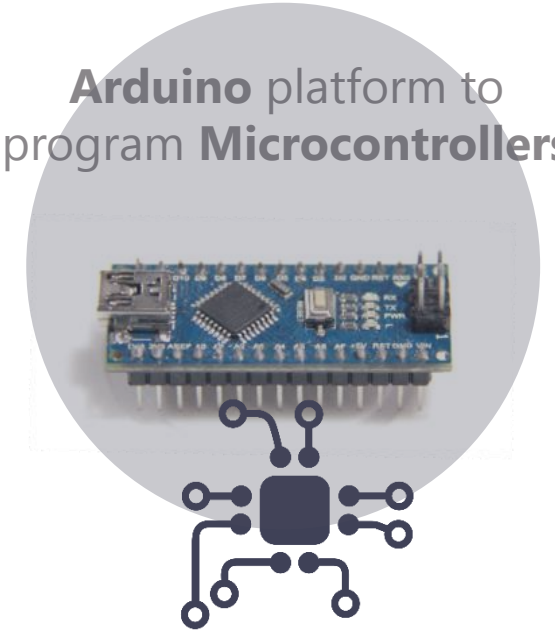
IOT and Cloud Computing

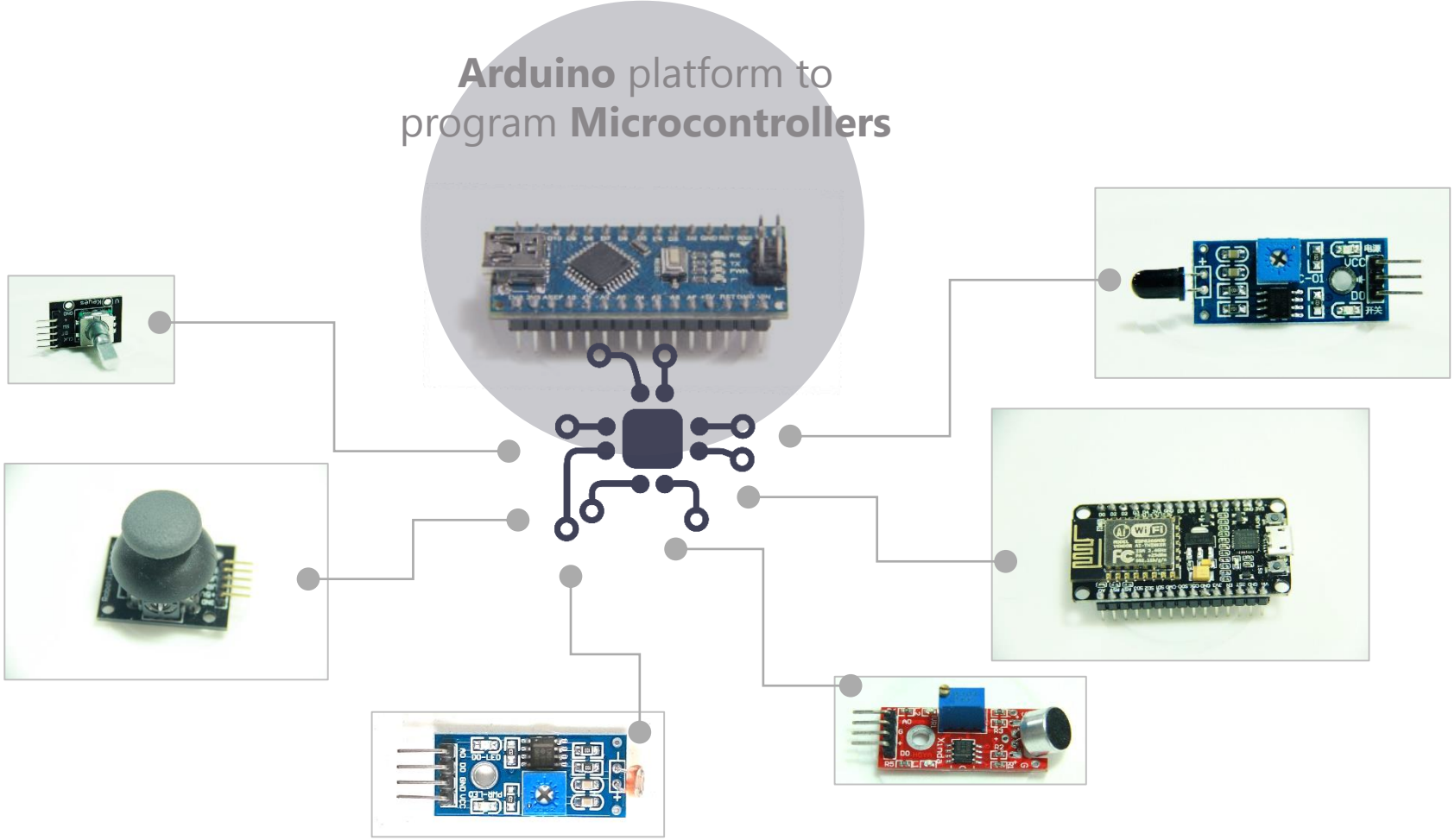
Introduction

IOT from Ground Up

Arduino platform to
program **Microcontrollers**



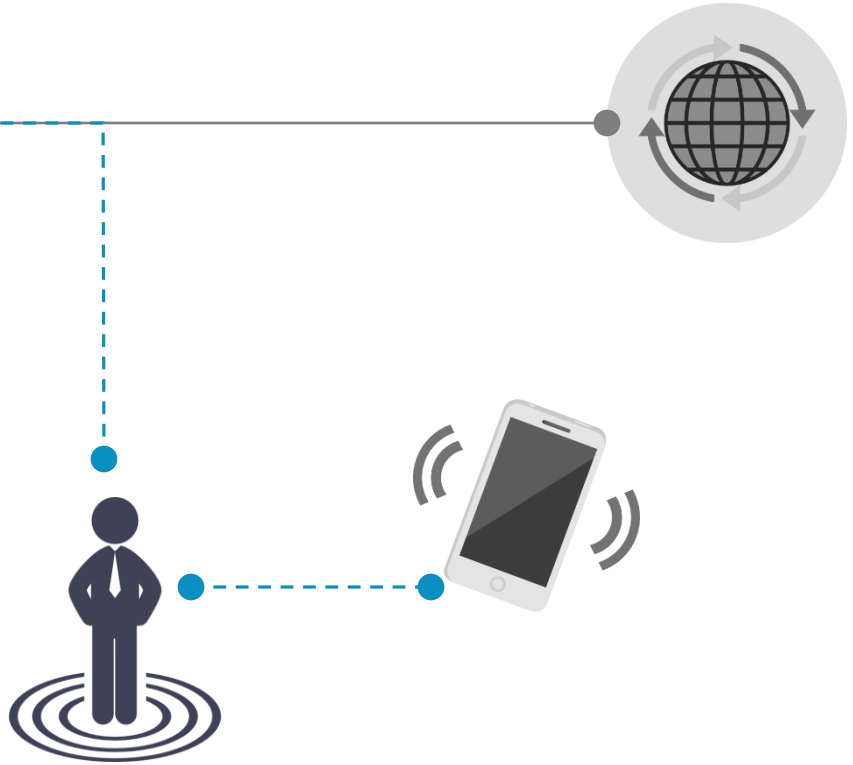
IOT from Ground Up



IOT from Ground Up - Arduino

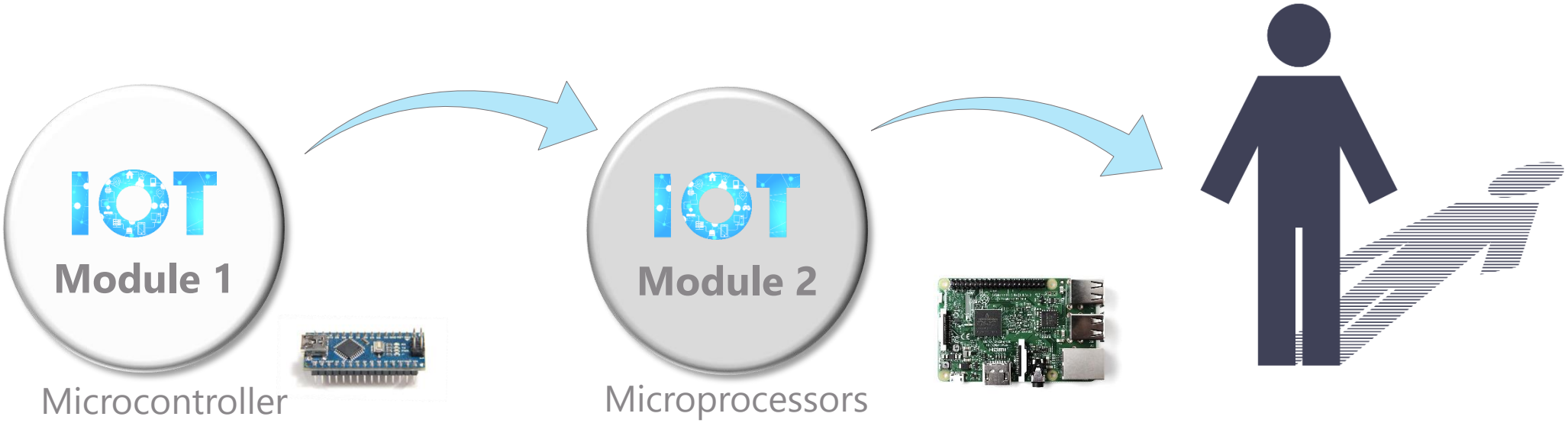
ESP8266 Microcontroller

Built in **Wi-Fi stack**



Low-level details of how **IOT Devices** are built

Powering IOT – Raspberry Pi

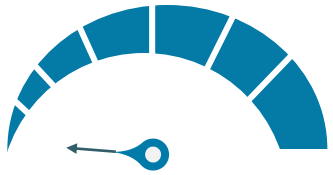


Microcontroller

Microprocessors

An understanding of how the two modules differ from each other
Relative strengths and weaknesses of both modules

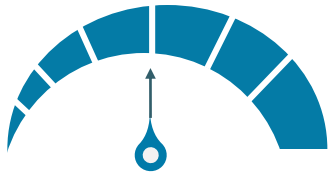
Powering IOT – Raspberry Pi



Computing Power

Explore new possibilities brought about by the computing power in IOT Devices

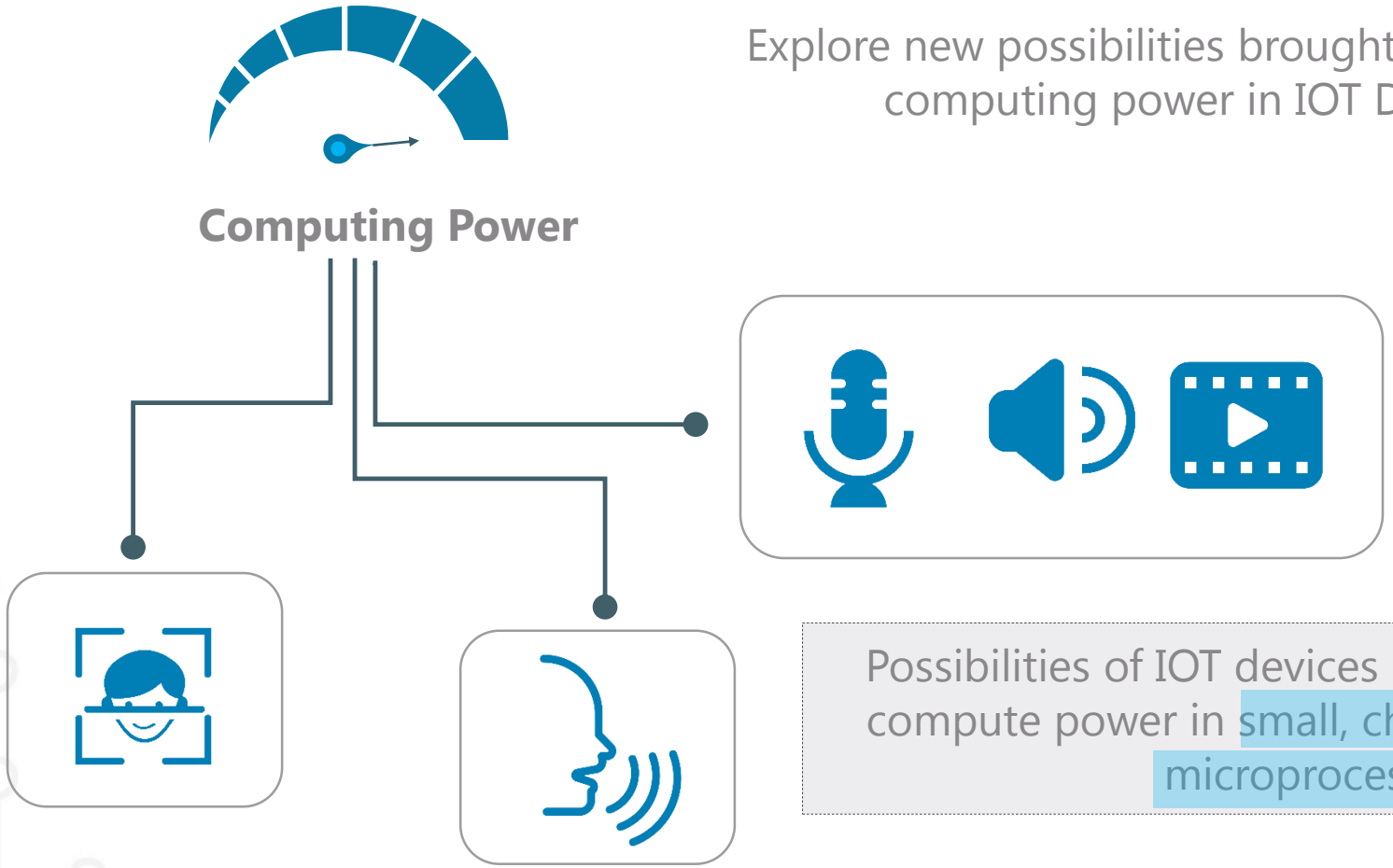
Powering IOT – Raspberry Pi



Computing Power

Explore new possibilities brought about by the computing power in IOT Devices

Powering IOT – Raspberry Pi



Explore new possibilities brought about by the computing power in IOT Devices

Possibilities of IOT devices enabled by growing compute power in small, cheap and low power microprocessors

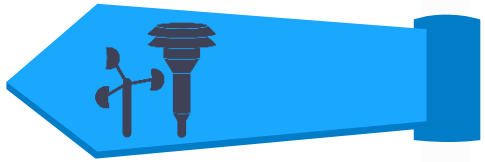
IOT and Cloud Computing

3 Technology Drivers of IOT

Moore's Law
Exponential growth of computing power

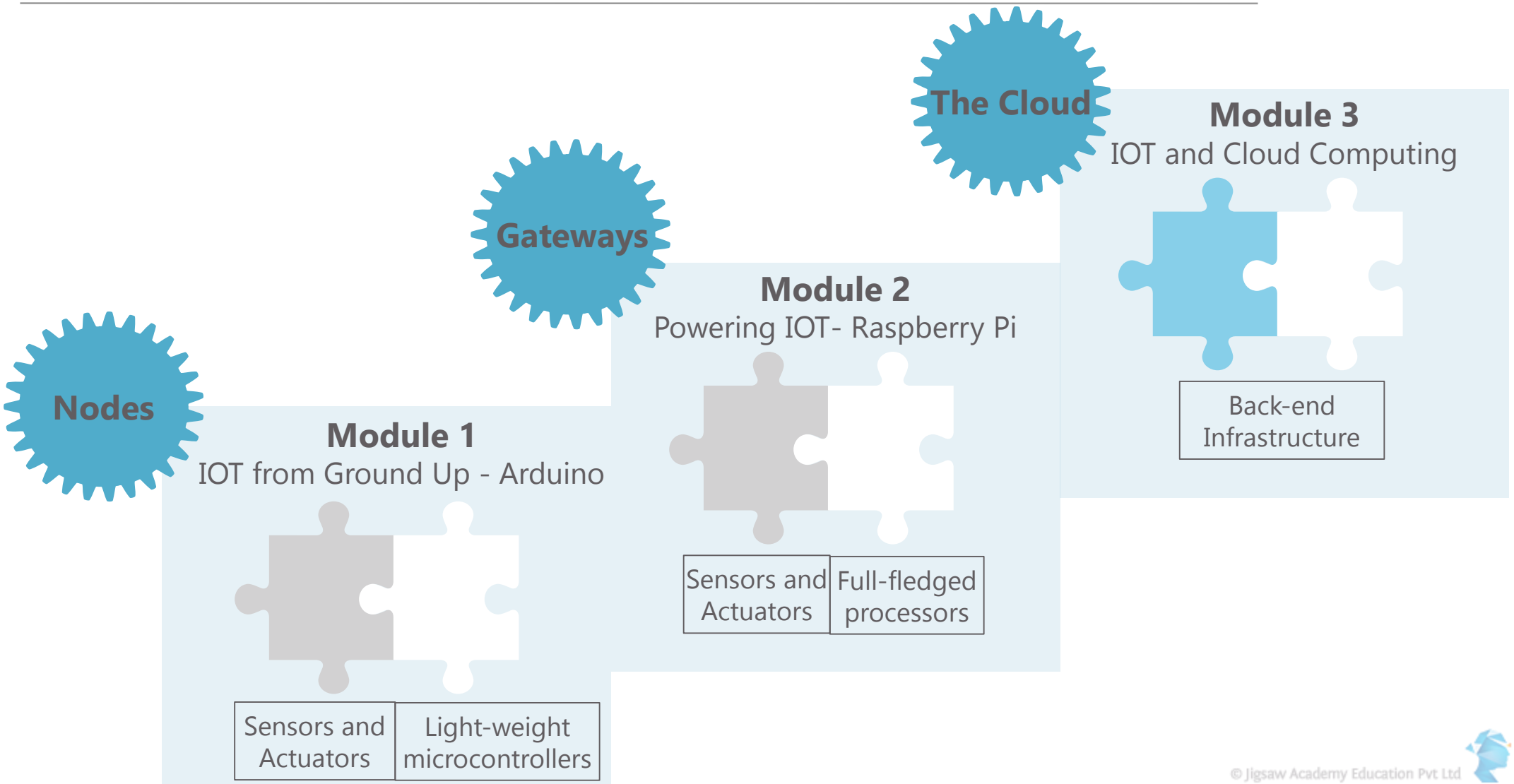
Connectivity
Expansion and accessibility of Internet

Availability of Sensors and Actuators
A host of options available

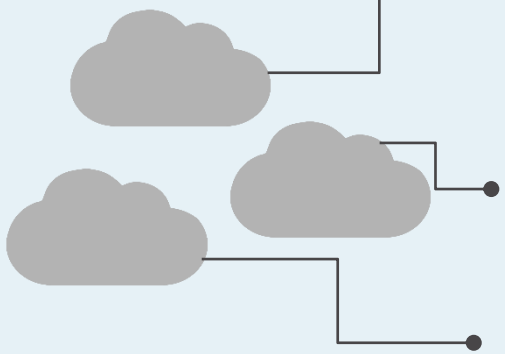


Framework for the IOT Course

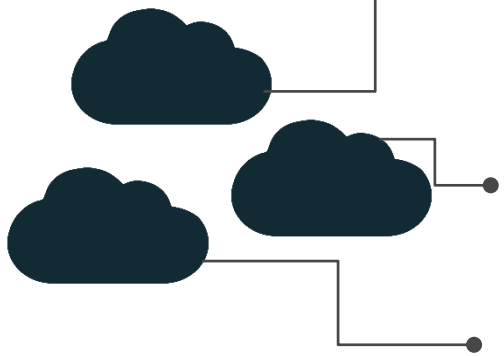
Connectivity is the Constant



Usage of the term ‘Cloud’



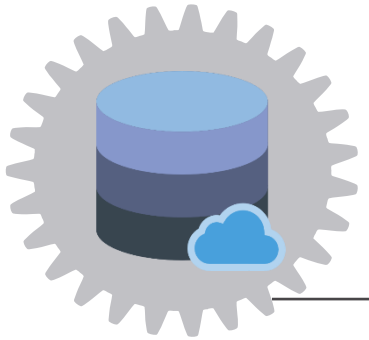
- Usually used to indicate migration of Local applications to Remote applications
- Google mail, Docs, Sheets, Calendar
- Most popular reference to **Cloud Computing**



- Back-end infrastructure
- The terms **back-end** and **cloud** are used interchangeably
- Explicit differentiation

What happens in the Cloud?

Hosted Applications

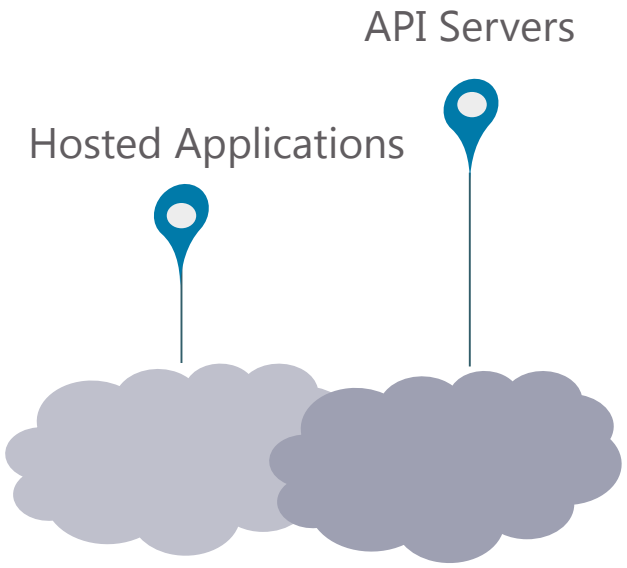


Cloud based servers to host applications
A place to store content and serve it over the network when requests to view the website come in

Web Application

Alternative application which runs on iOS or Android devices

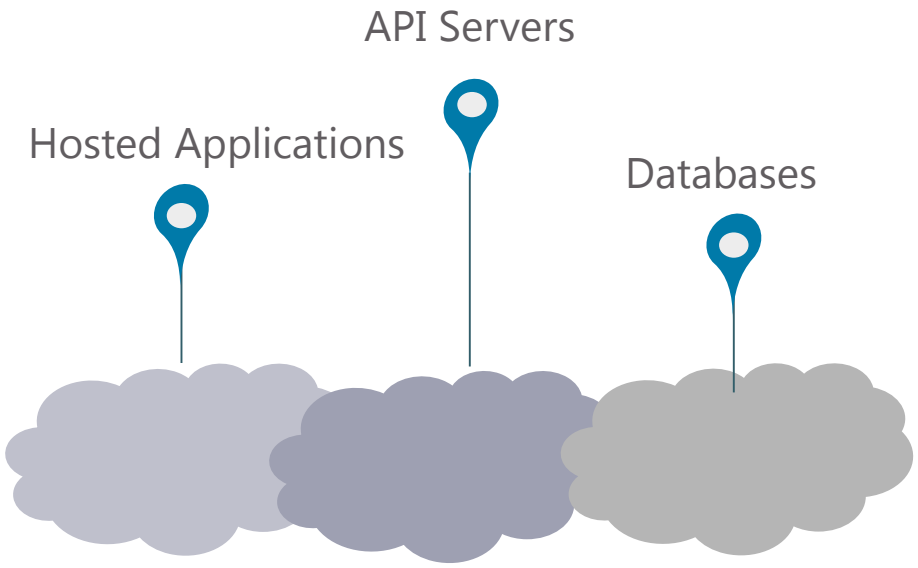
What happens in the Cloud?



API Servers

- Allows the App to authenticate itself
- Query the list of available devices, persist changes, manage usage from multiple devices
- A way to directly interact with the back-end
- Report status, upload data, get firmware update

What happens in the Cloud?

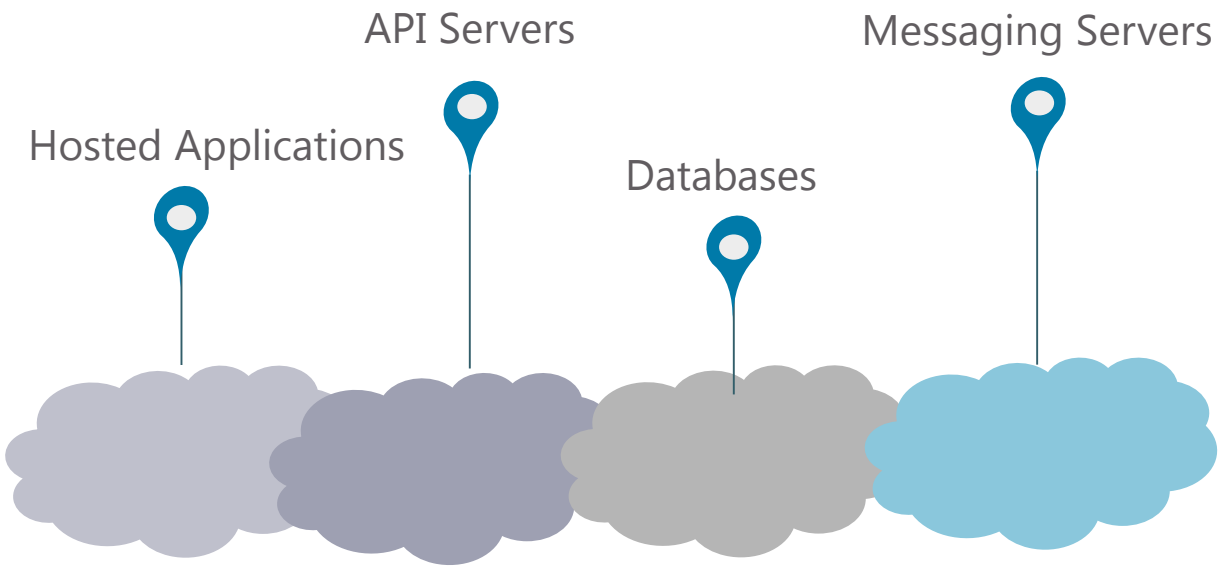


Databases

- Need databases to store data
- Relational Databases: SQL or Oracle
- Non-relational Databases: noSQL, Mongo DB and Redis

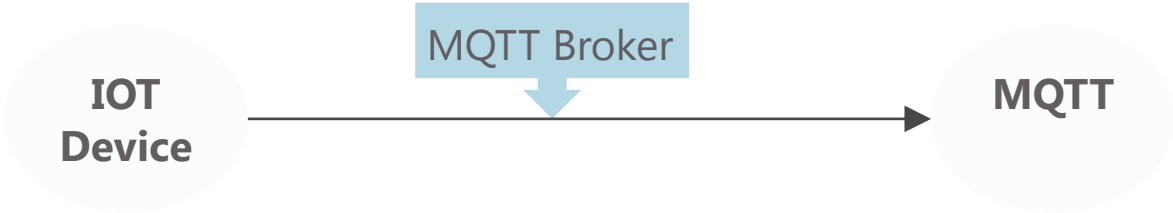
User data	Own data	Data from Metrics	Data from Clients

What happens in the Cloud?

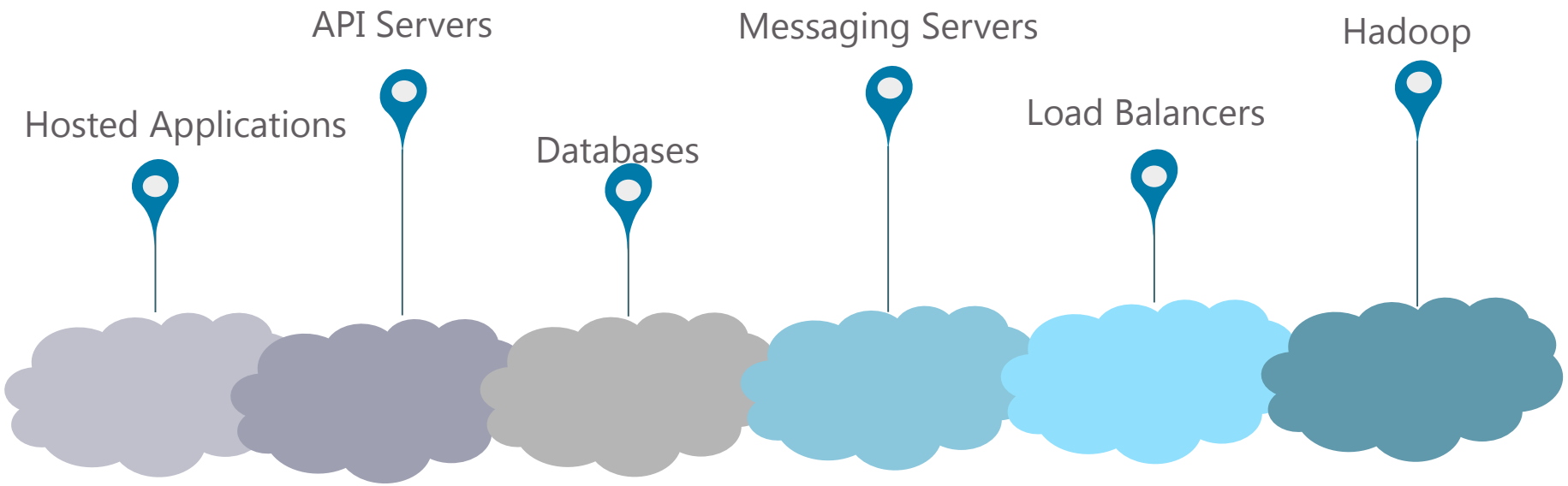


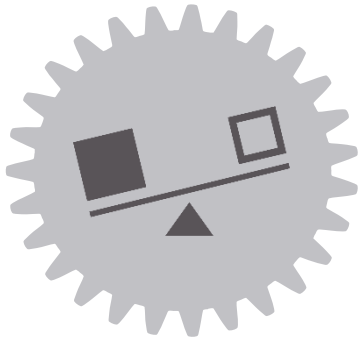
Messaging Servers

- Allow real time communication



What happens in the Cloud?





Load Balancers

- For a million users, a single server can't service all the requests within a stipulated time
- More than one API server is needed
- A Load Balancer is needed to spilt the load between the multiple API
- **Reverse proxies** acts as a **firewall** for cloud servers against malicious attacks

Cloud Services

SAAS

IAAS

PAAS

Cloud Services

SAAS
Software As A Service

salesforce.com

Gmail

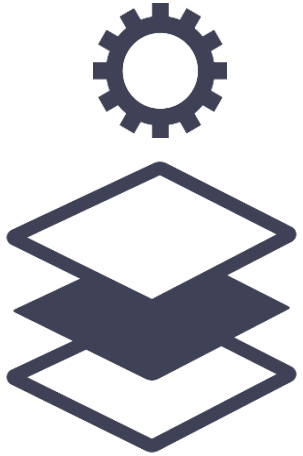
Run instead from the **cloud**

Traditional Cloud Computing

An application that would normally **run directly on PC**

Cloud Services

PAAS
Platform As A Service



Platforms are more configurable than SAAS

Cloud Services

IAAS
Infrastructure As A Service

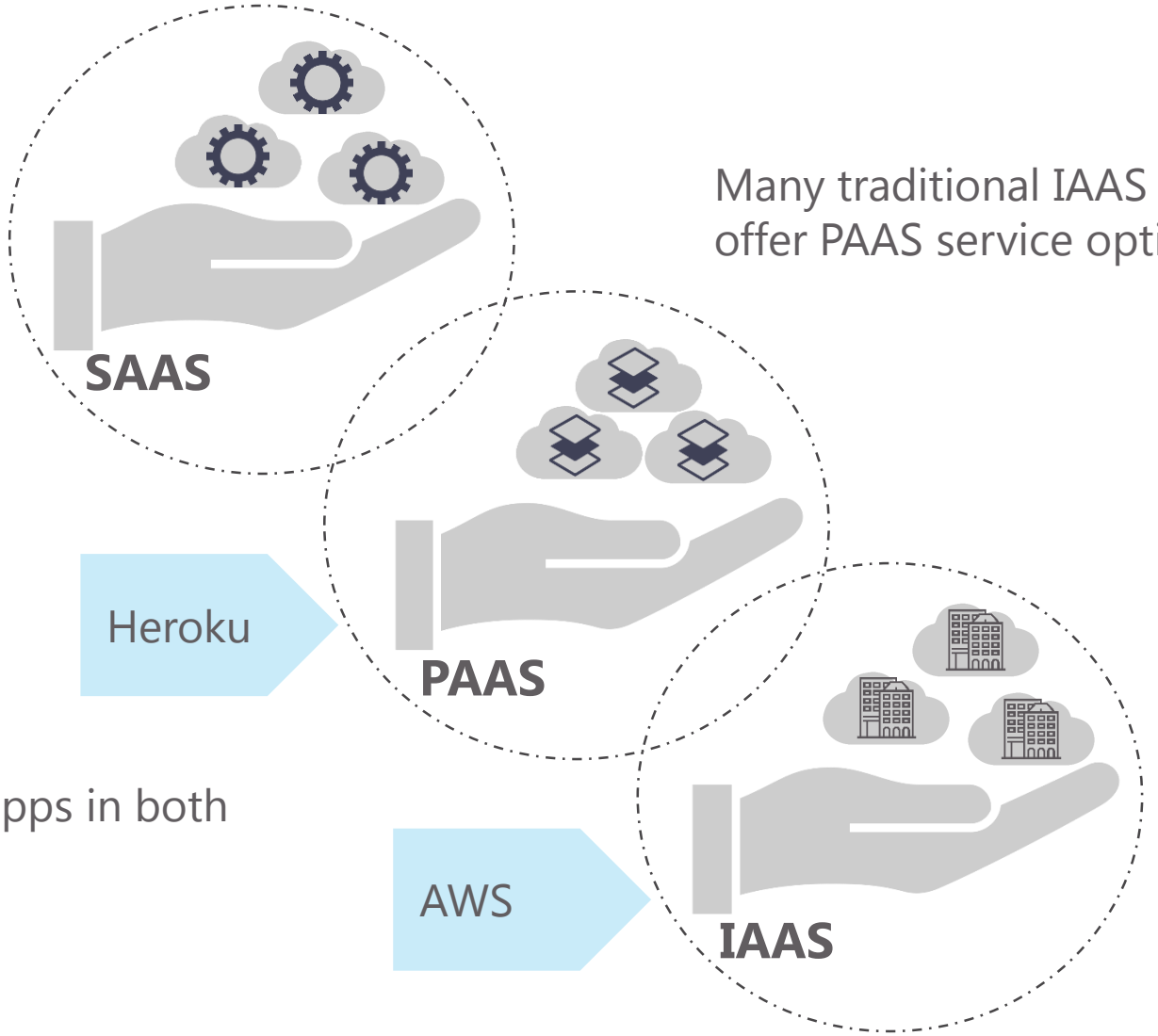
Amazon Web Services

Digital Ocean

IBM's Bluemix

Can run the client's server in the service provider's data centres

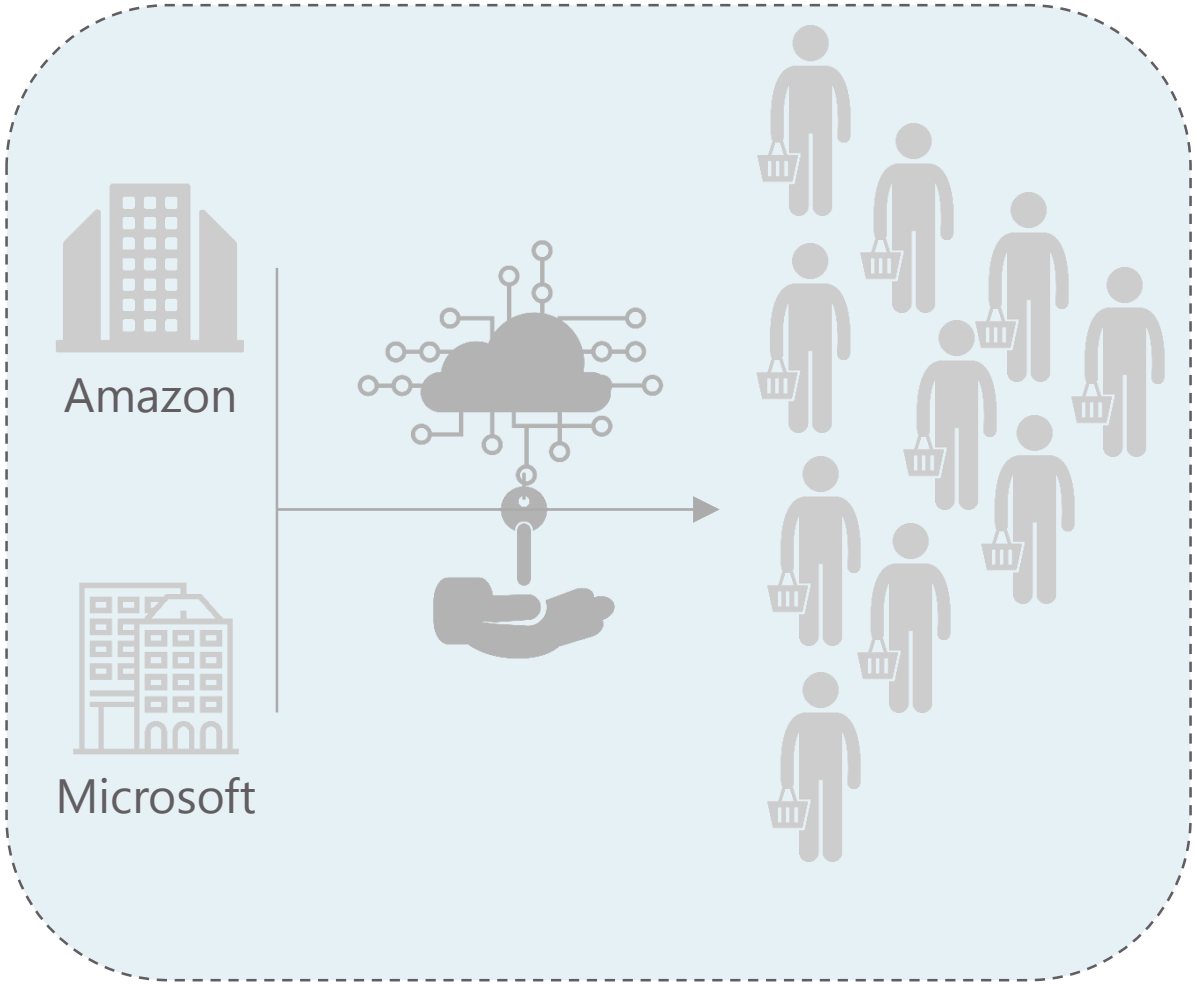
Cloud Services



Many traditional IAAS providers offer PAAS service option

How to deploy apps in both PAAS and IAAS

Virtualization

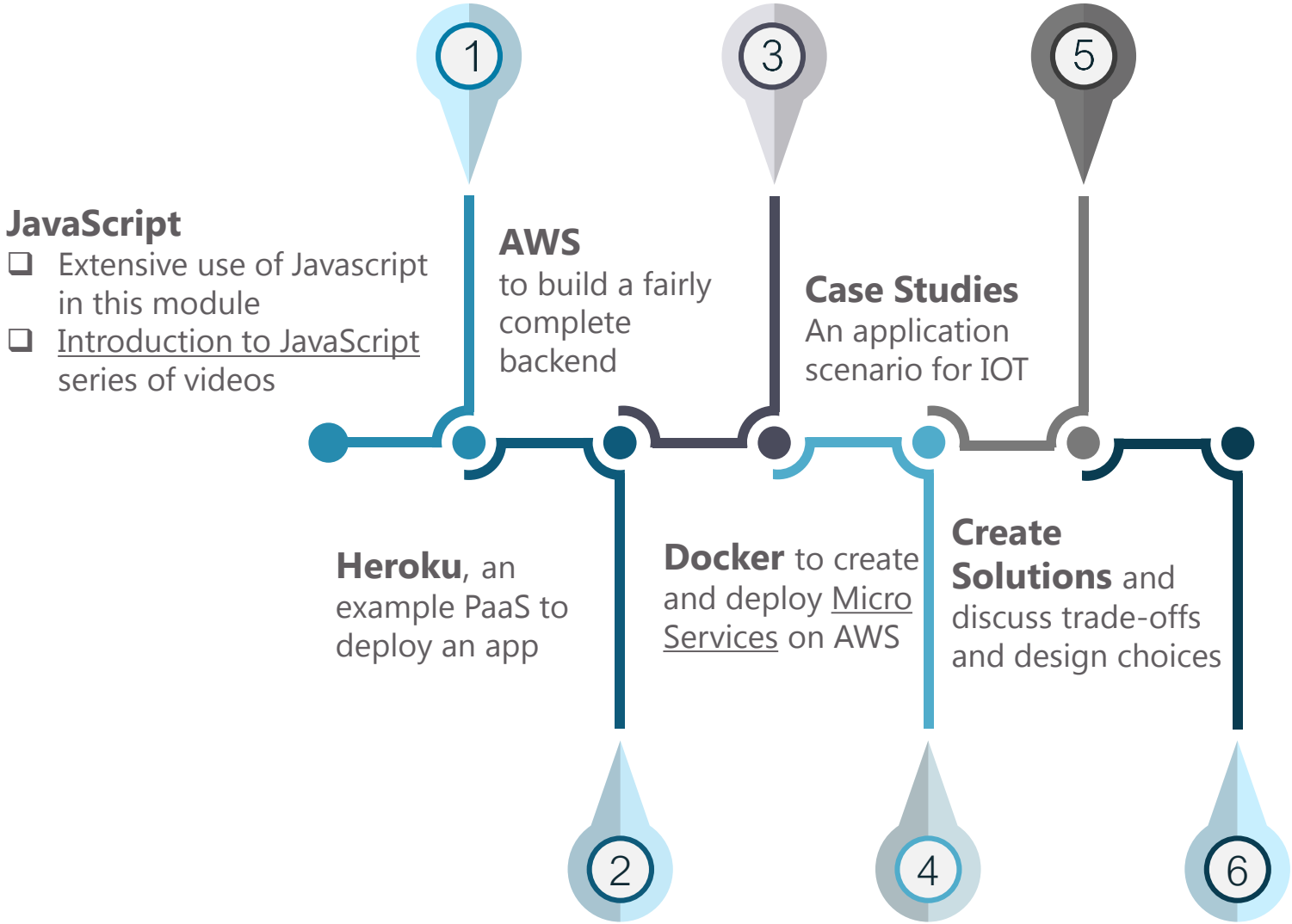


Cloud services are built on **Virtualization**

Makes it possible for companies to rent out infrastructure to multiple users

Containerization
Create Micro Services

Things to Learn



Recap

Introduction to IOT and Cloud Computing

- The IOT Course so far
- 3 Technology Drivers of IOT
- Connectivity is the Constant
- Usage of the term ‘Cloud’
- What happens in the Cloud?
- Cloud Services
- Virtualization
- Things to learn in this Module