Project Specification: Healthcare Appointment System

1. Project Overview

The goal is to design and develop a **Healthcare Appointment System** that allows patients to easily book appointments, doctors to manage their schedules and prescriptions, and administrators to oversee and analyze system activity.

The platform will feature:

- **Role-based dashboards** for Admins, Doctors, and Patients.
- **Calendar-based doctor availability** management.
- **Appointment booking system** with status tracking and reminders.
- **Secure prescription upload and download**.
- **Admin dashboard with statistics and reports**.

The solution will be developed using **Symfony** for backend and frontend (Twig) and **MySQL/PostgreSQL** for data storage.

2. Objectives

- Provide a **user-friendly, responsive, and scalable healthcare scheduling system**.
- Implement **role-based authentication** for Admins, Doctors, and Patients.
- Enable doctors to manage their **availability and prescriptions**.
- Allow patients to **search, book, and manage appointments**.
- Automate **notifications and reminders** to improve attendance.
- Provide admins with **statistics and reporting tools**.
- Ensure **performance, security, and maintainability**.

3. Needs Analysis & Specification

3.1 Study of Existing Systems

Analysis of existing medical booking platforms (Doctolib, Zocdoc, local clinic systems) to identify best practices and features such as:

- Easy doctor search and filtering.
- Appointment availability validation (prevent double booking).
- Prescription sharing and secure storage.
- Reminder systems to reduce missed appointments.

3.2 Formalism

System requirements will be modeled using **UML diagrams**:

- Use case diagrams (patient booking, doctor availability, prescription management).
- Class diagrams (User, Doctor, Patient, Appointment, Prescription).

4. Functional Requirements

4.1 Authentication & User Roles

Secure login/registration with role-based access.

- **Admin**: Manage doctors/patients, oversee appointments & prescriptions, view statistics.
- **Doctor**: Define availability, manage appointments, upload prescriptions.
- **Patient**: Search doctors, book/cancel appointments, download prescriptions, receive reminders.

4.2 Doctor Availability Management

- Calendar interface for weekly schedules.
- Define recurring working hours.
- Mark unavailable days (vacations, leave).

4.3 Appointment Booking

- Patients can only view available slots.
- Validation to prevent double booking.
- Appointment status: **Pending, Confirmed, Canceled**.

4.4 Prescription Management

- Doctors can upload prescriptions (PDF/images).
- Patients can securely access and download prescriptions anytime.
- Files stored with proper access controls.

4.5 Notifications & Reminders

- Email confirmations for booking, cancellation, and updates.
- Reminder email sent **24 hours before appointment**.

4.6 Admin Dashboard

- Manage doctors, patients, and appointments.
- View and export statistics (appointments per doctor, busiest days, patient count).
- Reports available in **PDF/CSV format**.

5. Non-Functional Requirements

- **Performance**: Fast and responsive scheduling and search.
- **Scalability**: Support multiple doctors and a large patient base.
- **Security**: Role-based access, encrypted password storage, secure prescription files.
- **Usability**: Intuitive dashboards for each role.

6. Technical Stack

- **Backend & Frontend**: Symfony (PHP, Twigl).
- **Database**: MySQL or PostgreSQL.
- **Authentication**: Symfony Security (role-based).
- **Styling**: Bootstrap / TailwindCSS.
- **Email Service**: SMTP or third-party provider (SendGrid/Mailgun).

7. Working Environment

- **Languages**: PHP, JavaScript (for optional frontend interactivity).
- **Tools**:
    - PhpStorm / VS Code (IDE).
    - Git/GitHub (version control).
    - Postman (API testing).
    - MySQL Workbench / pgAdmin (database management).
    - Draw.io / Lucidchart (UML diagrams).

8. Development Roadmap

Phase 1 (MVP)

- Authentication system (Admin, Doctor, Patient).
- Doctor profiles and availability management.
- Basic appointment booking (CRUD).

Phase 2

- Prescription upload and download.
- Email notifications and reminders.

Phase 3 (Portfolio Upgrade)

- Admin dashboard with statistics.
- Advanced filters (search by specialty, location, date).
- Export reports (PDF/CSV).