Chapter XIV

Monitoring and Analysis of Power Line Failures: An Example of the Role of GIS

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Abstract

This chapter presents a case study on the role of geographical information systems in power utility automation. It argues that geographical information systems are ideal software components for enterprise-wide application integration, data and asset management, and decision support applications. The authors believe that advances in industrial software applications are predominantly realized through stepwise integration and extension of existing systems. A case study on a monitoring application for power lines serves as example for this thesis. Furthermore, the authors hope that understanding technical and economic conditions governing the field of industrial automation helps readers in appreciating that software development and integration strategies are strongly linked to organizational and structural changes in the power utility industry.
Introduction

The supply of electricity to almost any inhabited part of our planet has been one of the cornerstones of social development in the late 19th and 20th centuries; its continuous extension and modernization still present a major challenge. Power utilities, i.e., the companies responsible for various parts of the process of generation, transmission and distribution of electricity, are showcases for political, economical, and technological successes and failures of our industrial history.

The first part of this chapter sheds light on the current state of automation in the utility industry. It presents a number of processes and applications and puts them into a structural and functional context. Current trends and ways to integrate key applications from different organizational units of typical power utilities and possible future strategies to come to more enterprise-wide approaches towards automation are discussed in the context of possible changes to the overall structure of the power distribution sector.

The second part of the chapter is devoted to a case study on the use of a geographical information system as a support to network monitoring and surveillance. Although a rather focused application is described, the goal remains to exemplify and concretize a number of statements made in the first part.

The main thesis of this chapter is the view that GISs, through their functionality and data management abilities, are key components for software integration strategies in industrial automation. Monitoring and surveillance applications, such as the one that serves as an example to this chapter, are typically part of industrial processes carrying a potential for increasing efficiency through integration. However, such processes and tasks are often far from trivial and powerful software components are needed in order to achieve the required performance. GIS that provides functionality for such tasks will play an important role in this context, and ideas on the future of GIS within industrial automation in general are presented and related to the case study.

Although there is no “typical” utility, a look at common processes and activities at least allows establishment of a reasonably general model of the utility industry. References to “utilities” throughout this chapter should be understood within this context.

The chapter is of technical nature, although a number of business-related issues are dealt with. It is written from the perspective of a research and development center of a globally operating company offering products, systems, software and services for the automation and optimization of industrial and commercial operations.

Automation and IT in Power Utilities

The full treatment of the topic of automation and IT in the power utility industry goes obviously beyond the scope of this chapter. As it is a main goal of this chapter to show the importance of software integration as a part of a general IT strategy for utilities, an introduction to the topic is essential.
A Multi-Level Cache Approach for Realtime Visualization of Massive 3D GIS Data
Xiaoming Li, Weiping Xu, Qing Zhu, Jinxing Hu, Han Hu and Yeting Zhang (2012).
www.igi-global.com/article/multi-level-cache-approach-realtime/70404?camid=4v1a

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Ernest Davis (2012). Qualitative Spatio-Temporal Representation and Reasoning: Trends and Future Directions (pp. 97-146).
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