Chapter XXXVI
Modeling Objects of Industrial Applications

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ABSTRACT

This chapter presents the development and design of an industrial application based on new technologies and explores the technological dimension of data acquisition, storing, access, and use; the data structure and integration and aggregating values from data necessary for the control of production processes. The demo application presented here was designed according to the Enterprise-Control System Integration Standard (ISA-95) with the goal of maintaining a standard that defines the interface between control functions and other enterprise management and business functions. The component-based object-oriented development concept was implemented in order to utilize advantages provided by creating a complete plant equipment model. The value of semantics was rediscovered in applications, which communicate among their system modules on Simple Object Access Protocol (SOAP), the standard defined by W3C, whose initiative has provided standard semantics markup languages based on XML as well. The data format and the format of standard XML messages that are used in industrial applications are defined by Business To Manufacturing Markup Language (B2MML) as W3C XML Schema for implementation of ISA-95, while offering the framework for project integration, the separation of business processes from manufacturing processes and focusing on functions instead of systems, organizations or individuals themselves.
INTRODUCTION

Each production is organized in hierarchical levels and for its control and management uses control and information systems. Enterprises name their departments, activities and production functions differently. Communicated information varies depending on every company and its implemented control systems. Even within one company the terminology used for control systems and for management may vary, it is, however, very necessary to be able to communicate efficiently.

The progress and development of new technologies enable the information flow and make it more sophisticated and even easier. Interfaces between enterprise and production systems make important information accessible at the requested time and in a proper place to the appointed competent person. This is possible because of the tools, environments and standards introduced into the design and development of processes, which will be further described.

BACKGROUND: THE TECHNOLOGY WHICH IS HERE FOR US TO BE USED

XML Documents and Their Components

XML is the technology available here for us for sharing information easily based on a format of documents designed for reading over the Internet. XML is made for everybody and to be used by everybody and for almost anything by being easy to understand, easy to use, and easy to implement (Ortiz, 2002). This is one of the many reasons why it has become the universal standard and has faced and met the challenges of convincing us - the development and user community.

When the creators of XML were working out their design, their goals set for an XML document, among others factors, were defined by directions as to how XML is to be used:

- XML documents shall be easy to create, legible to read and reasonably clear, it should be easy to write programs that process XML documents,
- XML design should be prepared quickly, it should also be formal and concise,
- XML shall be straightforwardly usable over the Internet,
- XML shall support a variety of applications.

As referred to sources (Ortiz, 2002), XML offers a simple solution to a complex problem, a standard format for structuring data or information in a self-defined document format. This way, the data can be independent of the processes that will consume the data. But this concept behind XML is not new. It is a subset of a huge amount of specifications and conditions declared and developed by the World Wide Web Consortium (W3C) in 1986. The W3C began to develop the standard for XML in 1996. Since then, many software vendors have implemented various features of XML technologies.

An XML document contains a variety of constructs, also referred to as elements. Some of the frequently used ones include:

- **Declaration:** Each XML document can have the optional entry `<?xml version="1.0"?>`. This standard entry is used to identify the document as an XML document conforming to the W3C recommendation for version 1.0.
- **Comment:** An XML document can contain HTML-style comments such as `<!--Equipment data -->`.
- **Schema or Document Type Definition (DTD):** In certain situations, a schema or DTD might precede the XML document. A schema or DTD contains the rules about...