

Developing collaboration tool for virtual team using UML models

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ABSTRACT

Computer aided software engineering (CASE) uses the unified modelling language UML to produce executable code to visualize software architectural blueprint systems. UML is a standard software modeling language for specifying, constructing, documenting and visualizing the artifacts of produced software-intensive systems. However, UML lacks virtual collaboration regardless of their geographical location. The present work developed a prototype of web-based CASE tool that enables UML modes to manage software projects as a virtual collaboration tool. The present methodology starts with the specification of a set of UML triplets; then, the tool generates the visual models automatically with high quality SVG graphs. The system eliminates the manual diagram requirements based on the UML possibility and supported by three diagrams that involves class and use cases. The independent scripting language was PHP7 and MYSQL 8.0 which was used to save the system data.

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1. INTRODUCTION

CASE tools are used to develop high quality applications with defect-free and maintainable software based on end user's perspective [1, 2]. It represents an effective tool for communicating system behaviour which is used for specifying the external visible system behaviour [3-6]. It is partly inspired used by computer aided design CAD tools for hardware products design. The CASE tools are classified into two parts the first is installed CASE tool and the other is web based. The web CASE tools involves many advantages over the desktop based applications. It helps engineering teams to collaborate from different locations all over the world. Also, this software did not required installation process or update [6, 7]. This feature enable the user to save and administrate the work flow of the large companies. The CASE tools software involves the capability of database accessible by multiple users and multi-computers in real time. This software is feasible and easy due to website uptime [6].

In this paper, a web CASE tools are used to provide less time features and more reliability of user's collaboration. It provides real-time UML design drawing with efficient and good quality [8-12]. The drop and drag facility provides a great power to users. Computer aided software engineering CASE uses the unified modelling language UML to produce executable code to visualize software architectural blueprints systems. UML is a standard software modeling language for specifying, constructing, documenting and visualizing the artifacts of produced software-intensive system. But, UML lacks to virtual collaboration regardless to their geographical location.

The main contribution of this paper as follow: to develop a prototype of web-based CASE tool which enable UML modes to manage software projects as a virtual collaboration tool. In addition, the present work contains three sections, the second section related works, the third section the proposed method ,and the section four include Conclusion and future works.

2. RELATED WORKS

Planas and Cabot in 2020 proposed a useful lessons to improve the UML modelling process [12-14]. They analyze the modeler's behavior in building UML models and evaluate the modelling tools used for supporting this task. They recommend some changes to enhance the tools effectiveness in order to facilitate the UML learning [15-17]. The researchers observe that the UML turn into better align based on theory and practice applications [18].

Babar *et al.* In 2020 addresses the UML extension to implement multidimensional modeling. They used the UML class model in DW applications in order to explore in depth the current MD models based on UML extensions [19-22]. They deduced that the current models lack to accuracy and integrity regarding to available properties and features of MD model. The proposed framework of UML extension mechanism able to model all aspects and features of the MD model specifically. Also, the proposed work was simple, precise, comprehensible and precise. The improved model provides a universal method due to UML familiar and acceptable notations that serve the designers and users [22-26]. Cerra *et al.* In 2018 produced a learning environment based on video and self-assessment combination tools for computer-Aided Design CAD applications. The method developed to analyze the problem and determine the combination effect of the two tools to find out the importance of learning subjects [27-29].

3. THE PROPOSED METHOD

3.1. The used languages in the design

3.1.1. PHP

PHP is general-purpose programing and scripting language which is used to create dynamic interactive websites. The PHP reference implementation continuously produced by the PHP group. The PHP origination was for personal home page applications. Nowadays, it stands for the recursive initialism PHP (hypertext preprocessors). PHP code is executed on web server using PHP interpreter. The implemented code my represents a daemon, a module or as a common gateway Interface executable. Initially, the interpreted and executed PHP code can take any type of data such as binary image data or generated THHP. It forms a whole or part of THHP response. PHP did not have formal specification until 2014, then, is created to be used either in academic site with complete grammar and formal specification, or by enthusiastic programmer.

3.1.2. HTML5

HTML5 is a markup language specified with labels, multimedia elements, and user interface. It is used for presenting and structuring World Wide Web content. The HTML5 represents the last version of traditional hypertext markup language which recommended by World Wide Web consortium. The current specification is called the HTML living standard and preserved by major browser vendor consortium (Microsoft, Google, Mozilla, and Apple). Also, it maintained by Web Hypertext Technology Working Group.

3.1.3. Cascading style sheet

The cascading style sheet CSS3 can be defined as a style sheet language used to format the layout of web page. It is used to describe the presentation of written documents in markup languages such as HTML. CSS represents the World Wide Web cornerstone technology in addition to HTML and JavaScript. The cascading style sheet mainly designed to enable the separation process in written presentation and content of markup language. It provides more flexibility and control for presentation based on the specification of characteristics. Also, it enables multiple web pages to share formatting separately depending on relevant CSS. The CSS can reduce the repetition and complexity in the structural content in web pages. It facilitate the displayed layout, design and variations using different screen sizes and devices.

3.1.4. Javascript

JavaScript is a dynamic programming language compatibles with ECMA Script. It's a high-level language, multi-paradigm program and Just-in-Time compiled. It has curly-bracket syntax, prototype-based object orientation, dynamic typing and first-class function. JavaScript considered one of the World Wide Web core technology. Its similar to HTML and CSS software. It represents an essential part of web

applications which enables web pages to interact. The client-side page behavior represents a major issue in websites, for that the JavaScript used in all web browsers to execute their engine.

3.1.5. JQuery

JQuery is a JavaScript library developed to facilitate HTML DOM (document object model) tree traversal and manipulation. Its open source software utilizing the MIT permissive license. This software able to recognize the actions by using event handling and employ the CSS animation with Asynchronous JavaScript XML (Ajax). Web analysis indicates that this software is widely used in JavaScript library by a large margin. The software usage 3 to 4 times more than any other JavaScript library. JQuery syntax is developed to be effective in document navigation.

3.1.6. Bootstrap4

Bootstrap4 is an open-source CSS framework employed to mobile-first front-end web development. It involves CSS and (optionally) JavaScript-based design templates for forms, buttons, typography, navigation and other interface components.

3.1.7. Database of project

The database can be defined as an organized collection of information saved in the computer system and have the ability to access and deal with. The database is usually developed by using formal design and modelling techniques in this system a MySQL 8.0, it is a relational database management system RDBMS which is available as an open-source software. Its abbreviation for structured Query Language. The present relational database manages the data based on one or more tables which involves data types. The data organized due to the relations between them and the correlations between the data will help to structure the data. SQL is the program that can extract, modify and create the data form using the relational database. It is also control the users access to the database. The traditional database such as MySQL, SQL and RDBMS correlates with operating system and develop a relational database in the storage system of the computer. It can provide a facility to test the data, allows for network access and create data backup.

3.1.8. The used severe in the system

XAMPP 3.2.2 is an open-source cross-platform web server solution stack package. It produces by Apache Friends involving mainly the Apache HTTP Server. The package interpreters for scripts written I the Perl and PHP programs. In general, most of actual web servers apply the same component as XAMPP, for that it became easy to transition from local test server to a live server.

3.1.9. The flowchart of the proposed system

It represents a schematic diagram of the design of the system, which in this paper a n web-based UML CASE for helping a software development team to share the design of the proposed system easily and quickly, even if the team are in different places. This is an important software development step that involves requirements gathering and design analysis, coding/implementation, testing and maintenance. A framework that specifies the steps involvd in every step og software development is referred to as software life cycle (SLC). This framework provides a detailed stepwise guide for the planning, development, deployment and maintenance of the software as shown in Figure 1.

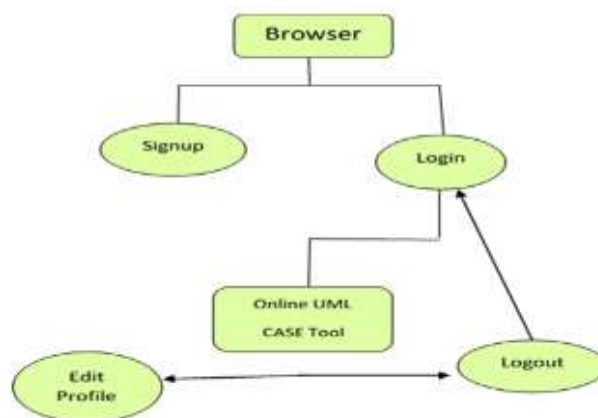


Figure 1. the flowchart of the proposed system

3.2. System main pages

3.2.1. Login page

Login is the process of accessing the system in online case individually. UML CASE system provides a user unique name and password to enable the user to access. The user credentials processed by matching the username and the password to identify the access permission and this refer to login (or sign-in or sometimes sign-on).

3.2.2. Registration web page

The user registration starting with sign-up function for the first time to provide the credentials to the user access. The registration allows the user to use the website, program or any other system. Registered users provide a sort of credentials to prove their identity and access the system. This process is known as logging in registered user may be granted privileges in addition to granted to unregistered users as shown in Figure 2.

3.2.3. The online UML CASE tool

This page contains the main tools of the online UML CASE tool, and contain the properties of tools. As shown in Figure 2. As a dynamic diagram in UML, a UML CASE tool relies on actors and use cases to model the functions of a system. These use cases are a set of functions, services and actions that must be performed by a system. Here, a "system" refers to what is being developed (such as a web site) or operated while the "actors" are entities that are operating within the system under defined roles, Figure 2 describe the UML case tool.

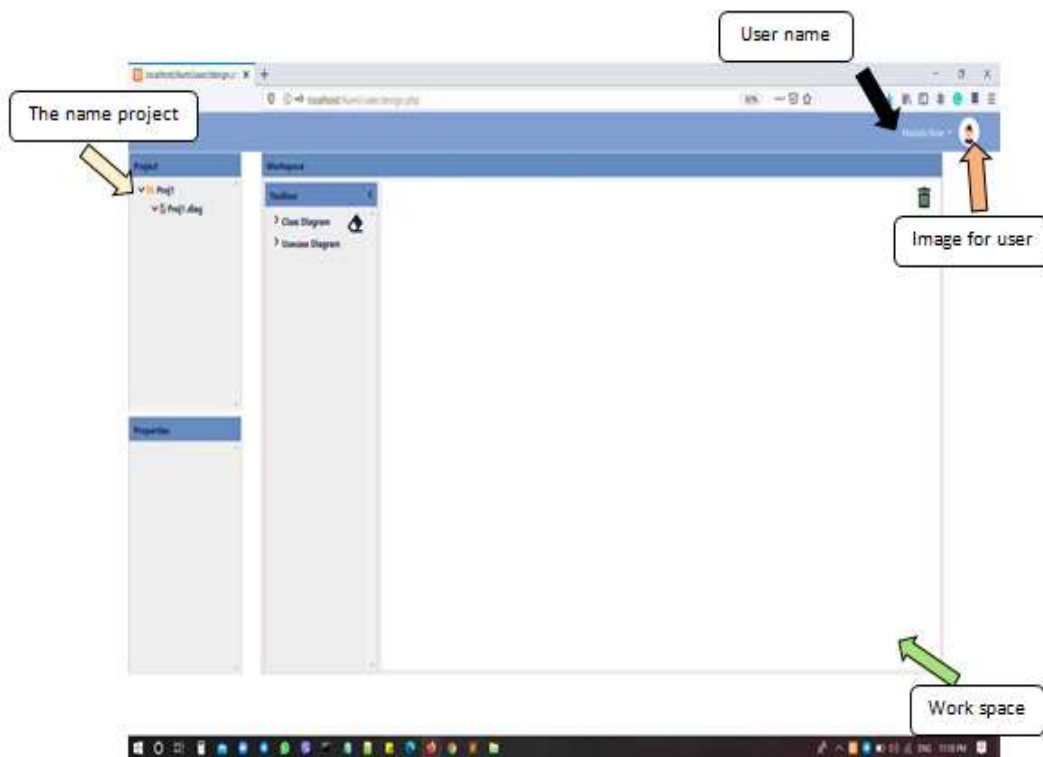


Figure 2. the UML CASE Tool

3.2.4. Class diagram tool

This page contains the tools of the class diagram of the online UML CASE tool, and contain the properties of the class diagram tools. It comes with a simple but powerful editor that permits easy and quick creation of class diagrams; the free UML editor can be assessed without time limitation, and comes with no ad; there is also no restriction on the number of shapes and number of diagrams. The users own their diagrams they created and can use them for non-commercial and personal purposes. As shown in Figure 3 the figure contains the class diagram tool element.

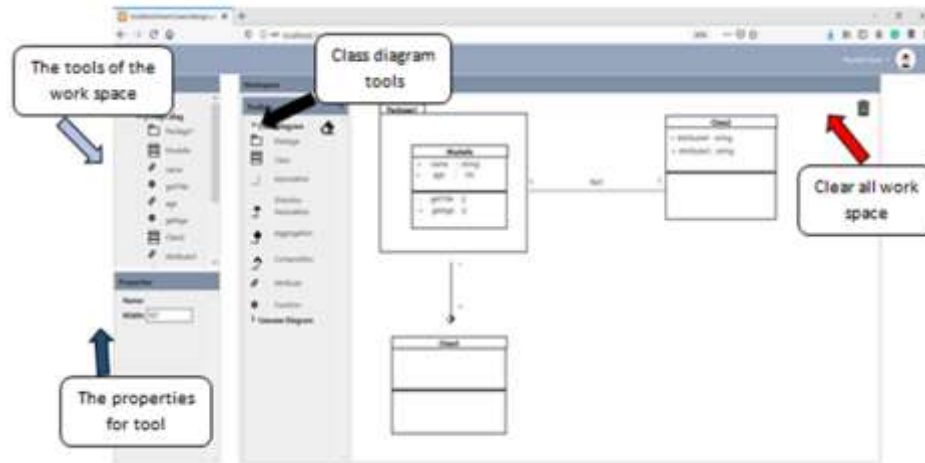


Figure 3. class diagram tool

3.2.5. Use case diagram tool

This page contains the tools of the use CASE diagram of the online UML CASE tool, and contain the properties of the user CASE diagram tools. In UML, the use case diagrams are used during the at the requirements phase of software development; the system requirements are normally converted into a diagram format for easy viewing of the functions that must be supported at a glance. Being that a system must have few use cases, the user is required to draw as many use case diagrams as possible. Use case diagrams, together with the other UML diagrams, such as component diagram, activity diagram, and sequence diagram, aids in viewing the software & requirements before initiating the programming stage. As shown in Figure 4, the figure show the use case diagram tool in details.

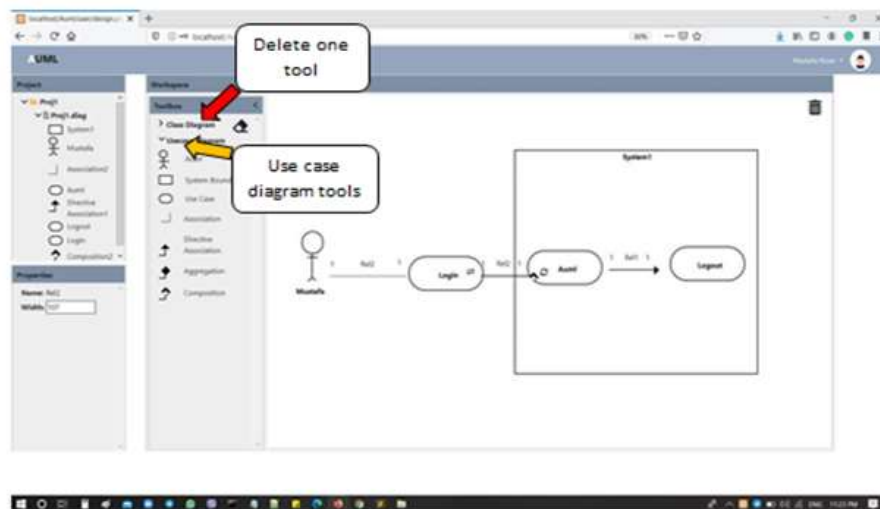


Figure 4. USE CASE diagram example

3.2.6. Saving diagrams

In this page each designed diagram can be saved with its associated user profile for editing, retrieving for modifying or or send it for all the collaborative software engineering. This template can be edited at this stage for the creation of the own diagram. The created diagrams can be exported to Word, Powerpoint, Excel, Visio or other document formats. The developed UML diagram tool in this study simplifies the design & documentation processes and improves the way of collecting, reviewing and implementing responses/feedback from the potential users and stakeholders as shown in Figure 5.

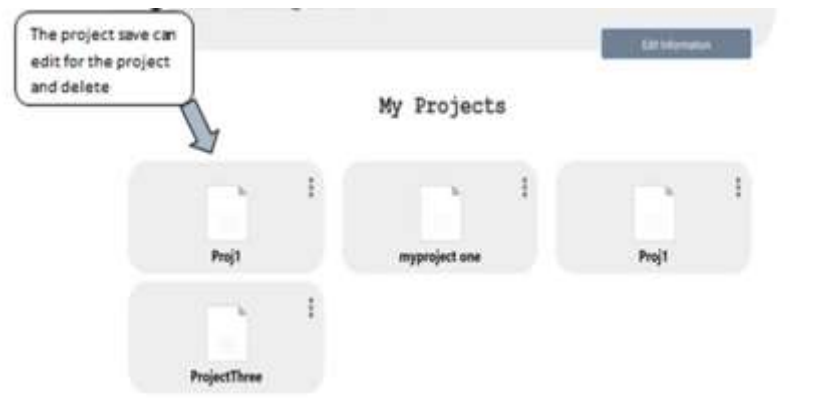


Figure 5. My projects web page to create a new project

4. CONCLUSION

In this research, a web-based UML and UML CASE was developed for improving the process of software development in the areas of sharing the design of the proposed system easily and quirkily even when the team members are in different places. The design was correctly built and the system requirements were met as it now works on the web. In this paper, a prototype of web-based CASE tool that enable UML modes to manage software projects as a virtual collaboration tool was developed. The present methodology started with the specification of a set of UML triplets, followed by generation of the visual models automatically with high quality SVG graphs. In the future work, the proposed system will be used to develop AUML (agent UML) diagrams.

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