Mawid Application: Ministry of Health

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1 Abstract

Human life has become easier because of using technologies and mobile applications. Mobile applications can be used in different fields such as social applications, games applications, and health applications…etc. MAWID application is a health care application in Saudi Arabia provided by the Ministry of Health, it allows all citizens to make an appointment in the health center around his/her region. In addition, it allows all family members to use it by entering their Abshir information. In this paper, we are interested in making the MAWID application cover not only health centers, but also government hospitals. First, we reviewed the related research in order to structure our research questions (RQs). After that, we discussed and designed the structure of the new functions in the MAWID application. Finally, we answered the RQs.

keywords: *Make Appointments, Health Centers, Hospitals*

2 Introduction

Making appointments through the application can save time and money. The MAWID application is developed by the Ministry of Health. The application uses Abshir information in the log in process. It allows the users to view the health centers in his/her region, choose the nearest one, and choose the available time in order to make an appointment. The application has some limitations, and in this research paper we are interested to improve the performance of the application by adding an emergency function, child's vaccination and health record in the information profile, and allow the users to make a government hospital's appointment.

3 Related works

There are a variety of applications, websites, and research papers that focus on hospital appointment systems.

The research in [1] proposes to improve the hospital appointment system and reduce patient waiting time by developing an intelligent internet-based application for scheduling hospital appointments. As stated, there are many systems for a patient to make appointments, but the

difference for their system is to use the intelligent tool a neural network. In [1] the neural network is trained taking advantage of the data regarding past completed appointments. So, it is estimating the duration of new appointments, based on the clinic selected and symptoms of the patient. After that, using the estimated duration to calculate the next available time slot of the same clinic. Authors in [2] proposes a new model for automatic information collection, rule-based appointment decision making to balance demand and supply, and real-time service monitoring. In [2] the Advanced Appointment System has six elements as shown in Figure 1. By using the Strategy Module, it will give the user the recommendations to help them manually make appointments.

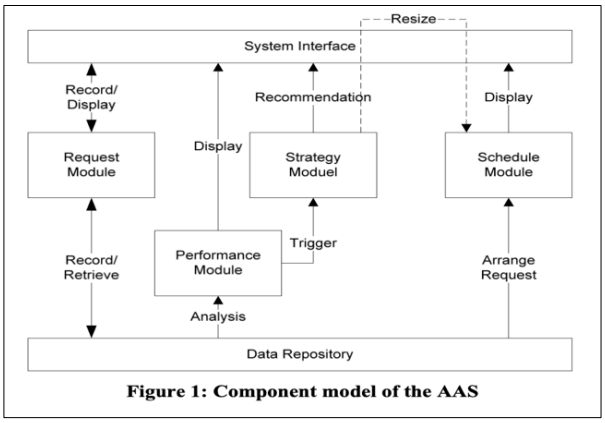

Figure 1: Component model of the AAS.

The paper [3] represents a mobile application for emergency health care by using cloud computing. Allow the user to find the nearest hospital or medical center and send to get the help then set the appointment. Authors in [4] proposes a novel secure-aware online appointment registration system. The system focuses on the security of the user information and how to achieve that. All four-researches above considered making a new appointment are the main aim of the project, but it is different in the type of appointment. Our project deals with a combination of a normal and emergency type of appointment.

The Application of Almana General Hospital [5] is very similar to the MAWID Application. However, Almana General Hospital application is specific to a particular hospital and MAWID that is completely specific to health centers only. We can take advantage of some available features in the Almana General Hospital application and apply them to the MAWID Application based on the feature's effectiveness, and the patient and doctor benefit. The BOOKNMEET [6] is an online appointment scheduling platform in India. It provides many services such as online appointment reservation, waiting list, prescriptions, and laboratory tests that can be easily accessed in the application. Moreover, this platform is similar to MAWID App in that it supports many hospitals in India, but its disadvantage is that it does not exist in the Arabic App store. Authors in [7] examined the selection group of literature about Web-based medical appointment systems, they focused on the impact of implementing Web-based medical scheduling systems dissimilar to other literature focused on fundamental theories. In [7] they reached that adopting Web-based scheduling leads to positive changes in some metrics of practices such as decreased waiting time and improved satisfaction.

The paper [8] proposed a system that manages the emergency services in hospitals that responds to two problems that occur continuously in hospitals: the large number of people uses the emergency service, and the long waiting times that puts the patient's life in danger. In [8] the system consists of a Smart Priority Recommendation and Patient Control System (SPRPC) and a Hospital Emergency Smart Band (HESB) placed in each patient to triage and detect changes in the health status of the patient, and they are in continuous communication to provide a real time monitoring of the patient's status. We will improve the MAWID application's emergence services taking into consideration the characteristics of this paper's proposed system. The authors [9] proposed a system that will store and retrieve the child's vaccination and health record, it is an online service to view this information at any time and in anywhere, also it will include a reminder system to alert parents at the vaccination due date that will continue alerting the parents till the vaccination schedule of the child is complete. In order to avoid delays in vaccination, it is important to improve the MAWID application and benefiting from the proposed system. In [10] a new appointment system is proposed and a comparison between it and the traditional appointment system is made to verify the effectiveness and stability of the new proposed system that is based on the Health Data Bank (HDB). The paper [10] it is an intelligent hospital appointment system that matches between the doctor and the patient to help patients find the most suitable doctor immediately, in addition the system will take into account the personal preferences of patient and doctor and will screen out the patients whose symptoms do not match the expertise of the candidate doctors. The proposed algorithm will help us improve the health services in the application and generate the optimal solution for appointments.

We compared all related works with our proposed application's functions. The comparison has been made by following a specific criterion in order to find a match with our idea as shown in Table 1.

Table 1: Related Work comparison.

Name of Work	**Criteria**		
	Have one or more of appointment type?	Is it for hospital and center health (medical)?	The patient enters his/her information manually?
A Web-based Application for Innovative Hospital Appointment Scheduling using Neural Network	No, one type (normal)	Not mention it	Not mention it
Design an automatic appointment system to improve patient access to primary health care	No, one type (normal)	Not mention it	Not mention it
Application of mobile cloud computing in emergency health care	Focus on emergency type	Both	No information, just chose type of user in login page.

Security-Aware Department Matching and Doctor Searching for Online Appointment Registration System	Not mention it	No, one type (hospital)	Not mention it, but the user has information of record health on cloud.
Application of Almana General Hospital	One type	No, one type (private hospital)	Manually
BOOKNMEET	One type	Both	Not mention it
Web-Based Medical Appointment Systems_ A Systematic Review	One type (mention that emergency need to human select)	Both	Not mention it
Towards Real-Time Patient Prioritization in Hospital Emergency Services	Emergence type	No, one type (hospital)	No, the system will monitor the patient's status form (SRPCP) and (HESB).
Immunize - Baby Steps for smart healthcare	No, one type (normal)	Not mention it	Not mention it
Intelligent Hospital Appointment System Based on Health Data Bank	Intelligent appointment system	No, one type (hospital)	Yes, the patient will enter the appointment information and his/her preferences

4 Research Questions

In this section, we will set the research questions (RQs) in order to answer them in the result section, and to clarify the main concept of this research. Here are the RQs:

1. What is a better way to modify appointments to include emergency cases?
2. What is a better way to (add / create) a child's vaccination and health record in an information profile?
3. What is a better way to create a government hospital's appointment?

The first RQ is to add a new function in the system for serving emergency cases. While the second RQ is to help parents on the vaccination date for their children. Lastly, the third RQ is to make the application covers government hospitals in the system.

5 Research Methodology

In this research, we will follow the Software Engineering Studies methodology. Here we will illustrate the steps of this methodology [11]:

1. System analysis:
   In the first step, we need to identify the problem definition, then the functional and non-functional requirements.

2. System design:
   In this step, we will define the architectural organization of the program, and the Application Programmer Interface (API).
3. Implementation:
   In the third step, we will work with prototyping instead of actual implementation in this research paper.
4. Validation & Maintenance.

In the final, we will answer the RQs.

5.1 System Analysis

5.1.1 Problem Definition

1. Problem Description
   Sometimes when parents are facing an emergency case with their children such as the vaccination due time, they need to make an appointment as soon as possible to the health center, and the problem here is that there is no available appointment in that day, so they select another day or go to the health center for a manual appointment. For that, they need a useful way to help them to make an appointment by selecting the type of it (emergency or not).
2. Problem Statement
   MAWID application is a health care application that serves only Saudi people to make an appointment in the health centers. In this research paper, we need to add some functionality to address the emergency cases. In addition, we need to add the child vaccination report in the system in order to help parents with their child vaccination information when they forget the paper report. Lastly, we need to modify the system in order to cover not only health centers, but also the government hospitals, so the patient will have an available appointment in the desired time with the desired hospital or health center.
   **The System's Stakeholders: All people (Saudi only), ITs.*

5.1.2 Sources of Domain Analysis Information

- Ministry of Interior: Get the user's information from the Abshir system.

5.1.3 Scope of the system

- All Saudi citizens around the Saudi Arabia cities
- All health centers around the Saudi Arabia cities
- All government hospitals around the Saudi Arabia cities

5.1.4 Functional Requirements

The functional requirements of the current Mawid Application is:

1. The system will allow the user to identify the location of the Health Center.
2. The system will allow the user to make an appointment.
3. The system will not work if there is no connection with the network.
4. The system will not identify the location if the location service is turned off.
5. The system will not show the list of functions unless the user signs in with Abshir information.
6. The system will allow the user to display booking/ upcoming appointments.
7. The system will allow the user to display the user's clinic.

8. The system will allow the user to add new dependent.
9. The system will allow the user to display new campaigns.
10. Only the IT staff can maintain the system and solve IT problems.

The functional requirements of the new version of MAWID Application are:

1. The system will allow the user to identify the type of (Health Center or Hospital).
2. The system will allow the user to identify the type of appointment (Normal or Emergency).
3. The system will allow the user to add a child's vaccination and health record to his/her information profile.

5.1.5 Non-Functional Requirements

1. The system will deal with Arabic and English languages only.
2. The system will log out if the user did not act with the system in 1 minute.
3. The system generates the data of user from other system "Abshir"
4. The system takes care of security issues.

5.1.6 Use Case Model

- Actors of the System
  - General users are:
    - (Patient) all family members -especially parents- who have an Abshir account.
    - Employees of Health Centers and Hospitals.
  - ITs staff
- Use Case Diagram

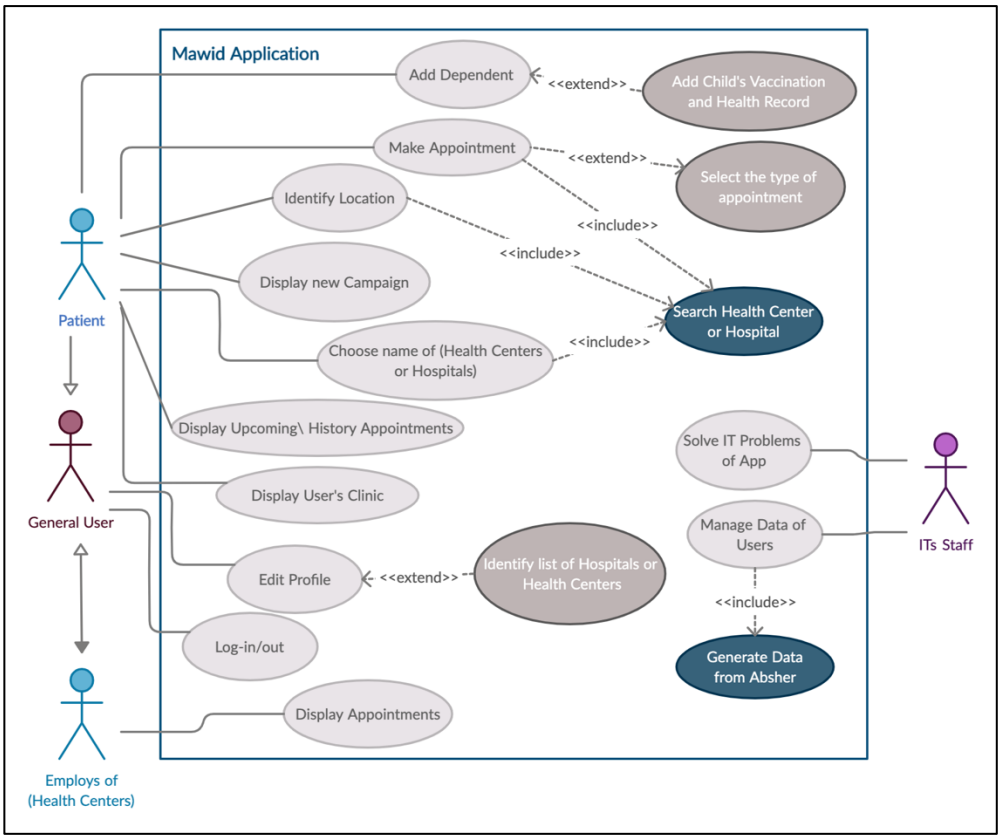

Figure 2: Use Case of Mawid Application.

5.1.7 Use Case Descriptions

Here we select three use cases in order to illustrate the new functional requirements of the system.

Table 2: Use Case Description #1

Name:	**Display the list of Hospitals or Health Centers.**
Actors:	**Patient**
Goals:	**Easy to find the list of one type (Hospitals or Health Centers).**
Preconditions:	**Log-in by Abshir account & Edit Profile.**
Summary:	**When actors choose this use case, they'll display the list of specific type only (Hospitals or Health Centers) based on actor's decision of where he/she want to make the appointment.**
Related use cases:	**None**
Steps:	***Actor actions*** | ***System responses***

	1-The patient clicks on the "Profile button". **3-The patient will switch which type they want from switch button.**	**2- The system will display the page of Profile page.** **4-The system will display the selected list on search pages.**
Post-conditions:	**None.**	

Table 3: Use Case Description #2

Name:	**Make an Appointment.**	
Actors:	**Patient**	
Goals:	**Help patients to find the suitable time to make an appointment.**	
Preconditions :	**Log-in , Select the Type**	
Summary:	**When actors choose this use case, they'll make an appointment with the (Health Center or Hospital) they want, and then display all information about the appointment.**	
Related use cases:	**Search Health Center or Hospital.**	
Steps:	***Actor actions***	***System responses***
	1-The patient clicks on the "Appointment" button. **3-The patient will click on the search button when they need to change the default.** **5-The patient writes the name of (Health Center or Hospital).** **7-The patient will choose one time for the appropriate.** **9-The patient selects the type of appointment.**	**2- The system will display the default (Health Center or Hospital) that is near to the patient.** **4-The system will display a search screen.** **6-The system will check the name.** **● False=>Re Enter the name.** **● True=>The system will display the appointment page.** **8-false=>Re select the date. True=> Return Available date.** **10-The system will send the appointment information to the employee then the employee will confirm the appointment.** **11- The system will make priority if the type is emergency.** **12- The system will save appointments and return a confirming message via mobile SMS.**

Post-conditions:	**None.**

Table 4: Use Case Description #3

Name:	**Add a child's vaccination and health record.**
Actors:	**Patient**
Goals:	**Easy to add a child's vaccination and health record.**
Preconditions :	**Log-in by Abshir account & Add Dependent.**
Summary:	**When actors choose this use case, they'll add a child's vaccination and health record to their newly added dependent.**
Related use cases:	**None**
Steps:	***Actor actions*** / ***System responses*** **1-The patient clicks on "Add dependent button".** **3-The patient will complete the dependent's information including the child's vaccination and health record.** **4-The patient click on "add button"** / **2- The system will display the add dependent page.** **5-The system will save the new dependent on patient' profile.**
Post-conditions:	**None.**

5.2 System Design

5.2.1 Model Architecture

In the following figure, the model architecture of the new function in the MAWID app is illustrated, and the steps are as follows: the user will start login to the system by entering the Abshir account login information, and then the system will invoke the information and wait for the response from Abshir database in order to compare it with the entered information, after that the system will display the "selecting type" page to let the user to choose between hospital or health center, after that the user is allowed to make an appointment, the system will invoke the appointment booking service from the cloud database and wait for the response, after that the user is allowed to choose the type

of the appointment and then set the appointment, after that the system will save the new appointment in the cloud database and return a confirmation message to the user.

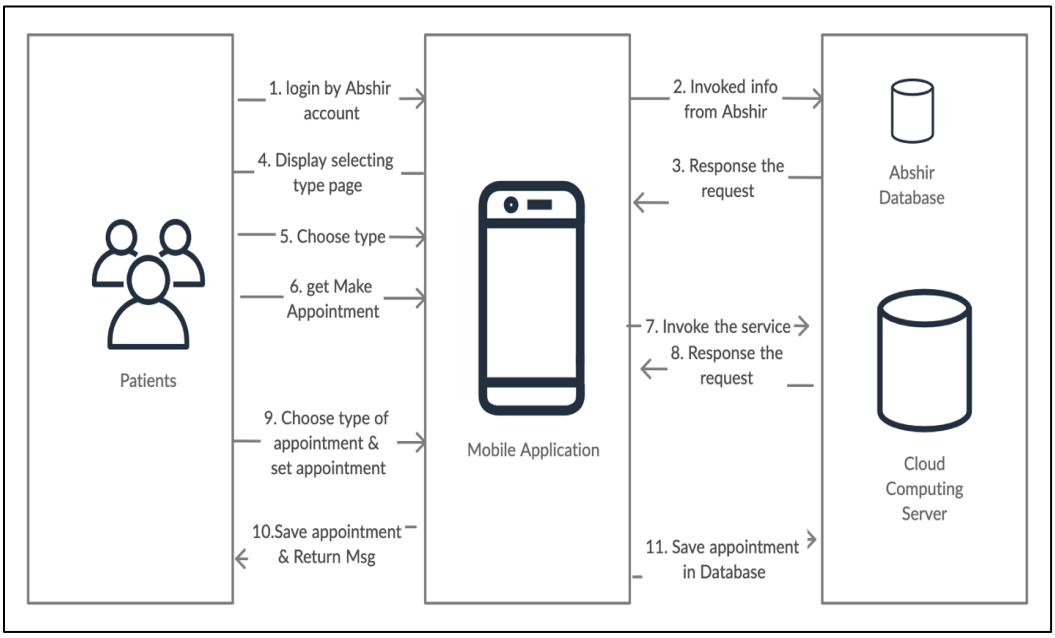

Figure 3: Model Architecture of Mawid Application.

5.3 Implementation

5.3.1 User Interface Prototype

In the appendix A, the current pages and functions of MAWID Application are presented. Here we present the prototype of the new functions in the application as seen below. The First prototype is for the new function of choosing between health centers or government hospitals for making the appointment. While the second one is for the new function of adding the child's vaccination report to the information of the new dependent. Lastly, the third prototype in the right is for the new function where the user can choose if he/she is facing an emergency case.

Figure 5: User Profile in Mawid Application with Chosen Button.

Figure 4: Page of Adding new independent with Add child's vaccination.

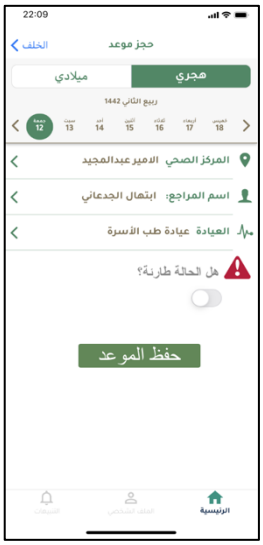

Figure 6: Page of Make New Appointment with Select Type of it.

5.3.2 Platforms Environments

[3] The developers usually use a specific programming language and platform for a specific operating system. Therefore, if the client wants the application to work on different mobile devices with different operating systems, then the application will work with one specific environment as seen in Figure 7. This method takes a long time and cost when a client has multiple mobiles with different OSs. For that, the developer resorted to cross-platform mobile development to decrease the costs and time. Cross-platform mobile development is a useful tool to increase the speed of the development, it is one code inside one platform and it will be used on multiple different OSs as seen in Figure 8.

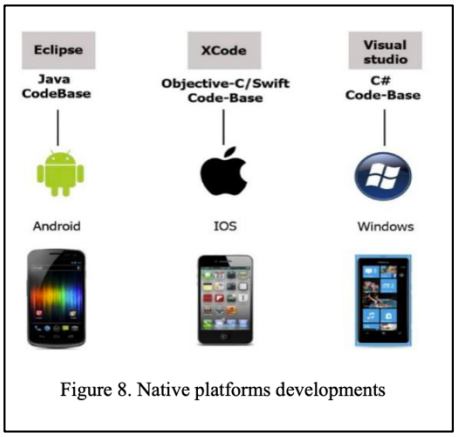

Figure 7: Native Platform Developments.

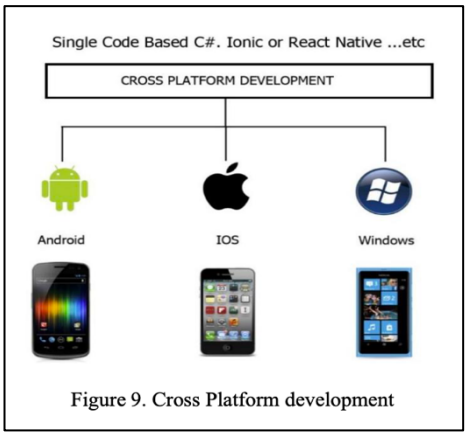

Figure 8: Cross Platform Development.

6 Result

- **What is a better way to modify appointments to include emergency cases?**
  Emergency cases are very important and need to act quickly to not puts the patient's life in danger, so these cases must have a higher priority in dealing with them. For these reasons, this paper [8] proposed a real time system that consists of a Smart Priority Recommendation and Patient Control System (SPRPC) and a Hospital Emergency Smart Band (HESB) placed in each patient to provide a real time monitoring of patient's status, and the HESB sensors will alerts the nurse to re-evaluate the patient's status in cases where the patient's live is in danger. In this research paper, we placed a switch button in the appointment page when the patient is facing an emergency case, he/she can choose if his condition is an emergency or not to have a priority in the hospital or health center.

- **What is a better way to (add / create) a child's vaccination and health record in an information profile?**
  The addition of the child's vaccination and health record is very important, it is perishable to be damaged or lost. Such a solution is in this paper [9] where a system is proposed to store and retrieve the child's vaccination and health record, it is an online service to view this information at any time and in anywhere to avoid delays in vaccination. In this research paper, we introduce a new function for the patient, where he/she can add the child's vaccination and health record when he/she adds a dependent to his/her account. An "Add Vaccination Card" icon will appear to a patient and choose from device files then through this icon, he/she adds the child's vaccination and health record to his/her information profile.

- **What is a better way to create a government hospital's appointment?**
  MAWED application is designated specifically for health centers, and we found that it is important to add government hospitals to the application in the appointment function in order to reach government hospitals. Such a solution is in this paper [10] where a non-traditional system using a well-structured algorithm is proposed, it is based on the Health Data Bank (HDB), and will provide the optimal solution taking into account the personal preferences of patient and doctor. In this paper, we have added a new function to allow the selection of government hospitals for the appointment. When a patient wants to book an appointment, he/she can choose whether or not he/she wants government hospitals to be included in searching for a new appointment.

7 Future Work

In the future, we will add more functionality that may improve the system, make it more expand and include other types of hospitals (government and private). We hope that the developer of the MAWID application will take our ideas and add it in the real application.

8 Conclusion

In this paper, we have studied the MAWID application and its functionalities, and then found out some limitations that need to be considered in this paper. First, we reviewed the related research in order to structure our research questions (RQs). After that, we discussed and designed the structure of the new functions in the MAWID application. Finally, we answered the RQs to fully explain the main concept of this research paper.

9 Reference

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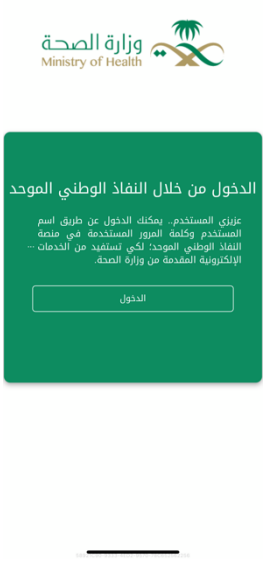
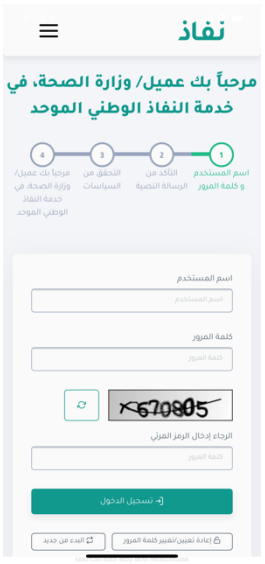
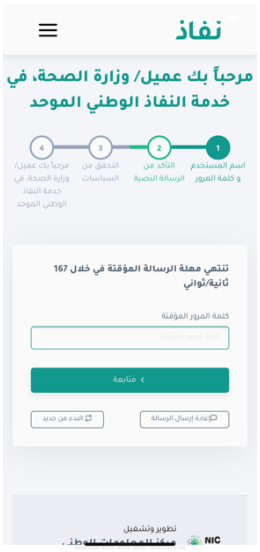
1 Appendix A


وزارة الصحة
Ministry of Health
موعد


EN
وزارة الصحة
Ministry of Health
موعد
دخول
خدمة مقدمة من وزارة الصحة
للمساعدة اتصل على ٩٣٧
الإصدار 10.7.7


وزارة الصحة
Ministry of Health
الدخول من خلال النفاذ الوطني الموحد
عزيزي المستخدم.. يمكنك الدخول عن طريق اسم المستخدم وكلمة المرور المستخدمة في منصة النفاذ الوطني الموحد؛ لكي تستفيد من الخدمات الإلكترونية المقدمة من وزارة الصحة.
الدخول


نفاذ
مرحباً بك عميل/ وزارة الصحة، في خدمة النفاذ الوطني الموحد
اسم المستخدم و كلمة المرور
التأكد من الرسالة النصية
التحقق من السياسات
مرحباً بك عميل/ وزارة الصحة، في خدمة النفاذ الوطني الموحد
اسم المستخدم
كلمة المرور
الرجاء إدخال الرمز المرئي
تسجيل الدخول
إعادة تعيين/تغيير كلمة المرور
البدء من جديد


نفاذ
مرحباً بك عميل/ وزارة الصحة، في خدمة النفاذ الوطني الموحد
تنتهي مهلة الرسالة المؤقتة في خلال 167 ثانية/ثواني
كلمة المرور المؤقتة
متابعة
البدء من جديد
إعادة إرسال الرسالة
تطوير وتشغيل
NIC


وزارة الصحة
Ministry of Health
تسجيل الدخول
الدخول


خدمة موعد
مرحبا ابتهال.
مركزك الإفتراضي هو الامير عبدالمجيد وهو مغلق الآن - سيفتح 12:00 ص الاحد.
تطعيم الإنفلونزا الموسمية
بدون موعد
اضغط هنا لمعرفة أقرب مركز صحي لك
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مواعيد سابقة
حجز موعد
مواعيد قادمة
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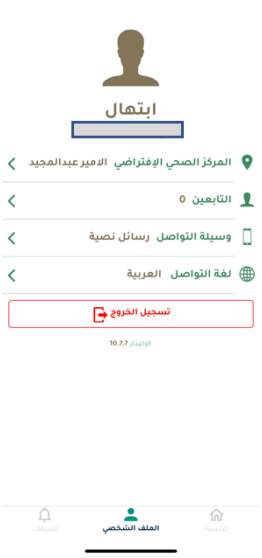
ابتهال
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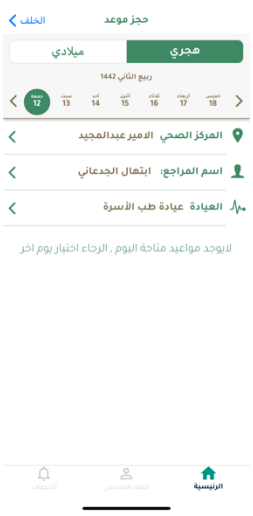
الإصدار 10.7.7
الملف الشخصي


الخلف
حجز موعد
هجري
ميلادي
ربيع الثاني 1442
المركز الصحي الامير عبدالمجيد
اسم المراجع: ايتهال الجدعاني
العيادة عيادة طب الأسرة
لايوجد مواعيد متاحة اليوم , الرجاء اختيار يوم اخر
الرئيسية


الخلف
إضافة تابع
رقم الهوية
رقم هوية التابع المراد إضافته
تاريخ الميلاد
هجري
ميلادي
جمادى الثاني 1408
رجب 1407
شعبان 1406
إضافة تابع
الملف الشخصي
الرئيسية