

A developer's guide to the Internet of Things (IoT)- Coursera

DJ's notes

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1 Introduction

1.1 What is IoT?

- IoT is a network of interconnected things, objects, devices, and systems that connects and transmit data and exchange data among them.
- The data exchanged is collected, analyzed and acted on them.

1.2 What is the value of IoT?

- Collecting data from IoT based devices (such as wearables and smart appliances) enables business to learn more about their operating environment.
- This way, businesses can identify and act on the potential to create new value.
- Value by unlocking your revenue from existing products and services, value by inspiring new working practices and processes, value by changing or creating new business models or strategies.
- The potential of Internet of Things lies on the intelligence.

1.3 Why is IoT so special ?

- You go where the data is
- Provide a service
- Discrete industries come together (e.g. wellness + fitness + nutrition)
- A variety of particles, domains and applications allow collection of data from a vast number of things not hindered by location.
- Those things can be configured in a number of different ways. Some with processor, storage, keyboards, screens, but somehow or another they must communicate with the internet either directly, or via an internet connected device.
- Standard connectivity which can send data to the cloud from anywhere.
- Storage and applications that can analyze this data lead to new insight and revenue opportunities. There are consistently new sources of data for businesses.
- And businesses are creating systems of insight by unlocking data from billions of interconnected devices. IoT takes computing power out of the data center, and onto the cloud.

The cloud is critical for devices beyond the reach of the data center. To connect and communicate from anywhere in the world through open standards. Internet of Things gives business access to product usage data they never had before.

- Personalized services designed from usage data creates opportunity for new sources of revenue.
- You have probably noticed some of this with advertisement after a Google search or with suggested videos and YouTube.
- Personalize and instant are the new expectations for engagement. But there is so much more data, 90% of it which is created at the edges of IoT that is never even captured, analyzed, or acted upon.
- And from the data that is captured, 60% of it loses its value within milliseconds of being generated. This means that most of the data is never turned into insight.

1.4 How does IoT work

- How does IoT work? <https://www.youtube.com/watch?v=QSIPNh0iMoE&feature=youtu.be>
- The Future of IoT at Work. https://www.youtube.com/watch?v=4jjcznMXF8M&index=4&list=PLBF0HYVTEVoDzBoFYC9PJq-pUT_Ykde0g

2 Rapid application development in the cloud

2.1 Cloud computing

1. Infrastructure-as-a-Service (IaaS)
2. Platform-as-a-Service (PaaS)
3. Software-as-a-Service (SaaS)
4. Function-as-a-Service (FaaS)

2.2 IBM computing

1. Get IBM cloud Lite account for 6months to get access to Bluemix
<https://e5.onthehub.com/WebStore/Security/LtiSignIn.ashx>

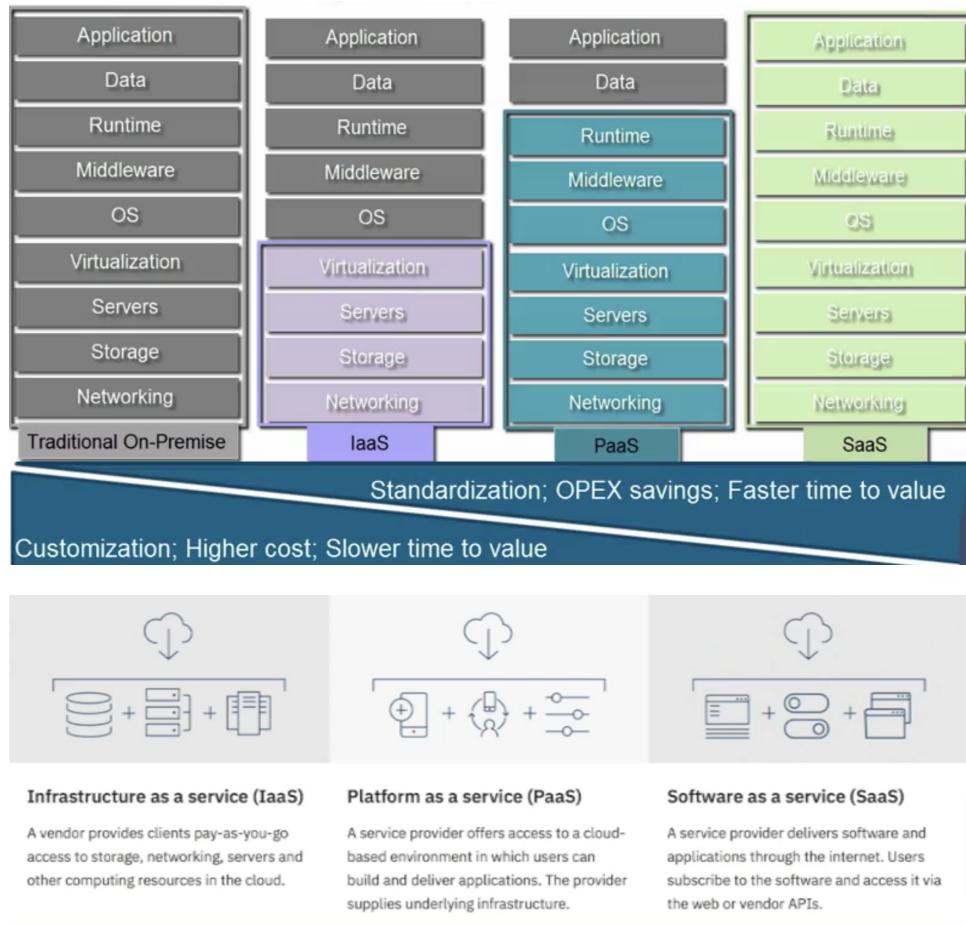


Figure 1: Cloud computing

2. Apply code

<https://console.bluemix.net/account/billing?accountId=e6269f255a404d6cb1a5849dae2f9510>

3. IBM cloud Identity and access management (IAM)

4. Cloud Foundry Orgs, add a region. <https://console.bluemix.net/account/organizations?accountId=e6269f255a404d6cb1a5849dae2f9510>

2.3 Rapid application for IoT

1. Deploying Node-RED on the IBM Cloud

a Catalog <https://console.bluemix.net/catalog>

b Go to Node Red (different from course video probably due to update) <https://console.bluemix.net/catalog/starters/node-red-starter>

c Enable https://console.bluemix.net/apps/23d84272-669c-44a2-91a3-f009a176740e?paneId=overview&env_id=ibm:yp:eu-gb

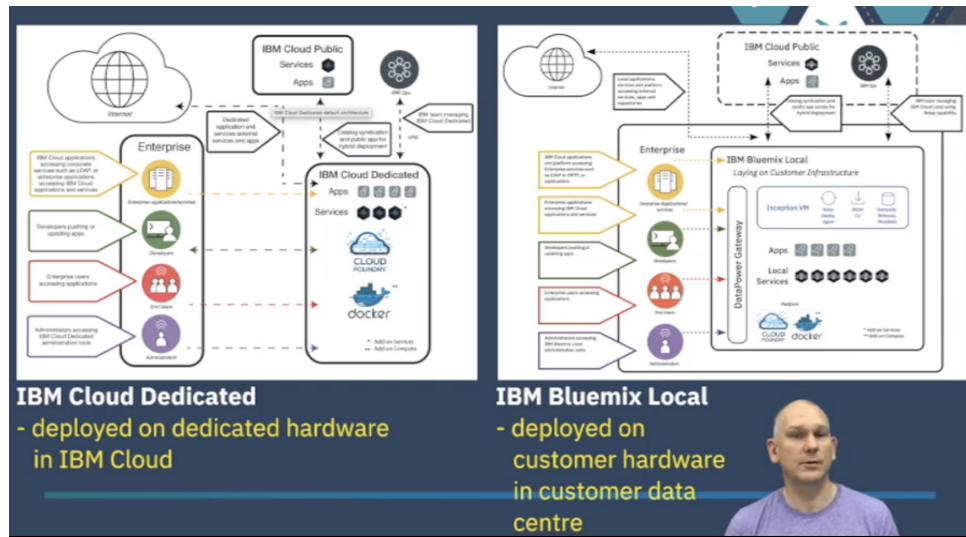


Figure 2: IBMcloud

- Create Platform API key <https://console.bluemix.net/iam/#/apikeys>
- Go to Git profile and reate an access token (or ssh key) https://git.eu-gb.bluemix.net/profile/personal_access_tokens
- Copy and save the token
- By default, the project is created as a private repository.

```
// To access the repository on ibm git repository
git clone https://jujmdu@git.eu-gb.bluemix.net/jujmdu/jnode.git
// password is the token
```

- Open the cloned project in Atom, make changes in the editor, add commit messages and commit to the master branch. (gitplus package needed)

2. Introduction to NodeRED 1

- Access NodeRED <https://jnode.eu-gb.mybluemix.net>
- Provide a username and password
- Follow the guide and enter <https://jnode.eu-gb.mybluemix.net/red/#flow/e7bfdaf.a4b2b28>

3. Introduction to NodeRED 2

- Nodes works by sending JavaScript messages.
 - Messages flow along the connectors between nodes
 - When javascript arrives, it is made available as the msg variable.

- iii. The most important content in a message is found in the payload property
- b To change settings of a node, double click the node.
- c Where are the nodes stored?
 - i. Cloud: NoSQL
 - ii. Raspberrypi: Local
- d How to store the nodes on the NodeRED user interface?
 - i. Up Right: Menu- Export and save as a library
 - ii. Loca board: click on sheet then dragging over required nodes and save as text files
- e How to import the nodes on the NodeRED user interface?
 - i. Up Right: Menu- Import text files
 - ii. **Passwords** are not saved when the import and export flows. Need to reinput any passwords stored in the flow.
- f How to install nodes?
 - i. Menu- Manage palette
 - ii. npm

2.4 NodeRED function node

2.5 Additional NodeRED nodes

3 Rapid application development on a Raspberry Pi

3.1

- 1.
- 2.

4 Lower level programming for the Internet of Things

4.1

- 1.
- 2.