IOT Beer Making 101

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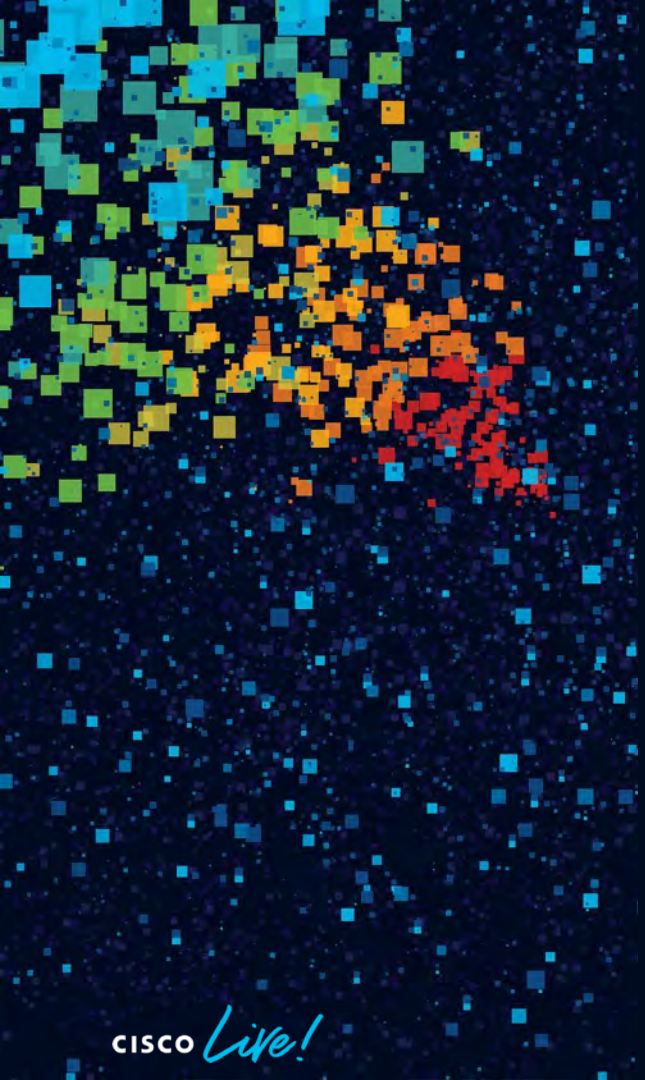
DevNet-IOT



Agenda

- Introduction
- Science behind Beer
- Applying IOT
- Exploring IOT Protocols

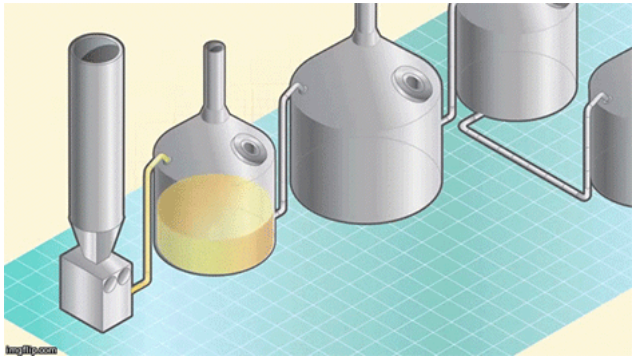
Introduction

- The brewing industry is undergoing a revolution (manufacturing in general really)
- Hop is a volatile and a major ingredient.
- Sensors can gather data on temperature and humidity of hops.
- Brewing today is a pretty exact science.
- Use of IOT gateways to collect data from low-power energy sensors in the tanks.
- Combine this with data analytics tools and brewers can monitor the quality and consistency of the beer.


The Science

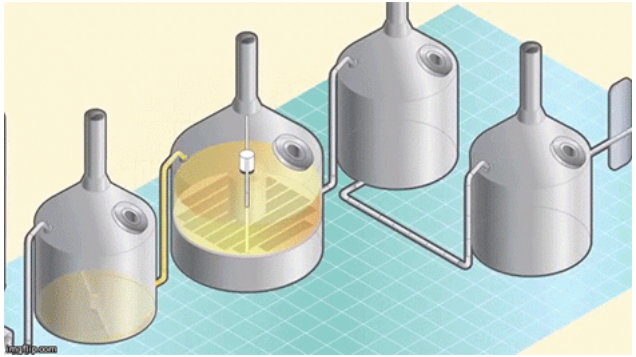
Science Behind Beer
Mash

- Grains are mixed in with sugar.
- Type of beer dependent on grains used.
- Mixture is brought to a boil and temp maintained



- *The conversion process uses natural enzymes in the malt to break the malt's starch down into sugars.*

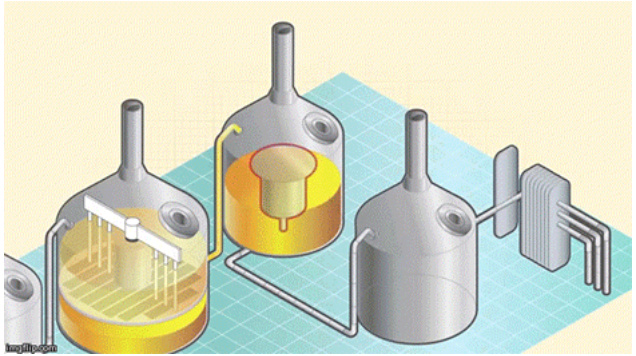
Science Behind Beer
Lautering



- Mash is separated (sweet liquid from grains)
- Wort is created (sweet liquid) IoT
- Wort consistency and temperature is key

- *Wort is unfermented beer waiting for yeast to be pitched. But first no hops no beer.*

Science Behind Beer
Boil

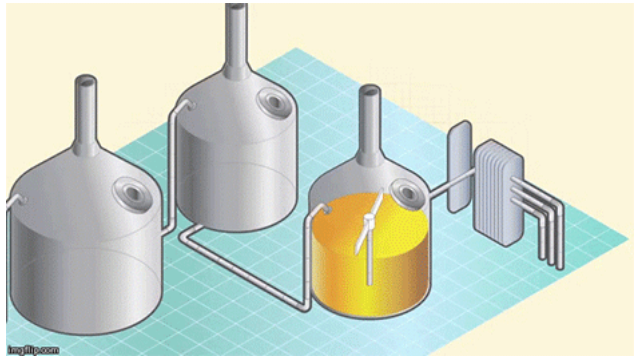


- Wort is then collected in a vessel called a kettle
- Controlled boil is key before the hops are added.
- Hops are added

- *Wort boil temperature varies depending on the type of hops that is being added.*

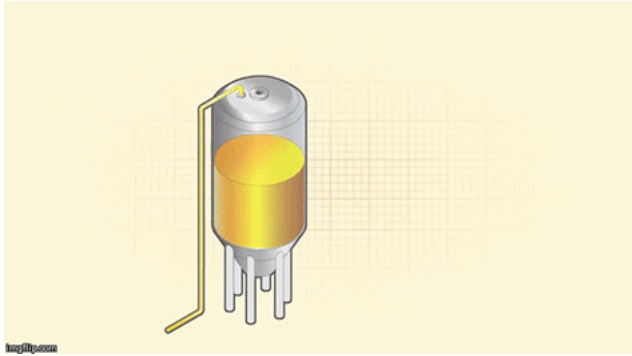
Science Behind Beer
Cooling

- Wort is cooled to fermentation temperature.
- The faster the cooling the better fermentation.



- *Wort cooling causes cold break (bacteria) to form Quickly moving the wort to fermentation temperature and pitching the yeast minimizes the impact of these bacteria on beer.*

Science Behind Beer
Fermentation



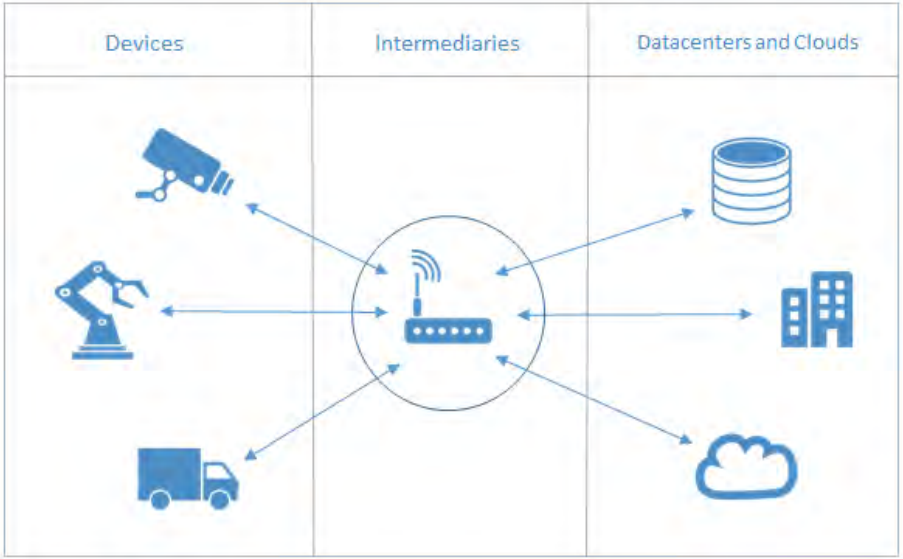
- To start the fermentation, yeast is pitched
- Yeast feed on sugar
- Fermentation at a controlled temp is a must

- *Yeast converts the sugary wort into beer by producing alcohol, the higher the sugar content the higher alcoholic content.*

Applying IOT

IOT Sensor Network
Components

- **Sensors:** Monitor and transmit data
  - temp sensor, flow sensor, humidity sensor
- **IOT Gateway:** Collect sensor data
  - Cisco IR829, Arduino, rPi, Custom
- **Protocol**: Messaging protocol between sensor and gateway
  - MQTT, XMPP, DDS, AMQP, and CoAP



Basic IoT Architecture

Transport Protocol

MQTT

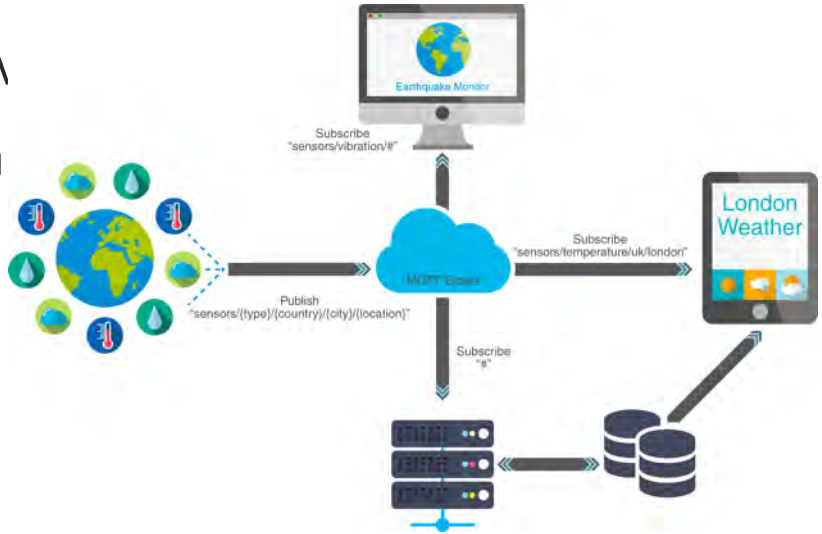
What is MQTT?

- MQTT is Lightweight message queueing and transport protocol.
- Stands for Message Queue Telemetry Transport.
- Suited for Mobile to Mobile (M2M) , Wireless Sensor Network (WSN) and IoT Scenarios

MQTT

Characteristics

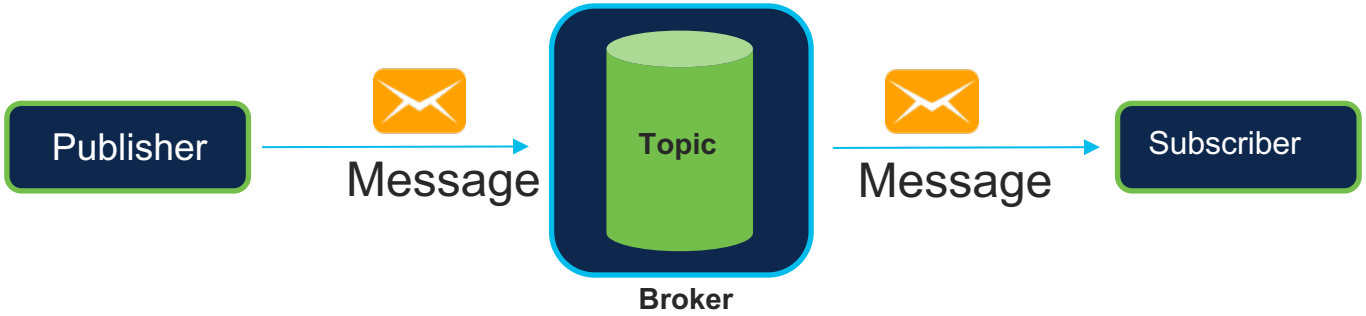
- Asynchronous
- Low overhead (2 byte header)
- Publish / Subscribe (PubSub) Model
- Low complexity protocol for simple dev
- Runs on TCP to be used with 6loWPan



MQTT

Model

- Clients Subscribe to topics to publish and receive messages
- Broker (MQTT Server) receives subscriptions from client topics.
- Broker receives messages from clients and forwards to interested clients



Thank you