

Chapter 39

Managing Large Amounts of Data Generated by a Smart City Internet of Things Deployment

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ABSTRACT

The Smart City concept is being developed from a lot of different axes encompassing multiple areas of social and technical sciences. However, something that is common to all these approaches is the central role that the capacity of sharing information has. Hence, Information and Communication Technologies (ICT) are seen as key enablers for the transformation of urban regions into Smart Cities. Two of these technologies, namely Internet of Things and Big Data, have a predominant position among them. The capacity to “sense the city” and access all this information and provide added-value services based on knowledge derived from it are critical to achieving the Smart City vision. This paper reports on the specification and implementation of a software platform enabling the management and exposure of the large amount of information that is continuously generated by the IoT deployment in the city of Santander.

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1. INTRODUCTION

The smart city concept has undergone a rapid growth in popularity and interest recently. The fact that in the future the majority of the world's population will live in cities (the World Health Organization (2010) has predicted that by 2050 seventy percent of the world's population will live in urban areas) and that more than half of the world's population already lives in cities encourages researchers and managers to look for new solutions guaranteeing the sustainability and efficiency of such complex ecosystems.

Different city-domain stakeholders (technicians, city planners, politicians, researchers, etc.) will need to take measures aimed at assuring that some key quality criteria related to the sustainability and efficiency in the city domain are fulfilled. Thus, many different approaches are being followed to achieve the smart city vision (Belissent, J., 2010), (Zygiaris, S., 2013), (Nam, T., & Pardo, T. A., 2011). Something that is common to all these approaches is the central role that the capacity of sharing information has. Hence, Information and Communication Technologies (ICT) are seen as key enablers for the transformation of urban regions into smart cities. Two of these technologies, namely Internet of Things and Big Data, have a predominant position among all of them (Vilajosana et al., 2013). The capacity to "sense the city" and access all this information to provide added-value services based on the knowledge derived from it are critical to achieving the smart city vision. This revolution is still only in its infancy as suitable infrastructures are being deployed and significant investments are being made in city infrastructures.

Among the different challenges that must be considered when dealing with a real IoT deployment summarized by Gluhak et al. (2011) and Lanza et al. (2015), the scale, heterogeneity and data-centricity aspects are the focus of the work presented in this paper. This paper's main contribution is the specification and implementation of the software platform enabling the management and exposure of the large amount of information that is continuously generated by a real large-scale IoT deployment.

The remainder of the paper is structured as follows. In order to fully understand the scale and heterogeneity aspects addressed by the platform presented in the paper, Section 2 will summarize the main details of the infrastructure deployed. This description will present the general scenario that sets the framework for the work presented in this paper. The big data facet of the deployment is highlighted. Better knowledge of the infrastructure will help us to understand the key design considerations, which will also be presented in this section. Section 3 will present a review of related work. This review will centre on analyzing analogous deployments of IoT infrastructures focusing on the smart city domain and placing emphasis on the software platforms handling the data they generate. The detailed description of the platform implemented (main contribution of the paper) will be introduced in Section 4. Last but not least, Section 5 will conclude the paper, highlighting the main contributions and discussing the key issues raised throughout the paper.

2. LARGE SCALE SMART-CITY IOT DEPLOYMENT

As has already been mentioned, the basis for the main contribution of this paper, namely the description of the specification and implementation of the software platform enabling the management and exposure of a large amount of IoT information, is a real city-scale IoT deployment. This section will present an overview of this IoT infrastructure which is deployed in the city of Santander.

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