Automatic Code Generation Using UML To XML Schema Transformation

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ABSTRACT: The emergence of Unified Modeling Language (UML) as a standard for modeling systems has encouraged the use of automated software tools that facilitate the development process from analysis through coding. An effort has been made to find methods to automatically generate executable code from the UML class diagrams. An object oriented approach has been proposed to generate executable implementation code from UML class diagrams in an object-oriented programming language.

In our approach UML class diagram is used to generate XML schema and generated xml schema is used for code generation. We have implemented a system for XML Schema generation using .net platform. .net is helpful in fastly generating the tool. A tool named JIBX is used for code generation which is developed by IBM and also a open source tool.

KEYWORDS: UML, SDLC(Software Development Life Cycle),XML, OMT, OMG(Object Management Group)

I. INTRODUCTION

The main aim of this project is to reduce efforts of development team by generating code from the UML diagram. UML diagram are made just after the Specification phase in the design and analysis phase. UML diagram contain all the details of the application. Once the design and analysis phase is completed we start with coding which is the most time consuming phase. So to reduce development efforts and time we have proposed this approach.

In propose solution we have generated a tool which will convert UML diagram to XML Schema which is a standard for information interchange. This generated XML Schema is used code generation using tool JiBX.

II. OBJECTIVES

The final goal of this research is to automatically generate implementation code from the UML class diagrams. The general objectives are:
1. To find an approach to generate implementation code from UML class in an object-oriented programming language such as Java.

2. To implement the proposed approach and develop a system for automatic Java code generation from UML class. Our code generation approach and tool will help in bridging the gap between the design and development phase and will support the developers in the software development process.

III. Methodology

Generally it is difficult to develop a project without design and analysis phase. Design and analysis phase define the structure of the application or project. It defines both the static and dynamic aspect of the application. After the design and analysis most difficult and time consuming phase of software development comes. To reduce the difficulty and the time span we are proposing a solution of effort reduction by automatic code generation.

![Flowchart of proposed solution](image-url)
IV. RESULTS AND ANALYSIS

The results for the effort reduction by automatic code generation. UML to XML Schema transformation is used for automatic code generation. Generated XML Schema is a intermediate form for models proposed in the dissertation.

Analysis shows that effort is reduced by the proposed model. Effort reduced is in terms of development time and human efforts.

Case we consider in this dissertation is UML Diagram of a Publication. Associations exist between Bibliography and Publication class. There are three more classes that are Online Publication, Conference Paper and Books. These three classes inherit Publication class. In this example we have two type of relationship one is association and other is generalization.

Publication class has following attributes:

- Title - String Type
- Author - String Type
- Year_Published - Date Type

Bibliography class has following attributes:

- Book_Attr - Object of Class Book
- ConferencePaper_Attr - Object of Class ConferencePaper
- OnlinePublication_Attr - Object of Class OnlinePublication

OnlinePublication class has following attributes:

- URL - String Type

ConferencePaper class has following attributes:

- Conference_Title - String Type
- Conference_Place - String Type
- Conference_Date - Date Type
Book class has following attributes:

- Publisher_Name - String Type
- Place_Published - String Type

UML class diagram in graphical form is not used as the input instead it has been converted into text form which is easy to read.
A. Tool developed for Text UML to XSD file:

We are using XSD as intermediate for the code generation purpose. For transforming UML to XSD a tool UML to XSD convertor has been developed. UML to xml convertor has been developed using .net technology with C# language. It take UML text as input and return XSD as output.

Fig 1.4 UML to XSD convertor

Fig 1.5 Jibx Output screen
V. CONCLUSION

In this work, we have presented a new approach that produces automatically code from UML class diagram with XML Schema transformation.

We have converted UML diagram to text UML and this UML text is converted to XML schema through a tool which is developed by us.

We have implemented this approach through a prototype. Then this generated XML Schema is used for java code generation using JiBX.

This automatic code generation can reduce efforts and development time by reducing coding efforts.

Our approach is an object-oriented approach and in the present study we have used Java as the target language. However our approach is general so it can be used to generate the low level code in other object-oriented languages.

Future work can also be extended to following fields:

• Standard specifications for the reverse engineering XML schemas to UML models.

• Developing a GUI based tool to better represent and map UML models.

• Work on identifying mapping specifications for multiple inheritance (generalization) and multi-level inheritance in UML

REFERENCES


