# Architectures for the internet of things

## Introduction

In this assignment I have been asked to produce an and IoT device that connected up to the cloud using Node-RED, IBM Bluemix and IBM Watson. The core functionality that I will be implementing are devices that are connected together and connected to the cloud. The data that is sent to the cloud will be analysed and displayed on the IBM Bluemix platform. On top of these core system attributes I will be implementing some desired functionality.

## Literature

IBM Bluemix is a cloud-based data analytics service that is scalable up to an industrial size the platform is mainly used for storing and analysing big data.

Node-Red is and open source drag and drop programming system that is cross platform and can integrate itself with the IBM Watson cloud computing platform.

The raspberry Pi is a single board computer that was produced in order to help people have a way of learning to code.

The Arduino family of boards are a microcontroller based boards that are good at controlling hardware they have no operating system but can be programmed to control many different types of electronic hardware.

## Methodology

Firstly, I setup the Raspberry Pi 3 the first thing after logging in was to expand the file system to take up the full size of the SD card. Following this any needed new software was installed this was the Node Red programming software and the Arduino software. The Arduino software was installed on the Raspberry Pi in order to keep the flow of work moving quickly. Following this I setup an account on the IBM Bluemix platform selecting the student account type free for 6 months I then setup an

The first thing that I started on was the initial code in the Node-Red software that could take the CPU temperature data in from the Raspberry Pi and send it to the IBM Bluemix cloud platform using the IBM Watson core. To do this I connected an injection timestamp block to and exec block that collected the CPU temp data this then went into a function box with two line of JavaScript this then went to a debug message handler and the Watson IoT core for Node-Red.

Following this I created an Internet of Things Platform and named it RPi this platform was an IBM Watson platform that could be used to capture and analyse the data that I was sending to the cloud. After launching this I then created a device type for the Raspberry Pi and then created a specific device for the Raspberry Pi. Once the basics for this were set up I went and created a key for the Raspberry Pi to use in order to connect to the IBM Watson cloud service passing this key into the IBM Watson node in Node-Red was the final thing before seeing a working secure connection and data that was coming in from that connection.

Now that the CPU data was coming into the IBM Watson Platform I was able to then create a new board for it and add a simple graph to display the data over time.

## Conclusions

In conclusion the IBM Bluemix platform with the node red coding platform is a powerful combination for collecting and analysing big data in a real world situation that is cost effective and easy to use. Despite some initial teething issues the two work very well and the Node-Red coding platform is incredible light weight and can be run on a Raspberry Pi with no issues and it doesn’t choke up the system the Arduino board can be connected to the Node-Red platform in a number of ways including wirelessly and using a serial connection allowing for flexibility of use of the hardware. I do feel that however that my system could be greatly improved with many adjustments some of which are more complex than others.

## References

IBM (2019). *IBM Cloud* <https://www.ibm.com/cloud/> Accessed 08/05/2019

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Node-Red (2019). *Node-Red* <https://nodered.org/> Accessed 08/05/2019