

MODELLING OF WEB BASED PROJECT USING REQUIREMENT ENGINEERING

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Abstract— Requirement engineering is an integral part of the software system development lifecycle since the idea for developing successful software system depends on comprehending its needs within the initial place. Requirement engineering involves variety of processes for gathering requirements in accordance with the wants and demands of users and stakeholders of the software package. This paper is beneficial to understand this state of the affairs relating (the requirement, the need and necessity engineering analysis. The study additionally summarizes the simplest practices and the way to use a mix of the requirement engineering techniques as a good methodology to successfully conduct the requirement engineering task. In the current changing technology, only teaching is the field where still there is no advancement. We still are using pen and paper which includes lots of human effort. In this paper we propose a new teaching technology which is free of large human efforts. This technology is based on the online teaching system which includes teaching, learning and examination. This technology reduces the human effort. We have used the Requirement Engineering [1] to gather the information for modelling the Web Based Student Response System (WBSRS). Relevant methodology and formulation are used in this paper. Detailed work of this is represented in this report.

Index terms- Requirement Engineering, Requirement Elicitation, Class Room Response System, Student Response System, Clicker, UML, WBSRS etc.

I. INTRODUCTION

To understand web application development in a better way, we need to comprehend the unique characteristics of web systems and how these characteristics impact the development process. The web applications are unique in many aspects mainly the dynamic nature, vast audience, high precariousness of client needs, rapidly changing technology. For creating a web system, like any system, it is critical that web application meets the requirements put up by the stakeholders and technically be efficient.

The web applications have been classified in [1] and there requirements have been studied against it [2]. The requirement analysis for web applications is different from generic applications in many aspects. The requirements scattered by a web applications are also specific to the area. Combining the generic nature of software applications and special needs of web applications, the requirements have been classified as in [3] as below:

Purposeful requirements are capabilities that a system must exhibit to solve a problem. Other definitions are given by [4], [5]. Functional requirements can be sub-classified as:-

- Data requirements
- Interface requirements
- Navigational requirements
- Personalization requirements
- Transactional requirements

Non functional requirements are the expected qualities a system should possess. Examples of non functional requirements are portability requirements, user requirements, usability requirements, availability requirements, performance requirements etc. Requirements Engineering refers to the actions projected at assuring that a software system fulfills the goals, the needs and the expectations of all the relevant stakeholders [7]. Requirement engineering involves a set of intervened tasks [9]- a) requirements elicitation; b) analysis and modeling; c) negotiation and validation. Inefficient requirements enhance the risk of missing the opportunity of meeting customer's requirements and enhancing the user's experience. In order to be flourishing on the market, a web application has to be stakeholder-centered.'

A. Defining Requirements Engineering [21]

RE is a vital phase of software development that aims at collecting quality requirements, analyzing and documenting them for subsequent implementation in the software code in an appropriate way in order to achieve desired functionality and meet the user's needs [2]. A precise definition of RE is defined by Zave as: —Requirements engineering is the branch of software engineering concerned with the real world goals for functions of and constrains on the software systems. It is also concerned with the relationship of these factors to precise specifications of software behavior and their evolution overtime and across software families [3].

B. Requirements Engineering Processes

Requirement engineering is an organized approach in which RE activities encompass the entire system and software development lifecycle. RE process is iterative that targets developing quality product [2]. As requirements elicitation act as foundation stone for all the subsequent software

development work, therefore, all the key stakeholders are required to follow the same requirement gathering process. There are two broader categories of RE process [3]: *Requirement Gathering* (eliciting, analyzing, specifying, and validating requirements) and *Requirement Implementation* (executing the requirements in the software development activities).

II. LITERATURE REVIEW

CLASSIC/TRADITIONAL TECHNIQUES[13]

Interviews: Interviews is the common and popular method used by the requirement engineers to elicit system requirements and comprehend objectives of the system through verbal conversation with the stakeholders. Interviews could be *structured or closed* (i.e., in the form of predefined questions), *semi-structured* (i.e., a blend of predefine and unplanned questions) and *unstructured or open* (i.e., an informal interview that does not involve predefined questions). The first two approaches largely aim towards acquiring quantitative data, whereas the later approach attributes to understand user expectations through open discussions with the stakeholders and acquire qualitative data [3].

Surveys[7]: The survey techniques are used to get large set of requirements from a larger population that may scattered on disparate geographical locations. Surveys collect information from large number of users and it is quite economical and rapid to analyze the data through planned surveys.

Questionnaires: The questionnaire is a method of requirement elicitation which is simple and requires lesser time and cost. To get precise results, the questionnaire should be clear, concise and structured to obtain genuine user requirements, objective and constraints [3]. However, this technique lacks in the mechanism to seek users' clarification on the topic.

Domain Analysis: Domain analysis is used to gather early requirements and capture a bird eye view of the domain knowledge by investigating the existing applications and related documentation [7]. Usually this technique is used by the domain experts to study the domain area thoroughly. It is helpful in eliciting requirement from design documents, instruction manuals, templates and forms either used in the existing system or in the current business processes. Domain analysis also encompasses the domain knowledge and its reusable concepts and components. Mostly, this technique is used when project involves replacement or enhancement in the existing legacy system.

Introspection: Introspection is a preparatory step in requirement elicitation where requirement engineers use their experience and expertise to acquire requirements of the stakeholders in terms of their expectations towards the new system. However, this technique mainly necessitates requirement analysts to have a massive experience in this area. It is very effective when analysts are well-known of the domain and goal of the system as well as experts in business processes that users ordinarily perform [7].

Observation: It is one of the ethnographic techniques in which the requirements engineer visits and observes the

environment of the customer where the software has to perform the services. This technique is often used with the conjunction of other requirements engineering techniques like interview and task analysis.

III. TEACHING METHODS

a. Clicker[12]: Boosting interactions and engagement of students in a classroom and remote learning is the major focus of our research. The software that has been developed named as *Clicker* is an android and web based system, designed to aid the teacher and the students to perform assessment, instant feedback and raise anonymous doubts. The software has been specifically designed for two distinct environments, viz., classroom and remote learning environment. Newly added features in Student Response System (SRS)[16] are raising doubts remote learning and make the SRS more interactive. Random shuffling of questions among the students enables the safe way of conducting the quizzes. Asking instant question with anonymous user feature makes the student more comfortable to ask a question any time. It increases the student's active participation within classroom as well as in remote centers. The usage of *Clicker* for their regular classes is highly benefited for teacher and students revealed from our survey.

b. UTClicker[18] : Classroom Response Systems (CRSs) have proven to be effective tools in support of classroom interaction. Most existing CRSs utilize proprietary hardware, purchased by students as classroom "clickers". This project set out to take advantage of the near ubiquitous student use of mobile computing devices such as smart phones, tablets and laptops, in class, by utilizing any of those devices as CRS-inputs. The flexibility of a Web-based CRS allows the boundaries of typical CRSs to be extended, both with a wider array of question/response types, and with different usage patterns in class and before class.

c. Quiz Tool[16]: It allows the teacher to give a quiz to the students, and then collect their answers in real time. Results are shown to the teacher as a graphical chart. They can be projected on a screen and used to start a discussion. Students can solve quizzes individually or in groups. The teacher can get quick feedback on the performance of the students, so that they can immediately evaluate their involvement and comprehension about the covered topics. This tool does not require an Internet connection, has no cost, is flexible, and includes the possibility of arranging a Student Response Systems with a wide set of collaborative tools. They also present an evaluation study involving teachers and students from a high school. Results show improvements in student's participation and engagement.

IV. METHODOLOGY[3]

There are many methodology that we generally study. They are as follows-

- 1- Goal Oriented Methodology [17]
- 2- Object Oriented Methodology [18]

Goal oriented methodology is a methodology of Requirement Engineering which is used to convert our requirement into final goals. This methodology transforms the informal observation of the real world into mathematical specification language.

Object oriented methodology is a methodology of Requirement Engineering which is an approach to encapsulating information about product and process as well as functionality into requirement objects

As per our requirement, after considering the methodologies, we came to a conclusion that Goal oriented methodology is best fit in our case. The reasons behind choosing this methodology for our case are as follows-

- 1- This methodology is based on goals which we have already decided.
- 2- As goals are predefined, so it will be easy for us to model the desired system.
- 3- If goals are set, we can think unidirectional while working for our project
- 4- Also if goals are clear there will be no conflicts
- 5- Also goals are important factor while connecting the design with the original goals

So for all these reasons we are using here Goal Oriented Methodology for our modeling purpose

A. Goal Oriented Methodology[9]

Goal oriented methodology is part of Requirement Engineering which helps us in converting our goals to the product. This methodology is concerned with the use of goals for eliciting, elaborating, specifying, analyzing, negotiating, documenting and modifying the requirement. This is based on the goals. Before going to develop any product under the Goal Oriented Methodology, we need to specify the goals. Our final goals are as follows:

- 1- To model the new teaching technology
- 2- To model a system that can teach, help in learning and in taking exams of the students
- 3- Can answer short type questions
- 4- Can improve the response speed
- 5- Can use images, videos etc. to change the way of teaching and learning

V. MODELLING

We can model our Goals by using UML [21] diagrams. In our case we are using different UML diagrams in order to get our models. We have to generate following use case and other relevant diagrams so that we can model our goals according to our requirements.

- 1- Add department
- 2- Add subject
- 3- Marks allotment
- 4- Grade-sheet generation
- 5- Video, images addition
- 6- Database addition
- 7- Correction of papers



Figure 1 Modelling of department addition



Figure 2 Modelling of setting exam papers

These diagrams are only two of them. Other Use Case diagrams are drawn similarly.

VI. IMPLEMENTATION

Implementation part of this project is dependent upon many things. After getting the final requirement, we worked on modeling our goals and requirements. In order to generate a web based system, we model a website. This website is developed using languages used to develop a website like PHP, HTML etc. Our main focus was on the examination system as there are many online teaching system available but no one is suitable to give answer of short type questions. Security is another important aspect of this teaching system. For security we have worked on the website that we have made three login in the website. One login is for admin, another for teacher and last for student. Student can apply with their roll number only which will make sure that only one student can give exam with their roll number. Also during exam this website will work only on intranet. During exams full question paper will be divided into three sections- 1- objective, 2- Multiple choice question, 3- Text type. We have used UML[21] for modelling the project.

Implementation part was done using following software-

- 1- E-draw Max- This enables students, teachers and business professionals to reliably create and publish various kinds of diagrams to represent any ideas.
- 2- Apache - is web server software, that playing a key role in the initial growth of the World Wide Web
- 3- PHP- is a server-side scripting language designed for web development but also used as a general-purpose programming languages.
- 4- MySQL- is a relational database management system. The program runs as a server providing multi-user access to a number of databases.

- 5- Net-beans – is a platform framework for Java and you can use it as Text-Editor
- 6- WordPress- is a free and open-source content management system
- 7- (WBSRS) based on PHP and MySQL

VII. PARAMETERS FOR EVALUATION OF RESULTS ON BASIS OF SURVEY

In order to compare the final results, we are using Survey method in which we surveyed various results among the users. According to the view of the users, we have generated following results. Parameters under which final survey is performed are as follows-

- 1) Performance
- 2) Cost
- 3) Response time
- 4) Security level
- 5) Interactivity
- 6) Database
- 7) Learning and teaching
- 8) Future Scope
- 9) Accuracy

Questions	Strongly Agree	Agree	Slightly Agree	Slightly Disagree	Disagree
Q1	78	10	4	4	4
Q2	72	8	9	5	6
Q3	65	10	15	5	5
Q4	60	20	12	4	4
Q5	60	20	8	9	3
Q6	70	14	8	6	2
Q7	78	12	5	3	2
Q8	60	20	5	10	5
Q9	50	10	20	10	10
Q10	63	12	10	8	7

Table 1

This table is based on the response added by using the method Survey. In survey we have selected 100 students, who were divided in some groups to survey the performance and other important aspect of the WBSRS and we are showing result of all of them. The responses recorded are purely based on their personal experience with the WBSRS. Maximum number of the student are satisfied with the working of the WBSRS.



Figure 3 Evaluation of Result on basis of Response

VIII. CONCLUSION

This paper signifies our work on modelling of WBSRS. This paper includes the research work of the Requirement Engineering and modelling of the WBSRS. Till now our research shows that, the WBSRS a new method of teaching is far better than the previous ones. This methods includes videos and images which increases the interactivity and decreases the paper work. While studying the RE, we realized that the requirements changes day by day. User demands varies with time, so we have work more on the requirement elicitation technique so that the exact requirement of the user can be analyzed easily. Also initial results shows that the Questionnaire is the best method of Requirement Gathering which has given us a better view of requirement. We have used Goal Oriented Methodology for specifying our goals. Methodologies use in this project are relevant to the current scenario but can be modified for the future work, that’s why we are taking open ended methodology. For final evaluation we have used Survey method. The results obtained by the Survey method has proven that the WBSRS is a cheaper method of teaching as only once we have to invest and it will work for long. Our main aim was to model a teaching method that will help the student and teacher in many ways. This teaching method is reliable as only one student can answer with one login id and also the security involve in this is strong enough that forgery can be stopped easily. A student can also have their opinion in front of everyone when they post in the discussion forum. Student can get immediate response from the teacher or from the colleague. Since videos are involve in this so imagination and visualization power of a student increases. So complete paper is based on the work that we have done using Requirement Engineering.

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