

Mobile Cloud Computing: Academic Services for Palestinian Higher Education Institutions (MCCAS)

Prof. Samy S. Abu Naser¹, Mahmoud Abu Ghosh², Rasha R. Atallah²

¹(Faculty of Engineering & Information Technology, Al-Azhar University, Gaza, Palestine)

²(Faculty of Information Technology, The University of Palestine, Gaza, Palestine)

ABSTRACT: *Recently, Many Palestinian higher education institutions had a successful experience in utilizing e-Services and e-learning. Most of University services are currently applied as an electronic application web. Services such as lecture schedule, exams schedule, viewing the academic information, grades report, library services, Email services, eLearning services, News and Announcements, but these services are only supported by web based applications or desktop application which restrict the access of the users using computers or laptops.*

Users need to access the University services anytime and anywhere as mobile services, so in this paper we present a system called Mobile Cloud Computing Academic Services at Palestinian Higher Education Institutions (MCCAS) which is a mobile application to facilities access.

MCCAS serve the students and the lecturers of Palestinian higher education institutions. According to a study we have done, there is a strong evidence on the readiness of academic staff and students to accept and use Academic Services on Mobile in their education environment. Also most institutions of higher education in Palestine have a suitable infrastructure, as wireless network or Wi-Fi. The study shown that students had an adequate knowledge and awareness to use technology in their education environment. Furthermore, this will support the utilization of technology in Palestinian higher education institutions. Agile methodology was adapted to develop MCCAS application. It incorporates the SDLC phases starting from the Planning, analysis, design, implementation, test and evaluation up to the Maintenance phase in each iteration.

The evaluation was conducted on 220 students and 51 person from the academic staff at 8 universities from Gaza strip and west Bank, to determine users' perception on MCCAS to measure the usability, ease of use, satisfaction. Also the results showed that MCCAS success in helping the users doing their transactions successfully and accurately any time anywhere. It is hoped that the result of this study will encourage the universities to engage MCCAS in their services. The system is evaluated by using SPSS T-independent test, Cronbach alpha and average method, the system's acceptance was 90.05%.

Keywords - *Cloud Computing, Academic Services, Mobile Application*

I. INTRODUCTION

Technological revolution change the perspective of the provision of services to users . It started to offer some services via the Internet then expand the coverage of all the services as electronica services (E-services). After that provision of services become via mobile phone as M-services (Mobile services [1][2].

Most of University Services, applied on the internet in many worldwide universities including Palestinian universities, are competitive advantages and value added for them. The University services can be classified as Registration and Admission services, Financial services, ELearning services, Email services, Library services, Exams bank services, Guide services, and Information services. Each service from those have its sub services that can be done.

Through the Registration and Admission services one can view courses, registered courses, view grade reports (Transcript); furthermore, on can display the courses schedule and exams schedule.

The Financial services show the financial report, loans and print the bonds. The Library services helps in searching for a book, allow someone to borrow a book and view the list of borrowed books.

In Palestine there are 28 Universities in Gaza strip and West bank, such as Al-Azhar Univesity, Islamic University, Al Najah University, and University Of Palestine[17,18]. These Universities use e-services.

Most of the Academic services are web application, that was clear through the result of a questionnaire which was distributed to about 947 students and 89 Academic staff, 94% said that their universities do not offer the academic services as a mobile application, also they said if it will offer 86% from them will use it, specially that 91% prefer using their mobile to open the various social media sites.

Most University services of Palestinian Higher Education Institutions are web based application, so all this services accessible from computers, but these devices are not always available, that restrict the Academic Staff and students from accessing them. They need to access the University Services periodically, anytime and anywhere.

70% of the evaluators have a smartphone with various operating system, 67% of them use android operating system, 22% use iPhone operating system, 9% use windows phone operating system, and 3% others.

The University Campuses have the required infrastructure for supporting the mobile application services, as shown on the questionnaire result that 92% have wireless internet services on their Universities.

So this study come to enable the students and academic staff to access all these services easily and quickly anytime and anywhere through Wireless using mobile application[3,6,8,9].

Mobile Cloud Computing Academic Services at Palestinian Higher Education Institutions (MCCAS) is a mobile application to provide university services for the students and academic staff. This system is applied in 8 universities: University Of Palestine, Al Azher University, Islamic University, Gaza University, Al Najah University, Al Quds University, Al Quds open University, and Birzet University.

II. TECHNICAL FUNDAMENTAL

2.1 Cloud computing

Cloud computing is on-demand computing that does not reside at the user's premise [5]. Instead, the computing resources (e.g., networks, servers, storage, services) are owned and managed by a service provider and the users access the resources via the internet. Cloud computing is web-based processing, shared resources and information provide on demand to portable devices and computers to the users for processing[7,12,13,15].

- **Software as a Service (SaaS):** The capability provided to the consumer to use the provider's applications running on a cloud infrastructure [13]. The applications are accessible from various client devices through a thin client interface such as a web browser (e.g., web-based email). The consumer does not manage or control the underlying cloud infrastructure with the possible exception of limited user-specific application configuration settings.
- **Platform as a Service (PaaS):** The capability provided to the consumer to deploy onto the cloud infrastructure consumer created or acquired applications created using programming languages and tools supported by the provider. The consumer does not manage or control the underlying cloud infrastructure including network, servers, operating systems, or storage, but has control over the deployed applications and possibly application hosting environment configurations[13].
- **Infrastructure as a Service (IaaS):** The capability provided to the consumer for provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications. The consumer does not manage or control the underlying cloud infrastructure but has control over operating systems, storage, deployed applications, and possibly limited control of select networking components (e.g. host firewalls).[12]

2.2 Web 2.0

A Web 2.0 site may allow users to interact and collaborate with each other in a social media dialogue as creators of user-generated content in a virtual community, in contrast to Web sites where people are limited to the passive viewing of content. Examples of Web 2.0 include social networking sites, blogs, wikis, folksonomies, video sharing sites, hosted services, Web applications, and mashups.[10,11,16]

III. RELATED RESEARCH (11 BOLD)

This section introduce the related works in the mobile application environment, also mobile application in academic field, and Higher education institutes.

Android Application for Islamic University Gaza (Student Portal) displaying the courses' schedule and exams' schedule for students from anywhere and anytime, also notifying the students to student lectures' schedule and exams automatically, viewing the academic information and grades report (marks transcript) for the students, providing silence schedule because most of students forget their mobile phones in normal mode during the lectures, but by the intended application, mobile phones will be automatically switched to silent mode during the lectures. But this system depends on the university Web site directly and doesn't have main activities such as semester registration and advertisement.

Android Application for Quds Open University use the smart phone technology to serve student, students can read the static data about the university without internet, but it is depends on the university Web site directly, also it doesn't have main activates such as semester registration and advertisement.

IV. MOBILE CLOUD COMPUTING: ACADEMIC SERVICES FOR PALESTINIAN HIGHER EDUCATION INSTITUTIONS (MCCAS)(11 BOLD)

Our proposed model is a mobile application for helping academic staff and students in higher education institutions to access the following services easily anywhere and anytime. Our application can deal with android, IOS, and windows phone, The system supports the Arabic and English language. The users of the application are academic staff and student. The following services are provided by MCCAS application

❖ **Student**

1. MCCAS application provide **academic service** as follows:
 - View the academic information.
 - View and registration the courses.
 - Grades report (Transcript).
 - Display the courses schedule.
 - Display the exams schedule.
 - View Study Plan.
 - View financial report
 - Remind the students with lectures and exams time automatically
 - Order academic queries.
 - Receive complaints and suggestions.
 - View academic laws and regulations.
2. MCCAS provide **Exams bank** as follows :
 - View previous exams.
3. MCCAS provide **library services** as follows :
 - Search for a book.
 - Borrow a book.
 - View the list of borrowed books.
 - Send reminder for deadline of borrowing book
4. MCCAS provide **Email service**.
5. MCCAS provide **E-Learning service**.
 - Downloading the lectures (PowerPoint, video , words)
6. View the **News and Announcements**

❖ **Academic Staff**

1. MCCAS provide **academic service** as follows:
 - View the academic information.
 - Display the courses schedule.
 - Display the exams schedule.
 - Enter student's marks.
 - View a report for the marks of courses.
2. MCCAS provide **Exams bank** as follows :
 - Provide previous exams.
 - Provide exams solution.
3. MCCAS provide **library services** as follows :
 - Search for a book.
 - Borrow a book.
 - View the list of borrowed books.
 - Send reminder for deadline of borrowing book
4. MCCAS provide **Email service**.
5. MCCAS provide **E-Learning service**.
 - Downloading the lectures (PowerPoint, video , words)
6. View the **News and Announcements**

Agile methodology [14] was used to develop MACCAS application. It was promotes collaboration between both the customers and developers to retrieve immediate feedback and to acknowledge their changing requirements swiftly. It is highly iterative, developers could easily refine each of the development phases either the ones which are completed or the one which just started anytime as appropriate.

V. INTERFACE OF MACCAS

This section display some of MACCAS interfaces.

5.1 Login Interface

This is the first screen on the application. It is the gate to the application services. In this screen student enters student ID and password to login as shown in Fig. 1.



Figure 1 the first interface is the main interface for the application, the second interface to choose your university, the third interface is for login.

5.2 Main Service Interface

The interface of MCCAS displays all services as shown in Fig. 2: academic services, library services, eLearning services, email services, exam bank services, the news and announcement, and the setting.

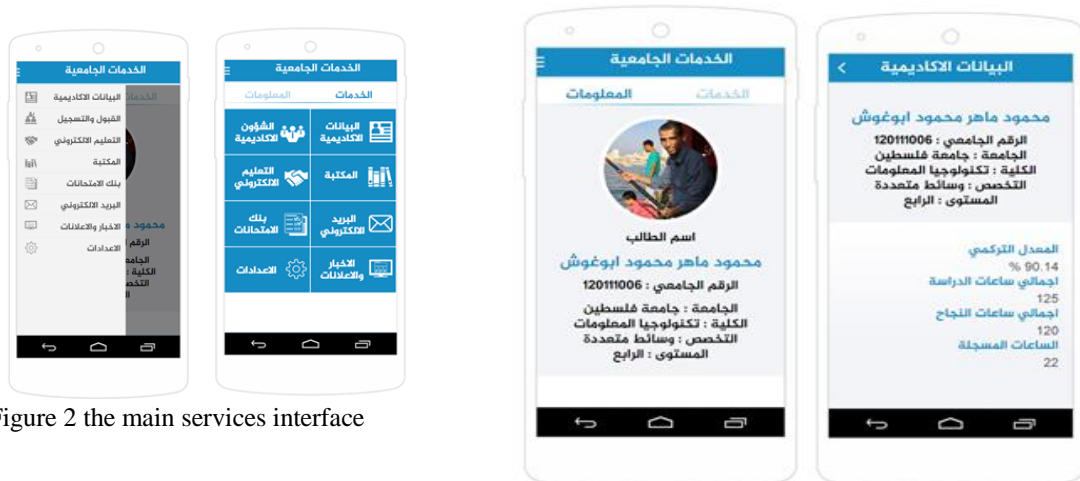


Figure 2 the main services interface

Figure 1 display the Academic Information interface

5.3 Academic Information Interface for student

Fig 3 displays the Academic Information, such as profile picture, name, Student id, University name, College name, major and the academic level, GPA, credit hours that completed, the remaining credit hours, and the registered hours.

5.4 Academic Staff Information Interface

Fig. 4 display the academic staff Information.

5.5 ELearning Interface

As shown in Fig. 5, the services of eLearning are shown such as download the lecture file, view video lecture, ask question and communicate with the teacher.

VI. EVALUATION OF THE SYSTEM

Effective evaluation uses the entire spectrum of educational and social science research methodologies[4], including surveys, face-to-face phone interviews, observations, focus groups, videotaping, audio-taping, and so on. Ideally a mixed methodology is utilized so that data can be triangulated to produce robust results.

After finishing MCCAS development, we made a survey. This survey answered by a group of academic staff and students who's used the application and answered the survey questions.

The survey answered by 220 students and 51 academic staff with different levels, gender and different phones types such as: Galaxy Tab, Galaxy S3, Galaxy S4, Galaxy Ace, Nokia Lumia 920 , iPhone 4, iPhone 4S, iPhone 5, Sony Xperia z2, Sony Xperia m and HTC.



Figure 4 Academic Staff Information Interface



Figure 5 ELearning Interface

The survey emphasize that MCCAS satisfies academic staff and student needs and run with high performance and compatible with all OS devices and achieve the main objective of our project.

89% of the students were in favor of the registration courses process were comfortable, 100% of the evaluators emphasize the view of table of exams and schedule courses were easy, 40 % said that transcript view in suitable way, 89% said it is easy to see the courses, also financial record was encouraged by 59%, the application provides academic plan 73% appropriately, but 60% support the electronic applications.

For ELearning services MCCAS provides courses files (PowerPoint) appropriately 95% and view the video lectures in appropriately 99%.

Search for a book through MCCAS accepted from users, 89% the application provides a search for a book or a scientific reference effortlessly, 59% of the user said that the application availability borrow books and reserved effortlessly, only 40% from the users said MCCAS view borrowed books properly, 90% of the users were comfortable with the way of display previous exams for the same university and 93% from display previous exams for others universities.

The users which send or receive email using MCCAS evaluate appropriately of it 90%, but the news display percentage was 70, and advertisement was 81 %.

MACCAS application support the alert system to notice the users for many issues, one of the notification was send near the time of the lecture or time of exam , it was accepted from users by 89% , 90% accepted from users for notification before the end of the period borrowing books. MACCAS used the notification for the new message received, it was accepted by 90%, finally there are a notification for the new grade, and it was accepted by 79%.

We have extracted the strong and weak points in the application.

The Strong points includes :

1. The application compatible with all OS devices.

2. The application performance accepted for students.
3. The application satisfies academic staff and students need.

However the weakness points includes:

1. A navigation in all screens for handset devices should be provided
2. A note must be used to indicate the purpose of the icon used.

The survey reflected the degree of acceptance to the application for Palestinian Higher Education Institutions academic staff and students, The system is evaluated by using SPSS T-independent test, Cronbach alpha and average method, the system's acceptance was 90.05%.

VII. CONCLUSION

In this paper, we presented a system called: Mobile Cloud Computing Academic Services at Palestinian Higher Education Institutions (MCCAS), which is a mobile application to facilitate access.

MCCAS serve the students and the academic staff of Palestinian higher education institutions. According to a study we have done, there is a strong evidence on the readiness of academic staff and students to accept and use Academic Services on Mobile in their education environment.

A survey was carried out on a group of academic staff and students who used MCCAS application and answered the survey questions.

The survey answered by 220 students and 51 academic staff with different levels, gender and different types of phones.

The survey emphasized that MCCAS satisfies academic staff and student needs and run with high performance and compatible with all OS devices and achieved the main objective of our system.

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