

The IDEA Web Lab *

Stefano Ceri Piero Fraternali Stefano Paraboschi
Dipartimento di Elettronica e Informazione, Politecnico di Milano
Piazza Leonardo da Vinci 32, I-20133 Milano, Italy
ceri/fraterna/parabosc@elet.polimi.it

Abstract

With the spreading of the World Wide Web as a uniform and ubiquitous interface to computer applications and information, novel opportunities are offered for introducing significant changes in all organizations and their processes. This demo presents the IDEA Web Laboratory (Web Lab), a Web-based software design environment available on the Internet, which demonstrates a novel approach to the software production process on the Web.

1 Introduction

The Web Lab is a virtual laboratory where users of the IDEA Methodology can experience the development of database applications with objects and rules¹; it makes available to remote clients the core tools of the IDEA design environment, which enables the development of an application from analysis to the delivery of the final code for Oracle, one of the implementation platforms supported by the methodology.

The IDEA Methodology is one of the results of the IDEA Project, a large Esprit Project funded by the European Commission (1992-1997), focused on the empowerment and dissemination of new aspects of database technology, such as the use of objects, deductive rules, and active rules.

At the end of the project, the Esprit Program sponsored a prosecution of the activities specifically aimed at diffusing the results of the project through an innovative software environment designed for letting Internet users directly experiment with the concepts and tools defined during the project. The result of this effort is the IDEA Web Lab, a Web site hosting a selection of the tools developed in the IDEA Project. The chosen tools support a chain of transformation and verification activities that enable users to craft an application from requirements to implementation on top of the Oracle relational DBMS.

*Research presented in this demo is supported by Esprit project P6333 IDEA

¹The URL <http://www.elet.polimi.it/idea/weblab.html> can be used to access the Web Lab.

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SIGMOD '98 Seattle, WA, USA
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2 The Web Lab

The goal of the Web Lab is to offer Internet users the possibility to get acquainted with the IDEA Methodology according to the "learning by doing" principle, that is, by having a direct experience with the development tasks required by the IDEA development process and with the IDEA analysis and design models.

The Web Lab has been designed with the following categories of users in mind:

- *Visitors*, with a generic interest in object-oriented development, business rule design, and/or CASE tools; they are given the opportunity to rapidly grasp the essence of the IDEA approach.
- *Evaluators*, interested in learning the IDEA Methodology; they can solve small-scale exercises and compare their solutions to design documents available on the site, and next develop case studies autonomously.
- *Adopters*, i.e., IT professionals willing to use the IDEA Methodology; they can practice with trial applications and then download a workstation-based copy of the Web Lab environment to start in-house usage of the tools.

Visitors are not expected to register to the Web Lab and have limited access by means of a generic guest account. Evaluators and adopters should obtain an account and a password from the webmaster, in order to obtain unrestricted access and a private working area where they can store their own applications in a secure way.

2.1 Structure and Main Functionalities of the Web Lab

To satisfy the different requirements of the various types of users, the Web Lab has been structured into different areas, accessible by means of links in the Web Lab's home page (see Figure 1).

The leftmost frame of the page contains general-purpose commands, which remain available throughout the Web Lab. Going from top to bottom, the command toolbar contains icons to access the IDEA Methodology Web Site, to get a list of the available mirror sites of the Web Lab, to register as an application developer, to contact the authors, and to access the Web pages describing the IDEA CD-ROM and book. From the home page, four major working areas can be reached:

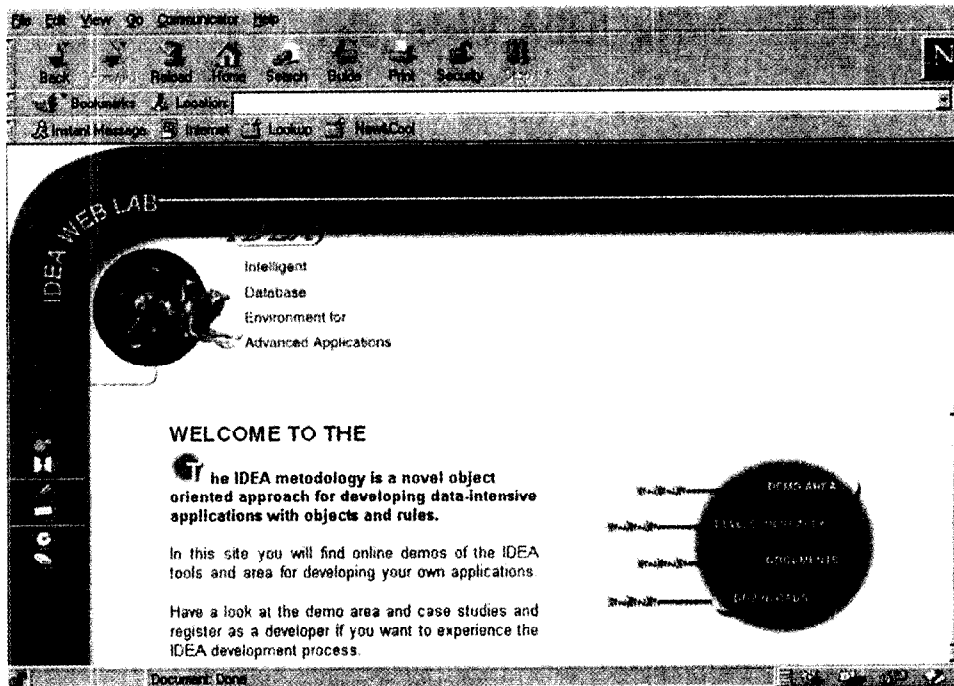


Figure 1: The Web Lab Home Page

- A **Demo Area** brings the visitor to a learning center, which collects a variety of teaching materials. First, three slide shows, augmented with audio comments, give a quick tutorial of each tool. Next, a “Tool Demo” link leads to an area where it is possible to activate the tools, automatically opened on the correct files of a small testcase (called “Jobshop”). In this way, the visitor can peruse each of the tools, and also try and modify the proposed example; however, the commands for making the modifications persistent are disabled, so that the demo’s integrity is ensured. Finally, a few small-size examples are provided, which the user can browse just as if they were his own applications. To foster learning-by-doing while preserving the integrity of the offered examples, the applications shown in this area are still read-only, but a registered user is given a command to make a copy of each example and import it into its private working area.
- The **Development Area** is dedicated to the potential adopters, and therefore is accessible only to registered users. They can declare the generalities of a novel application (i.e., the name and descriptive information) and then start development by entering the specific area dedicated to each phase of the IDEA process (analysis, design, prototyping, and implementation). Throughout development, commands are offered for creating different versions of an application, and for evolving a specific version through the IDEA development process.
- The **Documents** area is a repository of online and offline documentation about the IDEA Methodology and tools, including the manuals of the IDEA tools and descriptions of applications developed by industrial partners of the IDEA Consortium.
- The **Downloads** area is a Web page permitting de-

velopers willing to start in-house usage of the method to access the IDEA software. All tools can be individually downloaded and installed on the users’ host machines.

2.2 The Web Lab Tools

The Web Lab offers a chain of software tools which enable the stepwise development of applications according to the IDEA process. All the tools are written in JAVA and sub-structured into a client module and a server module; client modules run as applets loaded on the users’ browsers after they connect to the Lab, while the design documents and algorithms reside on the server.

At the start of the chain, IADE permits the input of the IDEA Object Model and its transformation into Chimera code. Chimera procedural and declarative code (typically integrity constraints, triggers, and transactions) can be manually inserted by the user to complete the definition of the Object Model classes and the specification of the application.

The Chimera schema and triggers produced by IADE are subsequently fed to ARACHNE, which performs the termination analysis of Chimera active rules.

Finally, the verified Chimera specifications (with the exception of deductive rules and generic integrity constraints) are submitted to PANDORA, which compiles them into executable Oracle code.

3 Demonstration

The presentation of the Web Lab at the SIGMOD Conference illustrates the complete IDEA process, using as example the “Jobshop” testcase. First, IADE is used in the construction of an object model for the Jobshop application; Figure 2 illustrates the resulting conceptual model. The

