

Model-Driven Design of Web Applications with Client-Side Adaptation

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ICWE 2004, 29-July-2004



Outline

Motivation

WebML and Generic Web Applications

The UML-Guide for Personalization

Integration

Further Work

Motivation

Model-driven design of server-side Web applications is dominant (WebML, Site Lang, ...)

Client side solutions may bring some advantages especially from personalization point of view (adaptivity in SVG documents, Rules and constraints for application self-reflection)

- Remembering/observing local context
- Control of user sensitive data by herself

Well balanced integration of client-side and server-side model driven approaches is a challenge

Motivating Scenario

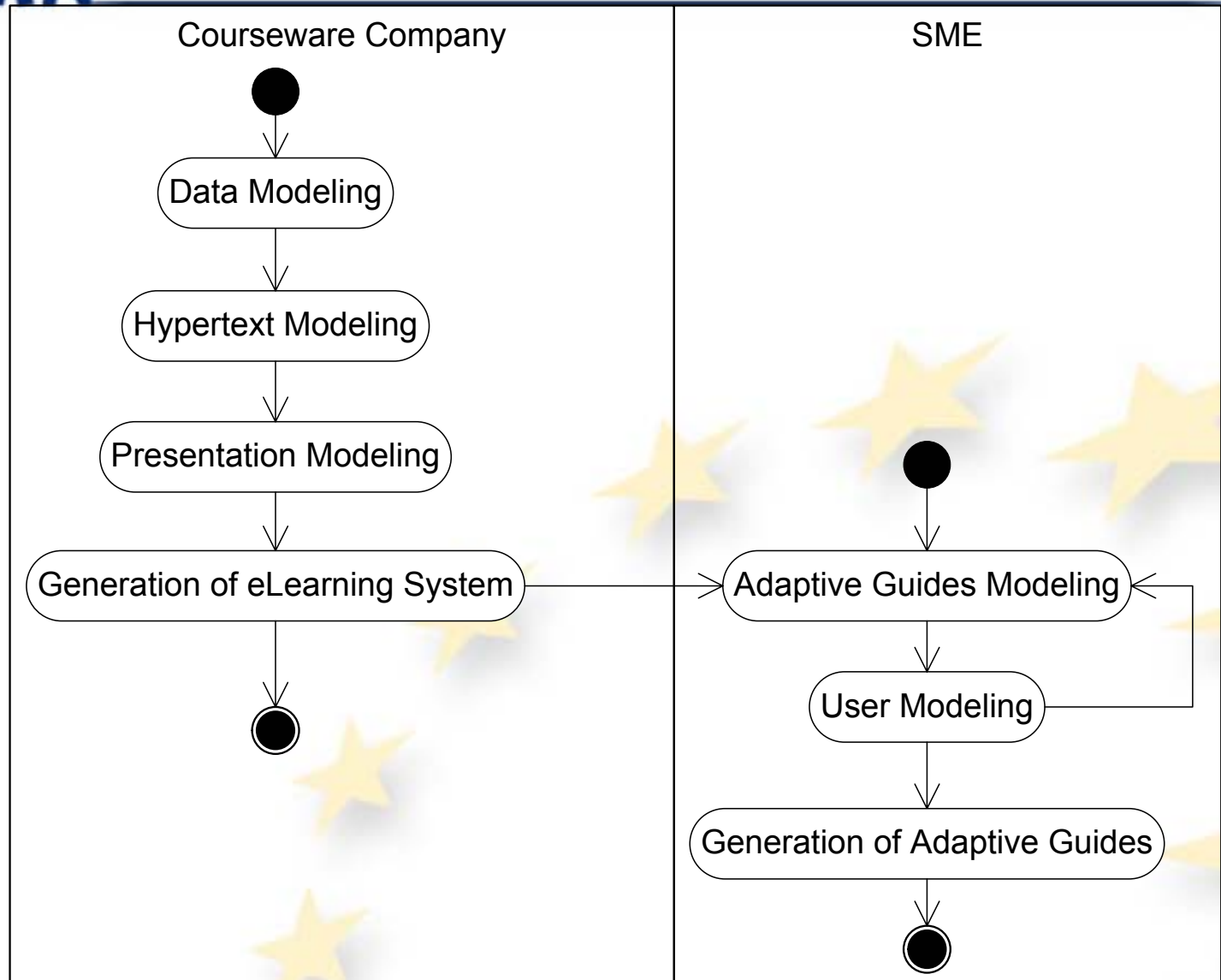
E-Learning system and content provision company

- Provides a generic learning management system
- Maintains learning objects in form of lessons, exercises, tests, and so on
- Classifies the learning objects according to a taxonomy (e.g. ACM CCS)

Several Small-Medium Enterprises

- Require customization functionality
- Builds personalized e-Learning Curricula

Process View



WebML Overview

Data Model – Extended ER

Hypertext Model:

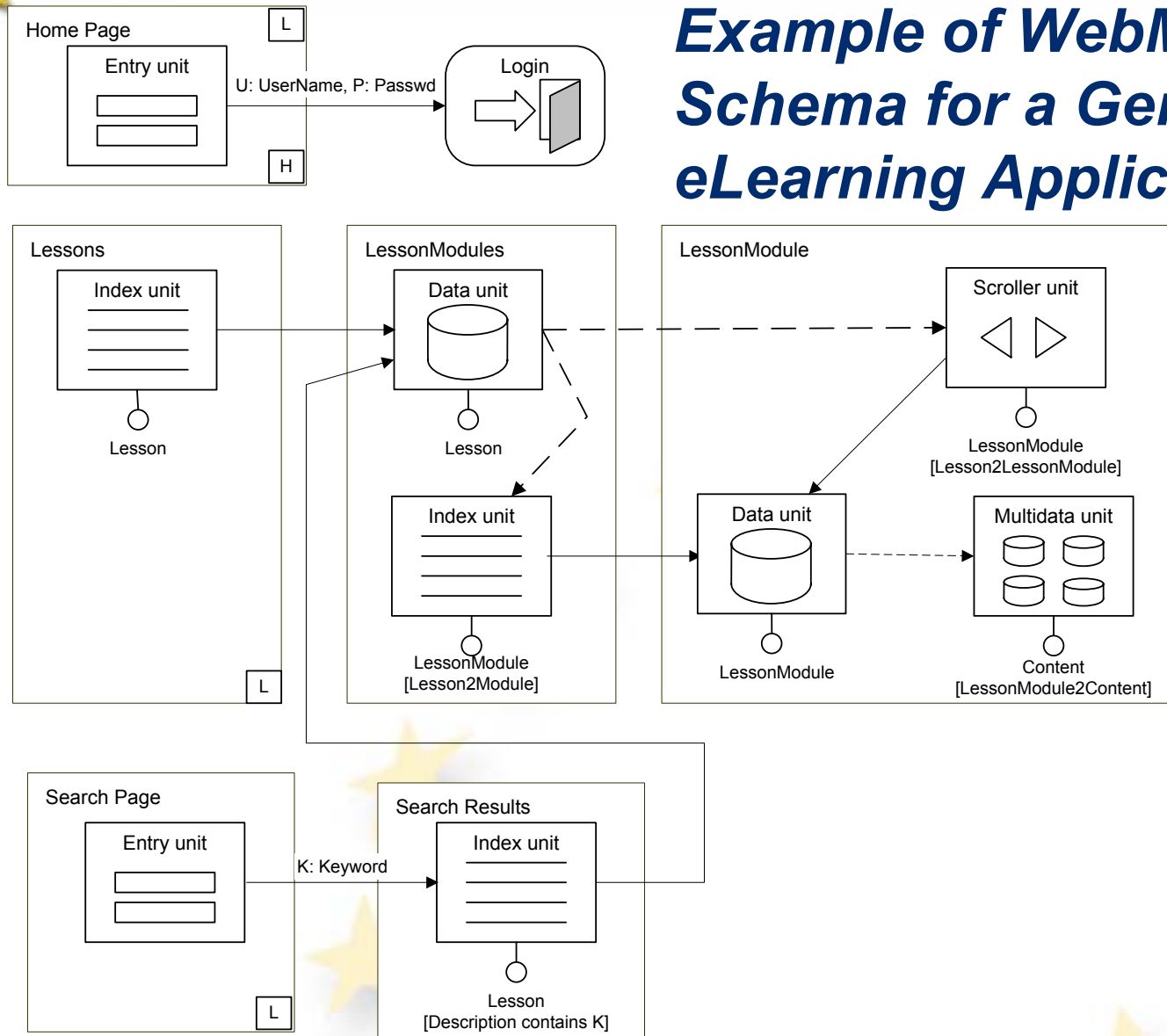
- **Elements for modeling pages, links, and units displaying data**
- **Grouping into site views**
- **Operations**

Presentation Templates

A code generator, which transforms conceptual specifications into application running code

An engine, which interprets WebML generated data-intensive server-side Web applications

Example of WebML HT Schema for a Generic eLearning Application



UML-Guide Overview

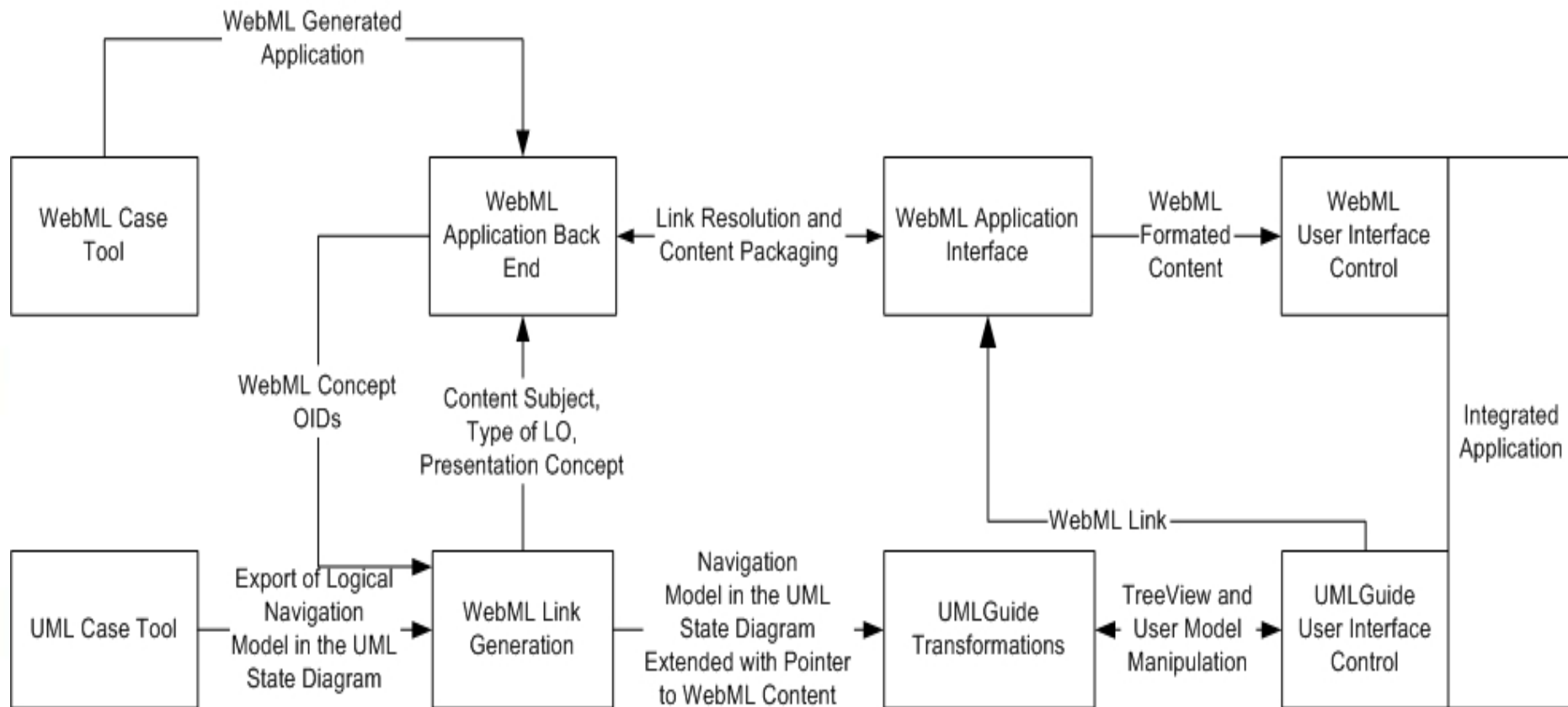
A method for modelling behavioural aspects of Web application navigation

An engine that interprets the UML state machines and provides adaptive guides through eLearning applications

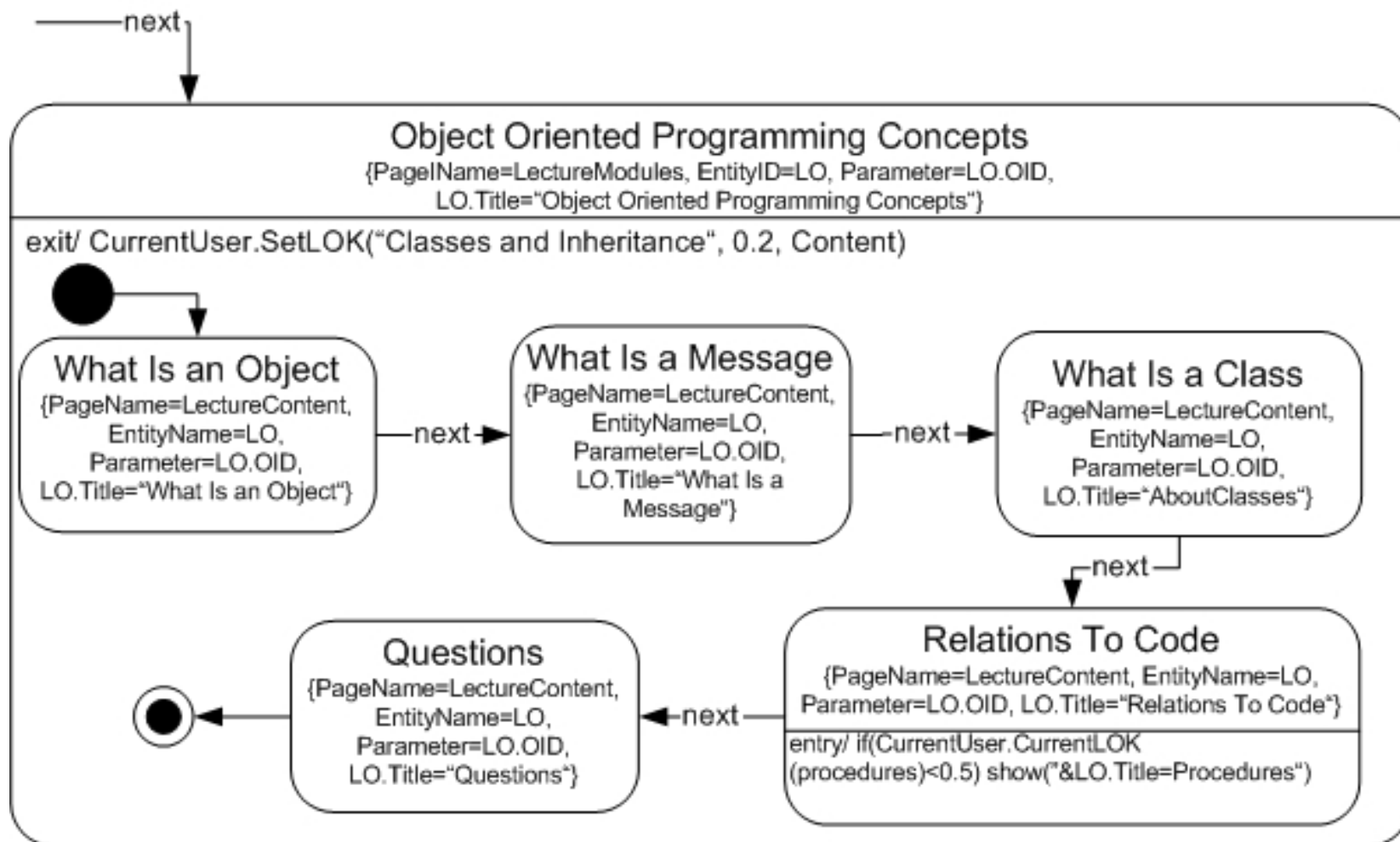
The generator makes use of XMI – XML based representation of the UML – and XSLT rules to generate a client side code dynamically



Putting It Together



WebML Concepts in the UML State Diagram



A Generated User Interface

Adresse <http://localhost:8080/uml/course.jsp> Wechseln zu Links »

Navigation Map

- Start
- Language Basics
- Object Basics and Simple Data Objects
- Classes and Inheritance
- Interfaces and Packages
- Overview
- Object Oriented Programming Concepts
 - Language Basics
 - StartOO
 - What Is an Object**
 - What Is a Message/next
 - What Is a Message
 - What Is a Class
 - Relations to Code
 - Questions
 - EndOO
 - Common Problems
 - End

Overview Lecture Modules

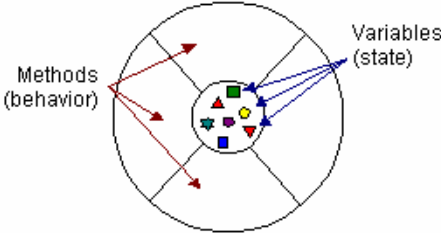
Previous Next

LECTURE MODULE: What is an Object?

Objects are key to understanding object-oriented technology. Software objects are modeled according to a state and a behavior. A software object maintains its state in one or more variable.

A variable is an item of data named by an identifier. A software object implements its behavior with methods. A method is a function (subroutine) associated with an object.

The following illustration is a common visual representation of a software object:



DEFINITIONS:

Exercises

- [Exercicisel: Object definition](#)

Examples

- [Example1](#)
- [Example2](#)

Fertig Lokales Intranet

Key Advantages

The use of high-level WebML abstractions in the context of UML-Guide enables the specification of a powerful client-side personalization engine.

The tools prove to be highly complementary and easily integrated, as it is sufficient:

- **To reuse concepts of WebML inside UML-Guide, to provide concept interoperability**
- **The URL generation technique of the WebML runtime inside the UML-Guide XSL code, to provide systems interoperability**

The use of UML-driven methods in conjunction with WebML is by itself a very interesting direction of research

Further Work

To open WebML generated applications but still staying model driven

To express WebML in terms of the UML concepts to help understanding the WebML better

To provide a base for MDA based WebML oriented models to benefit in extensions, generations for different platforms and so on

Questions?

<http://www.prolearn-project.org>

<http://www.l3s.de>

<http://webml.org>

<http://www.learninglab.de/~dolog/uml/>