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Development of a New Social Network Site for University Interactions

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Abstract: Social networking sites have gained much popularity in the recent years because of the opportunity to create better relationships with people by connect to each other in an easy and timely manner, exchanging and share various kinds of information. There may be need to improve the information dissemination strategies for a certain community which will in turn enhance the flow of communication using additional platforms. This study proposes a new web-based social networking system for universities, to improve the effectiveness of communication among its community, a waterfall method has followed in development, the data for design based on special university interaction needs, C# programming language and SQL server has implemented in order to add the positive effects of its properties in usability, user data exchange, security. For testing the system, the black and white boxes have been used. This site has introduced a platform for users to interact, share ideas, share the study announcements, activities to improve these include user status update, photo uploads, mailing, live chat. The full deployment of the system in the university would yield desired communication feedback and could even be adapted in different universities.

Key words: Social network site, flow of information, C# programming language, information, dissemination, communication

INTRODUCTION

A Social Networking Site SNS is an online location in which a user can make a profile and establish a personal network that connects him or her to other users. In the past 5 years, such sites possess rocketed from a niche efficiency into a phenomenon that share tens of millions of internet users. The evolution in the popularity of these sites has created concerns among some parents, school officials and government leaders about the potential risks posed to young people when personal information is made available in such a public setting (Lenhart, 2007).

Social network services essentially consist of a user's profile and provide means for users to interact over the internet such as instant messaging (Kim *et al*., 2010). In a broader sense, social network service usually means an individual-centered service.

The main types of SNS services are those which contain category places, means to connect with friends (usually with self-description pages) and a recommendation system linked to trust. Social Networking Sites (SNS) such as Facebook are one of the most important communications technologies that have been widely used by students and consequently have the possibility to become a worthy resource to support their educational communications and collaborations with faculty (Roblyer *et al*., 2010).

Programming languages are used for controlling the behavior of a machine (often a computer). Like natural languages, programming languages conform to rules for syntax and semantics.

The most popular websites have in common are called a dynamic website, their development typically involves server client side, side coding, coding and database technology. The programming languages applied to deliver similar dynamic web content however vary vastly between sites. The following table compares general and technical information for a selection of commonly used programming languages php and C# (Table 1).

Aim of the research: The main aim of this research project is to develop new social network using C# programming language with new design to show the impact of programming language and design on usability, exchanging data between users and to introduce better security with respect to Facebook as it coded using PHP.Programming language.

Literature review: Social networks have been applied to a number of domains including: government, business, dating, medical and education. In the governmental domain, it is used by agencies as a quick and easy way for government to get the opinion of the public and to keep the public updated on their activities. In the business

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Table 1: PHP and C# technical comparison

Language	Intended use	Imperative	Object oriented	Functional	Procedural	Reflactive	Standardized?
C#	Application, RAD, bushes, client-side, general server-side, web	Yes	Yes	Yes	Yes	Yes	2000, ECMA, ISO
PHP	Server-side, web, application, web	Yes	Yes	Yes	Yes	Yes	**No**

domain, it connects people at low cost (Cardenas, 2013). This can be beneficial for entrepreneurs and small businesses looking to expand their contact bases. Social networks also often act as customer relationship management tool for companies selling products and services (Babak, 2014). In the dating domain, social networks assist to provide an automated environment for persons to communicate and exchange information for the purpose of dating (Subrahmanyam and Greenfield, 2008). In the medical domain, healthcare professionals are adopting social networks as a means to manage institutional knowledge, disseminate peer-to-peer knowledge and highlight individual physicians and institutions (Gjorgjevska and Donev, 2010). In the educational sector, some built sites include communication such as chats, discussion threads and synchronous learning and educational blogs, e-Portfolios and a lot more (Schroeder *et al*., 2010).

MATERIALS AND METHODS

This project is based on the development and implementation of a web application. The waterfall model is considered as one of the traditional system development methodology that is used to plan the social networking system process through the stages of requirement analysis, design, implementation, validation integration and maintenance. Therefore, this model was used to plan, schedule the time, determine the target time and implementation of the whole system.

System design and modeling: Typically, these functional requirements represent the effects of the system on its environment. To ensure documents are managed properly, the functional requirements are focused on the outcomes required. The functional requirement is the high-level description of user's management functionality rather than the low-level specifications. The functional requirements consider that a basic user's management structure can take place for example, policies, procedures and classification. As a result, the functionalities of the electronic system are:

- It will provide the way to create users and their privileges and management them
- It will provide the simple way to request a friendship between system users
- It will provide the way to view all the user's friends but that depends on the user's privileges
- It will provide the way to edit the user's profiles by users which depends on the user's privileges

In addition to the functional requirements, there are many requirements can be considered as external requirements which are not from user's needs. For example, performance requirements, safety requirements, security requirements, system quality attributes and other requirements. The non-functional requirements are:

- The social networking system has to provide the fastest way to access the website with secure browsing
- The interface of the system should be easy to use

It can be considered that there are many database requirements as follow:

- Database system must be used to store the user's information and their friends
- Need to install Microsoft visual studio 2008 software to run the social networking system
- There is a need to install Microsoft SQL server to build the system database

A social networking system must:

- Provide a safe way to allow the registered users to be authorized
- Provide a security mechanism to prevent the intruders to access to it and view the system's user's data
- Provide a way to allow the users to do what they want if that is compatible with their permissions

The most useful feature of any social networking system is the workflow management which is usually designed by administrators. The benefit of the workflow is that it helps user to specify the steps of handling any friendship in the organization while completing the lifecycle.

The SNS system has to be designed to enhance the communication among people. This will provide access to all the resources and all the friend's profiles by specific registered user who logged in. A SNS provides useful information to users to do their own tasks by presenting it in a way. Therefore, the users need to access to the secure corrected system quickly.

The system is designed to manage user's profiles and to keep in touch with friends. This process will be done in

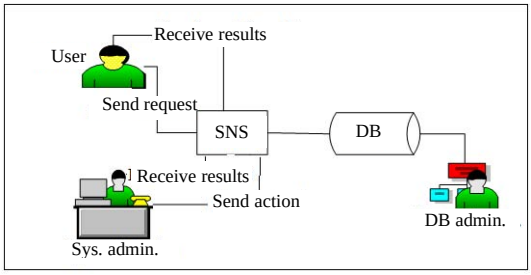

Fig. 1: System architecture

the web application. User can access their albums and edit them by using their privileges in the offline system. Describing of the social system is giving by providing use cases and diagrams as follows.

The user case diagram: The system architecture of the developed system is shown in Fig. 1. The three-tier architecture which contains user interface and back-end system and database was used to develop the system.

The creator of the architecture of the system is a database administrator who can use computers and knows how the people communicate with each other and how to share status between them. Therefore, he/she can create the structure of the user's profile which can be considered as a container of the user's information that can be submitted by the user in registration process.

There are three types of users namely: database, system administrator and normal user. The last two types of user access the system via. web browser which requires the internet connection on their computers. Their requests will be sent to web server. The SNS system will retrieve information from its database when a user makes request for viewing or updating some pages. When the administrator accesses the system to maintain or update process, the same process will apply. Figure 2 shows how the system interacts with all the types of users in general.

Figure 3 shows that after user login as an admin of the website, there are two processes (view user's list, delete user/s) can be done by him/her. However, the admin does not allow doing some other processes such as submit a post or add friend.

Implementation: The data collection technique used for this study was oral interview. Students of an academic department were questioned for their choice preferences on the systems functionalities. In developing the system, HTML, CSS (Cascading Style Sheet) and Macromedia Dreamweaver were the tools engaged in the user's interface. C# and Java script were used to make the web

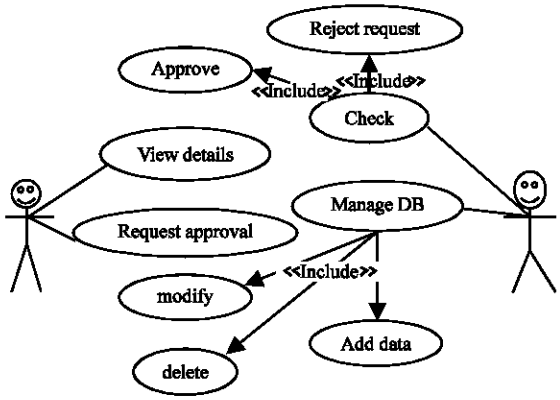

Fig. 2: User case diagram of the system

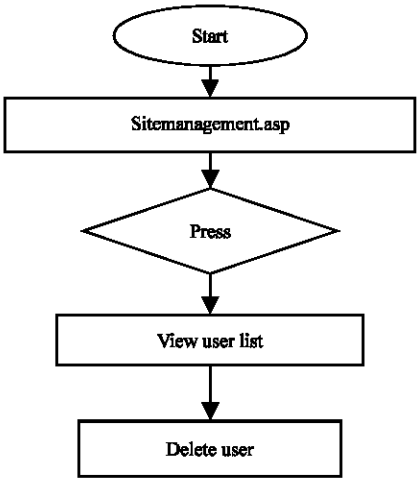

Fig. 3: The sequence diagram of administrator activities in the system

pages dynamic and interactive. SQL serves as the database. The web server used was apache. These tools were used to implement the system due to their efficiency and ease of use for web-based applications.

After the users, have been registered, the admin can view all the user's profiles. Also, he/she can delete any user separately by clicking on the delete button as shown in Fig. 4 site management page.

System users: The user activities as: Run the project. The website's registration page will open as shown in Fig. 5. User can choose to register and/or to login in the website by choosing register, login tab, respectively. Add user email and password and the system will check them. If authorized user, the home page of the user's website will open and in the left-hand side the activities menu. The user can choose any process from the menu as shown in the Fig. 6 and 7.

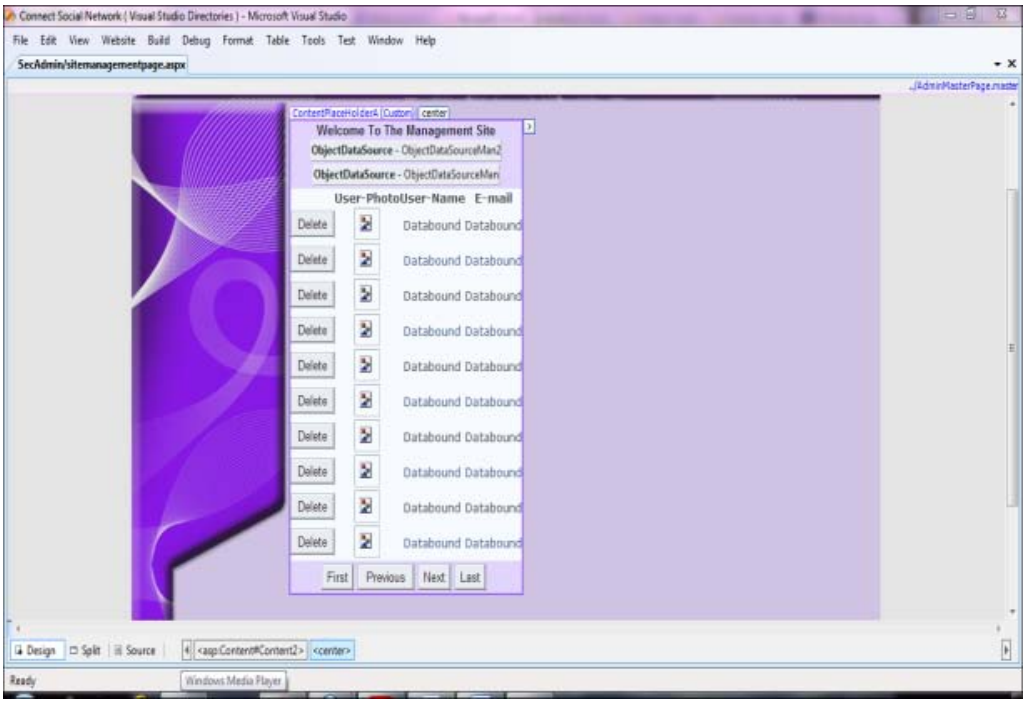

Fig. 4: Site management page

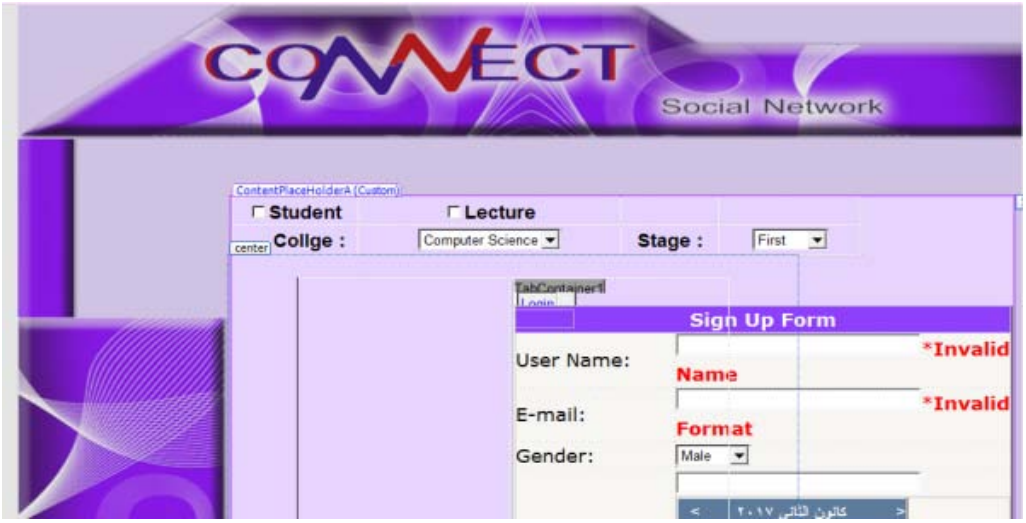

Fig. 5: User sign up

This page will provide to user to access and update his/her profile (Fig. 8). In the following figure, user will be able to see all the general user's profiles but only for the users who have been registered in the system. User should upload photo to be his/her profile picture. After that, he/she can change it when the user want that but he/she cannot see the new profile picture until he/she should sign out and sign in again (Fig. 9-13).

Data base design: To store the data and meta-data of the system, the database has to be designed. Therefore, there are nine tables which are illustrated as.

ERD of the electronic university document management system: There are 9 tables which are created and each table has a relation with another table or with many tables

Fig. 6: User page

Fig. 7: The menu in the user's pages

depends on the system needs. Therefore, the two types of relations have been used in the system's database as shown in Fig. 14-22.

One-to-One Relationship: Each user has one profile. Therefore, the relationships between user table and profile table is one-to-one. Figure 23 one-to-one relationship between user table and profile table.

Fig. 8: Editing user's profile page

The one-to-one relationship between the user table with profile table and both of the related columns are primary keys or have unique constraints. This relationship is not common because the information would be in one table. However, the one-to-one relationship uses.

- For security reasons
- To divide table to many columns
- To store temporary information which can be easy deleted by deleting the table
- To store information which is a subset of the main big table

The primary key in the user table is user id which is a key symbol. The Foreign key in the profile table is user id which is a key symbol as well. In the system's database, the one-to-one relationship will be used for security reason and the user can be considered as a subset from the profile table.

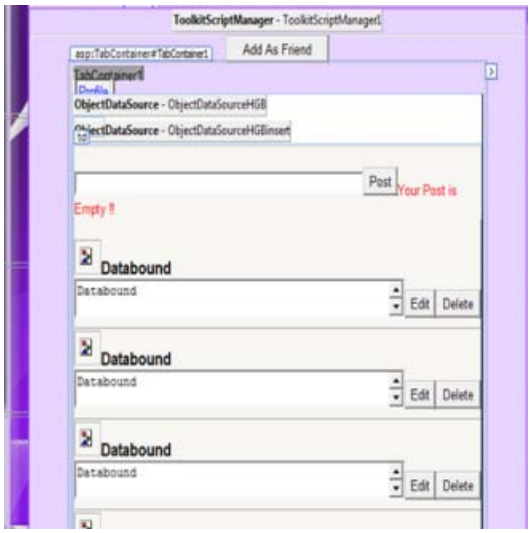

Fig. 9: The page of friend's additing

One-to-many relationships: The profile table has many profiles for all system's users who can have many friends, many friend's requests many albums and so on. Therefore, one-to-many relationships have been used to connect between all 7 tables with profile table.

For instance in the frequent table and friend table, user id columns are the Foreign keys side of the relationships which are denoted by the infinity symbols. In the profile table, the user id column is a primary key or has a unique constraint (Fig. 24 and 25).

C# language implementation: Microsoft attempts to redefine C++ for optimized use with Microsoft's common language runtime. Therefore, Microsoft introduced a C# as a new programming language for building applications in the visual studio.NET suite. Visual C# programming's Library is the NET framework. C# can be defined as a simple, modern and object oriented language which has a managed code. However, C# supplementary contains support for component-oriented programming. C, C++ and Java programmers are familiar to C# because it has its root in the C family of language. Therefore, C# language can be a better choice to build an application.

Admin section: Each system has one administrator who organizes the system and its contents. In order to use the system, user has to sign in. The following code shows that the developer opened the user table adapter and tested the values of the two textboxes which are entered by the admin who tries to log in. If the admin email and password are valid, the admin will be logged in.

Fig. 10: Command addition

Fig. 11: Friends and pages search

Algorithm 1; Admin section:

```
usertableTableAdapters.userTableAdapter
user1 = new usertableTableAdapters.userTableAdapter()
usertable.userDataTable table = user1.GetData()
foreach (DataRow row in table.Rows)
if (Login1.UserName == Convert.ToString(row["email"]) &&
Login1.Password == Convert.ToString(row["password"]))
        {
    Session["suserid"] = row["userid"]
System.Web.Security.FormsAuthentication.RedirectFromLoginPage(Log
in1.UserName'
false)
```

After the admin logged in, he/she can delete registered user's. The following code is to delete the registered user from the system in order to delete him/her from the authorized user's list.

Fig. 12: New page

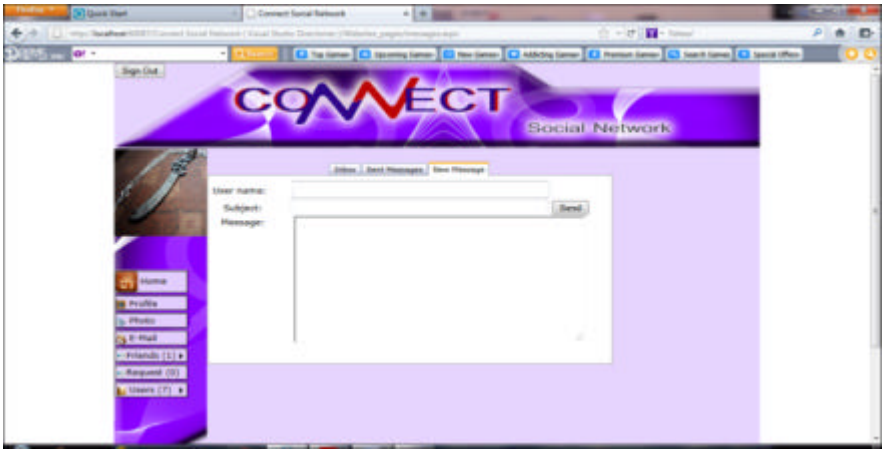

Fig. 13: Massage sending page

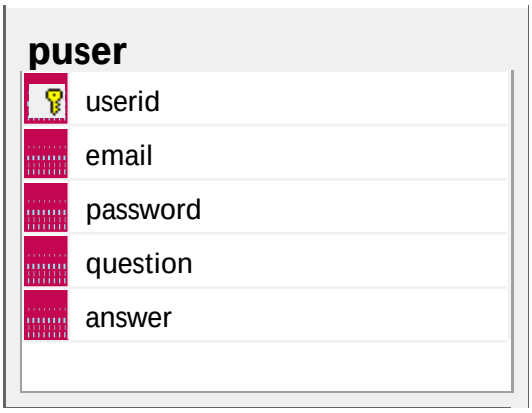

Fig. 14: User data base table

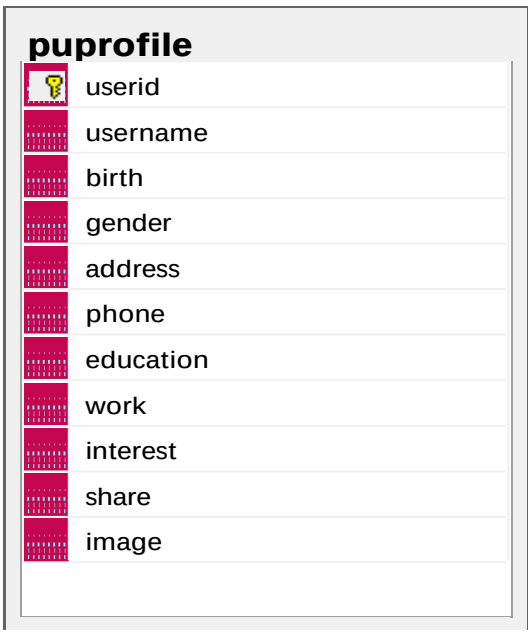

Fig. 15: Profile data base table

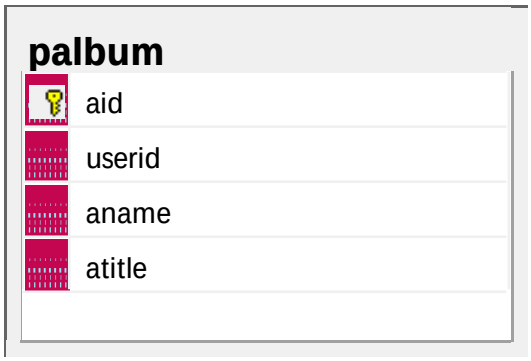

Fig. 16: Album data base table

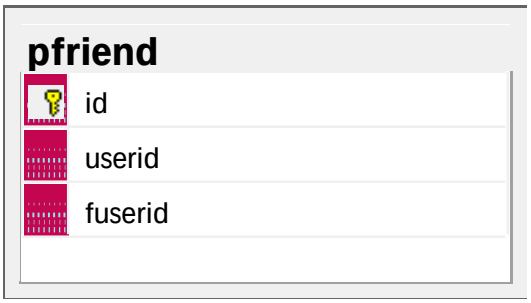

Fig. 17: Friend data base table

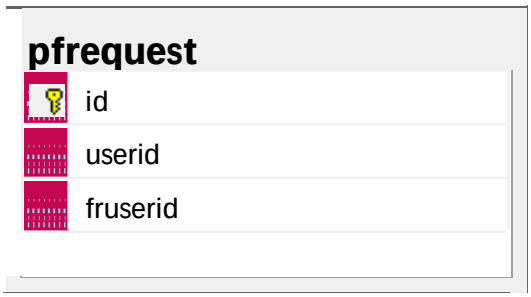

Fig. 18: Requestzz data base table

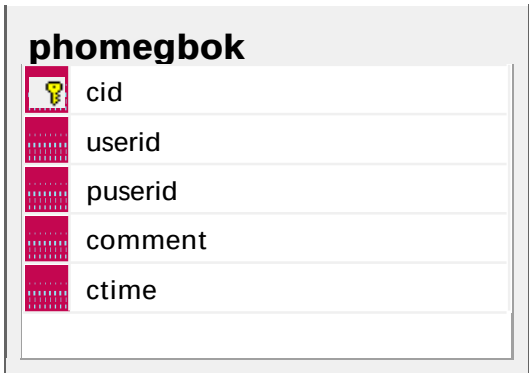

Fig. 19: Rmassage book data base table

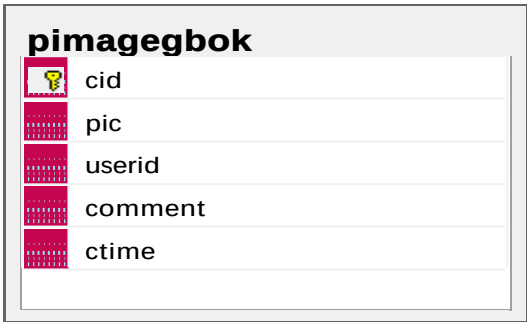

Fig. 20: Image book data base table

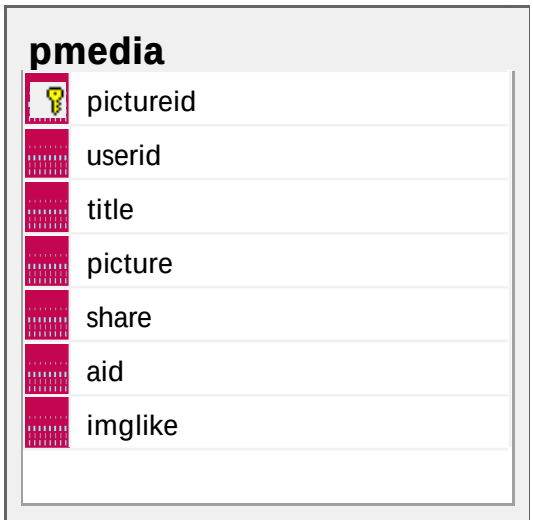

Fig. 21: Media data base table

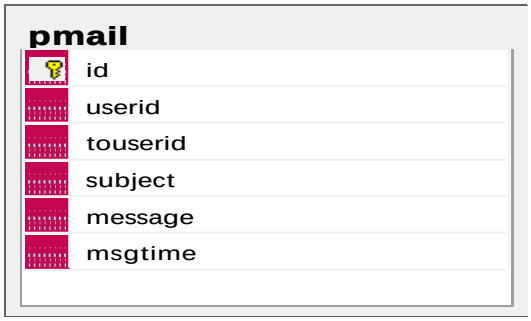

Fig. 22: Mail data base table

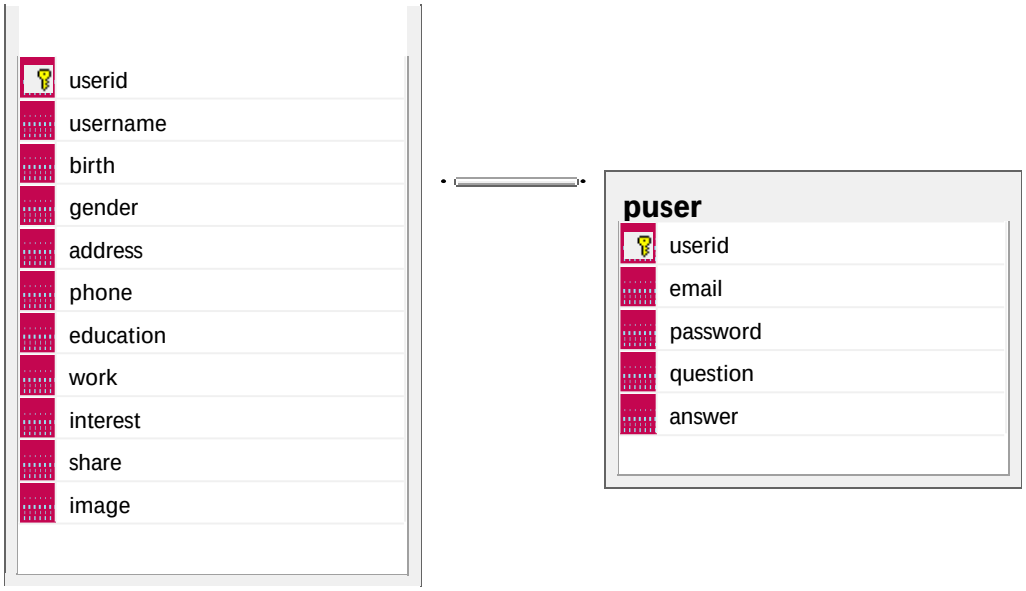

Fig. 23: One-to-one relationship

Algorithm 2; Table adopters:

```
usertableTableAdapters.ManagementDeleteTa
bleAdaptermandelete = new
usertableTableAdapters.Management DeleteTable Adapter()
mandelete.DeleteUserQuery(Convert.ToDecimal(userid))
mandelete.DeleteProfileQuery(Convert.ToDecimal(userid))
mandelete.DeleteMediaQuery(Convert.ToDecimal(userid))
mandelete.DeleteMailQuery(Convert.ToDecimal(userid))
mandelete.DeleteImageGBQuery(Convert.ToDecimal(userid))
mandelete.DeleteHomeGBQuery(Convert.ToDecimal(userid))
mandelete.DeleteFriendQuery(Convert.ToDecimal(userid))
mandelete.DeleteFrequestQuery(Convert.ToDecimal(userid))
mandelete.DeleteAlbumQuery(Convert.ToDecimal(userid))
```

User section: Each system has multi user who can login to website and do the following function:

- Register his/she account to web site
- Login to website
- Update his profile
- Send message and receive message
- Add friend to his account
- Upload post and delete it and update it
- Recover his password in case he/she forget it
- Search for user
- Can show RSS like (latest world new health, technology, business, …, etc.)
- The user can log of

Testing: Software testing is a process of validation, to ensure that the software application meets the system's and user's requirements that were specified in the design and development stages and that it achieves the expected outcome. Moreover, it will define any errors that have to

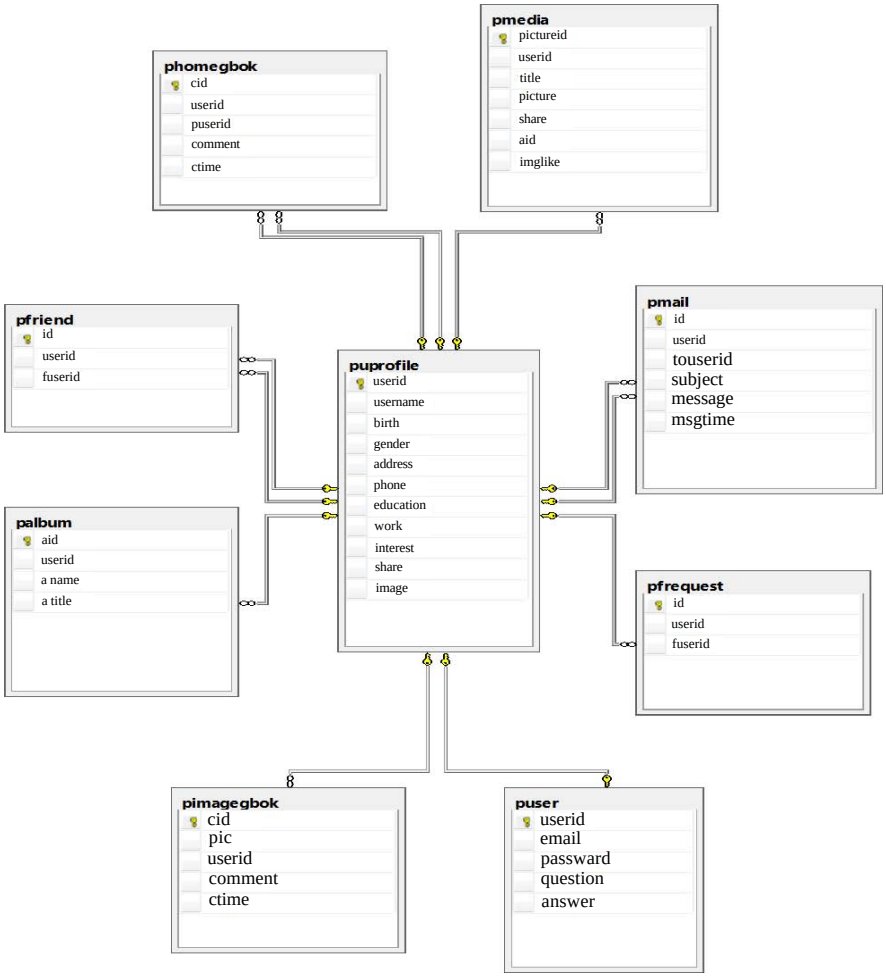

Fig. 24: One-to-many (profile table) relationships

be fixed (Bentley, 2005). In addition, software testing can be used to achieve the non-functional requirements such as reliability, usability integrity, capability, efficiency, portability and so on (Farooq and Quadri, 2010). Therefore, system testing is an important step which should be planned by taking into account its aim, the objectives and the limitations as well. The testing objectives are as following. The testing stage is a process by which the system is used in as many as environments as the users have available for example, finding out in which operating systems and in which browsers it will work well. It can be considered as a process to find previously undiscovered errors. A successful test is a process which discovers errors in a minimum amount of time and effort.

System testing is an integration testing in which a logical unit of testing to improves system quality to validate a new system. A Subsystem's components are the combined units which have been tested. The interfaces between the subsystems and units are also tested. The interfaces between the subsystems and units are also tested.

The SN the system will be tested by allowing users to access and use the system. In this way, two kinds of testing will be performed. While the system is built by programming, functional testing is performed and after publishing the website, the user acceptance testing is applied. The system testing will be done using two techniques of software testing: black-box testing and white-box testing.

Black box testing: Can be called functional testing and behavioral testing which will be done by independent testers who do not have any knowledge of the workings of the system and its components. Therefore, it defines the behavior of the system or subsystems and determines if the system does what it is needed to do. The black box is used to find undiscovered errors or missing functions

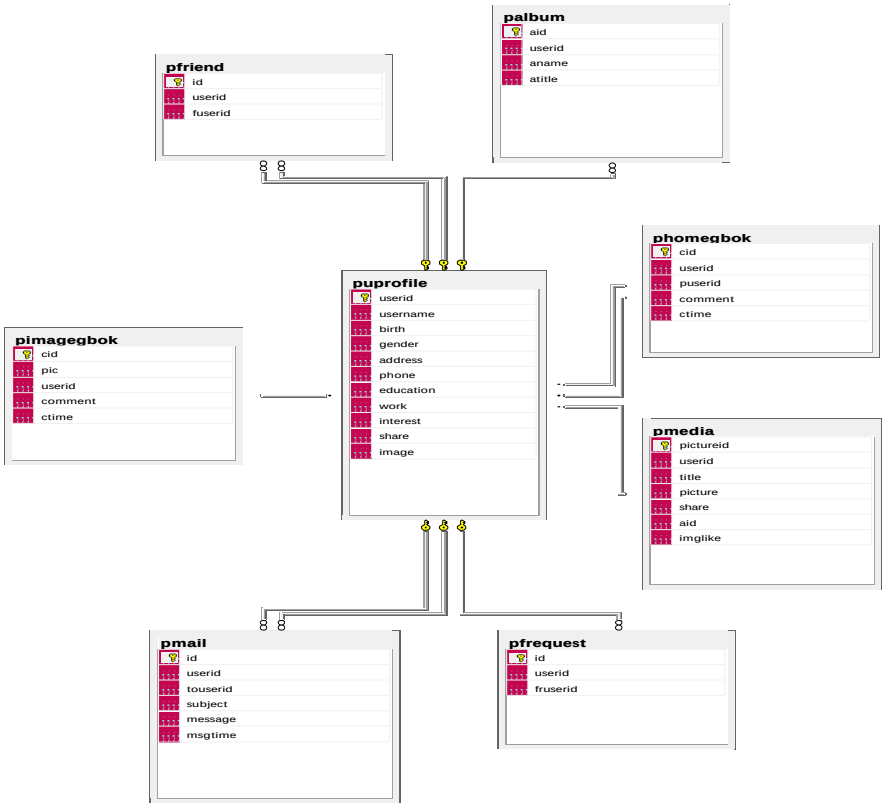

Fig. 25: ERD of the social networking system

Table 2: Describe the comparison between the expected and the actual results for admin section of the current work

Test ID	Description	Expected results	Actual results	Fail/Pass
T1	Precondition: Successful database connection; Admin information has to be saved in the database of the system Admin wants to log into the system	User logs into the system opened	User logged in and the default page of his/here website	Pass
T2	Precondition: Successful database connection Admin log into the system	Remove users from the website	Users can't enter into website	Pass

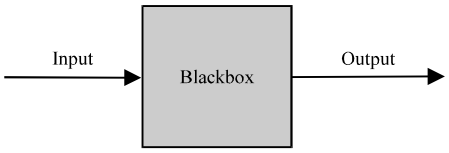

Fig. 26: Black box testing

that are defined in the system specification (Pressman, 2001). This opacity of testing can be used in many types of testing: integration, functional, system, acceptance, beta and regression testing (Fig. 26).

The social networking system is tested by examining all the functionalities which are provided to users in the system's website by entering their input and getting the results from the system and comparing them with what would have been expected from the specific process.

Test cases are designed to show that the system has performed correctly and that the security requirements are implemented successfully (Table 2 and 3).

White box testing: Is a process that tests logical paths of the system by exercising sets of conditions and loops in the website's pages. Therefore, this testing can only be done by the system's developer by using unit or regression testing (Pressman, 2001). White box testing is used to test both intended and unintended system behaviour because it includes control flow information flow, code exercises and error handling within the code (Janardhanudu, 2005). In white box testing, the developer has to look into the code to find out which part is broken (Parekh, 2005). The whole code in the website's pages will have been tested in the implementation stage. The

Table 3: Describe the comparison between the expected and the actual results for user section of the current work

Test ID	Description	Expected results	Actual results	Fail/Pass
T1	Precondition: Successful database connection; Must found internet; to complete register	Register account to his/her self	Register his/she self and show message that register complete successful	Pass
T2	Precondition: Successful database connection Know his/her password and E-mail by seeing it in the above of the registration page (after register action)	User loge into the system	User loge and home page and his/her website is opened	Pass
T3	Precondition: Successful database connection Login to his/her website	Upload post and edit and delete for his/her website	The post will appear in his/here home website	Pass
T4	Precondition: Successful database connection Login to his/her website	update his profile	His /her profile will updated	Pass
T5	Precondition: Successful database connection Login to his/her website; The website is an offline, so it must to be online to send message; Must found internet	Send message and receive message	The message will arrive	Pass
T7	Precondition: Successful database connection	Recover his/her password in case he/she forget it	Will get the password	Pass
T8	Precondition: Successful database connection Login to his/her website	Search for user	The user will be found in home page	Fail
T9	Precondition: Successful database connection; Login to his/her website; Must found internet	Can show RSS like (latest world new, health, technology, busines, etc.)	The RSS feeds have been appeared	Pass
T10	Precondition: Successful database connection; Login to his/her website	The user can log of	Exit from his/her website	Pass

developer handles the logical errors by using try catch block to increase usability and performance of the website.

RESULTS AND DISCUSSION

According to the system requirement specification and design, the development platform used is the Visual Studio 2008 and the language is C#. There are two types of users who can use it as an administrator and user. Social networking system is a web application. The user can access the system after he/she logged in.

During the website development, the designer will use one free template. This template has two directories site and sources. The template will be installed by copying all the directories from the 'site' directory to the website that just has been created. In addition, add new master page which allows developer to create a page layout by allowing him/her to manage how the placeholder controls are rendered. Thirdly, edit it by copying some code from index.html page which located in the "site" directory. Therefore, the template should be easy to work with people with minimum web development experience. There are several advantages of master pages as in the following lines: master pages allow all developer to create one page for common functionality. Therefore, developer needs to update just this page: using controls on the master page will provide an easy way to create a menu that applies to all website's pages. In the system's website, the developer will use a menu control which allocated in the navigation tab in Visual Studio.Net. The system's website contains a number of pages, so, it can be preferred to use one control to make the tasks as menu and user can choose what he/she wants to do.

The developer will use the Microsoft SQL Server Database File (SqlClient) to store the meta-data of the repository such as structures of the tables. Some of the meta-data cannot be changed even by administrator because editing it will damage the system.

The .NET concept was introduced as development framework by the Microsoft to integrate the development and delivery of windows, web and web services. A common set of components is provided by .NET to be used to develop an application. The .NET components are available to the developer as a predefined components and services. The development premises on using the classes in the .NET framework. The .NET framework contains more than 6000 predefined classes that can be used to integrate with files and with databases. The developers who want to build an application need to use this framework because it is the foundation for the entire .NET programming environment.

System evaluation: The evaluation process is planned to improve the implementation of the social networking system process. To test the system, there are many tasks needing to be performed by the end users, to ensure that the system is running at the highest levels of effectively and usability. The usability of the system is tested by determining whether the system's interface is familiar in order to make using the social networking system easy and intuitive. Therefore, users will quickly be using the system and have a good understanding on it with a small

amount of training. It is believed that the usability is an important feature as the same as the technology. Therefore, the social networking system needs to be user friendly.

The system is a website. There is a need for user software to be installed and maintained, so, testing the manageability of the system is an important process that should be considered. Some subsequent steps in the system evaluation focus on security features in terms of privacy and reliability.

Systems evaluation: The evaluation process is planned to improve theimplementation of the social networking system process. To test the system, there are many tasks needing to be performed by the end users, to ensure that the system is running at the highest levels of effectively and usability, several usability approaches exist but the technique known as cognitive walkthrough strategy (Rieman and Redmiles, 1995) was engaged in this study. Some subsequent steps in the system evaluation have focused on security features in terms of privacy and reliability. The survey instrument used was questionnaire which divides to five parts namely: user background information, ease of use and interface navigation with the system and task completion speed. A 78 questionnaires have answered. The evaluation were designed using 5 scale points as: 5 = strongly agree, 4 = agree, 3 = undecided, 2 = disagree, 1 = strongly disagree, as shown in Fig. 1-18, the analysis of the main survey question attributes reported the following mean scores:), ease of use (4.21), interface navigation (4.01), task completion speed (3.90) and task completion success (4.18). The average score for all attribute elements has equal to 4.08. Many previous studies have suggest that system with mean rating "5" as excellent usability, "4" as good usability, "3" as average usability, "2" as Bad usability" and "1" very bad usability" "it was proposed by Sauro and Kindlund (2005) that "good usability" should gain a mean rating = "4" on a "1"{to "5" scale and "5.6" on a "1" to "7" scale. It can therefore be concluded that the proposed system in this study has "Good usability" as it has gain the average total rating = 4.08 (Fig. 27). Analyzing of usability attributes proved that the system is easy to use and successful of task completion rate. However, the speed of task completion has the lowest rate which proved that the system need to review the speed of information processing.

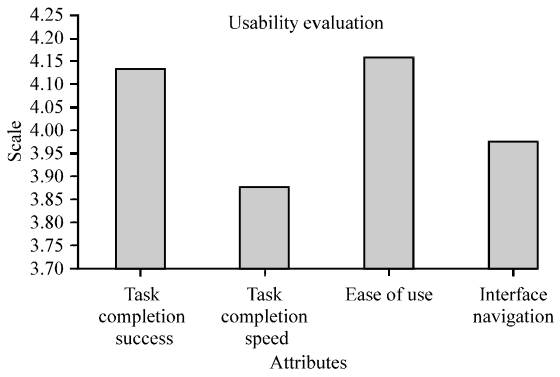

Fig. 27: Analysis of usability attribute

CONCLUSION

This study proposed new developed social networking system for university student interactions, share ideas, declare an important announcements according to system policy setting and developing relationships among students of the closed setting within university. The features as general in many social networks are: status, update, mailing, photo uploads.

REFERENCES

Babak, A., 2014. A study on the utilization, perception and potential of social media as a marketing tool: The case of travel agencies in Azerbaijan. Master Thesis, Instituto politecnico de viana do castelo, Viana do Castelo, Portugal.

Bentley, J.E., 2005. Software testing fundamentals-concepts, roles and terminology. Proceedings of SAS Conference, April 10-13, Philadelphia, PA., pp: 1-12.

Cardenas, K.A., 2013. Social media use in local government agencies: An implementation guide for public officials. Ph.D Thesis, California State University, Sacramento, California.

Farooq, S.U. and S.M.K. Quadri, 2010. Effectiveness of software testing techniques on a measurement scale. Orient. J. Comput. Sci. Technol., 3: 109-113.

Fukuyama, F., 1995. Trust: The Social Virtues and the Creation of Prosperity. Free Press, New York, USA.

Gjorgjevska, K. and M. Donev, 2010. Analysis of healthcare social networking sites and applicability in macedonian E-society. Proceedings of the 33rd International Conference on MIPRO, May 24-28, 2010, IEEE, Opatija, Croatia, ISBN:978-1-4244-7763-0, pp: 1142-1147.

Janardhanudu, G., 2005. White box testing. Department of Homeland Security, Washington, USA.

Kim, J.W., O.R. Jeong and S.W. Lee, 2010. On social web sites. Inf. Syst., 35: 215-236.

Lenhart, A., 2007. Social networking websites and teens: An overview. PEW Internet and the American Life Project, Washington, USA.

Parekh, N., 2005. The waterfall model explained. Buzzle, Sydney, Australia.

Pressman, R., 2001. Software Engineering Apractitioner's Approach. 5th Edn., McGraw Hill, Boston, Massachusetts..

Quadri, S.M.K. and S.U. Farooq, 2010. Software testing: Goals, principles and limitations. Intl. J. Comput. Appl., 6: 7-10.

Rieman, M.F.J. and D. Redmiles, 1995. Usability evaluation with the cognitive walk through. Proceedings of the ACM Conference on Human Factors in Computing Systems, May 07-11, 1995, ACM, Denver, Colorado, ISBN:0-89791-755-3, pp: 387-388.

Roblyer, M.D., M. McDaniel, M. Webb, J. Herman and J.V Witt, 2010. Findings on Facebook in higher education: A comparison of college faculty and student uses and perceptions of social networking sites. Internet Higher Educ., 13: 134-140.

Sauro, J. and E. Kindlund, 2005. A method to standardize usability metrics into a single score. Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, April 2-7, 2005, Portland, OR., USA., pp: 401-409.

Schroeder, A., S. Minocha and C. Schneider, 2010. The strengths, weaknesses, opportunities and threats of using social software in higher and further education: Social media-based mobile learning system. Afr. J. Comput. ICT., 5: 45-51.

Subrahmanyam, K. and P. Greenfield, 2008. Online communication and adolescent relationships. Future Child., 18: 119-146.