android things

IOTignite

Developing IoT Applications using Raspberry Pi and Android Things

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Ev Sahibi

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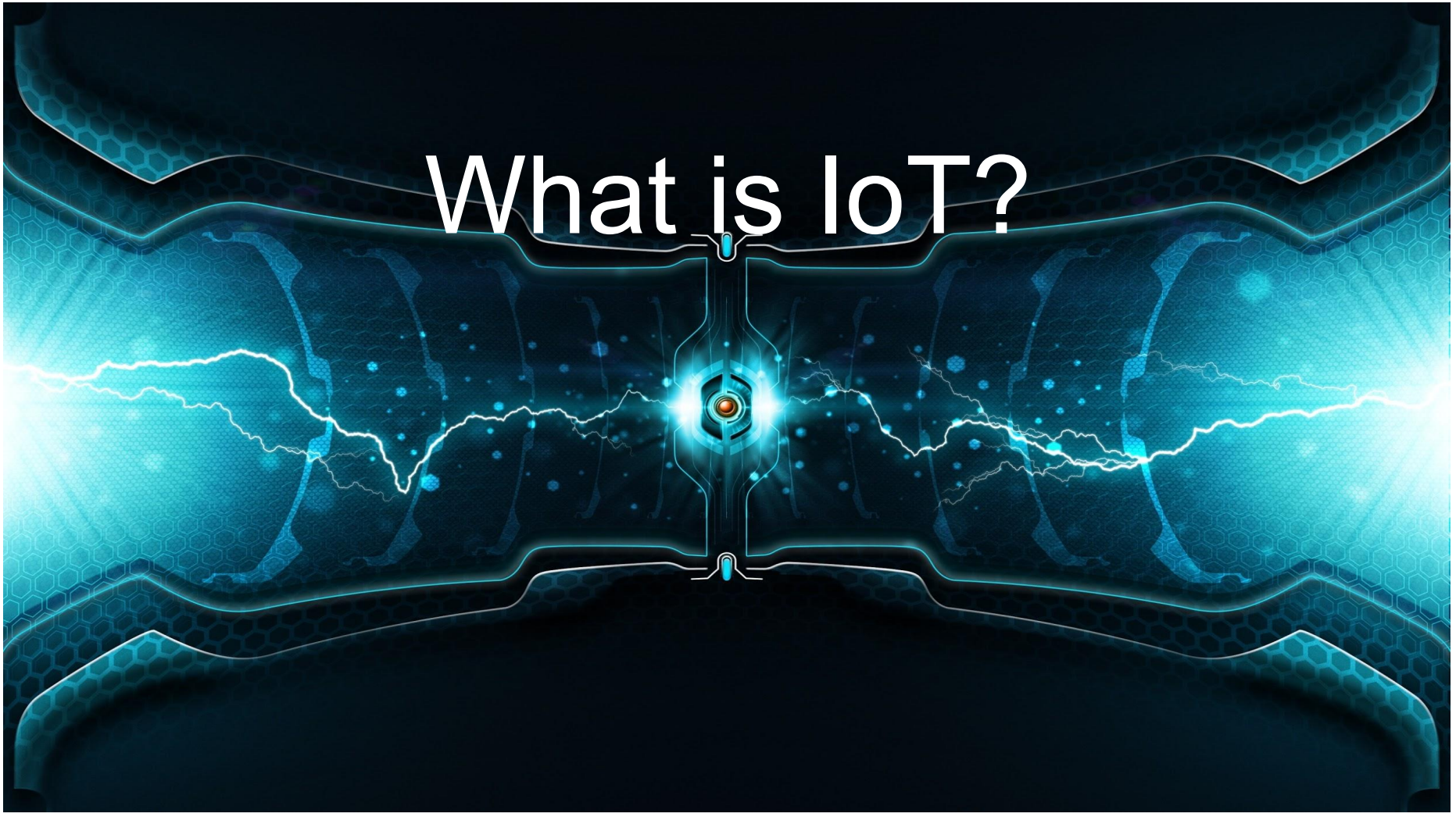
What are we going to learn ?

- What is IoT?
- Why Android Things?
- What is IoT-Ignite?
- Demo Application
- An Introduction to IoT Devices and Environment
- How to setup a gateway

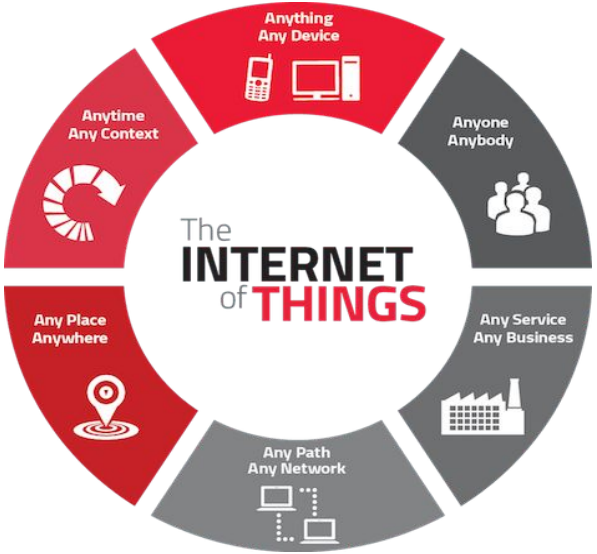
What are we going to learn ?

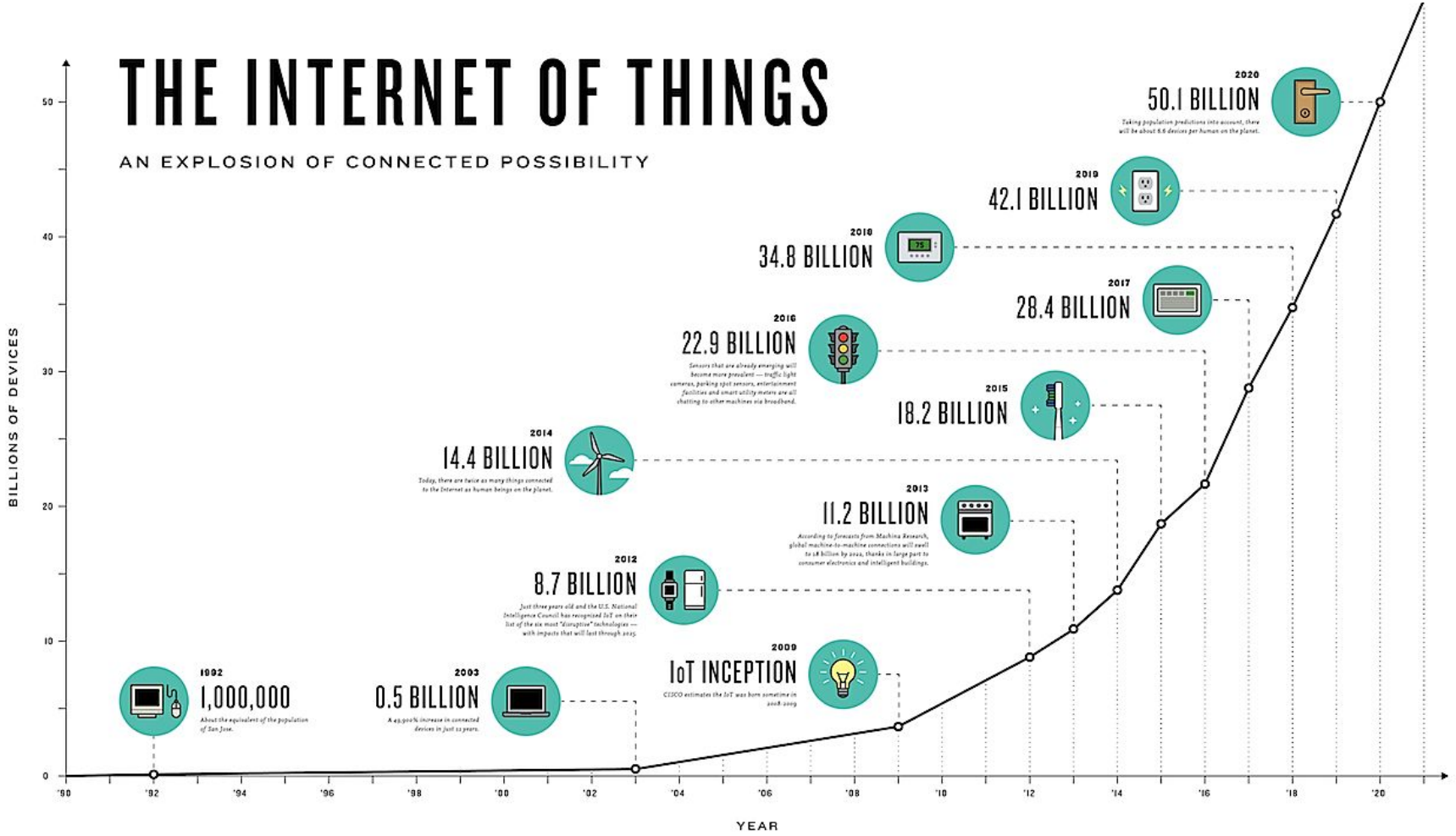
- Practising IoT-Ignite apps on demo code
- Making an application trusted
- Configuration a gateway
- Visualizing thing data on IoT-Ignite
- Defining a complex event rule


What is IoT?

What is IoT?

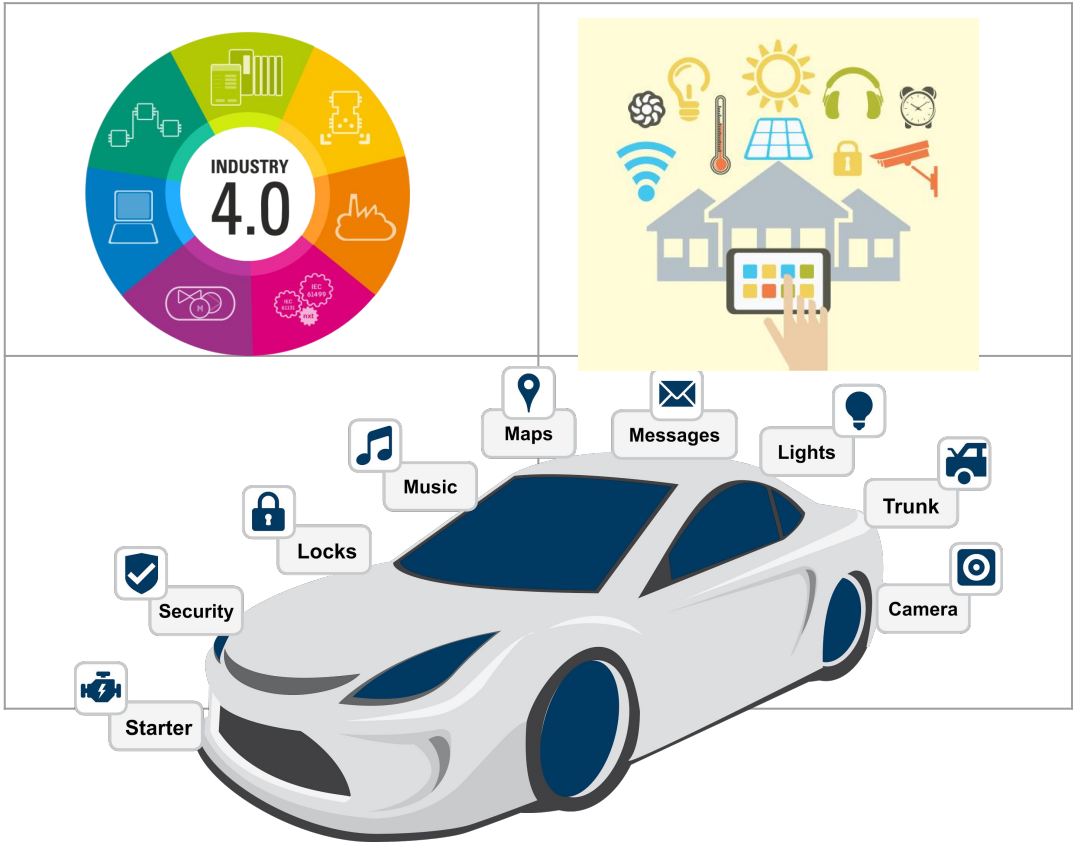
- IoT is an abbreviation for Internet of Things.
- All devices around us can be managed locally or remotely by connecting them to the Internet in various ways. Even devices can manage others.




THE INTERNET OF THINGS
AN EXPLOSION OF CONNECTED POSSIBILITY
BILLIONS OF DEVICES
YEAR
1992
1,000,000
About the equivalent of the population of San Jose.
2003
0.5 BILLION
A 49,900% increase in connected devices in just 11 years.
2009
IoT INCEPTION
CISCO estimates the IoT was born sometime in 2008-2009.
2012
8.7 BILLION
Just three years old and the U.S. National Intelligence Council has recognized IoT on their list of the six most "disruptive" technologies — with impacts that will last through 2025.
2013
11.2 BILLION
According to forecasts from Machina Research, global machine-to-machine connections will swell to 18 billion by 2022, thanks in large part to consumer electronics and intelligent buildings.
2014
14.4 BILLION
Today, there are twice as many things connected to the Internet as human beings on the planet.
2015
18.2 BILLION
2016
22.9 BILLION
Sensors that are already emerging will become more prevalent — traffic light cameras, parking spot sensors, entertainment facilities and smart utility meters are all chatting to other machines via broadband.
2017
28.4 BILLION
2018
34.8 BILLION
2019
42.1 BILLION
2020
50.1 BILLION
Taking population predictions into account, there will be about 6.6 devices per human on the planet.

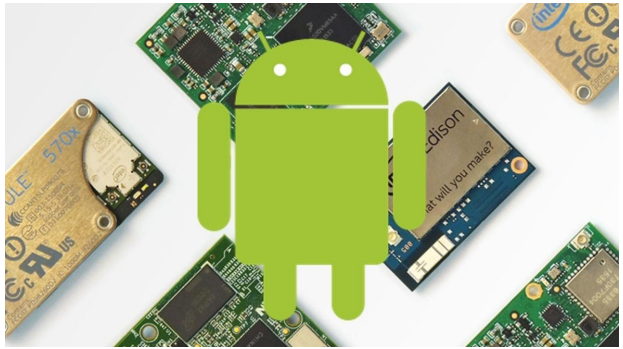
What are main IoT Application Areas?

- Smart Homes
- Industry 4.0
- Smart Cities
- Smart Agriculture
- Medical Applications
- Smart Cars



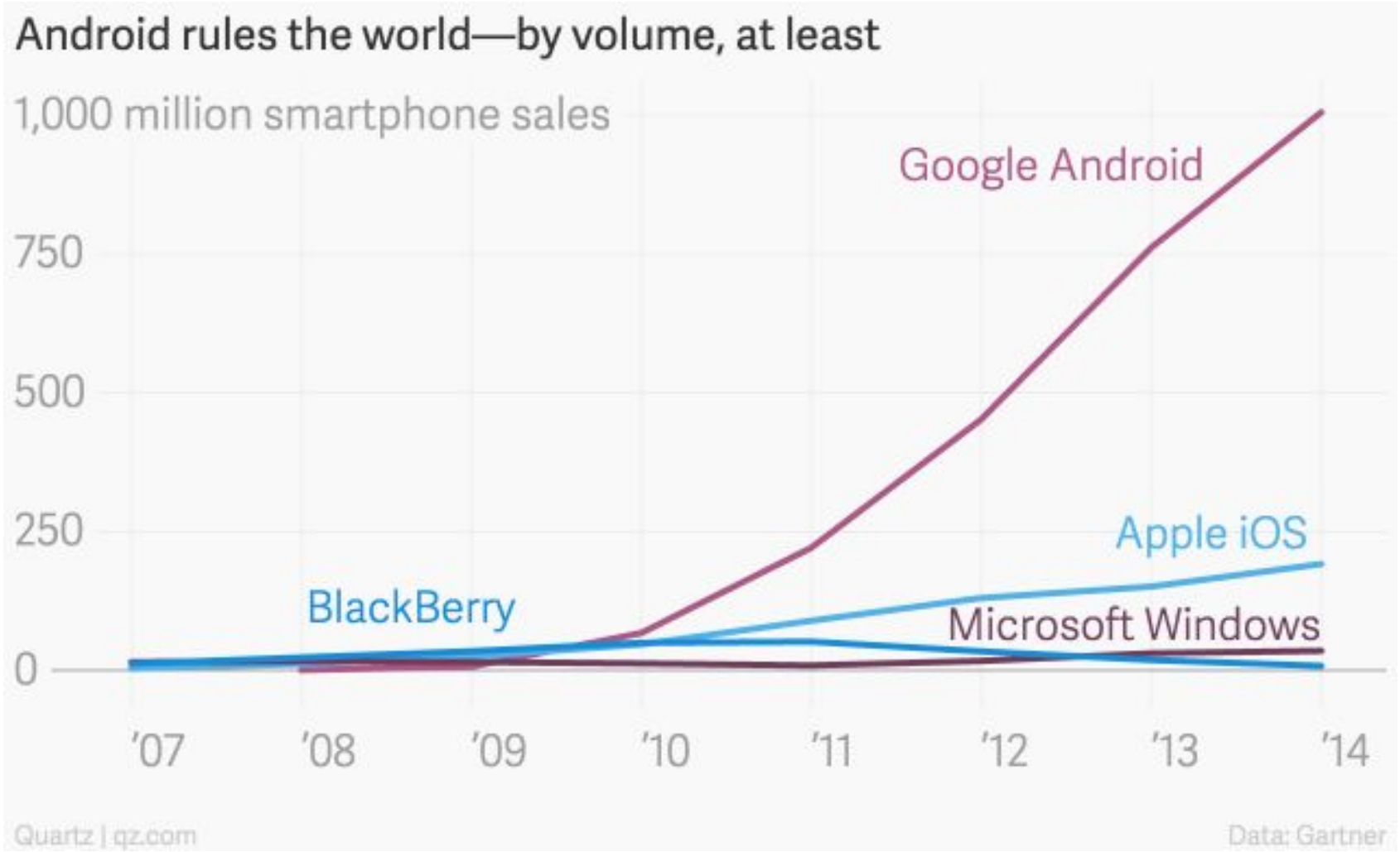
Android Things™

Google has developed the IoT version of Android OS, the most widely used operating system in the world, to run on embedded devices.



- Announce Date: December 2016 (Dev preview 1)
- https://developer.android.com/things/index.html

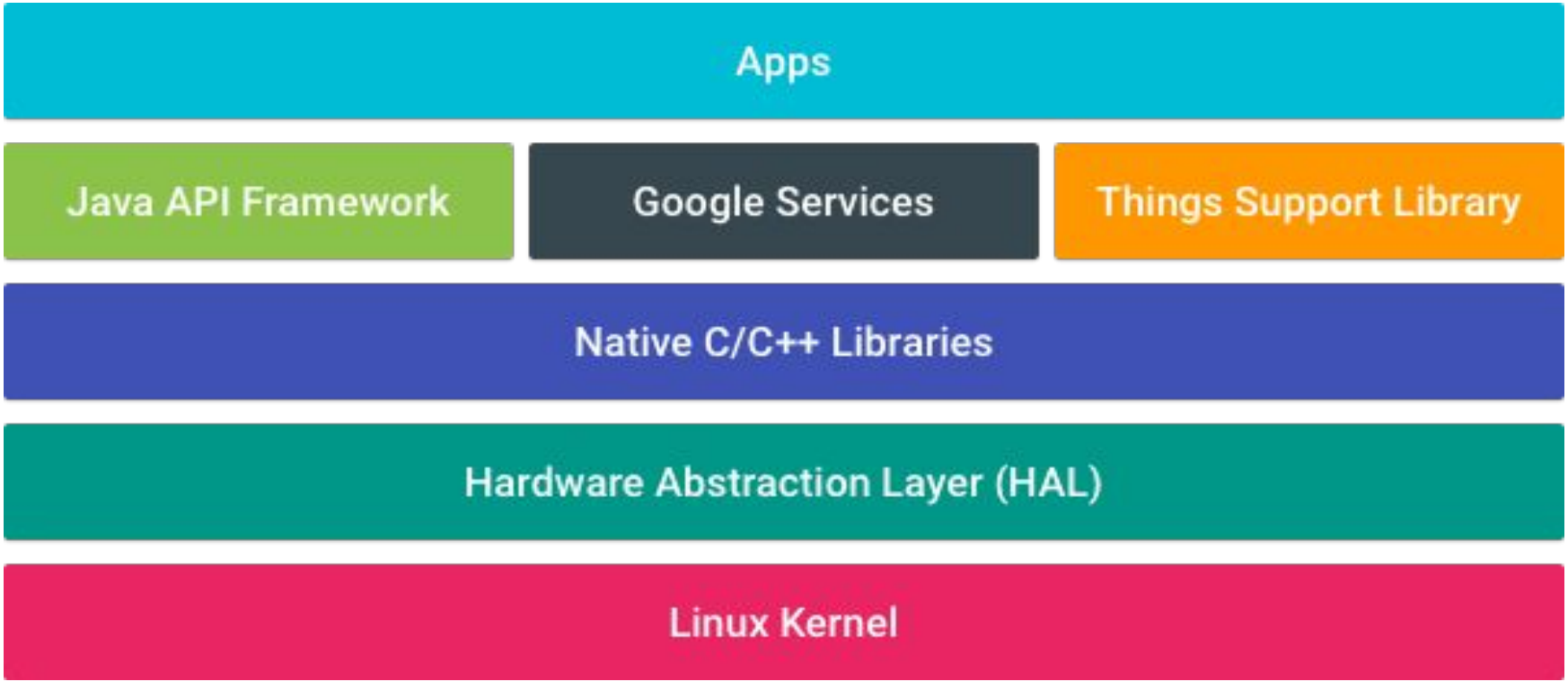
androidthings


Android rules the world—by volume, at least
1,000 million smartphone sales
750
500
250
0
Google Android
Apple iOS
BlackBerry
Microsoft Windows
'07
'08
'09
'10
'11
'12
'13
'14
Quartz | qz.com
Data: Gartner

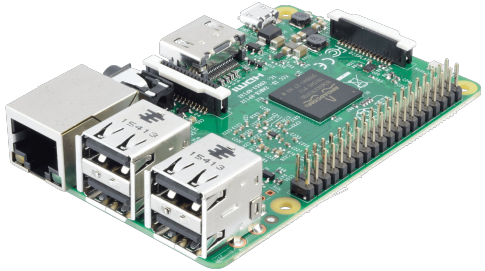
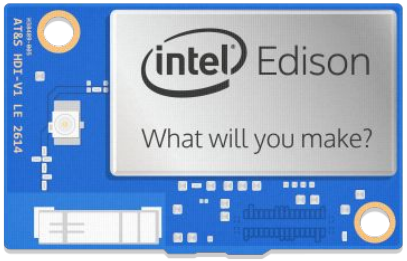
Advantages of Android Things

- Easy programming;
  - You develop your IoT applications in the same way you develop a mobile application.
  - You have the complete functional support of an IDE: Android Studio.
- It is free and open source (Source code will be published sooner).
- It is secure.
- Easy management.
- Offically supported hardware
- Platform with the largest developer community.

Android Things Architecture

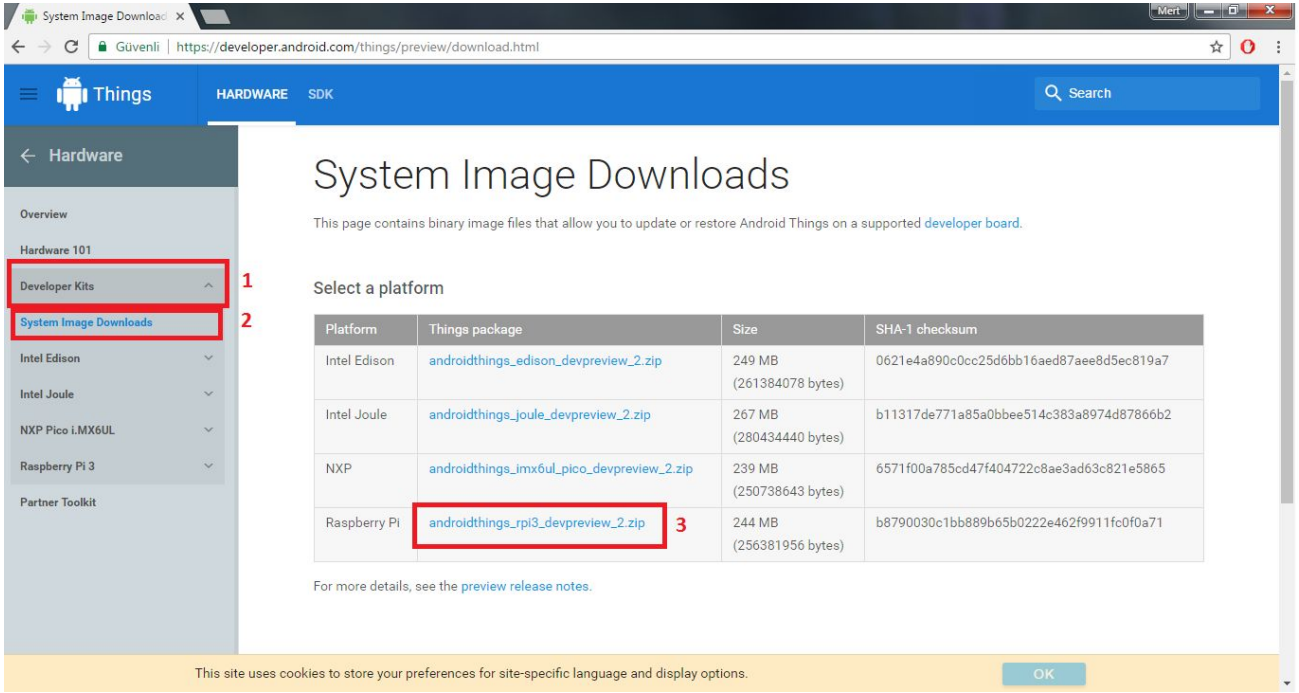


Supported Devices

Raspberry Pi 3	Intel Edison
	
Intel Joule	**NXP Pico i.MX6UL**

Installing Android Things

Download system image from https://developer.android.com/things/preview/download.html



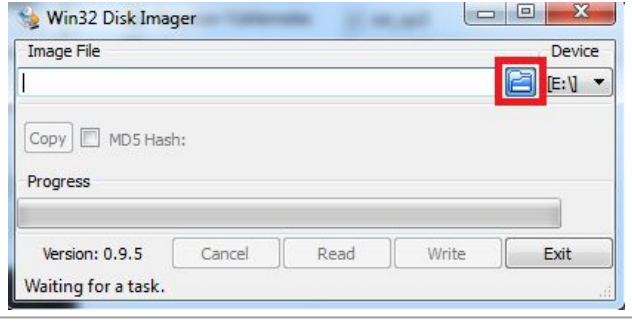
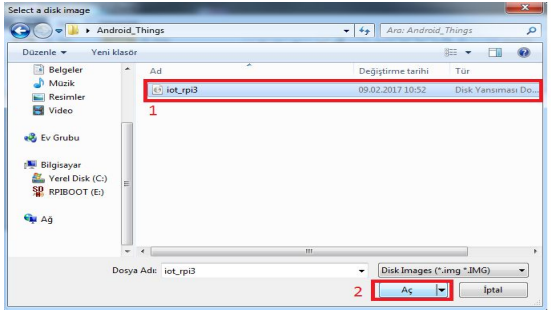
Installing Android Things

Download Win32DiskImager from the link below and install it.

https://sourceforge.net/projects/win32diskimager/

This program is capable of flashing Android Things “.img” file to Micro SD-Card.

Installing Android Things

Click button to select file.	Select file with “.img” extension
	
Click “Write” button to flash image.	

Installing Android Things

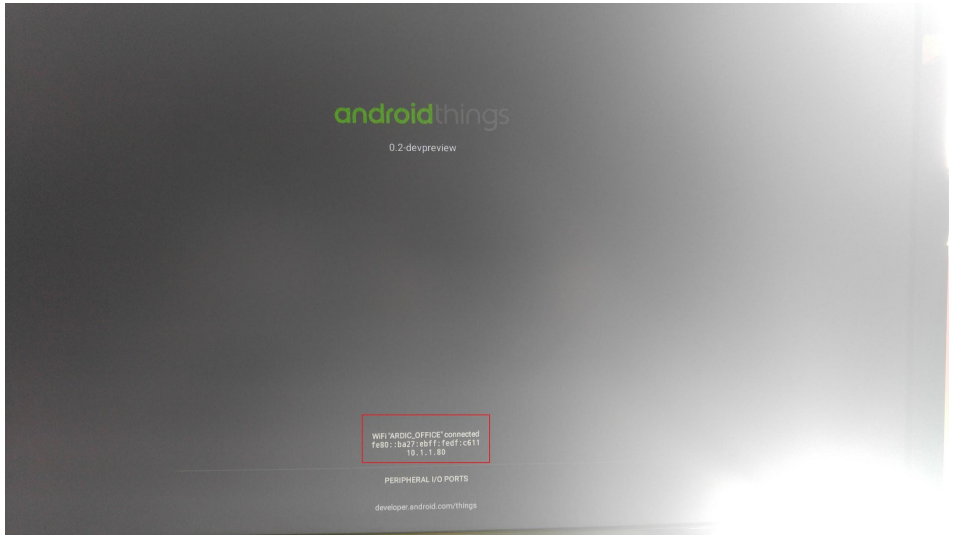
Insert flashed SD-Card to Raspberry Pi

Installing Android Things

Power up Raspberry Pi. You should see the boot up screen below.

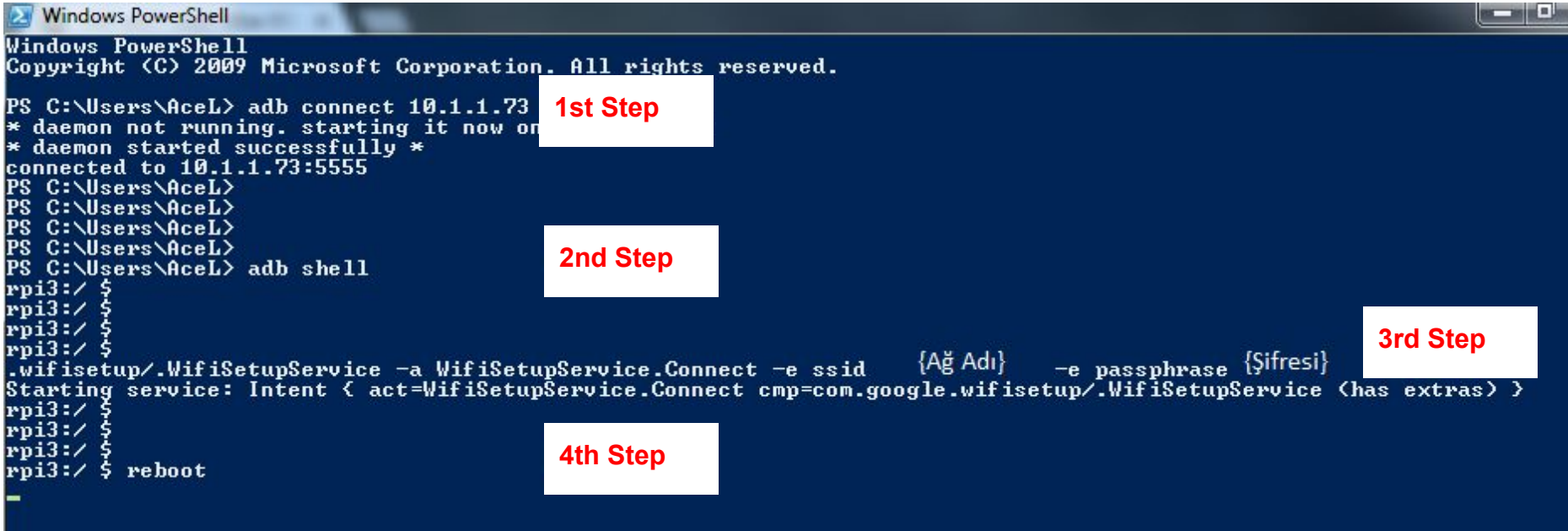
Installing Android Things

Using the displayed IP at the bottom of this screen, we can connect to and configure this device. We are going to use “adb” application for this purpose.

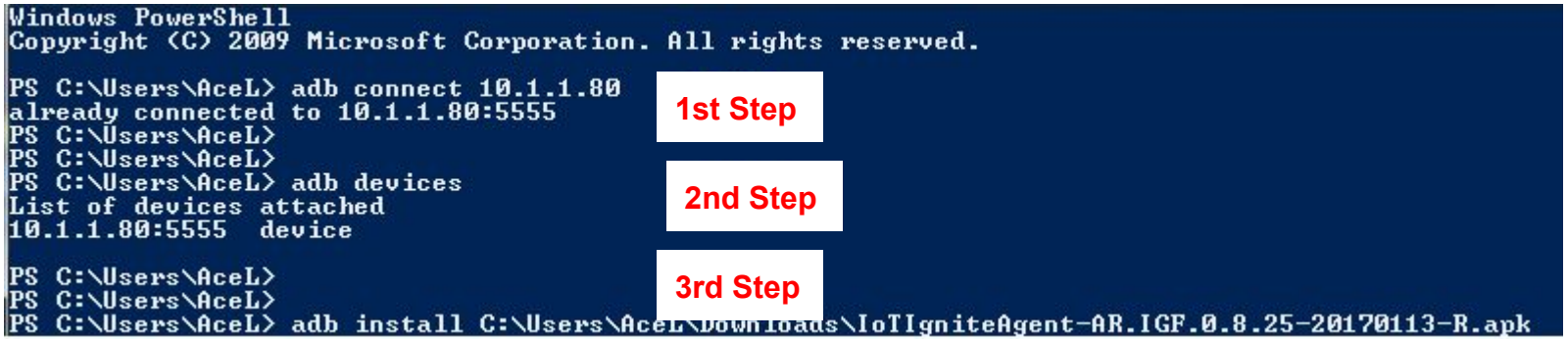


Installing Android Things

am startservice -n com.google.wifisetup/.WifiSetupService -a WifiSetupService.Connect -e ssid <SSID> -e passphrase <PASSWD>

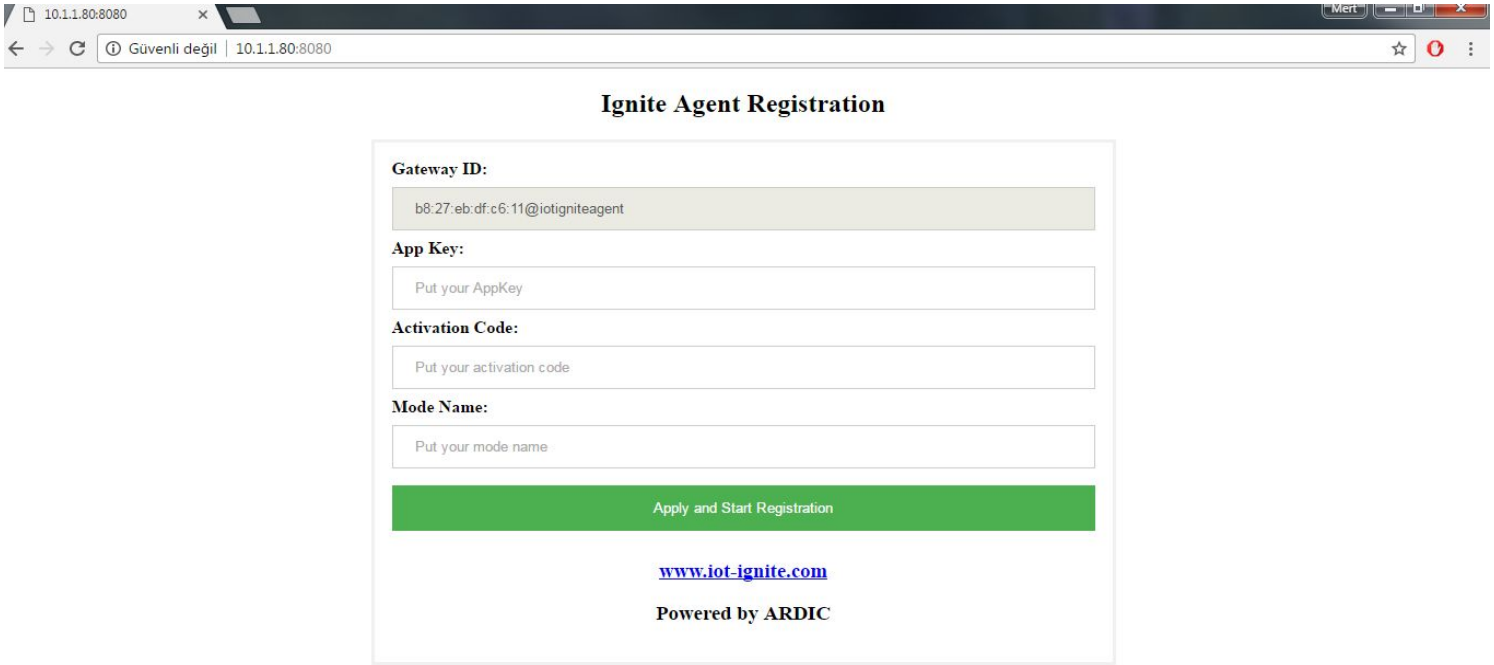


Installation of IoT-Ignite Agent & Licensing Gateway



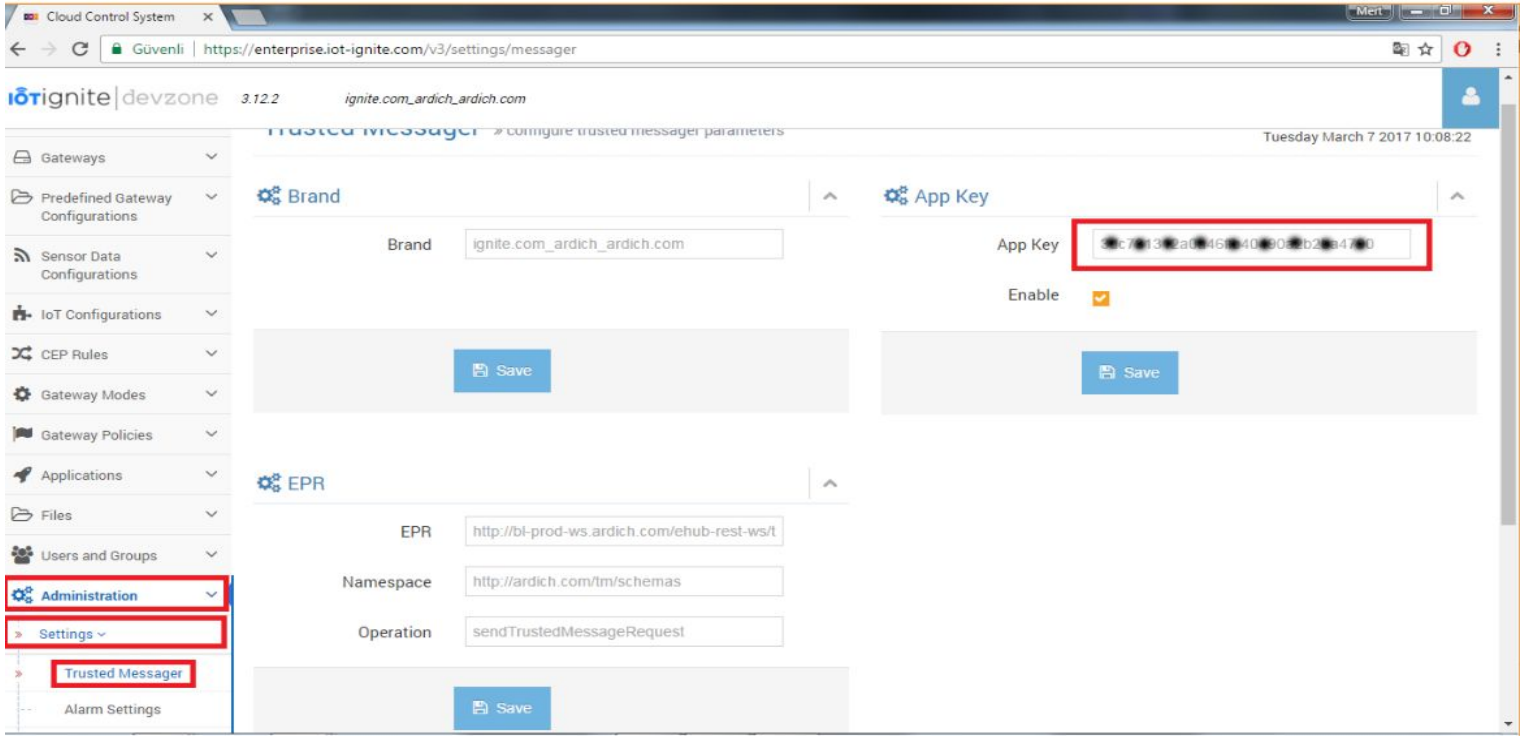
Installation of IoT-Ignite Agent & Licensing Gateway

After you connect to the same network, open a web browser and enter <Gateway IP>:8080.



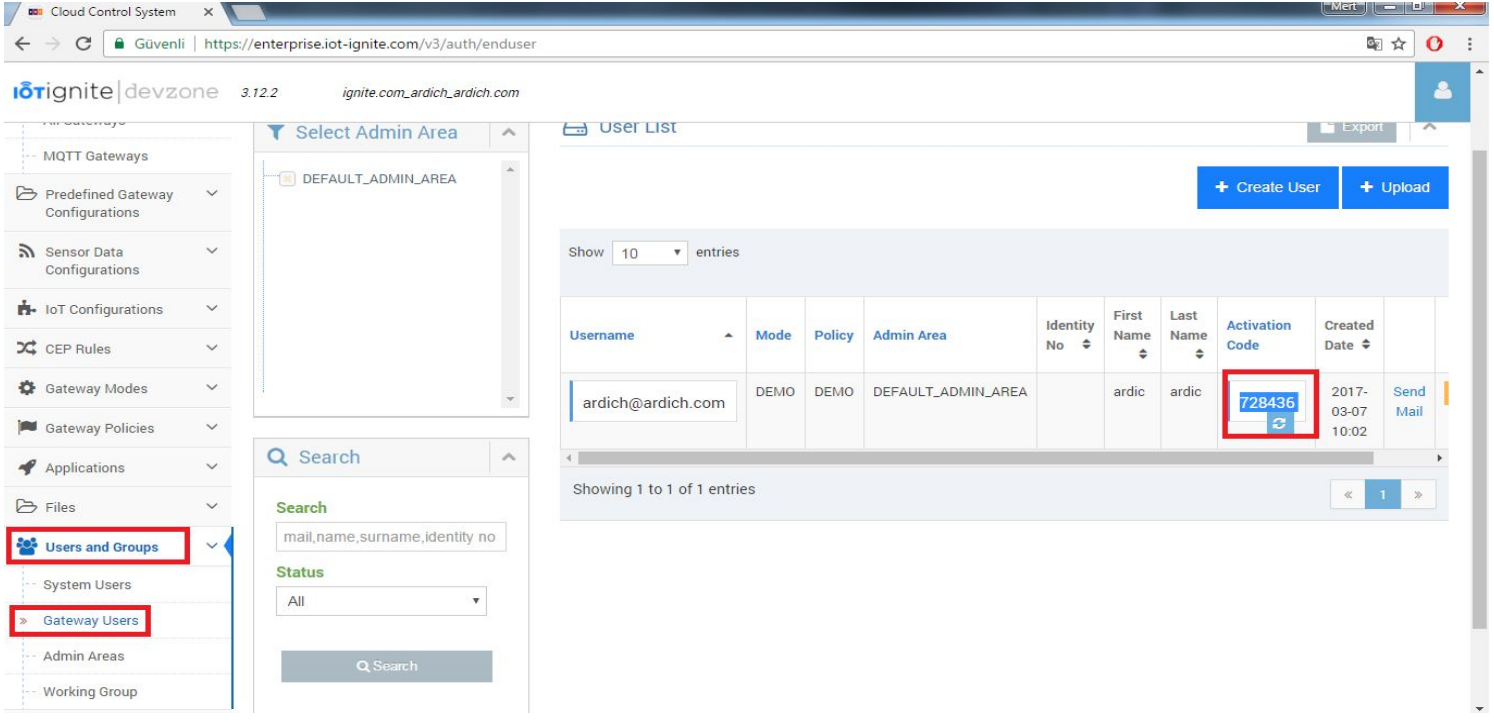
Installation of IoT-Ignite Agent & Licensing Gateway

How to obtain application key:



Installation of IoT-Ignite Agent & Licensing Gateway

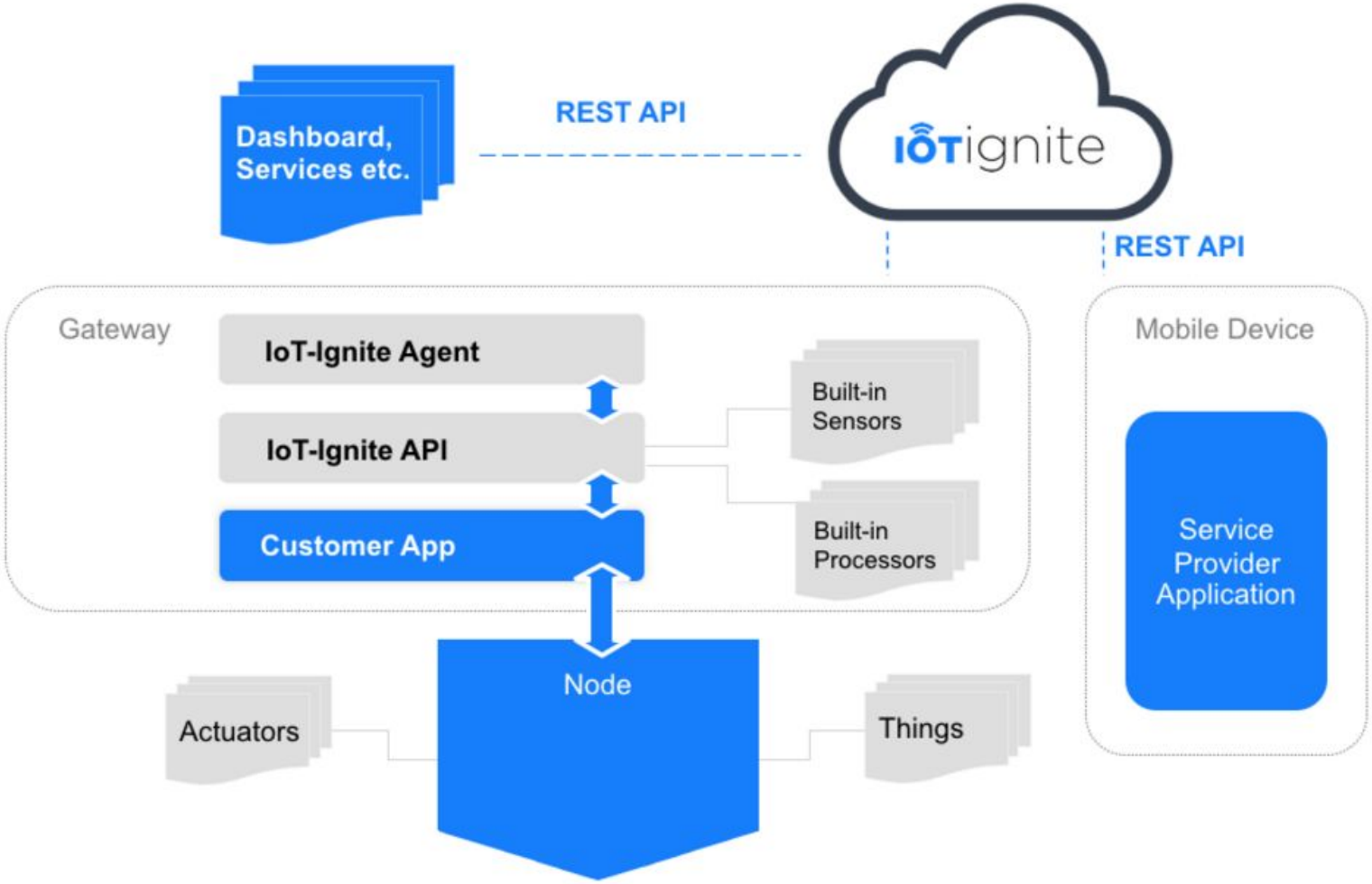
How to retrieve activation code:



Installation of IoT-Ignite Agent & Licensing Gateway

Mode Name:

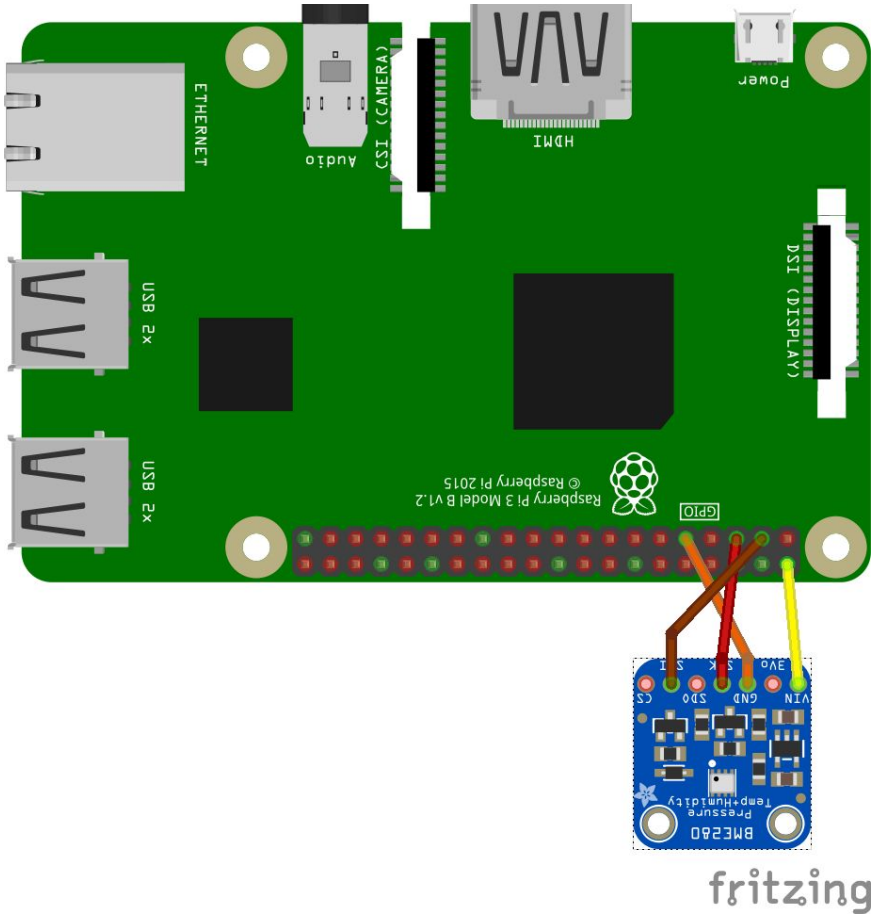
This step is optional. If skipped, gateway is switched to default mode. If you want your gateway to be switched to another mode, you can enter that mode name during licensing process.


Dashboard, Services etc.
REST API
IOTignite
REST API
Gateway
IoT-Ignite Agent
IoT-Ignite API
Customer App
Built-in Sensors
Built-in Processors
Mobile Device
Service Provider Application
Node
Actuators
Things

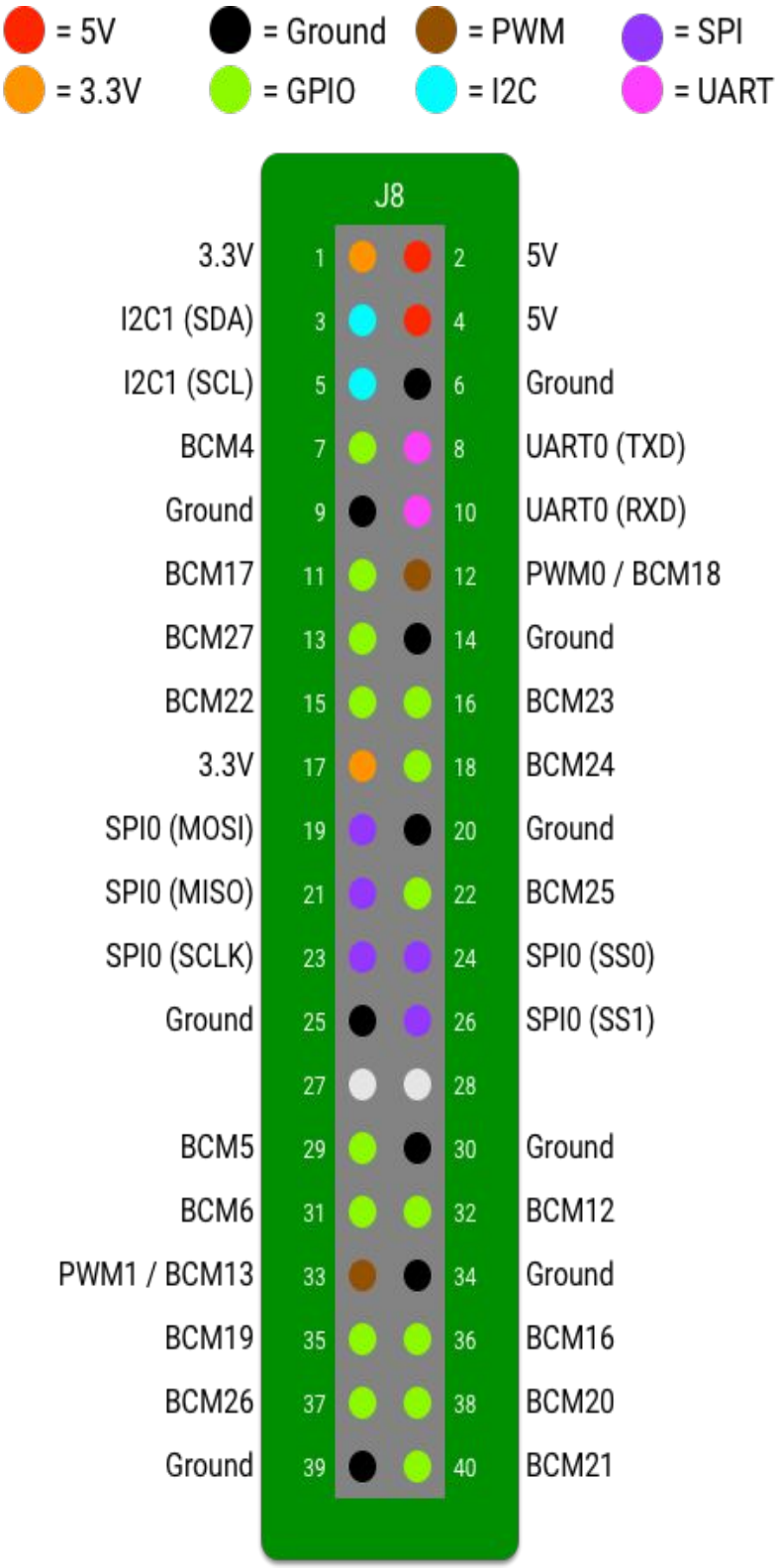
Smart Weather Station

- Using BME280 sensor and Android Things I2C interface, send data to IoT-Ignite Cloud.
- Write a rule on pressure or temperature and twit it.

Smart Weather Station



Raspberry Pi 3 PinOut



References

- https://developer.android.com/things/sdk/index.html
- https://devzone.iot-ignite.com/documents/
- https://github.com/IoT-Ignite
- https://github.com/androidthings
- https://github.com/androidthings/contrib-drivers