Chapter VI

An XML-Based Approach to Multimedia Engineering for Distance Learning

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Abstract

Multimedia software engineering (MSE) is a new frontier for both software engineering (SE) and visual languages (VL). In fact, multimedia software engineering can be considered as the discipline for systematic specification, design, substitution, and verification of visual patterns. Visual languages contribute to MSE such concepts as: Visual notation for software specification, design, and verification flow charts, ER diagrams, Petri nets, UML visualization, visual programming languages, etc. Multimedia software engineering and software engineering are like two sides of the same coin.
On the one hand, we can apply software engineering principles to the
design of multimedia systems. On the other hand, we can apply multimedia
technologies to the software engineering practice. In this chapter, we
concentrate on the first of these possibilities. One of the promising application
areas for multimedia software engineering is distance learning. One aim of
this chapter is to demonstrate how it is possible to design and to implement
complex multimedia software systems for distance learning using a tele-
action object transformer based on XML technology applying a component-
based multimedia software engineering approach. The chapter shows a
complete process of dataflow transformation that represents TAO in different
ways (text, TAOML, etc.) and at different levels of abstraction. The
transformation process is a reversible one. A component-based tool
architecture is also discussed. We also show the first experiments conducted
jointly using the TAOML_T tool. The use of an XML-based approach in the
distance learning field has other advantages as well. It facilitates reuse of
the teaching resources produced in preceding decades by universities,
schools, research institutions, and companies by using metadata. The
evolution of the technologies and methodologies underlying the Internet
has provided the means to transport this material. On the other hand,
standards for representing multimedia distance learning materials are
currently evolving. Such standards are necessary in order to allow a
representation which is independent of hardware and software platforms
so that this material can be examined, for example, in a Web browser or so
that it may be reused in whole or in part in other chapters of a book or
sections of a course distinct from that for which it was originally developed.
Initial experiments in reuse of distance learning carried out at the University
of Naples, Kent State University, and Cleveland State University are
described. The authors have also developed a collaboration environment
through which the resources can be visualized and exchanged.

Introduction:
Multimedia Software Engineering

For many years, the need to represent data in a portable format has grown in the
industrial and in the academic community. In the past, data was kept in a format
that couldn’t be read by a different computer and the applications couldn’t be run
under different operating systems or on other hardware platforms. Today, with
the spread of computer networks, it is necessary to support portability and
interoperability so that data can flow through many networks in a way transpar-
ent to the user.
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