EduCase: Automatic System for the Development of Educational Software

ROSA REIS
Departamento de Engenharia Informática
Instituto Superior de Engenharia do Porto, Portugal
Rua Dr. Bernardino de Almeida
PORTUGAL

Abstract: This work describes a proposal and a new automatic system for the development of educational software, called EduCase. This will help the teacher in creation the learning objects. EduCase is a CASE (Computer Aided Software Engineering) tool, because has the support of the X-Tec model. With the specifications of this model we can create and reuse the learning objects in order to reach a one specific public-target.

The architecture is composed for two parts: a graphic editor and a code generation editor. The graphic editor makes possible the edition of the diagrams of model X-TEC, which are stored in a data repository. The code generation editor will be responsible for the automatic creation of educative software for the web environment, such as, the generated code is HTML language. The software is created based in the specifications of the domain of the problem, internal specifications of the X-TEC model and in a set of templates.

The system encourages the style of incremental development, iterative and based on a prototype, so that in each/every phase models are built or enriched.

Key-Words: - X-TEC model, Instructional Strategies, Software Architecture, Data Repository, Code Generation, Windev Software.

1 Introduction

The information and communication technologies have been taking a more important role on what teaching and learning are concerned.

Throughout the last decade many publications approach thematic of the information technologies in education, being the generalized opinion that the use of tools based on computing can originate improvements of performance of the student and teacher to the level of reflection and construction of the knowledge.

The advantages of the majority learning management systems that have appeared in the market do not have resources that allow a fast and simple creation of institutional contents. Also they are not supported with a method, which provides a special notation (graphic and literal) and a set of criteria of software quality.

The main reason for the development of this project is:

To help the designer to help the designer in the different phases of the lifecycle of the software, as well as, in its management and documentation.

This paper in section two describes the EduCase architecture; Section three presents the Environment authoring and its components explain; the fourth section is focused on the Data Repository; the system implementation is described in the fifth section; Finally, draws some conclusions;

2. System Architecture

The system works with a set of models and it is called a project. Each project is stored in a distinct directory. This means that it is not possible to store information of several projects in the same directory.

The system is supported by a three tiered architecture: User Interface, Rules and Persistence, as shown in Fig.1.

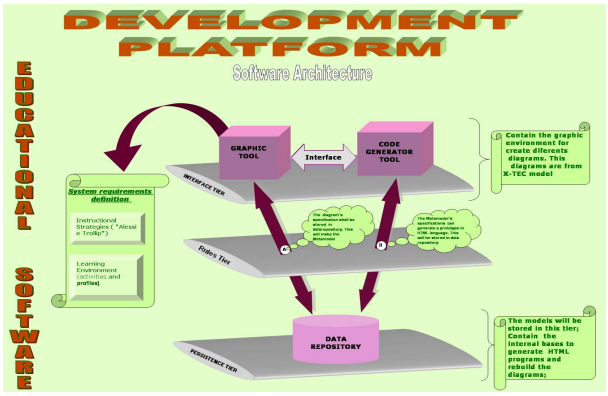

Fig.1 system architecture

In user interface (1st tier) we find the graphic and code generation tools. The graphic tool contains some graphic publishers who support the different diagrams that compose X-TEC (Techno-Didactical extension for Instruction/Learning Based on the Computer) model [1].

The diagrams created depend on the definition of the requirements of the system: the instruction strategy and the environment of learning [2].

All the specifications of the diagrams will be stored in a data repository, in the so called metamodel.

The code generation tool makes the process automatic, using the information stored in the repository to generate prototype of the system.

The Rules (the 2nd tier) have the Instruction/Learning Management Systems (ILMS) that supply the service to the designers, which is available in the persistence tier. Finally, the persistence (3rd tier) contains the data repository that is the base of the development system; all the information that is defined through the different phases of the development cycle meet stored here.

The different tiers are related, because:

- ✓ In the repository all the contents, rules and interface specifications are stored;
- ✓ The graphic tool opens appropriate forms, when specific information cannot be included in our diagrams. With these forms we can include more information.
- ✓ The code generation uses the information stored in the data repository to develop the prototype.
- ✓ Provide increased its performance, flexibility, maintenance and reusability while hiding the complexity of distributed processing.

3. Environment authoring

3.1 Graphic Editor

With graphic editor we can create the diagrams which have constructors and stereotype suggested by the X-TEC model. These diagrams are: use case diagram, action table, functional diagram, interaction diagram.

Before the graphic edition we have an interface where the designer answers a set of questions about problem domain specification.

The specifications are:

- ✓ Instructional strategies defined by Alessi and Trollip [3]. The instructional strategies are tutorials, drills, test, simulation, and educational games.
- ✓ Learning Environment: learning activities and learning profiles [2].

Graphic palettes on the basis of these specifications, which contain the constructors of the X-TEC model, related with the previous points will to be presented; these diagrams will be stored in the called data repository. That is found in the 3rd tier: the persistence.

3.2 Code Generator Editor

Here we can publish an author's guide and generate prototypes educative software. It's based in the internal specifications that had been stored in persistence tier during the different phases of the development cycle and in the association of templates.

The code generation, is based on a of software model process. A new specification can be obtained through the transformation rules application that can be mapped in description of the code in the HTML language or specifications in SQL for creation of the database system.

During the implementation process it is presented a set of forms and templates that allow the personalization of the product that will be generated are presented.

The code generation process is shown in fig. 2.

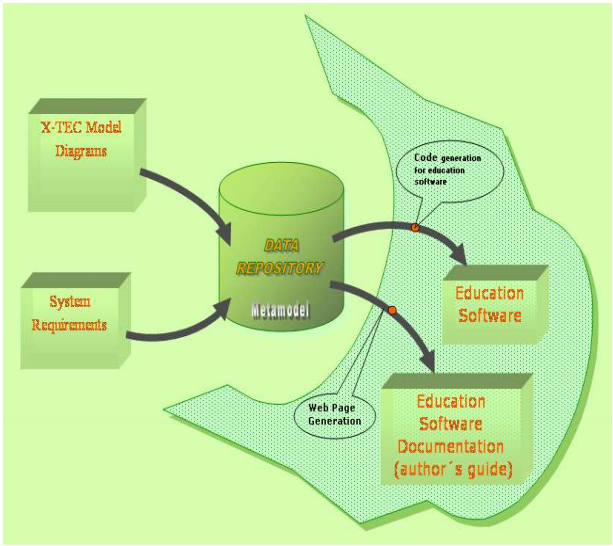

Fig.2 code generation process

A code generation editor is easy to use, and we can:

- ✓ Create a prototype Education Software(can be a final product);
- ✓ Publish our work by extracting information from our model and creating the necessary HTML

and related files needed to view it in a browser (It's the author's guide).

4. Data Repository

The repository contains the project of data created by designer. A project has two types of data, the graphical data (drawing) and the semantic data. The semantic data are stored in the repository in a metamodel and the graphical data in a file.

The designer is able at any time recover the diagrams and reuse them in others systems.

The data repository will be supported by a SGBD relational, and presents a complex model of data to support in a flexible form the storage and management of a variety of elements, namely: (1) the constituent elements of metamodel; e (2) the elements to support the proper process of generation.

5 System Implementation

The EduCase environment prototype will be developed in Windev [4], which provides a reliable way to implement the required Web applications.

The core of the project will be developed in W-Language and the supporting database management system will be used is SQL server.

6 Conclusion

The presented work proposes a new system for support the development of the educative software.

The main difference between the tools existing in the market is the graphic tool that possessed the builders and the stereotypes have of the X-TEC model. So, the designer will be able to communicate in an easier way with the team.

The system is going to give support to the construction of the author's guide and conception of prototypes that will be able to evolve successive alterations for a final product. That will serve as support to the education learning process of any tutor with or without great knowledge of computer science.

This is an interactive system that, allows the generated product to be used in several contexts. It makes possible to teachers to create environments that support the education activities and planned learning situations through the use of the resources of contained work in the environment.

Through interfaces the system makes possible to the teachers' access the tools of work that support specific activities of the educational trial (educational process), such as: the construction of educational software and the educational planning.

The system is presently in the phase of conception and analysis and as future work intends to develop a prototype

References:

[1] Escudeiro, P., Bibarra, J., "X-TEC: Techno-Didactical Extension for Instruction/Learning Based on the Computer", Actas da Conferência SITE 2006, Orlando, FL, E.U.A., 20-24 de Março de 2006Bibarra.

[2] Bibarra,"Contempt's Construction Support", Bidarra 2005.

[3] Alessi and Trollip, "Computer Bases Instruction: Methods and Development", Prentice-Hall, Inc., Englewood Cliffs, New Jersey, USA. 1985.

[4] Windev, http:/www.Pcsoft.com