Project Activity Management by Revenue Planner and Quality Dashboard Tools

Thesis Report

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CERTIFICATE

I hereby certify that the work which is being presented in the thesis entitled, *"Project Activity Management by Revenue Planner and quality dashboard tools"*, in paltiala fulfillment of the requirements for the award of degree of Master of Engineer in g in *Computer Science and Engineering* submitted in Computer Science and Engineering Department of Thapar Institute of Engineering and Techno logy, Patiala, is an authentic record of my own work carried out under the supervision of *Prof. Dr. Seema Bawa* and refers to her researcher' s work which are duly listed in the reference section .

The matter presented in the thesis has not been submitted for award of any other degree of this or any other University.

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This is to certify that the above statement made by the candidate is correct and true to the best of my knowledge.

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Abstract

Every corporation or institution needs an efficient tool for data organization and data maintenance. Doing it manually is very difficult as well as complex. Project passes through development, testing, maintaining phases and it is the complex, critical and long term process. Therefore, it is not feasible to maintain all these activities manually. Managerial tasks like planning project, assigning task to different teams, tracking status of projects and checking resource availability, all are performed manually which is not feasible at big level organization. At some interval manager needs performance and analysis reports to check the progress of project. Effective management and technical support are required to accomplish the required goal. Thus, we need efficient tools for the same. *Budget Editor tool* is used for the same reasons. It is an automated efficient data governance tool, basically used for Business Administration Platform Management. It provides user interface which is made in Microsoft Excel from where user can extract and analyze data in tabular format as well as regular format. Various type of reports can be generated using this tool which contains required data with default conditions and calculations.

In this thesis, efforts have been made to improve the formatting of XML files by disarticulating the required data set from a bunch of raw datasets which results in reducing storage and processing time. To improve the performance, several parameters are adjusted and tuned to achieve optimal performance, which earlier was the drawback in the existing system. Estimation model is a new model in this tool and for implementation of this feature, every required phase has been added like VBA macro code, Front end changes i.e. worksheet changes. Some features has been added to keep things more secure and confidential. Overall it reduces the cost of human resources by automating the process of data management and making the process of data analysis faster and efficient.

Keywords : Visual Basic Application, Budget, Macros, XML, Parsing

Abbreviations

BAT	Budget Analysis Tool.
SOAP	Simple Object Access Protocol.
REST	REpresentational State Transfer.
DRC	Data Rule Checks
PLine	Product Line
VBA	Visual Basic Application
XML	eXtensible Markup Language
DOM	Dimension Object Model
SAX	Simple API for XML
StAX	Streaming API for XML
JAXB	Java Architecture for XML Binding
UI	User Interface
LDAP	Lightweight directory Access Protocol
API	Application Program Interface

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Chapter-1
Introduction

This chapter is an introduction of work done in this thesis. Besides stating the definitions, it underlines the objectives to carry out this work and the research motivation. The budgeting framework is a conventional method for overseeing and controlling organizations. Associations utilize the monetary allowance to plan and arrange the following year. To propel employees, assign assets and planning activities inside an association are, and have been, the main role of the financial plan. Planning is meant to encourage obligation appropriation and is utilized to assess execution. Budget Editing Tool is used to organize data of manpower working in different projects in Deloitte. There are different filters like Sites, Resources, Organizations, Year, which we can use while retrieving the data. This Tool is macro-enabled Microsoft Excel file which contains VBA code in terms of macros and functions. Budget Editor tool is used for retrieving data from database through web service using online server. This tool is mainly used for generating various types of reports and get a specific conclusion. It makes task so easy for users because they get all required information at one place without doing any manual work. Figure 1.1 shows the Revenue Planner tool.

Business Administration is the cycle of evaluating plans, policies with effective procedures that model business on distance future. Project management without proper outlining results into failure of work. It assures that projects sphere is defined and outlined accurately which should accomplish the business goals [8].

1.1 Functional Partitioning

Functional Partitioning of Budget Editing tool can be done in two ways:

a) Front end: Client side
b) Back end: Server side

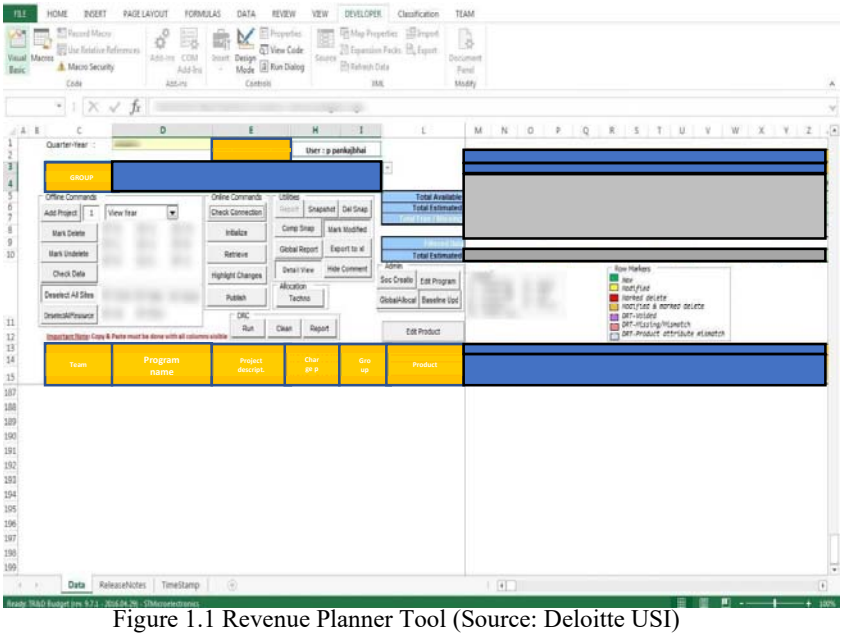


Figure 1.1 Revenue Planner Tool (Source: Deloitte USI)

Following are some points describing the working platforms at client and server end:

a) In Client side it is working through Excel VBA macro programming.

b) In Server side it is working through java programming.

c) Source code consists in 3 packages: common : For utilities and common stuff like LDAP functions etc., resource : For Jax-RS classes called resources which are something like servlets, model : For business java classes that do the real job by querying database etc.

d) Resources do preprocessing like getting parameters, doing LDAP authorization etc., invoke suitable business java objects, construct the return value.

e) Eclipse software for java coding and MySQL Workbench for database have been used.

1.2 Importance of Project Activity Management

Project management is the cycle of accessing plans, policies with effective procedures that model business on distance future. Project management without proper outlining results into failure of work. It assures that projects sphere is defined and outlined accurately which should accomplish the business goals [8].

Therefore, here is the tool named Revenue Planner which take cares of all business administration and management related task that ensure business administrator that things are running smoothly [5].

1.4 Thesis Outline

After the introduction chapter rest of the thesis is organized as:

Chapter 2 (Literature survey) describes the fundamentals required for this thesis. It describes the significance of framework used for this tool. It describes the review of the existing approaches for the validation process.

Chapter 3 (Proposed changes in Business Editing Tool) gives the detailed description of the new solution that has been implemented and the stages and process that are being used. Advantages of new model over old one and performance difference.

Chapter 4 (Design and Implementation) It includes designing methods suitable in this project on services provided by the middle ware web service.

Chapter 5 (Testing and Results) deals with testing and results analysis which we are referring for this tool.

Chapter 6 (Conclusion and Future Scope) covers conclusion which we get from this implementation and what are the future enhancements that can be done.

Chapter-2
Literature Review

In various firms the budget has historically had a control functions but today there are several objectives and purposes of the budget and the purposes vary among companies.

Hansen et al. describes that budgeting is thought to be a standout amongst the most critical administration instruments to control the organization. This paper centers around the capital planning. As Over-venture or under-speculation is wastefulness. The inefficiency of capital planning diminishes as the quantity of independent director increments [6].

Wang et al. addresses a fuzzy multi-target basic leadership of the promoting planning portion and also its application at the strategic level. The endeavors dependably need to locate an ideal assignment of promoting spending plan with a specific end goal to augment the publicizing adequacy, which is generally represented by the viewer's psila number. However, the watchers psila information gathered by the media just approximates to the genuine number of watchers who truly focus on the commercial. In the event that the operator expects that the reward in the bonus pool won't be designated totally, he will require a higher reward coefficient of the second time frame to give enough impetus. On the off chance that the foremost expects that the majority of the reward in the reward pool will be apportioned, he will steadily diminish the reward coefficient in every period to augment his own particular intrigue [7,10].

Anwar et al. consider DOM and SAX parser in the utilization of subtree separating, and assess them through the execution they represent during the time spent subtree filtering. We find that SAX isn't as advantageous as DOM to apply to the subtree filtering, yet has better execution [12].

Li Zifan et al. states that, to schedule all organization projects we need a database system that will store all details and when needed it should display the require interaction with database system. As a bridge we uses restfull web service. Web services generate data in XML forms so at front end this generated data needs to be parsed by some mechanism. While developing project, it is suitable to analyze

best web service and parsing methods [18,20]. Microsoft excel is the efficient tool for this kind of project development because:

a) Formatting: Excel has broad alternatives for arranging information outlines, cells, tables, and so forth. Different Sheets has restricted arranging capacities contrasted with Excel. Along these lines, tool can be look more compelling and efficient.
b) Formulas: Excel provides important and efficient formulas for financial, logical, text, math or trigonometry fields etc.
c) Location: We can utilize exceed expectations at any area, it is upheld all over the place.
d) High processing power: Work that requires high processing power like to analyze 10000+ rows of data.

Table 2.1: Summary of Literature Review

S. No	Paper Title	Description	Reference No.
1.	Towards a Unified Framework for visual basic framework.	It highlights the importance of visual basic application framework.	[3]
2.	A pattern based tokenization model for XML parsing	This paper introduces a hypothetical tokenization display for XML parsing. The model depends on the distinguishing proof of consecutively rehashing designs inside the structure of a XML document.	[18]
3.	A Data Parallel Approach to XML Parsing and Query	In this paper, an immediate parallel technique to take care of this issue without pre-parsing is proposed. In the immediate parallel strategy, we specifically begin the parallel parsing by finding the "light pinnacle", which is a specific character with a few exemptions, called pieces of information.	[19]

4.	Developing industrial strength simulation models using Visual Basic for Applications (VBA)	These unique applications utilized an independent Basic program to change over Lotus 123(R) information into Siman Experiment Frames.	[20]
5.	A Practical IP Quality Measurement Framework	Since the Subtree Filtering relies upon the parsing and querying of XML, the XML parser which applies in the subtree Filtering completes an awesome impact to the execution of Filtering for a given IP square.	[21]
6.	An XML-based framework for temporal database implementation	This paper attempts to consider DOM and SAX parser in the utilization of subtree separating, and assess them through the execution they speak to during the time spent subtree filtering. We find that SAX isn't as helpful as DOM to apply to the subtree separating, yet has better performance.	[22]
7.	Grove data model for efficient representation of XML documents	XML turned into the most standard strategy for representing and trading data on the web conditions because of its adaptability in printed representation, data displaying, data recovery, report trade, record administration, and information mining. XML can give hierarchal plan of information through some significant systems available for accessing.	[13]
8.	A Novel Method to Extract Informative Blocks from Web Pages Library	This paper proposes a novel calculation to records extricate the enlightening squares from website pages and channel the commercial which has nothing to do with the subject when individuals peruse the Web page.	[14]
9.	The Application and Analysis of Netconf Subtree Filtering Based on SAX and DOM	This paper endeavors to consider DOM and SAX parser in the utilization of subtree filtering, and assess them through the execution they represent during the time spent subtree filtering. We find that SAX isn't as advantageous as DOM to apply to the subtree filtering.	[25]

10.	Optimization of cutting conditions in Microsoft Excel	Present day phase of logical and innovative advance is described by a wide presenting of PC strategies. They enable one to build proficiency and to diminish the ideal opportunity for work in figuring the cutting conditions, standard time for preparing, examination of cutting procedures, outlining innovative procedures.	[26]
11.	Building an Enhanced Syntax-Directed Processing Environment for XML Documents by Combining StAX and CUP	This paper describes the environment and delineates its utilization in the advancement of, a XML-driven courseware framework.	[29]
12.	A simple plastic part cost estimator using Microsoft(R) Excel Validation: A Formal Perspective	The open architecture of the exercise manual permits part designers to comprehend the suppositions and sensitivities characterizing their parts cost.	[30]

2.1 VBA - Visual Basic for Application

Visual fundamental is large scale programming that permits to change and modify the Microsoft excel expectations according to the client's requirement [1]. It is a subset of the Visual Basics. Visual Basics application gives a great deal for windows excel client to computerize the things according to the clients wish. The developer can completely use the excel formulas and all of the feature by moving it to back end. All these elements are available in the Microsoft excel developer tab that makes one to utilize the visual basics application. In the developer tab there is an option of visual basics that open an editor where we can write code.

VBA is Visual Basic for Applications, this is a macro programming by Microsoft. This programming language is efficient so, user gave priority to this language and it can be used with Microsoft Office. Microsoft Excel has its own editorial manager that is Visual Basic Editor. In this editorial manager we can compose large scale codes for worksheets. Visual essential Editor is exceptionally exact, and it composes a code also. In the event that software engineer has conferred any

linguistic structure botch then it will indicate it instantly with blunder message box. It additionally gives investigating office, with the goal that you can track stream of your code and you can discover mistakes proficiently at specific line only [4]. Macros are small pieces of code, we can write it in Microsoft Excel. Macro is a part of programming language that is used in Visual Basic for Application. If we want to do repetitive processing then we can use macros, because we can use it more than once so, that we can reduce number of lines of code. Excel has lots of features but macro is concluded as most important feature of excel. Microsoft Excel gives loads of in-fabricated capacities to client. But, client can likewise compose their own capacities for performing specific errand by utilizing Excel macros. Client can likewise include their macros as exceed expectations work list, therefore client can utilize it same as like in-constructed capacities. It gives a usefulness like macros recording. This element is a substitution alternative for clients, on the off chance that they would prefer not to compose a code and specifically complete an activity from Excel toolbar and utilizing exceed expectations' fundamental usefulness then they can record whole process and it will change over this procedure into code in Visual Basic Editor [5].

2.2 Web Services

A Web service is a facility given by an electronic appliance to another electronic appliance. Web Service is communicating via WWW - the World Wide Web, contains technologies like HTTP. It is widely used for transferring device readable formats like JSON and XML [2]. It gives an object oriented interface which is based on web and this interface is being further provided to database. For example it is used by excel or any other software that gives an interface to the database server from which user wants to fetch data in front end as shown in figure 2.1. It provides a mash up to the user where server contains lots of web services on different devices and it compiles program into the single interface [10].

We can differentiate web services by two levels such as:

a) Conceptual level - This level of Web Service is a programming part given through an endpoint which is accessible by network. In this level, service source and service destination send messages to interchange request and response data in different formats like any of the self containing files which makes less assumptions for the technical capacities of the receiver [6].

b) Technical level - This level of Service can be executed in many ways. There are two types of Web Services which can be differentiated as “Big Web Services” which are also known as SOAP web services and second is “RESTful” web services [7]. Difference between these two services is described in figure 2.2. SOAP and REST have many differences at interface level. SOAP is less preferred then REST whereas REST have some identical advantages over SOAP.

No.	SOAP	REST
1)	SOAP is a **protocol**.	REST is an **architectural style**.
2)	SOAP stands for **Simple Object Access Protocol**.	REST stands for **REpresentational State Transfer**.
3)	SOAP **can't use REST** because it is a protocol.	REST **can use SOAP** web services because it is a concept and can use any protocol like HTTP, SOAP.
4)	SOAP **uses services interfaces to expose the business logic**.	REST **uses URI to expose business logic**.
5)	**JAX-WS** is the java API for SOAP web services.	**JAX-RS** is the java API for RESTful web services.
6)	SOAP **defines standards** to be strictly followed.	REST does not define too much standards like SOAP.
7)	SOAP **requires more bandwidth** and resource than REST.	REST **requires less bandwidth** and resource than SOAP.
8)	SOAP **defines its own security**.	RESTful web services **inherits security measures** from the underlying transport.
9)	SOAP **permits XML** data format only.	REST **permits different** data format such as Plain text, HTML, XML, JSON etc.
10)	SOAP is **less preferred** than REST.	REST **more preferred** than SOAP.

Figure 2.1 Difference between SOAP and REST (Source : Deloitte USI)

2.3 XML Parsers

In XML document, data access or data modification can be done by using xml parsers. Parsers are designed to read data in form of an xml and create a method for programs, so that functionality of program can use that data. In other words xml parser is a package or library that gives interfaces for user pro- grams to deal with an xml data. Xml parser is also used for validating a document and it checks that document is well formatted or not [7]. Almost all browsers have an

inherent xml parser to modify xml data and to retrieve same data. There are multiple options for parsing of xml data in Java. But some parsers are frequently used for parsing xml document [21]. There are 2 types of parsers that are being used for different purposes for the implementation of this tool such as:

2.3.1 DOM Parser

DOM parser is 'Document Object Model' Parser. DOM parser parses xml data in different manner, and it defines a standard method for manipulating and accessing document which is in XML format as shown in figure 2.3. It loads whole content of xml document and then it will generate its hierarchical tree in the system memory [14].

2.3.2 VTD Parser

VTD parser is 'Virtual Token Descriptor' is the non validating, non extractive, document centric XML processing API. The acceptable replacement of DOM parser is the VTD parser because VTD is the most random access memory efficient XML parser.

2.4 XML Parsing Steps

There are following XML parsing steps that converts the XML documents into some programming language.

2.4.1 Character conversion

This is the first step of xml processing but is the irrelevant of parsing model.

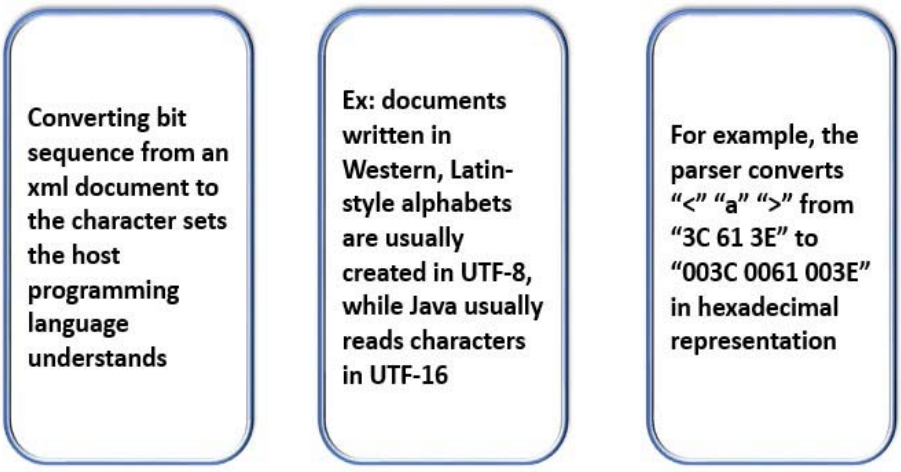


Figure 2.2 : Character conversion (Source : Deloitte USI)

2.4.2 Lexical and Syntatic analysis

Lexical analysis is also irrelevant of parsing model but sysntatic analysis generate data suitable for parsing model.

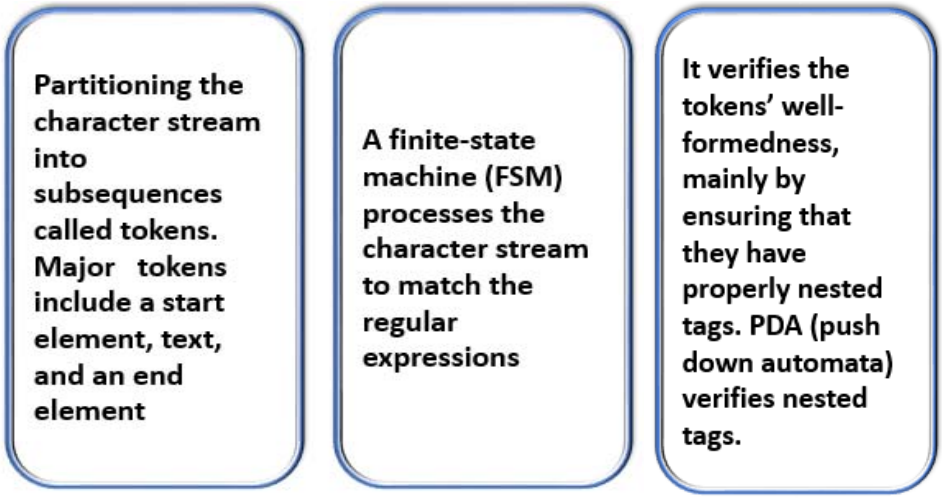


Figure 2.3: Lexical and Syntactic Analysis (Source : Deloitte USI)

a) These three step process remains almost same for every parser but these are very expensive services for the XML parsing process.
b) 3-step parsing process is the most expensive operation in XML processing.
c) After completing sysntatic analysis data is feasible by various parsing model like SAX, DOM, VTD etc. for the access or modification.
d) Long lived constitutional data is maintained by both DOM and VTD for the defined operations in access and modification stages but same is not true for the SAX.
e) Therefor DOM and VTD both are perfectly suitable for this tool. But here for this project we are choosing VTD over DOM. The reason behind this discussed in below sections.

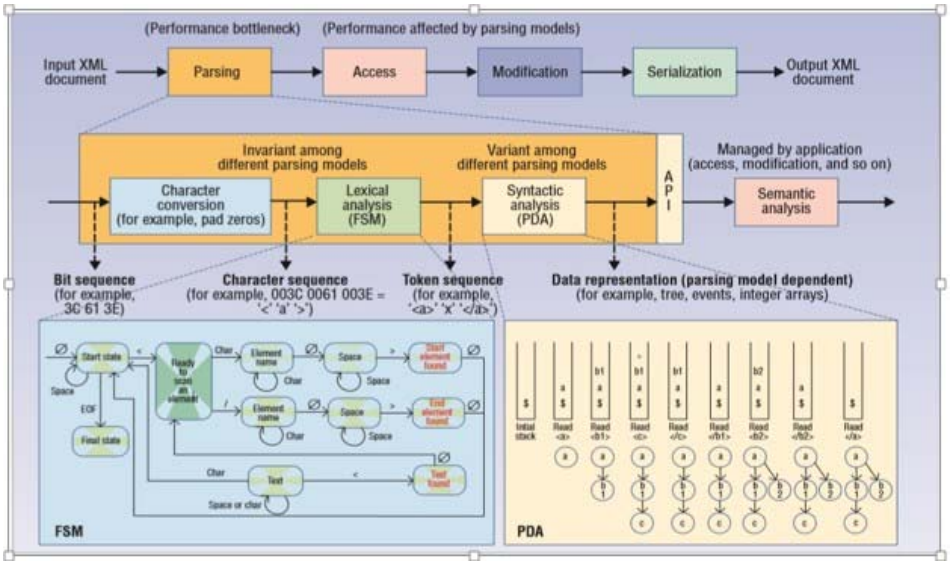


Figure 2.4: XML processing stages and parsing steps (Source : Deloitte USI)

2.3.4 XML Processing Performance

Performance of all the three parsers are being discussed in below given figure 2.5 on the basis of different categories [23].

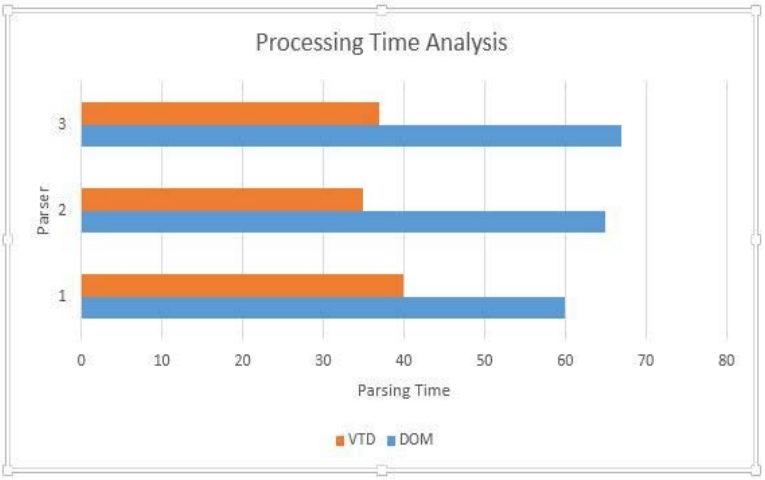


Figure 2.5: Parsing Process Time Analysis (Source : Deloitte USI)

2.4 JAXB

JAXB stands for Java Architecture for xml Binding. It is used to convert xml to Java object and Java object to xml. In SAX parser and DOM parser, we have to be aware of xml parsing techniques so that we can use xml data in our program. But in JAXB we don't need to be aware of xml parsing techniques [10]. It is mostly used in java program for xml web services and can create and map objects easily with xml. Figure 2.11 shows the JAXB architecture. XML

schema is being passed to binding compiler and then to the JAXB API from there it uses marshell technique to create XML document and unmarshell technique to create a content object tree.

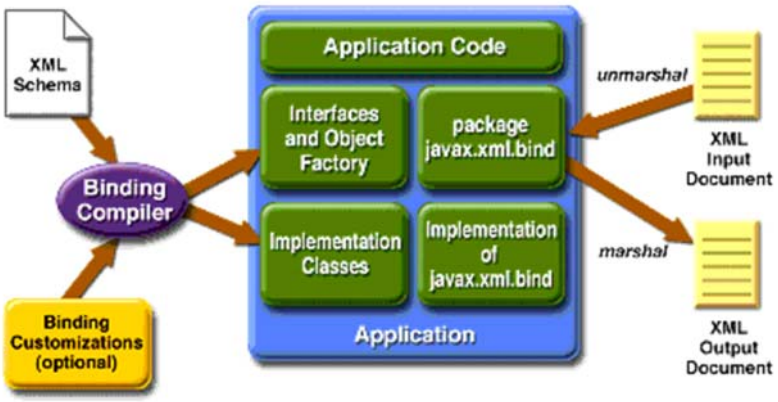


Figure 2.6: JAXB (Source : Google)

There are two methods in JAXB.

a. Marshalling - It converts Java objects to XML as shown in figure 2.12.

b. Unmarshalling - It converts XML to Java object as shown in figure 2.13.

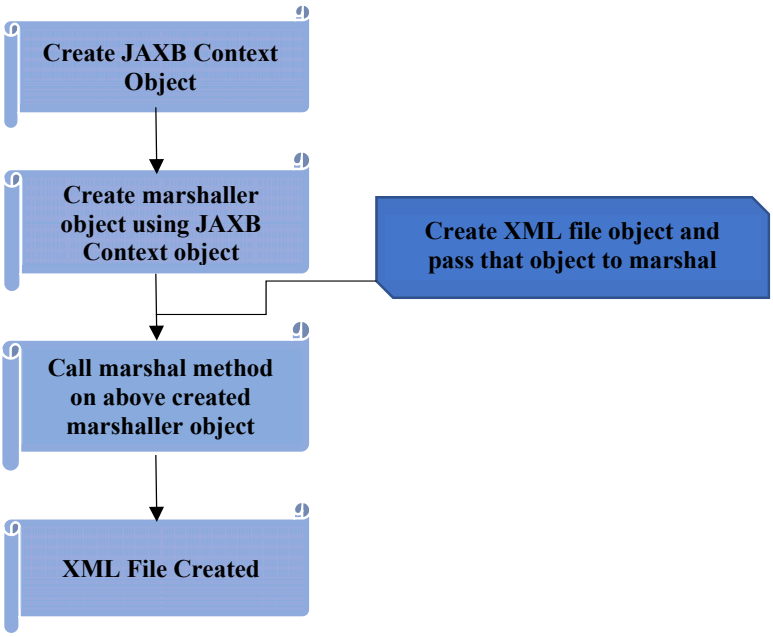


Figure 2.7 :Marshalling

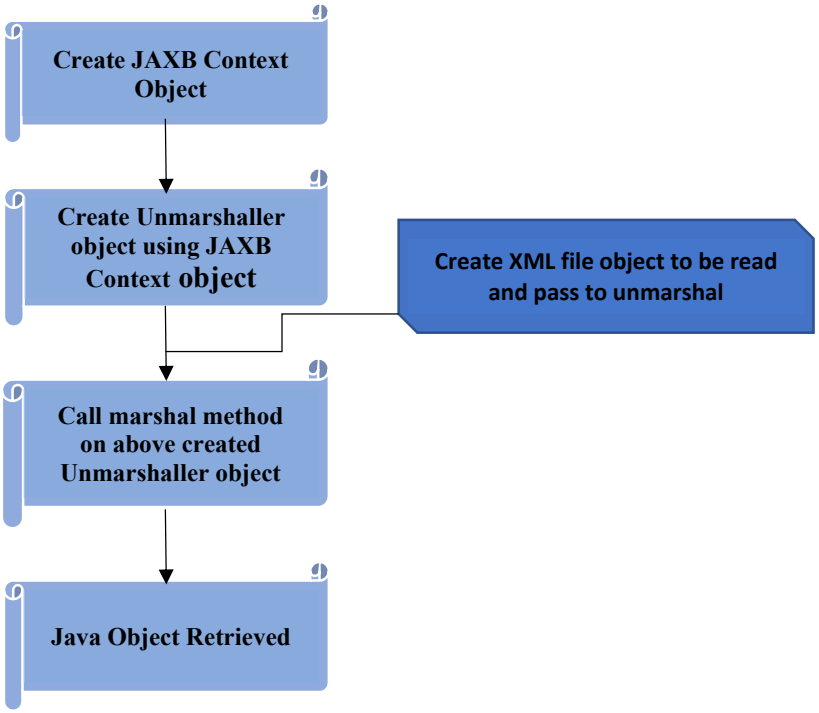


Figure 2.8: Unmarshalling

2.5 Problem Statement

Budget plans are utilized to design the future exercises of association. They are intended to guarantee that associations demonstration in the most ideal approach to achieve the desired objective. The arranging reason for the financial plans is utilized to design deals, purchase of products and for budgetary issues. All units in an association are, more or less, dependant on each other. By utilizing planning the units need to collaborate and trade off when it concerns with constrained assets. It ought to contain the data about how much assets are required and when. Which makes it conceivable to design inflows and surges of the association. When choosing a financial plan, higher authorities must anticipate the future and consider what changes and issues may happen. At the point when plans are made ahead of time, the number of inappropriate choices are diminished [22,23].

2.6 Objectives

1) To facilitate resource allocation within the organization.
2) To improve the processing time of operations.
3) To improve the security of data being used.
4) To design, implement and test above mentioned objectives.

Chapter -3
Proposed Changes in Revenue Planner Tool

This chapter discuss the changes that have been made in business editing tool. This tool is being used in Deloitte from past few years to manage the budget of the different project. To make this tool a better version we have added direct buttons to this tool.

3.1 Ribbon Buttons

For interface design in computer, there is a control element as ribbon which are placed on various tabs in the form of set of toolbars. As a form of modular ribbon, Microsoft products started to introduce it in 2007 as their main interface. This interface contains lot of tabs, large toolbars, so many graphical buttons and other control elements [15].

These ribbon buttons satisfies user's requirements, if user needs a tool with permanently fixed buttons then he/she can use this feature. Ribbon button provides graphical look to the button which gives better look to the tool. We can give all the button functionalities to the buttons by assigning a specific macro by the passing an argument control as 'IRibbonControl'. Figure 3.1 shows the Ribbon button present in the tool framework.

Here, we used 'Custom UI Editor for Microsoft Office' to provide functionalities to buttons. We can use inbuilt syntax for giving commands to these buttons. User can choose button image from inbuilt library of Microsoft Excel or any random image as per your choice. User can give description of button in form of screen tip and super tip. Important benefit of this feature is you can save space in worksheet by using ribbon button instead of ActiveX or form buttons on sheet.

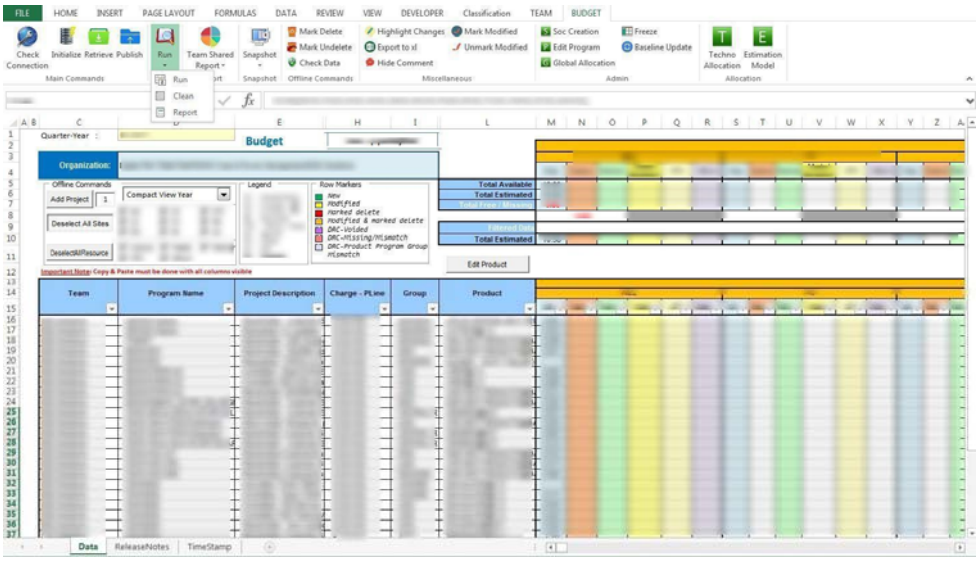


Figure 3.1: Ribbon Button (Source : Deloitte USI)

3.2 Estimation Model

Estimation Model is a new module in Revenue Planner Tool. For implementation of this feature, every required phase like VBA macro code, Front end changes i.e. worksheet changes etc. have been added as shown in fig 3.2. This feature is available for limited number of users and according to that user can use its features.

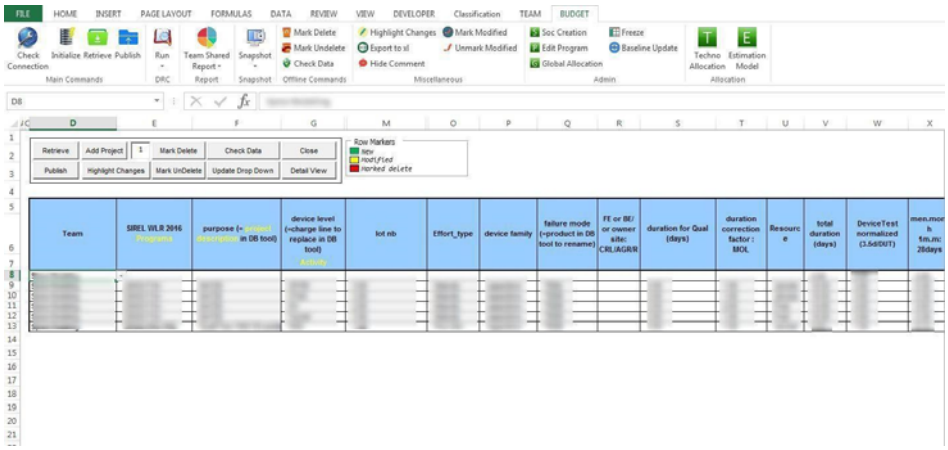


Figure 3.2: Estimation Model Sheet (Source : Deloitte USI)

Basically, user can retrieve the data for already existing techno platform data. And then he/she can modify these data according to their requirements and after updation they can publish that data in database server through web service. User can enter new techno platform records, update records, delete records and more.

This feature is available for only limited number of organizations. Figure 3.3 shows the warning message when wrong organization name is entered.

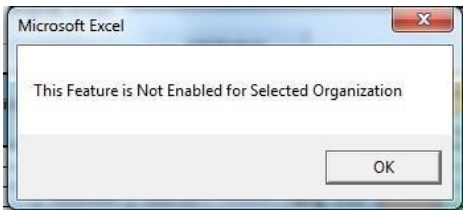


Figure 3.3: Warning message for correct organization (Source : Deloitte USI)

3.3 Forecast ID Modifications

There was an existing feature of forecast Id, that every single record is dependent on forecast Id as per year. Forecast id could be different for same project details but in different year. But in current version for same projects details, it can be in any year. Figure 3.4 shows the syntax of forecast id.

Quarter	Year	Forecast Id
Q1 - 2014	2014	123
Q1 - 2015	2015	234
Q1 - 2016	2016	345
Q1 - 2017	2017	456
Q1 - 2018	2018	567
Q2 - 2016 (Apr'16 to Mar'17)	2016	345|0
	2017	0|456
	2016 - 2017	345|456
Q3 - 2016 (Jul'16 to Jun'17)	2016	345|0
	2017	0|456
	2016 - 2017	345|456
Q4 - 2016 (Oct'16 to Sep'17)	2016	345|0
	2017	0|456
	2016 - 2017	345|456

Figure 3.4 : Previous Forecast Id Syntax(Source : Deloitte USI)

3.4 Multi Product Line

There is one supporting tool named Reporting world in SDB which will used to generate reports based on efforts made by individuals or teams in time period. Till now tool is only able to analyze reports based on organization but as per customer requirements new functionality of analyzing reports based on multiple product type is added. Figure 3.5 shows reporting world database.

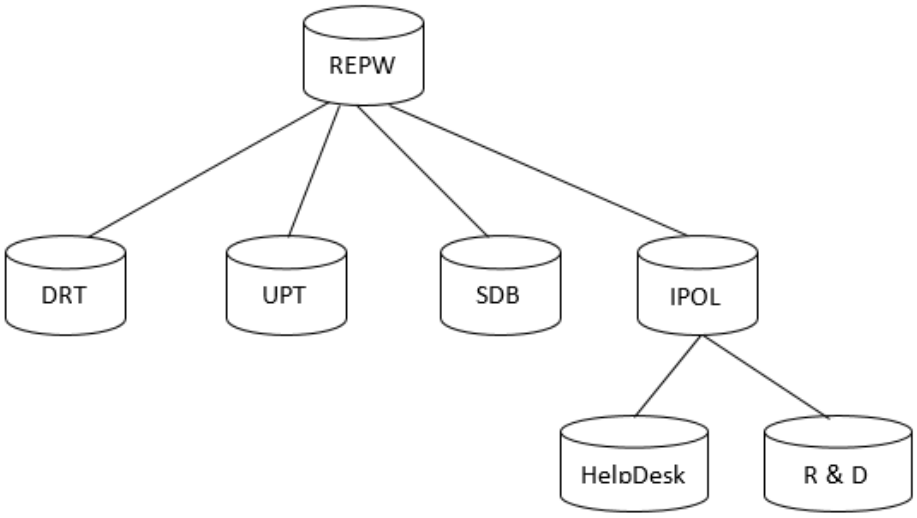
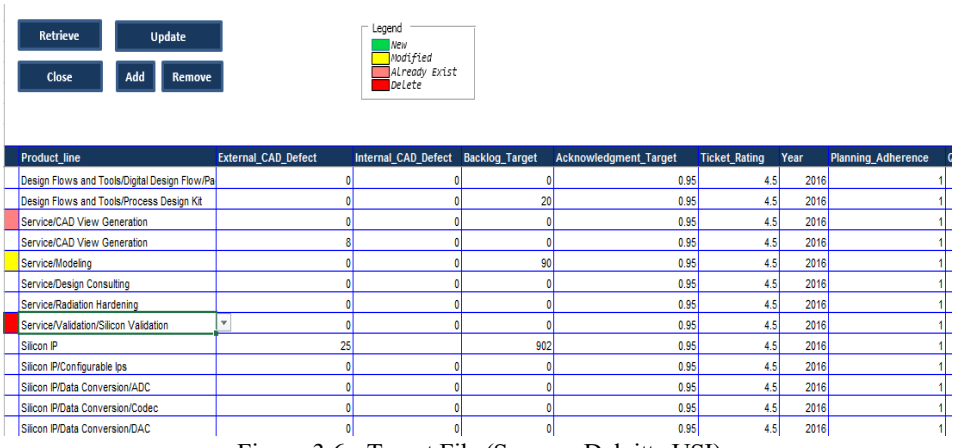


Figure 3.5: Reporting World DB

3.5 Edit Targets

New interface named edit targets added which is only editable by Admin users. Administrator has rights to change the targets related data. Here data is extracted based on year in which each product line contain internal and external defects, tickets rating, milestone quarter availability, planning, maturity plans etc.



Product_line	External_CAD_Defect	Internal_CAD_Defect	Backlog_Target	Acknowledgment_Target	Ticket_Rating	Year	Planning_Adherence
Design Flows and Tools/Digital Design Flow/Pa	0	0	0	0.95	4.5	2016	1
Design Flows and Tools/Process Design Kit	0	0	20	0.95	4.5	2016	1
Service/CAD View Generation	0	0	0	0.95	4.5	2016	1
Service/CAD View Generation	8	0	0	0.95	4.5	2016	1
Service/Modeling	0	0	90	0.95	4.5	2016	1
Service/Design Consulting	0	0	0	0.95	4.5	2016	1
Service/Radiation Hardening	0	0	0	0.95	4.5	2016	1
Service/Validation/Silicon Validation	0	0	0	0.95	4.5	2016	1
Silicon IP	25		902	0.95	4.5	2016	1
Silicon IP/Configurable Ips	0	0	0	0.95	4.5	2016	1
Silicon IP/Data Conversion/ADC	0	0	0	0.95	4.5	2016	1
Silicon IP/Data Conversion/Codec	0	0	0	0.95	4.5	2016	1
Silicon IP/Data Conversion/DAC	0	0	0	0.95	4.5	2016	1

Figure 3.6: Target File (Source : Deloitte USI)

Changes is done in retrieval schema. In old system data is retrieved based on organization but as per new functionality data is extracted based on multiple product line so accordingly changes are done in web service as well as in front end.

3.6 Generate Reports

As per requirements various reports in developing life cycle are generated. Suppose admin wants to show what targets achieved or completed in time, in developing process which phases are still remaining etc. So they want all these just by one click. That require some artificial intelligence which is built in background. In this tool we have another functionality which is helpful for this named Reporting World. To generate recent updated report we use latest updated data from the DB [5].

Here, system generate reports for multi parameters which are stored in different database system. So as per requirements reporting utility maintain their own database in which data are dumped from different DB and updated daily so user can get updated data.

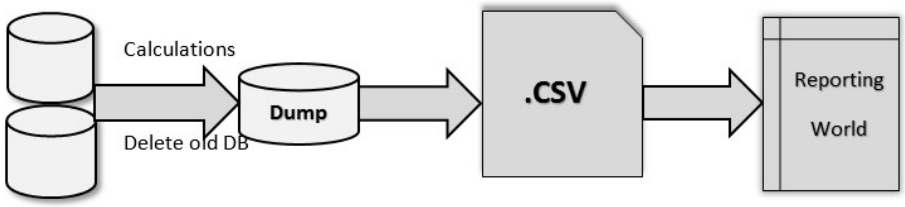


Figure 3.7: Record Management [4]

3.7 Milestone Analysis

This feature generate graph for each milestones based on achieved and committed time. Through this monthly how much target it received in year is analyzed. There is an important modification in this tool i.e. in existing tool user was retrieving report on the basis of organization and year was mandatory and product line was optional, in short data was fully dependent on organization and year. But now we have modified it and all the data for report will be generated on the basis of single product line or multiple product line and year which is mandatory and organization is optional.

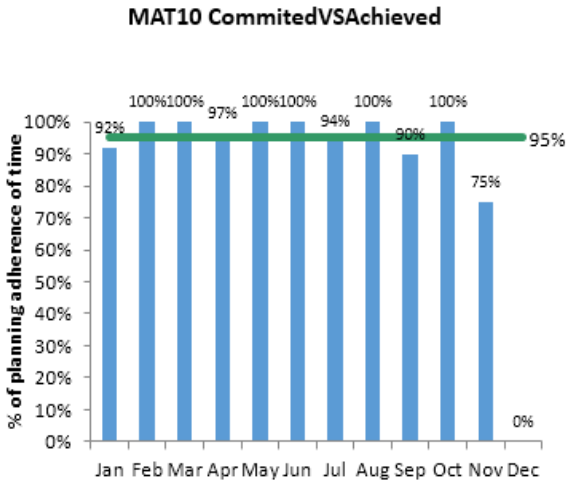


Figure 3.8 Milestone Analyis (Source : Deloitte USI)

Milestone in Business management is the mark which measure the growth of project to- wards the goal. Milestone has time line associated with it which helps administrator to keep track of project. It is necessary to achieve milestones in defined time period for the successful completion of project. But, there is some constrain on that like it only gives the primary idea of deliverables which will be necessarily completed on time. Milestones only measure with critical aspects so there is lack of tracking noncritical aspects. So administrator miss out to track those non-critical task and miss assuming that development process is on time results into increasing risk.

Chapter - 4
Design and Implementation

To obtain the desired objective of an organization this tool has been designed. A new solution is being designed and implemented. It has different functionalities for different tasks. We have provided these below mentioned functionalities, so that user can easily access this. Following are the features that have been implemented.

4.1 SDB Utilities

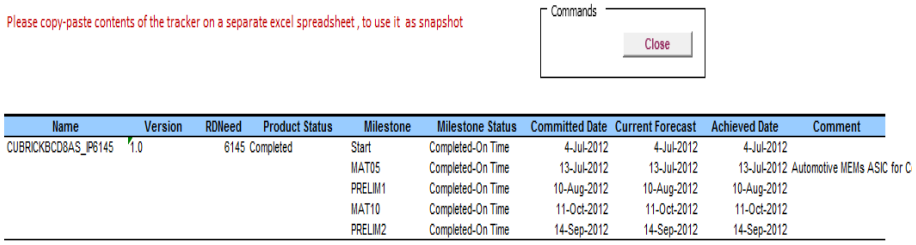
SDB utilities are scheduling database utilities which keep the track of different operations and times lines.

4.1.1 Generate Tracker

Tracker continuously keeps eye on milestones & it is used to track milestones life cycle.

4.1.2 Dump

Selected data dump to other sheet which will future used to calculate estimate based on milestones.



Name	Version	RDNeed	Product Status	Milestone	Milestone Status	Committed Date	Current Forecast	Achieved Date	Comment
CUBRICKBCD8AS_IP8145	1.0	6145	Completed	Start	Completed-On Time	4-Jul-2012	4-Jul-2012	4-Jul-2012	
				MAT05	Completed-On Time	13-Jul-2012	13-Jul-2012	13-Jul-2012	Automotive MEMs ASIC for C
				PRELIM1	Completed-On Time	10-Aug-2012	10-Aug-2012	10-Aug-2012	
				MAT10	Completed-On Time	11-Oct-2012	11-Oct-2012	11-Oct-2012	
				PRELIM2	Completed-On Time	14-Sep-2012	14-Sep-2012	14-Sep-2012	

Figure 4.1: Milestone tracker future planning (Source : Deloitte USI)

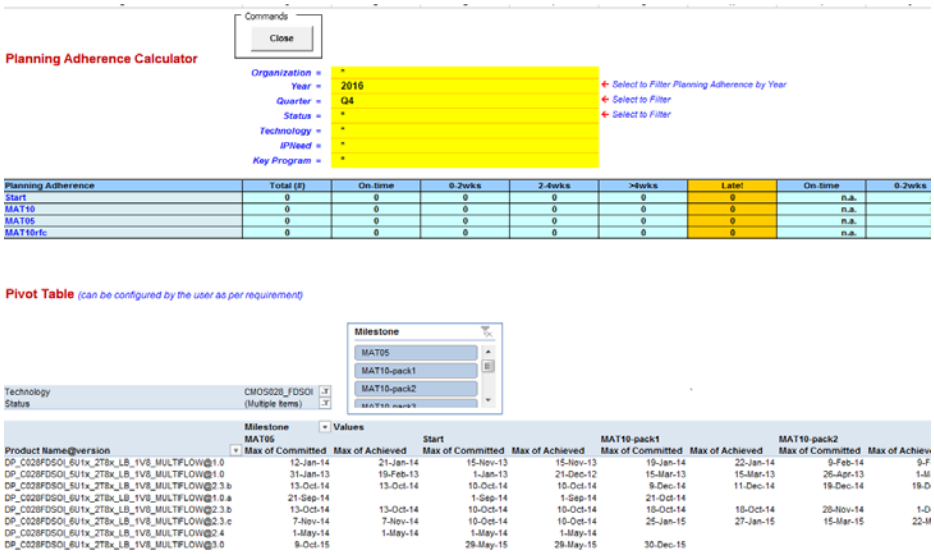


Figure 4.2: Estimate planning calculator(Source : Deloitte USI)

4.1.3 Time Line View (TLV)

It defines brief weekly time line of each milestone. On which week it is planned and when it is completed for each product.

4.1.4 DP Summary

Describe total summary of Design packages mode. Each techno contains many products and their milestones these summary is short report of those fields.

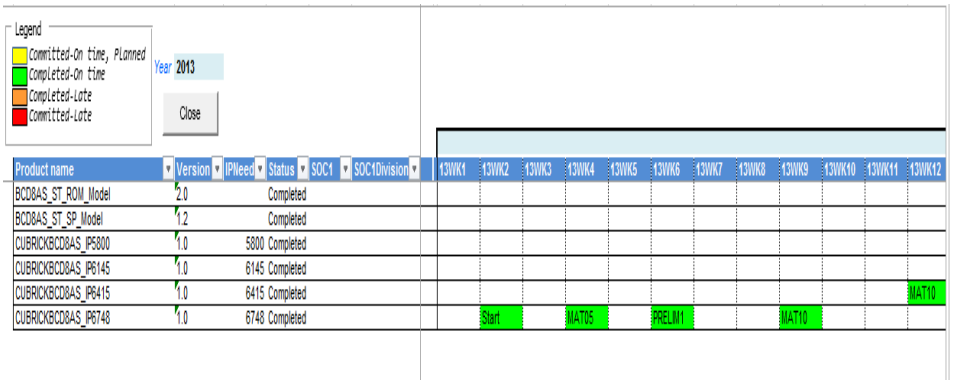


Figure 4.3: Time Line View(Source : Deloitte USI)

4.2 SDB Validation

SDB validation commands are used to check the logs, design rule checks and are shown below:

4.2.1 Design Rule Check

It validates that designed structure is identical to recommended pattern. Those which are not validated successfully give DRC run errors.

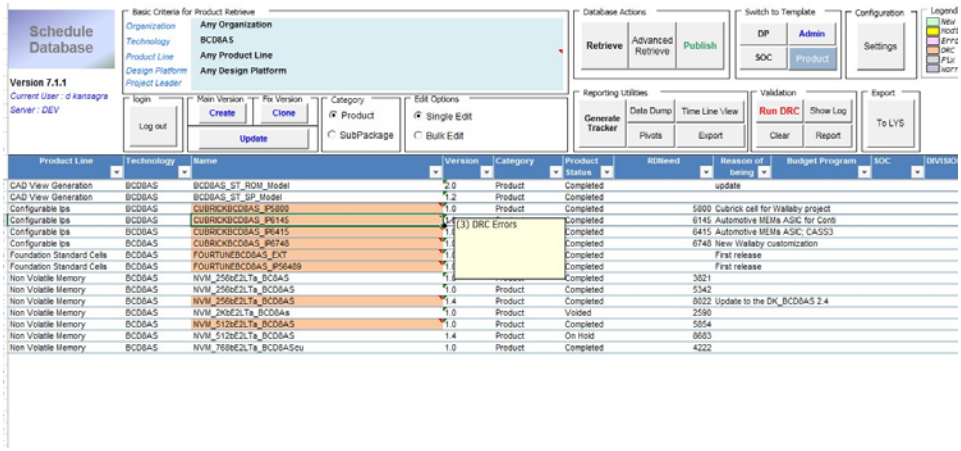


Figure 4.4: Run DRC (Source : Deloitte USI)

4.2.2 Log

It will generate a log about errors detected at validation time so that respective team can resolve them. Even project manager also keep watch on when these errors are resolved by which team. Within Log there is another utility named summary which represent data in structural format or chart format. This structural representation shows brief report of Validation.

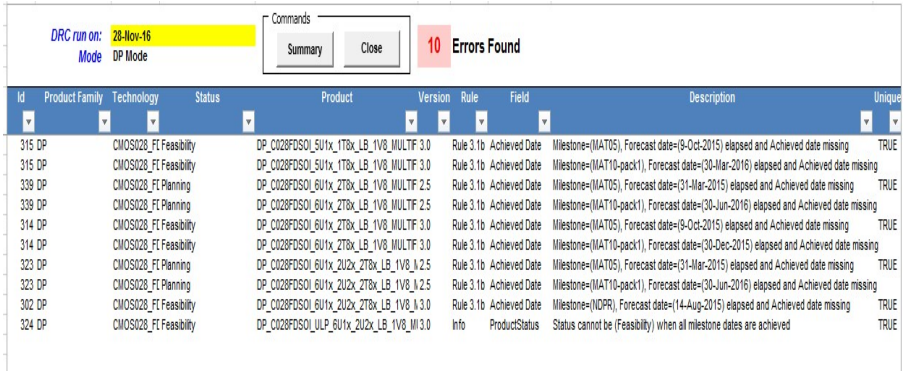
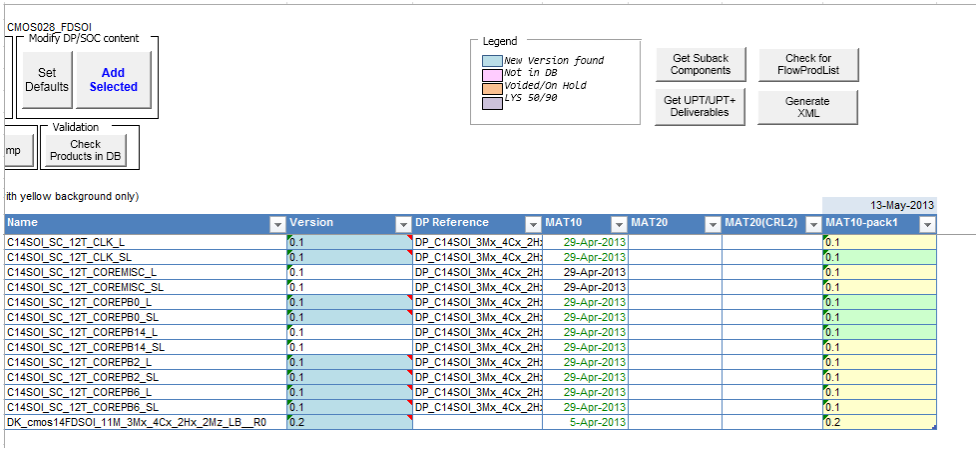


Figure 4.5: Log file (Source: Deloitte USI)

4.2.3 FlowProdList

This is the new feature that is included under the update DP/SOC content. Customer requirement is that product with valid deliverables is highlighted. Flowprod List generates an XML file for particular one milestone pack. It is the list of products having status FINAL APPROVED or MAT10 APPROVED. Which means product is developed with first level testing.

Here, query for checking valid deliverables is fired from XML file system and that system maintains central library of UPTPLUS, query is written as a script format which is executing on terminal window and through web service we are trying to access those result.



Name	Version	DP Reference	MAT10	MAT20	MAT20(CRL2)	MAT10-pack1
C14SOI_SC_12T_CLK_L	0.1	DP_C14SOI_3Mx_4Cx_2H	29-Apr-2013			0.1
C14SOI_SC_12T_CLK_SL	0.1	DP_C14SOI_3Mx_4Cx_2H	29-Apr-2013			0.1
C14SOI_SC_12T_COREMISC_L	0.1	DP_C14SOI_3Mx_4Cx_2H	29-Apr-2013			0.1
C14SOI_SC_12T_COREMISC_SL	0.1	DP_C14SOI_3Mx_4Cx_2H	29-Apr-2013			0.1
C14SOI_SC_12T_COREPB0_L	0.1	DP_C14SOI_3Mx_4Cx_2H	29-Apr-2013			0.1
C14SOI_SC_12T_COREPB0_SL	0.1	DP_C14SOI_3Mx_4Cx_2H	29-Apr-2013			0.1
C14SOI_SC_12T_COREPB14_L	0.1	DP_C14SOI_3Mx_4Cx_2H	29-Apr-2013			0.1
C14SOI_SC_12T_COREPB14_SL	0.1	DP_C14SOI_3Mx_4Cx_2H	29-Apr-2013			0.1
C14SOI_SC_12T_COREPB2_L	0.1	DP_C14SOI_3Mx_4Cx_2H	29-Apr-2013			0.1
C14SOI_SC_12T_COREPB2_SL	0.1	DP_C14SOI_3Mx_4Cx_2H	29-Apr-2013			0.1
C14SOI_SC_12T_COREPB6_L	0.1	DP_C14SOI_3Mx_4Cx_2H	29-Apr-2013			0.1
C14SOI_SC_12T_COREPB6_SL	0.1	DP_C14SOI_3Mx_4Cx_2H	29-Apr-2013			0.1
DK_cmos14FDSOI_11M_3Mx_4Cx_2Hx_2Mz_LB__R0	0.2		5-Apr-2013			0.2

Figure 4.6: FLowProdList (Source : Deloitte USI)

4.3 Authentication

There is login button which indicate that only authorized users can able to work with it. Here, authorized user means users need to have a permission to perform any operations

4.3.1 Permission Distribution

For security purpose there are different permission distribution are described as follows:

4.3.1.1 SYS_ Admin

As name suggest sys admin has all rights to perform any operation like he can

able to publish or modify any project details no matter from which team he belong. Also able to create new project and assign tasks to different teams. In short all features of this tool can be accessible by sys admin only.

4.3.1.2 DP_Admin

DP admin has only permission to modify or update Design Packages mode related projects. In tool to update Design packages details user either needs to have sys admin permission or DP admin permission.

4.3.1.3 SOC_Admin

In tool to modify System on Chip mode related project details user must have SOC Admin permission if user is not the sys admin.

4.3.1.4 Product_ Admin

If user is not the sys admin and want to update project related details then he must have product admin rights. Product admin rights assign based on groups. And these groups are formed with pair of productLines & Organizations. So ultimately product admin permission is nothing but special permission of user in which user has rights to update only selected group of products.

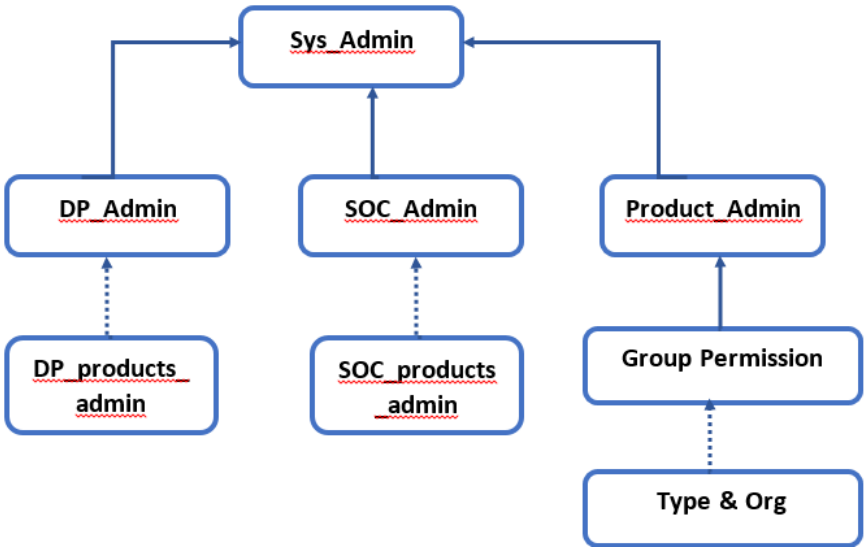


Figure 6.2: Permission Hierarchy

4.4 Data Display Process Flow

It will show how data is being processed at different level. Through online commands it will check for the valid credentials and then let the user to enter the required data. If the credentials are not valid then it will pop up with a message "try again". After the successful login it will ask for the year and organization for which the data or report is required. Again it will ask for the valid password for that particular file, if correct, will display the data.

For the updation of data the project needs to be edited as shown in figure 4.6 and after making the required changes it publish the file with the existing id. If the year is already freezed then no modifications can be done.

Figure 4.7 shows the data publishing process when we start there are two options that we have first is we have to add project then edit it. After editing record publishing can be done with existing id or will create a new id. If we want to delete any record we will go to delete record and publish it. For this we have to check whether the record is freezed or not.

In data process flow we first check the connection and put the required credentials If the credentials are correct then it will initialize the process otherwise it will show a warning message. After right credentials we need to give the year for which we want to get the result, organization of which we want and the quarter. Then it will retrieve the data if the credentials match to that dataset and if not it will give an error message. So after getting the right credentials it will display the data and the process will end.

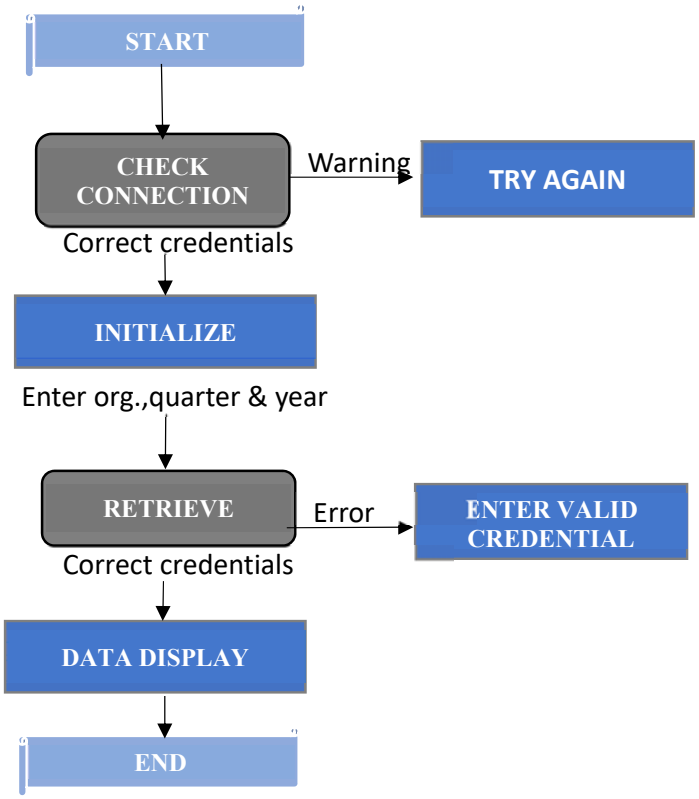


Figure 4.6: Data Display Process flow

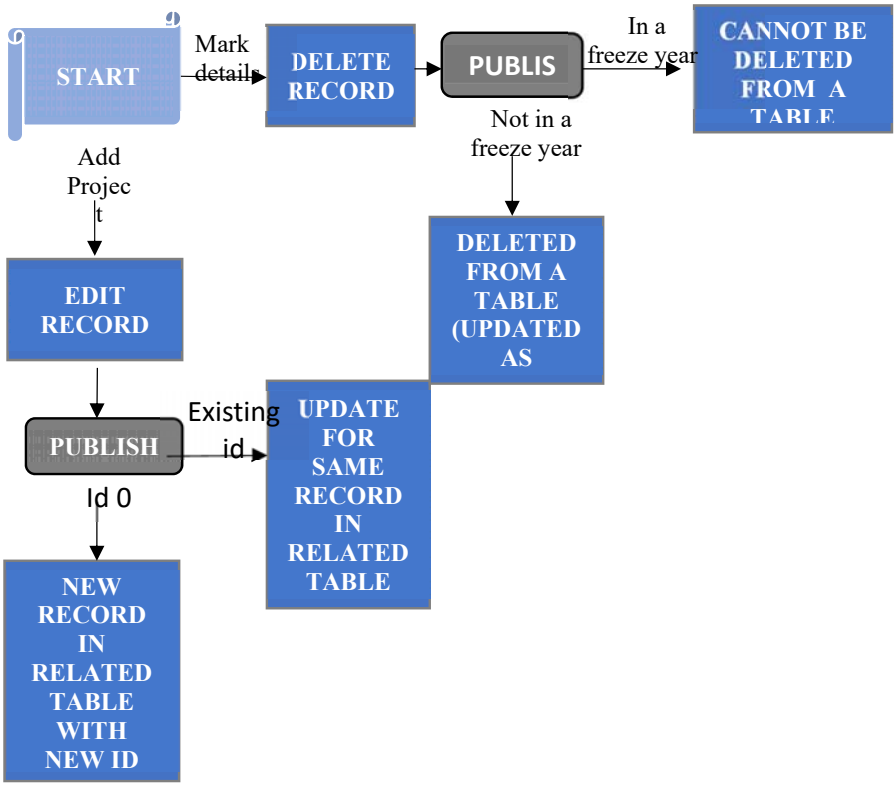


Figure 4.7: Data Publishing Process

Chapter - 5
Test Results and Analysis

Testing is the process of checking or verifying developed software and is must be able to satisfy with requested requirements. There are many types of testing available for different level like functional-testing, non-functional testing etc. but here we are in developing phase so developer need to perform unit testing to check the efficiency of lines of code.

5.1 Testing Framework

There is no automated testing framework available for front end testing. For the web service testing and DB testing we have many frameworks available but to test complete flow of tool we need to run complete test suit which needs to invoke entire flow from front to web service to DB. For that tool required one automated framework which can test all the results from front to back end and vice-versa.

Although we can't neglect the web service and SQL errors as shown in figure 5.1. Debug Mode figure shows new suggested approach. In this approach we are first focusing on to identify the errors or data loss. For that we are just simply comparing actual result with test data and intermediate data. That will generate errors logs which is used by programmer for the correction.

5.1.1 Rubberduck : Testing Add-on

Rubberduck is the add-on in VBA that help us to develop our own testing module. Through which we can minimize the macro processing time. This tool maintains time logs for every module in timestamp sheet. Here, is the time comparison chart which represent how much this testing module is effective, refer figure 5.2. It provides assert class with some default initialize and clean up methods. That will be used to provide inputs for test module at initialization phase and after performing test suit clean up method is executed to clean the testing environment. Asset class facilities some default methods which will compare actual result vs expected result. Rubberduck also has fix functionalities same as Eclipse provide automatic fixes which will first inspect the code if any basic fixes found, then will fix them [9].

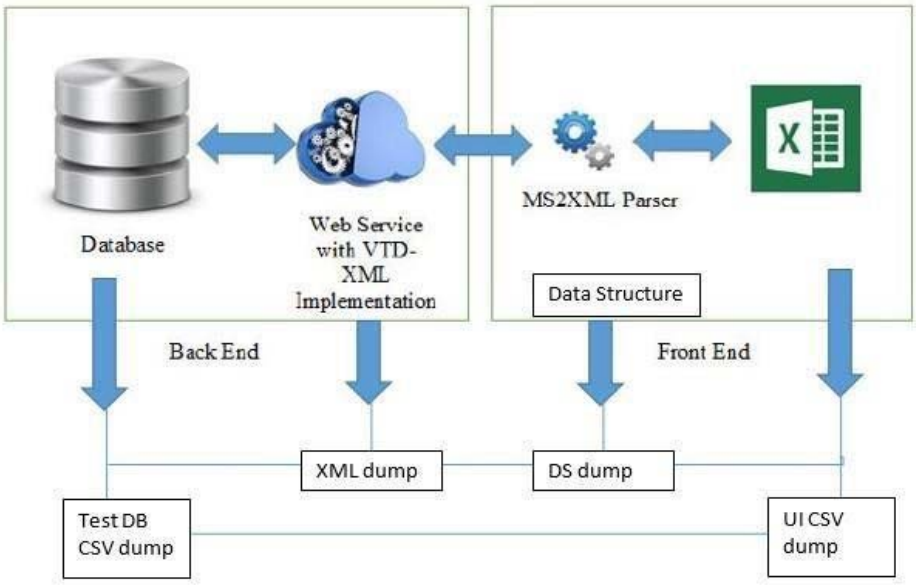


Figure 5.1: Debug Mode (Source : Deloitte USI)

There are different modules which contains different type of records like number of resources, budget of the project, Resources availability etc. Figure 5.2 shows their testing comparison.

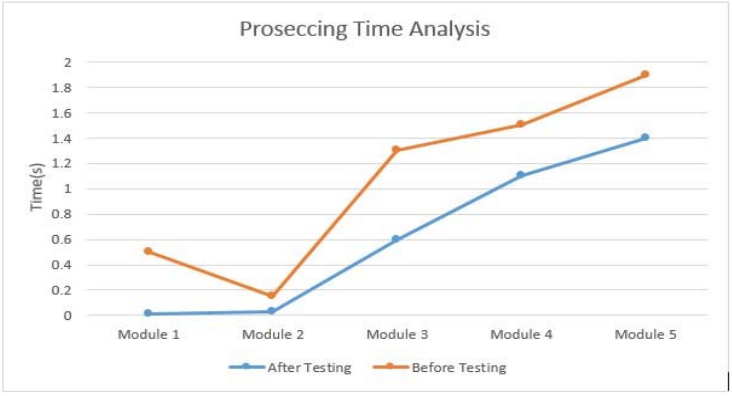


Figure 5.2: Comparision of Testing Time (Source：Deloitte USI)

The following description is about the analysis of work done and the results that has been derived after the analysis.

5.2 Forecast ID

There was an existing feature of forecast Id before, that every single record is

dependent on forecast Id. If admin wants to know about any forecast record then he/she can find it by its forecast Id. Forecast Id is a primary key in table, and it is used as foreign key in many tables.

Quarter	Year	Forecast Id
Q1 - 2014	2014	123
Q1 - 2015	2015	234
Q1 - 2016	2016	345
Q1 - 2017	2017	456
Q1 - 2018	2018	567
Q2 - 2016 (Apr'16 to Mar'17)	2016	345|0
	2017	0|456
	2016 - 2017	345|456
Q3 - 2016 (Jul'16 to Jun'17)	2016	345|0
	2017	0|456
	2016 - 2017	345|456
Q4 - 2016 (Oct'16 to Sep'17)	2016	345|0
	2017	0|456
	2016 - 2017	345|456

Figure 5.3: Forecast Id Syntax (Source: Deloitte USI)

Syntax as shown in figure 5.3 have to be maintained in table and in sheet as well. It is working very efficiently for updation and deletion without any error or collision. We can differentiate every entries for different year easily and coding for this feature for all the possible cases for updation as well as for deletion have been done.

5.3 Importing Project

When any project is currently going on in more than one team or any project goes under another team, at that time this feature works. Figure 5.4 shows the view of importing project. User can retrieve all the projects and they can import them to the selected organization. Project details will be entered in new rows and efforts will be shown as comments. This feature will not work if selected organization and fetched organization will be the same. Also, it saves a lot of time while importing project from one team to another team. Importing a project is a tedious job when have to do in with different department. So, using this feature project can be easily imported and can be used at different levels.

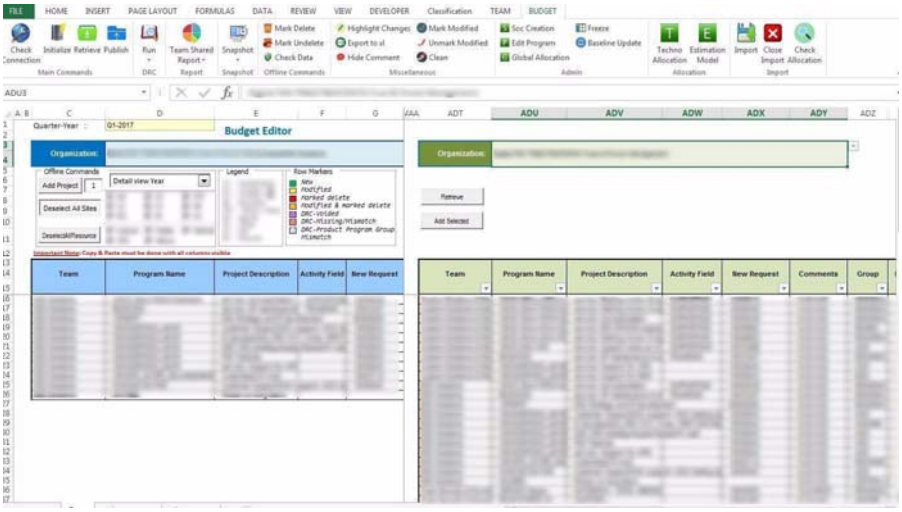


Figure 5.4 : Importing a new project(Source : Deloitte USI)

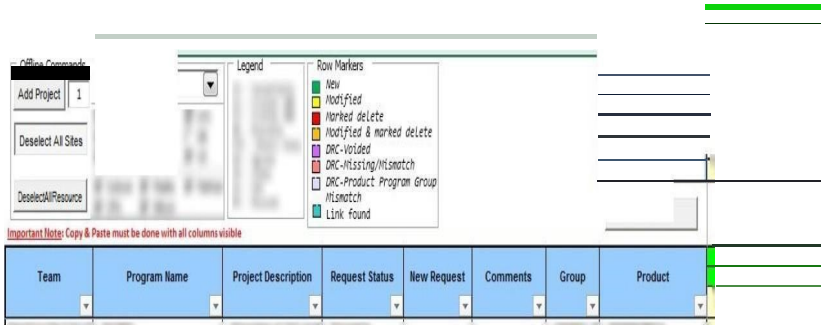


Figure 5.5 : Allocation of project (Source : Deloitte USI)

5.4 Check Allocation

If user wants to know that which project is imported/linked then he/she can select the project and then click on 'Check Allocation' button in the tool. Figure 5.5 shows when allocation of project is done. After clicking, two possibilities will be there :

a. If selected projects are linked then it will highlight with color green and efforts will be shown as comments on existing data.
b. If selected projects are not linked then it will highlight them with color Grey.

5.5 Performance Enhancement

a) The XML VTD (Document Object Model) defines the properties and methods for accessing and editing XML. Hence, increase the processing speed at back end.

b) However, before an XML document can be accessed, it must be loaded into an XML DOM object. So that it won't take the storage space for intermediate processing.

c) Optimized formula calculation by removing some unusual part with some inbuilt functions.

d) Used indexing to retrieve the record from the database.

Chapter - 6
Conclusion and Future Scope

6.1 Conclusion

Every organization requires data management and it is a tedious work but user can do this task more efficiently by this tool. Reporting is the best feature of this tool because user can get all the required data together with some pre-requisite conditions and pre-defined rules. User can get conclude overall review of the data and can do their task easily.

This tool is very efficient because it maintains very huge storage of data, server connections are also well maintained and user can see all the data about every organizations, every projects, every teams etc. at one platform.

6.2 Future Scope

We can modify the tool as per user's requirements, we can do changes which are needed now but was not there before in existing project and add some more features and functionalities for better performance. We will work on code optimization and time complexity. If we can optimize the code for same task so that it will give the same result with optimized form and also can try to reduce number of loops, repetitive code processing for reducing time complexity.

Budget Editor Tool is used by Deloitte employees from India and outside of India so, we have to maintain some standards of tool and try to make it more efficient and better. Thus, there is a scope of improvement always.

References

[1] Suddul, Geerish, Nimal Nissanke, and Nawaz Mohamudally. "A pattern based tokenization model for XML parsing." *AFRICON, 2013*. IEEE, 2013.

[2] Xiang, Yazhou, et al. "The Application and Analysis of Netconf Subtree Filtering based on SAX and DOM." *Measuring Technology and Mechatronics Automation (ICMTMA), 2010 International Conference on*. Vol. 3. IEEE, 2010.

[3] Visual Basic for Application Manual, Deloitte USI Internal Document

[4] Cheng-Han, and Sheng-De Wang. "A data parallel approach to XML parsing and query." *High Performance Computing and Communications (HPCC), 2011 IEEE 13th International Conference on*. IEEE, 2011.

[5] Ishitani, Yasuto. "Document transformation system from papers to XML data based on pivot XML document method." *Document Analysis and Recognition, 2003. Proceedings. Seventh International Conference on*. IEEE, 2003.

[6] Shea, J. J. "A Guide to Microsoft Excel for Scientists and Engineers." *IEEE Electrical Insulation Magazine* 15.1 (1999): 35-35.

[7] Developing and Deploying WebService, Deloitte USI.

[8] Deloitte Internal Document, MySQL WorkBench Manual.

[9] Working with Eclipse, Deloitte USI Internal Document.

[10] Noh, Seo-Young, and Shashi K. Gadia. "An XML-based framework for temporal database implementation." *Temporal Representation and Reasoning, 2005. TIME 2005. 12th International Symposium on*. IEEE, 2005.

[11] Li, Yuancheng, and Jie Yang. "A novel method to extract informative blocks from web pages." Artificial Intelligence, 2009. JCAI'09. International Joint Conference on. IEEE, 2009.

[12] Xiang, Yazhou, et al. "The Application and Analysis of Netconf Subtree Filtering based on SAX and DOM." *Measuring Technology and Mechatronics Automation (ICMTMA), 2010 International Conference on*. Vol. 3. IEEE, 2010.

[13] Sarasa-Cabezuelo, Antonio, et al. "Building an enhanced syntax-directed processing environment for XML documents by combining StAX and CUP." Database and Expert Systems Application, 2009. DEXA'09. 20th International Workshop on. IEEE, 2009.

[14] Wichmann, Mark W., T. D. Boyer, and T. J. Brogla. "A simple plastic part cost estimator using Microsoft (R) Excel." Electrical Insulation Conference and Electrical Manufacturing & Coil Winding Conference, 1999. Proceedings. IEEE, 1999.

[15] Excel VBA Programming For Dummies, 2nd Edition, Published By Wiley Publishing Inc., Indianpolis, Indiana.

[16] Haas. Reconciling Web services and REST services. In 3rd IEEE European Conference on Web Services (ECOWS 2005), Nov. 2005.

[17] M. Nicola and J. John, XML Parsing: A Threat to Database Performance, Proc. 12th Intl Conf. Information and KnowledgeManagement (CIKM 03), ACM Press, 2003, pp. 175-178.

[18] Zifan, Li, and Zhang Lei. "Dynamic Model of Company Capital Budget and Manager Compensation Design." *Intelligent Computation Technology and Automation (ICICTA), 2011 International Conference on*. Vol. 1. IEEE, 2011.

[19] Lianghua, Wu. "A research on company capital budgeting efficiency." *Computer Science and Service System (CSSS), 2011 International Conference on*. IEEE, 2011.

[20] D. J. Abadi, S. R. Madden, and M. Ferreira. Integrating compression and execution in column-oriented database systems. In SIGMOD, pages 671682, 2006.

[21] R. C. Tausworthe, “The work breakdown structure in software project management,” Journal of Systems and Software, vol. 1, pp. 181186, 1979.

[22] Karim, Syaeful, et al. "Automating functional and structural software size measurement based on XML structure of UML sequence diagram." *Cybernetics and Computational Intelligence (CyberneticsCom), 2017 IEEE International Conference on*. IEEE, 2017.

[23] Ye, Yushan, et al. "Result ranking of XML keyword query over XML document." *Image and Signal Processing, BioMedical Engineering and Informatics (CISP-BMEI), 2017 10th International Congress on*. IEEE, 2017.

[24] Zhu, Xinglin, et al. "A non-invasive framework for XML data binding." *Reliability, Maintainability and Safety (ICRMS), 2016 11th International Conference on*. IEEE, 2016.

[25] Sayih, Marouane, and Anne Brüggemann-Klein. "Using XML technology in the development process of web applications." *Information Science and Technology (CiSt), 2016 4th IEEE International Colloquium on*. IEEE, 2016.

[26] Sankar, V., and G. Zayaraz. "Securing confidential data in XML using custom level encryption." *Computation of Power, Energy Information and Commuincation (ICCPEIC), 2016 International Conference on*. IEEE, 2016.

[27] Najam, Sara, Hajar Mousannif, and Mohamed Ouzzif. "Building a structured collaboration system from XML specification." *Computer Systems and Applications (AICCSA), 2015 IEEE/ACS 12th International Conference of*. IEEE, 2015.

[28] Li, Yuancheng, and Jie Yang. "A novel method to extract informative blocks from web pages." Artificial Intelligence, 2009. JCAI'09. International Joint Conference on IEEE, 2009.

[29] Sayih, Marouane, and Anne Brüggemann-Klein. "Using XML technology in the development process of web applications." *Information Science and Technology (CiSt), 2016 4th IEEE International Colloquium on*. IEEE, 2016.

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