EUROPEAN UNIVERSITY OF LEFKE

FACULTY OF ENGINEERING

Graduation Project 2

Doctor Appointment Booking System

ALİ CAN DOĞAN

180343

A Doctor Appointment Booking System for efficiently managing patient-doctor appointments in a hospital. The system allows patients to make appointments with doctors in a particular department at a time suitable for their situation. The aim is to create a reliable, continuous and user-friendly reservation system.

Supervisor

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1.Introduction

With the innovations and widespread use of technology, people benefit from technology in every field. In the field of health, as in all other fields, technology has an important role. The spread of computers, phones and tablets is the best explanation of the point where they are found in almost every home **[1]**. Because of all these requirements, there is nothing natural until the digitalization of healthcare as well. A simple process such as making an appointment with public hospitals should be able to be done from their computers and phones. In this project, the communication between the patient and the hospital staff is organized and facilitated.

1.1 Problem definition

Building upon the accomplishments of my previous project, the primary objectives of my graduation project 2 remain focused on enhancing the relationship between patients and doctors, optimizing organizational efficiency, and ensuring traceability within healthcare settings. Through the implementation of a database-driven solution, this project aims to address the challenges encountered in traditional data storage methods, providing hospitals with a comprehensive data management system. By leveraging the working logic based on database operations, the project facilitates real-time communication, expedites processes such as reviewing medical histories and prescribing medications, and offers intuitive appointment management functionalities. Furthermore, it eliminates the limitations of human channels by creating a systematic approach that ensures accurate and efficient information exchange **[2]**.

Adopting existing solutions available in the market, this project aims to increase its effectiveness by leveraging a user-friendly interface and robust database operations. The project simplifies complex processes behind the scenes by providing users with an intuitive platform that displays appointments, schedules and statistics in a clear and understandable way. Thanks to these developments, the project aims to optimize time management, encourage efficient information exchange, and increase customer satisfaction and employee comfort..

1.2 Goals

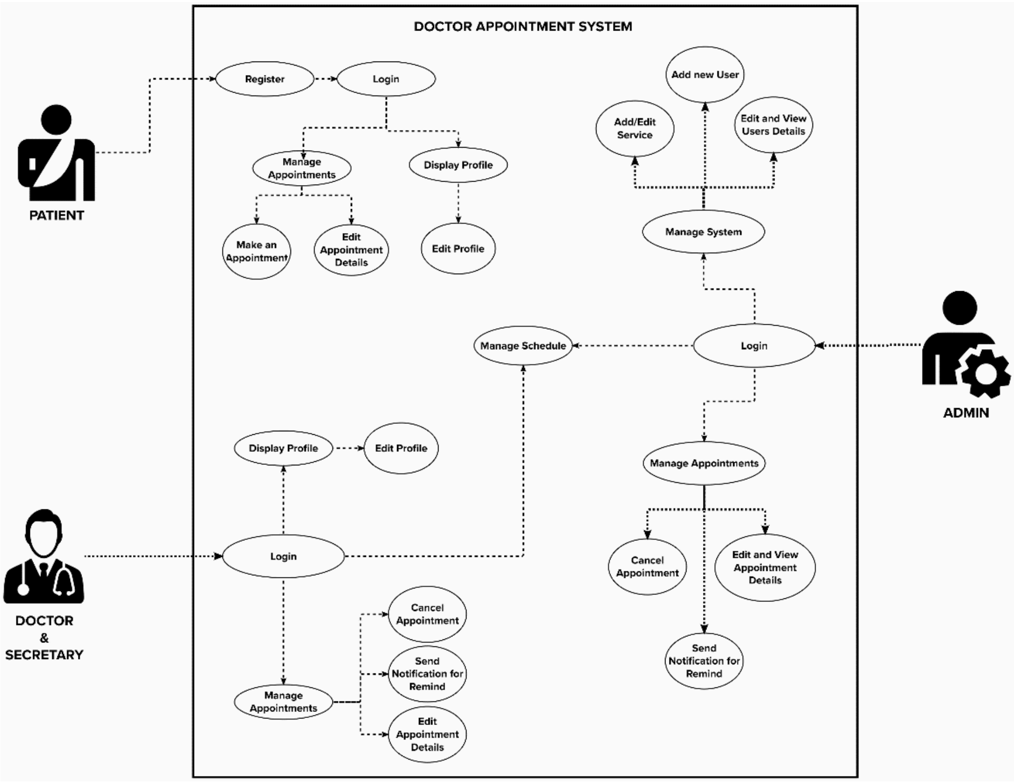
Intuitive User Interface: A key aspect of this project is designing an intuitive and user-friendly interface. The interface **[3]** will be carefully crafted to enable users to quickly locate the information they require and effortlessly interact with the system. Usability and ease of navigation will be the core principles guiding the interface design process.

Efficient Information Sharing through Database Systems: To achieve seamless communication and information sharing among doctors, secretaries, and patients, we will leverage robust database systems. The system securely stores and distributes user information and serves to provide fast communication. In this way, all users have timely access to the information they want.

Time Management and Resource Utilization: Time Management and Resource Utilization: Effective management of time, reducing costs and using minimum resources are important goals. By implementing these measures, we aim to save time, reduce costs and optimize resource allocation for all stakeholders **[4]**.

Improved Appointment Management: The new system will provide enhanced appointment management capabilities for both patients and physicians. For improvements, creating a user-friendly interface to minimize errors, manage and schedule appointments. It provides a smooth and orderly working environment by incorporating features such as appointment scheduling, cancellation and reminders.

Facilitating Improved Doctor-Patient Sessions: By effectively managing time and reducing administrative burdens, our system strives to foster better and more productive sessions between doctors and patients. The intervals between the doctor and the patient will play an important role in terms of more efficient use. In this way, you will spend more quality time.



USE-CASE DIAGRAM

2. Literature Survey

Explores the role and effectiveness of doctor appointment management systems in facilitating efficient and convenient healthcare services. These computer-based systems play a vital role in planning and managing appointments between healthcare providers and patients. The increasing demand for streamlined healthcare processes has contributed to the rising popularity of such systems.

Doctor appointment management systems offer a range of benefits for both patients and healthcare providers. For patients, these systems enable easy booking and rescheduling of appointments, along with online access to appointment details and medical records. Health care providers use these systems to reduce workload and increase the efficiency of the appointment process in order to focus more on the care of patients **[5]**.

Appointment management systems can be divided into two basic types, standalone and integrated. Standalone systems focus on appointment scheduling and management, while integrated systems offer additional functionality such as electronic prescribing and medical billing as part of more comprehensive electronic medical record systems. Previous research has extensively examined the effectiveness of doctor appointment management systems and found that these systems increase the efficiency and comfort of the appointment process, which in turn increases patient satisfaction.

While doctor appointment management systems offer many advantages, it is important to consider potential disadvantages as well. These disadvantages include the system initial cost and the need for constant maintenance and updates to ensure optimum performance.

Overall, the literature supports the view that physician appointment management systems provide significant benefits for both patients and healthcare providers. Despite disadvantages such as initial costs and implementation difficulties, the long-term benefits of these systems outweigh the potential disadvantages.Comparative analysis is conducted between three appointment scheduling software: 10to8, Picktime, and Setmore. These software solutions offer a range of features to streamline the appointment booking process and enhance overall efficiency in healthcare settings **[6]**.

10to8:

- Allows customers to book appointments online via a customizable booking page
- Integrates with Google Calendar and other calendar apps
- Automatic SMS and email reminders for customers and staff
- Offers real-time availability check
- Provides analytics and reporting on appointments and customer

Picktime:

- Provides a customizable booking page for customers to book online appointments
- Integrates with Google Calendar and other calendar apps
- Provides automatic SMS and email reminders for customers and staff
- Allows online payments through various gateways
- Offers a loyalty program and customer management tools

Setmore:

- Provides a customizable booking page for customers to book online appointments
- Integrates with Google Calendar and other calendar apps
- Provides automatic SMS and email reminders for customers and staff
- Allows online payments through various gateways

- Provides a customer relationship management (CRM) tool to manage customer data and interactions

These appointment scheduling software share common core features such as online booking, calendar integration, and automatic reminders. However, they differ in pricing, available plans, additional features and integrations.

When considering the benefits of appointment scheduling software, it's important to note the potential benefits for both businesses and customers, such as streamlining the appointment scheduling process, reducing overbooking or schedule conflicts, automating reminders to minimize no-shows. and improving overall organizational effectiveness and productivity. However, there are also potential disadvantages to consider, including the need for a reliable internet connection, software costs (if not provided for free), a learning curve for setup and use, and any limitations or restrictions on features or customization options.

Regarding project, it aims to address certain shortcomings observed in the aforementioned software solutions. Specifically, your project focuses on providing a more user-friendly, functional, and free alternative. It includes features such as appointment reminder notifications for patients, statistics for administrators, and data management for doctors and secretaries. By improving communication between doctors and patients, your project aims to enhance the efficiency of the examination process. These aspects address important gaps and align with the primary goal of appointment scheduling software: contributing to a more comfortable and practical life for users.

3. Background Information

3.1 Required software

- **PHP:**
  I will be using PHP as my primary programming language because it is widely used for web development and can easily be embedded into HTML files **[7]**.
- **HTML:**
  I have also chosen to use HTML for creating and displaying content and images on web pages in browsers **[8]**.
- **CSS:**
  CSS, another important markup language, will allow me to customize the style and appearance of my website pages according to my own rules and imagination.
- **JavaScript:**
  JavaScript will be useful for implementing complex coding on the web, reducing server interaction and response times, and improving user experience **[9]**.
- **MySQL:**
  I have selected MySQL as my database of choice because it is quick to install and manage, free to use, and commonly used in the web field, particularly in conjunction with PHP.

3.2 Other software

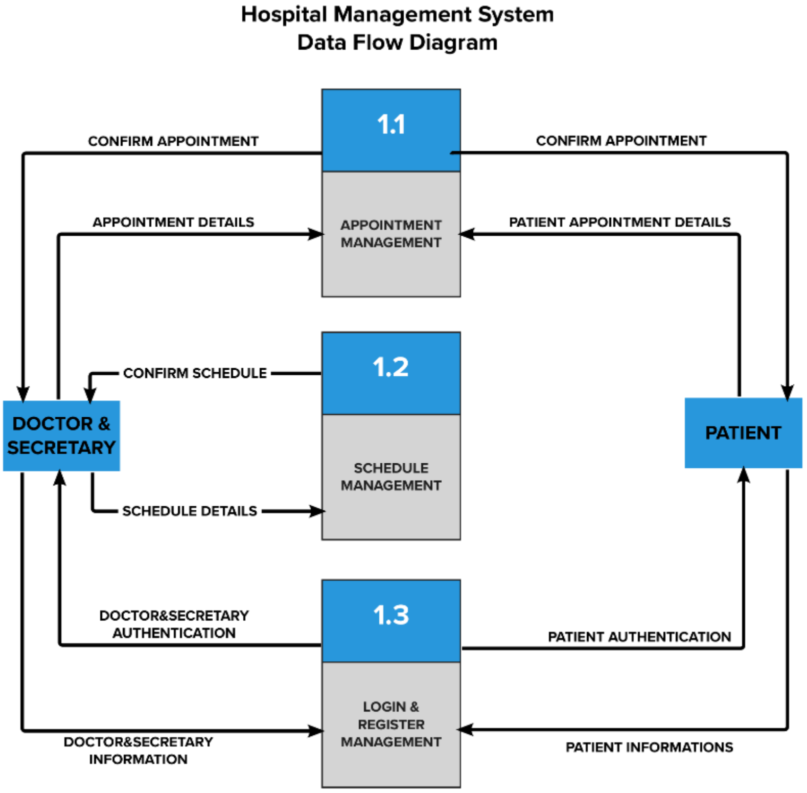
- **BitBucket:**
  I selected Bitbucket because it is a free and useful web-based network storage service that utilizes the Git version control system **[10]**.
- **Git:**
  Git is a widely used tool in software development, and it allows me to easily access previous versions of my projects by making copies of the step-by-step versions. In addition, I know that I will encounter Git frequently in my future professional life.
- **AdobeXD:**
  AdobeXD allows me to visualize and plan the interfaces of my project, and it is a very helpful resource for me **[11]**.
- **XAMPP:**
  I am using XAMPP to set up a PHP development environment for web services and establish a connection to the database. It provides me to all of the necessary software components for this purpose.

3.3 Hardware

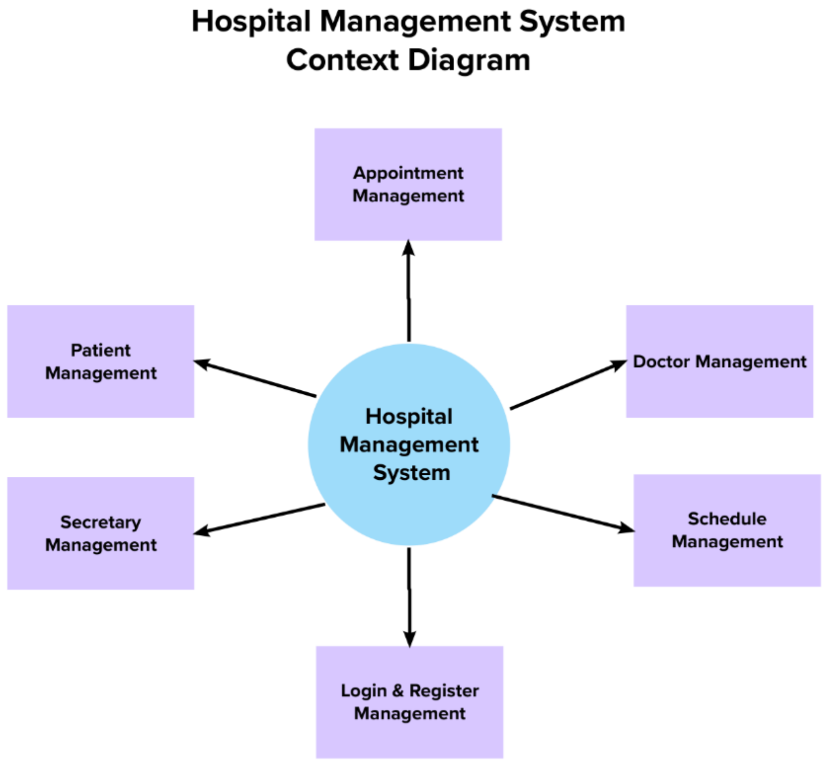
- **An up-to-date web browser:** Google Chrome, Mozilla, Microsoft Edge, Android and iOS mobile browsers.
- **An up-to-date operating system:** Windows7-8-10-11, Mac OS 10, Linux.
- **Internet connection:** An internet connection with a bandwidth of at least 1 or 2 Mbps to perform any operation.

4. Design Documents

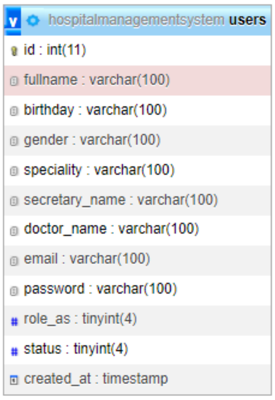
4.1 Data flow diagram

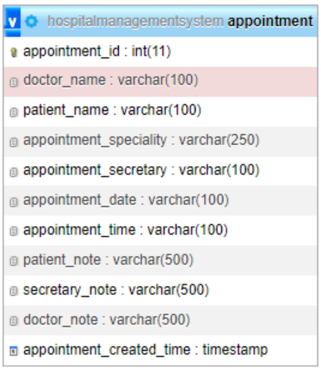


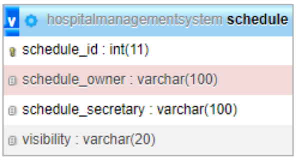
4.2 Context Diagram



4.3 Database Schemas


hospitalmanagementsystem users
id : int(11)
fullname : varchar(100)
birthday : varchar(100)
gender : varchar(100)
speciality : varchar(100)
secretary_name : varchar(100)
doctor_name : varchar(100)
email : varchar(100)
password : varchar(100)
role_as : tinyint(4)
status : tinyint(4)
created_at : timestamp


hospitalmanagementsystem appointment
appointment_id : int(11)
doctor_name : varchar(100)
patient_name : varchar(100)
appointment_speciality : varchar(250)
appointment_secretary : varchar(100)
appointment_date : varchar(100)
appointment_time : varchar(100)
patient_note : varchar(500)
secretary_note : varchar(500)
doctor_note : varchar(500)
appointment_created_time : timestamp


hospitalmanagementsystem schedule
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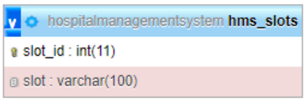
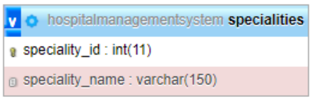
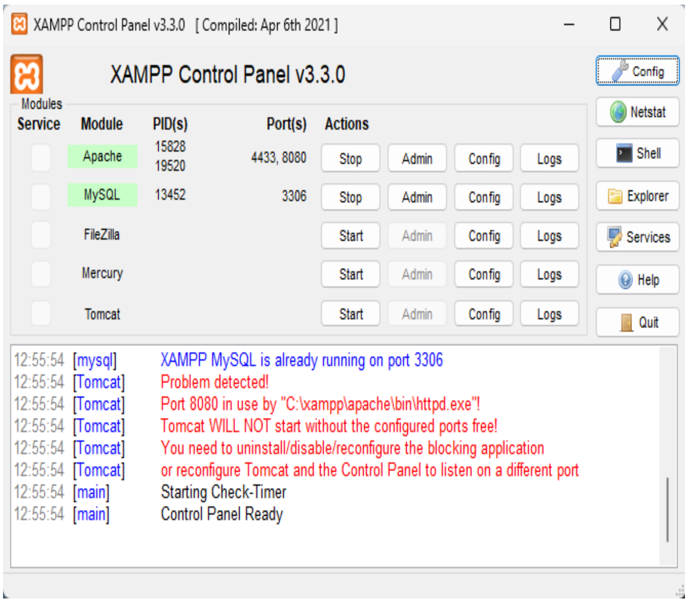
schedule_owner : varchar(100)
schedule_secretary : varchar(100)
visibility : varchar(20)


hospitalmanagementsystem hms_slots
slot_id : int(11)
slot : varchar(100)


hospitalmanagementsystem specialities
speciality_id : int(11)
speciality_name : varchar(150)

5. Methodology

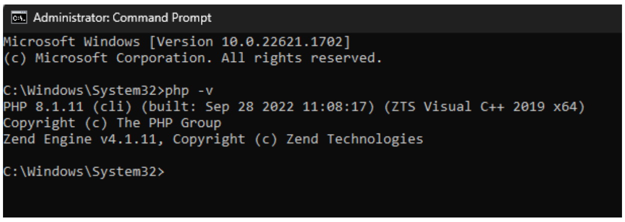
5.1 Installation Process: I first started the project by downloading the files and applications I needed throughout the process. PHP, Visual Studio Code and XAMPP. Creating a working environment and adapting yourself to that environment brings success. For this reason, I tried to set up the best practices and environment for the web project**.**

XAMPP Installation:	**XAMPP Control Panel Interface:**
1. Go to the XAMPP website at https://www.apachefriends.org/index.html. 2. Click on "XAMPP for Windows" button. 3. Download the file and double-click on it to open the setup window. 4. Click "Next" and choose the components you want to install. 5. Click "Next" and select the installation location. 6. Click "Next" and uncheck the "Learn more about Bitnami" box. 7. Click "Next" to start the installation. 8. Click "Finish" when prompted and the XAMPP Control Panel will open. 9. Choose a language and click "Save" to open the main Control Panel page. 10. To start XAMPP in the future, open the installation folder, right-click the xampp-control icon, select "Run as administrator," and click "Yes" when prompted. 11. If Apache refuses to run, click "Config" next to "Apache" heading, select "Apache (httpd.conf)," find the "Listen 80" section, replace 80 with an open port, save the changes, and restart XAMPP in administrator mode **[12]**.	 XAMPP Control Panel v3.3.0 [Compiled: Apr 6th 2021] XAMPP Control Panel v3.3.0 Modules Config Netstat Shell Explorer Services Help Quit Service Module PID(s) Port(s) Actions Apache 15828 19520 4433, 8080 Stop Admin Config Logs MySQL 13452 3306 Stop Admin Config Logs FileZilla Start Admin Config Logs Mercury Start Admin Config Logs Tomcat Start Admin Config Logs 12:55:54 [mysql] XAMPP MySQL is already running on port 3306 12:55:54 [Tomcat] Problem detected! 12:55:54 [Tomcat] Port 8080 in use by "C:\xampp\apache\bin\httpd.exe"! 12:55:54 [Tomcat] Tomcat WILL NOT start without the configured ports free! 12:55:54 [Tomcat] You need to uninstall/disable/reconfigure the blocking application 12:55:54 [Tomcat] or reconfigure Tomcat and the Control Panel to listen on a different port 12:55:54 [main] Starting Check-Timer 12:55:54 [main] Control Panel Ready • For start localhost run this app and start apache and for database (PHPMyAdmin) start MySQL. • Every time the system is running, xampp has to work. PHP is a local host language.

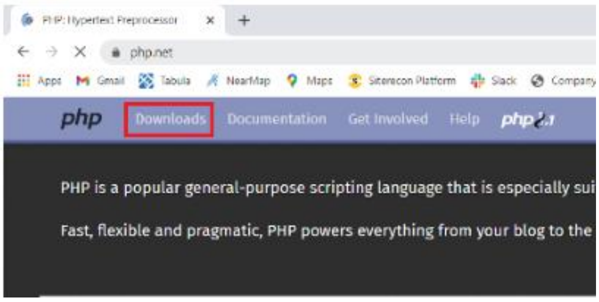
PHP Installation:

1. Visit https://www.php.net/ and go to the Downloads section.
2. Choose the Thread safe version for Windows and download the zip file.
3. Extract the downloaded file to get the folder.
4. Copy the extracted folder.
5. Paste the folder into the Program Files directory on your Windows drive.
6. Grant permission to paste the folder if prompted.
7. Copy the address of the pasted folder.
8. Open the system environment variables settings by searching for "Edit the system environment variables" in the Start menu.
9. In the System Variables section, find the "Path" option and double-click on it.
10. Click the "New" button and paste the address of the PHP folder.
11. Click "OK" to save the changes.
12. Open the Command Prompt from the Start menu.
13. Type "php -v" to check if PHP is installed successfully **[13]**.

Check PHP Installed or not on your computer:

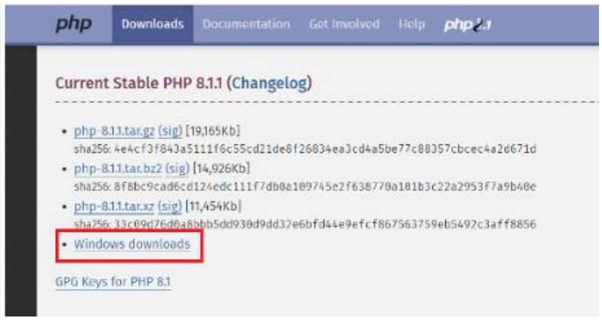


```
Microsoft Windows [Version 10.0.22621.1702]
(c) Microsoft Corporation. All rights reserved.

C:\Windows\System32>php -v
PHP 8.1.11 (cli) (built: Sep 28 2022 11:08:17) (ZTS Visual C++ 2019 x64)
Copyright (c) The PHP Group
Zend Engine v4.1.11, Copyright (c) Zend Technologies

C:\Windows\System32>
```



PHP is a popular general-purpose scripting language that is especially sui

Fast, flexible and pragmatic, PHP powers everything from your blog to the



Current Stable PHP 8.1.1 (Changelog)

- php-8.1.1.tar.gz (sig) [19,165Kb]
  sha256: 4e4cf3f843a5111f6c55cd21de8f26834ea3cd4a5be77c88357cbcec4a2d671d
- php-8.1.1.tar.bz2 (sig) [14,926Kb]
  sha256: 8f8bc9cad6cd124edc111f7db0a109745e2f638770a181b3c22a2953f7a9b40e
- php-8.1.1.tar.xz (sig) [11,454Kb]
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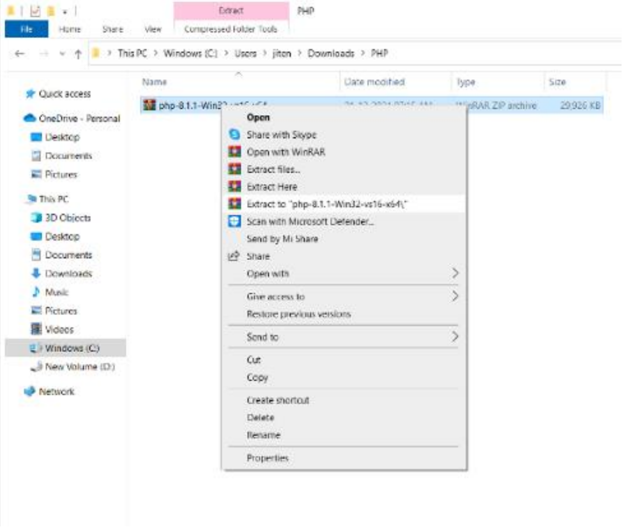
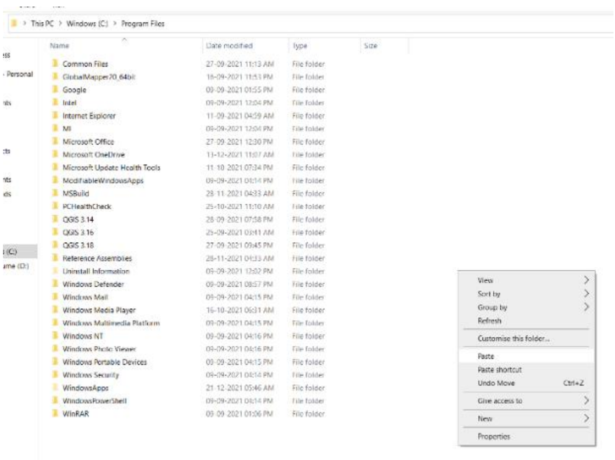
- Windows downloads

GPG Keys for PHP 8.1

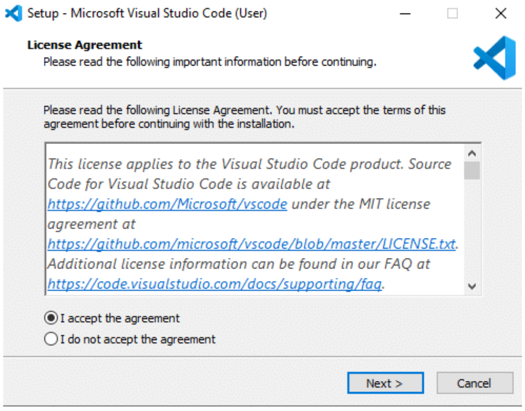




Name	Date modified	Type
Common Files	27-09-2021 11:13 AM	File folder
GlobalMapper20_64bit	18-09-2021 11:53 PM	File folder
Google	09-09-2021 01:55 PM	File folder
Intel	09-09-2021 12:04 PM	File folder
Internet Explorer	11-09-2021 04:59 AM	File folder
MI	09-09-2021 12:04 PM	File folder
Microsoft Office	27-09-2021 12:30 PM	File folder
Microsoft OneDrive	13-12-2021 11:07 AM	File folder
Microsoft Update Health Tools	11-10-2021 07:34 PM	File folder
ModifiableWindowsApps	09-09-2021 04:14 PM	File folder
MSBuild	28-11-2021 04:33 AM	File folder
PCHealthCheck	25-10-2021 11:10 AM	File folder
QGIS 3.14	28-09-2021 07:58 PM	File folder
QGIS 3.16	25-09-2021 03:41 AM	File folder
QGIS 3.18	27-09-2021 09:45 PM	File folder
Reference Assemblies	28-11-2021 04:33 AM	File folder
Uninstall Information	09-09-2021 12:02 PM	File folder
Windows Defender	09-09-2021 08:57 PM	File folder
Windows Mail	09-09-2021 04:15 PM	File folder
Windows Media Player	16-10-2021 06:31 AM	File folder
Windows Multimedia Platform	09-09-2021 04:15 PM	File folder
Windows NT	09-09-2021 04:16 PM	File folder
Windows Photo Viewer	09-09-2021 04:16 PM	File folder
Windows Portable Devices	09-09-2021 04:15 PM	File folder
Windows Security	09-09-2021 04:14 PM	File folder
WindowsApps	21-12-2021 05:46 AM	File folder
WindowsPowerShell	09-09-2021 04:14 PM	File folder
WinRAR	09-09-2021 01:06 PM	File folder

Visual Studio Code Installation:

1. Visit "https://code.visualstudio.com/download" and select the appropriate platform.
2. Download the Visual Studio Code installer for Windows (VSCodeUserSetup-{version}.exe).
3. Run the installer and accept the agreement.
4. Choose to create a desktop icon and proceed.
5. Click on the "Install" button.
6. Once the installation is complete, click "Finish" to open Visual Studio Code.
7. By default, it installs in the directory: C:\users{username}\AppData\Local\Programs\Microsoft VS Code.
8. Explore the User Interface of Visual Studio Code Editor in the next section **[14]**.



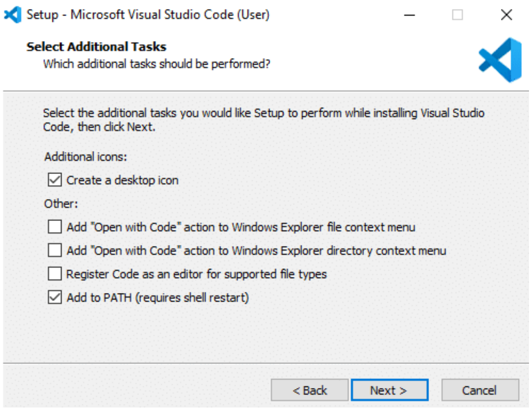
Setup - Microsoft Visual Studio Code (User)

License Agreement
Please read the following important information before continuing.

Please read the following License Agreement. You must accept the terms of this agreement before continuing with the installation.

This license applies to the Visual Studio Code product. Source Code for Visual Studio Code is available at https://github.com/Microsoft/vscode under the MIT license agreement at https://github.com/microsoft/vscode/blob/master/LICENSE.txt. Additional license information can be found in our FAQ at https://code.visualstudio.com/docs/supporting/faq.

● I accept the agreement
○ I do not accept the agreement

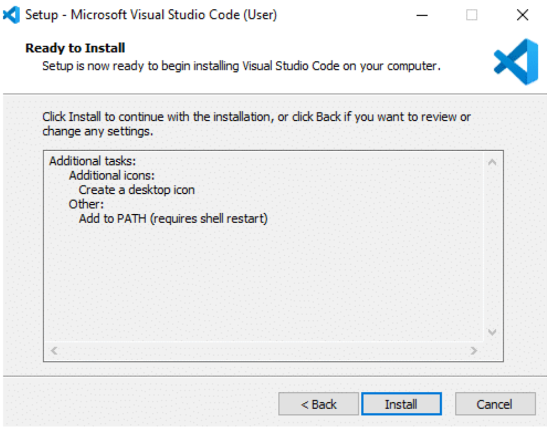


Setup - Microsoft Visual Studio Code (User)

Select Additional Tasks
Which additional tasks should be performed?

Select the additional tasks you would like Setup to perform while installing Visual Studio Code, then click Next.

Additional icons:
☑ Create a desktop icon
Other:
□ Add "Open with Code" action to Windows Explorer file context menu
□ Add "Open with Code" action to Windows Explorer directory context menu
□ Register Code as an editor for supported file types
☑ Add to PATH (requires shell restart)

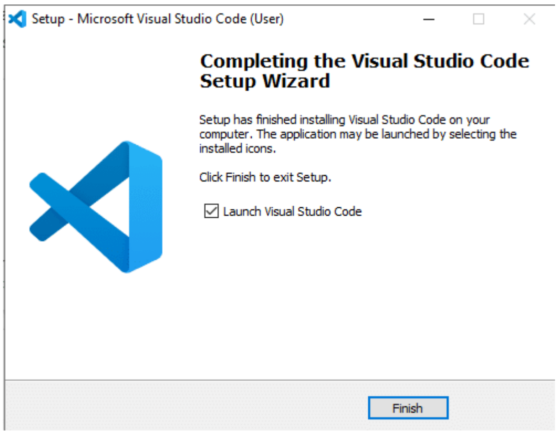


Setup - Microsoft Visual Studio Code (User)

Ready to Install
Setup is now ready to begin installing Visual Studio Code on your computer.

Click Install to continue with the installation, or click Back if you want to review or change any settings.

```
Additional tasks:
    Additional icons:
      Create a desktop icon
    Other:
      Add to PATH (requires shell restart)
```



Setup - Microsoft Visual Studio Code (User)

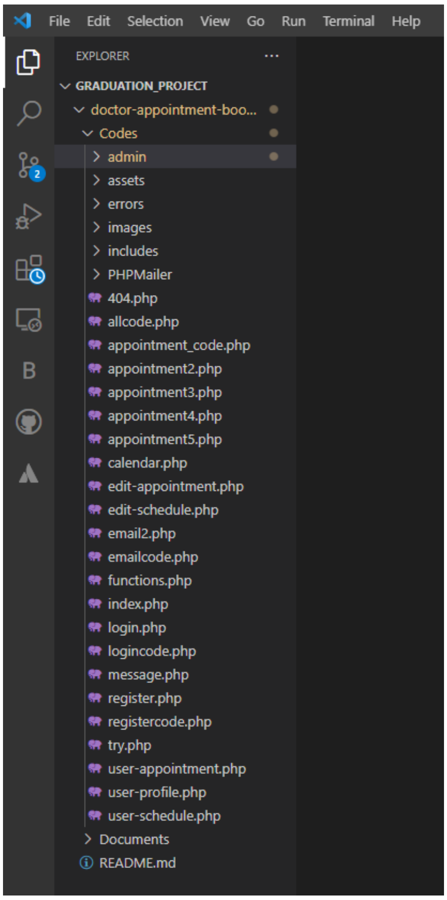
Completing the Visual Studio Code Setup Wizard

Setup has finished installing Visual Studio Code on your computer. The application may be launched by selecting the installed icons.

Click Finish to exit Setup.

☑ Launch Visual Studio Code

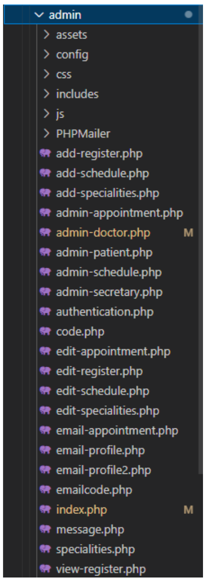
5.2 File Organization and Management: It allows you to easily reach an information or page that you want to organize files in an organized manner **[15]**. In the project, I separated the files regularly and used them. In this way, file management has become much easier. Project file needs to be in C:\xampp\htdocs\graduation_project.



```
GRADUATION_PROJECT
  doctor-appointment-boo...
    Codes
      admin
      assets
      errors
      images
      includes
      PHPMailer
      404.php
      allcode.php
      appointment_code.php
      appointment2.php
      appointment3.php
      appointment4.php
      appointment5.php
      calendar.php
      edit-appointment.php
      edit-schedule.php
      email2.php
      emailcode.php
      functions.php
      index.php
      login.php
      logincode.php
      message.php
      register.php
      registercode.php
      try.php
      user-appointment.php
      user-profile.php
      user-schedule.php
    Documents
    README.md
```

- Here is main file structures. Basically, there are 2 different interface (Admin and other users) and 4 different users (admin, doctor, secretary, patient). Almost same files in admin folder.

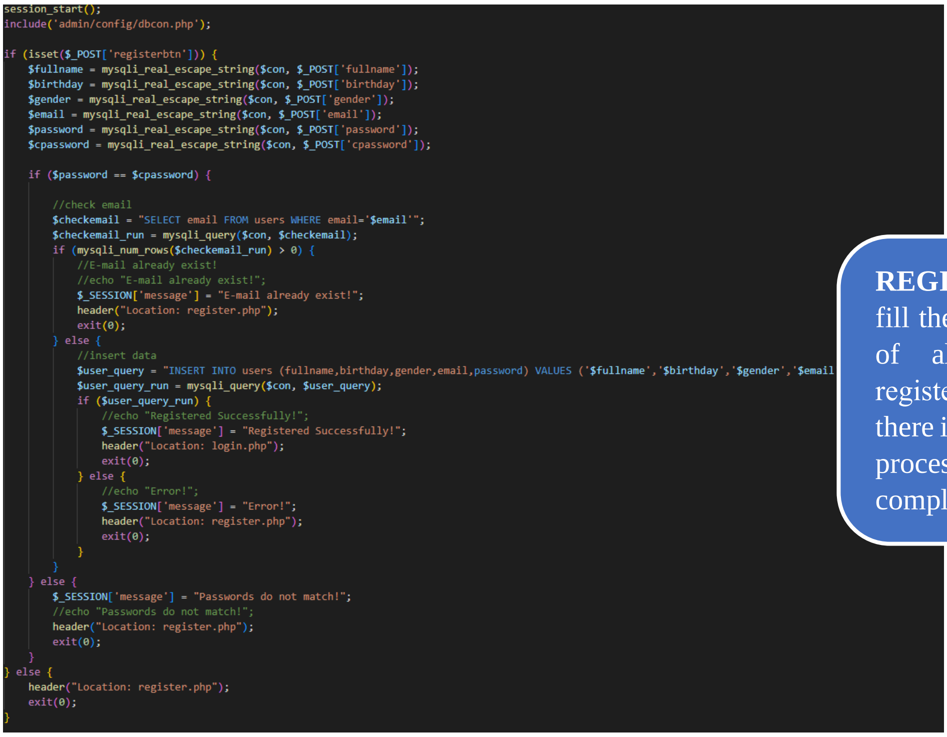
- Admin folder structures.



```
admin
  assets
  config
  css
  includes
  js
  PHPMailer
  add-register.php
  add-schedule.php
  add-specialities.php
  admin-appointment.php
  admin-doctor.php          M
  admin-patient.php
  admin-schedule.php
  admin-secretary.php
  authentication.php
  code.php
  edit-appointment.php
  edit-register.php
  edit-schedule.php
  edit-specialities.php
  email-appointment.php
  email-profile.php
  email-profile2.php
  emailcode.php
  index.php                 M
  message.php
  specialities.php
  view-register.php
```

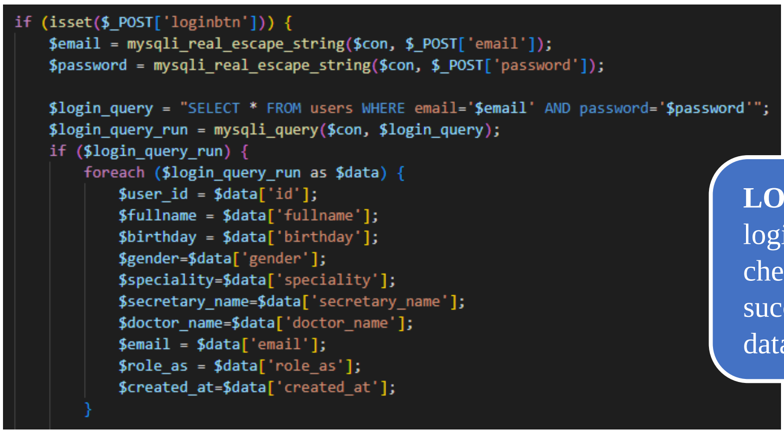
5.3 Backend Logic: Backend is a set of code that runs on localhost, receives information from clients and includes the logic of sending the appropriate data back to the client. It also has a database to permanently store the data in the developed project. PHPMyAdmin was used for the database in the project.

a) Authentication: In the backend logic, authentication mechanisms are implemented to ensure that only authorized users can access specific parts of the system and actions. Firstly, user needs to register to the system using register form. When user use this form it will be automatically patient (role_as=0). If someone wants to be a doctor or secretary he/she needs to contact with admin. Admin can change user role or create a new doctor/secretary. And can inform them via e-mail.



```
session_start();
include('admin/config/dbcon.php');

if (isset($_POST['registerbtn'])) {
    $fullname = mysqli_real_escape_string($con, $_POST['fullname']);
    $birthday = mysqli_real_escape_string($con, $_POST['birthday']);
    $gender = mysqli_real_escape_string($con, $_POST['gender']);
    $email = mysqli_real_escape_string($con, $_POST['email']);
    $password = mysqli_real_escape_string($con, $_POST['password']);
    $cpassword = mysqli_real_escape_string($con, $_POST['cpassword']);

    if ($password == $cpassword) {

        //check email
        $checkemail = "SELECT email FROM users WHERE email='$email'";
        $checkemail_run = mysqli_query($con, $checkemail);
        if (mysqli_num_rows($checkemail_run) > 0) {
            //E-mail already exist!
            //echo "E-mail already exist!";
            $_SESSION['message'] = "E-mail already exist!";
            header("Location: register.php");
            exit(0);
        } else {
            //insert data
            $user_query = "INSERT INTO users (fullname,birthday,gender,email,password) VALUES ('$fullname','$birthday','$gender','$email
            $user_query_run = mysqli_query($con, $user_query);
            if ($user_query_run) {
                //echo "Registered Successfully!";
                $_SESSION['message'] = "Registered Successfully!";
                header("Location: login.php");
                exit(0);
            } else {
                //echo "Error!";
                $_SESSION['message'] = "Error!";
                header("Location: register.php");
                exit(0);
            }
        }
    } else {
        $_SESSION['message'] = "Passwords do not match!";
        //echo "Passwords do not match!";
        header("Location: register.php");
        exit(0);
    }
} else {
    header("Location: register.php");
    exit(0);
}
```

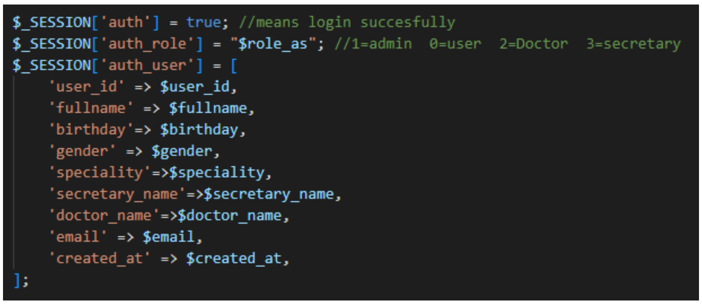
REGISTER: When user fill the register form first of all system check registered users' email. If there is not match register process successfully completed.



```
if (isset($_POST['loginbtn'])) {
    $email = mysqli_real_escape_string($con, $_POST['email']);
    $password = mysqli_real_escape_string($con, $_POST['password']);

    $login_query = "SELECT * FROM users WHERE email='$email' AND password='$password'";
    $login_query_run = mysqli_query($con, $login_query);
    if ($login_query_run) {
        foreach ($login_query_run as $data) {
            $user_id = $data['id'];
            $fullname = $data['fullname'];
            $birthday = $data['birthday'];
            $gender=$data['gender'];
            $speciality=$data['speciality'];
            $secretary_name=$data['secretary_name'];
            $doctor_name=$data['doctor_name'];
            $email = $data['email'];
            $role_as = $data['role_as'];
            $created_at=$data['created_at'];
        }
```

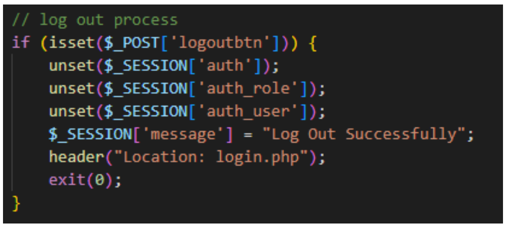
LOGIN: When user click login button this query checks authentication successful or not (Using database informations).

b) **Sessions:** Sessions allow the backend to remember user data across multiple requests, enhancing the user experience and enabling personalized features. I use sessions almost every page. Sessions needs to start at the beginning of the php code. When user successfully logged to the system session start for this user.



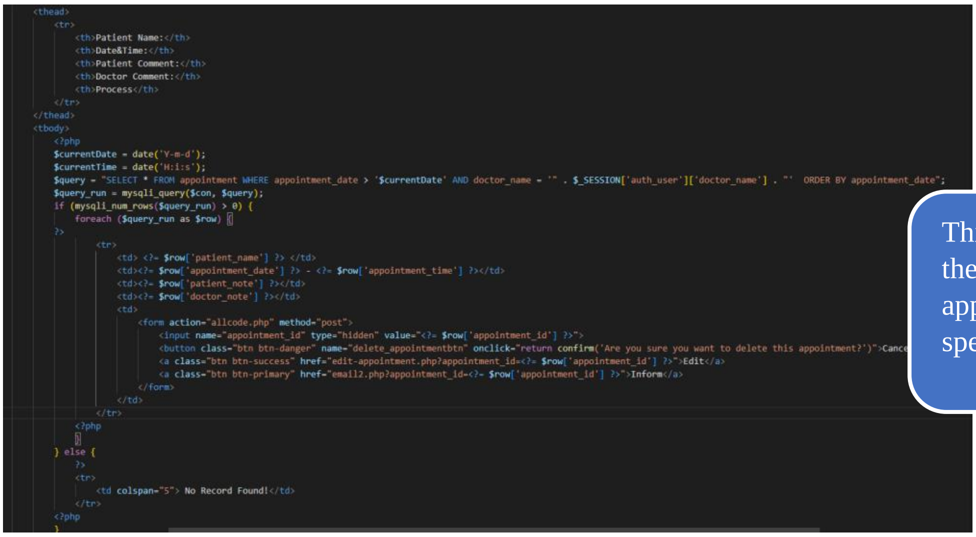
```
$_SESSION['auth'] = true; //means login succesfully
$_SESSION['auth_role'] = "$role_as"; //1=admin  0=user  2=Doctor  3=secretary
$_SESSION['auth_user'] = [
    'user_id' => $user_id,
    'fullname' => $fullname,
    'birthday'=> $birthday,
    'gender' => $gender,
    'speciality'=>$speciality,
    'secretary_name'=>$secretary_name,
    'doctor_name'=>$doctor_name,
    'email' => $email,
    'created_at' => $created_at,
];
```

c) **Log Out:** If user logged out. Sessions needs to be unset. This allows to log out and redirect to login.php page.



```
// log out process
if (isset($_POST['logoutbtn'])) {
    unset($_SESSION['auth']);
    unset($_SESSION['auth_role']);
    unset($_SESSION['auth_user']);
    $_SESSION['message'] = "Log Out Successfully";
    header("Location: login.php");
    exit(0);
}
```

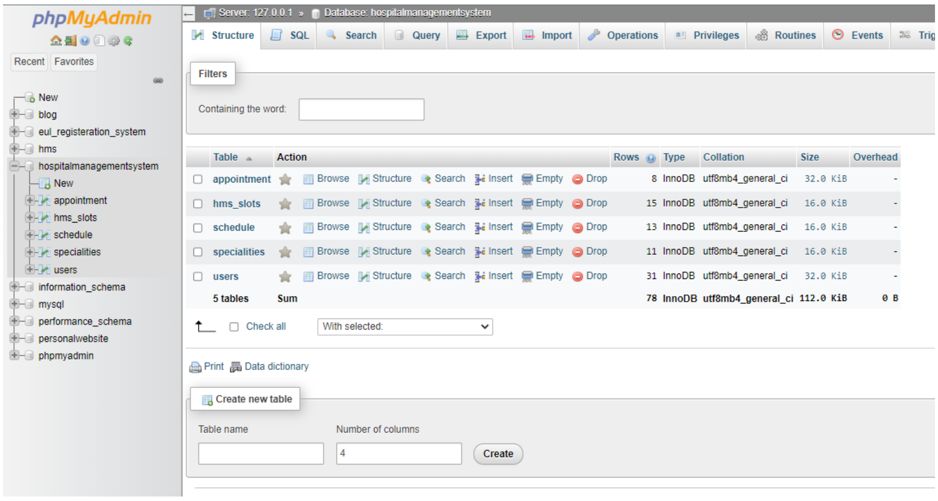
d) **Displaying datas from database**: This project uses lots of database process. Users needs to save, edit and delete something (appointments, schedules, profile informations). There are lots of examples of that, I will show one of them and in interface part you can examine it in details.



```
<thead>
    <tr>
        <th>Patient Name:</th>
        <th>Date&Time:</th>
        <th>Patient Comment:</th>
        <th>Doctor Comment:</th>
        <th>Process</th>
    </tr>
</thead>
<tbody>
    <?php
    $currentDate = date('Y-m-d');
    $currentTime = date('H:i:s');
    $query = "SELECT * FROM appointment WHERE appointment_date > '$currentDate' AND doctor_name = '" . $_SESSION['auth_user']['doctor_name'] . "'  ORDER BY appointment_date";
    $query_run = mysqli_query($con, $query);
    if (mysqli_num_rows($query_run) > 0) {
        foreach ($query_run as $row) {
    ?>
            <tr>
                <td> <?= $row['patient_name'] ?> </td>
                <td><?= $row['appointment_date'] ?> - <?= $row['appointment_time'] ?></td>
                <td><?= $row['patient_note'] ?></td>
                <td><?= $row['doctor_note'] ?></td>
                <td>
                    <form action="allcode.php" method="post">
                        <input name="appointment_id" type="hidden" value="<?= $row['appointment_id'] ?>">
                        <button class="btn btn-danger" name="delete_appointmentbtn" onclick="return confirm('Are you sure you want to delete this appointment?')">Cance
                        <a class="btn btn-success" href="edit-appointment.php?appointment_id=<?= $row['appointment_id'] ?>">Edit</a>
                        <a class="btn btn-primary" href="email2.php?appointment_id=<?= $row['appointment_id'] ?>">Inform</a>
                    </form>
                </td>
            </tr>
        <?php
        }
    } else {
        ?>
        <tr>
            <td colspan="5"> No Record Found!</td>
        </tr>
    <?php
    }
```

This code shows on the screen current appointments of specific doctor.

e) Database (PHPMyAdmin): All datas stored in PHPMyAdmin. There are 5 database named as Users, appointment, schedule, specialities, hms_slots.

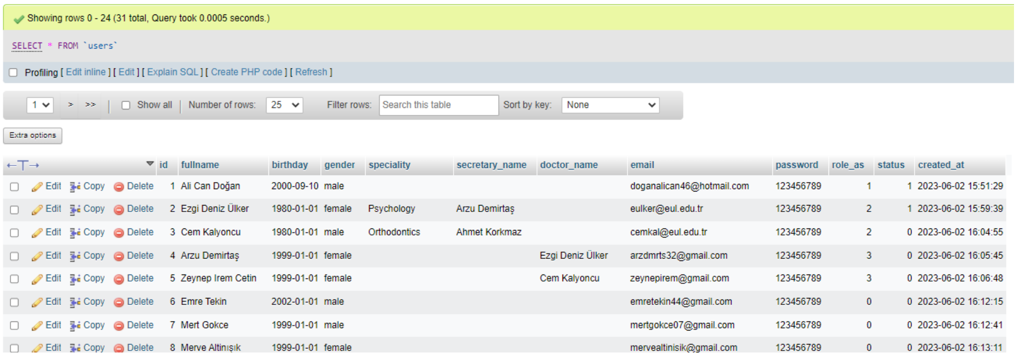


Containing the word:

	Table	Action	Rows	Type	Collation	Size	Overhead
□	appointment	☆ Browse Structure Search Insert Empty Drop	8	InnoDB	utf8mb4_general_ci	32.0 KiB	-
□	hms_slots	☆ Browse Structure Search Insert Empty Drop	15	InnoDB	utf8mb4_general_ci	16.0 KiB	-
□	schedule	☆ Browse Structure Search Insert Empty Drop	13	InnoDB	utf8mb4_general_ci	16.0 KiB	-
□	specialities	☆ Browse Structure Search Insert Empty Drop	11	InnoDB	utf8mb4_general_ci	16.0 KiB	-
□	users	☆ Browse Structure Search Insert Empty Drop	31	InnoDB	utf8mb4_general_ci	32.0 KiB	-
	5 tables	Sum	78	InnoDB	utf8mb4_general_ci	112.0 KiB	0 B

Table name:
Number of columns: 4

Users table



✓ Showing rows 0 - 24 (31 total, Query took 0.0005 seconds.)

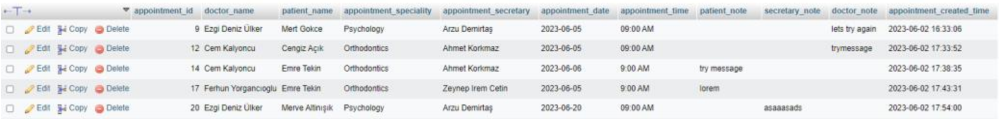
```
SELECT * FROM `users`
```

□ Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

1 > >> | Number of rows: 25 | Sort by key: None

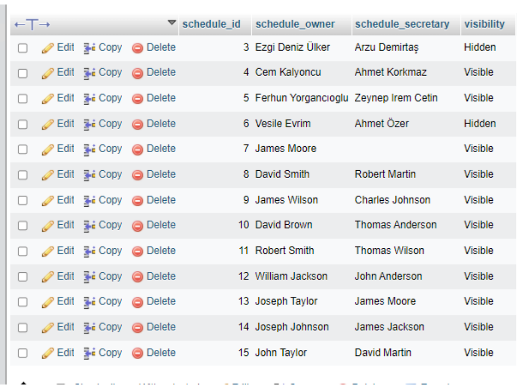
	id	fullname	birthday	gender	speciality	secretary_name	doctor_name	email	password	role_as	status	created_at
□ Edit Copy Delete	1	Ali Can Doğan	2000-09-10	male				doganalican46@hotmail.com	123456789	1	1	2023-06-02 15:51:29
□ Edit Copy Delete	2	Ezgi Deniz Ülker	1980-01-01	female	Psychology	Arzu Demirtaş		eulker@eul.edu.tr	123456789	2	1	2023-06-02 15:59:39
□ Edit Copy Delete	3	Cem Kalyoncu	1980-01-01	male	Orthodontics	Ahmet Korkmaz		cemkal@eul.edu.tr	123456789	2	0	2023-06-02 16:04:55
□ Edit Copy Delete	4	Arzu Demirtaş	1999-01-01	female			Ezgi Deniz Ülker	arzdmrts32@gmail.com	123456789	3	0	2023-06-02 16:05:45
□ Edit Copy Delete	5	Zeynep Irem Cetin	1999-01-01	female			Cem Kalyoncu	zeynepirem@gmail.com	123456789	3	0	2023-06-02 16:06:48
□ Edit Copy Delete	6	Emre Tekin	2002-01-01	male				emretekin44@gmail.com	123456789	0	0	2023-06-02 16:12:15
□ Edit Copy Delete	7	Mert Gokce	1999-01-01	male				mertgokce07@gmail.com	123456789	0	0	2023-06-02 16:12:41
□ Edit Copy Delete	8	Merve Altinışık	1999-01-01	female				mervealtinisik@gmail.com	123456789	0	0	2023-06-02 16:13:11

Appointment Table



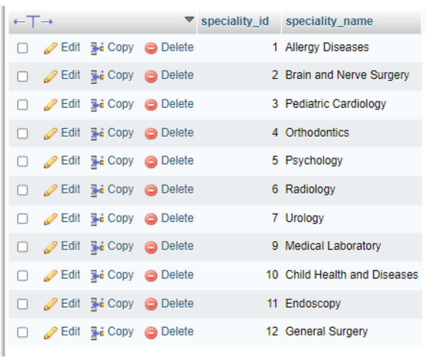
	appointment_id	doctor_name	patient_name	appointment_speciality	appointment_secretary	appointment_date	appointment_time	patient_note	secretary_note	doctor_note	appointment_created_time
□ Edit Copy Delete	9	Ezgi Deniz Ülker	Mert Gokce	Psychology	Arzu Demirtaş	2023-06-05	09:00 AM			lets try again	2023-06-02 16:33:06
□ Edit Copy Delete	12	Cem Kalyoncu	Cengiz Açık	Orthodontics	Ahmet Korkmaz	2023-06-05	09:00 AM			trymessage	2023-06-02 17:33:52
□ Edit Copy Delete	14	Cem Kalyoncu	Emre Tekin	Orthodontics	Ahmet Korkmaz	2023-06-06	9:00 AM	try message			2023-06-02 17:38:35
□ Edit Copy Delete	17	Ferhun Yorgancıoglu	Emre Tekin	Orthodontics	Zeynep Irem Cetin	2023-06-05	9:00 AM	lorem			2023-06-02 17:43:31
□ Edit Copy Delete	20	Ezgi Deniz Ülker	Merve Altınışık	Psychology	Arzu Demirtaş	2023-06-20	09:00 AM		asaaasads		2023-06-02 17:54:00

Schedule Table



	schedule_id	schedule_owner	schedule_secretary	visibility
□ Edit Copy Delete	3	Ezgi Deniz Ülker	Arzu Demirtaş	Hidden
□ Edit Copy Delete	4	Cem Kalyoncu	Ahmet Korkmaz	Visible
□ Edit Copy Delete	5	Ferhun Yorgancıoglu	Zeynep Irem Cetin	Visible
□ Edit Copy Delete	6	Vesile Evrim	Ahmet Özer	Hidden
□ Edit Copy Delete	7	James Moore		Visible
□ Edit Copy Delete	8	David Smith	Robert Martin	Visible
□ Edit Copy Delete	9	James Wilson	Charles Johnson	Visible
□ Edit Copy Delete	10	David Brown	Thomas Anderson	Visible
□ Edit Copy Delete	11	Robert Smith	Thomas Wilson	Visible
□ Edit Copy Delete	12	William Jackson	John Anderson	Visible
□ Edit Copy Delete	13	Joseph Taylor	James Moore	Visible
□ Edit Copy Delete	14	Joseph Johnson	James Jackson	Visible
□ Edit Copy Delete	15	John Taylor	David Martin	Visible

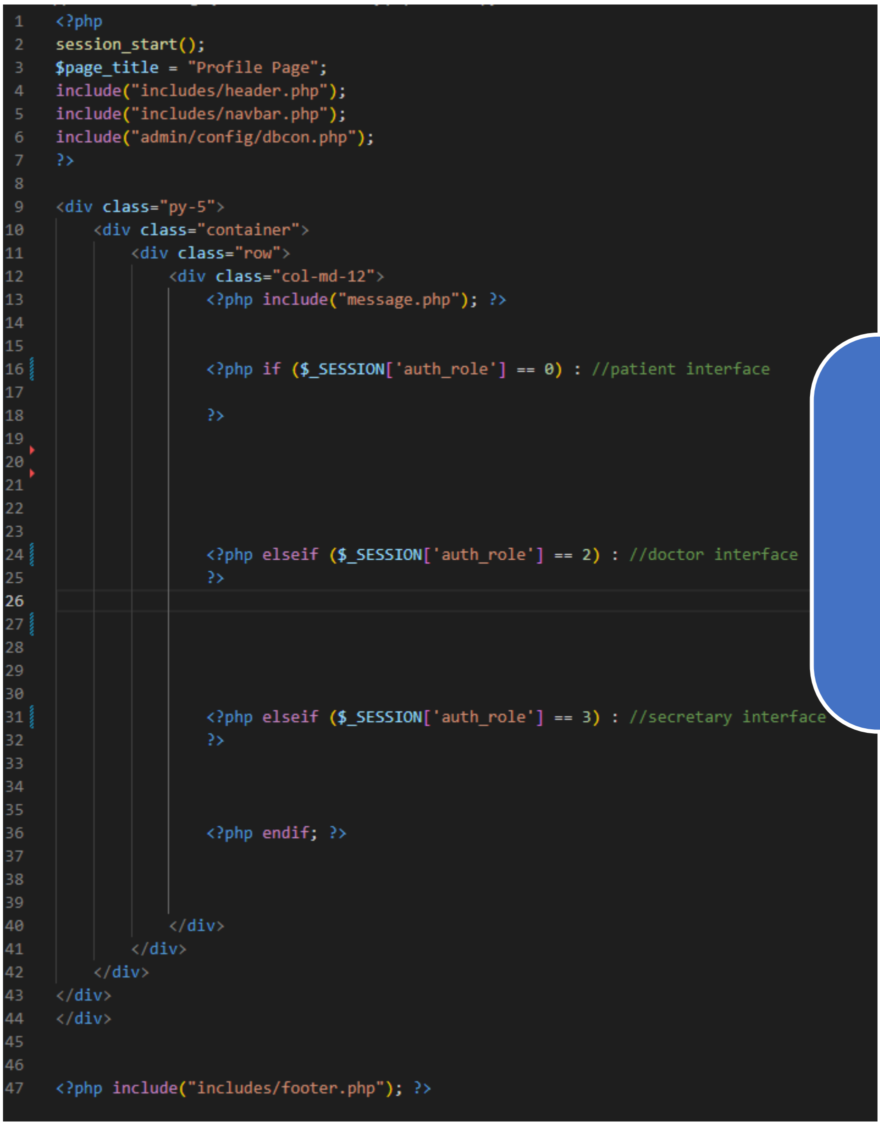
Speciality Table



	speciality_id	speciality_name
□ Edit Copy Delete	1	Allergy Diseases
□ Edit Copy Delete	2	Brain and Nerve Surgery
□ Edit Copy Delete	3	Pediatric Cardiology
□ Edit Copy Delete	4	Orthodontics
□ Edit Copy Delete	5	Psychology
□ Edit Copy Delete	6	Radiology
□ Edit Copy Delete	7	Urology
□ Edit Copy Delete	9	Medical Laboratory
□ Edit Copy Delete	10	Child Health and Diseases
□ Edit Copy Delete	11	Endoscopy
□ Edit Copy Delete	12	General Surgery

5.4 Frontend Logic: The most challenging part for me was imagining something I hadn't seen and writing the code about that. In the beginning, I followed the wrong path and first tried to write a backend. But as with the frontend logic, I designed the UI based on user experiences and similar projects then I integrated the necessary backend codes to the buttons and information cards on these interfaces. This is much more logical.

5.5 Approach to Interface Design: In general, a user-friendly, simple and pleasing interface was designed. Instead of creating a separate page for each user, I added different user interfaces between if-else blocks using php. I create a role_as column in users database using that property I didn't have to open more .php files and do the same things again.



```
<?php
session_start();
$page_title = "Profile Page";
include("includes/header.php");
include("includes/navbar.php");
include("admin/config/dbcon.php");
?>

<div class="py-5">
    <div class="container">
        <div class="row">
            <div class="col-md-12">
                <?php include("message.php"); ?>


                <?php if ($_SESSION['auth_role'] == 0) : //patient interface

                ?>






                <?php elseif ($_SESSION['auth_role'] == 2) : //doctor interface
                ?>






                <?php elseif ($_SESSION['auth_role'] == 3) : //secretary interface
                ?>



                <?php endif; ?>



            </div>
        </div>
    </div>
</div>
</div>


<?php include("includes/footer.php"); ?>
```

If role_as=1 →admin

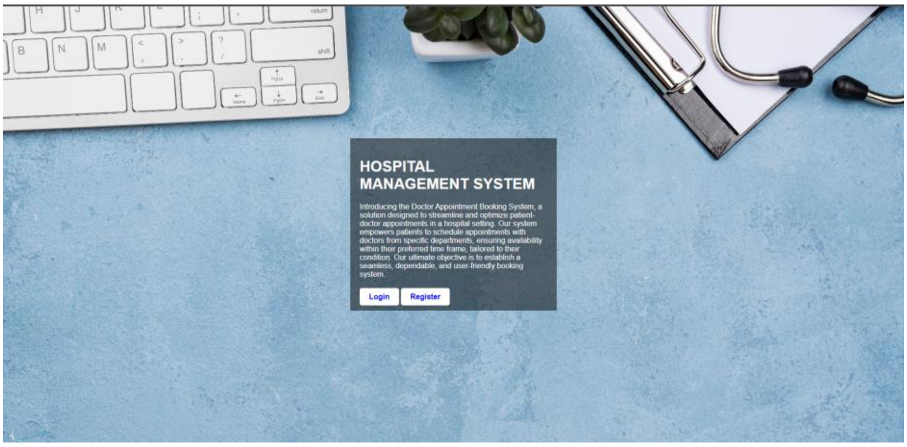
Elseif role_as=2 →doctor

Elseif role_as=3 →secretary

Elseif role_as=0 → patient

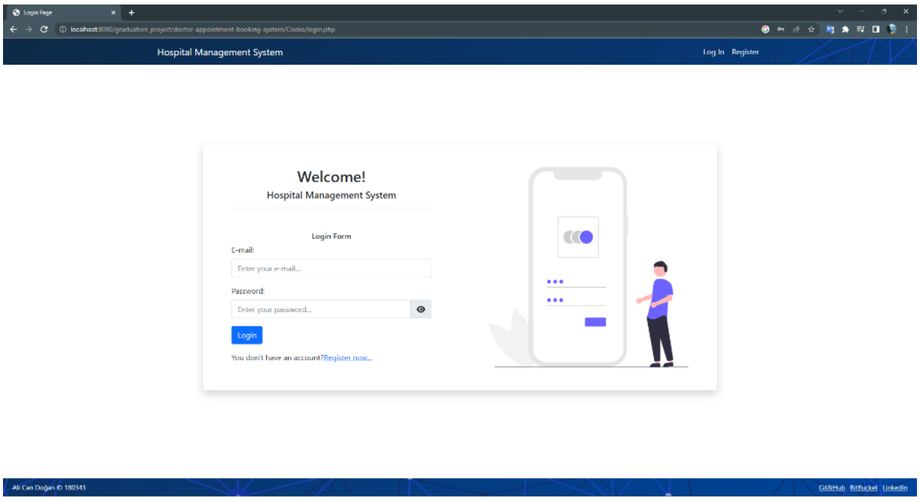
I use that in every module to create interfaces.

5.6 Login, Register & Welcome Page:


HOSPITAL MANAGEMENT SYSTEM

Introducing the Doctor Appointment Booking System, a solution designed to streamline and optimize patient-doctor appointments in a hospital setting. Our system empowers patients to schedule appointments with doctors from specific departments, ensuring availability within their preferred time frame, tailored to their condition. Our ultimate objective is to establish a seamless, dependable, and user-friendly booking system.

Welcome page gives information about system to user and redirect user to login or register page.


Login Page
localhost:8080/graduation_project/doctor-appointment-booking-system/Codes/login.php
Hospital Management System
Log In
Register

Welcome!
Hospital Management System

Login Form

E-mail:
Enter your e-mail...

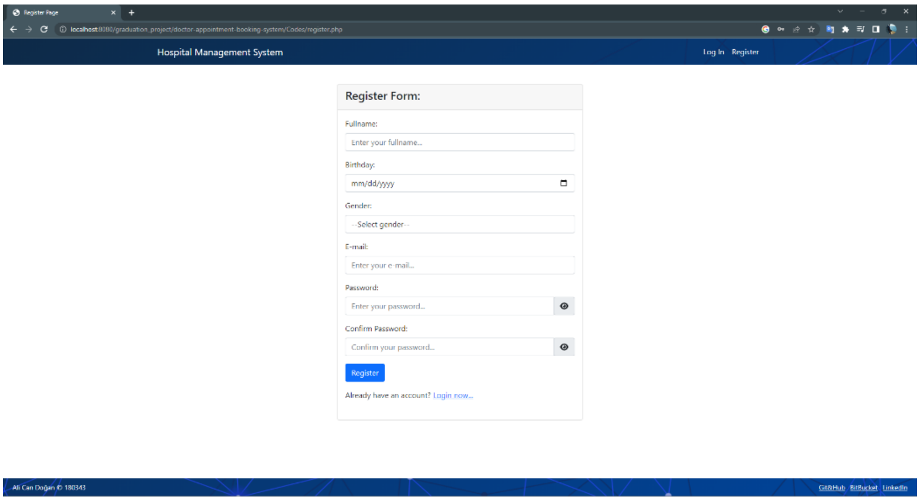
Password:
Enter your password...

You don't have an account?Register now...

Ali Can Doğan © 180343

Git&Hub
BitBucket
LinkedIn

Login page has classical login form. If user fill the form correct informations then go to dashboard.


Register Page
localhost:8080/graduation_project/doctor-appointment-booking-system/Codes/register.php
Hospital Management System
Log In
Register

Register Form:

Fullname:
Enter your fullname...

Birthday:
mm/dd/yyyy

Gender:
--Select gender--

E-mail:
Enter your e-mail...

Password:
Enter your password...

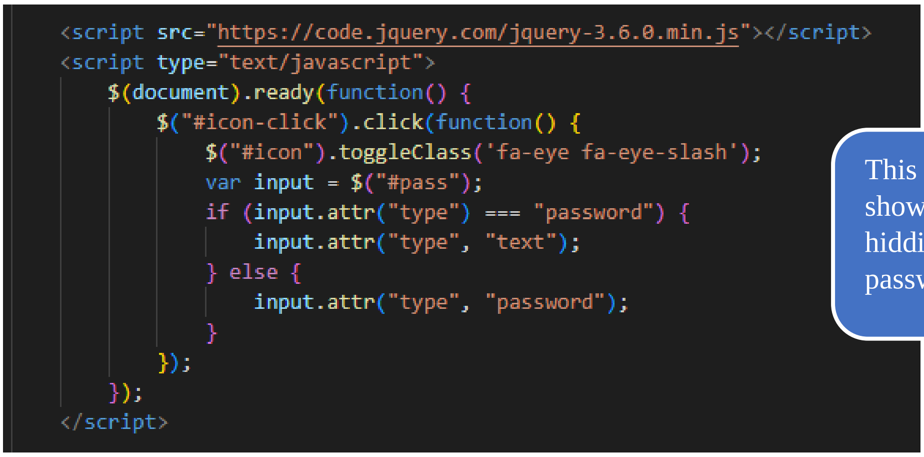
Confirm Password:
Confirm your password...

Already have an account? Login now...

Ali Can Doğan © 180343

Git&Hub
BitBucket
LinkedIn

Register page has classical register form. If user fill the form as requested then go to login page.

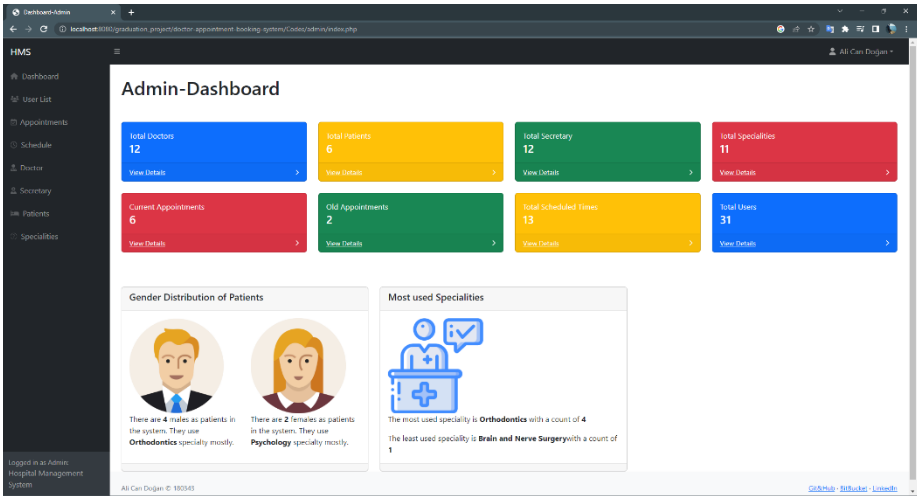


```
<script src="https://code.jquery.com/jquery-3.6.0.min.js"></script>
<script type="text/javascript">
    $(document).ready(function() {
        $("#icon-click").click(function() {
            $("#icon").toggleClass('fa-eye fa-eye-slash');
            var input = $("#pass");
            if (input.attr("type") === "password") {
                input.attr("type", "text");
            } else {
                input.attr("type", "password");
            }
        });
    });
</script>
```

This code for showing and hidding the password.

5.7 Dashboards: The basic logic in the interfaces of all users is the same. A simple and eye-catching welcome and statistics of its own **[16]**. These pages, which contain a lot of SQL queries, show what users are doing and contain redirects to some other pages.

a) Admin Dasboard:


Dashboard-Admin
localhost:8080/graduation_project/doctor-appointment-booking-system/Codes/admin/index.php
HMS
Ali Can Doğan
Dashboard
User List
Appointments
Schedule
Doctor
Secretary
Patients
Specialities
View Details
Git&Hub · BitBucket · LinkedIn

Admin-Dashboard

Total Doctors 12

Total Patients 6

Total Secretary 12

Total Specialities 11

Current Appointments 6

Old Appointments 2

Total Scheduled Times 13

Total Users 31

Gender Distribution of Patients

There are **4** males as patients in the system. They use **Orthodontics** specialty mostly.

There are **2** females as patients in the system. They use **Psychology** specialty mostly.

Most used Specialities

The most used speciality is **Orthodontics** with a count of **4**

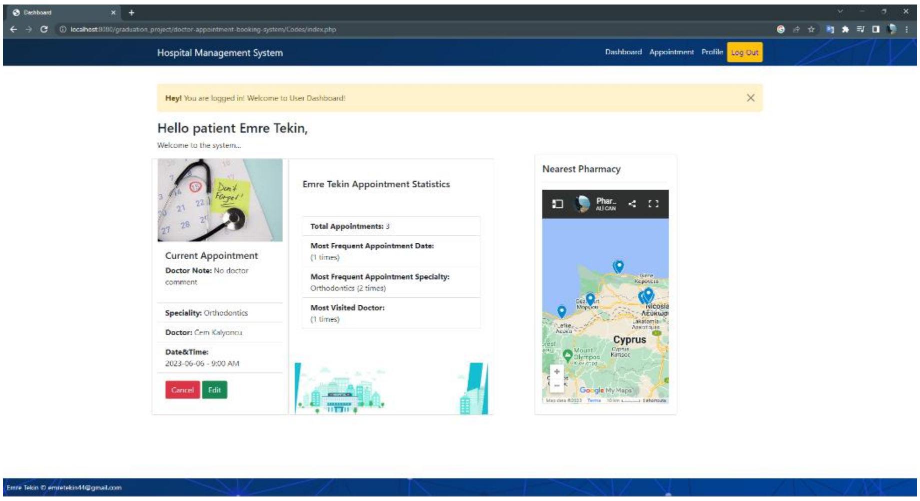
The least used speciality is **Brain and Nerve Surgery**with a count of **1**

Logged in as Admin: Hospital Management System

Ali Can Doğan © 180343

Admin dashboard has lots of statistics. That allows to manage system easly.

b) Patient Dashboard:


Dashboard
localhost:8080/graduation_project/doctor-appointment-booking-system/Codes/index.php
Hospital Management System
Dashboard
Appointment
Profile
Log Out
Don't Forget!
Cancel
Edit
Phar..
ALI CAN
Cyprus
Nicosia
Google My Maps

Hey! You are logged in! Welcome to User Dashboard!

Hello patient Emre Tekin,

Welcome to the system...

Current Appointment

Doctor Note: No doctor comment

Speciality: Orthodontics

Doctor: Cem Kalyoncu

Date&Time: 2023-06-06 - 9:00 AM

Emre Tekin Appointment Statistics

Total Appointments: 3

Most Frequent Appointment Date: (1 times)

Most Frequent Appointment Specialty: Orthodontics (2 times)

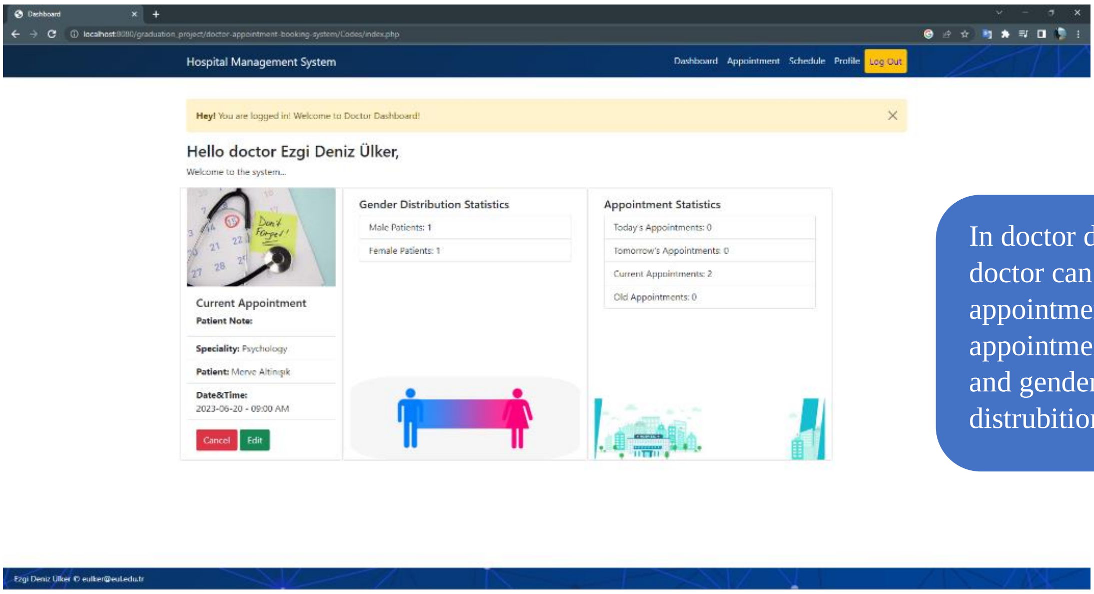
Most Visited Doctor: (1 times)

Nearest Pharmacy

Emre Tekin © emretekin44@gmail.com

In patient Dashboard, patient can see closest appointment, his appointment statistics and nearest pharmacies to him/her.

c) Doctor Dashboard:


Dashboard
localhost:8080/graduation_project/doctor-appointment-booking-system/Codes/index.php
Hospital Management System
Dashboard
Appointment
Schedule
Profile
Log Out
Cancel
Edit

Hey! You are logged in! Welcome to Doctor Dashboard!

Hello doctor Ezgi Deniz Ülker,

Welcome to the system...

Current Appointment

Patient Note:

Speciality: Psychology

Patient: Merve Altinışık

Date&Time: 2023-06-20 - 09:00 AM

Gender Distribution Statistics

Male Patients: 1

Female Patients: 1

Appointment Statistics

Today's Appointments: 0

Tomorrow's Appointments: 0

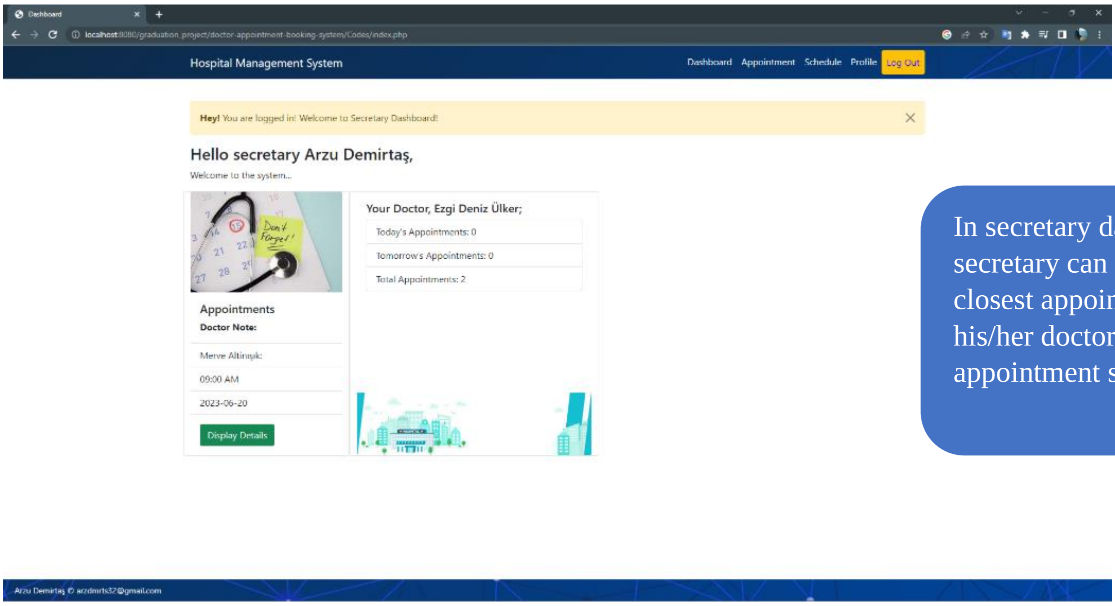
Current Appointments: 2

Old Appointments: 0

Ezgi Deniz Ülker © eulker@eul.edu.tr

In doctor dashboard, doctor can see closest appointment, his appointment statistics and gender distrubition statistics.

d) Secretary Dashboard:


Dashboard
localhost:8080/graduation_project/doctor-appointment-booking-system/Codes/index.php
Hospital Management System
Dashboard
Appointment
Schedule
Profile
Log Out
Display Details

Hey! You are logged in! Welcome to Secretary Dashboard!

Hello secretary Arzu Demirtaş,

Welcome to the system...

Appointments

Doctor Note:

Merve Altinışık:

09:00 AM

2023-06-20

Your Doctor, Ezgi Deniz Ülker;

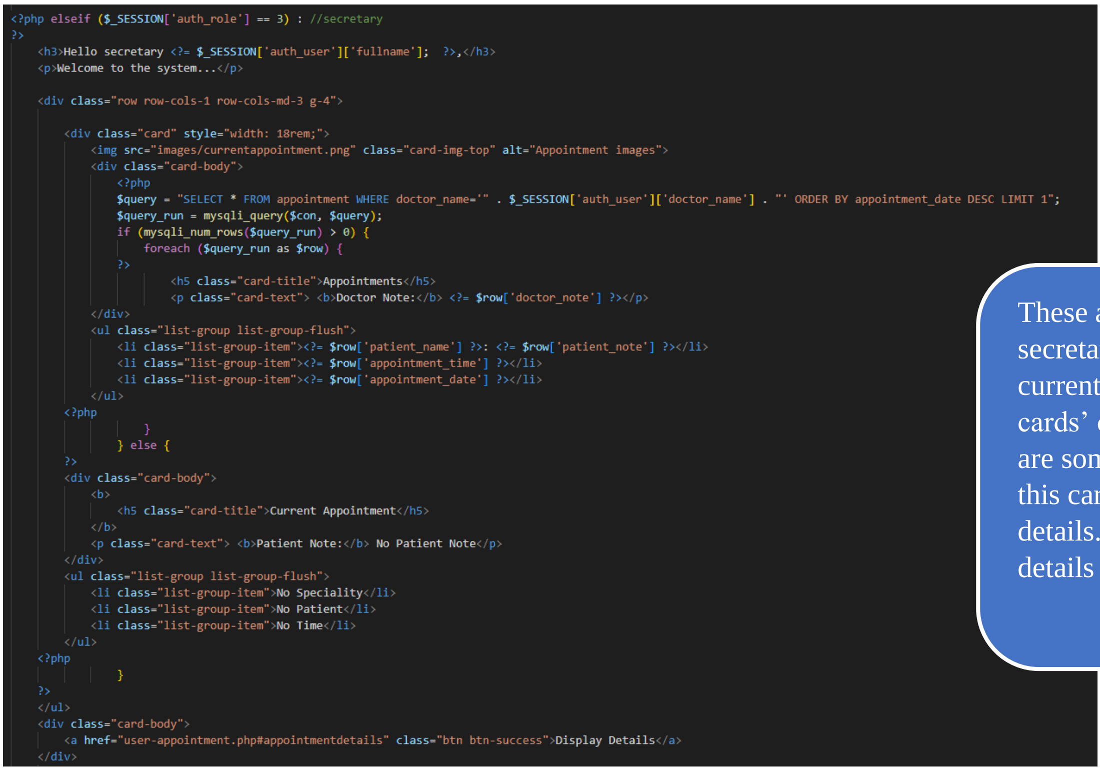
Today's Appointments: 0

Tomorrow's Appointments: 0

Total Appointments: 2

Arzu Demirtaş © arzdmrts32@gmail.com

In secretary dashboard, secretary can see closest appointment of his/her doctor, and appointment statistics.

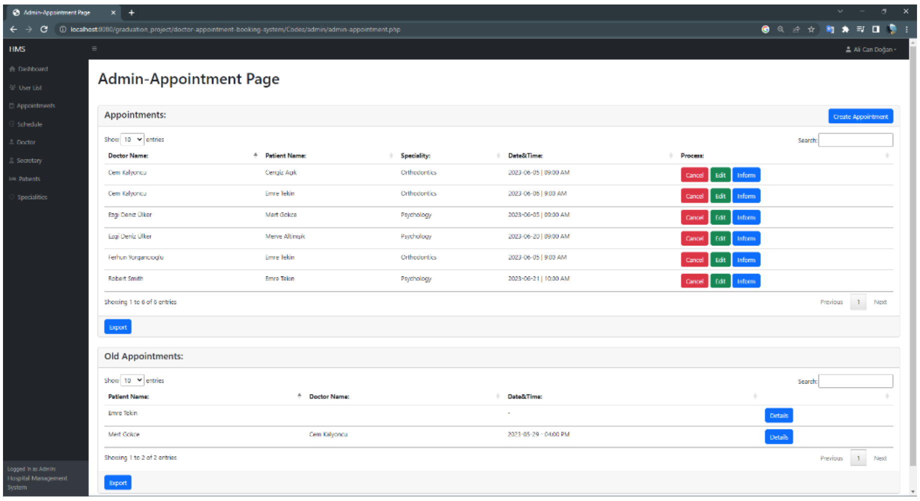


```
<?php elseif ($_SESSION['auth_role'] == 3) : //secretary
?>
    <h3>Hello secretary <?= $_SESSION['auth_user']['fullname'];  ?>,</h3>
    <p>Welcome to the system...</p>

    <div class="row row-cols-1 row-cols-md-3 g-4">

        <div class="card" style="width: 18rem;">
            <img src="images/currentappointment.png" class="card-img-top" alt="Appointment images">
            <div class="card-body">
                <?php
                $query = "SELECT * FROM appointment WHERE doctor_name='" . $_SESSION['auth_user']['doctor_name'] . "' ORDER BY appointment_date DESC LIMIT 1";
                $query_run = mysqli_query($con, $query);
                if (mysqli_num_rows($query_run) > 0) {
                    foreach ($query_run as $row) {
                ?>
                        <h5 class="card-title">Appointments</h5>
                        <p class="card-text"> <b>Doctor Note:</b> <?= $row['doctor_note'] ?></p>
            </div>
            <ul class="list-group list-group-flush">
                <li class="list-group-item"><?= $row['patient_name'] ?>: <?= $row['patient_note'] ?></li>
                <li class="list-group-item"><?= $row['appointment_time'] ?></li>
                <li class="list-group-item"><?= $row['appointment_date'] ?></li>
            </ul>
        <?php
                    }
                } else {
        ?>
        <div class="card-body">
            <b>
                <h5 class="card-title">Current Appointment</h5>
            </b>
            <p class="card-text"> <b>Patient Note:</b> No Patient Note</p>
        </div>
        <ul class="list-group list-group-flush">
            <li class="list-group-item">No Speciality</li>
            <li class="list-group-item">No Patient</li>
            <li class="list-group-item">No Time</li>
        </ul>
    <?php
                }
    ?>
    </ul>
    <div class="card-body">
        <a href="user-appointment.php#appointmentdetails" class="btn btn-success">Display Details</a>
    </div>
```

These are code for secretary dashboard current appointment cards’ codes. If there are some appointments this card will show its details. If not show no details message.

5.8 Appointment Pages: All users have similar interfaces and they all contain Create an Appointment, Current Appointments, Old Appointments. Let's explain the working logic of the Appointment page according to the user;

a) Admin Appointment:


Admin-Appointment Page
localhost:8080/graduation_project/doctor-appointment-booking-system/Codes/admin/admin-appointment.php
HMS
Ali Can Doğan
Dashboard
User List
Appointments
Schedule
Doctor
Secretary
Patients
Specialities
Create Appointment
Export
Logged in as Admin: Hospital Management System

Admin-Appointment Page

Appointments:

Show 10 entries Search:

Doctor Name:	Patient Name:	Speciality:	Date&Time:	Process:
Cem Kalyoncu	Cengiz Açık	Orthodontics	2023-06-05 | 09:00 AM	Cancel Edit Inform
Cem Kalyoncu	Emre Tekin	Orthodontics	2023-06-06 | 9:00 AM	Cancel Edit Inform
Ezgi Deniz Ülker	Mert Gokce	Psychology	2023-06-05 | 09:00 AM	Cancel Edit Inform
Ezgi Deniz Ülker	Merve Altınışık	Psychology	2023-06-20 | 09:00 AM	Cancel Edit Inform
Ferhun Yorgancioglu	Emre Tekin	Orthodontics	2023-06-05 | 9:00 AM	Cancel Edit Inform
Robert Smith	Emre Tekin	Psychology	2023-06-21 | 10:00 AM	Cancel Edit Inform

Showing 1 to 6 of 6 entries Previous 1 Next

Old Appointments:

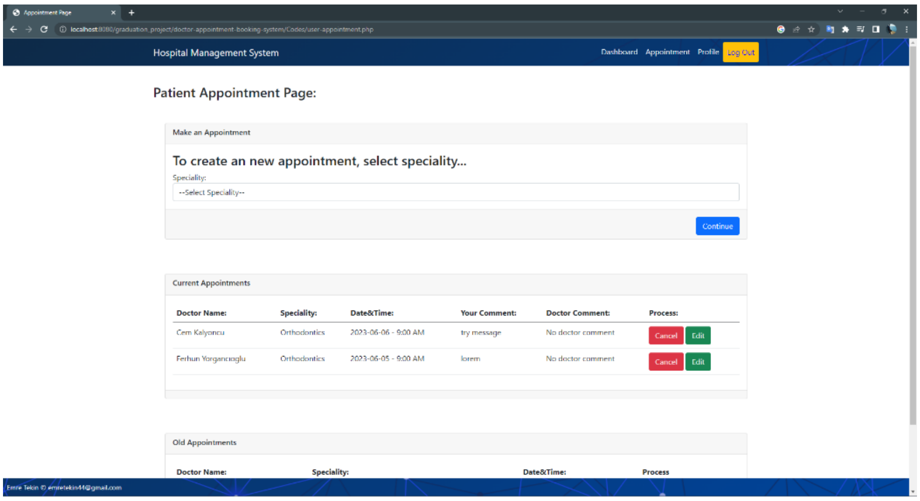
Show 10 entries Search:

Patient Name:	Doctor Name:	Date&Time:	
Emre Tekin		-	Details
Mert Gokce	Cem Kalyoncu	2023-05-29 - 04:00 PM	Details

Showing 1 to 2 of 2 entries Previous 1 Next

In this page, admin can see old and current appointments. Also can edit and inform users.

b) Patient Appointment:


Appointment Page
localhost:8080/graduation_project/doctor-appointment-booking-system/Codes/user-appointment.php
Hospital Management System
Dashboard
Appointment
Profile
Log Out
--Select Speciality--
Continue
Cancel
Edit
Emre Tekin © emretekin44@gmail.com

Patient Appointment Page:

Make an Appointment

To create an new appointment, select speciality...

Speciality:

Current Appointments

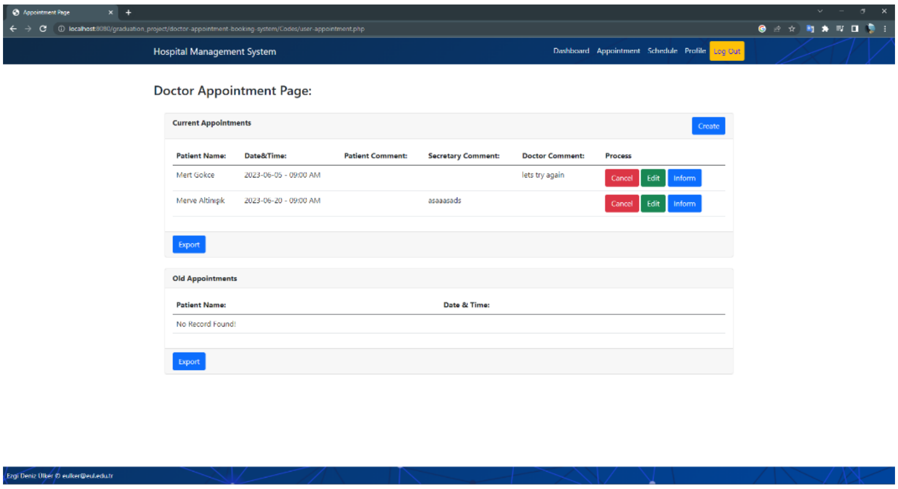
Doctor Name:	Speciality:	Date&Time:	Your Comment:	Doctor Comment:	Process:
Cem Kalyoncu	Orthodontics	2023-06-06 - 9:00 AM	try message	No doctor comment	Cancel Edit
Ferhun Yorgancıoglu	Orthodontics	2023-06-05 - 9:00 AM	lorem	No doctor comment	Cancel Edit

Old Appointments

Doctor Name:	Speciality:	Date&Time:	Process

In this page, patient can see old and create a new appointments. Also can edit and cancel appointment.

c) Doctor Appointment:


Appointment Page
localhost:8080/graduation_project/doctor-appointment-booking-system/Codes/user-appointment.php
Hospital Management System
Dashboard
Appointment
Schedule
Profile
Log Out
Create
Cancel
Edit
Inform
Export
Ezgi Deniz Ulker © eulker@eul.edu.tr

Doctor Appointment Page:

Current Appointments

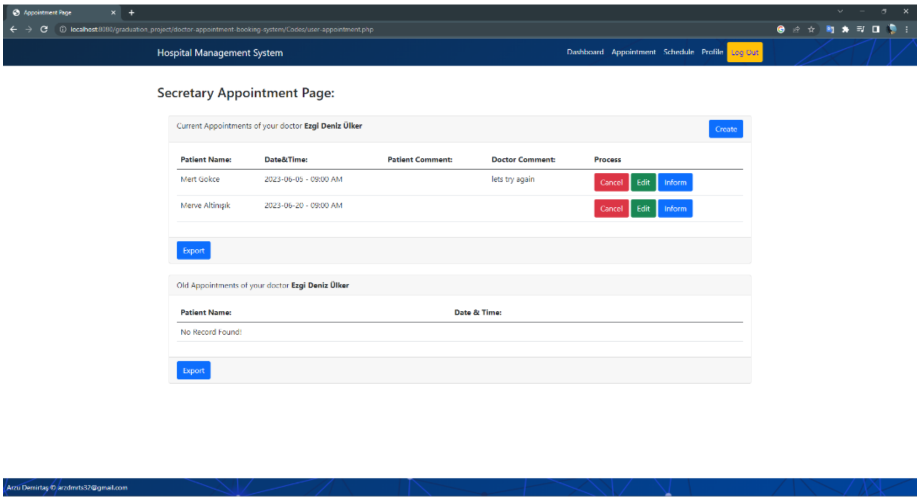
Patient Name:	Date&Time:	Patient Comment:	Secretary Comment:	Doctor Comment:	Process
Mert Gokce	2023-06-05 - 09:00 AM			lets try again	Cancel Edit Inform
Merve Altinışık	2023-06-20 - 09:00 AM		asaaasads		Cancel Edit Inform

Old Appointments

Patient Name:	Date & Time:
No Record Found!	

In this page, doctor can see old and create a new appointments. Also can edit and cancel appointment. Can inform the user.

d) Secretary Appointment:


Appointment Page
localhost:8080/graduation_project/doctor-appointment-booking-system/Codes/user-appointment.php
Hospital Management System
Dashboard
Appointment
Schedule
Profile
Log Out
Create
Cancel
Edit
Inform
Export
Arzu Demirtaş © arzdmrts32@gmail.com

Secretary Appointment Page:

Current Appointments of your doctor **Ezgi Deniz Ülker**

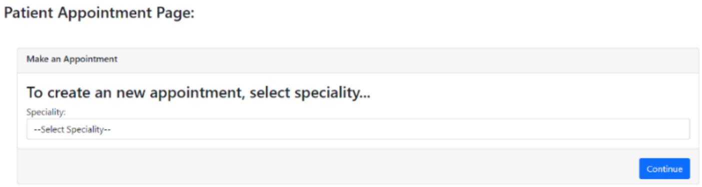
Patient Name:	Date&Time:	Patient Comment:	Doctor Comment:	Process
Mert Gokce	2023-06-05 - 09:00 AM		lets try again	Cancel Edit Inform
Merve Altinışık	2023-06-20 - 09:00 AM			Cancel Edit Inform

Old Appointments of your doctor **Ezgi Deniz Ülker**

Patient Name:	Date & Time:
No Record Found!	

In this page, secretary can see his doctors' old and current appointments. Also can edit and cancel appointment. Can inform the user.

- Let’s describe appointment logic. Every patient can create a new appointment when they register and login successfully. First of all they need no select speciality.



Patient Appointment Page:

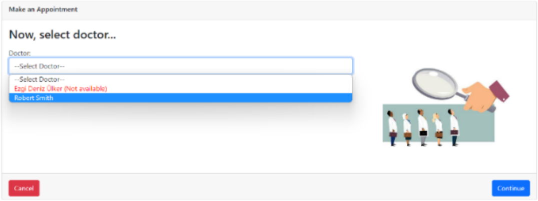
Make an Appointment

To create an new appointment, select speciality...

Speciality:

--Select Speciality--

- The system lists the doctors registered to the selected specialty. If doctor set his visibility visible, patients can make appointment with this doctor.



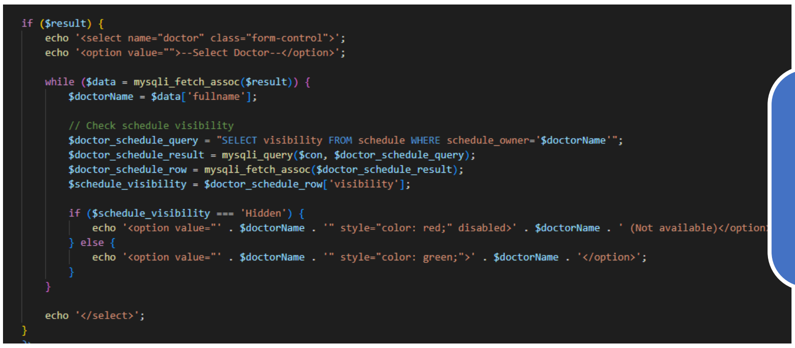
Make an Appointment

Now, select doctor...

Doctor:

--Select Doctor--

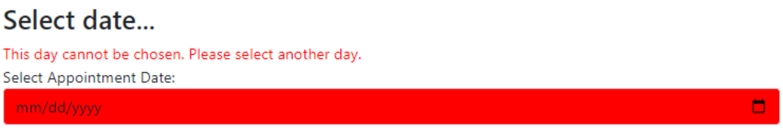
--Select Doctor--
Ezgi Deniz Ülker (Not available)
Robert Smith



```
if ($result) {
    echo '<select name="doctor" class="form-control">';
    echo '<option value="">--Select Doctor--</option>';

    while ($data = mysqli_fetch_assoc($result)) {
        $doctorName = $data['fullname'];

        // Check schedule visibility
        $doctor_schedule_query = "SELECT visibility FROM schedule WHERE schedule_owner='$doctorName'";
        $doctor_schedule_result = mysqli_query($con, $doctor_schedule_query);
        $doctor_schedule_row = mysqli_fetch_assoc($doctor_schedule_result);
        $schedule_visibility = $doctor_schedule_row['visibility'];

        if ($schedule_visibility === 'Hidden') {
            echo '<option value="' . $doctorName . '" style="color: red;" disabled>' . $doctorName . ' (Not available)</option
        } else {
            echo '<option value="' . $doctorName . '" style="color: green;">' . $doctorName . '</option>';
        }
    }

    echo '</select>';
}
```

This code displays visible doctors with green color, hidden doctors with red color.

- When patient select visible doctor next step is; selecting date. The date selection field is customized with script codes. Past days cannot be selected and a warning is given when weekends are selected.

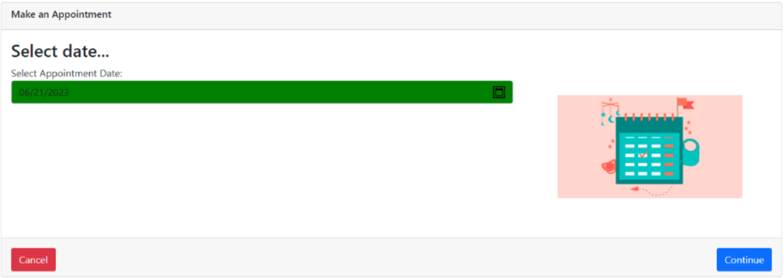


Select date...

This day cannot be chosen. Please select another day.

Select Appointment Date:

mm/dd/yyyy

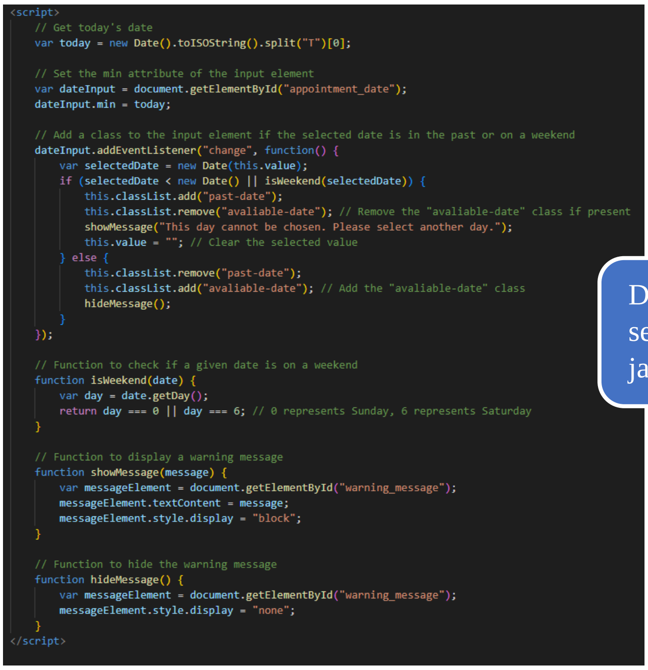


Make an Appointment

Select date...

Select Appointment Date:

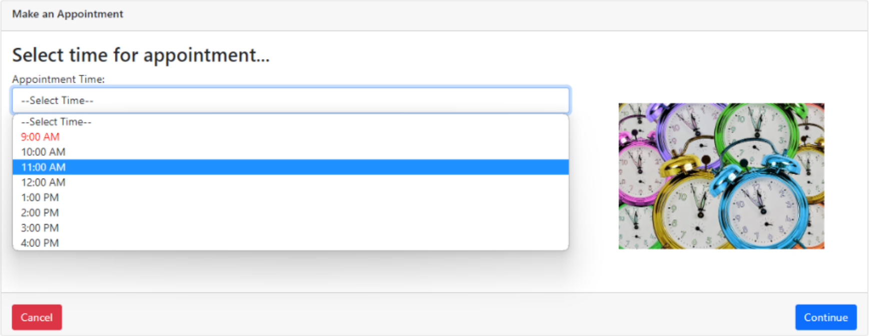
06/21/2023



```
<script>
    // Get today's date
    var today = new Date().toISOString().split("T")[0];

    // Set the min attribute of the input element
    var dateInput = document.getElementById("appointment_date");
    dateInput.min = today;

    // Add a class to the input element if the selected date is in the past or on a weekend
    dateInput.addEventListener("change", function() {
        var selectedDate = new Date(this.value);
        if (selectedDate < new Date() || isWeekend(selectedDate)) {
            this.classList.add("past-date");
            this.classList.remove("avaliable-date"); // Remove the "avaliable-date" class if present
            showMessage("This day cannot be chosen. Please select another day.");
            this.value = ""; // Clear the selected value
        } else {
            this.classList.remove("past-date");
            this.classList.add("avaliable-date"); // Add the "avaliable-date" class
            hideMessage();
        }
    });

    // Function to check if a given date is on a weekend
    function isWeekend(date) {
        var day = date.getDay();
        return day === 0 || day === 6; // 0 represents Sunday, 6 represents Saturday
    }

    // Function to display a warning message
    function showMessage(message) {
        var messageElement = document.getElementById("warning_message");
        messageElement.textContent = message;
        messageElement.style.display = "block";
    }

    // Function to hide the warning message
    function hideMessage() {
        var messageElement = document.getElementById("warning_message");
        messageElement.style.display = "none";
    }
</script>
```

Date input field setting with javascript codes

- After selecting date, now it's time to select time. If time already selected Its colored red. Other time slots are available.

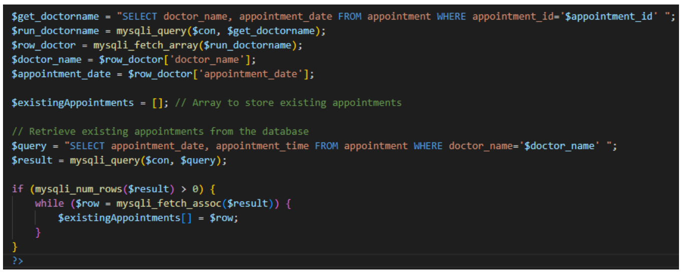


Make an Appointment

Select time for appointment...

Appointment Time:

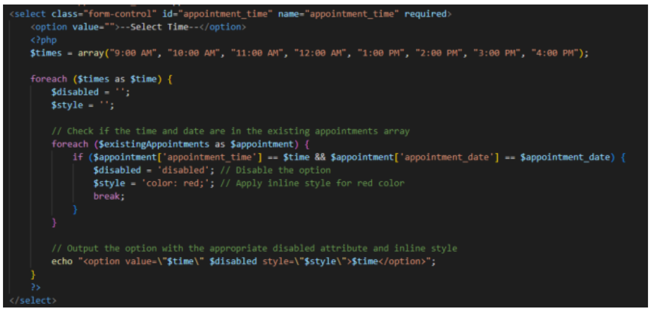
--Select Time--



```
$get_doctorname = "SELECT doctor_name, appointment_date FROM appointment WHERE appointment_id='$appointment_id' ";
$run_doctorname = mysqli_query($con, $get_doctorname);
$row_doctor = mysqli_fetch_array($run_doctorname);
$doctor_name = $row_doctor['doctor_name'];
$appointment_date = $row_doctor['appointment_date'];

$existingAppointments = []; // Array to store existing appointments

// Retrieve existing appointments from the database
$query = "SELECT appointment_date, appointment_time FROM appointment WHERE doctor_name='$doctor_name' ";
$result = mysqli_query($con, $query);

if (mysqli_num_rows($result) > 0) {
    while ($row = mysqli_fetch_assoc($result)) {
        $existingAppointments[] = $row;
    }
}
?>
```

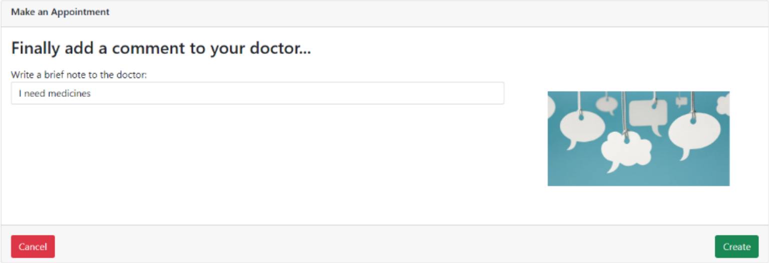
Create an array to store existing appointments for selected doctor…

Check existing appointments and deside already selected or not….



```
<select class="form-control" id="appointment_time" name="appointment_time" required>
    <option value="">--Select Time--</option>
    <?php
    $times = array("9:00 AM", "10:00 AM", "11:00 AM", "12:00 AM", "1:00 PM", "2:00 PM", "3:00 PM", "4:00 PM");

    foreach ($times as $time) {
        $disabled = '';
        $style = '';

        // Check if the time and date are in the existing appointments array
        foreach ($existingAppointments as $appointment) {
            if ($appointment['appointment_time'] == $time && $appointment['appointment_date'] == $appointment_date) {
                $disabled = 'disabled'; // Disable the option
                $style = 'color: red;'; // Apply inline style for red color
                break;
            }
        }

        // Output the option with the appropriate disabled attribute and inline style
        echo "<option value=\"$time\" $disabled style=\"$style\">$time</option>";
    }
    ?>
</select>
```

- Last part of appointment creation is comment. In this section patient can write a comment for doctor.

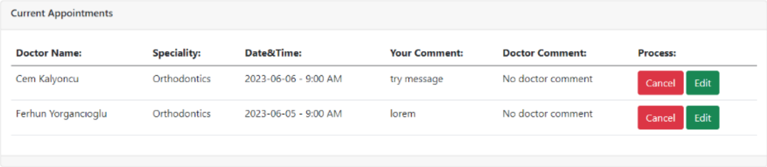


Make an Appointment

Finally add a comment to your doctor...

Write a brief note to the doctor: I need medicines

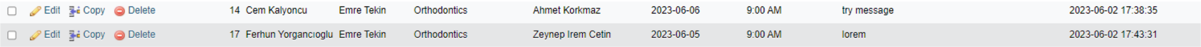
- All details save on database and doctor, secretary and patient can see its appointment on their appointment page.



Current Appointments

Doctor Name:	Speciality:	Date&Time:	Your Comment:	Doctor Comment:	Process:
Cem Kalyoncu	Orthodontics	2023-06-06 - 9:00 AM	try message	No doctor comment	Cancel Edit
Ferhun Yorgancıoglu	Orthodontics	2023-06-05 - 9:00 AM	lorem	No doctor comment	Cancel Edit

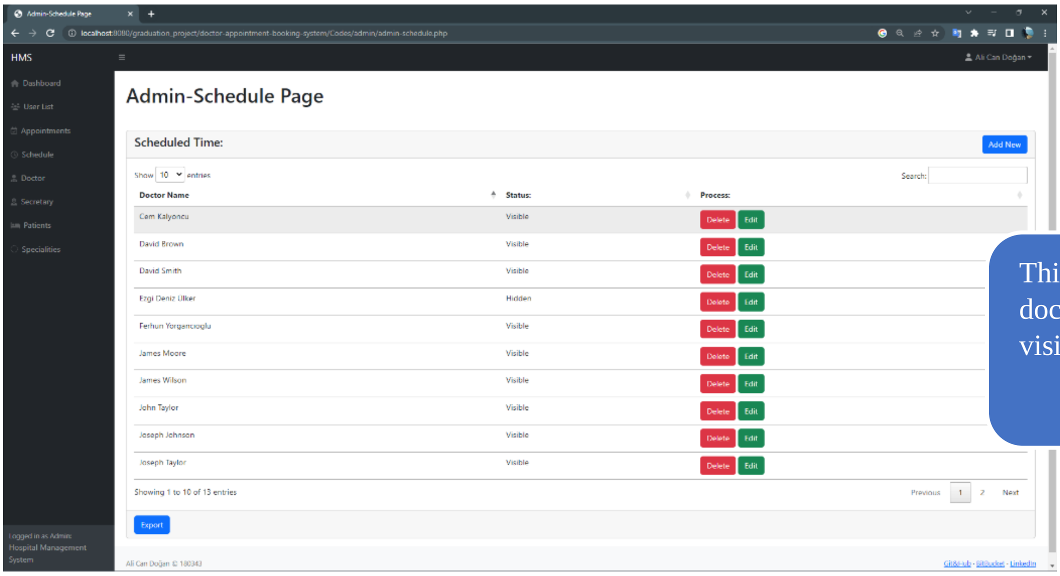
Database:



□	Edit Copy Delete	14	Cem Kalyoncu	Emre Tekin	Orthodontics	Ahmet Korkmaz	2023-06-06	9:00 AM	try message		2023-06-02 17:38:35
□	Edit Copy Delete	17	Ferhun Yorgancıoglu	Emre Tekin	Orthodontics	Zeynep Irem Cetin	2023-06-05	9:00 AM	lorem		2023-06-02 17:43:31

5.9 Schedule Pages: All users have similar interfaces. There is no patient schedule page, but other users do. Let's explain the working logic of the Schedule page according to the users;

a) Admin Schedule:



Admin-Schedule Page

Scheduled Time:

Add New

Show 10 entries

Search:

Doctor Name	Status:	Process:
Cem Kalyoncu	Visible	Delete Edit
David Brown	Visible	Delete Edit
David Smith	Visible	Delete Edit
Ezgi Deniz Ülker	Hidden	Delete Edit
Ferhun Yorgancıoglu	Visible	Delete Edit
James Moore	Visible	Delete Edit
James Wilson	Visible	Delete Edit
John Taylor	Visible	Delete Edit
Joseph Johnson	Visible	Delete Edit
Joseph Taylor	Visible	Delete Edit

Showing 1 to 10 of 13 entries

Previous 1 2 Next

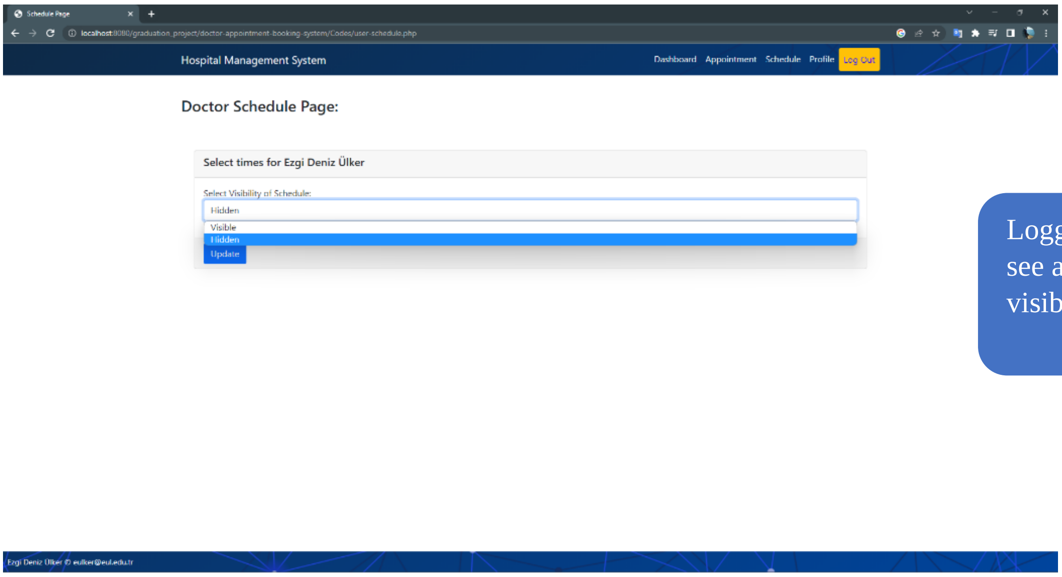
Export

Ali Can Doğan © 180343

GitHub - BitBucket - LinkedIn

This page shows doctors schedule is visible or not.

b) Doctor Schedule:



Schedule Page
localhost:8080/graduation_project/doctor-appointment-booking-system/Codes/user-schedule.php
Hospital Management System
Dashboard
Appointment
Schedule
Profile
Log Out

Doctor Schedule Page:

Select times for Ezgi Deniz Ülker

Select Visibility of Schedule:

Hidden

Visible

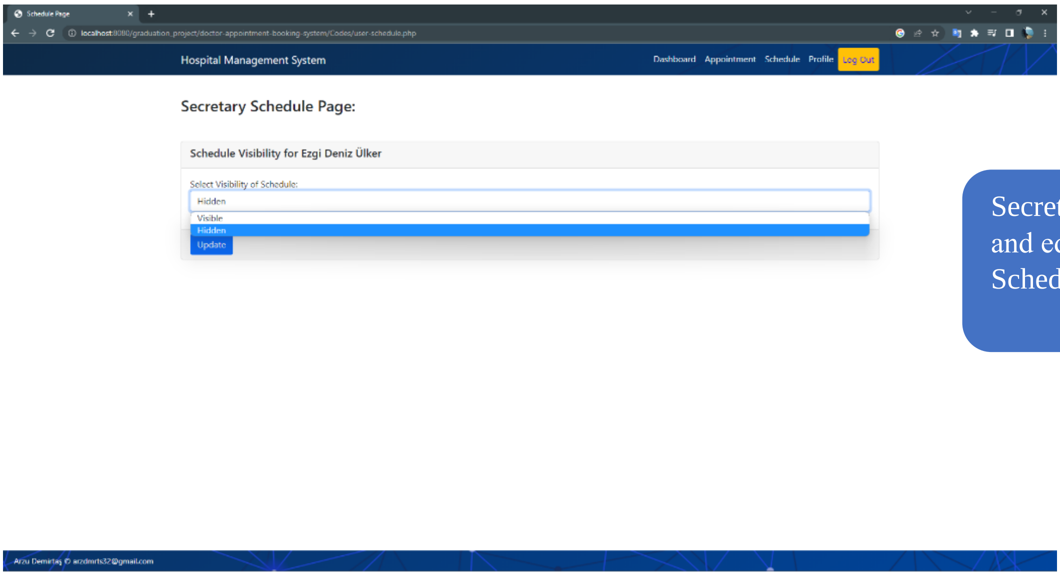
Hidden

Update

Ezgi Deniz Ülker © eulker@eul.edu.tr

Logged doctor can see and edit its visibility.

c) Secretary Schedule:


Schedule Page
localhost:8080/graduation_project/doctor-appointment-booking-system/Codes/user-schedule.php
Hospital Management System
Dashboard
Appointment
Schedule
Profile
Log Out

Secretary Schedule Page:

Schedule Visibility for Ezgi Deniz Ülker

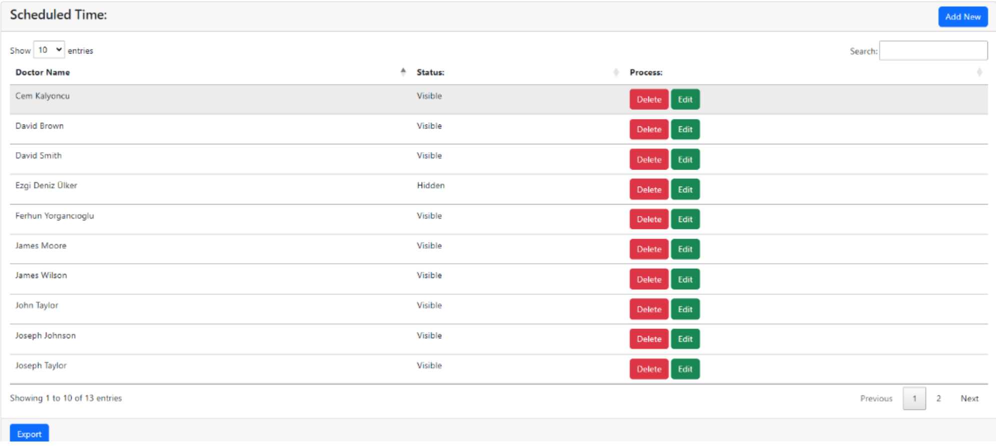
Select Visibility of Schedule: Hidden

Visible
Hidden
Update
Arzu Demirtaş © arzdmrts32@gmail.com

Secretary can see and edit its doctors’ Schedule.

- Let’s describe schedule logic. Admin needs to create all doctors’ schedule visible when add new doctor to system. Then, doctor or secretary can change schedule settings on their schedule page. This effect to appointment availability.

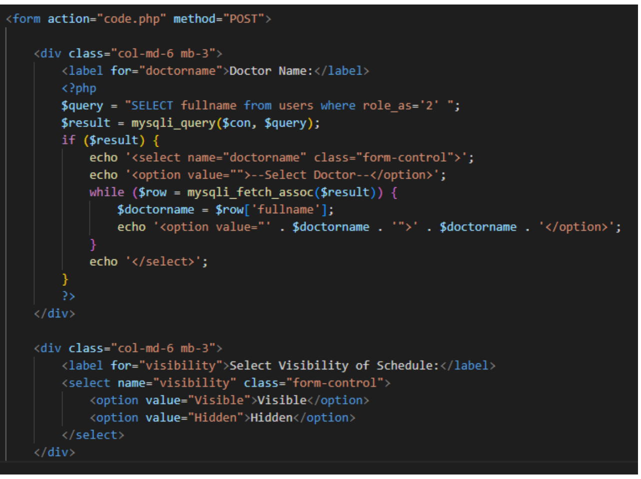
Admin Page:



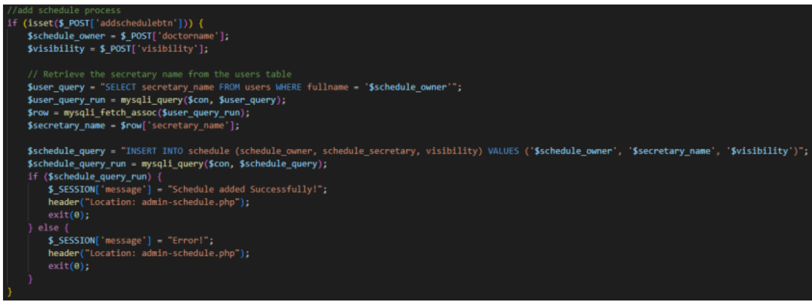
Scheduled Time:

Doctor Name	Status:	Process:
Cem Kalyoncu	Visible	Delete Edit
David Brown	Visible	Delete Edit
David Smith	Visible	Delete Edit
Ezgi Deniz Ülker	Hidden	Delete Edit
Ferhun Yorgancıoglu	Visible	Delete Edit
James Moore	Visible	Delete Edit
James Wilson	Visible	Delete Edit
John Taylor	Visible	Delete Edit
Joseph Johnson	Visible	Delete Edit
Joseph Taylor	Visible	Delete Edit

Showing 1 to 10 of 13 entries



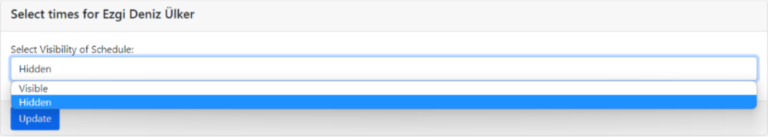
```
<form action="code.php" method="POST">

    <div class="col-md-6 mb-3">
        <label for="doctorname">Doctor Name:</label>
        <?php
        $query = "SELECT fullname from users where role_as='2' ";
        $result = mysqli_query($con, $query);
        if ($result) {
            echo '<select name="doctorname" class="form-control">';
            echo '<option value="">--Select Doctor--</option>';
            while ($row = mysqli_fetch_assoc($result)) {
                $doctorname = $row['fullname'];
                echo '<option value="' . $doctorname . '">' . $doctorname . '</option>';
            }
            echo '</select>';
        }
        ?>
    </div>

    <div class="col-md-6 mb-3">
        <label for="visibility">Select Visibility of Schedule:</label>
        <select name="visibility" class="form-control">
            <option value="Visible">Visible</option>
            <option value="Hidden">Hidden</option>
        </select>
    </div>
```



```
//add schedule process
if (isset($_POST['addschedulebtn'])) {
    $schedule_owner = $_POST['doctorname'];
    $visibility = $_POST['visibility'];

    // Retrieve the secretary name from the users table
    $user_query = "SELECT secretary_name FROM users WHERE fullname = '$schedule_owner'";
    $user_query_run = mysqli_query($con, $user_query);
    $row = mysqli_fetch_assoc($user_query_run);
    $secretary_name = $row['secretary_name'];

    $schedule_query = "INSERT INTO schedule (schedule_owner, schedule_secretary, visibility) VALUES ('$schedule_owner', '$secretary_name', '$visibility')";
    $schedule_query_run = mysqli_query($con, $schedule_query);
    if ($schedule_query_run) {
        $_SESSION['message'] = "Schedule added Successfully!";
        header("Location: admin-schedule.php");
        exit(0);
    } else {
        $_SESSION['message'] = "Error!";
        header("Location: admin-schedule.php");
        exit(0);
    }
}
```

Doctor Page:

Doctor Schedule Page:

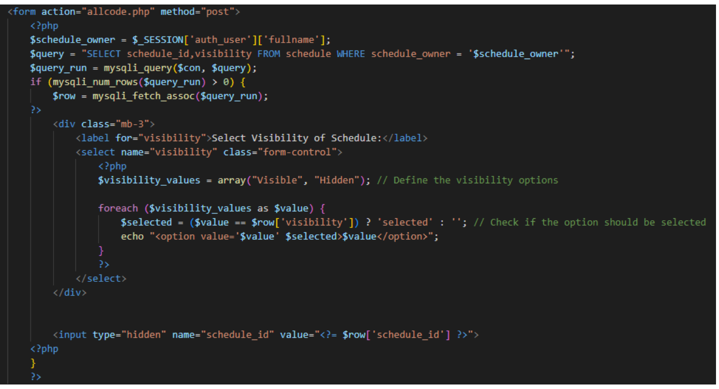


Select times for Ezgi Deniz Ülker

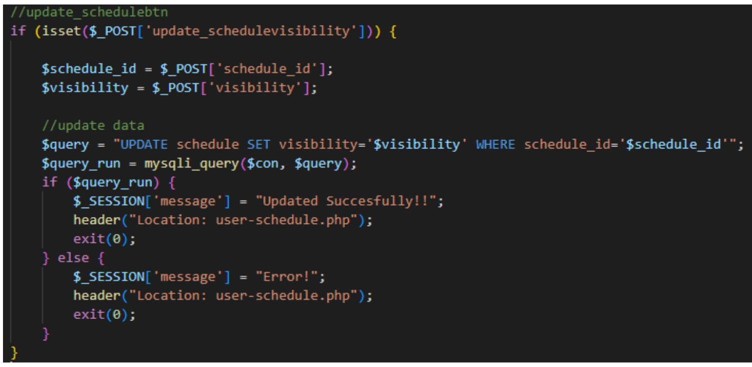
Select Visibility of Schedule:

Hidden

Both code pieces doing same thing. First part select schedule visibility and second part save it in database.



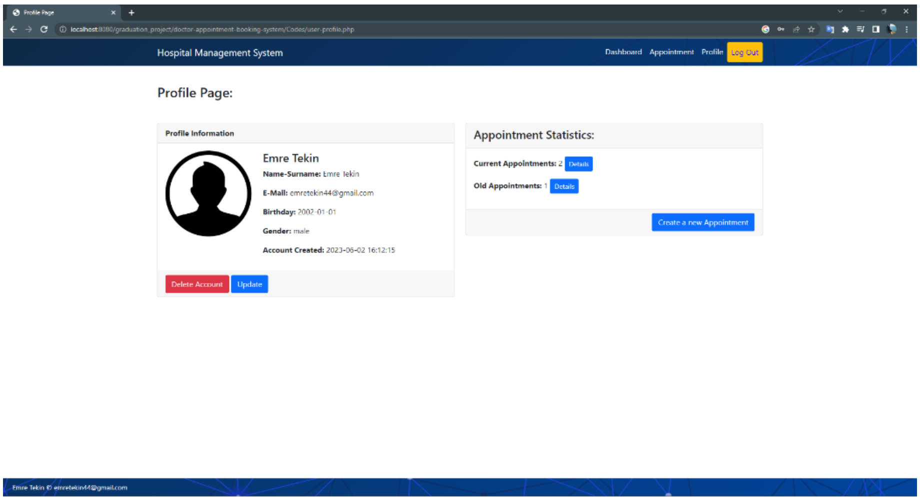
```
<form action="allcode.php" method="post">
    <?php
    $schedule_owner = $_SESSION['auth_user']['fullname'];
    $query = "SELECT schedule_id,visibility FROM schedule WHERE schedule_owner = '$schedule_owner'";
    $query_run = mysqli_query($con, $query);
    if (mysqli_num_rows($query_run) > 0) {
        $row = mysqli_fetch_assoc($query_run);
    ?>
        <div class="mb-3">
            <label for="visibility">Select Visibility of Schedule:</label>
            <select name="visibility" class="form-control">
                <?php
                $visibility_values = array("Visible", "Hidden"); // Define the visibility options

                foreach ($visibility_values as $value) {
                    $selected = ($value == $row['visibility']) ? 'selected' : ''; // Check if the option should be selected
                    echo "<option value='$value' $selected>$value</option>";
                }
                ?>
            </select>
        </div>


        <input type="hidden" name="schedule_id" value="<?= $row['schedule_id'] ?>">
    <?php
    }
    ?>
```



```
//update_schedulebtn
if (isset($_POST['update_schedulevisibility'])) {

    $schedule_id = $_POST['schedule_id'];
    $visibility = $_POST['visibility'];

    //update data
    $query = "UPDATE schedule SET visibility='$visibility' WHERE schedule_id='$schedule_id'";
    $query_run = mysqli_query($con, $query);
    if ($query_run) {
        $_SESSION['message'] = "Updated Succesfully!!";
        header("Location: user-schedule.php");
        exit(0);
    } else {
        $_SESSION['message'] = "Error!";
        header("Location: user-schedule.php");
        exit(0);
    }
}
```

5.10 Profile Pages: The user logged in on this page can view, edit and delete their own information.

a) Patient Profile:



Profile Page
localhost:8080/graduation_project/doctor-appointment-booking-system/Codes/user-profile.php
Hospital Management System
Dashboard
Appointment
Profile
Log Out

Profile Page:

Profile Information

Emre Tekin

Name-Surname: Emre Tekin

E-Mail: emretekin44@gmail.com

Birthday: 2002-01-01

Gender: male

Account Created: 2023-06-02 16:12:15

Appointment Statistics:

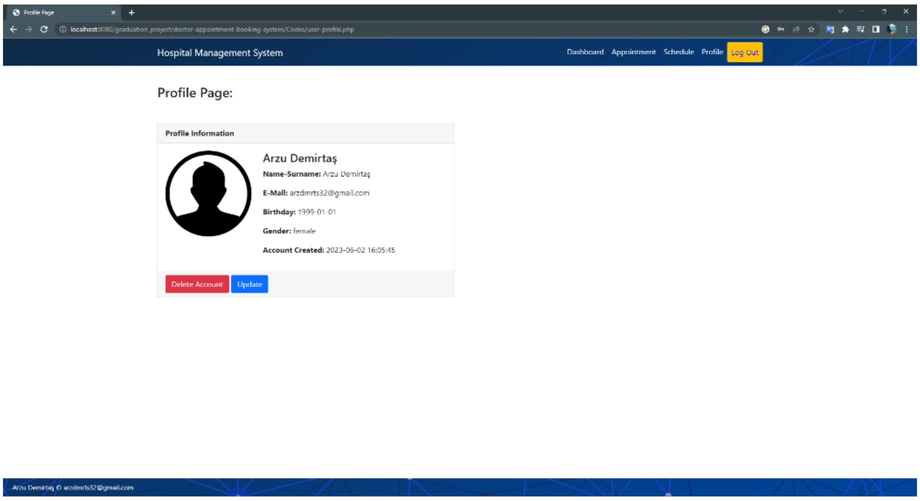
Current Appointments: 2

Old Appointments: 1

Details
Details
Create a new Appointment

Emre Tekin © emretekin44@gmail.com

b) Doctor & Secretary Profile:



Profile Page
localhost:8080/graduation_project/doctor-appointment-booking-system/Codes/user-profile.php
Hospital Management System
Dashboard
Appointment
Schedule
Profile
Log Out

Profile Page:

Profile Information

Arzu Demirtaş

Name-Surname: Arzu Demirtaş

E-Mail: arzdmrts32@gmail.com

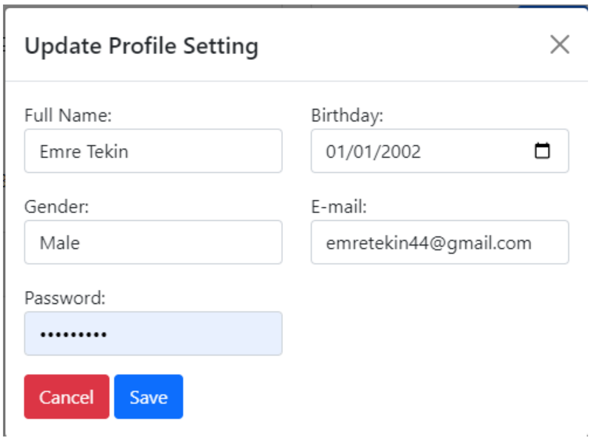
Birthday: 1999-01-01

Gender: female

Account Created: 2023-06-02 16:05:45

Arzu Demirtaş © arzdmrts32@gmail.com

c) Update Profile Modal



Update Profile Setting

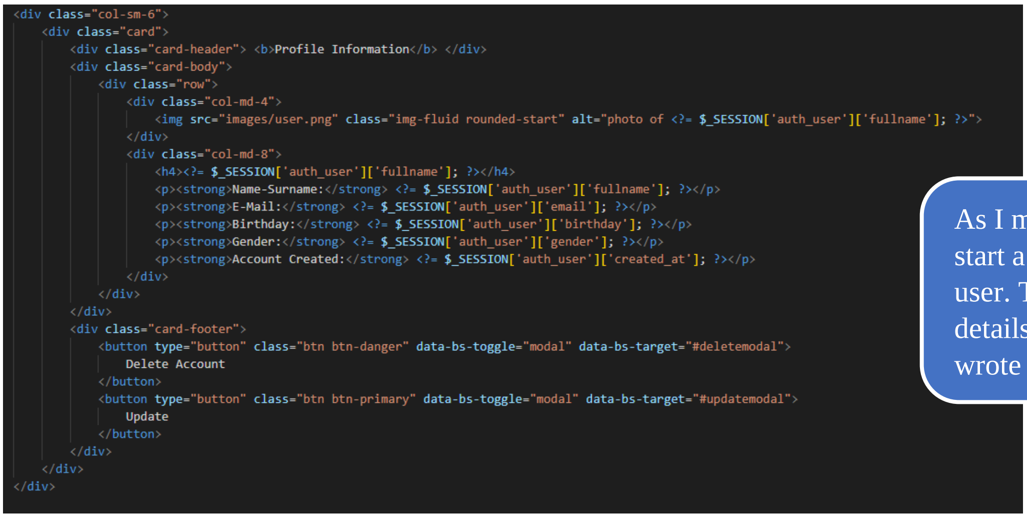
Full Name: Emre Tekin

Birthday: 01/01/2002

Gender: Male

E-mail: emretekin44@gmail.com

Password: •••••••••

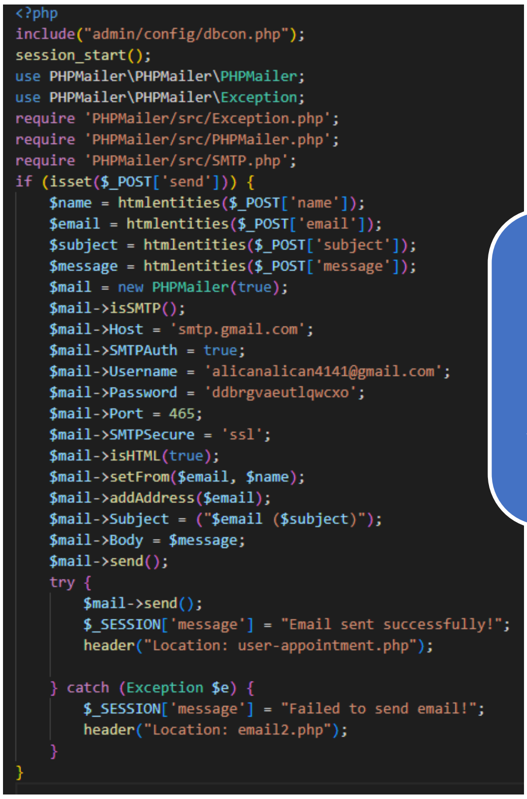


```
<div class="col-sm-6">
    <div class="card">
        <div class="card-header"> <b>Profile Information</b> </div>
        <div class="card-body">
            <div class="row">
                <div class="col-md-4">
                    <img src="images/user.png" class="img-fluid rounded-start" alt="photo of <?= $_SESSION['auth_user']['fullname']; ?>">
                </div>
                <div class="col-md-8">
                    <h4><?= $_SESSION['auth_user']['fullname']; ?></h4>
                    <p><strong>Name-Surname:</strong> <?= $_SESSION['auth_user']['fullname']; ?></p>
                    <p><strong>E-Mail:</strong> <?= $_SESSION['auth_user']['email']; ?></p>
                    <p><strong>Birthday:</strong> <?= $_SESSION['auth_user']['birthday']; ?></p>
                    <p><strong>Gender:</strong> <?= $_SESSION['auth_user']['gender']; ?></p>
                    <p><strong>Account Created:</strong> <?= $_SESSION['auth_user']['created_at']; ?></p>
                </div>
            </div>
        </div>
        <div class="card-footer">
            <button type="button" class="btn btn-danger" data-bs-toggle="modal" data-bs-target="#deletemodal">
                Delete Account
            </button>
            <button type="button" class="btn btn-primary" data-bs-toggle="modal" data-bs-target="#updatemodal">
                Update
            </button>
        </div>
    </div>
</div>
```

As I mentioned before, we start a session for logged user. To display logged user details in profile page I wrote these codes.

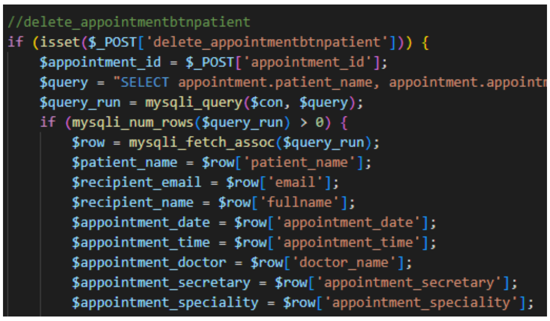
5.11 **Sending Emails**: This was one of the biggest challenges I've had. Because the places I used as a source were very old and I had a hard time integrating them into my code. I downloaded PHPMailer **[17]** and used this process in different ways.

- System login information is sent to the e-mail of the doctor and nurse registered in the system.
- When a patient has a short time to his appointment, the secretary, doctor or admin can send a reminder mail to the patient.
- When a doctor cancels the appointment, the patient receives an e-mail.
- When a patient cancels the appointment, the secretary gets an e-mail.

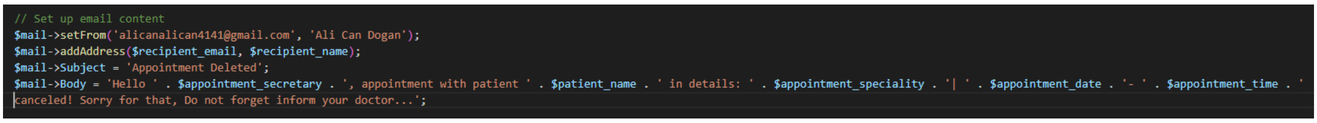


```
<?php
include("admin/config/dbcon.php");
session_start();
use PHPMailer\PHPMailer\PHPMailer;
use PHPMailer\PHPMailer\Exception;
require 'PHPMailer/src/Exception.php';
require 'PHPMailer/src/PHPMailer.php';
require 'PHPMailer/src/SMTP.php';
if (isset($_POST['send'])) {
    $name = htmlentities($_POST['name']);
    $email = htmlentities($_POST['email']);
    $subject = htmlentities($_POST['subject']);
    $message = htmlentities($_POST['message']);
    $mail = new PHPMailer(true);
    $mail->isSMTP();
    $mail->Host = 'smtp.gmail.com';
    $mail->SMTPAuth = true;
    $mail->Username = 'alicanalican4141@gmail.com';
    $mail->Password = 'ddbrgvaeutlqwcxo';
    $mail->Port = 465;
    $mail->SMTPSecure = 'ssl';
    $mail->isHTML(true);
    $mail->setFrom($email, $name);
    $mail->addAddress($email);
    $mail->Subject = ("$email ($subject)");
    $mail->Body = $message;
    $mail->send();
    try {
        $mail->send();
        $_SESSION['message'] = "Email sent successfully!";
        header("Location: user-appointment.php");

    } catch (Exception $e) {
        $_SESSION['message'] = "Failed to send email!";
        header("Location: email2.php");
    }
}
```

MAIL: This code use PHPMailer to send E-Mail. I use my Google account and my Google app password as a sender and receiver is varies according to the situation.

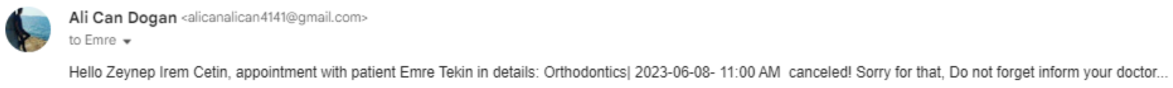


```
//delete_appointmentbtnpatient
if (isset($_POST['delete_appointmentbtnpatient'])) {
    $appointment_id = $_POST['appointment_id'];
    $query = "SELECT appointment.patient_name, appointment.appointm
    $query_run = mysqli_query($con, $query);
    if (mysqli_num_rows($query_run) > 0) {
        $row = mysqli_fetch_assoc($query_run);
        $patient_name = $row['patient_name'];
        $recipient_email = $row['email'];
        $recipient_name = $row['fullname'];
        $appointment_date = $row['appointment_date'];
        $appointment_time = $row['appointment_time'];
        $appointment_doctor = $row['doctor_name'];
        $appointment_secretary = $row['appointment_secretary'];
        $appointment_speciality = $row['appointment_speciality'];
```



```
// Set up email content
$mail->setFrom('alicanalican4141@gmail.com', 'Ali Can Dogan');
$mail->addAddress($recipient_email, $recipient_name);
$mail->Subject = 'Appointment Deleted';
$mail->Body = 'Hello ' . $appointment_secretary . ', appointment with patient ' . $patient_name . ' in details: ' . $appointment_speciality . '| ' . $appointment_date . '- ' . $appointment_time . '
canceled! Sorry for that, Do not forget inform your doctor...';
```

OUTPUT:



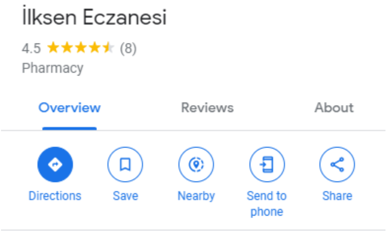
Ali Can Dogan <alicanalican4141@gmail.com>
to Emre ▾

Hello Zeynep Irem Cetin, appointment with patient Emre Tekin in details: Orthodontics| 2023-06-08- 11:00 AM canceled! Sorry for that, Do not forget inform your doctor...

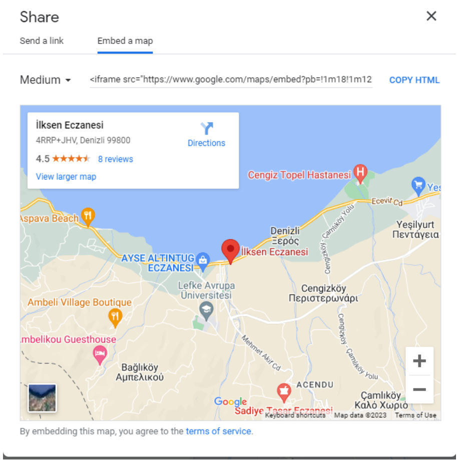
5.12 **Adding and Utilizing I-frames**: Useful add-ons added to the patient dashboard interface. One of them is the map showing the nearest pharmacies. Go to google maps and select something on map **[18]**.

1- Select some place on google maps.

2- Click share.



3- Select embed a map and copy that frame.



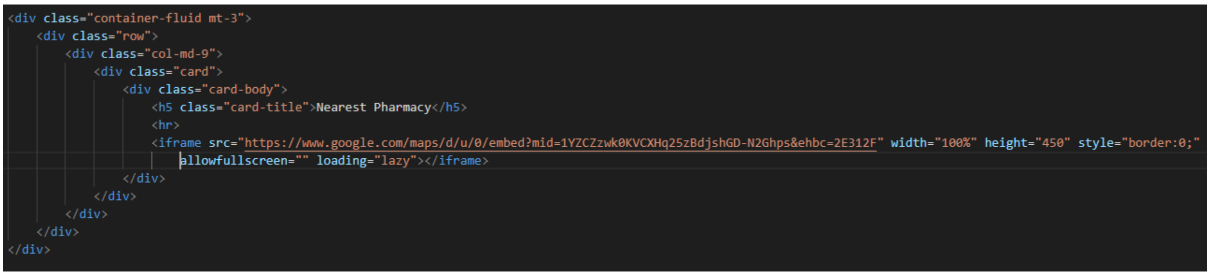
<iframe src="https://www.google.com/maps/embed?pb=!1m18!1m12

4RRP+JHV, Denizli 99800

4.5 ★★★★★ 8 reviews

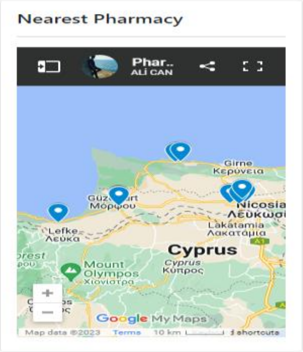
By embedding this map, you agree to the terms of service.

4- Paste it to your code.

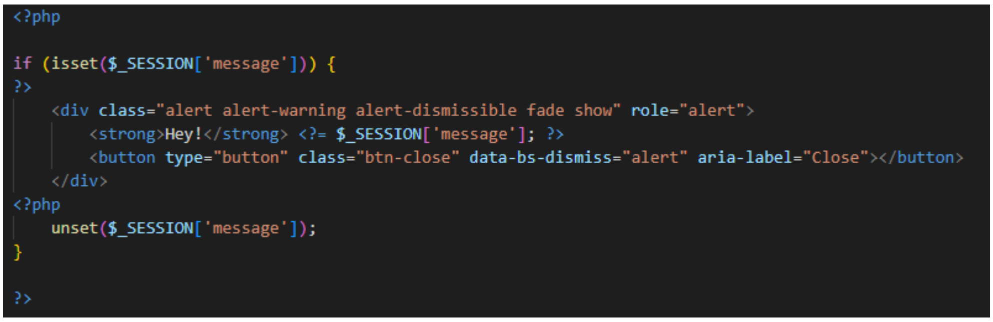


```
<div class="container-fluid mt-3">
    <div class="row">
        <div class="col-md-9">
            <div class="card">
                <div class="card-body">
                    <h5 class="card-title">Nearest Pharmacy</h5>
                    <hr>
                    <iframe src="https://www.google.com/maps/d/u/0/embed?mid=1YZCZzwk0KVCXHq25zBdjshGD-N2Ghps&ehbc=2E312F" width="100%" height="450" style="border:0;"
                        allowfullscreen="" loading="lazy"></iframe>
                </div>
            </div>
        </div>
    </div>
</div>
```

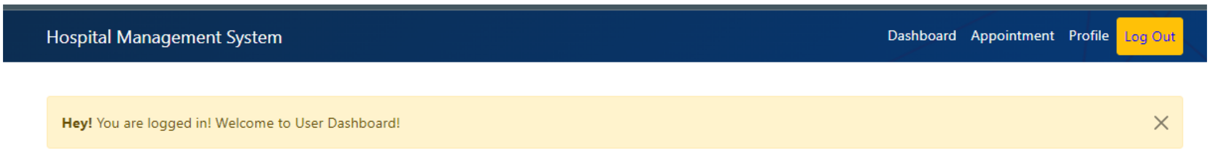
5- Here is the output:



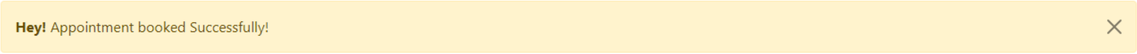
5.13 **Alerts:** This session for alert messages. When I want to display some alerts on screen, I use this code.



```
<?php

if (isset($_SESSION['message'])) {
?>
    <div class="alert alert-warning alert-dismissible fade show" role="alert">
        <strong>Hey!</strong> <?= $_SESSION['message']; ?>
        <button type="button" class="btn-close" data-bs-dismiss="alert" aria-label="Close"></button>
    </div>
<?php
    unset($_SESSION['message']);
}

?>
```



Hey! You are logged in! Welcome to User Dashboard!



Hey! Appointment booked Successfully!

Patient Appointment Page:

5.14 **Export tables as an excel file:**

1) Add tableToExcel file to your project.
2) Give an id to your table which you want to export.

```
<table class="table table-hover " id="myTable">
```

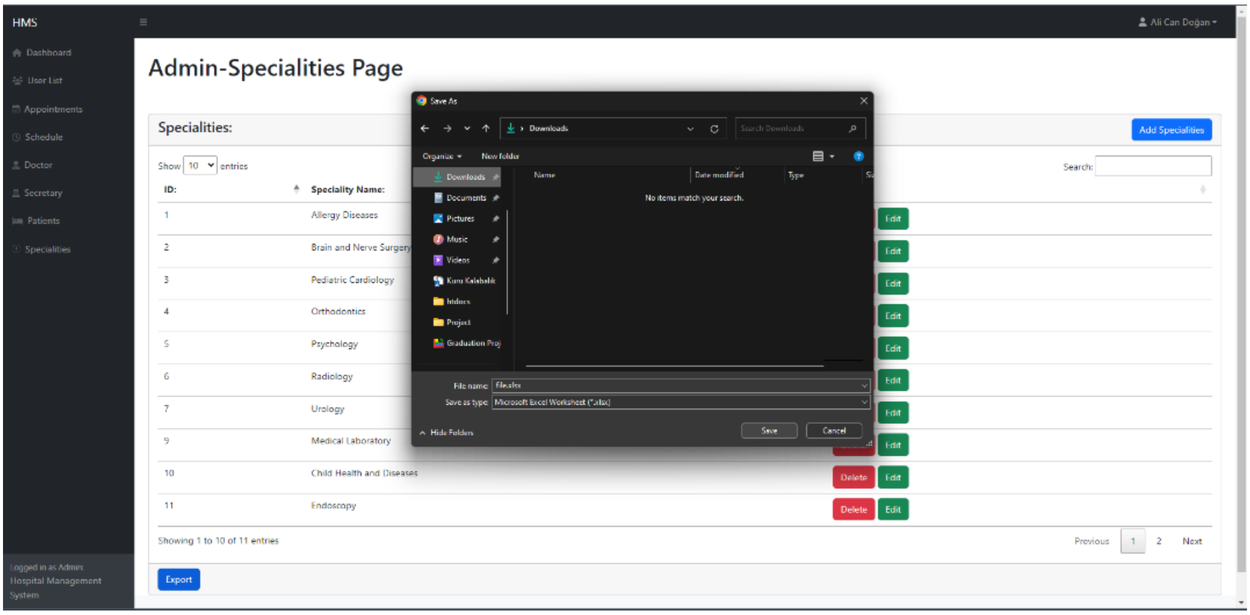
3) Add a button and give a onclick event to this button.

```
<button class="btn btn-primary" id="exporttable"
onclick="tableToExcel()"> Export</button>
```

4) Create a script tag for function.

```
function tableToExcel() {
        var table2excel = new Table2Excel();
        table2excel.export(document.querySelectorAll("#myTable"));
}
```

5) Here is the result.



Admin-Specialities Page

Specialities:

Show 10 entries

Search:

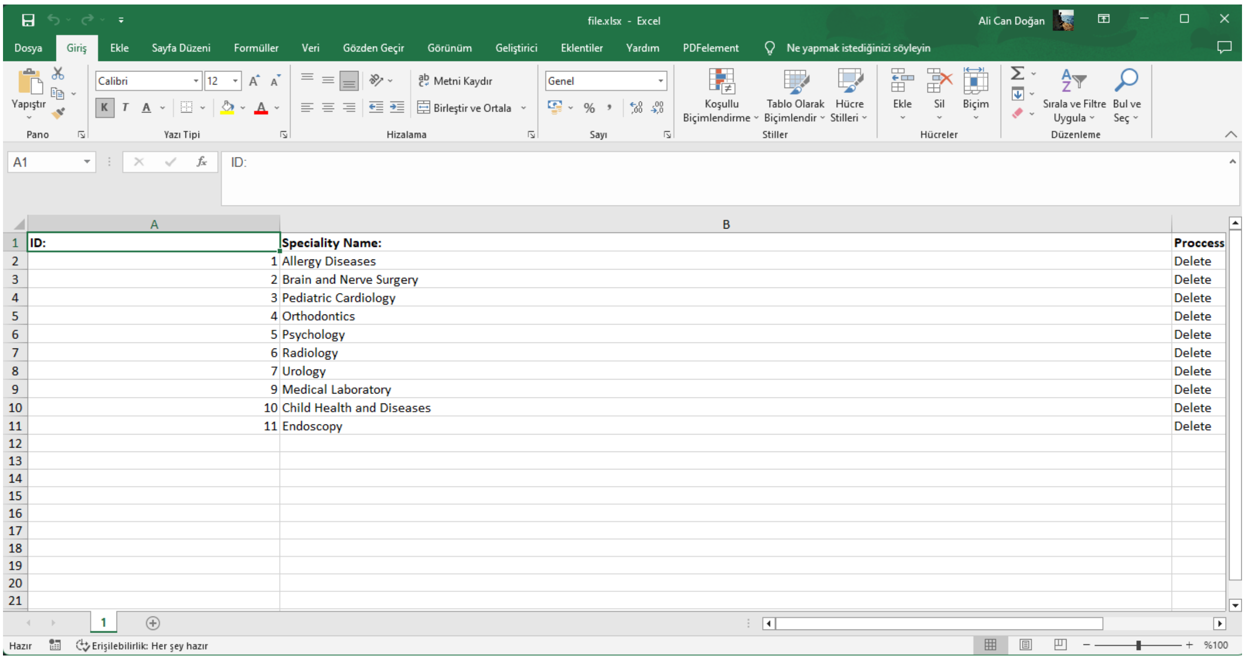
File name: file.xlsx

Save as type: Microsoft Excel Worksheet (*.xlsx)

ID:	Speciality Name:
1	Allergy Diseases
2	Brain and Nerve Surgery
3	Pediatric Cardiology
4	Orthodontics
5	Psychology
6	Radiology
7	Urology
9	Medical Laboratory
10	Child Health and Diseases
11	Endoscopy

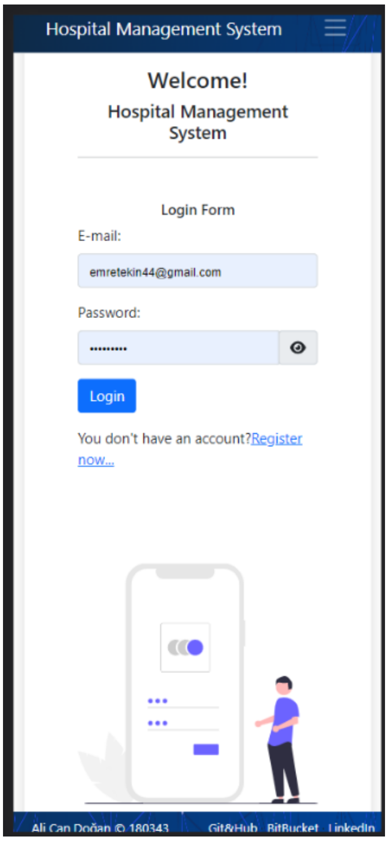
Showing 1 to 10 of 11 entries

Logged in as Admin:
Hospital Management System



ID:	Speciality Name:	Process
1	Allergy Diseases	Delete
2	Brain and Nerve Surgery	Delete
3	Pediatric Cardiology	Delete
4	Orthodontics	Delete
5	Psychology	Delete
6	Radiology	Delete
7	Urology	Delete
9	Medical Laboratory	Delete
10	Child Health and Diseases	Delete
11	Endoscopy	Delete

5.15 Responsive Design:



Hospital Management System

Welcome!

Hospital Management System

Login Form

E-mail:

emretekin44@gmail.com

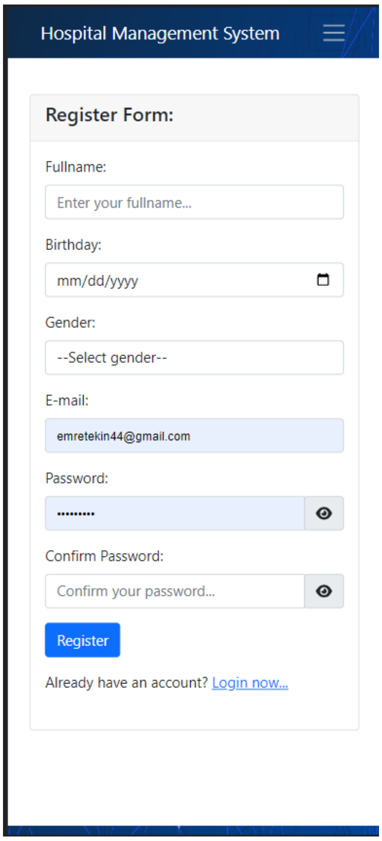
Password:

•••••••••

Login

You don't have an account?Register now...

Ali Can Doğan © 180343 Git&Hub BitBucket LinkedIn



Hospital Management System

Register Form:

Fullname:

Enter your fullname...

Birthday:

mm/dd/yyyy

Gender:

--Select gender--

E-mail:

emretekin44@gmail.com

Password:

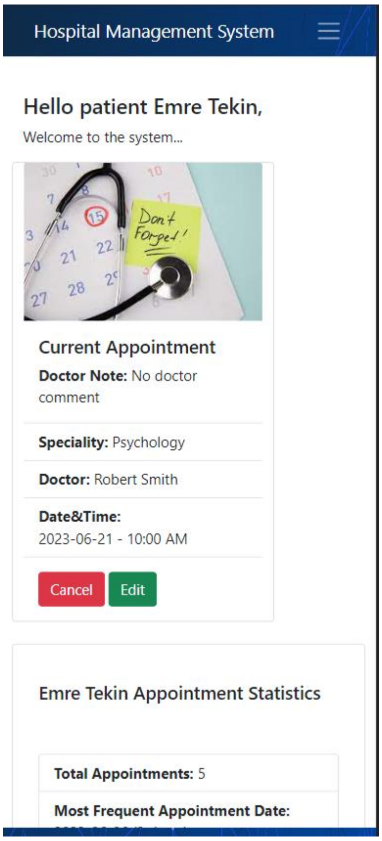
•••••••••

Confirm Password:

Confirm your password...

Register

Already have an account? Login now...



Hospital Management System

Hello patient Emre Tekin,

Welcome to the system...

Current Appointment

Doctor Note: No doctor comment

Speciality: Psychology

Doctor: Robert Smith

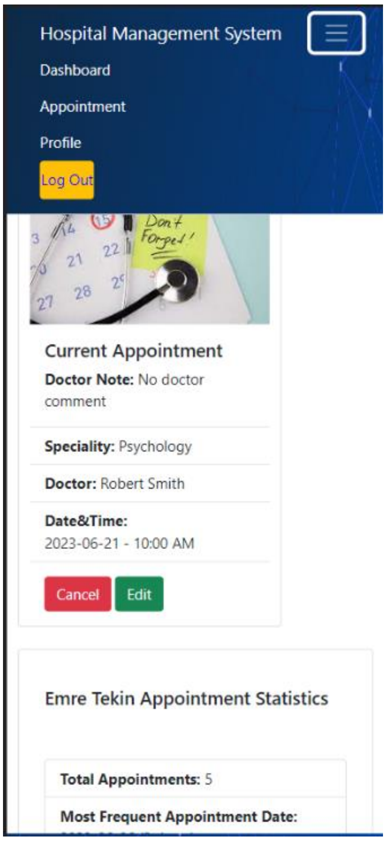
Date&Time: 2023-06-21 - 10:00 AM

Cancel Edit

Emre Tekin Appointment Statistics

Total Appointments: 5

Most Frequent Appointment Date:



Hospital Management System

Dashboard

Appointment

Profile

Log Out

Current Appointment

Doctor Note: No doctor comment

Speciality: Psychology

Doctor: Robert Smith

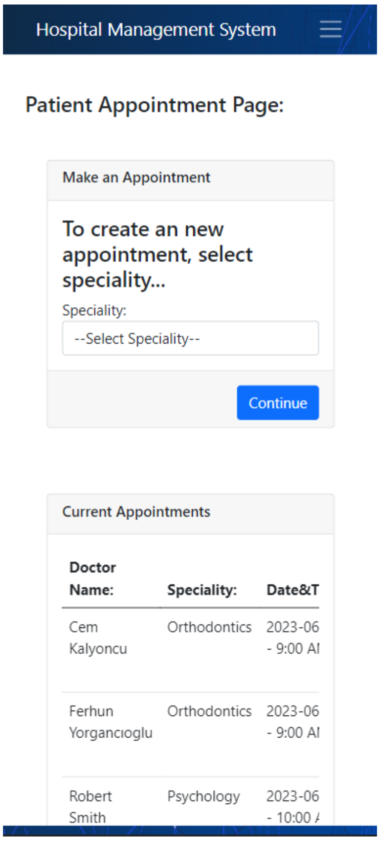
Date&Time: 2023-06-21 - 10:00 AM

Cancel Edit

Emre Tekin Appointment Statistics

Total Appointments: 5

Most Frequent Appointment Date:



Hospital Management System

Patient Appointment Page:

Make an Appointment

To create an new appointment, select speciality...

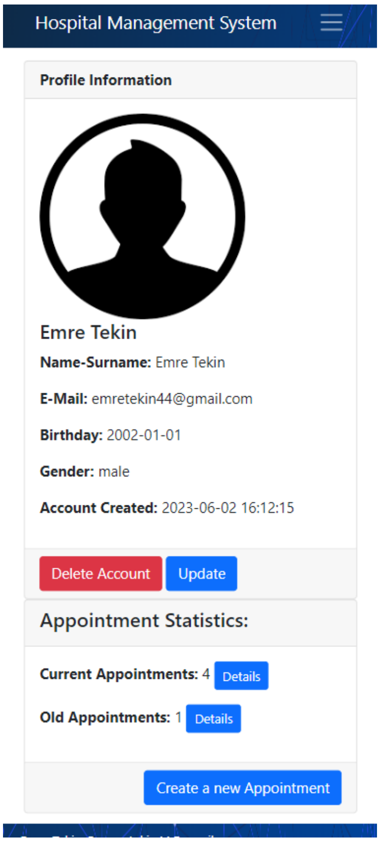
Speciality:

--Select Speciality--

Continue

Current Appointments

Doctor Name:	Speciality:	Date&T
Cem Kalyoncu	Orthodontics	2023-06 - 9:00 AI
Ferhun Yorgancıoglu	Orthodontics	2023-06 - 9:00 AI
Robert Smith	Psychology	2023-06 - 10:00 /



Hospital Management System

Profile Information

Emre Tekin

Name-Surname: Emre Tekin

E-Mail: emretekin44@gmail.com

Birthday: 2002-01-01

Gender: male

Account Created: 2023-06-02 16:12:15

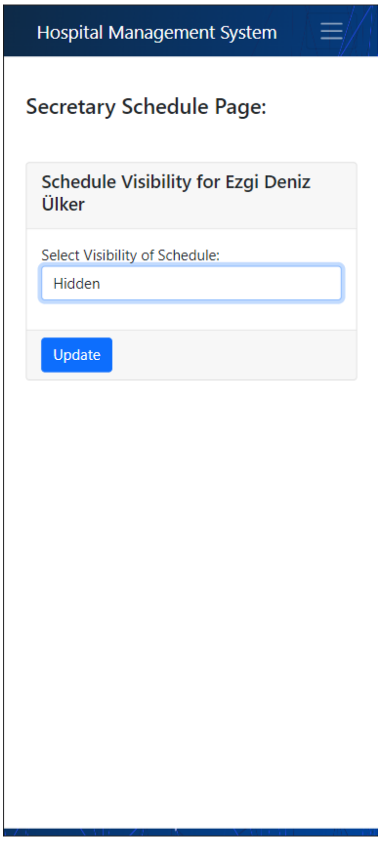
Delete Account Update

Appointment Statistics:

Current Appointments: 4 Details

Old Appointments: 1 Details

Create a new Appointment

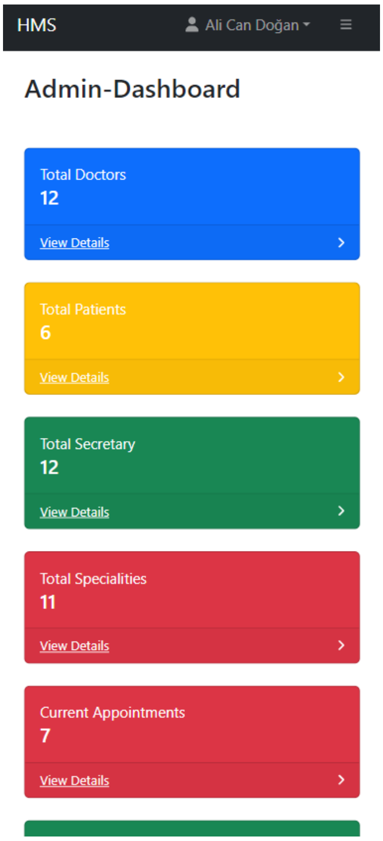


Hospital Management System

Secretary Schedule Page:

Schedule Visibility for Ezgi Deniz Ülker

Select Visibility of Schedule: Hidden



HMS Ali Can Doğan

Admin-Dashboard

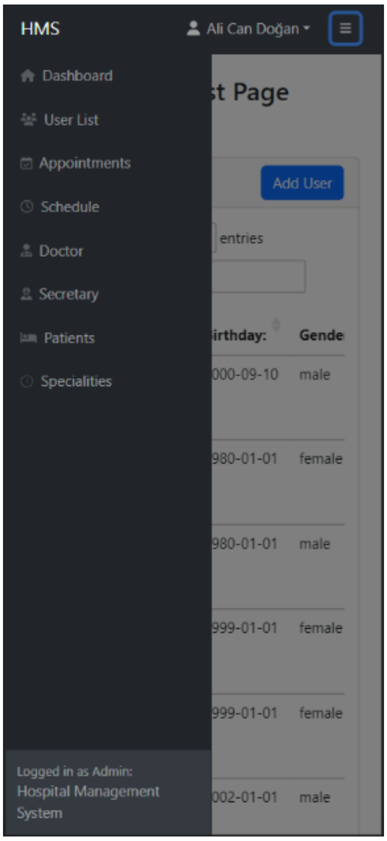
Total Doctors 12

Total Patients 6

Total Secretary 12

Total Specialities 11

Current Appointments 7



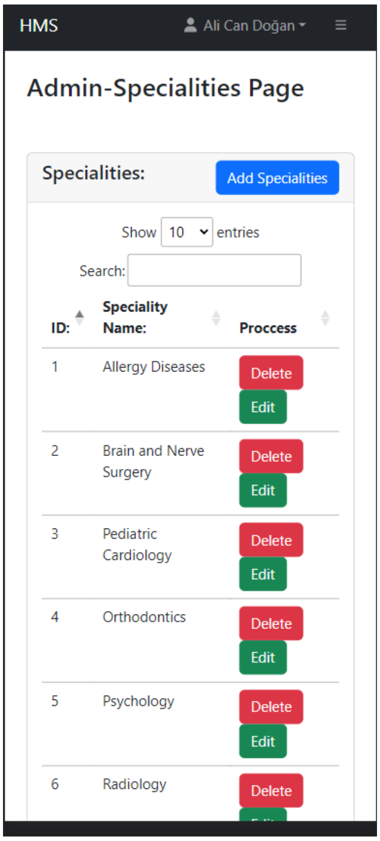
HMS Ali Can Doğan

t Page

entries

irthday:	Gende
000-09-10	male
980-01-01	female
980-01-01	male
999-01-01	female
999-01-01	female
002-01-01	male

Logged in as Admin:
Hospital Management System



HMS Ali Can Doğan

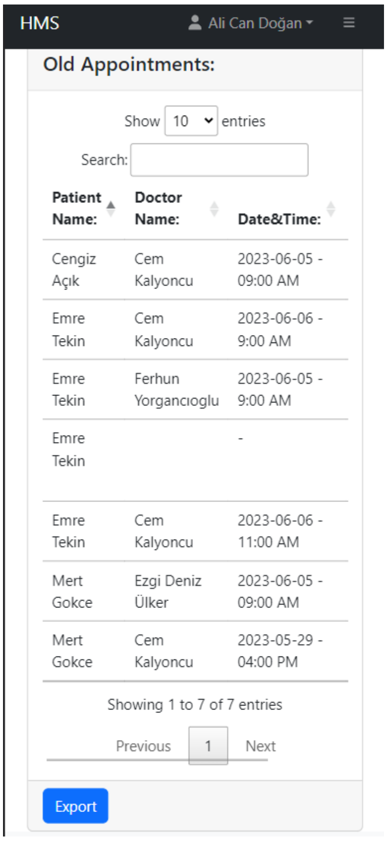
Admin-Specialities Page

Specialities:

Show 10 entries

Search:

ID:	Speciality Name:	Process
1	Allergy Diseases	Delete Edit
2	Brain and Nerve Surgery	Delete Edit
3	Pediatric Cardiology	Delete Edit
4	Orthodontics	Delete Edit
5	Psychology	Delete Edit
6	Radiology	Delete



HMS Ali Can Doğan

Old Appointments:

Show 10 entries

Search:

Patient Name:	Doctor Name:	Date&Time:
Cengiz Açık	Cem Kalyoncu	2023-06-05 - 09:00 AM
Emre Tekin	Cem Kalyoncu	2023-06-06 - 9:00 AM
Emre Tekin	Ferhun Yorgancıoglu	2023-06-05 - 9:00 AM
Emre Tekin		-
Emre Tekin	Cem Kalyoncu	2023-06-06 - 11:00 AM
Mert Gokce	Ezgi Deniz Ülker	2023-06-05 - 09:00 AM
Mert Gokce	Cem Kalyoncu	2023-05-29 - 04:00 PM

Showing 1 to 7 of 7 entries

6. Conclusion

A user-friendly, understandable and easy-to-use hospital management system has been created. The system can be monitored even by people who do not have detailed knowledge of the technology. The system will provide improved patient experiences, better data management and cost savings. It will also contribute to the overall improvement of health services.

6.1 Benefits

a. Benefits to users:

1. There will be more efficient communication between all users.
2. By leveraging the benefits of programming, we can eliminate old-style paperwork for data storage.
3. Doctors will be able to spend more time with their patients.
4. Thanks to the user-friendly interface, every user will be able to easily do what they want.
5. Hospital operations will be better managed from the admin panel with various statistics.

b. Benefits to me:

1. I learned the process and operation of installing a database.
2. I learned web interface design.
3. I learned how to download and install something from a website.
4. I learned better by practicing with the HTML, CSS, and JavaScript.
5. By working on both front-end and back-end on my own, I gained experience as a full stack web developer.

6.2 Ethics

The concept of ethics in technology and health is complex. When developing a technological project in the health sector, it is important to be conscious of responsibility and consider the ethical implications. Below, I have listed some important ethical considerations for a doctor appointment booking system:

- Patients' personal data and disease histories should be stored and processed confidentially. The hospital should only share this data with authorized persons (doctors and secretaries) and it should not be used for any other purpose. This is called privacy and confidentiality **[19]**.
- System users have the right to be informed about every action they take. This is called "informed consent". The system owner should inform patients about how to use the system and ensure that they receive digitally healthy services **[20].**
- Patients should have equitable access to all technological health services regardless of their economic, cultural, sociological or any other personal characteristics. This is known as accessibility **[21]**.
- A doctor appointment booking system should not discriminate against any group or individual and should be designed in a way that is equal, fair, and equitable for all users. This is called fairness and non-discrimination **[22].**
- Hospitals should transparently inform patients about how technology is used in healthcare. Transparency is important in healthcare **[23].**
- Technological interventions in health should be developed and utilized in a socially responsible manner and with due consideration of their impact on society as a whole. This is called social responsibility **[24].**

When developing and implementing a health technology project, it is extremely important to follow ethical guidelines. The rights of patients, doctors and all other users must be respected and protected**[25]**.

Meeting a personal challenge was one of the main factors in choosing this project. In my own experience, I have noticed that making appointments to go to the hospital or other health care facilities is done in a very irregular and old-fashioned way. In today's digital age, it seems rather strange that some companies cannot modernize this process. As a result, I decided to do this project with the aim of making people's lives easier and reducing time loss with more effective appointment management.

6.3 Future Works

Technology is constantly evolving, so it's important to adapt to changing trends. As a result, always there are potential improvements that can be made to the project. Of course, the resulting software will have problems. The first goal will be to try to fix the problems and glitches that arise.

- ✓ Can be made into a mobile application that is compatible with both Android and iOS.
- ✓ A part of the system can be created where the doctor and patient can chat with each other.
- ✓ The system can be made faster, more reliable, and more useful.
- ✓ The buyers of the system may have more than one hospital, and it is possible to expand the system by creating shared servers and databases.

7. References

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[3]: Web Design: What Makes a Good Website (6 Key Qualities). (2022, May 12). Hotjar: Website Heatmaps & Behavior Analytics Tools. https://www.hotjar.com/web-design/

[4]: 10 ways technology is changing healthcare - Hunimed. (2021, July 26). Hunimed. https://www.hunimed.eu/news/10-ways-technology-is-changing-healthcare/

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