An Approach towards Automatic Source Code Generation and Embedding Generic Business Logic Using DND

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Abstract— In the practice of Software development and evolution, developer has to response multiple enquiries for proper development. Today development process needs revolution in terms of development or designing the application. Today every individual is alacritous to toil in Graphical User Interface (GUI) environs as working in GUI makes an collaborative session and easy to recognize the manner of development. This approach helps to improve its readability, maintainability, innovativeness, conversion and refactoring. The recent integrated development environments (IDEs) offer numerous plugins and tools which works on Drag and Drop (DND) analogy such as BIRT (Business Intelligence Reporting Tools) and Eclipse WindowBuilder. These tools and others which are existing in present environment offer enormous contribution to the system tool usability in very approachable manner to improve almost 90% application. But the existing systems are missing in context of generic component for development.

In this paper we are streamlining an approach of development in an enormously innovative way via Drag and Drop (DND), Automatic Source Code Generation (ASCG), and Database Connectivity (DBC) to create more tools which contain Generic Business Logic (GBL). These results bolster to the researchers, tool developers and system tool designers to think reconsideration aspect about future of development or design tools.

Keywords— DND, ASCG, DBC, GBL, DB, GUI, Expro-Builder (EB).

I. INTRODUCTION

Today each and every sector availing the advantage of Information Technology in terms of many aspects but one is prior in all i.e. Software Applications. Software applications consider modern approach which is DND. DND is an approach in which users get their action visualization. This approach provides Graphical User Interface (GUI) environment to select the virtual components from panel and drop on the frame or on different component, result in terms of component creation on the frame or in the component. Initiation of this approach in more realistic way was done by Mac OS (Macintosh Operating System) for operating files (operation on file in terms coping, affecting the data location and various other functionality related to file). In realistic world everyone wants to work in the comfort zone in terms of development, for that GUI provides aspect of development by DND the best way to work on. DND reduces the development work of application GUI design by around 40%. ASCG is new approach to address the challenges of writing code and reusing the generated code. ASCG is a novel aspect in terms of revolution to make efficient, faster and precise development process. When the elements are dragged and dropped their source code is automatically generated in a predefined language. Business Logic (BL) is a tactic which works on real business environment comprising of different guidelines that how data can be created, computed, envisioned and influenced. Generic Business Logic (GBL) is the logic for any given application to be established can be stored as Meta data (XML source) which once produced at first time of development can be further used which helps for easy, swift development on dissimilar platform. DBC is one of significant aspect which enables the application interface with database. DBC allows application to work with backend such as Database Management System (DBMS).

II. LITERATURE SURVEY

In this unit, there is confab about the different tools existing for drag and drop, source code generation and business logic phenomena while development of application as well as problems in the existing approaches.

A. Related work on Drag and Drop (DND) Concept
Garnet:

User interface software is problematic and luxurious tool [1]. Highly cooperative interfaces are among the firmest to create, since they must grip at least two asynchronous input procedures (such as a mouse and keyboard), real-time response, numerous windows, and rich, lively graphics.

The Garnet project is generating a set of tools to support the scheme and execution of highly communicating, graphical, direct handling user interfaces. Garnet also benefits designers to design rapid model transformed interfaces and explore numerous user interface representations through initial product design. Most graphical boundaries are generated using toolkits, assemblies of interaction procedures (sometimes called "widgets" or "gadgets") such as menus, scroll bars, and buttons.

Features of Garnet:
   a) Drag and Drop for GUI design.
   b) Faster Execution.

Boundaries or Limitations of Garnet:
   a) Platform Reliant.
   b) Absence of business logic.
   c) Absence of source code.
   d) Absence of database connectivity

Business Intelligence Reporting Tool (BIRT):
It is a mechanism in eclipse environments that offers reporting and business intelligence abilities for end user and web based applications [2; 3; 4]. It is a self-governing public software. It offers extensive variety of services in relations of report creation that permit designers to easy design and incorporate. BIRT allows us to make wide range of reports of desired applications. Reports can be represented in various forms such as:
   • Lists
   • Charts
   • Crosstabs
   • Letters & Documents
   • Compound Reports
   • Pie Charts

Components of BIRT are:
   1) A graphic reporting tool within the Eclipse IDE for generating BIRT Reports.
   2) A runtime module for creating reports that can be installed to any Java environment.

The BIRT offers a monitoring engine which is a blend of report designer and report engine, it is a standalone system.
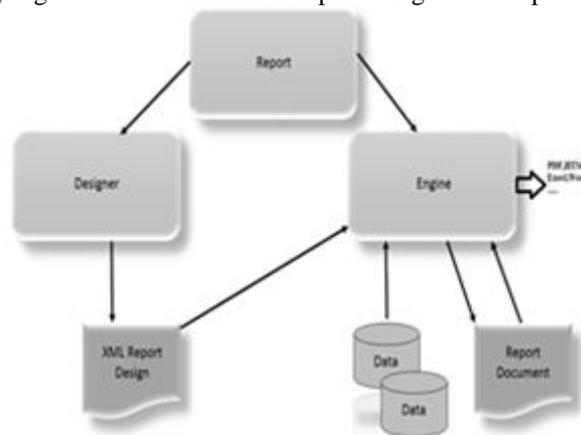

Fig. 1.Block Diagram of BIRT

Features of BIRT:
   a) Drag and Drop for GUI design.
   b) Rapid Report Generation.
   c) Report in numerous layout.

Boundaries or Limitations of BIRT:
   a) Platform Reliant.
   b) Absence of source code and business logic.
   c) Absence of database connectivity.
   d) Not capable to work as web based application.

Oracle Financial Management Analytics (OFMA)
It is an advanced reporting tool for finance management which offers accumulated dashboard and logical reports for the financial procedure and financial outcomes [5; 6]. When these qualities are combined with the Oracle Hyperion Financial Close Suite product in an effective way it decreases operation time and delivers a minimal cost.
Accumulated dashboard comprise of:
   • Executive View
   • Financial Statements
   • Sales Analysis

- Cost Analysis
- Process Management
- Close Manager
- Account Reconciliation Manager
- Oracle Hyperion Data Quality Management Enterprise Edition

Which works on instantaneous data, OFMA eliminates the difficulty of data enactment and results in simplified information for appropriate action. Standard Oracle Enterprise Performance Management (EPM) system safety and admittance control are purchase (obtained by lever) in count OFMA is retrieved using the identical specific mark (signature) on as other EPM applications. This provides a specific version of the truth for mutually data and Meta data in terms of orders which are acknowledged by all users of the Oracle Hyperion Financial Close (OHFC) suite.

Features of Oracle Financial Management Analytics:
a) Drag and Drop for GUI design.
b) Imagining of ideas.
c) Meta data orders.
d) Faster Execution.
e) High Precision.

Boundaries or Limitations of Oracle Financial Management Analytics:
a) Absence of business logic.
b) Absence of source code.
c) Reporting tool only.
d) Domain Precise.
e) Absence of database connectivity.
f) Platform Reliant.

Microsoft Dynamics Customer Relationship Management (MS-CRM)
It is a contribution of Microsoft, which is a software package for customer relationship management [7; 8]. It mainly emphasizes on Sales, Marketing, and Service (help desk) divisions. Microsoft has been marketing Dynamics CRM as a flexible tool to reassuring their partners to use their own (.NET based) structure to modify it. It is a server-client application which is mainly an Internet Information Server (IIS)-based web application.

Features of Microsoft Dynamics CRM:
a) Drag and Drop for GUI design.
b) Imagining of ideas.
c) Web based Application.

Boundaries or Limitations of Microsoft Dynamics CRM:
a) Absence of Business Logic.
b) Absence of database connectivity.
c) Platform Reliant.

B. Related work on Drag and Drop (DND) and Code Generation Concept
Window Builder (WB)
It is one of the tool which works on DND to create Java graphical user interface (GUI) without consuming lot of time in writing code for proper visualization [9; 10]. Window Builder uses the WYSIWYG (What-You-See-Is-What-You-Get) graphic designer and outline tool to make simple forms to composite windows; the java code is generated simultaneously. Effortlessly enhance controls using DND, enhance event handlers to user's controls, transformation numerous properties of controls by expending a property editor, internationalize user's application and plentiful supplementary attributes. Its limitations in context of business logic and platform independent. There is absence of Generic Business Logic (GBL) which helps users to get knowledge of how the project is designed and reuse the same approach in less time [17].

Features of Window Builder:
a) Drag and Drop for GUI design.
b) Source code generation.
c) Faster Execution.

Boundaries or Limitations of Window Builder:
a) Platform Dependent.
b) Absence of database connectivity.
c) Absence of business logic.

Visual Basic
It is outcome of advancement in Beginner's All-purpose Symbolic Instruction Code (BASIC).It permits the Rapid Application Development (RAD) of GUI applications, also permit admittance to database via ActiveX Data Objects,

establishment of ActiveX controls and objects (also by others)[11;12;13]. Alan Cooper made the drag and drop scheme for the user interface of Visual Basic.

A user or developer can build an application using numerous components form toolbox delivered by the Visual Basic program the aforementioned. It supports user to get insight of designs in more real and graphical environment. By that time programmers have made the advancement in programming language to recent ethics i.e. Windows Application Programming Interface (Windows API). Result of enrichment programming language is given by programmers as result to user in Visual Basic (VB) can also use the Windows API, which involves external function declarations. After certain modifications it became Visual Basic 6.0[16].

For example, if you are a institute professor, you can build enlightening programs to teach physics, chemistry, economics, automobile, history, geography, computer, electrical, chemical, production, financial management, mechanical, information system and more to make training more real, applied, cooperative and stimulating. If you are a part of a business association, you can also create professional programs or plans such as inventory management system, enterprise resource planning (ERP), point-of-sale system, payroll system, financial program as well as accounting program to help manage your business, trialing, market investigation and growth in throughput.

Features of Visual Basic 6.0:
a) Drag and Drop for GUI design.
b) Realization of ideas.
c) Database Connectivity.
d) Faster Execution.

Boundaries or Limitations of Visual Basic:
a) Platform Reliant.
b) Absence of generic business logic.

It's Alive! Continuous Feedback in UI Programming:
Live programming [14] allows programmers to revise the code of a running program and instantly see the outcome of the code changes. This narrowing of the traditional edit-compile-run cycle condenses the intellectual gap between program code and implementation, improving the knowledge experience of beginning programmers while enhancing the productivity of expert ones. Unfortunately, live programming is problematic to understand in training as authoritative languages lack well-defined generalization restrictions that create live programming approachable or its view is comprehensible. This tabloid provides idea which permits live programming on behalf of user interface programming by efficiently splitting the execution and non- execution aspects of a UI program, permitting the demonstration to be revitalized on a code modification without restarting the program. A type and effect system validates this separation and offers an evaluation model that includes the code modernize step.

Features of Live Programming:
a) Drag and Drop for GUI design.
b) Faster Execution.
c) Source Code Generation.

Boundaries or Limitations of Live Programming:
a) Platform Dependent.
b) Absence of business logic.
c) Absence of database connectivity.
d) Web based application.

Flapjax: A Programming Language for Ajax Applications
It is a language aimed for contemporary Web applications [15]. These applications converse with servers and have rich, collaborative interfaces. Flapjax offers two significant features that streamline writing these applications.
- It offers event streams, a constant generalization for communiqué within a program as well as with external Web services.
- The language itself is sensitive, it inevitably pathways data dependences and spreads modernizes along those data flows.

This permits developers to write sensitive boundaries in a declarative and compositional elegance. It is assembled on topmost of JavaScript. It tracks on unchanged browsers and freely interoperates with existing JavaScript code. It is operational as either a programming language (that is assembled to JavaScript) or as a JavaScript library, and is premeditated for mutual uses. It is a language, its design decisions, and illustrative examples drawn from several working applications.

Features of Flapjax:
a) Drag and Drop for GUI design.
b) Faster Execution.
c) Application specific business logic.
d) Source Code Generation.

Boundaries or Limitations of Flapjax:
   a) Platform Reliant.
   b) Absence of generic business logic.
   c) Web based application.
   d) Absence of database connectivity.

C. Existing System Architecture

This diagram is pictorial representation of the visualization of various systems studied by authors.
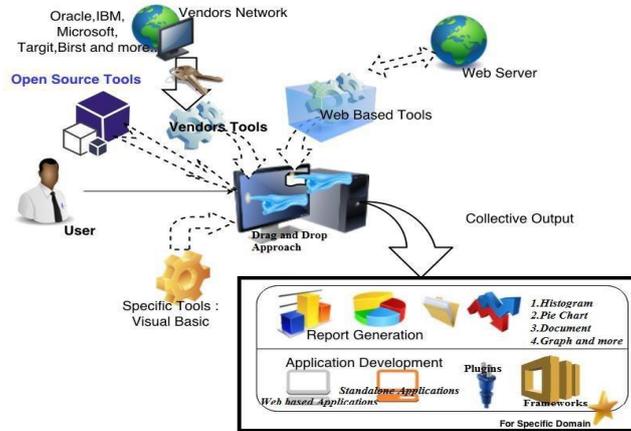

Fig. 2.Existing Systems Architecture

D. Taxonomy Chart

The taxonomy chart given below shows the comparison of various existing tools. The constraints used here to for comparison gives us clear idea where in a concrete work can be done.

Services / Paper Or Other Source	DND	BL	ASCG	Meta Data	DBC	GBL
Garnet	✔	X	X	✔	X	X
Business Intelligence Reporting Tool	✔	✔	X	✔	X	X
Oracle Financial Management Analytics	✔	✔	X	✔	X	X
Microsoft Dynamics Customer Relationship Management	✔	✔	X	✔	✔	X
Window Builder	✔	✔	✔	✔	X	X
Visual Basic	✔	X	✔	✔	✔	X
It's Alive! Continuous Feedback in UI Programming	✔	X	✔	✔	X	X
Flapjax : A Programming Language for Ajax Applications	✔	✔	✔	✔	X	X
Drag-and-drop refactoring: Intuitive and efficient program transformation	✔	✔	X	✔	✔	X
Expro-Builder (Proposed System)	✔	✔	✔	✔	✔	✔

Fig. 3. Taxonomy Chart

III. EXPRO-BUILDER : A PROPOSED SYSTEM

We proposed Expro-Builder (EB) which gives insight that how we can advance user interface development tools by remodelling the aspect of programing and business logic features in concert.

EB contributes to the state of the art for user interface development tools by introducing a novel DND model, a graphical notation, an inheritance contrivance, and a sentient editor for its graphical notation. Further, Expro-Builder demonstrates how manipulative these structures to work well organized advances both the discrete components and the usability of the structure as an integrated whole.

An easy way to comply with the conference paper formatting requirements is to use this document as a template and simply type your text into it.

A. Problem Definition

A Utility/tool is to be developed which will provide the developer with various functionalities such as project GUI development using DND, Automatic Database Creation (ADC), ASCG, DBC, etc. The tool allows the developer to develop project for standalone system.

EB is a GUI tool for building the project just by DND and specifying the values of essential attributes of form and fields to generate the code embedded with GBL in it.

B. Mathematical Model

S: Expro-Builder System

S = {DND,DbC,SCG,GBL}

DND={Label, Text box, Radio button, Check box, Submit button, Add button, Search button, Modify button}

DBC= {Oracle, MS Access, MS-SQL}

SCG= {JAVA, C++}

Where, SCG: Source Code Generation, DbC: Database Creation,D: Developer

D: f(S),

f(S) → A,

Where,

A: Application

f_1 (DND) → GUI,

f_2 (DbC) → Database Task,

f_3 (GBL) → Code Specific Business Logic

Constraints:

1. f_2 (DbC), iff Database installed in Computer System
2. f_3 (GBL) → {JAVA, C++ }
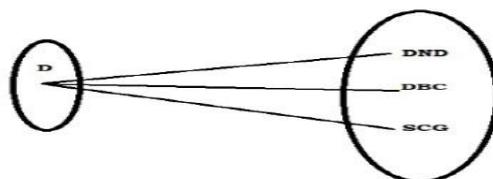
Fig. 4.Venn Diagram

C. Software Architecture

Software architecture serves as the blueprint of Expro-Builder, defining the work assignments that must be carried out by design and execution. The architecture is the main carrier of system abilities such as presentation, modifiability, and safety, none of which can be realized without a combining architectural vision. EB is consist of different modules such as: Language Selection Module,DBC Module,DND Module,ASCG Module and GBL Module. This diagram is pictorial representation of the idea visualization of proposed system
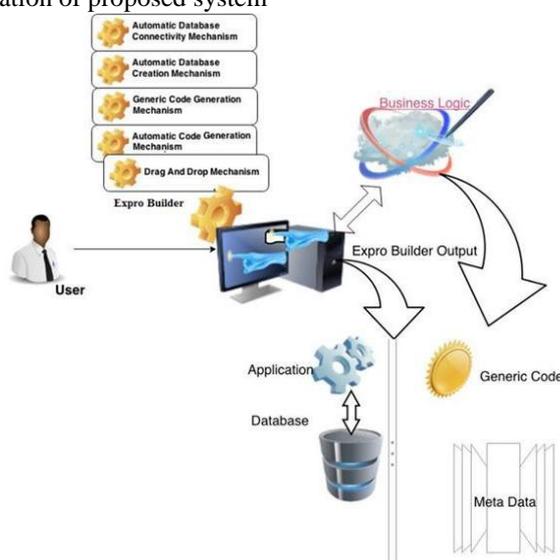

Fig. 5. Expro-Builder System Architecture

D. System Modules

1. Language Selection Module

This module provide flexibility to select language for ASCG i.e. Java or C++.

Fig. 6. Expro-Builder Language Selection Module

2. **DBC Module**

This module provide flexibility to select database for DBC i.e. MS Access, MS-SQL.

Fig. 7. Expro-Builder Database Selection Module

3. **DND Module**

This module is contribution of two different approaches:
   a) First, an interface's status, which often controls its presence and actions.
   b) Second, relationships among interface components and underlying data models.

In event-call back code, it is difficult to manage, maintain, debug, and understand these states and relationships. EB introduces a DND that addresses these challenges by including components attribute and constraints as fundamental language constructs. This module articulates interactive behaviours' as constraints that are compulsory only in particular DND component. In this module there are such components which contains BL such components are Save button, Ok button, Update button and more.
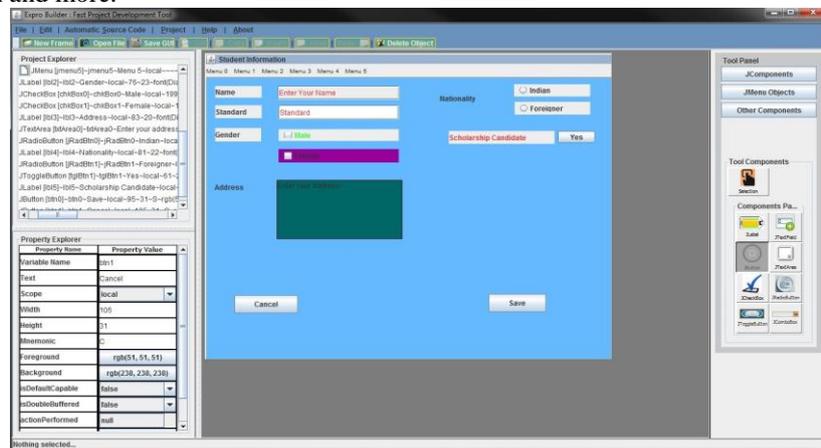

Fig. 8. Expro-Builder Drag and Drop Module

4. **ASCG Module**

This module provides facility of source code generation by DND approach and allow developer to customize the source code as per their requirement. Here changes in DND Module are immediately reflected in the running application.

ASCG is a novel aspect in terms of revolution to make efficient, faster and precise development process. When the elements are dragged and dropped their source code is automatically generated in a predefined language.
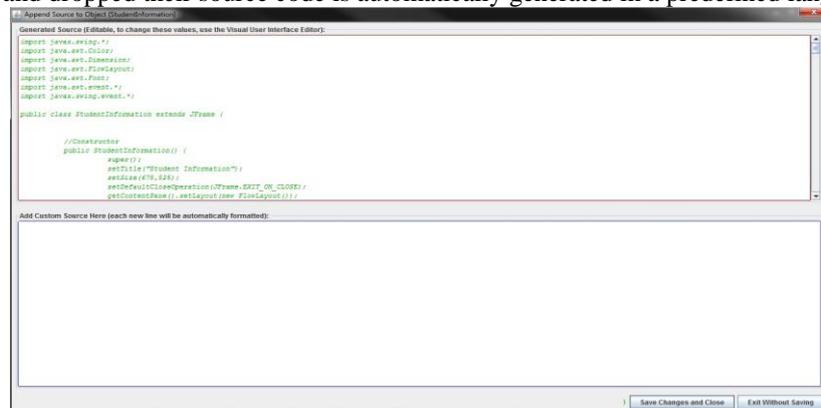

Fig. 9. Expro-Builder Automatic Source Code Generation Module

5. **GBL Module**

This module provides us a template which is resultant of all updates in DND Module , ASCG Module and Metadata (XML source) which once produced at first time of development can be further used which helps for easy, swift development on dissimilar platform.

```
<FORM NAME = "StudentInformationForm">
        <CLASS NAME ="StudentInformation">
                <FIELD LABEL NAME="Name" />
                <FIELD TEXT TYPE= "String"/>

                <FIELD LABEL NAME="Standard" />
                <FIELD TEXT TYPE= "String"/>

                <FIELD LABEL NAME="Gender" />
                <FIELD TEXT TYPE= "List"  VALUES ="Male, Female" />

                <FIELD LABEL NAME="Nationality" />
                <FIELD TEXT TYPE= "List"  VALUES ="Indian, Foreigner" />

                <FIELD LABEL NAME="Address" />
                <FIELD TEXT TYPE= "String"/>

                <FIELD LABEL NAME="Scholarship" />
                <FIELD TEXT TYPE= "Boolean"/>

                <FIELD CBUTTON NAME="Save" />
                <FIELD CBUTTON NAME="Cancel" />

        </CLASS>
</FORM>
```

Fig. 10. Expro-Builder Generic Business Logic Module

IV. CONCLUSIONS

As we have seen that various existing tools do support DND and predefined business logic but not generic business logic. There is no generic business logic mechanism in existing systems. We presented an approach in terms of open source tool which carry a novel concept of business logic, generic code and Meta data generation with application. It reduces the time of development work up to 70% as when developer drags and drops elements, Meta data and business logic are automatically added by our tool. The tool we develop can be used for implementation of project which is for standalone systems.

This novice concept can be extended for development of web based application by adding more components enabling the development process.

ACKNOWLEDGMENT

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