Chapter VI

Enterprise Modeling with ODP and UML

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ABSTRACT

RM-ODP is a standard defining a framework for the specification of large distributed systems that is based on solid foundations, and that defines five generic and complementary viewpoints for structuring the system specifications in order to deal with their inherent complexity. One of these viewpoints, the enterprise viewpoint, focuses on the purpose, scope, and policies for the system and its environment. This viewpoint is independent from any computational and platform-specific concerns, and provides a well-defined approach to enterprise modeling. However, the fact that RM-ODP does not define any notation for describing its viewpoint languages has traditionally hampered its wide adoption by many industrial sectors. On the other hand, UML is a widely accepted notation for system specification but lacks formal semantics, and has limited structuring mechanisms for dealing with large and complex system
specifications. In this paper, we describe how ODP and UML can be combined for enterprise modeling, showing how enterprise viewpoint specifications can be written in UML to obtain the major benefits of both approaches. The work described here is part of an ISO/IEC and ITU-T initiative to define the use of UML for ODP system specifications.

INTRODUCTION

One of the common ways of dealing with the inherent complexity of specifying distributed systems is by dividing the design activity into a number of areas of concern, each one dealing with a specific aspect of the system. Current software architectural practices define several distinct viewpoints of systems, as described in IEEE Std. 1471 (2000), in order to accomplish such decomposition of a specification. Examples include the “4+1” view model (Kruchten, 1995), the Zachman framework (Sowa & Zachman, 1992; Zachman, 1987), and the reference model of open distributed processing (RM-ODP) (ISO/IEC 10746-1, 1998).

In particular, we are interested in the RM-ODP. The RM-ODP defines a framework for system specification based on five generic and complementary viewpoints on the system and its environment: enterprise, information, computational, engineering, and technology. Specifications of a system from these viewpoints provide abstractions that allow stakeholders to observe a system from different suitable perspectives (Linington, 1995). The viewpoints have been chosen as a necessary and sufficient set to meet the needs of ODP standards and of system specification. A language is defined for each viewpoint comprising concepts, rules, and structures for the specification of a system from that viewpoint.

Within the set of ODP viewpoint specifications, the enterprise specification focuses on the purpose, scope, and policies for the system and its environment. Its objective is to describe the structure and operation of the enterprise of which the system is a part in order to define the enterprise requirements on the system, and the system behaviour to meet these requirements, abstracted from other system considerations such as particular details of its implementation or of the technology used. The enterprise language (ISO/IEC 15414, 2002) comprises concepts, rules, and structures for the specification of a system from the enterprise viewpoint. Thus, it allows the representation of enterprise issues and provides an excellent basis for establishing technology- and tool-independent communication mechanisms between enterprise and IT stakeholders.

However, the viewpoint languages are abstract, in the sense that they define what concepts should be supported, but not how they should be represented. Although an advantage in theory, this really hinders the development of commercial tools for writing and analysing ODP system specifications.

So far, most of the notations proposed for the different viewpoints are based on formal description techniques such as Z, LOTOS, or SDL. They allow precise specifications of systems, and even some tool support for analysing and formally reasoning about the specifications produced. The main drawback of these approaches is that the formality and intrinsic difficulty of most formal description techniques have hampered their acceptance and wide use in industrial environments, and have encouraged the quest for more user-friendly notations. In this respect, the general purpose modeling notation UML (unified modeling language) is clearly the most promising candidate.
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