



System Management Lawyer Office

THESIS

SUBMITTED FOR THE AWARD OF THE DEGREE OF

Bachelor's Degree

IN

Engineering and Computer

BY

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September 21 University

Sana'a 2025 - Yemen

2025

Abstract

The Lawyer Office Management System represents an integrated software solution designed to organize and automate various administrative and operational processes within law firms. This system addresses the challenges faced by traditional offices, such as document accumulation, lack of organization, difficulty in tracking cases and appointments, and the absence of reliable financial and technical systems.

The system provides a comprehensive digital environment for managing client data, where personal information and transaction records are stored securely and are easily accessible. It also offers complete case management across different legal domains (civil, criminal, commercial, administrative), with precise tracking of each case's timeline and linking it to relevant clients and parties. Furthermore, the system includes an advanced module for managing appointments and court sessions, supported by a smart calendar and a notification system through SMS and email, ensuring that no important dates are missed.

In terms of document management, the system offers an advanced electronic archiving solution that supports multiple file formats, with quick search capabilities and automatic linking to related cases. It also includes a financial unit for invoice issuance, payment tracking, and generating periodic financial reports to support administrative decision-making. Additionally, the system provides comprehensive statistical reports on case progress, overall office performance, and financial status, enhancing transparency and governance.

From a technical perspective, the system is built using ASP.NET Core Web API for the backend, Angular for the frontend, SQL Server as the main database, and a fully integrated mobile application developed with Flutter to ensure accessibility across

multiple devices (computer, tablet, smartphone). These technologies were chosen for their efficiency, security, scalability, and seamless integration.

The project adopts the Agile methodology for system development due to its flexibility and responsiveness to changing requirements. Agile allows the project to be divided into short sprints, with periodic delivery of usable versions and continuous improvements based on user feedback.

In summary, this project contributes to transforming law offices from traditional methods into a modern, fully digital model, enhancing efficiency, simplifying the management of cases and clients, and improving the quality of services provided. At its core, the system aims to establish a professional and trustworthy working environment that meets contemporary requirements and strengthens client confidence.

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Introduction

1.1 Introduction

In the context of rapid technological advancement, digital automation has become an imperative necessity in all fields, especially in legal sectors that heavily rely on precision and organization in handling case files. The legal profession is a vital one that plays a fundamental role in achieving justice and safeguarding rights. However, lawyers in many developing countries, including Yemen, still face significant difficulties in organizing their legal and administrative work due to their reliance on traditional methods for managing cases and files.

The accumulation of cases, the multitude of documents, the variety of court sessions, managing client relationships, tracking payments, and other administrative and legal tasks make it essential to develop an integrated electronic system that helps lawyers organize their work, track their cases, archive documents accurately, and generate necessary reports. This enhances office efficiency, reduces human errors, and improves the quality of services provided.

This project comes in response to this urgent need, aiming to build a comprehensive information system for managing the work of lawyers in Yemen. It considers the specifics of local laws and procedures and facilitates dealing with administrative and legal aspects through a modern and effective electronic approach.

1.2 Problems Facing Law Firms

Law firms in Yemen, especially small and medium-sized ones, suffer from a set of problems that negatively impact work quality and operational efficiency. The most prominent include:

1. **Reliance on traditional paper-based methods** for registering and tracking cases: Paperwork remains prevalent in many of these offices, where case data, clients, and documents are recorded in physical registers and ledgers. This method not only wastes time and effort but also makes retrieving information and tracking case developments slow and error-prone, hindering strategic planning and timely decision-making.
2. **Loss or damage of important legal documents** due to poor archiving: Due to the lack of an organized electronic archiving system, important documents such as pleadings, memos, and judgments are stored in paper cabinets susceptible to damage from environmental factors like humidity or heat, or loss due to disorganization and lack of classification. Losing any legal document can have severe consequences, including losing the case or delaying procedures for months.
3. **Difficulty tracking and adhering to session dates**, causing delays and postponements: Lawyers often rely on memory or personal paper notes to track court session dates, which is an entirely unreliable method. Forgetting or confusing dates leads to delays in attendance or even absence, resulting in postponements that disrupt case progress, cause loss of client trust, and incur additional costs.
4. **Lack of a unified data management system** leading to effort duplication and inaccurate data entry: In the absence of a centralized database, each lawyer or assistant might enter the same client or case data multiple times, or information may differ from one file to another. This duplication not only wastes time but also creates data chaos and inconsistency, threatening the credibility of

information used in memos and submissions to the court.

5. **Weak follow-up on client payments and invoices:** Managing financial affairs manually makes tracking client dues and balances complex and inaccurate. It becomes difficult to know who has paid and who hasn't, and to calculate administrative expenses related to each case, potentially leading to significant financial losses and affecting the office's cash flow, not to mention damaging client relationships due to misunderstandings.
6. **Absence of a system for periodic reports** aiding sound decision-making: Without specialized software, preparing reports on office performance (e.g., number of closed cases, ongoing cases, revenues, success rate) is an arduous task that takes days. Consequently, office owners make decisions based on intuition or incomplete information, not on accurate statistics and analyses, depriving them of a clear view of their business performance and its strengths and weaknesses.
7. **Difficulty in communication among team members** within the office: Lawyers and administrative assistants often work in isolated silos due to a lack of effective communication channels. Information about cases is shared through verbal reminders or passing papers, leading to misunderstandings, lost information, and not everyone being updated on the latest developments, negatively impacting the quality and efficiency of teamwork.
8. **Absence of important alerts and notifications** for deadlines or tasks: The lack of an automated system for sending reminders for court sessions, memo submission deadlines, or legal expiration dates exposes the office to significant risks. Missing a single critical deadline can be enough to harm a client's interest and the office's legal reputation irreparably.
9. **Complexity of time-consuming administrative procedures** affecting completion speed: Routine tasks like creating a new case file, searching for a document, or preparing a basic legal form take a long time when done manually. This routine consumes the energy of the work team that could have been

directed towards higher-value work, such as legal research, strategy, and litigation, reducing the office's overall productivity.

10. **Lack of technical capabilities among some lawyers** in dealing with modern systems: Some lawyers, especially those with long experience, face a psychological or knowledge barrier in dealing with computers and modern software. This lack of digital skills creates resistance to change and hinders the digital transformation process within the office, making it lag behind competitors who have adopted these technologies.
11. **Lack of clear permissions for different users**, threatening information security: In a paper-based or even rudimentary electronic system, it is difficult to control who can access sensitive client files or financial data. Information may be accessed by unauthorized persons, or it may be modified or deleted accidentally, posing a serious threat to information confidentiality and security, a cornerstone of the legal profession.
12. **Difficulty preparing and printing legal forms** quickly and uniformly: Preparing memos, contracts, and requests requires writing each document from scratch or modifying old, unformatted templates. This leads to a lack of uniformity in the form and content of documents issued by the same office and may contain errors due to copy-pasting, negatively reflecting on the office's professional image and potentially weakening the legal document's strength.
13. **Lack of secure backup for data and documents**: Traditional offices rely on a single paper copy of each document. In the event of a disaster like a fire, flood, or even theft, the entire archive is lost forever. The absence of regular, secure digital backups in another location means the office could lose its ability to function entirely in an instant.

1.3 Project Objectives

1.3.1 General Objectives

Develop an integrated and intelligent system that helps manage a lawyer's work effectively electronically, supports daily workflow, and improves performance quality.

1.3.2 Specific Objectives

1. **Organize client and case data** in a coordinated and interconnected manner:
The system creates a centralized database that intelligently links all parties, connecting client personal data with all related cases, and each case with all its documents (pleadings, memos, judgments), financial transaction records, and important dates, providing a comprehensive overview that allows the lawyer to see the client's complete history at a glance, increasing accuracy and efficiency.
2. **Easily register new cases and update them:** This feature enables the user to enter all basic details of any new case in a unified and easy form, including litigation parties, case type, number, competent court, stage, and important dates. Most importantly, the ability to update this data at any later time to record any new development, maintaining information accuracy and timeliness throughout the case's lifespan.
3. **Manage session dates and send automatic notifications:** The system provides a central calendar for all judicial appointments and important meetings. It's not just about recording; automatic notifications are sent via email or SMS to the concerned lawyer sufficiently before the appointment (e.g., a day or two), significantly reducing the possibility of forgetfulness or missing appointments.
4. **Secure electronic document archiving:** This feature radically solves the paper chaos problem. All documents and records (whether scanned or original digital files) are uploaded and stored securely on the system and linked to the relevant client or case. They can then be searched and retrieved within seconds

using keywords, with their security and confidentiality guaranteed through advanced protection systems.

5. **Automatically generate and print legal forms:** The system contains a library of ready-made, pre-designed templates for the most commonly used forms (such as work contracts, procedural memos, and pleadings). All the user needs to do is fill in the required data (such as client name and contract date), and the system automatically generates a complete, formatted document ready for printing or sending, saving valuable time and ensuring uniformity and professionalism.
6. **Accurate management of fees and invoices:** This unit enables the lawyer to record all financial agreements with clients, create accurate electronic invoices, track payment status (paid, partial, overdue). Payments can also be linked to the specific case, providing clear visibility of the financial situation for each client and facilitating accounting and tax reporting processes.
7. **Detailed periodic reports to support decision-making:** The system automatically generates a wide range of analytical reports that provide valuable insights into office performance. These reports include statistics on the number of ongoing and completed cases, collected revenues, lawyer performance, and the percentage of cases concluded in favor of clients. This data enables the office manager to make informed strategic decisions.
8. **Customize user permissions:** To ensure information security and confidentiality, the system allows creating different user levels (e.g., system administrator, lawyer, administrative assistant). Each level has specific permissions to access or modify data. For example, an administrative assistant can enter data but cannot access confidential financial files, preventing leakage or unauthorized modification.
9. **A notification system for tasks and deadlines:** In addition to session alerts, users can create personal or group tasks (such as "write defense memo" or "renew

license") and set a deadline for them. The system will send reminders for these tasks, ensuring workflow continuity and not overlooking any internal or external commitments.

10. **Full support for the Arabic language:** The user interface, printing options, and reports are designed to be fully in Arabic with proper right-to-left character order and local legal terminology. This makes the system easy to comprehend and apply in the Yemeni environment without language barriers.
11. **Regular data backups:** The system automatically creates backups of all information at regular intervals (daily or weekly) and stores them separately and securely (locally or in the cloud). In case of any emergency failure or data loss, all information can be restored to the last save point, ensuring business continuity and protecting the office's information assets.
12. **User-friendly interface:** The system interface is designed to be intuitive and simple, with clear icons and direct commands. The goal is to enable any lawyer or administrative staff to use the system effectively after basic short training without needing to be a technical expert, reducing resistance to change and increasing the adoption rate.
13. **Improve internal communication:** The system includes internal communication tools that allow team members to communicate effectively about cases. Comments can be added to a specific case file or internal messages can be sent, ensuring everyone is on the same page and reducing reliance on unrecorded verbal conversations that may lead to misunderstandings.
14. **Reduce paper reliance and transition to digital environment:** Implementing the system contributes significantly to the transformation towards a "Paperless Office". Everything is stored digitally, reducing printing and physical storage costs, enhancing efficiency, making work more flexible (from anywhere), and being environmentally friendly.

15. **Enhance governance and administrative organization:** By unifying and documenting all procedures and processes within the system (from client reception to case closure), work becomes more organized and transparent. Every action can be tracked, knowing who is responsible and when, enhancing accountability, reducing errors and negligence, and raising the level of quality and professionalism in office management.
16. **Manage legal consultations:** This unit enables the office to register and organize all consultation requests, whether conducted face-to-face or via phone. Each consultation is classified (under review, responded, needs follow-up) and linked to the client, creating a valuable historical record that can be referred to in the future and helps provide consistent service and accurate follow-up of client needs.
17. **Legal subscription packages system:** Allows the office to offer its services through flexible packages (subscriptions) that meet the needs of different client segments (individual package, small business package, etc.). Each package can include a specific number of consultations or follow-up of one case or contract preparation. The system is automatically linked to the billing platform to collect subscription value periodically, creating a recurring and stable income source for the office.
18. **Integrated website with client portal:** The website serves as a digital interface for the office and a client attraction tool. It is not limited to displaying information only but is fully integrated with the internal management system. The client can log in to a secure portal to track case developments, pay invoices electronically, request new consultations, and upload documents. This level of service enhances client trust and positions the office at an advanced level of professionalism and modernity.

1.4 Project Scope

1.4.1 Included Areas

The system will include the following areas:

1. **Client Data Management:** The system will provide a secure and comprehensive database to store all client information, including complete personal data, contact information, and transaction history with the office. This data will be organized to allow quick and easy access while maintaining privacy and security.
2. **Comprehensive Case Management:** The system will enable registration of all types of cases across various legal specialties (criminal, civil, commercial, administrative) with precise tracking of each case's stages. Cases will be linked to relevant clients and concerned parties, with the ability to continuously update status and track progress.
3. **Appointment and Session Management System:** The system will provide a smart calendar for managing all court appointments and sessions, with an advanced notification system that sends prior alerts via text messages and email. This system will ensure no important dates are missed and reduce the rate of postponements.
4. **Digital Document Archiving:** A comprehensive electronic archiving system will be developed that allows uploading, storing, and classifying all legal documents. The system will support various file formats with quick search capability and automatic linking to relevant cases and clients.
5. **Invoice and Payment Management:** The system will include an integrated unit for managing financial affairs including invoice issuance, payment tracking, and account management. Users will be able to generate periodic financial reports to monitor the office's financial status.

6. **Notifications and Alerts System:** The system will provide multiple channels for communication and notifications including text messages and email for alerting about important dates and updates. Notifications will be sent automatically based on specified events and dates.
7. **Reports and Statistics:** The system will enable generating detailed reports about office performance, case progress, and financial status. Reports will include daily, weekly, and monthly statistics to support administrative decision-making.
8. **User and Permissions Management:** The system is designed with a flexible structure that allows adding new users and defining access permissions according to roles (lawyer, assistant, manager). The permissions system can be expanded in the future according to office needs.
9. **Access via Multiple Devices:** The system will be developed as a responsive web application that works on various devices (computer, tablet, mobile) with a unified and easy-to-use interface. The system will support working through the browser without needing to install additional software.
10. **Security and Protection System:** The highest security standards will be applied including data encryption, regular backups, and access control systems. Sensitive data will be protected from unauthorized access.
11. **Intuitive User Interface:** The system interface is designed to be easy to use and in Arabic, focusing on simplicity and efficiency. It does not require advanced technical expertise to deal with the system.
12. **Future Scalability:** The system architecture is designed to be scalable and capable of adding new features in the future such as integration with external systems or adding advanced services.
13. **Legal Consultation Management:** The system will provide an integrated system for managing legal consultations, including appointment booking, consultation recording, and organized storage of records in the client file.

14. **Packages and Subscriptions System:** The system will enable designing and displaying diverse service packages for clients, with integrated management of subscriptions, payments, and benefits for each package.
15. **Office Profile Website:** An introductory website will be developed that displays the office's services, work team, and contact information, with service request forms.

1.4.2 Excluded Limits

The system will **NOT** include:

1. **No integration with court systems:** The system does not include any integration with electronic court systems or government entities. All operations are performed manually without automatic connection to external systems.
2. **Absence of Artificial Intelligence:** The system does not include any artificial intelligence tools or automated analysis of legal texts. All tasks are performed manually by users.
3. **No support for direct electronic services:** The system does not provide direct electronic services such as submitting court applications online. It is limited to internal office management.
4. **Arabic language only:** The system supports only Arabic without support for other languages at this stage.
5. **Single office only:** The system is designed to manage a single law office and does not support managing multiple offices or branches.
6. **No advanced marketing:** The system does not include any advanced tools for marketing or public relations management.
7. **Limited financial services:** Limited to managing basic invoices and payments without covering full accounting or tax systems.

8. **No field support:** The project does not include on-site installation or direct periodic maintenance.
9. **No hardware provision:** The project does not include providing any devices or infrastructure necessary for operation.
10. **No machine translation:** The system does not support any machine translation services for documents or content.

1.5 Methodology and Technologies Used in the Project

1.5.1 Methodology: Agile

The Agile methodology was chosen for developing the lawyer's office management system due to its flexibility and rapid response to changing project requirements. This approach relies on continuous interaction with end-users (lawyers and legal office staff) to ensure the system is practically compatible with their real needs, with the possibility of improving and developing it gradually during work.

Advantages of Agile Methodology

1. Dividing work into short phases (Sprints): Small parts of the project are completed during a short period (2-4 weeks), allowing for gradual and organized system development.
2. High flexibility for change: Modifications can be introduced to project requirements during implementation based on feedback and new needs without disrupting workflow.
3. Continuous collaboration: Agile features direct and continuous communication between the development team and the client, ensuring clarity of shared vision regarding project goals.

4. Gradual product delivery: The system is not delivered only at the end of the project, but partial usable versions are presented periodically, enhancing client satisfaction and allowing early evaluation.
5. Suitable for dynamic projects: Such as legal office management systems, where requirements may change based on laws or work nature.

Agile Workflow Stages

1. Sprint Planning:

- Identifying the most important requirements
- Creating a short work plan (Sprint) typically lasting 2-4 weeks
- Determining tasks to be completed during this period

2. Daily Standups:

- Short meetings (10-15 minutes) to track work progress
- Each individual clarifies what they have accomplished, what they will work on, and what challenges they face

3. Continuous Delivery:

- Developing usable functions gradually
- Delivering a trial version to the client after each Sprint for review and testing

4. Sprint Review & Retrospective:

- Discussing what has been achieved with the client and users
- Evaluating the quality of achievement and extent of goal realization
- Suggesting improvements and modifications for the next period

Expected Outcome

Adopting the Agile methodology in developing the lawyer's office management system ensures:

- Flexibility to adapt to new requirements
- Continuous improvement of the final product quality
- Effective communication between the development team and users
- Faster delivery of usable versions

1.5.2 Technologies Used

- **Frontend – Angular:**

- Description: Open-source framework from Google for developing interactive web applications
 - Features: Supports Single Page Application (SPA) making browsing fast and smooth, based on TypeScript which increases code strength and ease of maintenance, provides ready-made libraries and reusable components, features high performance and flexible, responsive user experience
 - Why we chose it: Because it is very suitable for developing advanced and fast-responsive interfaces, especially for law offices that need to manage large amounts of data flexibly

- **Backend – ASP.NET Core Web API:**

- Description: Modern framework from Microsoft for building application programming interfaces (APIs)
 - Features: Very high performance compared to other frameworks, strong security support (JWT, OAuth, Identity), integrated with Entity Framework Core for easy handling of databases, supports RESTful APIs making

integration with web and mobile applications easy, open source and works on multiple servers (Cross Platform)

- Why we chose it: Because it is reliable, secure, and fast, and allows easy connection between the frontend (Angular) and mobile application (Flutter) via API

- **Mobile App – Flutter:**

- Description: Framework from Google for developing smartphone applications
- Features: Enables developing Android and iOS applications with a single codebase, high performance thanks to using Skia graphics engine, designing rich and attractive interfaces using ready-made and customizable Widgets, speed in development thanks to Hot Reload feature that allows seeing changes directly
- Why we chose it: Because it reduces cost and time by building two applications (Android and iOS) with a single codebase, with performance close to native applications

- **Database – SQL Server:**

- Description: Relational database management system from Microsoft
- Features: Supports handling huge amounts of data with high efficiency, provides advanced security tools for data protection, integrated with ASP.NET Core and Entity Framework making system development easy, provides powerful tools for reports and analytics (such as SSRS, SSMS), reliable in enterprise environments
- Why we chose it: Because it is stable, reliable, and very secure, and supports smooth integration with Microsoft technologies that the project depends on

1.6 Project Organizational Report

Item	Details
Project Name	Lawyer Office Management System
Project Presenters	Shaher Khaled Al-Ya'ari & Aasim Ahmed Al-Ya'ari
University ID Number	[University ID Number]
Academic Supervisor	Dr. Hamzah Jamel
Implementing Body	Faculty of Engineering & Computer – IT Department
Execution Period	First Semester – 2025
Programming Language	C# using ASP.NET Core Web API
Database	SQL Server
User Interface	Angular, HTML, CSS, Bootstrap, JavaScript
System Type	Internal Web System with Flutter Mobile App
Target Audience	Law Firms in Yemen

Background and Literature Review

2.1 Introduction

This chapter aims to review several electronic systems for managing law offices that have been examined, highlighting their advantages and disadvantages to identify gaps faced by lawyers in the local environment. It also provides a brief overview of the current system in law offices in Yemen, followed by a review of the most relevant previous studies, building a solid theoretical background for the current project.

2.2 Some Legal Office Management Systems

2.2.1 Clio

Clio is one of the most prominent global law office management systems and relies on cloud computing technologies. It provides comprehensive case management, scheduling of court sessions, invoicing, and financial reporting. Its main advantages include integration with accounting and analytics systems. However, its high cost and reliance on continuous internet make it difficult to use in small offices, especially in developing countries.

2.2.2 MyCase

MyCase focuses on improving communication between lawyers and clients through a dedicated portal and provides tools for managing documents and timelines. It features a simple interface and ease of use, but it is limited in customization to local laws, and its monthly subscription can be financially burdensome for small offices.

2.2.3 Lawcus

Lawcus uses a Kanban-style interface to track cases and files visually and supports integration with external services such as Google Drive and QuickBooks. It facilitates teamwork within the office, but its presence in the Arab world is limited, and its cost remains high for resource-constrained environments.

2.2.4 Regional (Arab) Systems

Some Arab countries have developed systems specifically for lawyers, often featuring Arabic language support and affordable pricing compared to global systems. However, these systems suffer from limited continuous development, weak information security, and typically focus only on archiving or financial aspects rather than providing comprehensive case management.

2.3 Current System in Yemen

Law offices in Yemen face significant challenges due to the absence of specialized electronic systems. The current situation can be described as follows:

- **Document management:** Most offices rely on paper filing, making documents prone to damage or loss and slowing down retrieval.
- **Case and appointment management:** Schedules are recorded in notebooks or memorized by lawyers, leading to missed or conflicting appointments.

- **Financial management:** Most offices use manual books or simple programs like Excel to track fees and invoices, lacking accuracy and integration.
- **Technology and communication:** Lawyers often use WhatsApp for client communication due to the absence of specialized systems, which lacks confidentiality and organization.

Clearly, the current system does not meet efficiency and reliability requirements, emphasizing the need for an integrated electronic system tailored to the Yemeni environment.

2.4 Previous Studies

2.4.1 Global Studies

Smith (2019): Examined the impact of cloud-based systems like Clio on U.S. law firms, showing a 40% increase in productivity, but highlighted privacy and security risks.

Anderson & Lee (2020): Focused on legal document management systems, showing that digitization reduced file loss by 70%, but increased operational costs.

Martin (2021): Studied client satisfaction in offices using online portals, showing increased client trust, though older clients still prefer traditional methods.

2.4.2 Arab Studies

Al-Hamadi (2018) – Saudi Arabia: Examined digital transformation in Saudi legal offices, noting that 60% still use traditional methods due to lack of training.

Al-Kubaisi (2020) – UAE: Evaluated a local law office management system, showing that it helped track cases but lacked precise financial reporting.

Abdelsalam (2021) – Egypt: Focused on technical challenges in applying electronic legal systems, concluding that poor internet is the main obstacle.

2.4.3 Local Studies (Yemen)

No specialized studies directly address law office management systems in Yemen. Some general studies on digital transformation in government institutions (e.g., Sana'a University 2020) confirm that infrastructure absence and low technical awareness are major barriers to automation.

2.5 Conclusion

From reviewing previous systems and related studies, the following is evident:

- Global systems are advanced but unsuitable for Yemen due to cost, language, and internet dependence.
- Arab systems are more suitable in terms of language and cost but suffer from lack of development and poor integration.
- In Yemen, offices rely on manual methods, creating an urgent need for a simplified and effective local system.

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Requirements Analysis and Modeling

3.1 Introduction

This chapter provides a detailed analysis of the requirements for the Lawyer Office Management System. Functional requirements describe the specific operations the system must perform to satisfy user needs, while non-functional requirements focus on system quality, security, and performance. Additionally, the chapter presents system modeling, including use case diagrams, data modeling, and workflow descriptions. Each point is explained in a paragraph for clarity and completeness.

3.2 Functional Requirements

3.2.1 Clients Management

The system must allow the registration of client information including name, address, phone number, and email. Each client should be linked to their respective cases to ensure a comprehensive record. Moreover, it should track the client's consultation and financial history. This centralized management of client data helps lawyers quickly access all relevant information, improves the efficiency of case handling, and enhances the overall service provided to clients.

3.2.2 Case Management

The system should support entering detailed information about each case, such as case number, court or prosecutor, type of case, and registration date. Cases should be classified (e.g., criminal, civil, commercial), and the system must allow tracking of their status, including under review, initial judgment, appeal, or cassation. All documents related to the case should be archived systematically. This ensures proper organization, minimizes the risk of errors, and facilitates smooth legal procedures.

3.2.3 Session Management

The system must enable recording of session dates, times, and locations, including the court or prosecutor involved. It should capture the results of sessions, such as postponement, judgments, or witness hearings, and notify lawyers of upcoming sessions. This structured session management guarantees that deadlines are not missed, enhances scheduling efficiency, and ensures accurate documentation of legal proceedings.

3.2.4 Courts Management

The system should store detailed information about courts, including their addresses, types, and level of jurisdiction. Each court should be linked to the cases and hearings it hears. This facilitates better scheduling of appointments, ensures that cases are accurately linked to the relevant judicial authorities, and reduces administrative errors.

3.2.5 Invoices & Payments

The system should allow generation of invoices for services or cases, recording payments via cash, bank transfer, or check, and track financial obligations of each client. Proper management of invoices and payments ensures transparency, reduces errors in accounting, and allows the office to maintain up-to-date financial records.

3.2.6 Consultations

All client consultations must be recorded, indicating whether they are paid or free, and linked to the corresponding client. Maintaining a detailed consultation history improves accountability, helps in tracking client interactions, and supports billing or reporting needs.

3.2.7 Users & Roles

The system should enable creating accounts for lawyers, assistants, accountants, and managers, with role-based access control. It must manage login and logout processes securely. This ensures that sensitive information is protected and only authorized personnel can access certain functionalities.

3.2.8 Reports

The system must generate various reports, including case reports by type and status, upcoming and overdue session reports, financial reports covering outstanding invoices and payments, and reports on client activity. These reports assist in strategic decision-making, monitoring office performance, and improving client service.

3.3 Non-Functional Requirements

3.3.1 Security

The system should ensure the confidentiality and integrity of sensitive data through encryption and strong authentication mechanisms. User permissions must be carefully managed to prevent unauthorized access. These measures protect the legal and personal information of clients.

3.3.2 Confidentiality

Access to case files, documents, and records must be restricted to authorized users only. Confidentiality safeguards ensure compliance with legal and ethical standards while preventing data breaches.

3.3.3 Reliability

The system should operate continuously during working hours without interruptions. All data must be stored securely and be resilient to hardware or software failures. This reliability ensures that lawyers can depend on the system for day-to-day operations.

3.3.4 Usability

The system should provide an intuitive, user-friendly interface that accommodates lawyers and assistants of varying technical skills. Full support for the Arabic language should be included to ensure usability in the local legal context. A simple and accessible interface reduces training requirements and accelerates system adoption.

3.3.5 Performance

The system must provide fast data retrieval for client and case searches, and efficiently handle a large volume of cases and sessions without delay. High performance improves workflow efficiency and allows lawyers to work effectively even during peak periods.

3.3.6 Scalability

The system architecture should support adding new branches, handling an increasing number of users, and storing more data over time without affecting performance. Scalability ensures the system can grow with the office's needs.

3.3.7 Backup & Recovery

The system should implement regular automatic backups and provide recovery mechanisms in case of failures. Backup and recovery processes ensure data preservation and business continuity in unexpected situations.

3.3.8 Compatibility

The system should operate seamlessly across multiple devices, including computers, tablets, and mobile phones. It should be accessible via web browsers and potentially as a standalone application. Compatibility ensures that users can interact with the system from different platforms and locations.

3.4 Modeling

3.4.1 Use Case Modeling

Use case diagrams represent the interactions between system users and their functions. The main actors include the system administrator, attorneys, and the client (via an online portal). Each party interacts with specific functions, such as case registration, scheduling hearings, managing documents, generating invoices, and accessing reports. This modeling clarifies responsibilities and ensures that all requirements are considered in the system design.

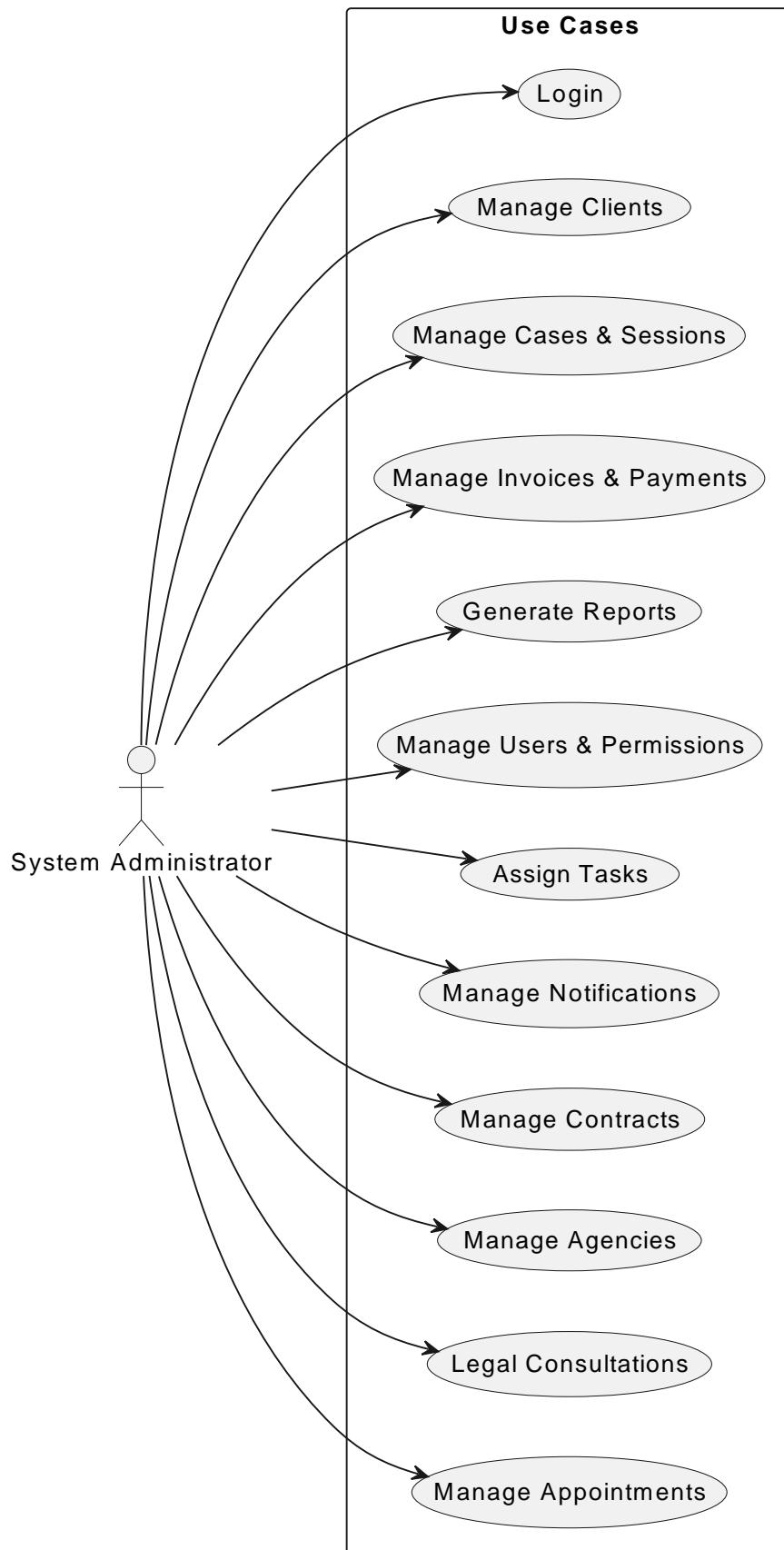


Figure 3.1: Use Case Diagram To Lawyer

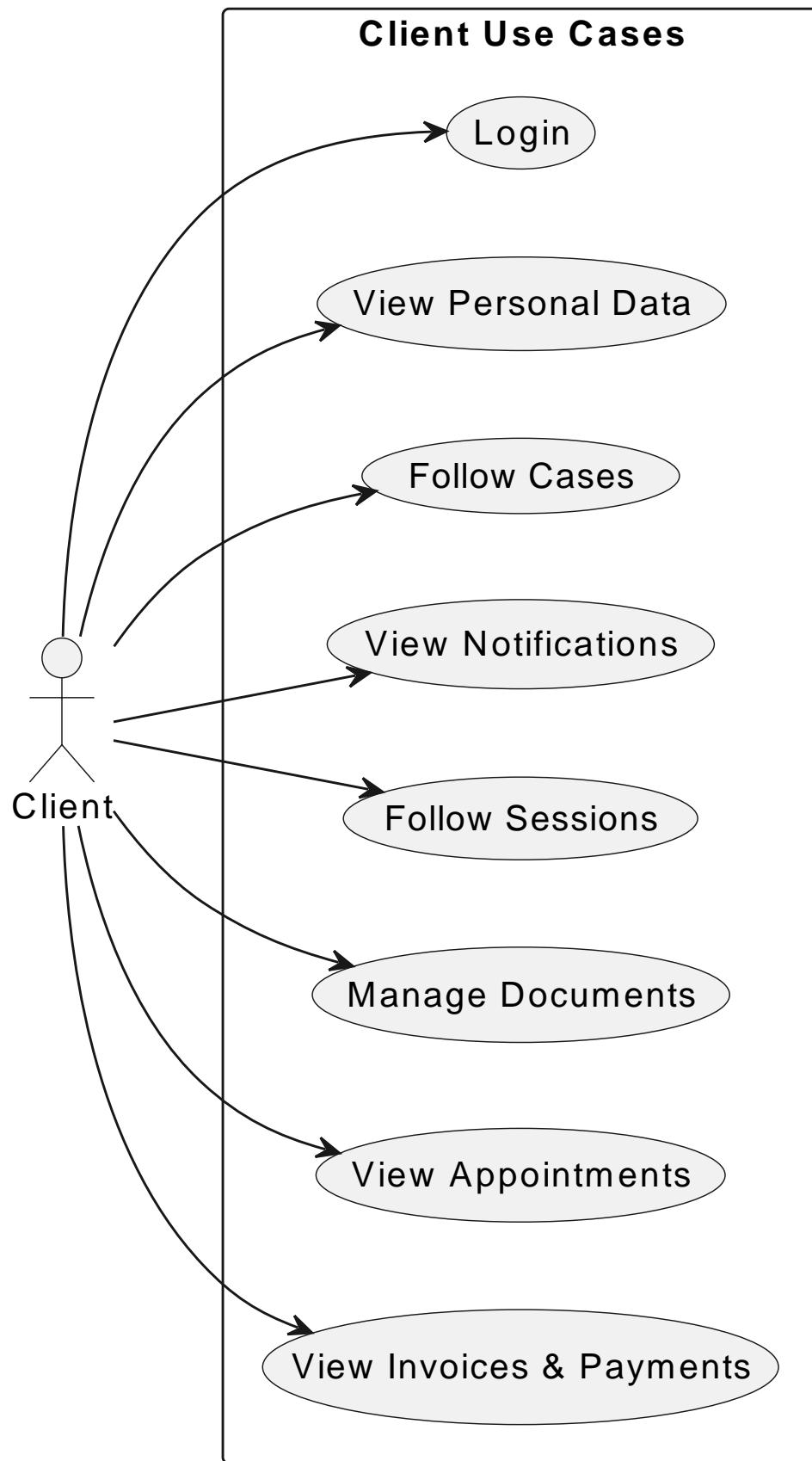


Figure 3.2: Use Case Diagram To Clint

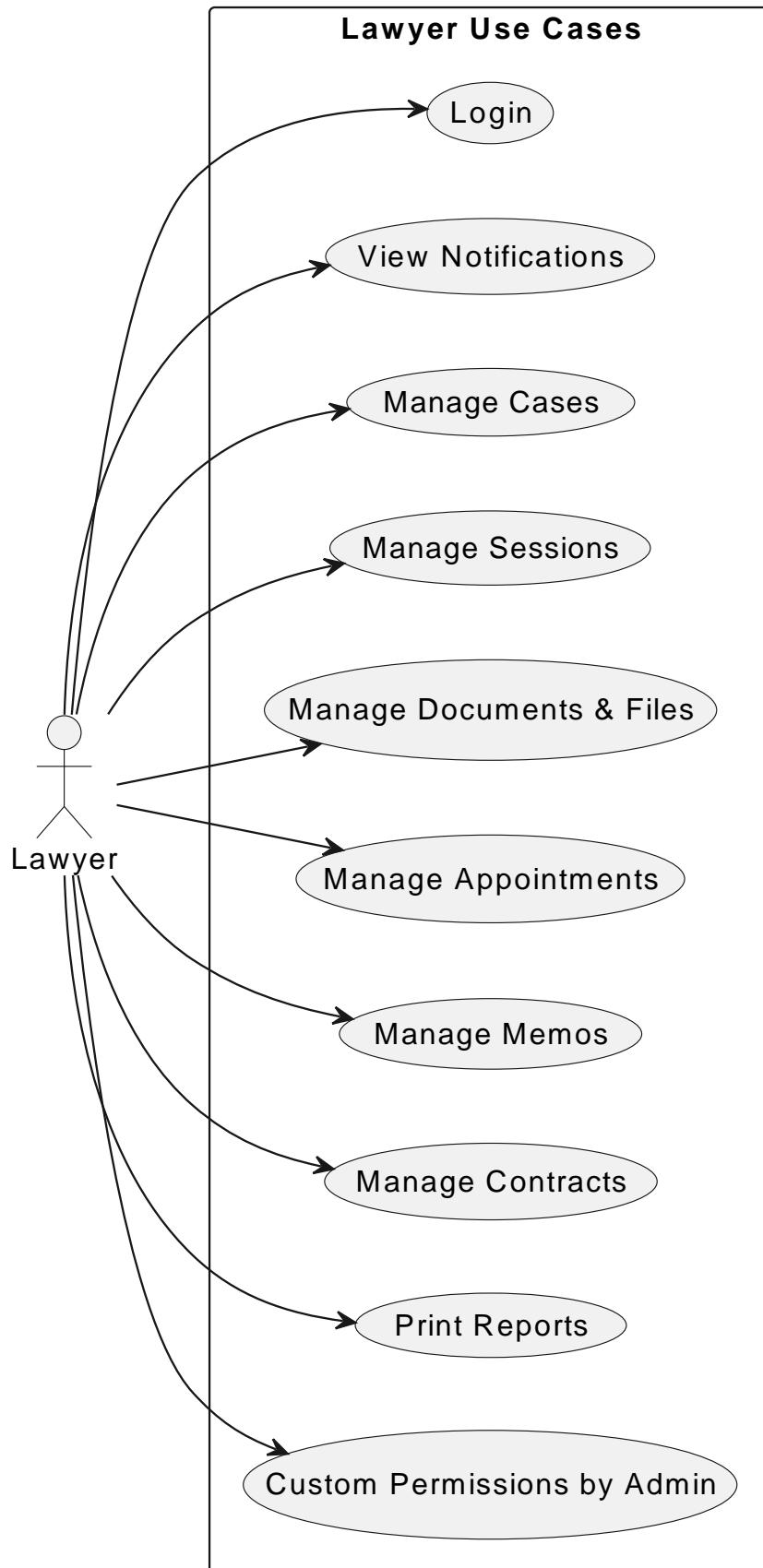


Figure 3.3: Use Case Diagram Lawyer

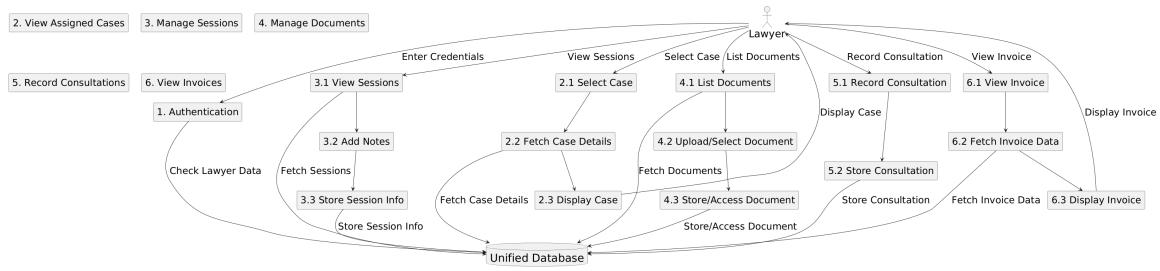


Figure 3.4: Data Flow Diagram To Lawyer

3.4.2 Data Modeling

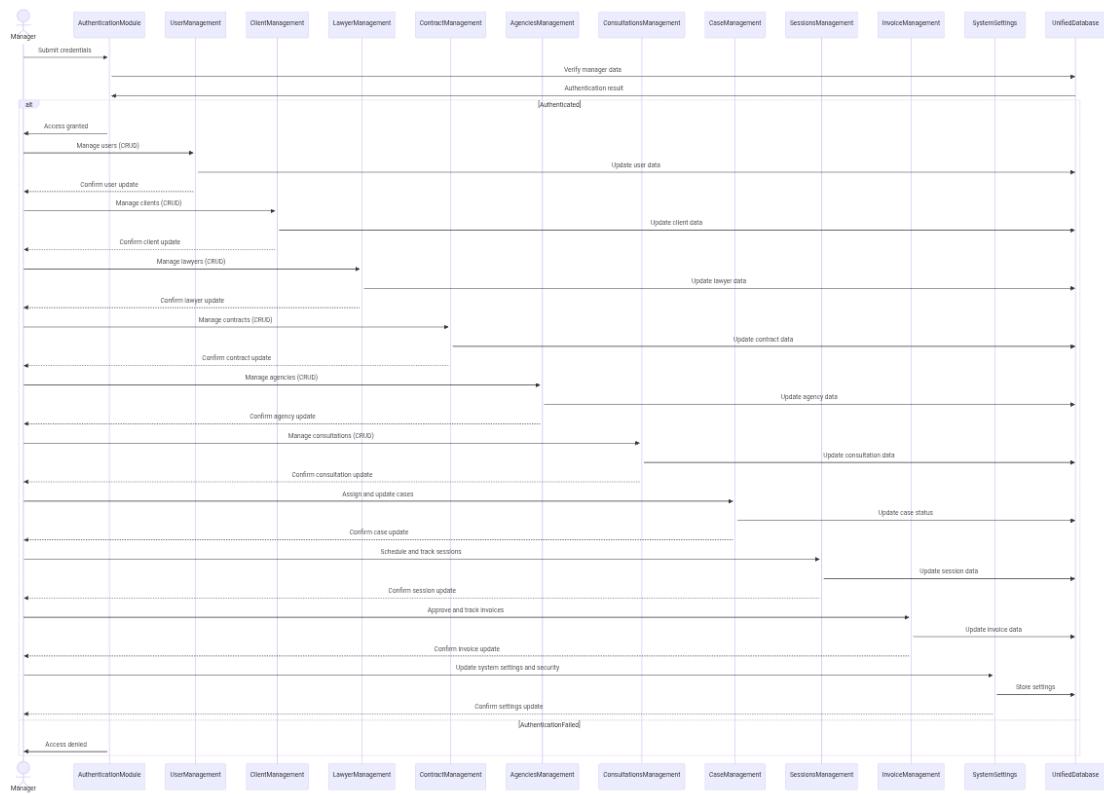
An Entity-Relationship Diagram (ERD) defines the database structure. Key entities include Clients, Cases, Documents, Appointments, Invoices, Payments, Users, and Subscriptions. Relationships ensure data integrity, such as linking each case to its client and documents, and associating each invoice with the corresponding case. Proper data modeling guarantees that the database efficiently supports all system operations.

3.4.3 Workflow Description

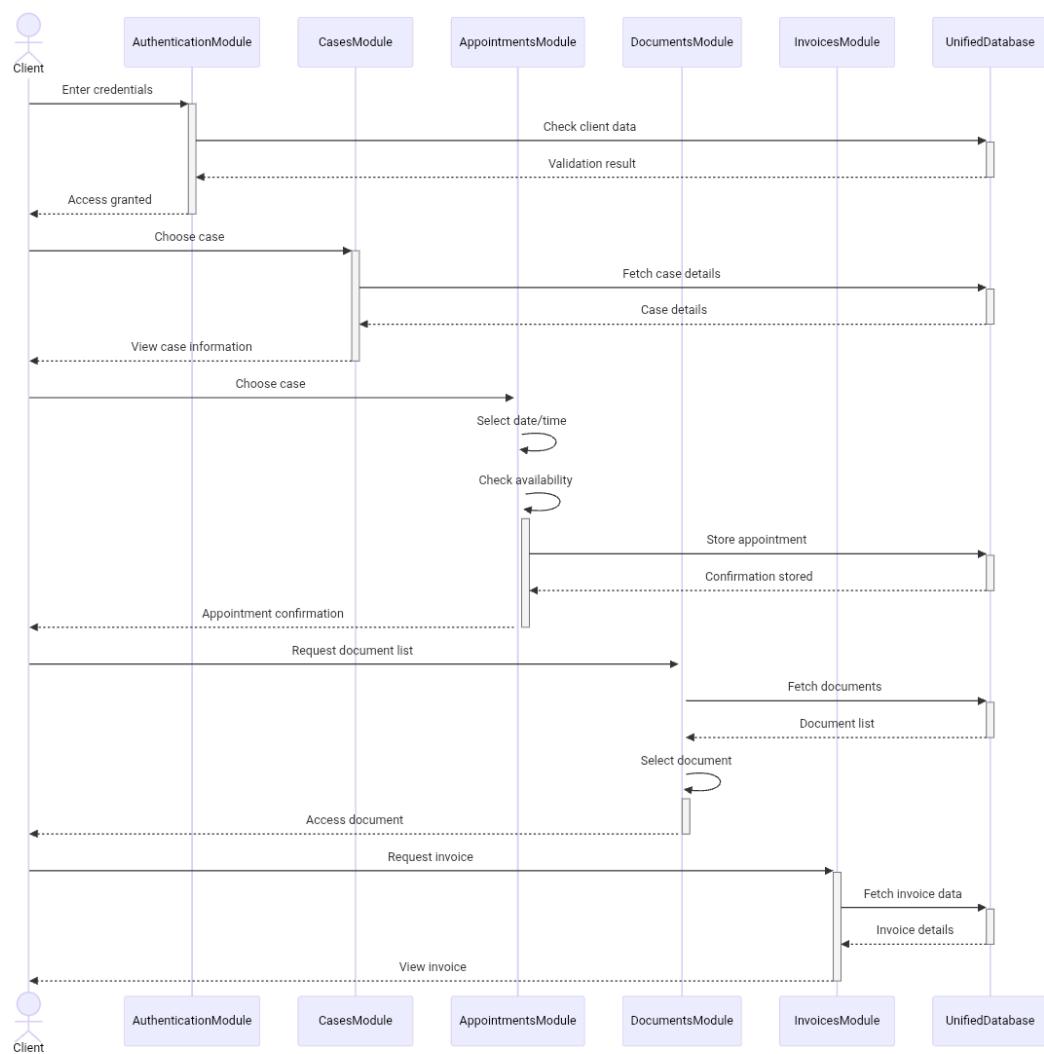
The typical workflow begins with client registration, followed by case creation. Documents are uploaded and linked to cases, and sessions are scheduled. Tasks are assigned to staff, with automatic notifications and reminders for deadlines. Financial transactions are recorded and summarized in reports. This workflow ensures structured operations, efficient case management, and smooth coordination among staff.

3.5 Conclusion

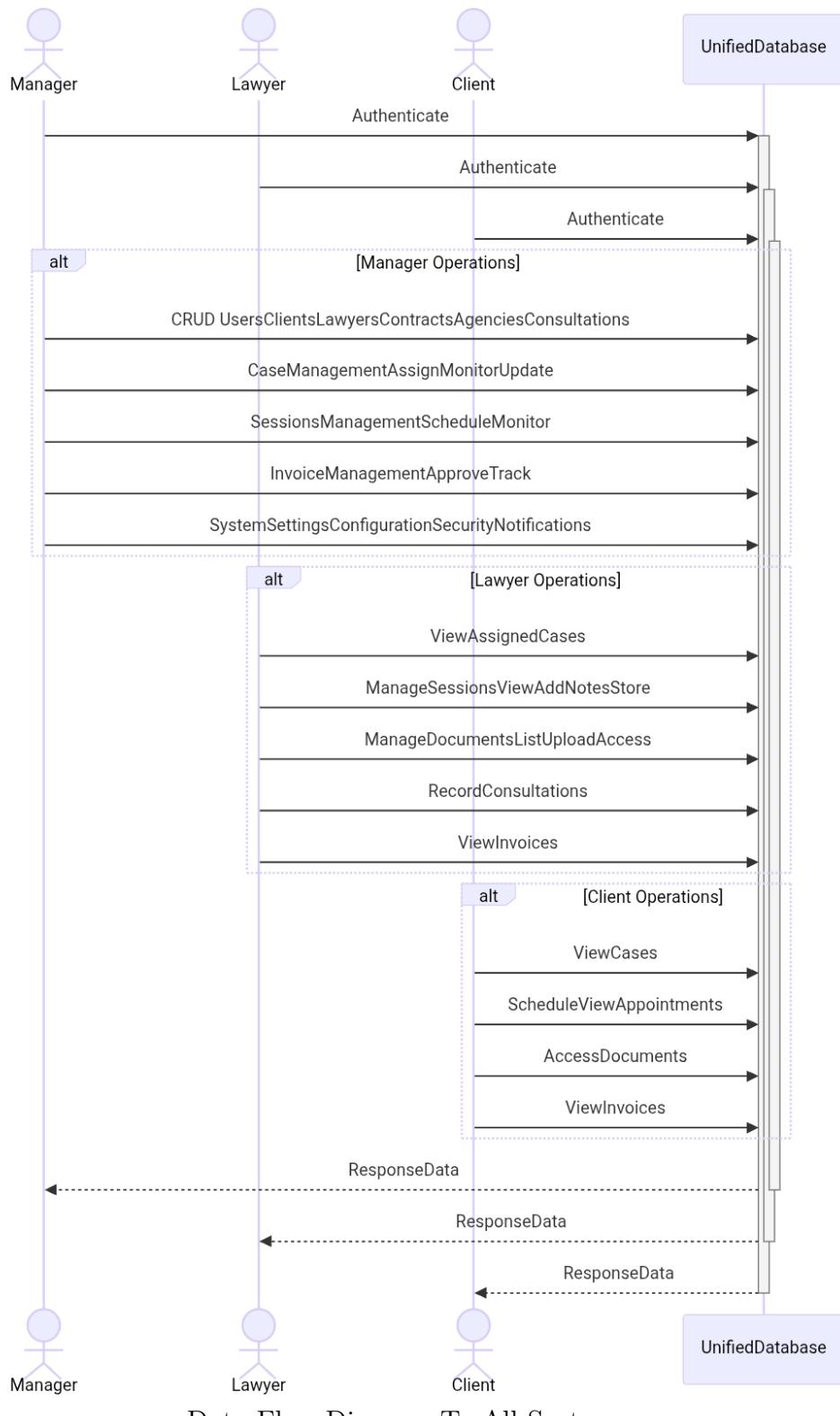
This chapter provided a detailed explanation of both functional and non-functional requirements and described the system modeling, including use case diagrams, data modeling, and workflow. Presenting each requirement and model in a paragraph format ensures clarity and provides a solid foundation for the system's design and implementation phases.



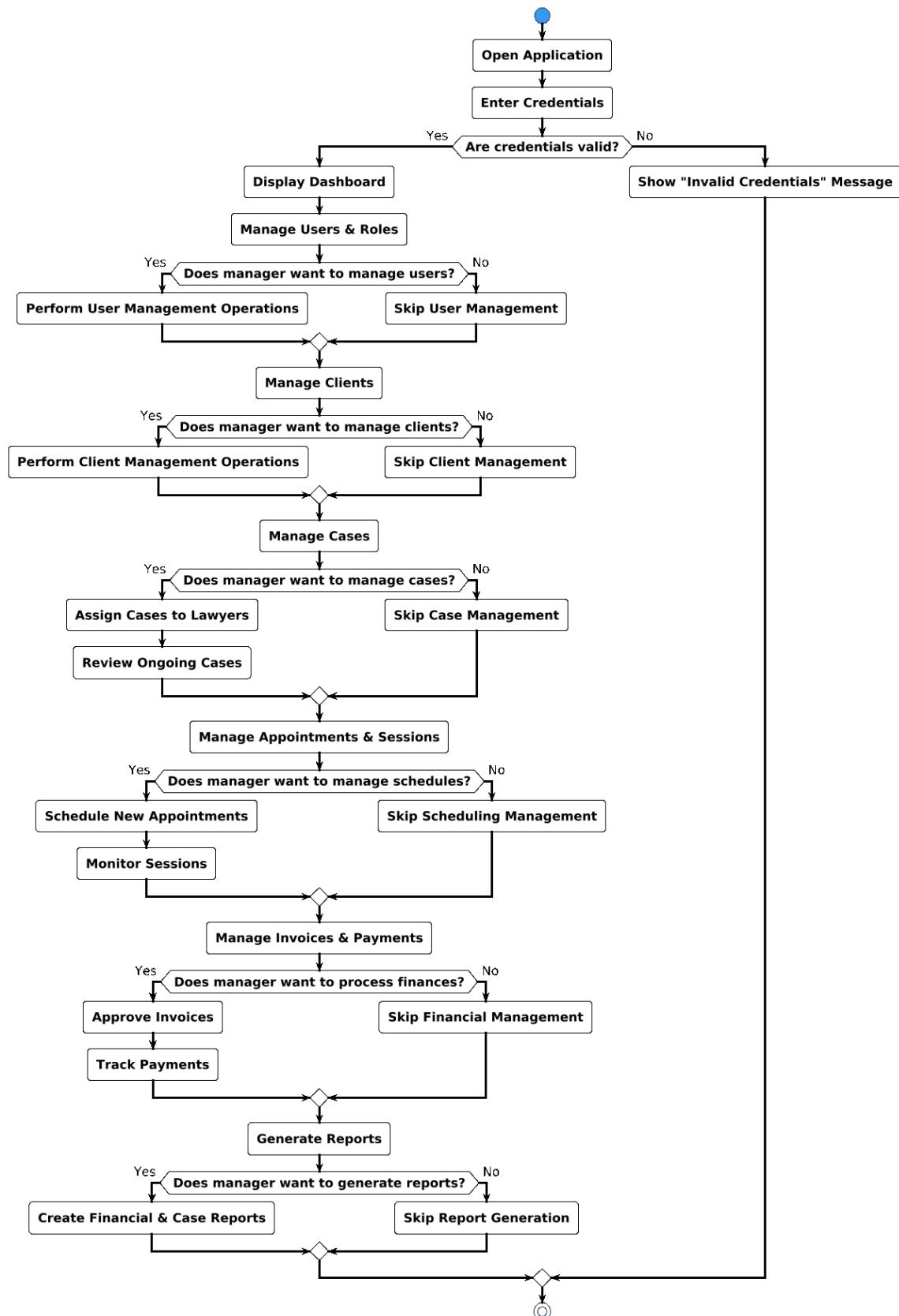
Data Flow Diagram To Admin



Data Flow Diagram To Clint



Data Flow Diagram To All System



Activity To Admin

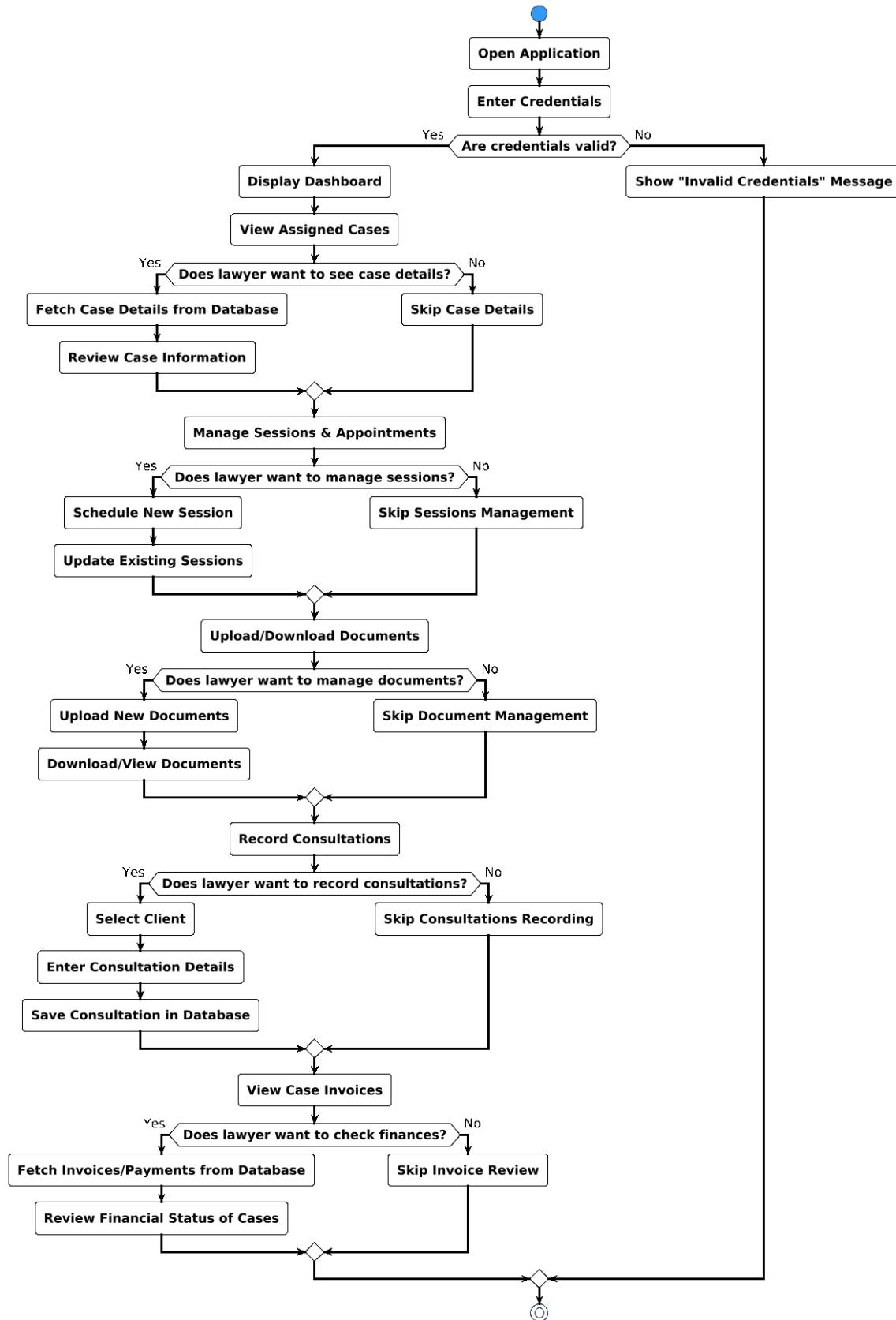


Figure 3.5: Activity To Lawyer

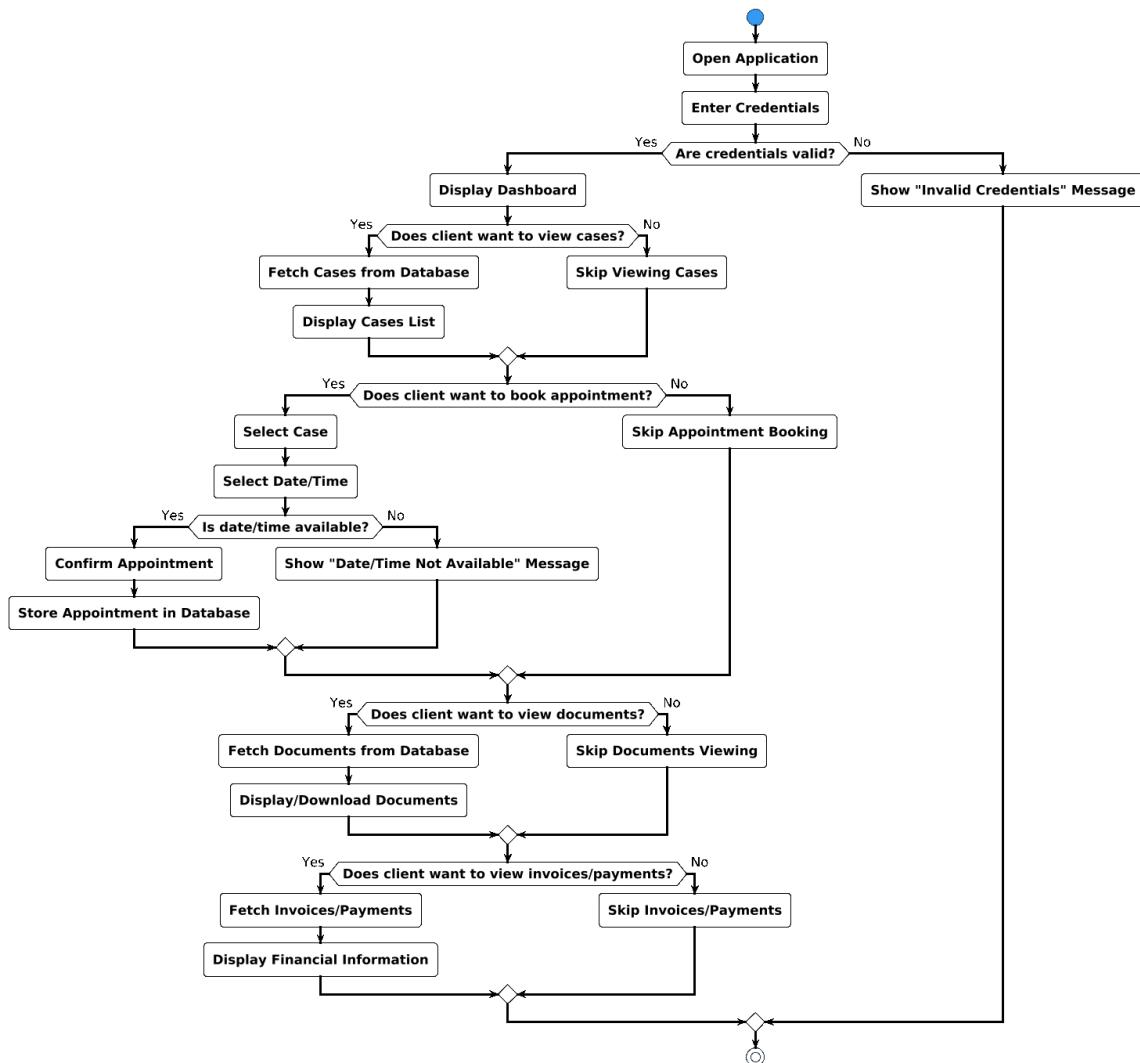


Figure 3.6: Activity To Client

Project Design

4.1 Introduction

This chapter presents the comprehensive design of the Lawyer Office Management System, focusing on architectural patterns, system components, data flow, and technology stack. The system follows Clean Architecture principles to ensure maintainability, scalability, and testability while separating concerns through distinct layers.

4.2 System Architecture

The system employs a layered Clean Architecture approach with the following components:

4.2.1 Architecture Overview

The Clean Architecture pattern organizes the system into four main layers, each with distinct responsibilities and dependencies flowing inward toward the domain layer.

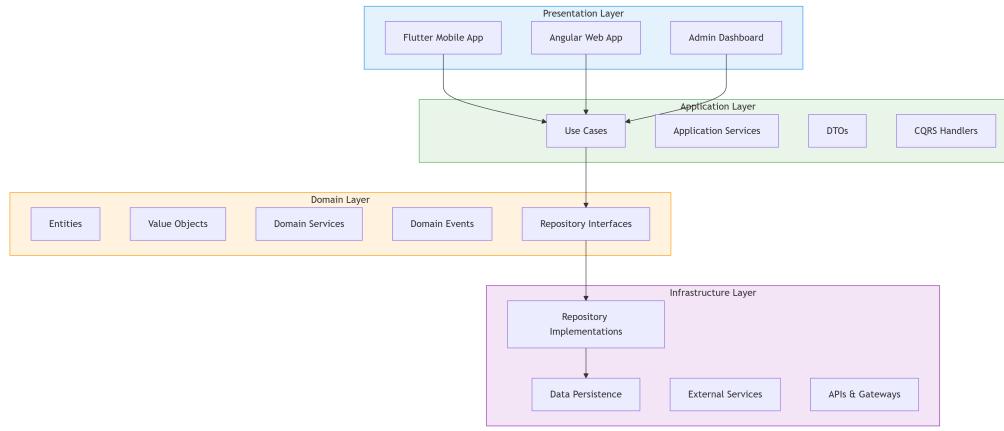


Figure 4.1: Architecture Overview

4.2.2 Layer Responsibilities

Presentation Layer

- **Components:** Flutter Mobile App, Angular Web App, API Controllers
- **Responsibilities:** User interface rendering, input validation, response formatting, and user interaction handling
- **Technologies:** Flutter/Dart, Angular/TypeScript, ASP.NET Core Controllers

Application Layer

- **Components:** Use Cases, DTOs, Application Services, CQRS Handlers
- **Responsibilities:** Business process coordination, workflow management, request/response transformation
- **Patterns:** Command Query Responsibility Segregation (CQRS), Mediator Pattern

Domain Layer

- **Components:** Entities, Value Objects, Domain Services, Domain Events, Repository Interfaces
- **Responsibilities:** Core business rules, domain logic validation, business invariants enforcement
- **Principles:** Domain-Driven Design (DDD), Rich Domain Model

Infrastructure Layer

- **Components:** Data Persistence, External Services, APIs & Gateways, Repository Implementations
- **Responsibilities:** Data persistence, external service integration, cross-cutting concerns
- **Technologies:** Entity Framework Core, SQL Server, Redis, RabbitMQ

4.3 Database Design

The system utilizes SQL Server with a relational database model designed for data integrity and performance.

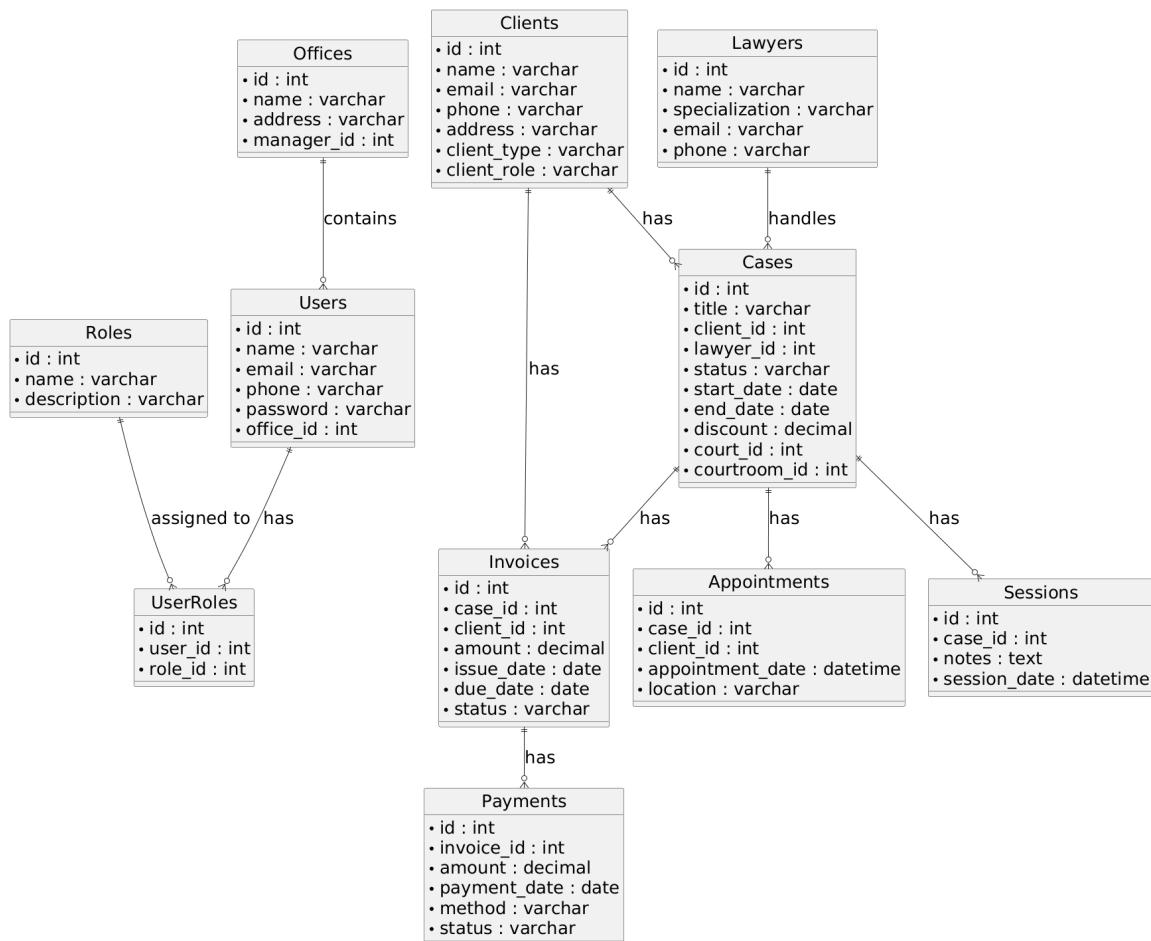


Figure 4.2: ERD TO Admin

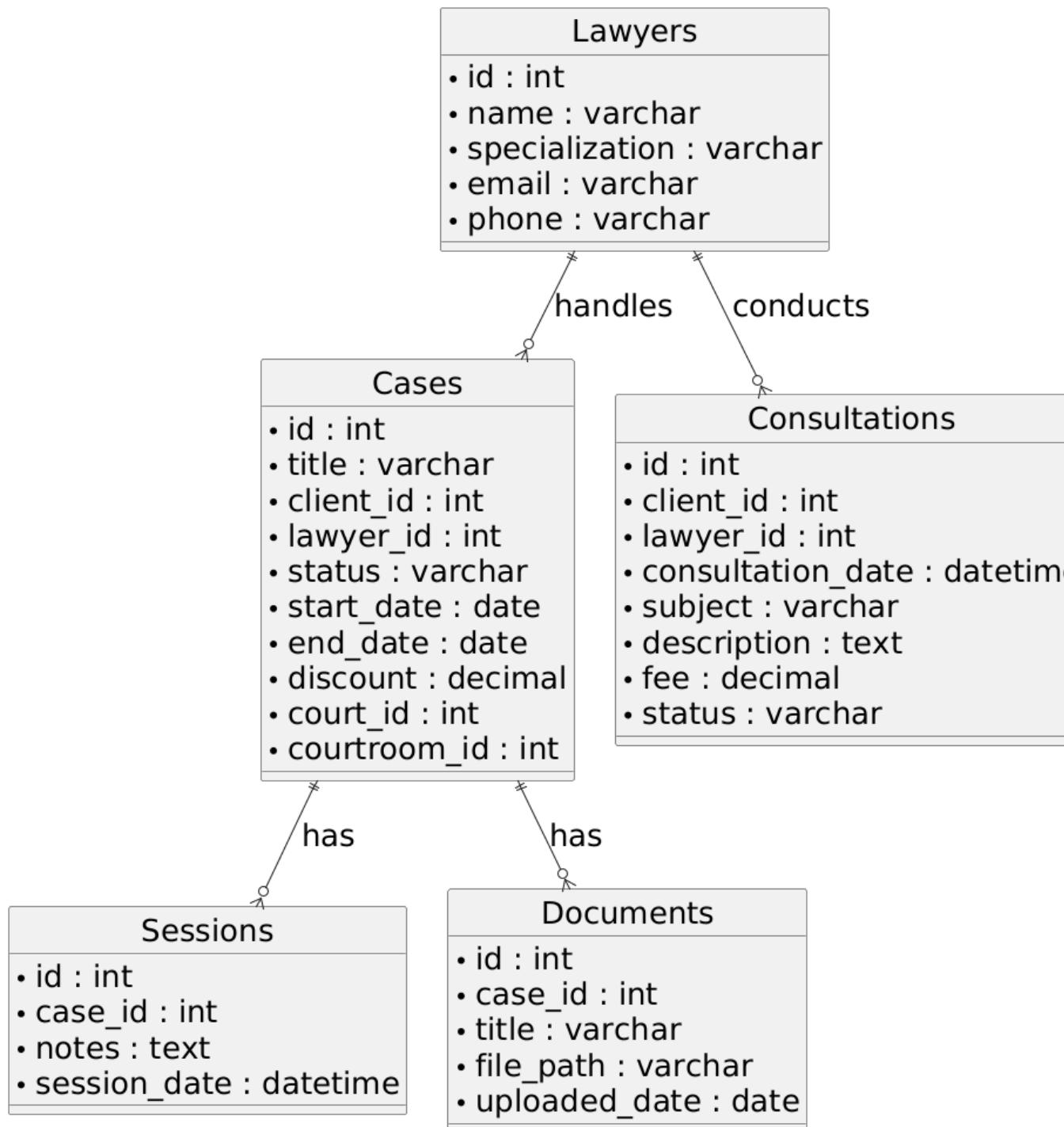


Figure 4.3: ERD TO Lawyer

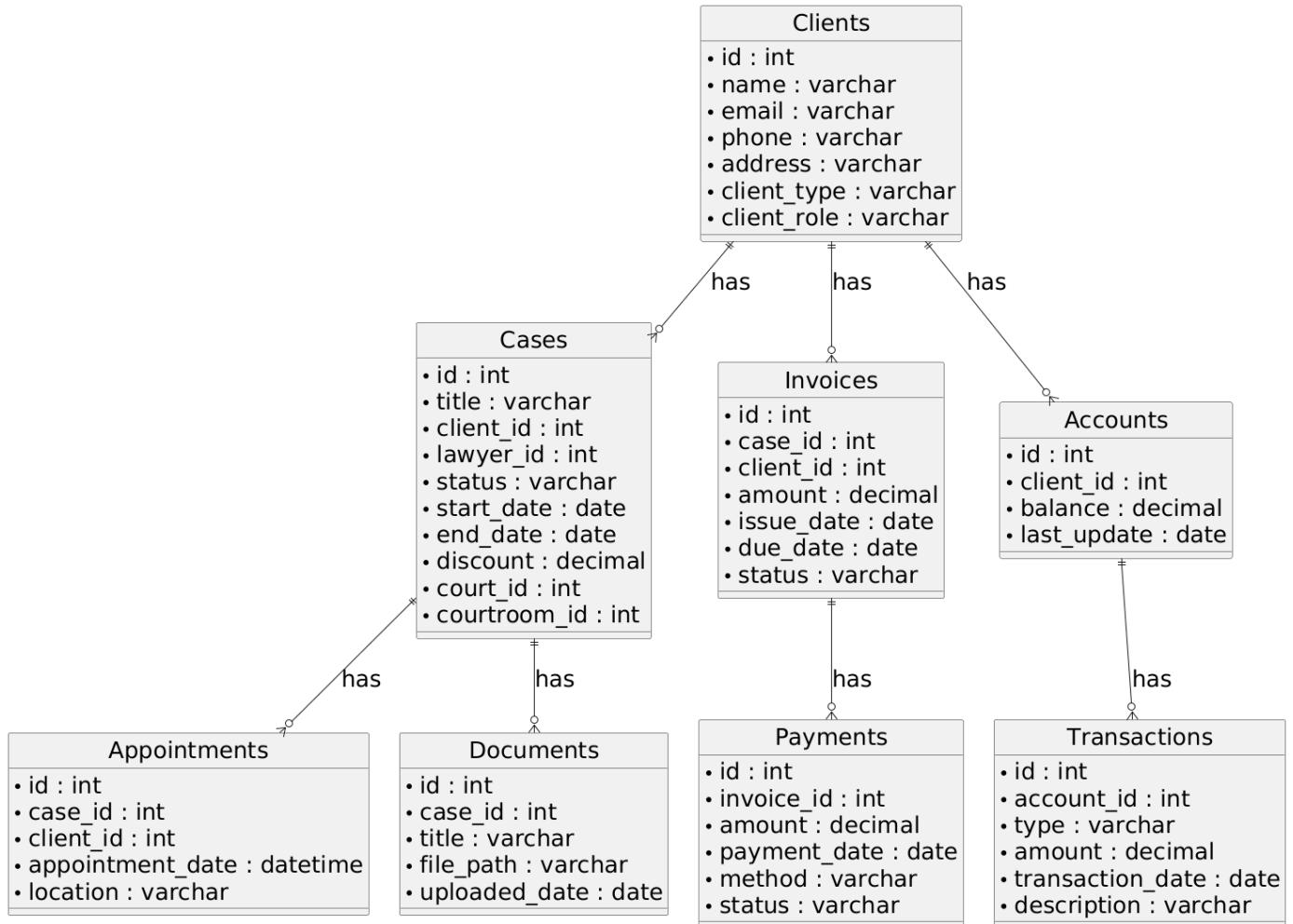


Figure 4.4: ERD TO Client

4.4 System Components and Services

4.4.1 Client Management Module

The client management module handles all client-related operations including registration, profile management, and case access.

Client Registration

- Secure onboarding process with email verification
- Multi-step registration with progressive profiling

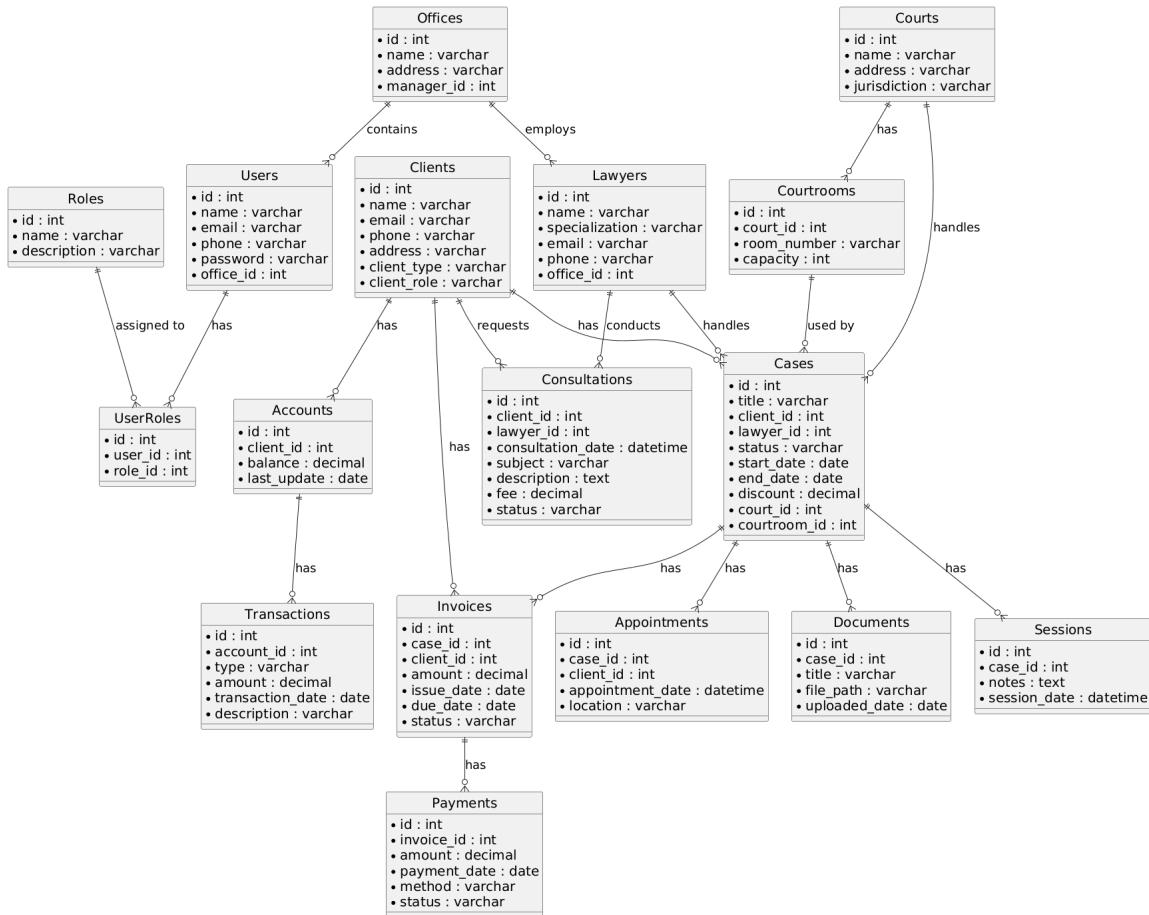


Figure 4.5: ERD All Project

- Automated welcome email and system orientation
- Role-based access configuration during registration

Profile Management

- Personal information updates with audit logging
- Preference management for notifications and communications
- Document upload and verification for identity proof
- Privacy settings and data sharing preferences

4.4.2 Case Management Module

The case management module provides comprehensive tools for managing legal cases throughout their lifecycle.

Case Lifecycle Management

- Case intake with automated conflict checking
- Matter creation with template-based setup
- Status tracking with customizable workflow states
- Automated deadline calculation and reminder generation
- Case archiving and retention policy enforcement

Document Management

- Version control with change tracking and approval workflows
- template management for standard legal documents
- Optical Character Recognition (OCR) for scanned documents

- Secure document sharing with expiration and access controls
- Full-text search across document repository

4.4.3 Financial Management Module

The financial management module handles billing, payments, and financial reporting.

Invoice Generation

- Automated invoice creation based on time entries and expenses
- Customizable invoice templates with firm branding
- Recurring invoice scheduling for retainers
- Proforma invoice generation for cost estimates
- Multi-currency support with automatic exchange rates

4.5 Data Flow Design

4.5.1 System-Level Data Flow

The system follows a unidirectional data flow pattern with clear separation between read and write operations.

Request Processing Pipeline

1. **Request Reception:** HTTP requests received by API Gateway
2. **Authentication:** JWT token validation and user identification
3. **Authorization:** Role-based permission checking
4. **Validation:** Input sanitization and business rule validation
5. **Business Logic:** Domain-driven business process execution

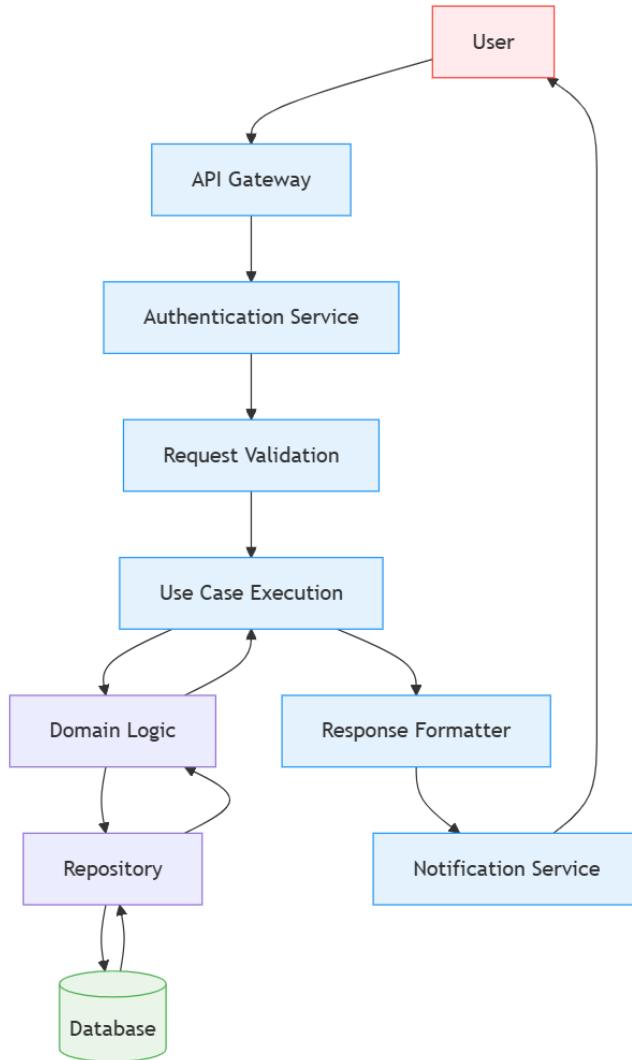


Figure 4.6: Database Design

6. **Data Persistence:** Database operations through repository pattern
7. **Response Generation:** Data transformation and formatting
8. **Notification:** Real-time updates and event propagation

Command and Query Separation

The system implements CQRS pattern to separate read and write operations:

- **Commands:** Modify system state, return success/failure
- **Queries:** Read system state, return data without side effects
- **Command Handlers:** Process business transactions
- **Query Handlers:** Retrieve and project data for display

4.6 Technology Stack

4.6.1 Frontend Technologies

Mobile Application

- **Framework:** Flutter 3.0 with Dart programming language
- **State Management:** BLoC pattern with flutter_bloc package
- **UI Components:** Material Design 3 with custom theming
- **Navigation:** Go Router for declarative routing
- **Local Storage:** Hive for offline data persistence

Web Application

- **Framework:** Angular +17 with TypeScript
- **State Management:** NgRx Store with Redux pattern
- **UI Components:** Angular Material with custom components
- **Routing:** Angular Router with lazy loading
- **Forms:** Reactive forms with custom validators

4.6.2 Backend Technologies

API Server

- **Framework:** ASP.NET Core 6.0 Web API
- **Authentication:** JWT Bearer tokens with refresh token support
- **Documentation:** Swagger/OpenAPI with XML comments
- **Validation:** FluentValidation for request validation
- **Logging:** Serilog with structured logging

Data Access

- **ORM:** Entity Framework Core 6+ with code-first approach
- **Database:** Microsoft SQL Server 2019
- **Caching:** Redis for distributed caching
- **Migrations:** EF Core migrations with version control

4.7 Conclusion

The designed system architecture provides a robust foundation for the Lawyer Office Management System, adhering to modern software engineering principles and best practices. The Clean Architecture approach ensures maintainability and testability, while the comprehensive technology stack supports scalability and performance requirements.

The modular design facilitates independent development and deployment of system components, enabling agile development practices and continuous delivery. The security measures implemented throughout the system ensure data protection and compliance with legal industry standards.

This design serves as a blueprint for implementation, providing clear guidance for development teams while maintaining flexibility for future enhancements and technological evolution.

Publications Related to the Thesis

Journal Papers

- H.A.A. Qasem, A.M. Abbas, “A Moving Anchor Based Range-Free Localization Scheme for Wireless Sensor Networks”, *International Journal of Computer Science and Information Security*, vol. 14, no. 9, pp. 352–362, September 2016.
 - A.M. Abbas, H.A.A. Qasem, “VirP: VirPoints Based Localization Scheme for Wireless Sensor Networks”, *Wireless Personal Communication*, Springer-Verlag (submitted).

Conference Papers

- A.M. Abbas, H.A.A. Qasem, “AnchLP: An Anchor Based Localization Protocol for Wireless Sensor Networks”, In *Proceedings of 5th IEEE International Conference on Advances in Computing, Communication and Informatics (ICACCI)*, pp. 2122–2128, New Delhi, India, September 24–26, 2014.
 - H.A.A. Qasem, A.M. Abbas, “MoveRL: A Movement Region Based Location Discovery Protocol for Wireless Sensor Networks”, In *Proceedings of 2nd ACM International Conference on Information and Communication Technologies for Competitive Strategies (ICTCS)*, pp. 1–6, Udaipur, India, March 4–5, 2016.
 - A.M. Abbas, H.A.A. Qasem, “Locate, Promote, and Split: An Exponentially Fast Localization Algorithm for Wireless Sensor Networks”, In *Proceedings of 2nd*

*IEEE International Conference on Contemporary Computing and Informatics
(IC3I), December 14–17, 2016.*