Chapter 1
A Comprehensive Evaluation of Internet-of-Things Platforms

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ABSTRACT

Internet of things (IoT) has attracted researchers in recent years as it has a great potential to solve many emerging problems. An IoT platform is missioned to operate as a horizontal key element for serving various vertical IoT domains such as structure monitoring, smart agriculture, healthcare, miner safety monitoring, smart home, and healthcare. In this chapter, the authors propose a comprehensive analysis of IoT platforms to evaluate their capabilities. The selected metrics (features) to investigate the IoT platforms are "ability to serve different domains," "ability to handle different data formats," "ability to process unlimited size of data from various context," "ability to convert unstructured data to structured data," and "ability to produce complex reports." These metrics are chosen by considering the reporting capabilities of various IoT platforms, big data concepts, and domain-related issues. The authors provide a detailed comparison derived from the metric analysis to show the advantages and drawbacks of IoT platforms.

1. INTRODUCTION

Internet of Things (IoT), which was firstly remarked by Kevin Ashton to connect the radio frequency identification idea in a supply chain, has attracted researchers in recent years since it offers many capabilities in various areas (Rayes et al., 2019). Firstly, IoT aims to construct an ambient environment in which things are communicated through the Internet infrastructure, seamlessly. This will provide everyday objects around the people, that sense the events and communicate to accomplish missions without external commands. By achieving sensing, communication and analysis, IoT targets to take action to increase the quality of service experience and production. By utilizing IoT, vast amounts of structured and unstructured data, namely Big Data, is collected and analyzed from various resources such as healthcare systems, social media, factories and research institutes operating worldwide. In this manner, it is believed that IoT will be one of the important technological developments that ever seen

by the people since the existence of the world. IoT has already been a perfect storm driven by the factors such as convergence of operational technology and information technology, the astonishing introduction of Internet-based startups, mobile device explosion, analytics at the edge, cloud computing and virtualization, digital convergence and transformation, technological advancements in hardware/software technologies, enhanced user interfaces, fast rate of technological adoption, social network explosion, the rise of security requirements and the non-stop Moore's law.

Since IoT is envisioned to connect a tremendous amount of devices having different capabilities and running various applications through the Internet, one of the crucial missions for a successful IoT solution is to deploy an IoT services platform which manages plethora of devices and data sources (Terroso-Saenz et al., 2017) (Iyer et al., 2019) (Zamora-Izquierdo et al., 2019) (Xu et al., 2018) (Kuo et al., 2018) (Benammar et al., 2018) (Mahmud et al., 2018) (Dupont et al., 2018) (Rogojanu et al., 2018). A prosperous IoT platform functions as a horizontal solution for serving various vertical applications belonging to different business domains (Alonso et al., 2020) (Badii et al., 2020) (Foukalas, 2020) (Lee et al., 2020) (Sakthidasa Sankaran et al., 2020) (Sarmento et al., 2020) (Trilles et al., 2020) (Li et al., 2021) (Ramallo-Gonzalez et al., 2021) (Sagheer et al., 2021) (Yang et al., 2021). An IoT services platform is responsible to configure, deploy, secure, monitor and manage various devices (Motlagh et al., 2017) (Tsokov et al., 2017) (Shahzad et al., 2017) (Khazaei et al., 2017) (Ongenae et al., 2017) (Girau et al., 2017) (Abdelgawd et al., 2017) (Haghi et al., 2017) (Makinen et al., 2017) (Jamborsalamati et al., 2017) (Vergara et al., 2017). Besides that, it can handle software installation, debugging and starting/stopping. Moreover, an IoT services platform may provide advanced services such as closed-loop control, complex event handling and data analytics.

Figure 1. An IoT Architecture.
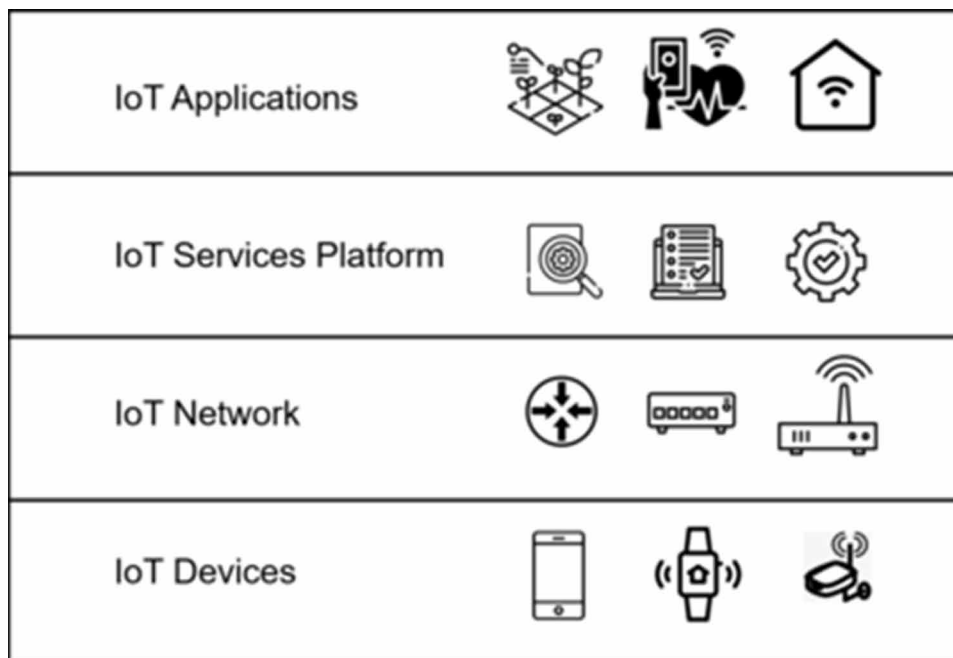
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