

Deployment of SDL Systems Using UML

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Abstract. The increasing complexity of SDL software (for example, as required for distributed system architectures and advanced operating system integrations) has generated a need for a powerful notation for deployment. The notation should be used for modeling the run-time configuration of SDL applications and the communication between these. This paper formulates requirements on a deployment notation to be used with SDL. Using the mapping between SDL and UML in Z.109, it is investigated how the UML implementation diagrams can be used for deployment of SDL systems, and how well the diagrams conform to the requirements. It is found that the UML deployment diagram can be used for showing deployment of SDL agent instance sets and static instances. Agent instances dynamically created and destroyed require certain mapping rules in order to be modeled. The interface concept in UML is found to be adequate for modeling communication. Using the UML extension construct “tagged value”, information at arbitrary detail levels can be shown. This information can be used by a variety of targeting tools such as code generators.

1 Introduction

1.1 Background

The ever-increasing interest in SDL [1] continuously produces new application areas where SDL is used for system development. SDL is today used for implementation of both hardware and software. Code can be generated in a variety of programming languages, both compiled and interpreted. Integrations exist with a great variety of target platforms, such as different real-time operating systems (RTOSes).

It is well known that platform-independent specification languages like SDL can be used to specify functionality independently of the target implementation. The rise of embedded systems, where customized software and hardware is often developed, emphasizes the need for simple co-design of hardware and software.

The rise and merge of the Internet and mobile communication put new requirements on existing systems. Integration between existing software/hardware systems and Internet services are common. New protocols, such as WAP and Bluetooth, create new possibilities for interaction. Implementing communication between systems has become an essential part of system development.

The rising popularity of distributed system architectures leads to complex interaction models between distributed units. For systems developed using SDL, it is also relevant to specify the execution model of a system or a part of it. Organization of SDL entities into operating system threads or tasks is a common scenario.

The high complexity of systems, with regard to the above aspects, implies that architectural design today is a substantial part of system development. An effective notation for *targeting* is needed. Targeting is referred to as the transition from a logical functional model to a concrete system. The notation should be used for controlling code generation from SDL models as well as configuration of communication and integration with target platforms.

1.2 Objectives

The objective of this paper is to discuss requirements on SDL systems deployment. It is described how the UML component and deployment diagrams can be used for deployment of SDL systems. Based on this description, a discussion is held on the usability of the UML diagrams for SDL deployment purposes.

1.3 Scope

This paper focuses on the modeling aspects of SDL system deployment. The presented requirements focus on static deployment of SDL objects at run-time.

The reader is assumed to have basic SDL and UML knowledge. Where necessary, the UML notation is explained.

1.4 Organization

The paper is organized as follows: In Sect. 2, requirements for deployment of SDL systems are discussed. In order to illustrate the requirements, some typical SDL deployment scenarios are presented. In Sect. 3, it is described how the UML component and deployment diagrams can be used for SDL deployment. The deployment scenarios from Sect. 2 are modeled using the UML diagrams. The usability of UML for SDL deployment purposes is discussed in Sect. 4. Finally, a summary is given in Sect. 5.

2 Deployment Requirements

2.1 Requirements on a Deployment Notation for SDL

The following requirements apply for a notation for SDL system deployment:

- The notation should support targeting of SDL systems;
- The notation should be unambiguous and possible to use as input to code generators and makefile generators;