Name: Nyle Malik Team: The Original BUSCA Name of Project Advisor: Linda S Milor

Review and Consideration for Amazon Web Services IoT

Introduction

The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction. A thing in the Internet of Things can be a device with almost any purpose – a person with a heart monitor implant, a farm animal with a biochip transponder, an automobile that has built-in sensors to alert the driver when tire pressure is low. Any other natural or man-made object can be assigned an IP address and be made to transfer data over a network. In the modern day, applications of IoT are extensive and can benefit the workplace or home with improved connectivity and decision-making [1]. A popular IoT service on the market today is AWS IoT by Amazon.

Commercial Service

AWS IoT Core is a managed cloud service that lets connected devices easily and securely interact with cloud applications and other devices. It can support billions of devices and trillions of messages, and can process and route those messages to AWS endpoints and to other devices reliably and securely. Applications running AWS IoT can keep track of and communicate with other devices all the time, regardless of if they are connected. It synchronizes with other services to build Internet of Things (IoT) applications that gather, process, analyze and act on data generated by connected devices, without having to manage any infrastructure. The commercial applications extend to any set of devices that would benefit from sharing information with each other or the Internet [2].

The AWS IoT service is made by Amazon. It is part of their extensive suite of cloud computing services under the Amazon Web Services umbrella. AWS offers a pay-as-you-go approach for pricing for over 160 cloud services, including IoT. Users and billed only for the individual services they need without requiring long-term contracts or complex licensing. The pricing scheme is similar to paying for utilities like water and electricity – only pay for the services consumed and there are no additional costs or termination fees [3].

Market Technology

Applications of AWS IoT are vast and modular. Some of the major areas which implement this technology are smart home and city, connected healthcare, and industrial IoT. In the home and city category, the service thrives at data visualization for an IoT fleet to maintain reliability, availability, and performance. It allows for locating, managing, and managing connected devices at scale. For the healthcare sector, AWS IoT simplifies connectivity for tracking and monitoring remote patient health applications. In the industrial world, this technology can do things such as monitor worker safety and productivity as well as perform analytics on industrial equipment to identify possible future breakdowns [4]. The advantages of IoT shine where a system needs autonomous communication between a large number of devices.

Technical Architecture

AWS IoT works by enabling Internet-connected devices to connect to the AWS Cloud. Through the cloud, it lets applications to interact with Internet-connected devices. When connected to the network, devices can report their state by publishing messages, in JSON format, on MQTT topics. Each of the MQTT topics has a hierarchical name that identifies the device whose state is being updated. When a message is published, it is sent to the AWS IoT MQTT message broker. This broker is responsible for sending all messages published on a specific topic to all clients subscribed to that topic [5].

To implement the technology, the devices being used must have an Internet connection. If they satisfy that condition, they can then be registered in the AWS registry. From there, the AWS IoT SDK can be installed on the device. This will allow connection to the cloud network. Topics can be created in the AWS IoT MQTT Client which let the devices either publish messages or subscribe to various other IoT devices on the network [6].

System Requirements

Hardware and software are both required for AWS IoT. IoT connects devices together and AWS IoT is the software bridge for this. The service itself is of the cloud computing variety and handles most of the software implementation. The sole requirements for the hardware is an Internet connection and the ability to run the SDK [7]. Since microcontrollers are popular in IoT networks, AWS IoT also offers Amazon FreeRTOS – an operating system for microcontrollers that makes small, low-power edge devices easy to program, deploy, secure, connect, and manage. It extends the FreeRTOS kernel, a popular open source operating system for microcontrollers, with software libraries that make it easy to securely connect small, low-power devices to AWS cloud services like AWS IoT [8].

Microcontrollers have limited compute power and memory capacity and typically perform simple, functional tasks. Microcontrollers frequently run operating systems that do not have built-in functionality to connect to local networks or the cloud, making IoT applications a challenge. Amazon FreeRTOS helps solve this problem by providing both the core operating system (to run the edge device) as well as software libraries that make it easy to securely connect to the cloud (or other edge devices) so you can collect data from them for IoT applications and take action [9].

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