Web Application for Generating a Standard Coordinated Documentation for CS Students' Graduation Project in Gaza Universities

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Abstract: *The computer science (CS) graduated students suffered from documenting their projects and specially from coordinating it. In addition, students' supervisors faced difficulties with guiding their students to an efficient process of documenting.*
In this paper, we will offer a suggestion as a solution to the mentioned problems; that is an application to make the process of documenting computer science (CS) student graduation project easy and time-cost efficient.
This solution will decrease the possibility of human mistakes and reduce the effort of documenting process.

Keywords: web applications, cost efficient, time-cost efficient, documenting, software engineering, graduation projects.

1. INTRODUCTION

Computer science (CS) is the study of the occurrences adjoining computers [1]. It's also defined as the study of computers and computational systems, computer scientists deal usually with software (unlike electrical and computer engineers), Primary parts of study inside Computer Science consist of computer systems, operating systems, networks, database systems, artificial intelligence, computer architecture, security, computer graphics, human computer interaction, systems analysis, software engineering, theory of computing and programming languages [11,17-28].
In computing, a web application is a client–server application that means, the client (like user interface) works in a web browser [2]. The general distinction between a web application and a dynamic web page is vague, web sites that we can name them as "web applications" are those have comparable functionality to a mobile application or to a desktop applications [3]. At bachelor level, in Computer Science (CS) colleges, each student is required to complete a graduation project as part of his graduation requirements. The purpose of the graduation project is to provide the student with an opportunity to become involved in an activity that will allow him to show his ability to apply the knowledge and skills, which he has gained during education years [10]. The graduation project enables the student to apply the experiences gained during previous courses and projects to solve a well-defined problem [9]. It is also provides an opportunity to connecting education to business, and offers a scope to present a piece of work on a specific topic [4].
We made questionnaires and distributed them on students studied or studying in these Gaza's universities:
Al-Azhar University, the Islamic University, Al-Quds Open University, and University of Palestine. The graduation project in these universities divided into two parts through the last two semesters, the first one for the project documentation and the second for the project implementation (the software application itself).
Software documentation used to define the system to its users and to software engineers that are accountable for upholding the system [6]. Software Engineering team produce Software documentation during the software lifecycle [5], which can demarcated as the route for scheduling, producing, testing, and circulating a software system [16].

Sorts of documentation include:
1- Requirements: explanation of what the software ensures or intends to do.
2- Architecture/Design: Outline of software. Comprises Analysis purposed diagrams and relationships to creation principles for using them software components design.
3- Technical: Documentation of code, interfaces and algorithms.
4- End user: Guides for the end-user, system managers and maintenance team.
5- Marketing: How to market the product and study of the market indigence.

Software documentation is written-text and illustrations that string along with computer software [12], illustrations are usually unified modeling language (UML)-based diagrams. UML has come to be a standard language for modeling the requirements and design of a software [13]. It is responsible for supplying a standard way to envision the system design [14]. A modeling language is any language that used for explain a system in a structure which is cleared by a harmonious set of rules; the rules are used for explanation of the meaning of components in the construction [15].

Documentation errors can lead to errors by end-users that could lead to system failures result, therefore, managers and software engineers should give their attention to documentation as to the development of the software itself [7].

The document structure is the way that the material inside the document is arranged into chapters, and inside these chapters, into sections and sub-sections, document structure must be readable and usable efficiently and it is important to design it carefully when creating documentation [8].

2. LITERATURE REVIEW

Up to the knowledge of the researchers, no such research was found that perform what our system propose.

3. RESEARCH METHODOLOGY

We made questionnaires and tested them by expert researchers in Al-Azhar University. According to the result of the questionnaires, 76.5% of users are prefer dealing with web applications rather than the desktop ones, because of that, we suggest a web application to accomplish our aim. Moreover, according to the result of another statistics, 60 % of computer science (CS) graduating students were faced problems while documenting their graduation project, 80% were faced technical problems while writing their project documentation. In addition, there is 90% of supervisors face difficulties in guiding the students to document their projects. That is why we thought about a solution to make the process almost easy.

3.1 THE QUESTIONNAIRES RESULTS

The first questionnaire: we make a public questionnaire for computer users these were the paragraphs:

Level:

Gender:

Department:

#	Paragraph	Web	Desktop
1	In your opinion, which of these applications is easier and more flexible to use		

Arrange these web applications' features according their importance to you:

رتب مميزات تطبيقات الويب حسب الأكثر الأهمية بالنسبة إليك:

Easy to use from any device ( )   سهولة الإستخدام عن طريق أي جهاز ( )

Beautiful interfaces design ( )   واجهات رسومية جميلة ( )

Flexible sharing ( )   سهولة النشر (نشر الرابط) ( )

High security ( )   درجة عالية من الأمان ( )

Figure15: First questionnaire paragraph

And the results were as follow:

Questions	web	%	desktop	%
In your opinion, which of these applications is easier and more flexible to use	13	76.5	4	23.5

	No.	%	rank
Easy to use from any device	4	23.5	3
Beautiful interfaces design	6	35.3	1
Flexible sharing	1	5.9	4
High security	6	35.3	2

Figure16: First questionnaire results

The second questionnaire: we make a questionnaire special for CS students who are at the final year or graduated, these were the paragraphs:

Gender:

Department:

NOTE: A= (Yes), B= (Almost yes), C= (I don't know), D= (No), E= (Absolutely no)

#	Paragraph	A	B	C	D	E
1	You faced difficulties while coordinating your project documentation					
2	You faced technical problems while writing your project documentation					
3	There were problems with English definitions					
4	You wrote your documentation randomly using MS-Word					
5	You used a standard templates to write your documentation					
6	You needed your supervisor during writing your documentation					
7	You got help from other during the process of documenting your project					
8	You checked out previous documentations					
9	There was a course during the semester to teach the students how to document their projects					
10	Standard documentation is better than the random one					

11 – Do you think an application that makes project documentation easier should be created?

☐ Yes
☐ No
☐ I don't care

Figure17: Second questionnaire paragraphs

And the results were as follow:

		MEAN	Std. Deviation	Mean Average	rank
1.	You faced difficulties while coordinating your project documentation	3.0000	1.26491	60.00000	6
2.	You faced technical problems while writing your project documentation	4.0000	1.09545	80.00000	2
3.	There were problems with English definitions	1.8333	.40825	36.66667	9
4.	You wrote your documentation randomly using MS–Word	1.6667	.81650	33.33333	10
5.	You used a standard templates to write your documentation	2.6667	1.21106	53.33333	8
6.	You needed your supervisor during writing your documentation	3.1667	2.04124	63.33333	5
7.	You got help from other during the process of documenting your project	3.5000	1.22474	70.00000	4
8.	You checked out previous documentations	5.0000	.00000ᵃ	100.00000	1
9.	There was a course during the semester to teach the students how to document their projects	3.0000	1.26491	60.00000	7
10.	Standard documentation is better than the random one	3.8333	1.47196	76.66667	3

Questions	yes	%	No	%
an application that makes project documentation easier should be created	6	100	-	-

Figure18: Second questionnaire results

The third questionnaire: we make a questionnaire special for CS graduation projects supervisors in Al-Azhar University. These were the paragraphs:

NOTE: A= (Yes), B= (Almost yes), C= (I don't know), D= (No), E= (Absolutely no)

#	Paragraph	A	B	C	D	E
1	You face difficulties in guiding the students to document their projects					
2	You care about guiding students to a standard process of documentation					
3	During the discussion, you put notes on the way of writing the documentation e.g. order of chapters					
4	The students use a standard way while document their projects					
5	The students usually don't have a full and standard process of documenting their projects					

6 – Do you agree that there is a need to create an application that takes the documentation data then generates a standard coordinated MS-Word file?

_____

7 - In case you agree with paragraph # 6: Which is better in your opinion (web, or desktop application?)

_____

Figure19: Third questionnaire paragraphs

And the results were as follow:

Paragraph		MEAN	Std. Deviation	Mean Average	rank
1–	You face difficulties in guiding the students to document their projects	4.50	.57735	90.	3
2–	You care about guiding students to a standard process of documentation	5.0	.00000ª	100	1
3–	During the discussion, you put notes on the way of writing the documentation e.g. order of chapters	5.000	.00000ª	100	2
4–	The students use a standard way while document their projects	4.000	.00000ª	80.	4
5	The students usually don't have a full and standard process of documenting their projects	3.50	.57735	70	5

Questions	No.	%
agree that there is a need to create an application that takes the documentation data then generates a standard coordinated MS-Word file	4	100

Questions	web	%	desktop	%
In case you agree with paragraph # 6: Which is better in your opinion (web, or desktop application?)	4	100	-	-

Figure18: Third questionnaire results

4. EXPLANATION OF THE SOLUTION

In this paper, depending on the previous statistics, we suggest to make a web application that's guide the CS student to a standard process of documenting his graduation project. What is the idea?

The idea of the application is to take from the user all the data that should be in the document then generate a standard-coordinated documentation in MS-word file.

The application first asks you to have an account to can sign in and start documenting.

It will also contain a tutorial to explain each chapter in the documentation in case of the student did not understand.

The student can start with any chapter then the application saves automatically what he entered.

The application connect each user to a data-base and the contents of the documentation for this user will represented as data-base tables in his database.

In this paper, we sketched user interfaces as suggestions, and below we put snapshots from our designs.

Suggested UIs

Figure1: Log in/Registration
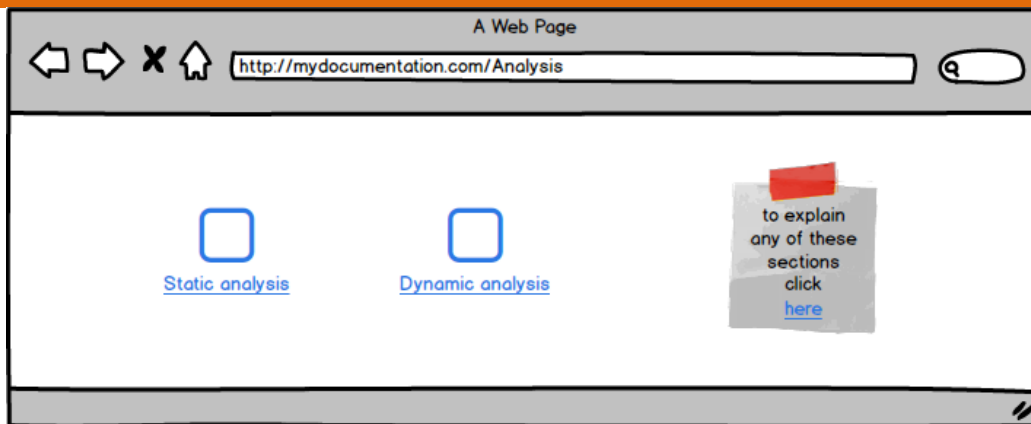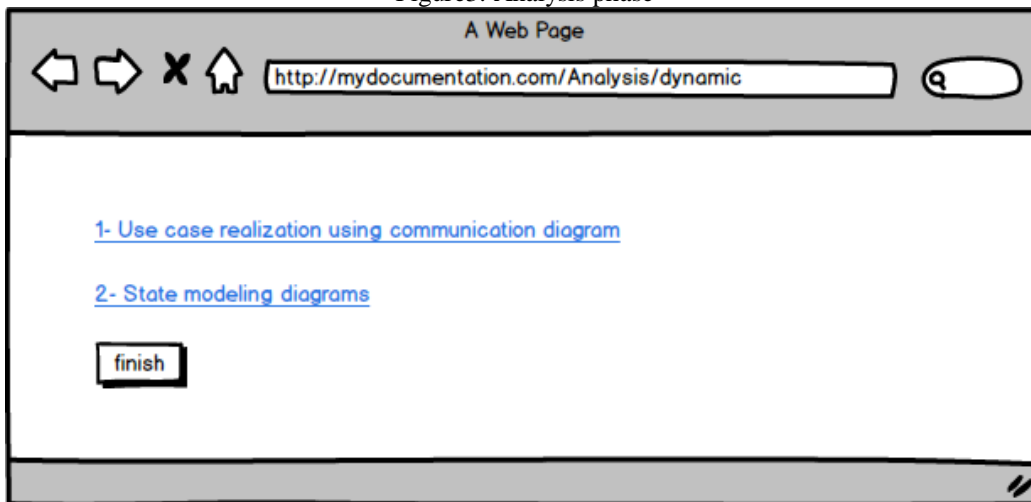

Figure2: Home page
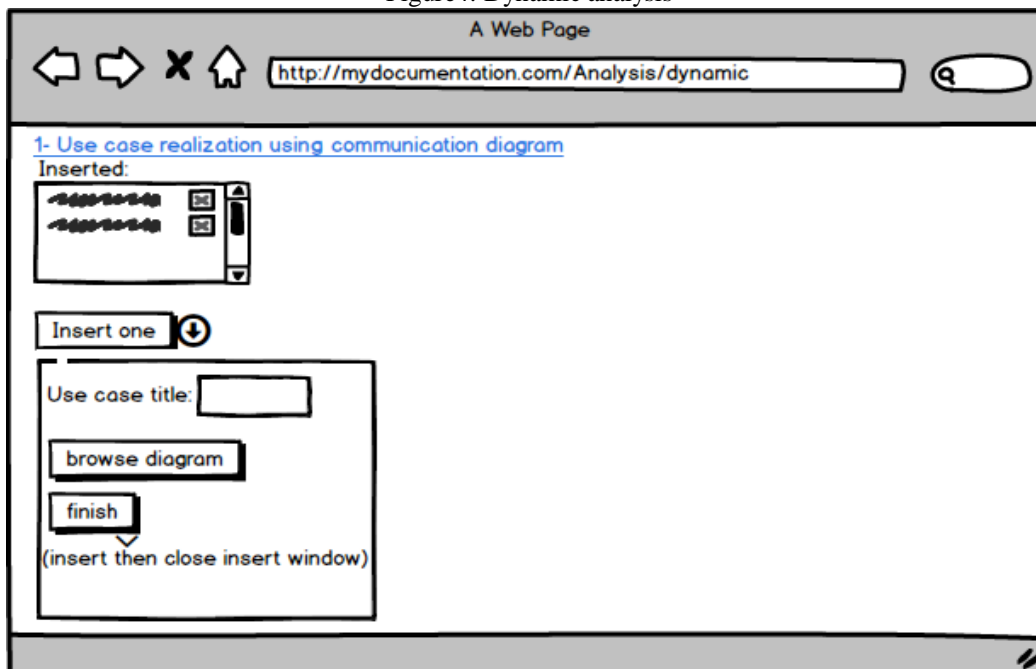
Figure3: Analysis phase

Figure4: Dynamic analysis

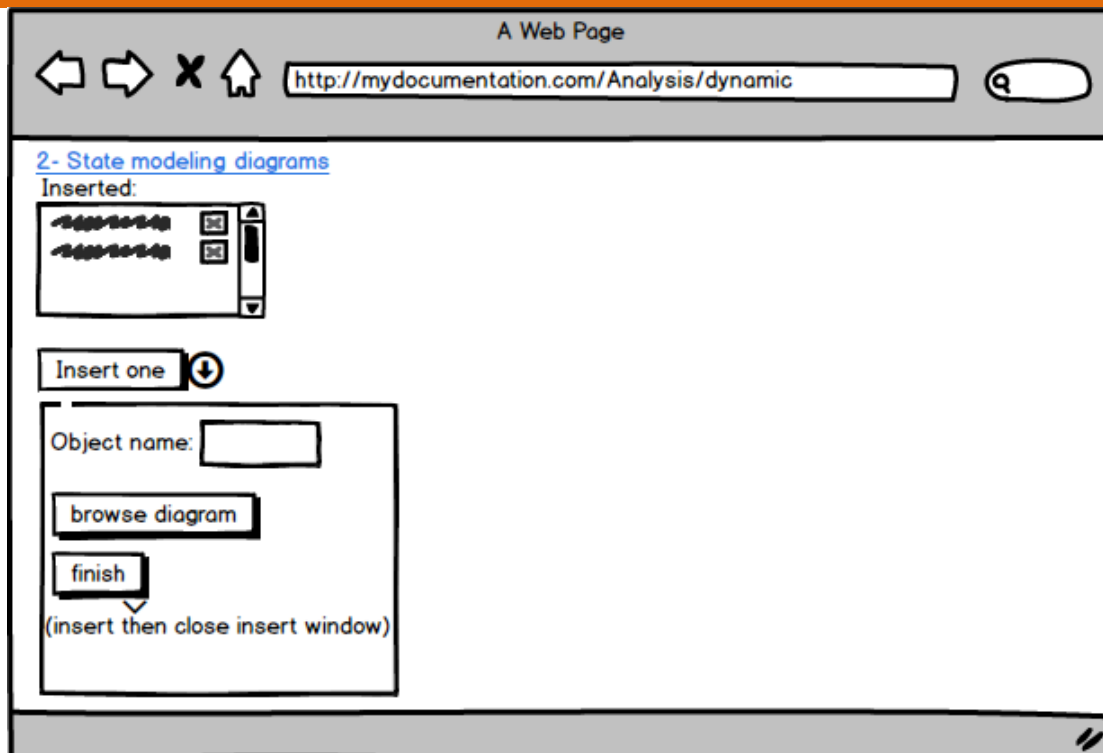Figure5: Insert communication diagrams

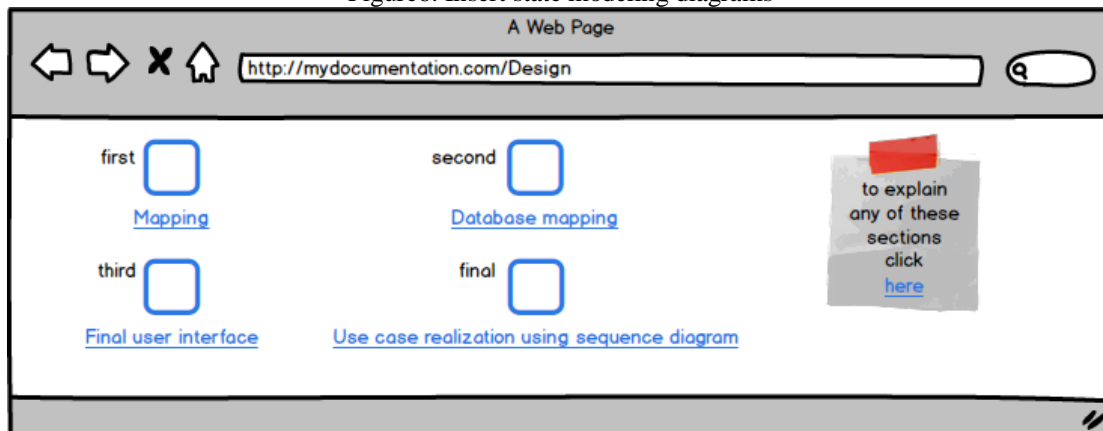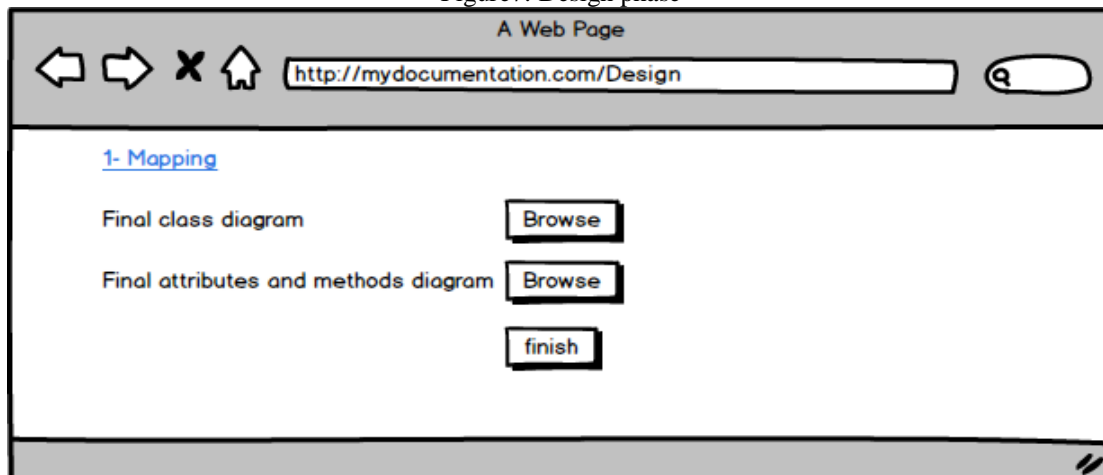Figure6: Insert state modeling diagrams

Figure7: Design phase

Figure8: Insert final class and attributes-methods diagrams

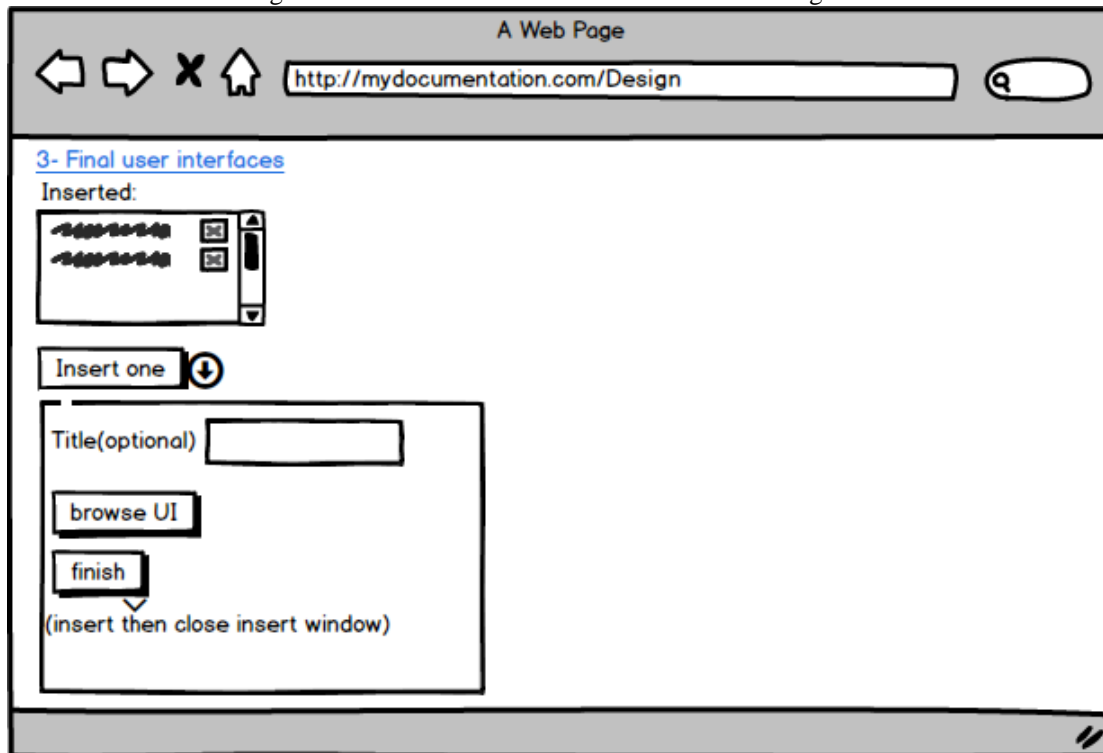Figure9: Insert final user interfaces

Figure10: Insert sequence diagrams
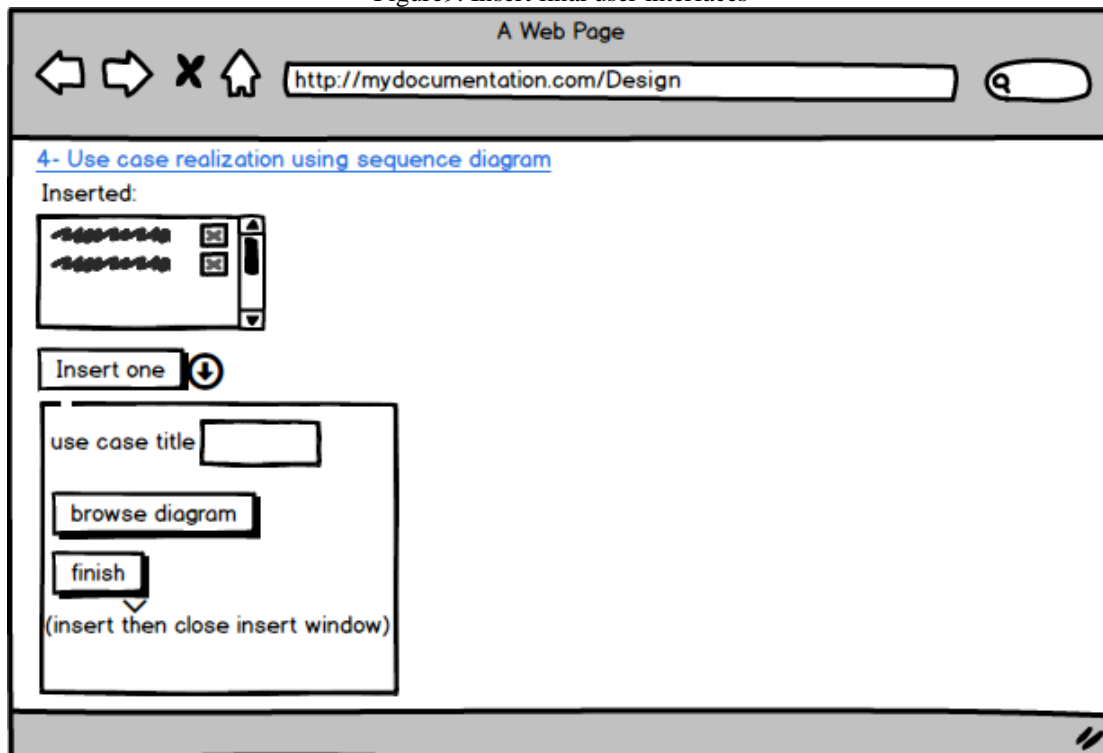
Figure11: Insert the prioritize of use cases (system requirement phase)

Figure12: Insert use case list (system requirement phase)

Figure13: Insert project scope and objectives

Figure14: Insert project members' roles

5. RESEARCH LIMITS AND SCOPE

The proposed system is limited to CS students' graduation projection in Gaza Universities : Al-Azhar University, the Islamic University, Al-Quds Open University, and University of Palestine

6. CONCLUSION

The application that we suggested will make the process of documenting the CS student graduation project very easy and flexible; he/she will not waste his/ her time in coordinating. In addition, his documentation will be full and in a standard way easily. Moreover, this solution will make the supervisor comfort and he/she will not face problems with his/her students.

7. FUTURE WORK

The programmers can develop this application in a way that makes it more efficient. For example: make it helpful for any college graduation projects, like the user first choose his college and department then move to sub application special for this specific college's department.
It can also be wider than that, it could be not limited for only graduation projects, it could be helpful for any report that the student will need during the bachelor level.

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