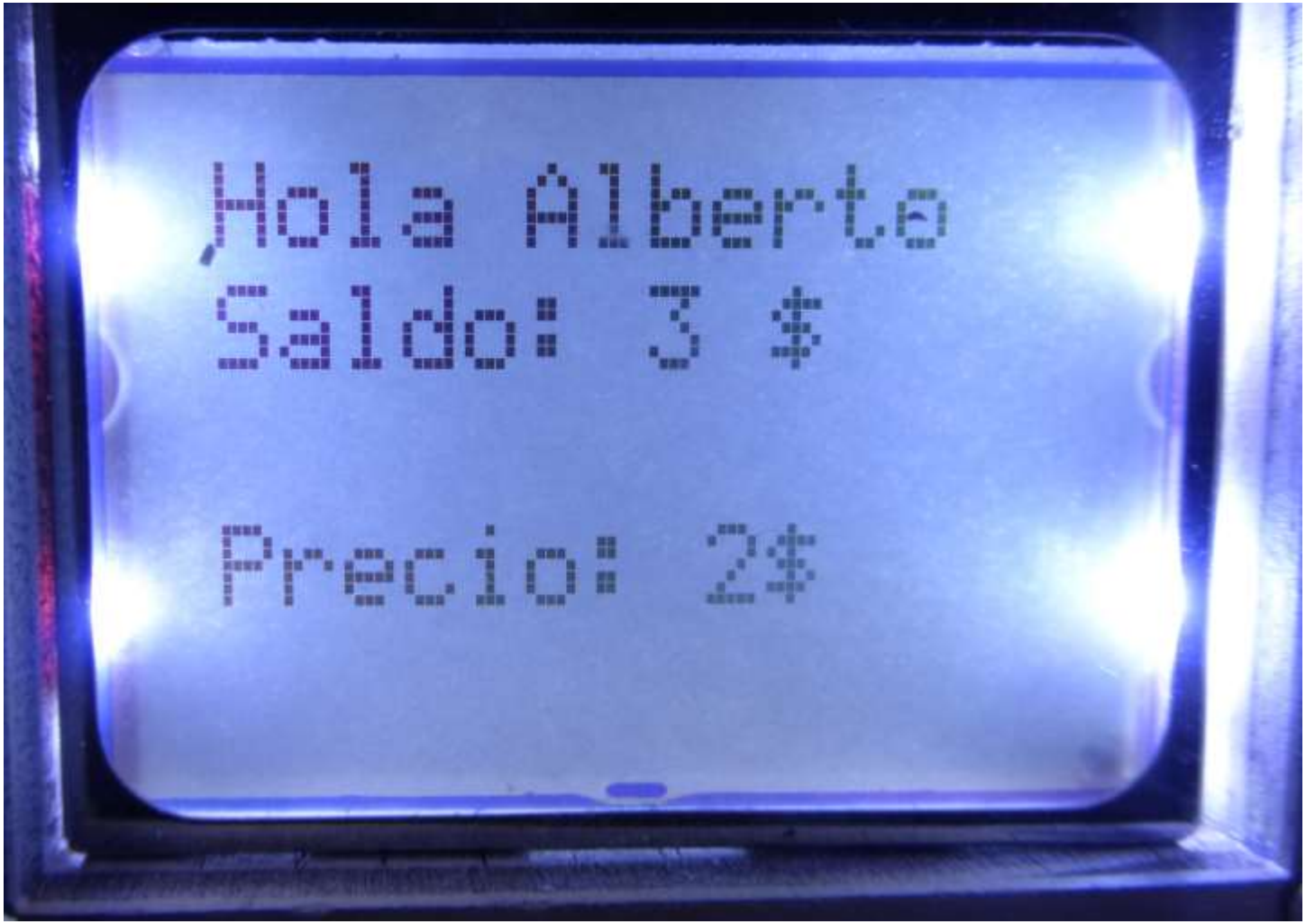
Modified with:

- Arduino Uno replaced with AT MEGA 2560
- Ethernet Shield added
- RFID reader added
- RGB led added

Demo

Initialization

RFID Card Data from Server



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Special Offer message