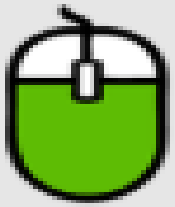


IndiaTechnologyWeek
@Home 2020

How to quickly setup a real world POC testbed in IoT

“The value of your IoT solution increases when you challenge your assumptions !!”

Bhupendra Pratap Singh

R&D Engineer, CDAC, Pune

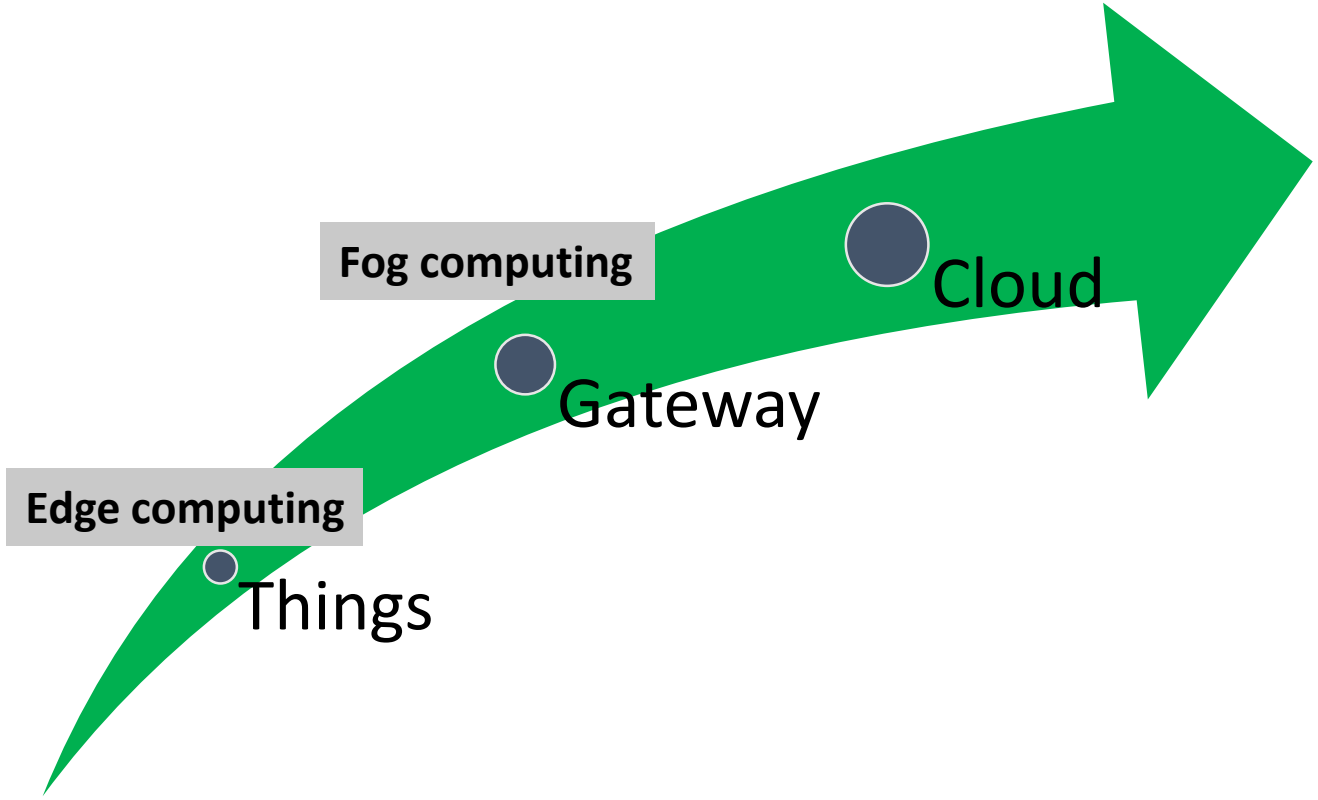
Agenda

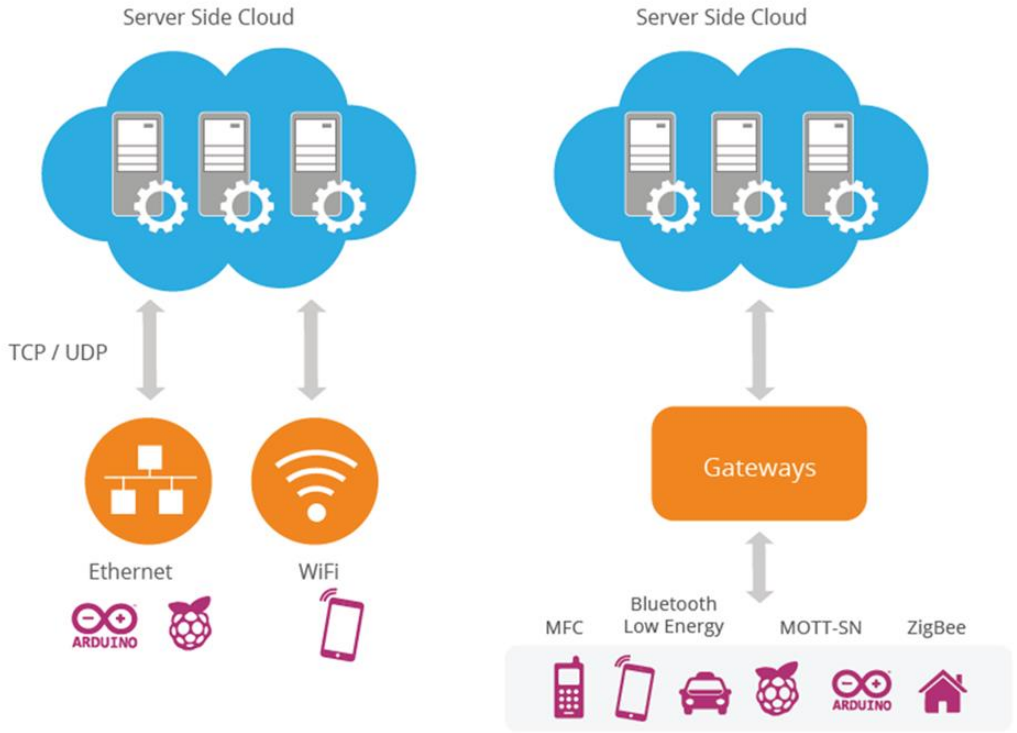
- Understanding things to cloud continuum
- Best Practices to follow in selecting the sensors & actuators
- Best Practices to follow in selecting the IoT protocols and communication mediums
- Best practices to follow in selecting the IoT devices and gateways
- Do we require Edge and Fog computing?

Agenda

- Best Practices to follow in selecting the right IoT Platform
- Designing a concrete architecture from the IoT reference architecture
- Role of AI in IoT : AIoT
- Role of DLT in near future
- FOSS(s) for quick prototyping of an IoT based application

Things to Cloud Continuum

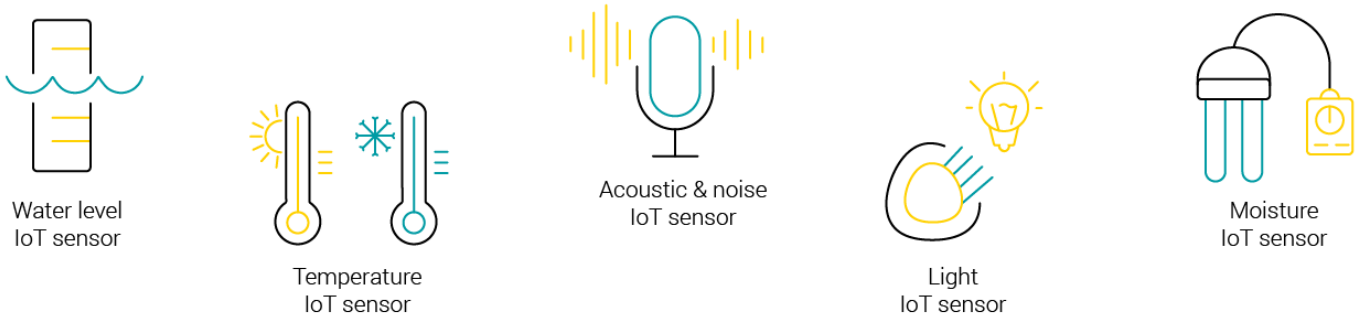




How to select a right sensor for your product?

The quality of any sensor can be measured on following parameters:

- Power management
- **Range** (e.g. measurement of temperature has a range of -200 to 800^{o}C)
- **Accuracy:** ability to measure value close to the actual value
- **Precision**(Repeatability): ability to produce same measurement results again and again.
- Reponses Time



How to select right communication protocol?

IoT deals with constrained environment (connectivity, storage, processing)

Major IoT Protocols:

- MQTT
- CoAP
- REST/Http
- WebSocket
- AMQP
- OPC-UA

Popular Message Brokers

- Mosquito
- Rabbit MQ
- Kafka

How to Select a right gateway?

- Which connectivity options, protocols and interfaces are provided by the gateway
- How much data does the gateway need to collect from sensors (***Memory for Data Logging***)
- Does data collected from the sensors needs to be down s
- At What location gateway need to be installed
- TLS, SSL and Client side X509 Certificate Support

How to select Communication Medium?

IoT solutions are heavily relied on Wireless communication

Short Range Communication

- Wi-Fi
- Li-FI
- BTLE
- ZigBee
- 6LowPAN
- Thread

Long Range Communication

- LoRAWAN
- NB-IoT
- SigFox
- Cellular (2G/3G/4G)

Do we require Edge Computing or Fog Computing?

Largely depends at the application context; However in generic context edge computing/Fog Computing ensures following benefits:

- Process data locally or in nearby edge data centers.
- Reduce the Signal to Noise Ratio
- Decrease latency and increase response time to trigger actuators

- **EdgeXFoundry**
- **Apache Edgent**
- **IoFog**
- **Eclipse Kura**

How to select an IoT platform?

- Scalability
- Self-Healing of application
- Connectors for protocols (MQTT, CoAP, REST/Http. Etc.)
- End to End Data Security
- Device Management & Dashboard Management
- Data Analytics
- Rule Engines

Suggested IoT Platforms

- AWS IoT
- Azure IoT
- Google : Cloud IoT Core
- Things Board
- Thinger.io
- Kaa

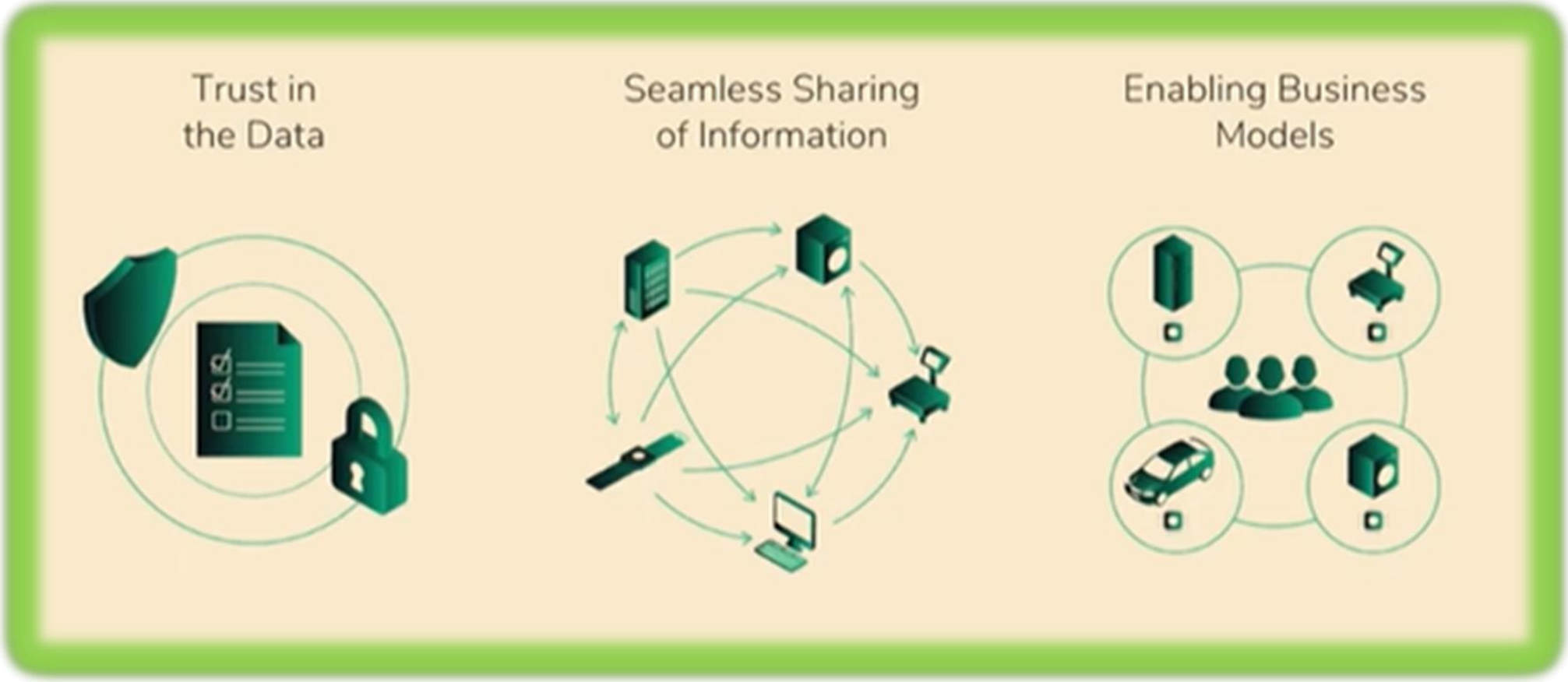
Role of AI in IoT

- **Predictive:** Predictive analysis helps to determine when a part of the machinery is most likely to experience a breakdown. Such analysis will help in averting the failure through preemptive intervention.
- **Prescriptive:** Prescriptive analysis offers immediate suggestions that can be instrumental in preventing any kind of disasters or botches.
- **Adaptive/ autonomous:** Constant data feeds from sensors can help the systems in taking frequent actions autonomously without any human involvement.

Role of AI in IoT

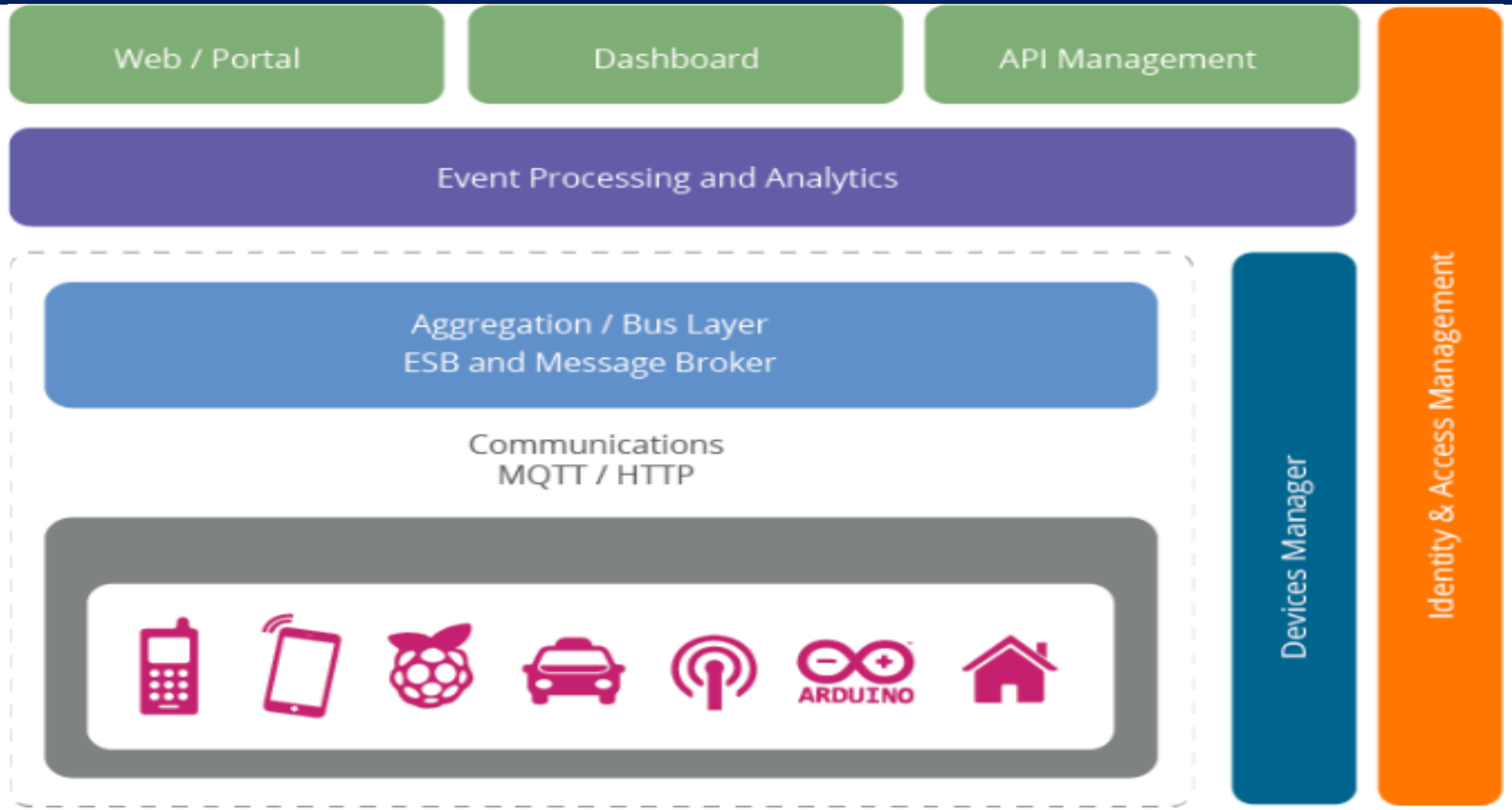
- **Greater Revenues:** The collective effect of AI & IoT will prove to be majorly beneficial for many industries in terms of greater revenues and returns.
- **Augmented Safety Standards:** Real-time monitoring can help in keeping a strict check and thus prevent all kinds of failures or disasters. This will raise the overall safety and security standards and increase efficiency. This will also help in minimizing the loss of lives and the damage caused to assets.
- **Reduced Costs:** Reduced operational costs for both households as well as business enterprises.
- **Improved Customer Experience**: Learn the user preferences and adjust their values accordingly. For example, thermostats in smart homes can adjust to the ideal temperature settings of different users living in the same house.

Role of DLT in near Future (IoTA)



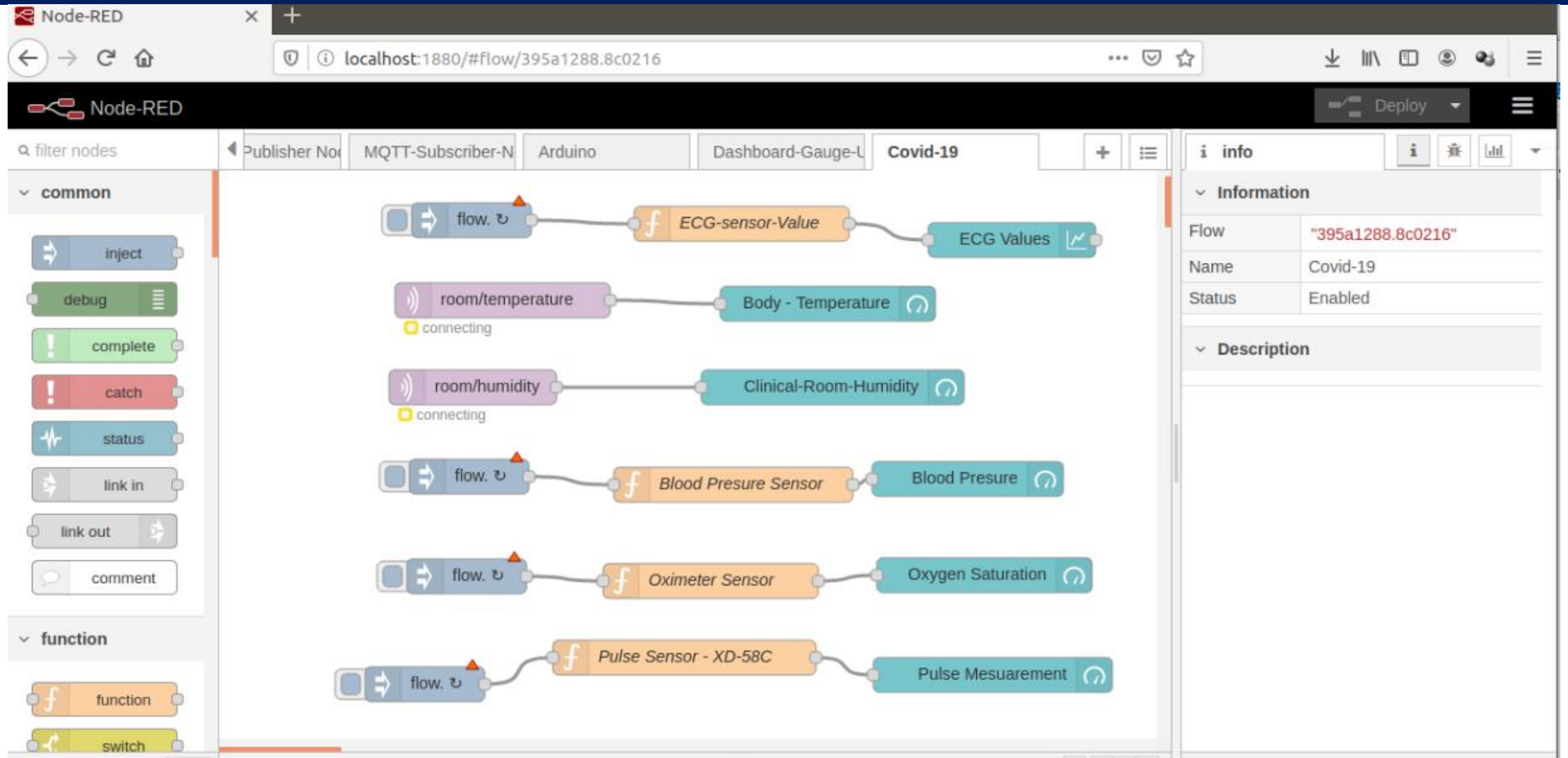
IoT reference Architecture

Ref : WSO2

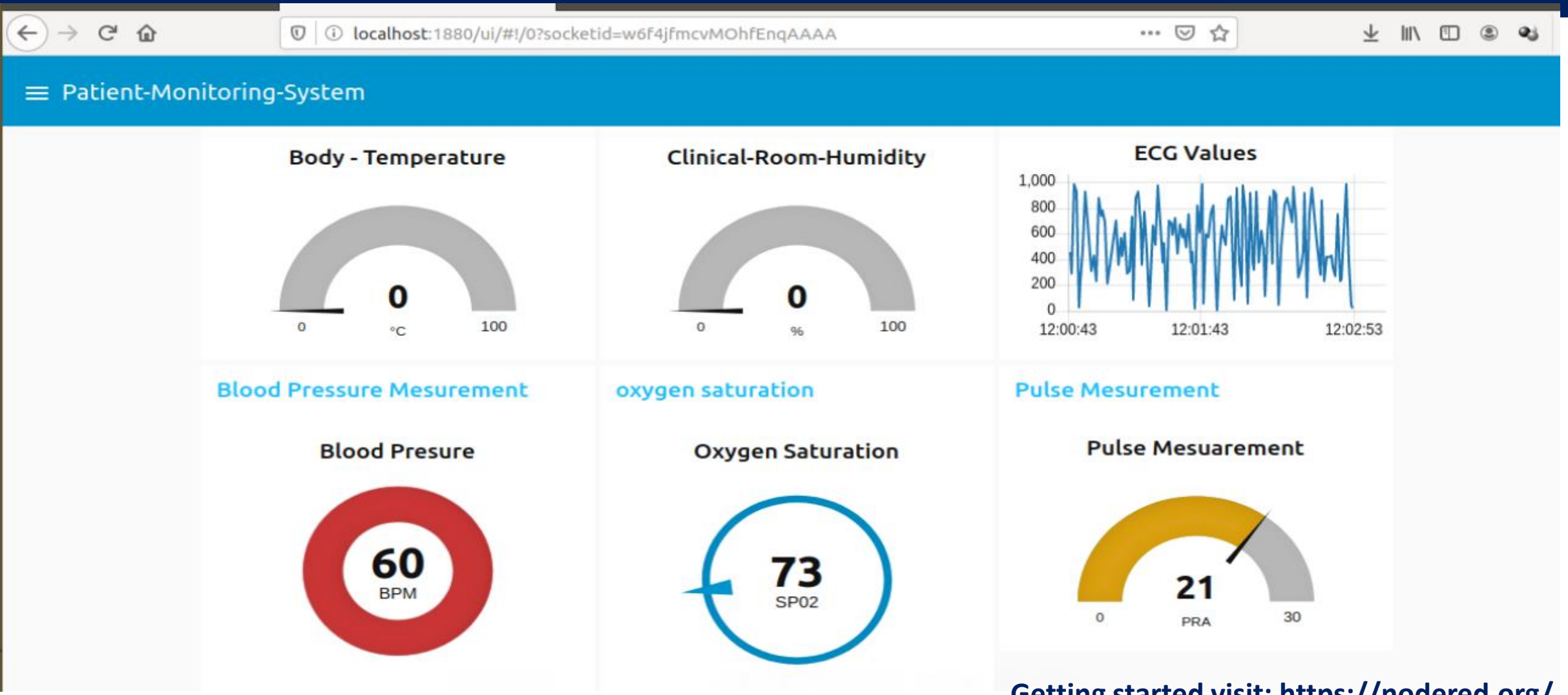


Open Source tool for prototyping IoT solution

(Node-Red: Low-code programming for event-driven applications)



Node-Red : Dashboard Creation



Getting started visit: https://nodered.org/

Thank you for your attention!!

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