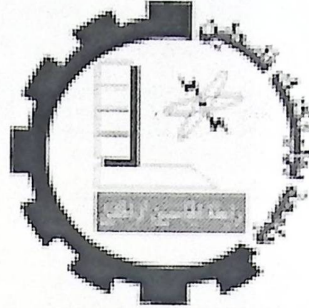


Palestine Polytechnic University
College of Administrative Science & Informatics
Department of Information technology



Ubiquitous Computing for University Announcements
“Using Bluetooth for Identification”

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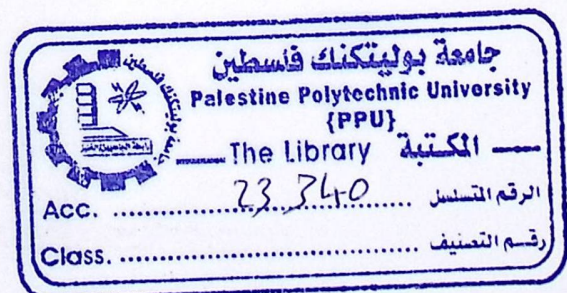
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14/7/2009

This project is presented as partial fulfillment for requirements of BSc degree in information technology.

2009



Abstract

The aim of this project is to propose a solution for the problems of traditional announcement systems by using available and cheap technologies. Users of the proposed system can view their own announcement through a context awareness system using their mobile phones which should be equipped with Bluetooth device.

The system has two parts: The first is a web-based application which enables an administrator to make and manipulate the announcements. The second system is desktop application which is responsible of detecting the users and the displaying their announcement.

The system aims to provide flexible signing up and succeeded to offer a user friendly interface for the announcements that can support large number of users. The system can be used in many areas, where the privacy of the information is not required. In our case, it was implemented for the announcement for the students and staff inside the Palestine Polytechnic University.

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Introduction

1.1. Overview

1.2. Background

1.3. Objectives

1.4. Constraints & solutions

1.5. The main goal of the application

1.6. Summary

1.1. Overview

Technology has become one of the most important things in our life, because it provides satisfaction of needs, including the convenience, safety, and health benefits. Our society has entered an era of technology in order of its doors wider to consumers diverse products.

As a result of the rapid technological development world of science and learning was in the need to develop methods of dealing with data and presentation, so is consistent with this rapid development.

The mechanism for building announcements which is building electronic system that shows the announcements that will be added by the administrator through web page.

Introduction

1.1. Overview

1.2. Background

1.3. Objectives

1.4. Constraints & solutions

1.5. The main goal of the application

1.6. Summary

Bluetooth

Bluetooth is an open wireless protocol for exchanging data over short distances from fixed and mobile devices, including personal area networks (PANs). It was originally conceived as a wireless alternative to RS-232 data cables. It can connect several devices, overcoming problems of synchronization.

Conclusion

1.1. Overview:

Technology has become one of the most important things in our life, because it provides many advantages that have received the satisfaction of users, including the convenience, time saving, effort reduction and other benefits. Our society has entered an era of technology it is one of its doors wider to consumers diverse products.

As a result of the rapid technological development world of science and learning was in the need to develop methods of dealing with data and presentation, so is consistent with this rapid development.

The mechanism for building a system based on a new idea of announcements which is building electronic system that shows the announcements that will be added by the administrator through web page.

1.2. Background:

Ubiquitous computing (UC):

UC means is that computers are everywhere; putting many computers together throughout the physical environment, while making them effectively invisible to the user. Ubiquitous computing is held by some to be the Third Wave of computing. The First Wave was many people per computer; the Second Wave was one person per computer. The Third Wave will be many computers per person. Three key technical issues for UC are: power consumption, user interface, and wireless connectivity. ⁽¹⁾

Bluetooth:

Bluetooth is an open wireless protocol for exchanging data over short distances from fixed and mobile devices, creating personal area networks (PANs). It was originally conceived as a wireless alternative to RS232 data cables. It can connect several devices, overcoming problems of synchronization. ⁽²⁾

1.3. Objectives:

The project aims at turns out a paper-based to electronic-based bulletin which is presented by display screen available to all users (students or teacher). Registered users are identified via Bluetooth address that is available in their mobiles. The system displays their own announcements.

Announcements are added for students through a special page used by the system administrator, and specify the type of announcements is it given to a student or students studying a particular course or to students or to allocate a certain college students in general.

The system is based on the use of Bluetooth technology, which is doing connection between user mobile and a server to display information related for him or her. The user will be identified through Bluetooth address available in his or her mobile. The most important goals are:

- Reduce the effort of the announcement system.
- Making announcement available for large numbers of users
- Making the signing very flexible.

1.4. Constraints:

In this project, we have the following assumptions and constraints.

- Each user is identified using his own mobile. So we assume the user will not use the mobiles of others
- The mobile should be equipped with Bluetooth.
- Only five students can be get services at the same time because of the limited space on the screen.
- The system should not be used in applications that expose private information.

1.5. The main goal of the application:

Building an electronic system by using modern technology that is more flexible in presentation of the announcements. Identifying the users is done from the address of the Bluetooth which is available in their own mobile phones. This way we also provide more pleasure and interest in seeing the announcements.

1.6. Summary:

In this chapter, we have talked about some definition that related for our project and we shown the objectives and constraints of the system. Also, different alternatives were discussed and the main goal of our application was defined.

Chapter Two:

System Planning

- 2.1. Introduction
- 2.2. Restrictions
- 2.3. Alternatives
- 2.4. Feasibility study
- 2.5. Project scheduling
- 2.6. Summary

2.1. Introduction:

In this chapter, the rules of the software plan and all the sources they need are discussed, and the constraints that will be faced. In addition, the feasibility of alternatives is studied. The initial stage in the development of the system includes the scheduling of full system sources and the cost of construction is presented.

2.2. Restrictions:

In this section we explain the restrictions may be encountered during the process of system development, including:

- Building the system within a certain period of four months.
 - The costs are within the budget that has been identified.
 - The system can be maintained and developed.
- Building the system that suits the level of users to help them to interact with the system to receive the important information quickly and easily by an interactive and enjoyable method.

2.3. Alternatives:

The existing traditional system currently supported in the university is the process of using paper-based announcements on the boards. The problem is that some students would not be able to see these announcements, because there are many announcements located without organizations. In addition, the old announcements are not removed from board regularly.

One solution is to send e-mail to each student containing the announcement, but some may have no internet access or can not see the announcement in a timely manner because email is an offline system.

A second solution is the use of electronic bulletin board to display the announcements of all students. But there is no relation between the announcements and the students who see them because the electronic bulletin can not detect the students

Our proposed solution is through the technology available and affordable to all students which is the current mobiles which have Bluetooth option. The advantages of this alternative are:

- Announcements are easily added to the system.
- Displaying announcements related only to the students who are near the board.
- The creation of the accounts is very easy.

2.4. Feasibility study:

2.4.1. Resources and costs of the paper-based alternative:

Currently, in every collage at PPU, the secretary prints the announcements by an order from any teacher or head of collage. The Secretary asks another employee to publish the announcements by paste it on board.

This alternative has many limitations like:

1. Lack for administration.
2. Students can see his announcements in his collage only.
3. Lack of privacy.
4. Uncivilized view for university.
5. Anyone can damage or destroy the papers.

2.4.2. Resources of the proposed alternative:

In this section, we divide the resources and costs into two parts:

- The development resources and costs for the system.
- Operating resources and costs for the system.

Based on the choice to build a system that supports the display announcements for each user.

1. Resources of system development:

This includes the following:

- **Hardware resources:**

Table (2.1) shows the resources of system hardware development:

Hardware components	No.	Specifications
computer (Dual-Core)	1	Processor speeds of 2.6 GHz Memory size 4GB Hard disk size 320 GB Hard drive, DVD±R drive Modem (PCI 56 KB) 20-Inch LCD Monitor Keyboard, mouse.
Bluetooth device (sensor)	1	Range 2-4 m
Mobile phones	6	Different types

Table (2.1) Resources of system hardware development

- **Resources of software development:**

- 1) Microsoft windows XP professional.
- 2) Netbeans-6_5-Javafx-1_1-windows.
- 3) MySQL Server 5.1.33-win32.
- 4) Microsoft Office Visio 2007.
- 5) Microsoft Office 2003.
- 6) Adobe Photoshop CS2 9.0
- 7) Apache Tomcat 6.0.

- **Human development resources:**

The project team includes three members, working on the study and analysis of system requirements, design and programming.

2. Resources of running the system:

That includes the following:

- **Resources of the hardware in the running system:**

Table (2.2) shows the operating hardware resources for the system:

Hardware components	Specifications
Web Server and Database Server	computer (Dual-Core) Processor speeds of 2.6 GHz 20-Inch LCD Monitor Motherboard the type of Intel

Table (2.2) the operating hardware resources for the system

- **Resources of the software in the running system:**

1) Microsoft windows XP professional.

2) MySQL Server 5.1.33-win32.

- **Resources of human:**

– Administrator, who is adding of the announcements.

– The system programmer for maintenance.

3. Development cost of the system:

That includes the following:

- **Expected cost of hardware for system development:**

Table (2.3) shows the expected cost of hardware for system development:

Hardware component	Specification	cost
computer (Dual-Core)	Processor speeds of 2.6 GHz Memory size 4GB Hard disk size 320 GB Hard drive, DVD±R drive Modem (PCI 56 KB) 20-Inch LCD Monitor Keyboard, mouse.	\$640
Bluetooth device (sensor)	Range 2-4m	\$2
Mobiles	Has Bluetooth	\$268
Total		\$910

Table (2.3) the expected cost of hardware for system development ¹

- **Expected cost of software for system development:**

Table (2.4) shows the expected cost of software for system development:

Software components	cost
Microsoft Windows XP Professional	\$199
MYSQL Server 5.1.33-win32	\$0 (open-source)
Microsoft Office Visio 2007	\$155
Microsoft Office 2003	\$287
Adobe Photoshop CS2 9.0	\$125
Netbeans-6_5-Javafx-1_1-windows	\$0 (open-source)
Apache Tomcat 6.0.	\$0 (open-source)

¹ This price for www.amazon.com

Total	\$766
--------------	--------------

Table (2.4) the expected cost of software for system development ²

- **Expected human cost for system development:**

Table (2.5) shows the expected human for system development:

Number of human	Hours / week	Cost / hour	Total / week
3	36	\$10	\$1,080

Table (2.5) expected human costs for system development

And the cost of human resources during the 14 weeks period and the total is expected to develop:

$$\$ 1,080 * 14 = \$ 15,120$$

Human Resources costs per month:

$$\$ 1,080 * 4 \text{ (weeks)} = \$ 4,320$$

- **The expected total cost for system development:**

Table (2.6) shows the expected total costs for system development:

Hardware costs	Software costs	The human costs / month	Total
\$910	\$766	\$4,320/month	\$1,676 + \$4,320/month

Table (2.6) the expected total costs for system development

The expected total costs for development during the 14-week:

$$\$ 1,676 + (\$ 4,320 / \text{month}) * 3.5 \text{ months} = \$ 1,676 + \$ 15,120 = \$ 16,796 \text{ nearly.}$$

² This price for www.amazon.com

4. Operating cost of the system:

That includes the following:

- **Expected cost of hardware for the system when operating:**

Table (2.7) shows the expected cost of hardware for system operating:

Hardware component	Specification	Cost
computer (Pentium IV)	Processor speeds of 2.6 GHz Memory size 4GB Hard disk size 320 GB Hard drive, DVD±R drive Modem (PCI 56 KB) 20-Inch LCD Monitor Keyboard, mouse.	\$340
Bluetooth device (sensor)	Range 2-4m	\$2
Projector	3 LCD Multimedia Projector	\$550
Total		\$892

Table (2.7) the expected cost of hardware for system operating³

- **Expected cost of software for the system when operating:**

Table (2.8) shows the expected cost of software for system operating:

Software components	Cost
Microsoft Windows XP Professional	\$199
Total	\$199

Table (2.8) the expected cost of software for system operating⁴

³ This price for www.amazon.com

⁴ This price for www.amazon.com

- **Expected cost of human for the system when operating:**

Table (2.9) shows the expected human cost for operating the system:

Human components	Cost
Programmer	\$10,200
Total	\$10,200

Table (2.9) the expected cost of human for system operating

- **The expected total cost for system operating:**

Table (2.10) shows the expected total cost for system operating:

Hardware costs	Software costs	The human costs	Total
\$892	\$199	\$10,200	\$1,398 + \$10,200/year

Table (2.10) the expected total cost for system operating

5. Maintenance cost of the system:

Expected maintenance for the system is divided into two parts:

- **Expected maintenance for software:**

Expected system maintenance for program includes:

1. Database
2. User interface
3. Added new services
4. modify code
5. Reducing of the area covered by Bluetooth sensor or increase it

- **Expected maintenance for hardware:**

Expected system maintenance for hardware includes:

1. Computer
2. Projector
3. Bluetooth device (sensor).

Where amount the cost of system maintenance a certain percentage may be 15% of the system cost itself, and this rate for one year in the life of the system, and this percentage is agreed upon previously.

The reason for the selection of this system:

Through the working the feasibility study, we found that this system satisfies the announcement needed for the university by:

1. Giving the university a civilized view.
2. Making it dependent on available technology.
3. Reducing the cost of traditional announcement system.
4. Speeding up the operations of adding and deleting announcements.
5. Providing accuracy and maintaining privacy.
6. Providing announcements for all the students from one consistent database
7. Making the interaction between the system and users is very easy.

2.5. Scheduling:

In this section, we will offer the time taken for each stage of the construction of the system. Table (2.11) presents the scheduling time for each stage when building the system and shows that there are overlaps between these stages.

Task number	Task name	Time spending
1	System planning	Week
2	System analysis	Four Week
3	System design	Two Week
4	System development	Three week
5	System testing	Two Week
7	Documentation	Over all system development period

Table (2.11) Scheduling time for each stage of building the system

The scheme of operations:

Task \ Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14
System planning	Expected	Actual												
System analysis		Expected	Expected	Expected										
System design			Actual	Actual	Actual	Expected	Expected							
System developing					Actual	Actual	Actual	Actual	Expected	Expected	Expected	Expected		
System testing													Expected	Expected
documentation	Expected	Expected	Expected	Expected	Expected	Expected	Expected	Expected	Expected	Expected	Expected	Expected	Expected	Expected

Table (2.12) the scheme of operations



: Expected time



: Actual time

2.7. Summary:

In this chapter, the project team talking about system planning by present feasibility study about their project and its alternatives, the team also presents development, operating and maintenance cost for their project, finally the team shows the project scheduling over the time.

Chapter Three:

System Analysis

- 3.1. Introduction
- 3.2. System requirements
- 3.3. Validation criteria
- 3.4. Use case
- 3.5. System testing Plan
- 3.6. Summary

3.1. Introduction:

The process of gathering requirements and analysis is very important, it is an essential step for the development and completion of any system. It must be done before building the system. In this chapter, we will analyze the functional and non-functional requirements and determine its relationship with system environment in details. We will describe all the data and rules of the database.

3.2. System requirements:

This system includes a set of requirements is divided into functional and non-functional requirements, which will be clarified through the following points:

1. Functional requirements:

This system includes a set of functional requirements that can be divided into the special requirements for student, teacher and system administrator, as follow:

Specific requirements for student:

Students should be able to view announcements in a more flexible and easy way.

Specific requirements for teacher:

1. Enable teacher to add the course announcements and student announcements, according the courses that are given to student by this teacher, thus each teacher can add announcements in this system.
2. The teacher can see his own announcements.
3. Enable teacher to modify his own announcements that exists previously.

Special requirements for system administrator:

1. Enable the administrator to add and modify announcements to the system through the user interface that has.
2. Add new student and new teacher in this system.
3. Modify Bluetooth address for the student or teacher.

2. Non-functional requirements:

Interface:

Based on some guidance received from the specialists and the instructions relating to the interface and knowledge of principles of human-computer interaction, the interface must have colors suitable to our eyes, and the interface designed is suitable with the idea of the project and target group. User can view his announcements through this interface.

Security:

Achieve Safety and privacy in the system through:

- Deny access to the system without verifying the authenticity of the user name and password.
- Not allowing any user to access the page by another user.
- Just the administrator can access the database.
- Nobody can hack the system using Blue Jacking, Blue Dump Attack or any other type of hacking.

Speed:

- Fast interaction between user and the system, through user interface that is provided.
- Speed to display the announcements and daily lectures for five users in period less than (15) seconds.
- Speed in switching between users should be convenient.

Ease of use:

System is characterized for easy to use, and achieved the following:

1. Interactivity: interaction between the system and user can be done by one click.
2. Readability: the interface colors comfortable for the user eyes.
3. Accessibility: teachers and administrators can easily access to the web application from any where and any place, users can access to the announcements easily and without pushing.

4. Updatable: teachers and administrators can update the showed announcements and users information easily.
5. Consistency: system interface have the same style, login, administrator and teachers have the same design and colors.

3. Description of functional requirements:

Description of functional requirements for the student:

- Enable the student to enter on system and watch his announcements.

Job	Access to the system and get benefit from it.
Description	Student can access to the system by switching on his Bluetooth device to see the announcements.
Input	Bluetooth address.
Output	View announcements.
Objective	Enable the user to receive the announcements in easy way.
Requirements	Bluetooth in the phone should be available.
Conditions before implementation	The user is registered in the system.
Conditions after implementation	User access to announcements.
Procedures	Bluetooth must be available and turn on, the system compare student Bluetooth address with value that stored in the database, if the both address matching the system will identify the student then display his announcements.

Table (3.1) Description of functional requirements for the student

Description of functional requirements for the teacher:

- Enable teacher to add the course announcements and student announcements, according the course that given to student by this teacher, thus each teacher can add announcements in this system.

Job	Add announcements to the system database.
Description	Teacher can access to the system database and add announcements for his course and student.
Input	Announcements text.
Source	Teacher page.
Output	New added announcements in database.
Objective	Enable teacher to access the web page system.
Requirements	The teacher enters announcements text and its target (course or student(s)).
Conditions before implementation	The user is registered in the system.
Conditions after implementation	The new announcements will be added to the system database.
Procedures	The teacher login by enters the user name and password compared with data stored in the database if the data entered is correct the teacher access to teacher page then he can add any announcements to any target.

Table (3.2) Description of functional requirements for the teacher to add ads

- Enable the teacher to view his ads in system.

Job	Access to the system and get benefit from it.
Description	Teacher can access to the system by switching on his Bluetooth device to see the announcements.
Input	The Bluetooth address.
Output	Teacher can see announcements for system.
Objective	Enable the teacher to receive the announcements in easy way.
Requirements	Bluetooth in the phone should be available.
Conditions before implementation	Teacher must be registered in the system.
Conditions after implementation	Teacher access his announcements.

Table (3.3) Description of functional requirements for the teacher to view his ads

- The teacher can modify his own ads:

Job	The teacher can modify his own announcements.
Description	Enable the teacher to do the operations that allowed to him which is modifying the announcements which was adding by him in last time.
Input	The required update to the announcements that existing previously.
Source	Home page for modifying announcements.
Output	Announcements that have been modified
Objective	Enable the teacher for modified on the announcements that had been added by him.
Requirements	The Teacher Enter valid username and password.
Conditions before implementation	Login.
Conditions after implementation	Modified on existing announcements.
Procedures	The teacher login to system by entering valid user name and password then to modifying announcements window select the announcements he won't to modify then he can modify it and save.

Table (3.4) Description of functional requirements for the teacher to modified ads

Description of the functional requirements for administrator:

- Enable the administrator to add announcements, student, course and teacher in system.

Job	Add the announcements, student and teacher in the system.
Description	Enable the admin to add the announcements for a specific student or all students, for course and college in the same article.
Input	The announcements, student, course and teacher
Output	Student or teacher can be get benefit for system and view the added announcements.
Objective	Add the announcements to enable the student to see it. Add the student, course and teacher to access the system.
Requirements	The admin Enter valid username and password.
Conditions before implementation	Login.
Conditions after implementation	Add new announcements, student, course and teacher in the system.

Table (3.5) Description of functional requirements for the admin to add record

- The admin can modify student information, teacher information and all announcements in system:

Job	The admin can modify all system information.
Description	Enable the admin to do any change he won't in the system.
Input	The required modified to the information that existing previously.
Source	Modifying page for admin.
Output	Information that have been modified
Objective	Enable the admin for modified announcements, teacher information, course information and student information.
Requirements	The admin Enter valid username and password.
Conditions before implementation	Login.
Conditions after implementation	Modified on existing information.
Procedures	The admin can be modified all system information.

Table (3.6) Description of functional requirements for the admin to modify record

3.3. Validation criteria:

- Access database: only administrator has full privilege on the database.
- User mac address: the user can use one Bluetooth device to show his announcements.
- Enter password: must consist at least six characters, can use numbers or letters.
- The first registration, the application validate syntax Bluetooth name with user number in database.

3.4. Use case:

Announcement system:

Scenario:

1. The user must be at front of the screen and change Bluetooth name to his own number, then open his Bluetooth.
2. The system will verify the name of Bluetooth, and determine the user type.
3. Display advertisement related to specific user.

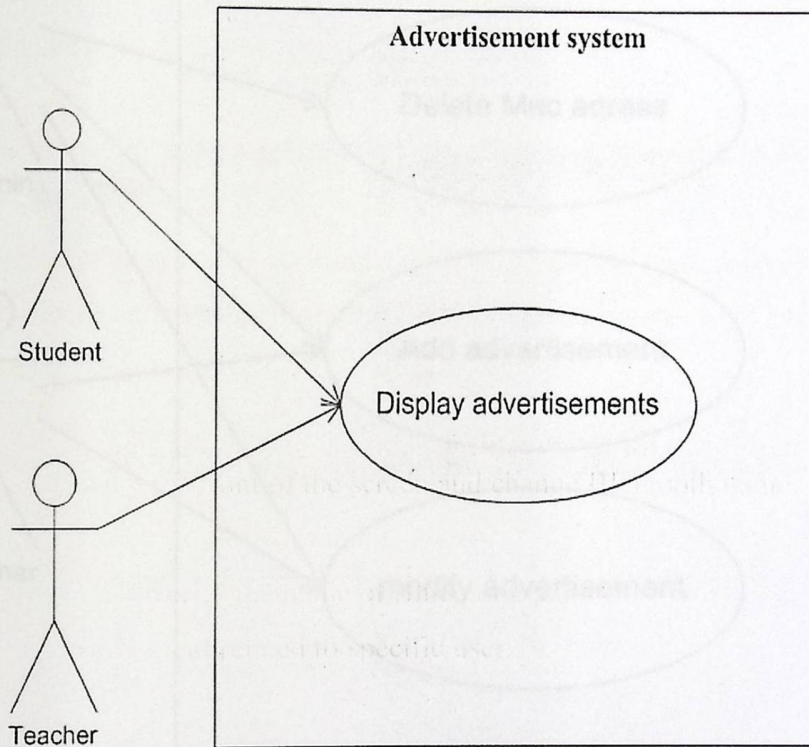
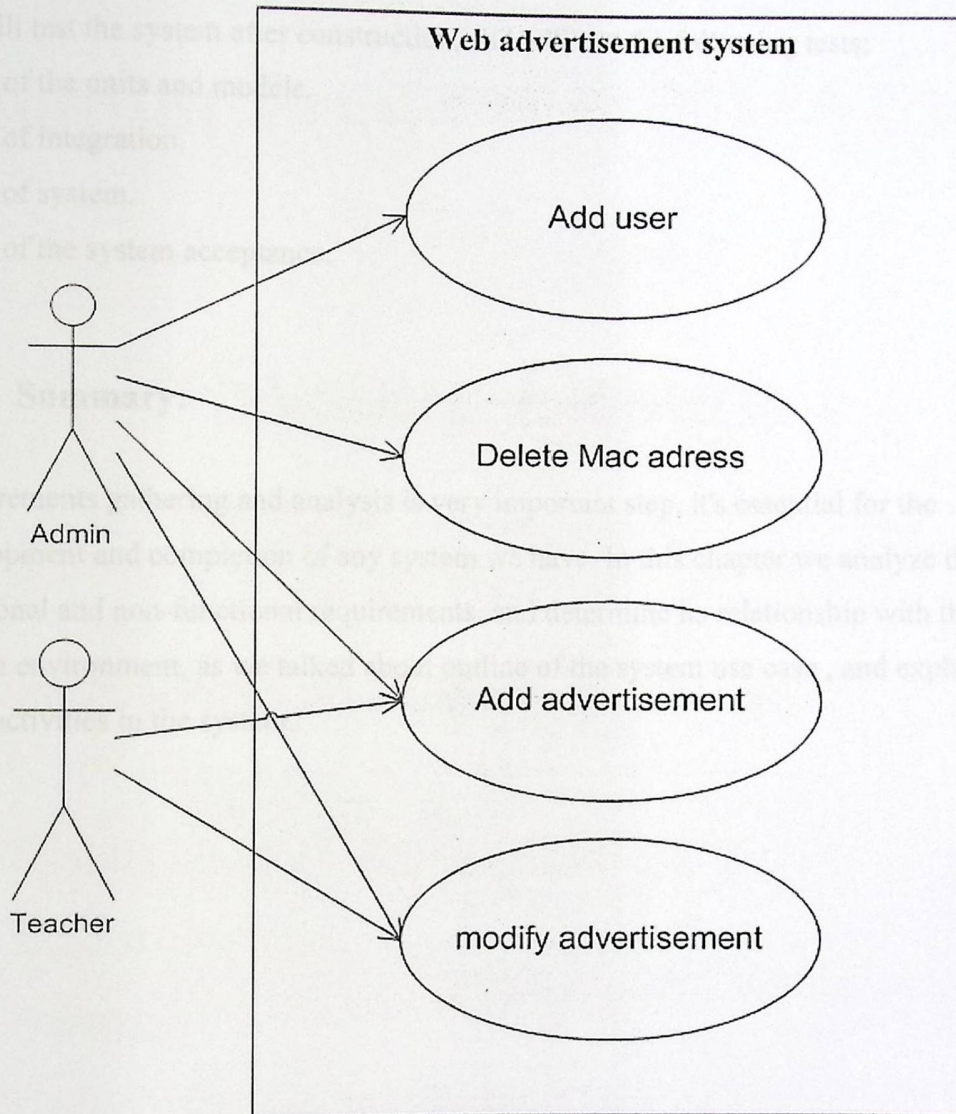


Figure (3.1) Use case diagram for announcement system

Web announcement system:



Figuer (3.2) Use case digram.for web announcement system:

3.5. System testing Plan:

We will test the system after construction, and will use the following tests:

- Test of the units and models.
- Test of integration.
- Test of system.
- Test of the system acceptance.

3.6. Summary:

Requirements gathering and analysis is very important step, it's essential for the development and completion of any system we have. In this chapter we analyze the functional and non-functional requirements, and determine its relationship with the system environment, as we talked about outline of the system use case , and explained the basic activities in the system.

Chapter Four:

System Design

- 4.1. Introduction
- 4.2. UML diagrams
- 4.3. System interface design
- 4.4. Database design
- 4.5. Summary

4.1. Introduction:

In this chapter, we will describe the system design by using functional design for each part of system, additional to that, the design of the database of the system.

This chapter will include the following:

- UML Diagrams:

1. Class Diagram.
2. Sequence Diagram.
3. Activity Diagram.

- System Interfaces.

- Database description.

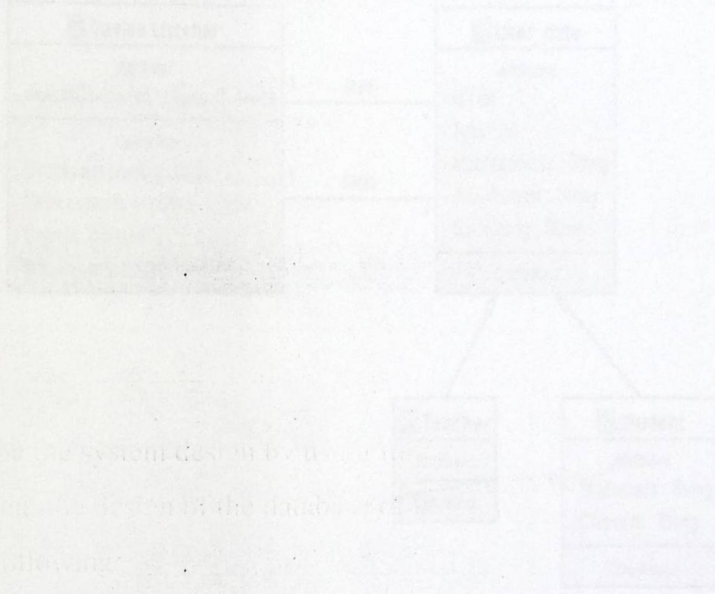


Figure (4.1) Class diagram

4.2. UML diagrams:

1. Class diagram:

The following diagram (Figure 4.1) shows the system users, it includes the search about devices, then displaying the announcements on the screen for both teachers and students.

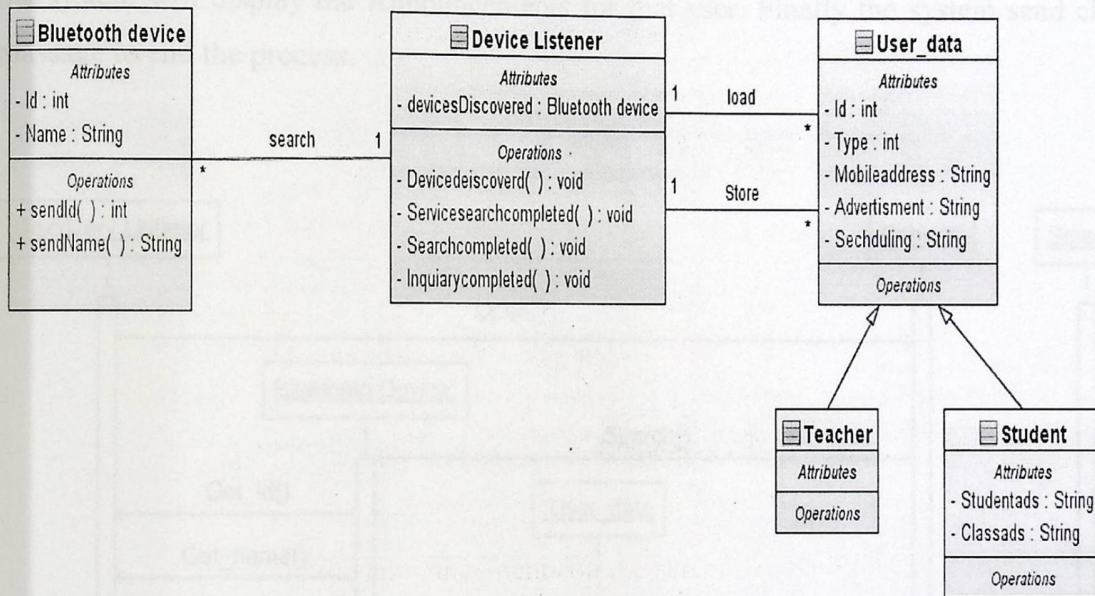


Figure (4.1) Class diagram

2. Sequence diagram:

Figure (4.2) shows the sequence of events from the discovering of Bluetooth device until the displaying of Announcements, Discovery listener start the process by sending an open message to the Bluetooth sensor to start searching about Bluetooth devices, when Bluetooth sensor found Bluetooth device the Discovery listener will take the Bluetooth name and address then the system identify the user that have this Bluetooth device, then the system will display the Announcements for that user. Finally the system send close message to end the process.

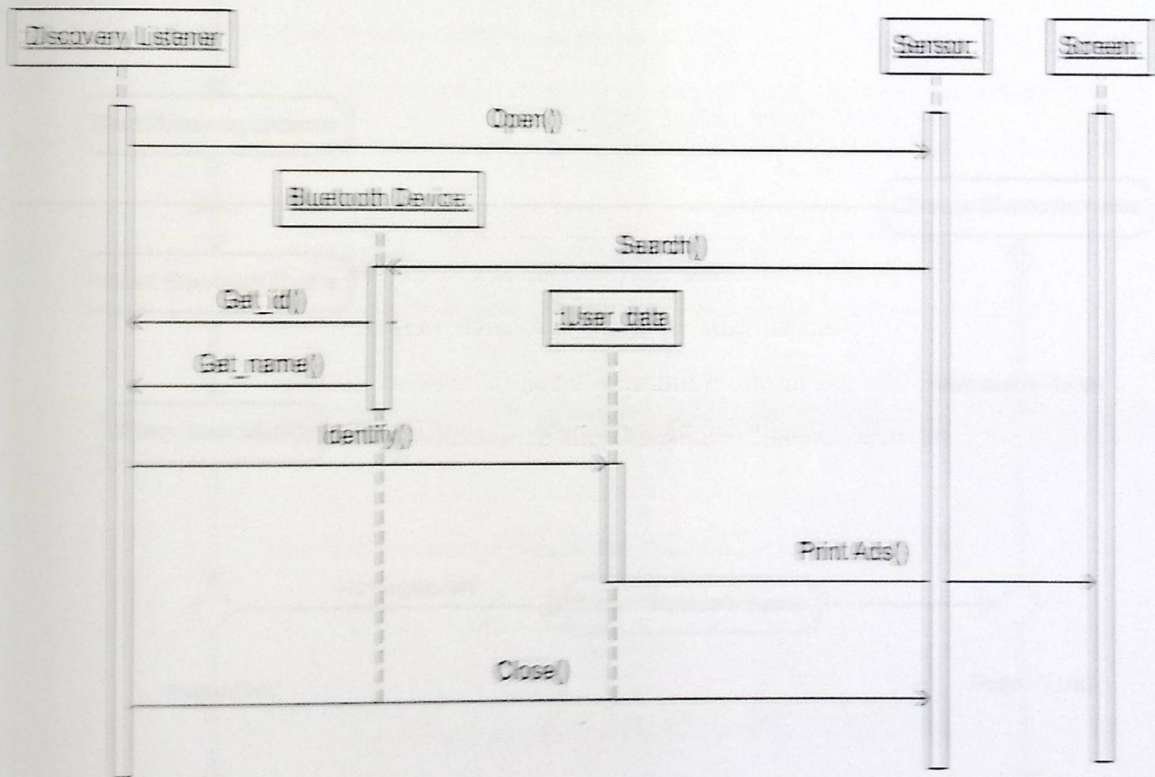


Figure (4.2) Sequence diagram

3. Activity diagram:

Figure (4.3) shows the activity along the system processes, the system start by searching about Bluetooth device when the system found first Bluetooth device the system check the validity of the user that own that device, if user registered the system will display his Announcements and lecture scheduling, if not registered check his Bluetooth name if its equal to any student or teacher number register him and display his Announcements and lecture scheduling, if the Bluetooth name not match to any student or teacher number he must change his Bluetooth name to his university number then the system register him. Then the system will repeat this process until end by the Administrator.

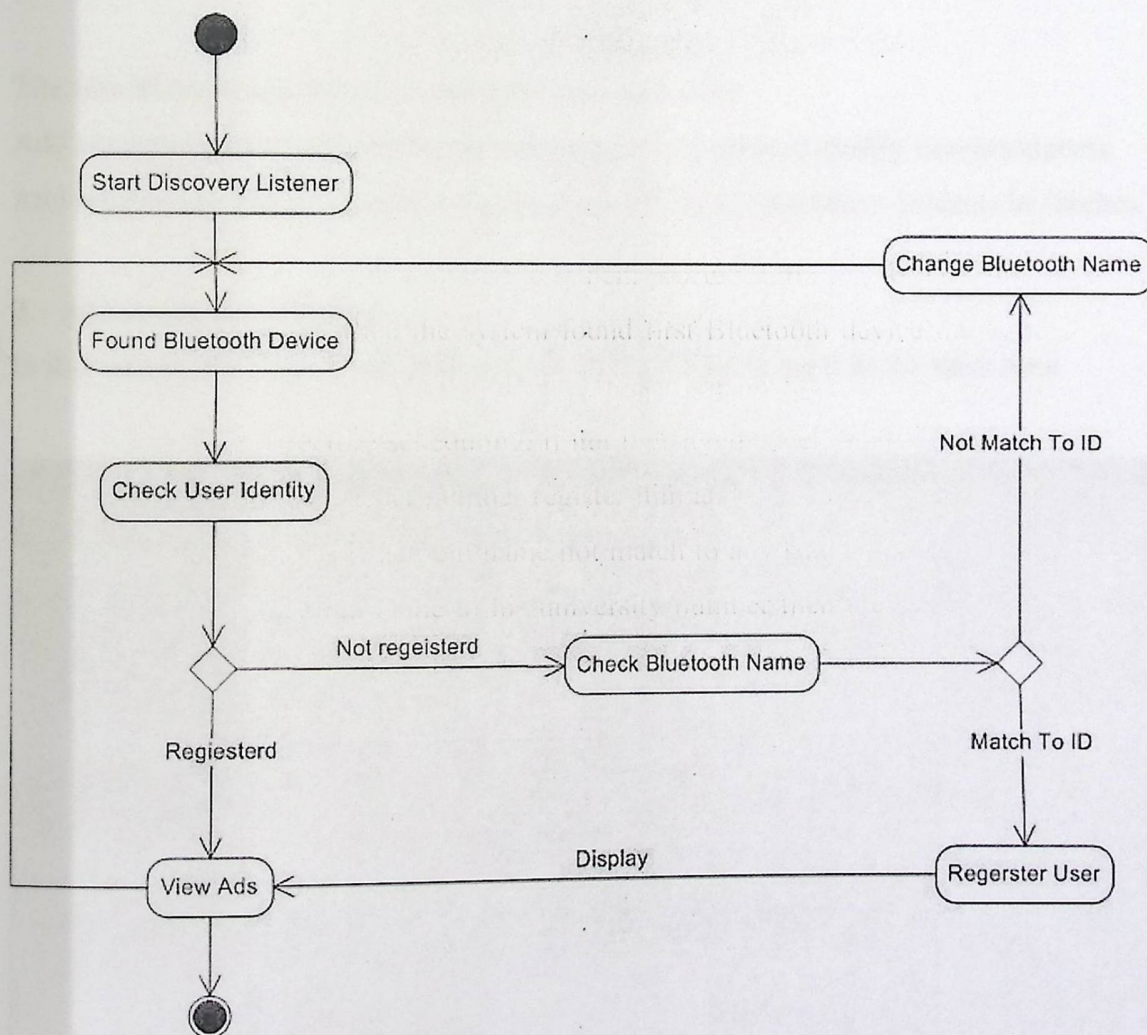
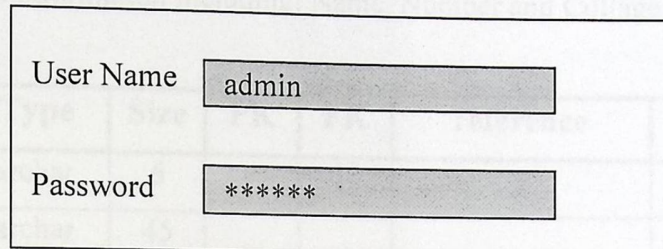


Figure (4.3) Activity diagram

4.3. System interface design:

1. Login screen:

This interface allows the administrator and teacher login to the system web page.



A screenshot of a login interface. It features two input fields: 'User Name' containing the text 'admin' and 'Password' containing seven asterisks '*****'. The fields are set against a light background with a faint grid pattern.

Figure (4.4) Login screen

The administrator can access to administrative tools like:

Add announcements, add teacher, add student, add course and modify announcements.

And teacher can add announcements and modify it for his courses or students he teaches.

2. Announcements board:

In this screen, the system will print announcements for five users in the same time.

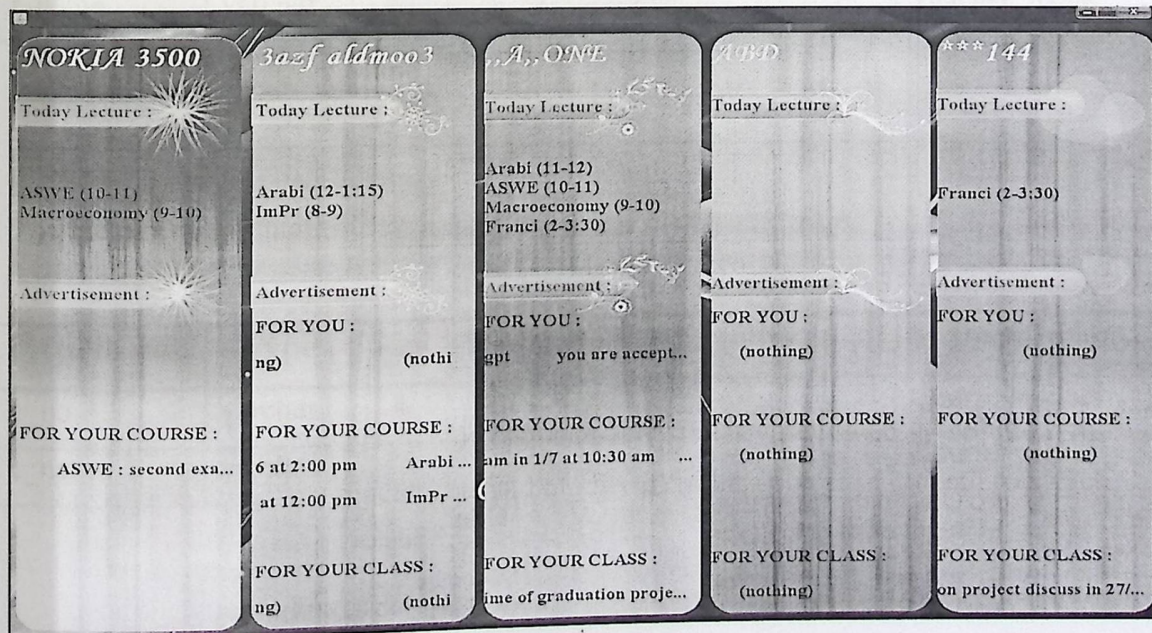


Figure (4.5) Announcements board

4.4. Database design:

In this section we will describe the system database that contains:

1. Student table:

Its contain student information including: Name, Number and Collage Number.

Attribute	Type	Size	PK	FK	reference	Description
Stdno	vvarchar	6	✓	–	–	Student number
Stdname	vvarchar	45	–	–	–	Student name
col_no	int	10	–	✓	Collage table	Collage number

Table (4.1) Student table

2. Teacher table:

This table contains information about teacher his name and number.

Attribute	Type	Size	PK	FK	reference	Description
t_no	vvarchar	6	✓	–	–	Teacher number
t_name	vvarchar	45	–	–	–	Teacher name

Table (4.2) Teacher table

3. Course table:

The course table contains the course number and the course name.

Attribute	Type	Size	PK	FK	reference	Description
c_no	vvarchar	4	✓	–	–	Course number
c_name	vvarchar	45	–	–	–	Course name

Table (4.3) Course table

4. College table:

This table about the colleges in the university, it contains college number and its name.

Attribute	Type	Size	PK	FK	reference	Description
col_no	int	10	✓	–	–	Collage number
col_name	vvarchar	45	–	–	–	Collage name

Table (4.4) Collage table

5. Section table:

This table about the courses sections it contains course number, teacher number, section number and the scheduling of that course.

Attribute	Type	Size	PK	FK	reference	Description
c_no	vvarchar	4	✓	✓	Course Table	Course number
T_no	vvarchar	6		✓	Teacher table	Teacher number
Section_no	Int	10	✓	–	–	–

Table (4.5) Section table

6. Reg_detail table:

This table contains information about the course that the student registers in; it contains course number, student number and section number.

Attribute	Type	Size	PK	FK	reference	Description
c_no	vvarchar	4	✓	✓	Section table	Course number
Stdno	vvarchar	6	✓	✓	Student table	Student number
section_no	int	10	✓	✓	Section table	Section name

Table (4.6) Reg_detail table

7. Lecture table:

This table contains information about the section that the student registers in; it contains course number, section number, day and time.

Attribute	Type	Size	PK	FK	reference	Description
c_no	varchar	4	✓	✓	Section table	Course number
section_no	int	10	✓	✓	Section table	Section name
Day	varchar	3	✓		–	Day name
Time	varchar	15	✓		–	Lecture time

Table (4.7) Lecture table

8. Mac address table:

This table contains information about the Bluetooth Mac address, it contains Mac address, student or teacher number and the type is he teacher or student.

Attribute	Type	Size	PK	FK	reference	Description
Mac	varchar	15	✓	–	–	Bluetooth address
No	varchar	6	–	–	–	Teacher/Student number
Type	int	10	–	–	–	Is he teacher or student?

Table (4.8) Mac address table

9. Announcements table:

This table contains the Announcements that will be displaying in the board, it contains the text of announcements, the number to identify the type of announcements, section number if the announcements belong to course, or the college number if the announcements belong to the student class and the expire date for this announcements.

Attribute	Type	Size	PK	FK	reference	Description
Text	text	max	-	-	-	text of announcements
No	varchar	6	✓	-	-	Identify announcements number
section_no	int	10	-	-	-	Section number if no = course number Collage number if no = class number
exp_date	datetime	-	✓	-	-	Expired date

Table (4.9) Announcements table

10. Account table:

This table contains the accounts of web page users it contains the id of the user, its password and its type is he teacher or administrator.

Attribute	Type	Size	PK	FK	reference	Description
userId	varchar	6	✓	-	-	User id
Pass	varchar	45	-	-	-	password
Type	int	10	-	-	-	Is he teacher or admin?

Table (4.10) Account table

10. ER model:

The following diagram shows the tables and the relationship between them.

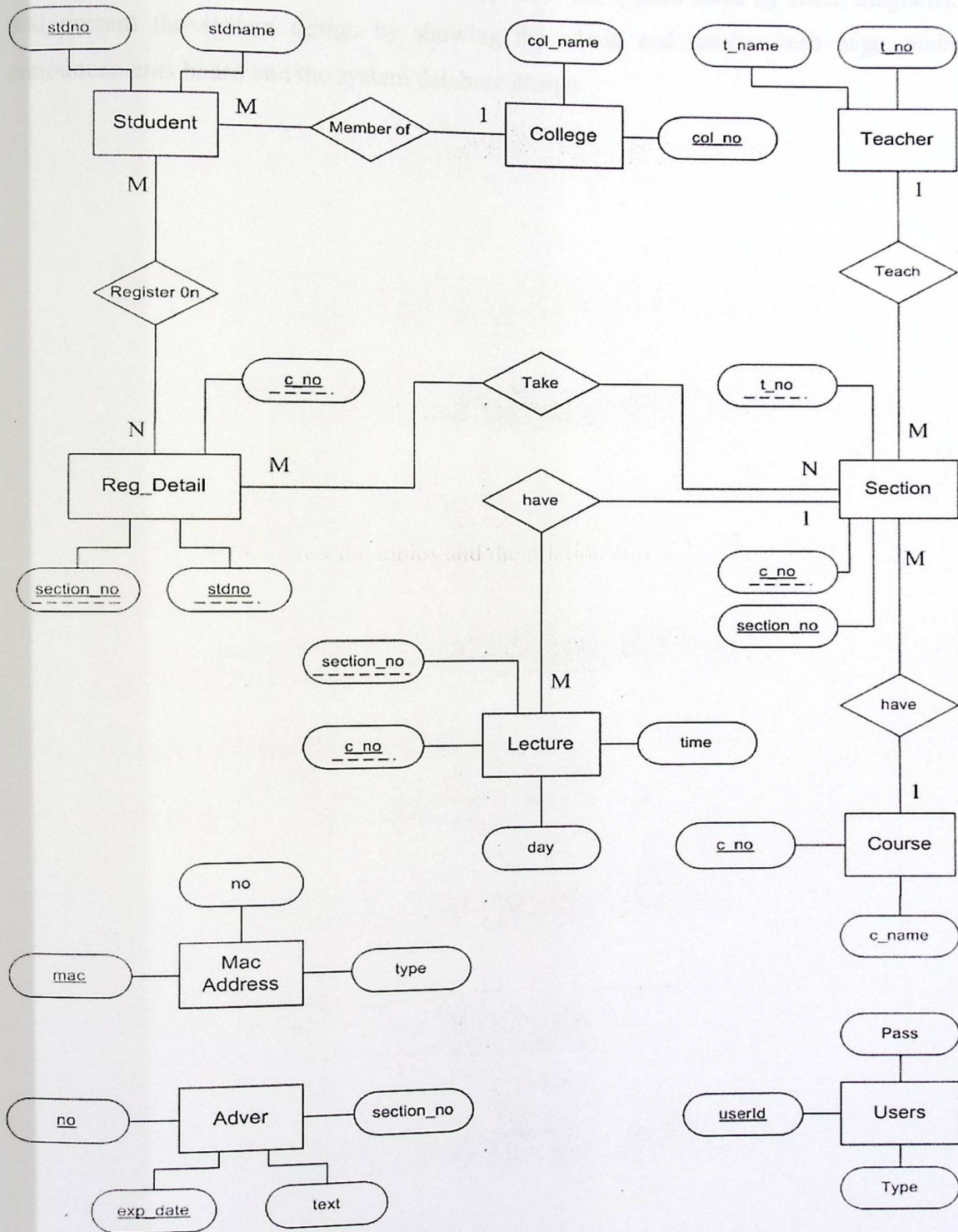


Figure (4.6) ER model

4.5. Summary:

In this chapter, the team present an over view how the system work by UML diagrams, and present the system design by showing the admin and teacher web page, main announcements board and the system database design.

System Implementation

5.1. Introduction

5.2. Resources

5.3. Project building

5.4. Project implementation

5.5. Summary

Chapter Five:

System Implementation

5.1. Introduction

5.2. Resources

5.3. Project building

5.4. Project implementation

5.6. Summary

5.1. Introduction:

Implementation is very important stage in the development process of any system; because the system in it changes from analysis phases to working phases, in this stage the team prepare the important physical and software recourses for programming the system completely. In this chapter, the team will show the physical and software recourses that's the system need to be implemented.

5.2. Resources:

5.2.1. Hardware resources needed to develop the system:

In this part, we must sure that all hardware resources are available and justify the need of system development process like:

- Computer Pentium 4 with this components:
 1. CPU with 1800 MHz in minimum.
 2. Ram with 256 MB.
 3. Hard disk with 80 GB to store the announcements text.
 4. Modem 56 KB.
 5. Data show to display announcements.
 6. Bluetooth device (sensor) USB.
 7. Mobiles have Bluetooth.

5.2.2. Software resources to develop the system:

In this part, the team prepare all software resources that the system need to be developed include Ms Office, windows XP, net beans with JDK 1.6, Mysql server with connector for java, Blue Cove and apache tomcat server.

1. Windows XP professional:

Its strong, high quality and performance operating system, it support many application and internet software, it also provided by a protection system so you can browse internet without faring of lost of your privacy.

2. **JDK 1.6:**

Java SE Development Kit 6u14.

3. **Net Beans 6.5:**

Net beans is a very strong program for java application development, it's also support other languages like C++, we use with this recourse JDK 1.6.

4. **Apache Tomcat 6:**

Apache is server used in web application development using java language its free source server and easy to use and configure.

5. **Ms Office 2003:**

It contains the word processor (Ms Word) which is used for documentation phase and (Ms Visio) for drawing charts used in project.

6. **My SQL server:**

My SQL is database server used for store announcements, user accounts, student and teacher and college information.

7. **Mysql connector java 5.1.7 bin:**

This is JAR file to connect java with My SQL server.

8. **Blue Cove 2.0.2:**

Blue Cove is an open source Java implementation of JSR-82 (i.e. BT API) that interfaces with the BT stack in the operating system.

Now this is the way that how the system work:

For the Desktop application:

- Install JDK 6.1.
- Install Net Beans 6.5 in your pc.
- Install Mysql server in your PC and use the file backup.sql to copy system database in My SQL server.

Database called "db" contains the following tables:

- Student Table:

Column Name	Datatype	NOT NULL	AUTO INC	Flags	Default Value	Comment
stdno	VARCHAR(6)	✓		<input type="checkbox"/> BINARY	NULL	
stdname	VARCHAR(45)	✓		<input type="checkbox"/> BINARY	NULL	
col_no	INT(10)	✓		<input checked="" type="checkbox"/> UNSIGNED <input type="checkbox"/> ZEROFILL	NULL	

Figure (5.1) Student table

- Teacher Table:

Column Name	Datatype	NOT NULL	AUTO INC	Flags	Default Value	Comment
t_no	VARCHAR(6)	✓		<input type="checkbox"/> BINARY	NULL	
t_name	VARCHAR(45)	✓		<input type="checkbox"/> BINARY	NULL	

Figure (5.2) Teacher table

- Course Table:

Column Name	Datatype	NOT NULL	AUTO INC	Flags	Default Value	Comment
c_no	VARCHAR(4)	✓		<input type="checkbox"/> BINARY	NULL	
c_name	VARCHAR(45)	✓		<input type="checkbox"/> BINARY	NULL	

Figure (5.3) Course table

- Collage Table:

Column Name	Datatype	NOT NULL	AUTO INC	Flags	Default Value	Comment
col_no	INT(10)	✓	✓	<input checked="" type="checkbox"/> UNSIGNED <input type="checkbox"/> ZEROFILL	NULL	
col_name	VARCHAR(45)	✓		<input type="checkbox"/> BINARY	NULL	

Figure (5.4) Collage table

- Section Table:

Column Name	Datatype	NOT NULL	AUTO INC	Flags	Default Value	Comment
c_no	VARCHAR(4)	<input checked="" type="checkbox"/>		<input type="checkbox"/> BINARY	NULL	
t_no	VARCHAR(6)	<input checked="" type="checkbox"/>		<input type="checkbox"/> BINARY	NULL	
section_no	INT(10)	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/> UNSIGNED <input type="checkbox"/> ZEROFILL	NULL	

Figure (5.5) Section table

- Reg_detail Table:

Column Name	Datatype	NOT NULL	AUTO INC	Flags	Default Value	Comment
c_no	VARCHAR(4)	<input checked="" type="checkbox"/>		<input type="checkbox"/> BINARY	NULL	
stdno	VARCHAR(6)	<input checked="" type="checkbox"/>		<input type="checkbox"/> BINARY	NULL	
section_no	INT(10)	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/> UNSIGNED <input type="checkbox"/> ZEROFILL	NULL	

Figure (5.6) Reg_detail table

- Lecture Table:

Column Name	Datatype	NOT NULL	AUTO INC	Flags	Default Value	Comment
c_no	VARCHAR(4)	<input checked="" type="checkbox"/>		<input type="checkbox"/> BINARY	NULL	
section_no	INT(10)	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/> UNSIGNED <input type="checkbox"/> ZEROFILL	NULL	
day	VARCHAR(3)	<input checked="" type="checkbox"/>		<input type="checkbox"/> BINARY	NULL	
time	VARCHAR(15)	<input checked="" type="checkbox"/>		<input type="checkbox"/> BINARY	NULL	

Figure (5.7) Lecture table

- Mac address Table:

Column Name	Datatype	NOT NULL	AUTO INC	Flags	Default Value	Comment
mac	VARCHAR(15)	✓		<input type="checkbox"/> BINARY	NULL	
no	VARCHAR(6)	✓		<input type="checkbox"/> BINARY	NULL	
type	INT(10)	✓		<input checked="" type="checkbox"/> UNSIGNED <input type="checkbox"/> ZEROFILL	NULL	

Figure (5.8) Mac address table

- Announcements Table:

Column Name	Datatype	NOT NULL	AUTO INC	Flags	Default Value	Comment
text	TEXT	✓			NULL	
no	VARCHAR(6)	✓		<input type="checkbox"/> BINARY	NULL	
section_no	INT(10)			<input checked="" type="checkbox"/> UNSIGNED <input type="checkbox"/> ZEROFILL	NULL	
exp_date	DATETIME	✓			NULL	

Figure (5.9) Announcements table

- Account Table:

Column Name	Datatype	NOT NULL	AUTO INC	Flags	Default Value	Comment
userId	VARCHAR(6)	✓		<input type="checkbox"/> BINARY	NULL	
Pass	VARCHAR(45)	✓		<input type="checkbox"/> BINARY	NULL	
Type	INT(10)	✓		<input checked="" type="checkbox"/> UNSIGNED <input type="checkbox"/> ZEROFILL	NULL	

Figure (5.10) Account table

- Copy bluecov-2.0.2.jar and mysql-connector-java-5.1.7-bin to this path C:\Program Files\Java\jdk1.6.0_12\jre\lib\ext\
- Go to start -> control Panel -> System -> Advanced -> Environment Variables under System variables : New ->
Variable name: CLASSPATH

Variable value: C:\Program Files\Java\jdk1.6.0_12\jre\lib\ext\mysql-connector-java-5.1.7-bin.jar

For administrator use the JSP web page:

- After installing net beans 6.5 you must install some plug INS like JSF frame work and tools for web application development.
- Install apache tomcat 6.5 for hosting the web application.

5.3. Project building:

1. The team uses Net Beans 6.5 for interface design for both web and desktop application, for the desktop application the users have two categories the first the students, every student has permission to access his announcements and lecture scheduling. The second is the teachers; every teacher has permission to access his lecture scheduling. For the web application the system has tow account one for the teachers ant the other is for the system administrator, teachers can do the following:

- Add announcements for their courses.
- Add announcements for their students.
- Modify any announcements he want that related for his course.

The other account is for the Administrator which has full permission to access the web page and he can he do the following:

- Add announcements for any student or all students, course and college.
- Add teachers to the system.
- Add courses to the system.
- Add students to system.
- Modify all information in the system.
- Delete announcements he wants.

For the desktop application the system can do the following:

- The system can delete announcements dynamically depends on expired date.
 - Administrator can modify the system date if the college has lecture in the week end.
2. Java has been used for desktop application and JSP for web application development.
 3. The project team use MySQL server to design the database of the system.

5.4. Project running:

Condition before using the system:

Student or teacher must has record in data base contains his number.

1. View announcements by user:

Student can view his announcements and lecture scheduling by terning on his mobile Bluetooth.

The following figure shows this process.

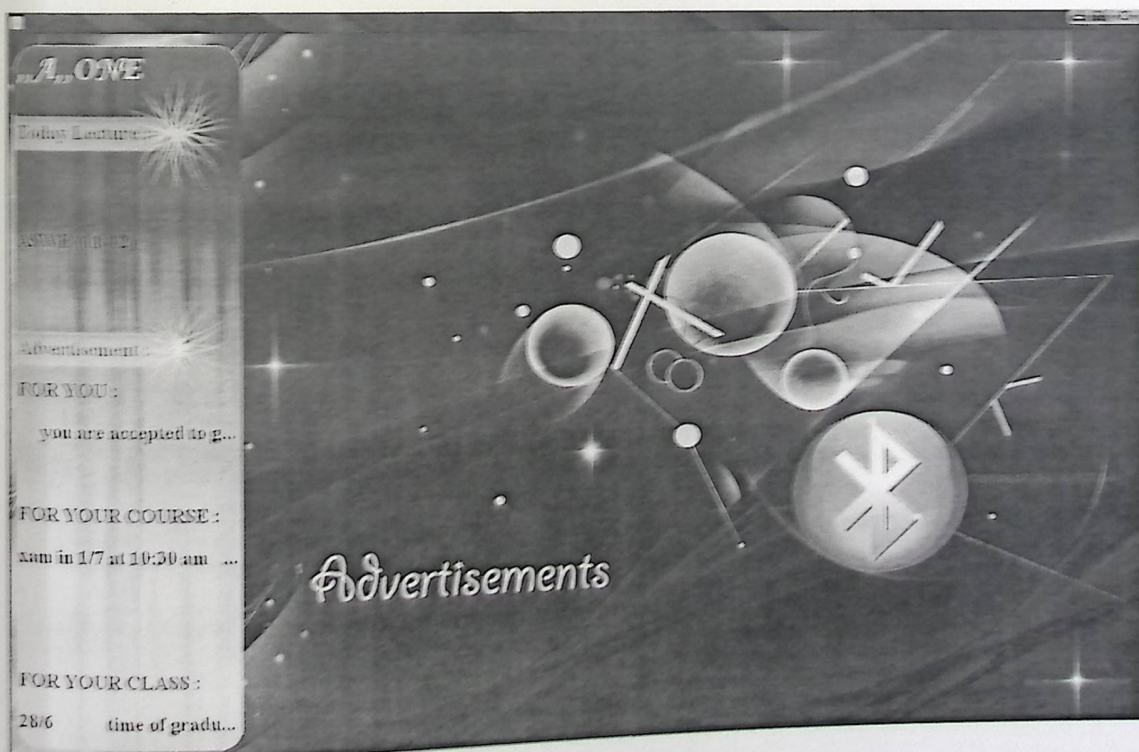


Figure (5.11) View announcements for one user

2. Many users can view the announcements:

The system also allows many users to view their announcements.

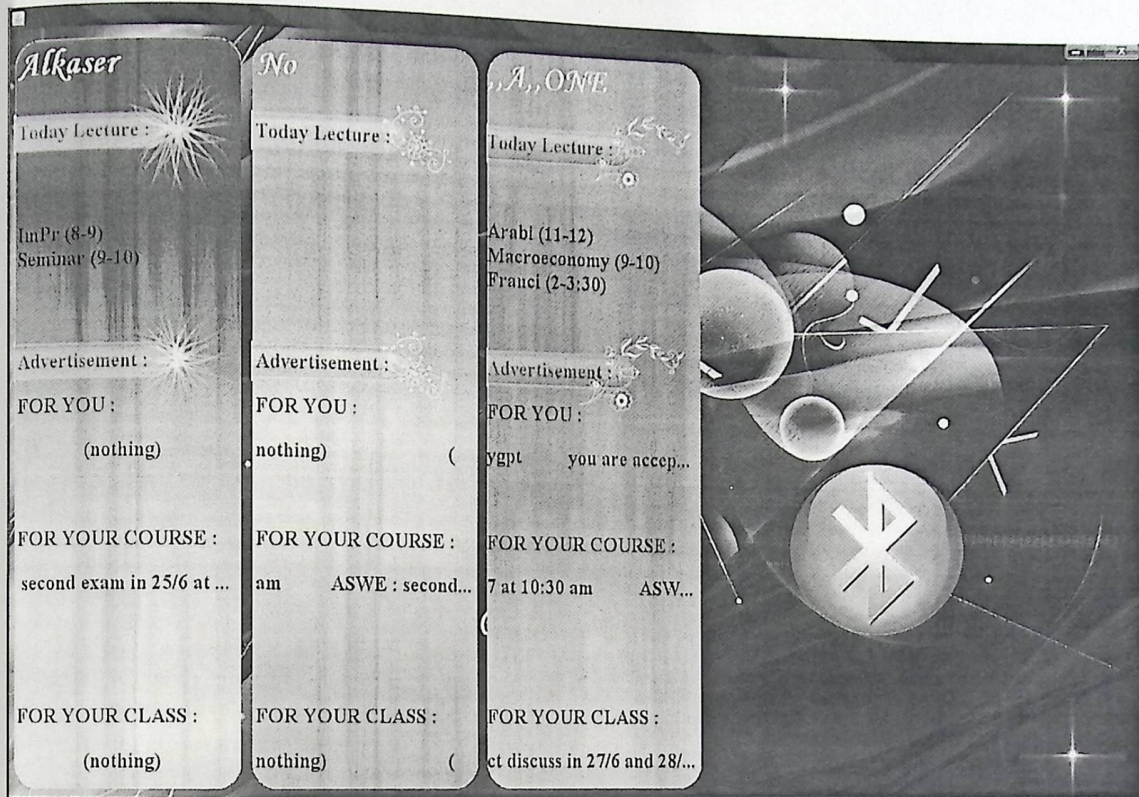


Figure (5.12) View announcements for many users

3. Add announcements to the system:

Administrator can also add announcements to the system database by using the system web page, this screen shows the adding process, the administrator insert announcement text and then define its type, if it for student he must select student name, if the announcement for course he must select the course number, he can also add announcement for all student in any college depending on college name. The administrator add expire date for all announcement he add.

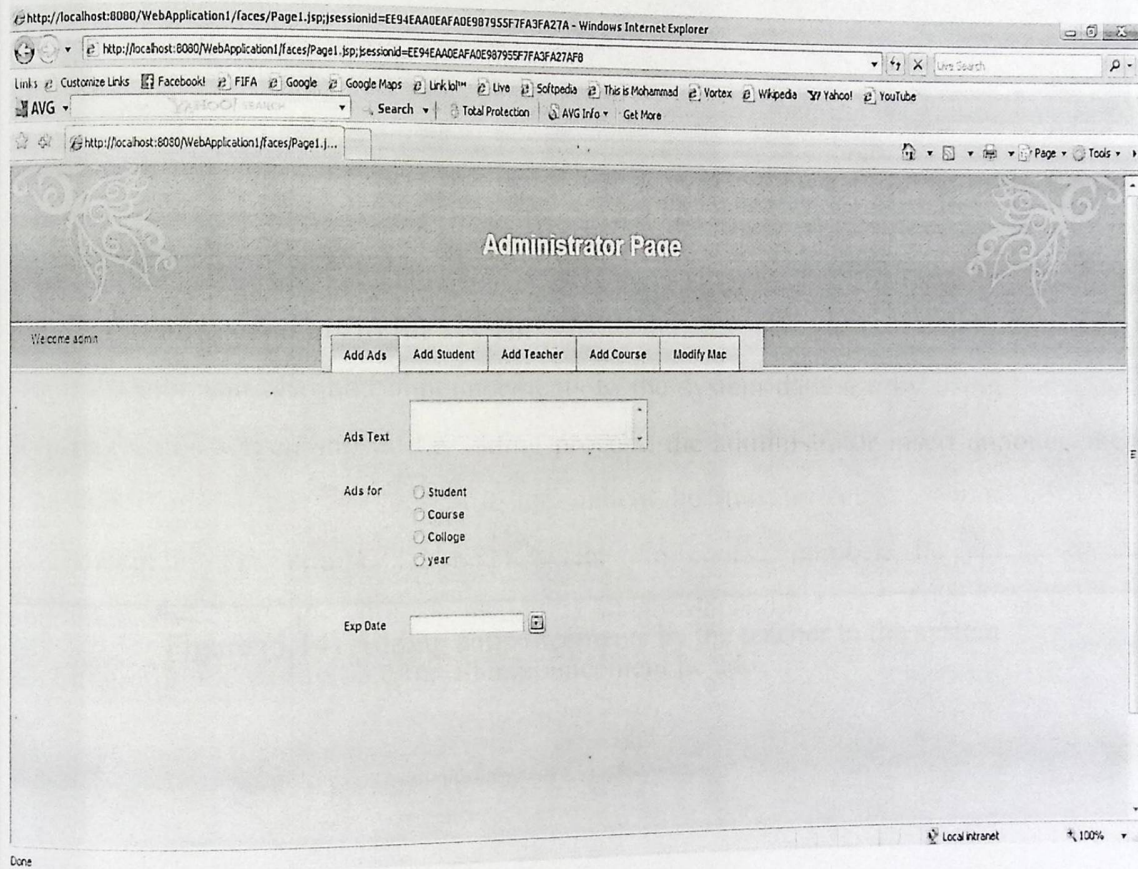
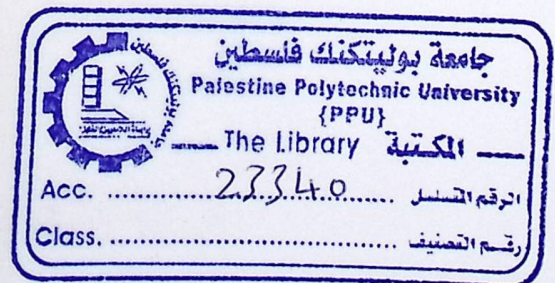


Figure (5.13) Adding announcements by the administrator to the system



Here teacher can add announcement to the system database, every teacher has account in the system, teacher can view his courses and students, the teacher can add announcement for specific student by selecting his number or all students by selecting the course number which they register in.

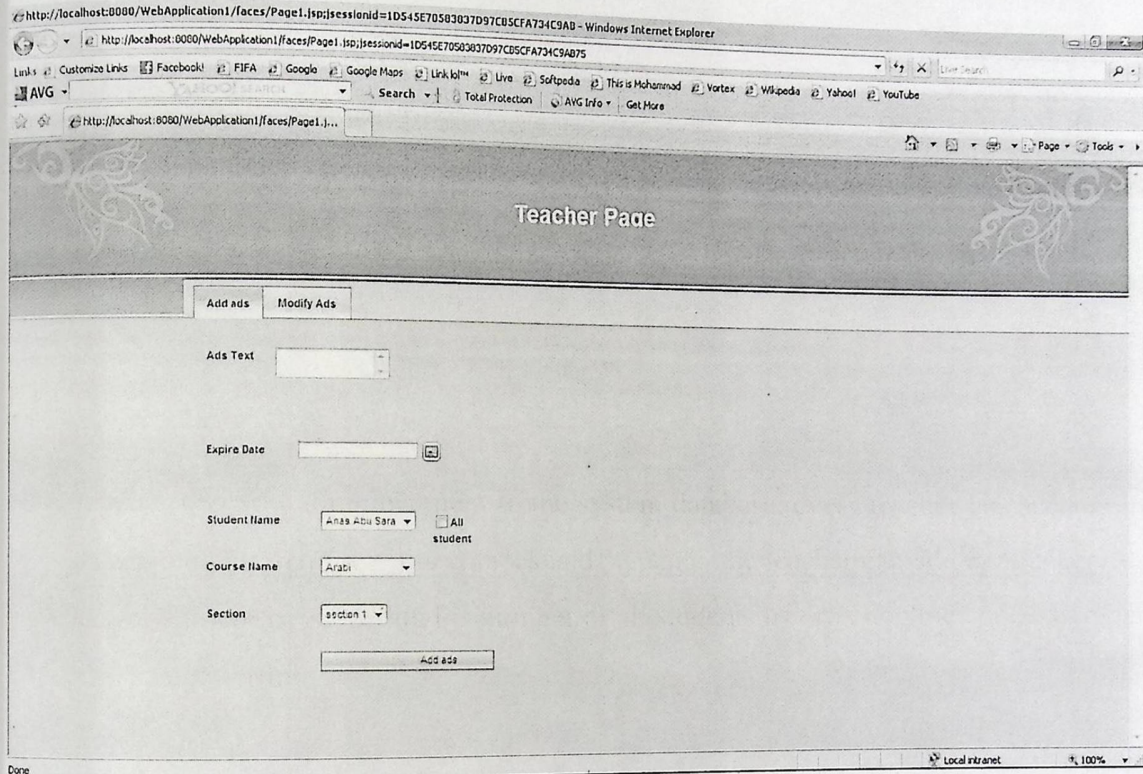


Figure (5.14) Adding announcements by the teacher to the system

4. Adding student to the system:

Administrator can add student to the system, the administrator adds the student number as integer value then his name then the college he belongs to. This page shows that:

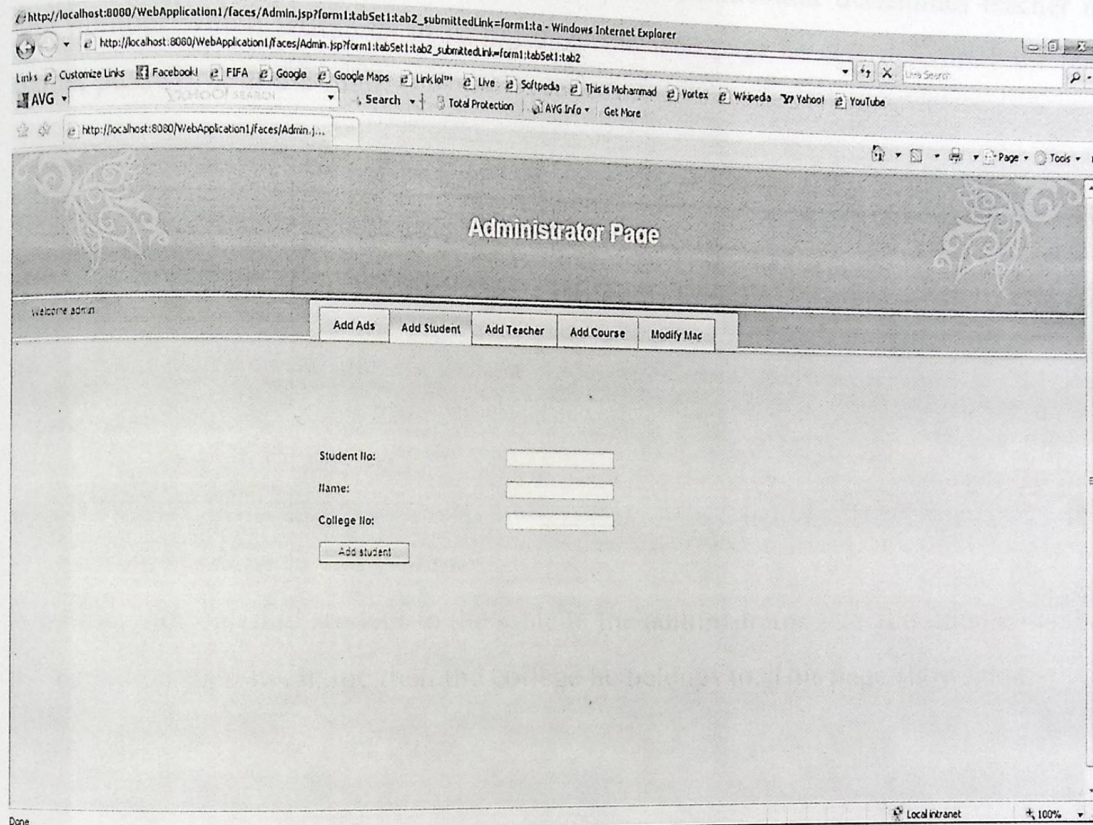


Figure (5.15) Adding student

5. Adding teacher to the system:

Administrator can add teachers to the system, teacher has account in users table to be able to log in to the system to add announcement and he can see his announcement in the displaying board in the displaying system. The administrator determines teacher name and number which works as id to log in to the web page he also determine the teacher name, password, and e-mail.

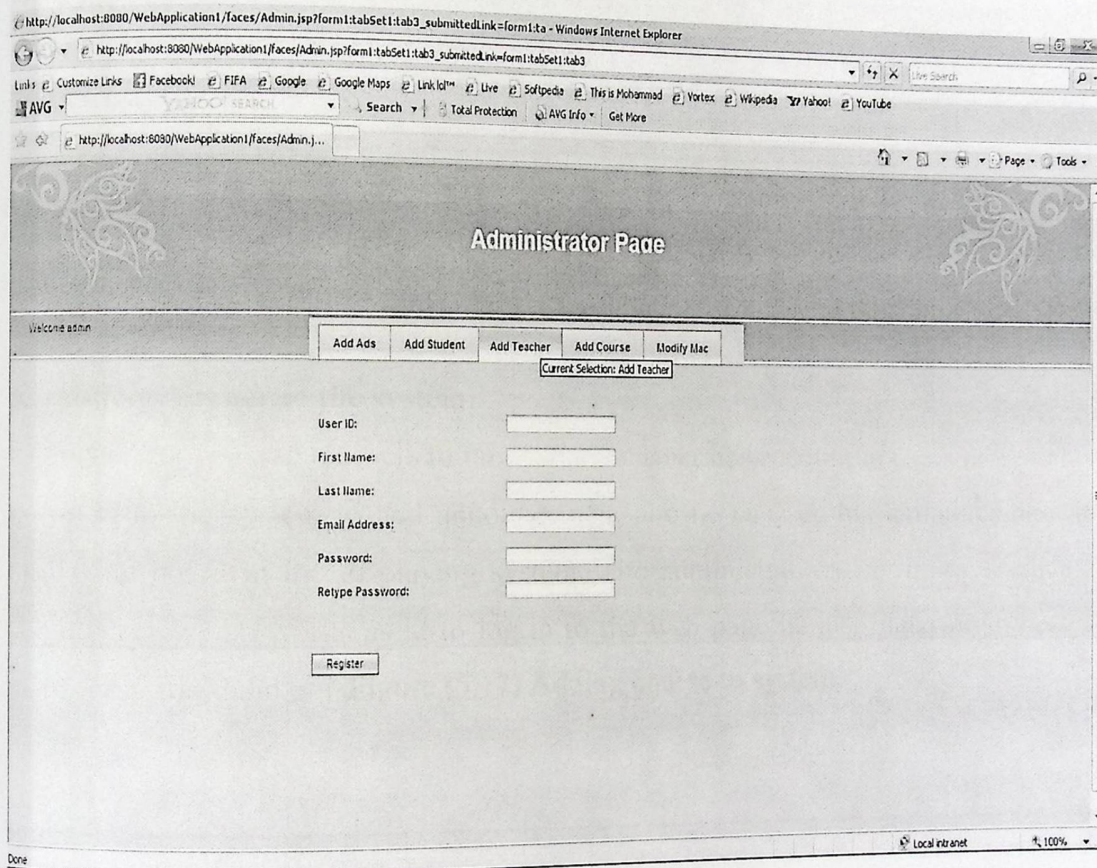


Figure (5.16) Adding teacher

6. Adding course to the system:

Adding page used by administrator to add courses to the system, the course has two values entered by system administrator which are the number and name.

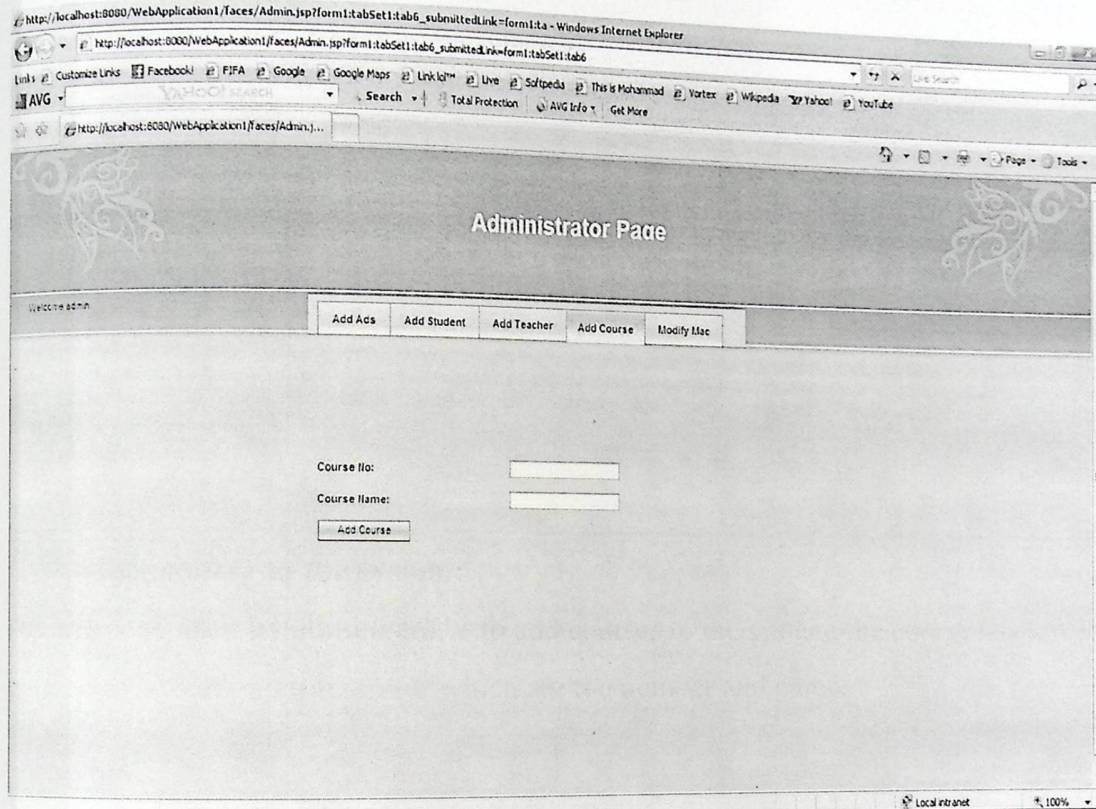


Figure (5.17) Adding course to system

7. Modifying the Mac address in the system:

In case of change the mobile the administrator can delete the old Bluetooth address and student can register the new one, the administrator enter the student number he want to change his Bluetooth address then delete the old one.

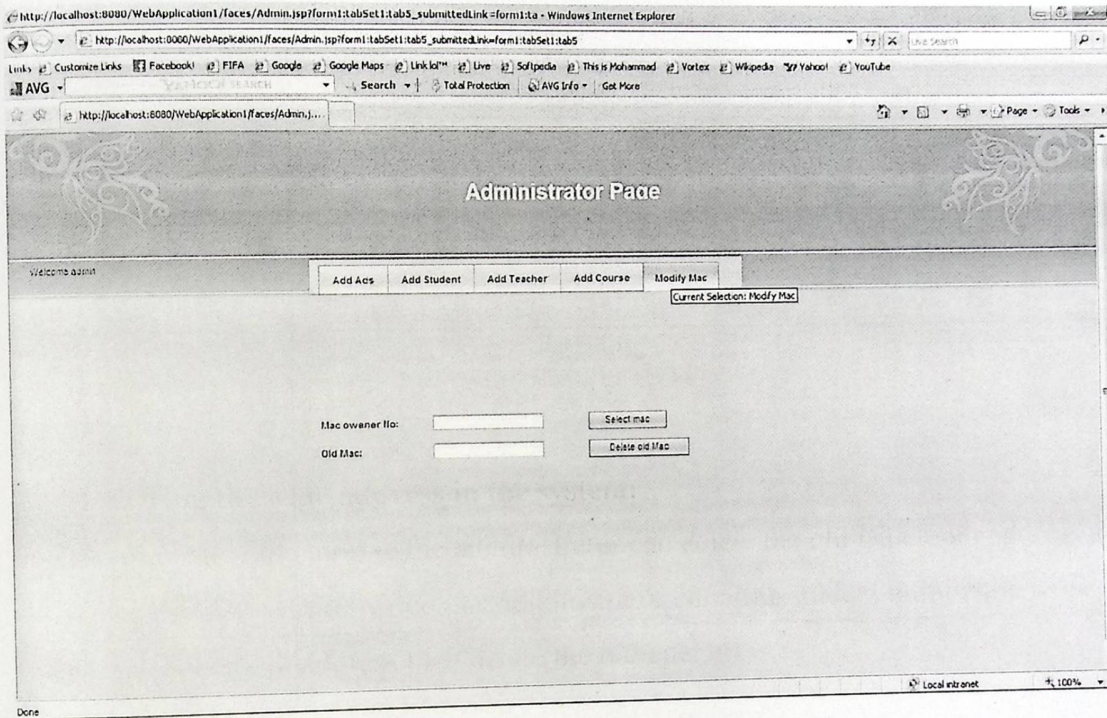


Figure (5.18) Modifying Mac address

8. Modifying/deleting announcements in the system:

Administrator or teacher can modify the announcement in the system, administrator or teacher select the announcement he want to modify, adjust any data of announcement he want then click update, if he want to delete click delete after selecting.

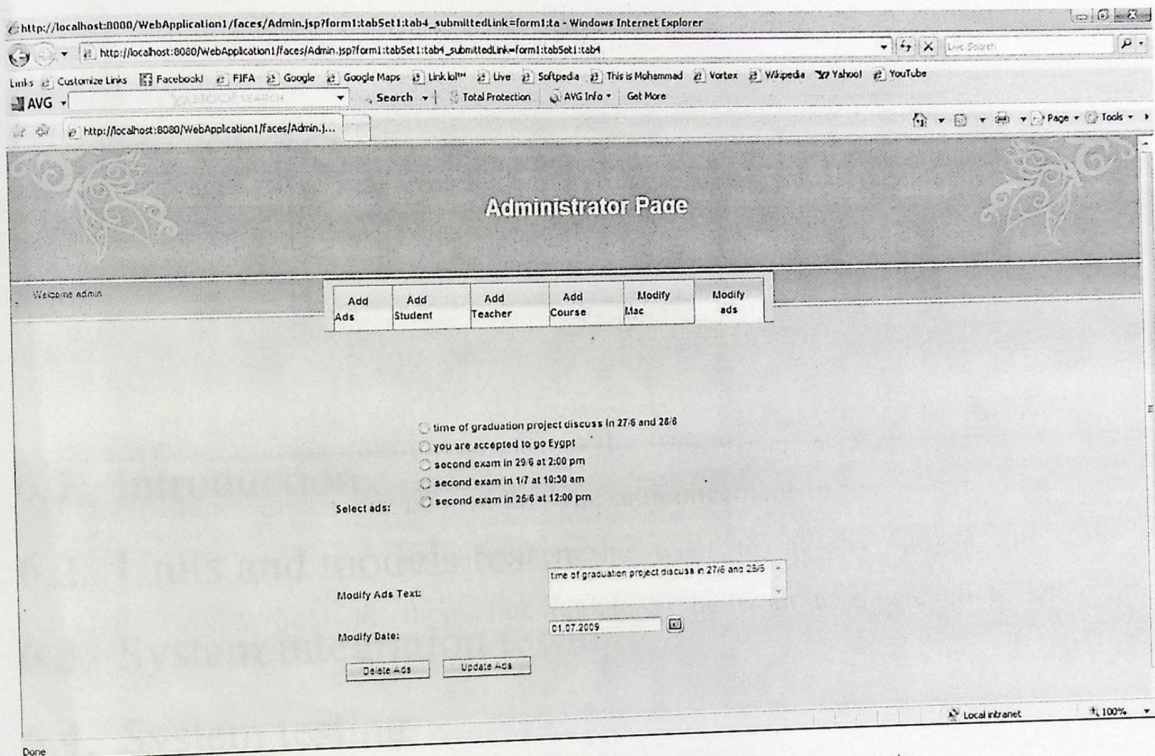


Figure (5.19) Modifying/deleting announcements

5.5. Summary:

In this chapter, we have talked about the practical side of system building, and transfer the theory side to application side. In this stage, we must prepare the hardware and software that used for system programming as a whole.

6.1. Introduction

After the end of the analyzing and programming phase of the system, the system testing

Chapter Six:

The importance of the system testing came to verify the reliability of each unit and each part of the system alone. In this chapter, we will address the stages of the testing process of the following:

1. Units and models testing
2. Integration testing
3. System testing
4. Acceptance testing

System Testing

6.1. Introduction

6.2. Units and models testing

6.3. System integration testing

6.4. System testing

6.5. Acceptance testing

6.7. Summary

6.1. Introduction:

After the end of the applying and programming phase of the system, the system testing came to ensure that the system satisfy the functional requirements, specifications and requirements that required.

The importance of the system testing came to verify the reliability of each unit and each part of the system alone; in this chapter, we will address the stages of the testing process of the following:

1. Units and models testing.
2. Integration testing.
3. System testing.
4. Acceptance testing.

6.2. Units and models testing:

In this point, start with testing each unit of the system separately to prove that it works correctly and as expected, where the system receives input and verify output.

1. Login testing:
2. test adding announcement for student:
3. test adding announcement for course:
4. test adding announcement for class and collage:
5. test show announcement for student and teacher:

The following table shows the result of login testing:

Status	Input	Expected result	Actual result
Login status to the system	User type: Admin User name: Password: 123456	Valid user name and password	Admin.jsp
Login status to the system	User type: 177 User name: Password: 123456	Valid user name and password	Teacher.jsp

Table (6.1) result of login testing

6.3. System integration testing:

In this section, the team is testing the system integration for different system component, by testing the interaction between these components or parts, for examples of these parts that the team tested by the integration of adding announcements firstly by the administrator or teacher for specific student or course that student or all students can view the announcements. Administrator can add student to system so this student can registers in the system by get closer to the announcements displaying system and the system take his Bluetooth Mac address. Administrator can add teacher too so this teacher can login to the system to add announcements or he can view his announcements in the displaying system.

The following table explain the work can the admin do it:

Status	Input	Expected result	Actual result
Admin added announcements, user, course to DB by admin web page	-Announcements text and identity who can see this announcements. - user number and name. - course number .	Valid data	-Added announcements in database. - Added user in database - Added course in database

Table (6.2) test the admin work

The following table explain the work can the teacher do it:

Status	Input	Expected result	Actual result
Teacher added announcements for own course and for student that study his course	-Announcements text and identity who can see this announcements.	Valid data	-Added announcements in database.
Bluetooth turn on	-	Valid data	teacher see his announcements

Table (6.3) test the teacher work

The following table explain the work can the student do it:

Status	Input	Expected result	Actual result
Bluetooth turn on.	-	Valid data	Student see his announcements

Table (6.4) test the student work

6.4. System testing:

After compilation of the final system form, and the end of testing phase, by the team members first, then by some students of the University of PPU, we found that the system gives few errors and very good results, such as displaying the student announcements and daily lectures in accurate way, the proportion exceeded 85%. But there were some problems that have happened, such as the system found students that away and a far from the display screen and show his announcements, at time he doesn't wait it.

6.5. Acceptance testing:

By showing the system to a number of students, and they interacted with it, and watching their announcements and daily lectures, we found a good acceptance of the system by students with respect to the interface and system use. As well as preference of modern technologies. After that we ask the students who have tested the system some question, we found that the rate of satisfaction the system is high.

6.6. Summary

In this chapter, the team has been talked about the system testing, where the team uses several types of testing.

Chapter seven:

Conclusion

After the completion of developing process of the system using Bluetooth technology, the project team achieves the goals that it has plans to do. Where the system has been developed depending on existence technology that is not utilize to display announcements for each student. In addition, the project team fined a set of recommendations that would lead to the improvement of the system and increase the efficiency of the future.

Building and developing the system by using Bluetooth technology, which enable the user to see private announcements and daily lectures in interactive way. The system allows the adding of the announcements for specific student, specific material, and specific class. In additional the system can be adding new user (teacher or student), and new course. In other hand, the administrator has full privilege to add or delete or modify any thing in the system, and the teacher has some privilege like add student, add announcements for all students, and add announcements for specific student on his course.

The system can detect Bluetooth devices for long distance.

User may be use another student Bluetooth device.

Some students have mobile without Bluetooth.

The system display announcements and daily lectures only for five students at the same time.

Implemented this system in university, at the same time can use this system for propaganda of any product and the university can be get money form the owners of this product for example the university can shift the label and use picture of 7up products .

Development the system to get many applications like Presence and absence of the students.

Development the system that use additional devices to increase interaction with the system.

In this chapter, the team has been talk about the results we have achieved in building a system of electronic advertising, and the difficulties and limitations that we faced, and then we talked about some of the recommendations for those who wanted to pursue the development of the system.

Reference:

1. <http://encyclopedia2.thefreedictionary.com/ubiquitous+computing>
2. <http://en.wikipedia.org/wiki/Bluetooth>