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A National Platform For Lawyers

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الملخص:

تُعد الرقمنة القانونية خيارًا استراتيجيًا لتعزيز العدالة وتسهيل الوصول إلى الخدمات القانونية، خاصة في ظل التحديات التي تواجه النظام القضائي التقليدي في الجزائر، كالبطء في الإجراءات، وصعوبة الوصول إلى المحامين في بعض المناطق. انطلاقًا من ذلك، جاء هذا المشروع ليقترح تطوير منصة وطنية رقمية موجّهة للمحامين، تهدف إلى ربطهم بالمواطنين، وتمكينهم من إدارة قضاياهم وتقديم استشاراتهم عبر بيئة مؤمنة وفعالة. تعتمد المنصة على تصميم ثلاثي الطبقات يشمل واجهات استخدام مرنة، وخدمات خلفية مؤمنة، وربطًا بقاعدة بيانات متكاملة. وتوفر وظائف كالتواصل الآمن، تتبع القضايا، حجز المواعيد، ونشر محتوى قانوني تثقيفي. تم إنجاز مراحل التصميم والتطوير من خلال دراسة ميدانية، مقابلات مع محامين، واستشارة خبراء في القانون والإعلام الآلي. المشروع لا يزال في مرحلة التطوير، ويطمح إلى التكامل مستقبلاً مع البوابة الرقمية للعدالة الوطنية، وتوفير تطبيق هاتفي وخدمات ذكية.

الكلمات المفتاحية: العدالة الرقمية، منصة المحامين، التحول الرقمي،الجزائر، خدمات قانونية، إدارة القضايا، الوصول إلى العدالة.

Abstract

Legal digitization is a strategic option to enhance justice and facilitate access to legal services, especially in light of the challenges facing the traditional judicial system in Algeria, such as slow procedures and difficulty accessing lawyers in certain areas. Based on this, this project proposes the development of a national digital platform aimed at lawyers, intended to connect them with citizens and enable them to manage their cases and provide consultations through a secure and efficient environment.

The platform relies on a three-tier architecture that includes flexible user interfaces, secure backend services, and integration with a comprehensive database. It offers functionalities such as secure communication, case tracking, appointment scheduling, and the publication of educational legal content. The design and development phases were carried out through a field study, interviews with lawyers, and consultations with experts in law and computer science. The project is still under development and aspires to eventually integrate with the national digital justice portal and provide a mobile application and smart services.

Keywords : *digital justice, lawyers' platform, digital transformation, Algeria, legal services, case management, access to justice.*

Résumé

La numérisation du domaine juridique constitue une option stratégique visant à renforcer l'efficacité de la justice et à faciliter l'accès aux services juridiques, notamment face aux défis rencontrés par le système judiciaire traditionnel en Algérie, tels que la lenteur des procédures et la difficulté d'accès aux avocats dans certaines régions. C'est dans ce contexte que s'inscrit ce projet, qui propose le développement d'une plateforme numérique nationale dédiée aux avocats. Celle-ci vise à les connecter aux citoyens, à leur permettre de gérer leurs dossiers juridiques et à offrir des consultations dans un environnement sécurisé et performant.

La plateforme repose sur une architecture en trois couches : des interfaces utilisateur souples, des services de traitement sécurisés, et une base de données intégrée. Elle met à disposition plusieurs fonctionnalités, telles que la communication sécurisée, le suivi des dossiers, la prise de rendez-vous, ainsi que la diffusion de contenus juridiques à visée éducative. Les phases de conception et de développement ont été menées à partir d'une étude de terrain, d'entretiens avec des avocats, et de consultations d'experts en droit et en technologies de l'information. Le projet est encore en cours de développement et ambitionne, à terme, de s'intégrer au portail numérique national de la justice, tout en proposant une application mobile et des services intelligents.

Mots clés : *justice numérique, plateforme pour avocats, transformation digitale, Algérie, services juridiques, gestion des dossiers, accès à la justice*

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General Introduction

The digital transformation of the justice sector has emerged as a strategic necessity for improving the performance of judicial institutions and enhancing citizens' access to legal services. Across the world, countries have adopted digital technologies to overcome the limitations of traditional legal systems—speeding up procedures, increasing transparency, and fostering inclusion. Algeria is no exception to this trend. Recent years have witnessed a growing focus on modernizing the Algerian justice system as part of the National Strategy for Digital Transformation 2020–2030.

This project stems from the urgent need to digitize judicial processes and offer accessible legal services to a wider public. It proposes the development of a web platform that facilitates interaction between lawyers, clients, and legal institutions while respecting legal and ethical constraints. The platform includes services such as secure lawyer-client communication, digital case tracking, appointment scheduling, legal forums, and an administrative dashboard for professional bodies like the Bar Association.

To ensure relevance and usability, the platform is designed following a user-centered methodology. The development process includes field visits to courts and bar associations, interviews with practicing lawyers and legal experts, and consultation with university faculty and students. The resulting platform aims to improve operational efficiency, enhances access to justice, and supports the digital transformation of Algeria's broader legal ecosystem.

The structure of this thesis is as follows:

- **Chapter 1: State of the Art**

  First chapter provides a comprehensive review of the Algerian legal system and the chal-

lenges it faces, particularly in rural and underserved areas. It analyzes key concepts such as digital justice, e-justice, and legal technology, and compares international platforms like FindLaw, Avvo, and Rocket Lawyer. The chapter concludes by identifying the gap and need for a local, contextualized digital solution.

- **Chapter 2: Analysis and Specifications**

  Chapter two details the user needs and project requirements gathered through fieldwork, including visits to courts, interviews with lawyers, and consultations with academic experts. It categorizes users (lawyers, clients, institutions, visitors), outlines legal constraints, and presents the functional and non-functional specifications of the platform. The main goal of Chapter 2 is to analyze user needs and define the platform's technical and legal requirements.

- **Chapter 3: Design**

  Based on the analysis, chapter three presents the system architecture of the platform. It adopts a three-tier architecture (presentation, application, data), and includes UML diagrams, database models, and detailed descriptions of platform modules. The goal is to provide a scalable, secure, and maintainable system design.

- **Chapter 4: Implementation and Development**

  Chapter four explains the tools, environments, and technologies used to build the platform. It describes the frontend and backend technologies, database choices, API integration, real-time features, and security measures. The implementation section showcases how core functionalities are developed and tested.

- **Chapter 5: Conclusion and Perspectives**

  The final chapter summarizes the project outcomes, evaluates its impact, and proposes future enhancements. It emphasizes the platform's potential to support justice digitalization efforts in Algeria and recommends further integration with public systems and expansion to other legal professions.

In summary, this work contributes to the digital modernization of Algeria's justice sector.

It offers a localized, user-friendly solution that supports lawyers, clients, and institutions, and aligns with national digital governance objectives.

Chapter 1

State of the Art

1.1 Introduction

In light of the increasing challenges facing traditional judicial systems, many countries are moving towards adopting digital justice as a strategic option to reform the judiciary and enhance its effectiveness. Global experiences, such as electronic courts in China and the digital judicial system in Estonia, have proven that employing technology can contribute to reducing disparities, accelerating procedures, and enhancing transparency and trust in judicial institutions.

Algeria is not immune to these transformations. Its legal system is witnessing many challenges, including limited access to justice, administrative complexities, and geographical disparities. In this context, digital justice represents an opportunity to bring about a qualitative shift through initiatives such as the "National Platform for Lawyers," which seeks to facilitate interaction between litigants and legal specialists.

This chapter focuses on studying digital justice as a reform option, by analyzing the current legal framework in Algeria, diagnosing the most prominent challenges that hinder the development of the traditional system, and exploring the role of digitalization in improving access to justice, which lays a scientific basis for evaluating the effectiveness of this approach in the national context.

1.2 Context and Key Concepts

This section presents an overview of the legal sector in Algeria and defines the fundamental concepts and key actors.

1.2.1 Overview of the Legal Sector in Algeria

The legal sector in Algeria is one of the basic components of the modern state, and plays a pivotal role in ensuring the rule of law and protecting rights. This sector consists of an independent judicial system divided into two main parts: the ordinary judiciary, supervised by the Supreme Court, and the administrative judiciary, led by the Council of State[1]. There is also the Constitutional Court, which monitors the conformity of laws with the Constitution[2]. This system ranges from local courts of first instance to courts of appeal in each of the country's states, and also contains specialized courts such as military courts and the conflict court[2]. The Supreme Judicial Council supervises this system, while the Ministry of Justice provides the necessary support [3].

According to the latest statistics issued by the National Union of Lawyers Organizations (UNOA), there are 26,741 licensed lawyers distributed among various regional bodies and unions across the national territory[4]. According to the provisions of Order No.13-07 of October 29, 2013, the legal profession is defined as "a free and independent profession that contributes to achieving justice and establishing the rule of law," which makes lawyers essential elements in the Algerian judicial system [5].

1.2.2 Key Concepts

- **National Union of Lawyers Organizations (UNOA):** The National Union of Lawyers' Organizations is defined in the Algerian Law Regulating the Legal Profession as a union formed by a group of lawyers' organizations and has a legal personality[6]. It works to coordinate between these organizations and promote the profession. It has a coordinating relationship with the Minister of Justice and expresses its opinion on every text related to the profession[6]. One of its most prominent specialties is protecting the interests of the

profession and preparing its regulations. It also prepares and updates the national roster of lawyers and sends it to the Ministry of Justice once a year[7].

- **The Lawyer:** The lawyer is a professional who is both liberal and independent, and works to ensure that the rights of defense are respected and protected. They contribute to the administration of justice and uphold the principle of the rule of law. Their missions include representing, assisting, and defending parties in legal matters, as well as providing legal advice and consultations[8].

- **The Client:** The client in a legal context is defined as the person or entity on whose behalf a lawyer or law firm provides legal services. The client is the recipient of legal advice, representation, and assistance, and the lawyer owes duties of care and confidentiality to this person or entity[9].

- **Justice:** Algerian law formally defines justice as the application of the principles of legality and equality through an independent judiciary available to all[10]. At the practical level, it involves institutional and judicial procedures that focus on protecting individual and societal rights, relying on the independence of the judiciary and the rule of law as a basis for ruling by right [11]. All of this strengthens the relationship between justice and the legal state and makes justice a guarantee of stability and growth in Algerian society[11].

- **Digital Justice:** Digital Justice emphasizes the transformation of the justice system through advanced digital technologies. It involves using data, analytics, and online platforms to create "smarter" justice systems. For instance, an IDB (Inter-American Development Bank) study notes that digital justice can build faster, more efficient courts by incorporating tools like machine learning, automated case-management, online dispute-resolution, and data visualization[12]. The goals are to speed up legal processes, expand remote participation (e.g., virtual hearings), and increase transparency and accountability[12]. In effect, digital-justice initiatives have enabled faster case processing and broader access. A report by the Boston Consulting Group (BCG) finds that digital justice "enables faster, more

efficient case management and the effective resolution of legal conflicts" [13]. Such initiatives have been applied worldwide (for example, e-case management in Brazil and virtual "Internet Courts" in China) to improve judicial outcomes[14, 13].

- **E-Justice:** E-Justice refers to the application of information and communication technologies (ICT) within judicial systems to improve access, cooperation, and efficiency. It aims to make courts faster and more transparent by automating case management, filing, and communication. For example, the LIBRe Foundation defines e-Justice as using ICT to "improve access to justice, increase cooperation between legal authorities, strengthen the justice system and improve legal institutions and the overall administration of law."[15]. The European Union similarly describes it as a policy to "simplify and improve" access to justice through digital means (including digitalizing cross-border legal procedures)[16].

- **Legal Tech:** Legal Tech (legal technology) refers to software and ICT tools used in legal practice and services. It covers any technology that supports legal work, from legal research databases to automated document systems. As one review notes, Legal Tech "covers all information and communication technologies used in the legal service sector," such as contract-management systems, document-management systems, e-discovery platforms, or judicial prediction algorithms[17]. The primary goal of Legal Tech is to automate routine legal tasks and improve efficiency: for example, automating contract drafting, enabling AI-driven case analysis, and providing legal information directly to clients[18]. By streamlining workflows and offering new services (like online legal advice), legal technology helps law firms, corporate legal departments, and clients work more effectively.

Comparison Table:

In Table 1.1, we present a comparative overview of Digital Justice, E-Justice, and Legal Tech, highlighting their primary aims, scope, tools, key examples, challenges, and underlying orientations.

Aspect	**Digital Justice**	**E-Justice**	**Legal Tech**
Primary Aim	Social and environmental justice, digital equity	Modernization and efficiency of judicial processes	Operational efficiency and digital transformation in legal practice
Scope & Focus	Community empowerment, inclusion, addressing digital harms	Digitalization of court systems and judicial workflows	Tools for automating legal work, managing documents, and optimizing workflows
Key Examples	Digital platforms for marginalized voices, environmental tech, advocacy	E-courts, e-filing, remote video hearings, digital identity systems	Document automation, e-discovery tools, legal chatbots, AI-powered research
Challenges	Bridging the digital divide, avoiding tech-driven inequality	Ensuring fairness, judicial governance in digital systems	Technology adoption, AI integration, data privacy
Orientation	Community- and rights-based	Institution- and process-based	Business- and operations-based

Table 1.1: Comparison between Digital Justice, E-Justice, and Legal Tech

1.3 Review of Existing Works

This section outlines the current state of legal services in Algeria, explores the national digital transformation strategy, and highlights relevant international platforms.

1.3.1 The traditional system of legal services in Algeria: role, access, and challenges

The role and duties of the lawyer in the Algerian legal system: According to Algerian law, a lawyer's duties include representing and defending the parties before judicial, administrative and disciplinary authorities throughout the country, assisting their client in all investigation and trial proceedings (criminal, civil, real estate, etc.), drafting agreements and memorandums, and providing legal advice. In practice, lawyers must be admitted to the local bar, complete a one-year apprenticeship-(apprenticeship), and then register with the National Register of Lawyers maintained by the National Union of Lawyers. The attorney-client relationship (retainer) is subject to strict obligations of confidentiality and loyalty[19].

How to access lawyers in the traditional system: Traditionally, Algerians seek out and contract lawyers through local referrals and networks. Clients typically identify attorneys via family, friends, or by referring to the regional bar association's "printed" table listing certified attorneys[20]. An interview based survey found that many Algerians do not know where to get legal assistance: only about 47% of respondents "know where to get advice and information " on legal problems and only 29% have been assisted by a lawyer or legal aid within the past two years. This suggests that under the traditional system most people rely on informal networks, and many have difficulty locating career advice[21].

Main challenges affecting access to legal services:

- **Geographic gap:** According to a United Nations study, most African lawyers live in cities, leaving rural populations underserved[22]. In Algeria, lawyers are highly concentrated in major cities: for example, the Algiers Bar Association alone had about 5,400 members out of approximately 30,000 lawyers nationwide [23]. Citizens, especially in remote provinces or desert towns, may have to travel hundreds of kilometers to obtain legal assistance or remain without help. This geographical gap limits routine access to lawyers, even for administrative needs such as documentation or civil status.

- **Low legal culture:** The situation is exacerbated by the low level of legal literacy. As in many countries, many Algerians lack awareness of their rights and legal procedures. In-

ternational observers note that African legal systems often suffer from low legal literacy and are perceived as inaccessible—comments that are also pertinent to Algeria[24]. For example, human rights groups like the Algerian League for the Defence of Human Rights (LADDH) have operated legal aid centres offering advice on domestic violence and labour disputes, suggesting that formal legal services leave many needs unmet[25].

- **Linguistic challenges:** Language and literacy barriers (some clients in rural areas speak only local dialects or have limited proficiency in French and Arabic) exacerbate the problem. Court proceedings are conducted in Arabic (the official language), and often require translators for foreigners. However, almost all judges and lawyers are also fluent in French. This bilingualism can be an obstacle for Algerians who prefer one language and complicates access for international clients[26].

- **Slow judicial processes:** The judicial process in Algeria is often slow and bureaucratic, as the organization of legal services remains largely manual. Case files are kept in physical form at each court or law firm, appointments are scheduled in person or by telephone, and correspondence is often based on the postal system. Therefore, the accumulation and delay of cases is common. For example, until recently, many citizens had to queue at civil status offices to obtain certificates, while there is now an online application system[27].

- **Lack of digital convenience in legal services:** Citizens cannot easily check the status of a case or a lawyer's credentials online. There is no online survey or Q&A forum for legal questions at the national level. In short, traditional legal services are characterized by paper-intensive procedures, limited transparency, restricted communications, and a lack of digital convenience, which particularly affects those who live outside major cities.

1.3.2 National Strategy for Digital Transformation 2020–2030

The Algerian state launched the National Strategy for Digital Transformation 2020–2030, which aims to digitize public sectors, and this includes the justice sector, with the aim of improving institutional performance and facilitating citizens' access to legal and administrative services[28, 29]. In this context, Minister of Justice Abdul Rashid Tabbi stated on several occasions that "the

sector has witnessed remarkable progress in digitizing the legal system, which has contributed to accelerating judicial procedures and reducing citizens' burdens"[30].

Objectives of the National Strategy 2020–2030

[28, 31]

- **Strengthening the digital infrastructure:** The strategy seeks to strengthen communications networks, expand Internet coverage, and generalize the use of information technology in public administrations.
- **Improving governance and transparency:** It focuses on changing government management patterns towards e-government, consolidating the principles of transparency and combating bureaucracy and corruption.
- **Simplifying judicial procedures:** Within the national vision, digital justice services are being introduced to facilitate litigation procedures and bring the judiciary closer to citizens (such as electronic judicial services portals and electronic signature circulation).

Developments Achieved in Judicial Digitization until 2025

[32]

Several key developments have been implemented under the national digital transformation strategy to modernize the Algerian justice system. These advances aim to improve transparency, accelerate judicial procedures, and ease access to legal services:

- **Algerian Law Portal:** An electronic platform that includes legal texts and judicial decisions (rulings of the Supreme Court, the Council of State, and civil and administrative procedures since 1989), It aims to enhance transparency and facilitate investors and lawyers' access to legal information.
- **Electronic Litigation:** creation of a digital platform for the remote exchange of notes and documents between lawyers and courts, with the introduction of the electronic signature and the activation of electronic payment in judicial proceedings. This came as part of

modernizing the Civil Procedure Code to reduce complex paper procedures and facilitate the work of lawyers and litigants.

- **Electronic Notification:**A system for sending judicial notices electronically (via SMS text messages in cooperation with Algeria Post) is being developed, while maintaining the functions of the judicial report when necessary.

Digital infrastructure

In terms of digital infrastructure, indicators of digital adoption in Algeria confirm the existence of a solid base for developing electronic justice. The number of Internet users in the country reached approximately 36.2 million users, equivalent to 76.9% of the total population, with the number of mobile phone lines exceeding 116% of the actual population [33]. These numbers reflect a wide spread of communication technologies, supporting the potential for widespread roll-out of digital justice solutions.However, fintech adoption lags: only 2.8% of Algerians have credit cards (January 2024) and about 8.2% have ever made an online purchase. This indicates that while online access is high, e-payment systems remain underused[34].

1.3.3 International Platforms

This section highlights prominent international digital legal platforms that have transformed access to legal services through technology-driven solutions, offering tools such as online legal advice, lawyer directories, and customizable legal documents.

FindLaw (USA):

A legal network that provides free legal information, attorney directories, and marketing advertisements to attorneys. Its services include texts of laws and forms, with a *local lawyers directory* to help litigants find a lawyer[35].

Avvo (USA):

A free online lawyer directory and Q&A forum. Avvo provides detailed attorney profiles (with ratings from 1–10), client reviews, and disciplinary records for over 97% of U.S. lawyers. Users can post legal questions and receive written answers from lawyers[36].

Rocket Lawyer (USA and global):

A legal platform that provides customized legal documents to users, reviews them electronically, and provides digital signatures, legal advice, and assistance in registering companies and tax files. It connects individuals with a network of lawyers and provides legal services online at competitive prices[37].

1.4 Comparison and critique

This section provides a comprehensive comparison of the legal platforms FindLaw, Avvo, and Rocket Lawyer in terms of their core functions, offered services, pricing, advantages, and drawbacks, followed by a critical analysis of their strengths, limitations, and potential adaptability to the Algerian context.

1.4.1 Comparison table for :FindLaw,Avvo,Rocket Lawyer

Feature	**FindLaw**	**Avvo**	**Rocket Lawyer**
Main Purpose	Helping law firms improve their online presence through SEO, websites, and marketing	Helping individuals connect with attorneys and get free legal answers	Providing ready-to-use legal documents (like wills or contracts) and legal help for individuals and businesses
Legal Documents	Not the main focus, mostly limited to marketing tools and directories	Doesn't offer document services or business formation tools	Offers a wide range of documents (wills, leases, LLC formation, etc.)

Talking to Lawyers	Mostly indirect – it's a tool for lawyers to market themselves	Direct interaction through a Q&A forum and attorney profiles	Direct access to attorneys for consultations is included in the membership
Pricing	Expensive: website and marketing packages can range from $800 to $2,500/month with contracts	Mostly free, premium options are available but optional	Free 7-day trial, then $39.99/month (monthly) or $19.99/month (annually)
Pros	Great for law firms wanting to be more visible online, large lawyer directory	Verified attorney ratings, wide network, free Q&A with lawyers	Lots of legal documents, affordable legal help, and good customer support
Cons	Pricey, with locked contracts, marketing value sometimes questioned	No legal document creation or business services	Can get expensive over time, estate planning tools are a bit limited
Best For	Law firms wanting to attract more clients online	People looking for a lawyer or quick legal answers	Individuals and small businesses needing DIY documents plus access to attorneys

Table 1.2: Comparison between: FindLaw, Avvo, and Rocket Lawyer

1.4.2 Critical Analysis

Strengths

- **FindLaw**: A content-rich legal platform that combines statutes, case law, articles, blogs, and a lawyer directory. Strong brand recognition and approximately 4 million monthly visitors enhance legal visibility. Serves both law firms and users, forming a valuable legal ecosystem.
- **Rocket Lawyer**: Offers an integrated legal service model with document creation, attorney consultations, and digital services (e.g., e-signatures). Subscription pricing ensures affordability and accessibility, especially for individuals and small businesses.
- **Avvo**: Excels in transparency and interaction. Provides lawyer profiles, reviews, peer endorsements, and a legal Q&A forum. Helps users assess legal professionals and democratizes access to basic legal advice.

Limitations

- **FindLaw**: U.S.-centric content based on common law does not align with Algeria's civil law. Paid advertising conflicts with Algerian legal ethics. Platform is only available in English, limiting accessibility.
- **Rocket Lawyer**: Content is U.S.-specific and requires legal adaptation for Algeria. Credit card subscription model is impractical in areas with limited online payment use. Some services may conflict with laws on unauthorized legal practice.
- **Avvo**: Focuses primarily on lawyer search and Q&A, lacking document or case services. Its review system may face cultural and ethical resistance in Algeria. Lawyer classifications are based on U.S. legal structures.

Applicability to Algeria

- **FindLaw**: Could be adapted by offering Arabic/French legal guides and directories by city and specialty. Marketing-based revenue model must be replaced with subscriptions, legal aid partnerships, or public support to comply with advertising restrictions.

- **Rocket Lawyer**: Concept is replicable for Algeria, especially for entrepreneurs. Needs local translation, legal review, and integration with local payment systems (e.g., Edahabia, BaridiMob). Pricing should reflect local economic conditions.

- **Avvo**: A localized directory without numerical ratings could work well. A moderated Arabic/French legal Q&A forum could boost public legal literacy. Legal compliance and moderation must be ensured to avoid defamation or unauthorized advice.

1.5 Conclusion

This chapter has provided a comprehensive overview of the current situation of the legal sector in Algeria, highlighting its traditional structure, the challenges it faces, and the efforts made towards digital transformation. By analyzing the legal system, the role of lawyers, and obstacles such as the geographical gap and low legal culture, it has become clear that there is an urgent need to develop innovative solutions to enhance access to justice and improve the efficiency of legal services. The National Digital Transformation Strategy 2020–2030, despite its progress, still faces challenges in implementation, which opens the way for new opportunities for innovation.

The comparison with international platforms such as *FindLaw*, *Avvo*, and *Rocket Lawyer* showed the potential of digital solutions in improving legal services, but also the need to adapt these solutions to the Algerian legal and cultural context. Thus, the need for a local digital platform that meets the needs of citizens and lawyers alike is becoming more urgent.

Chapter 2

Analysis and Specifications

2.1 Introduction

After addressing the general context of the legal sector in Algeria, its challenges, and the urgent need for digital transformation in the first chapter, this chapter moves to the initial practical steps towards establishing the "National Lawyers' Platform". The focus here is on the foundational elements necessary to ensure the platform's success, through a detailed analysis of user needs and system requirements.

The chapter begins by highlighting the importance of requirement analysis and its role in ensuring the platform is suitable, user-friendly, and aligned with user expectations. Reviews the reasons for conducting this analysis and discusses the data collection methodology adopted, which included interviews with lawyers, visits to legal institutions, and direct observation of practical operations. Subsequently, the main user categories of the platform are identified and classified with an analysis of their goals and functional needs.

The chapter also addresses the most significant legal and regulatory constraints relevant to the Algerian context, such as client data confidentiality.

Based on this data, a "Technical Specifications" document (Cahier des Charges) is prepared, outlining the platform's general and specific objectives, its functional and non-functional requirements, and a presentation of the selected technologies for developing the frontend, backend, and database. This comprehensive analysis forms a solid foundation for transitioning to the subsequent project phases, namely design, deployment, and implementation.

2.2 Requirements Analysis

This section outlines the importance and purpose of conducting a requirements analysis. Next, we present the data collection methodology adopted for gathering and analyzing user needs. Based on the results of this analysis, we identify the main user categories and define the platform needs of each category. Finally, we review the most significant limitations and challenges we have encountered during the analysis process, which should be taken into account in future development phases.

2.2.1 Objectives of Requirements Analysis

The needs assessment process aims to:

- Gather and understand the requirements of the platform.
- Define the basic functionality that the platform needs to provide.

To achieve this, we identify the target groups, the needs and expectations of each group, and the legal and regulatory constraints that need to be respected. We rely on a data collection methodology that combines interviews, schooling courses, and direct observation.

2.2.2 Data Collection Methodology

To ensure our platform adheres to Algerian laws and fulfills the needs of all users, we employed a thorough data collection methodology involving visits, interviews, and direct engagement with legal professionals. These activities are conducted in phases, as outlined below:

I. Visit to the Faculty of Law, University of Biskra (May 2024)

In May 2024, we initiated our analysis with a visit to the Faculty of Law at the University of Biskra. We met with Professor and Attorney Nasigha Fayçal, who provided insights into the legal profession, key governing laws, and the daily practices of lawyers both in and out of court. During this visit, we also engaged with law students who highlighted challenges in accessing reliable legal resources and specialized articles. This feedback prompted us to incorporate a dedicated section for legal articles in the application.

II. Interview with the Dean of the Faculty of Law (June 2024)

In June 2024, we held an official meeting with the Dean of the Faculty of Law to present the application concept. He expressed strong support for the idea and underscored its significance. During this visit, we met again with Professor Nasigha at his office, where he explained the legal and procedural steps for initiating a case for the first time.

III. Visit to the Bar Association (October 2024)

In early October 2024, we visited the Biskra Bar Association to present the application idea and explore the possibility of involving the Association as an official entity to verify the identities of lawyers registering on the platform. This visit was crucial in highlighting the need for a regulatory body within the application.

IV. Field Training at the Administrative Court (April 2025)

In April 2025, we conducted a 15-day training session at the Biskra Administrative Court. Ms. Hakima Makhloufi, the court's IT engineer, welcomed us and detailed the information system used, including the organization of electronic sessions and transactions. Through direct observation, we identified issues with the process of accessing court ruling outcomes, as both lawyers and clients were required to appear in person to review decisions. This insight led to the inclusion of a notification system and a session calendar in the application. Interactions with court staff and visiting lawyers further enriched our understanding of the judicial process.

V. Interviews with Lawyers and Legal Experts (April 2025)

During the same month, we conducted multiple interviews with prominent lawyers, including:

- **Professor Chaib Najib:** who endorsed the idea and proposed adding a "legal map" feature to help users locate lawyers by region.
- **Lawyer Lahrach Massouda:** and other lawyers, who supported the concept and offered valuable advice on designing the application to align with the legal work environment.

We also met with the Assistant Attorney General of the Ministry of Justice, Mr. Omrani, who showed interest in the project and provided critical feedback on legal procedures.

2.2.3 Identifying User Categories

Based on the data collection methodology which included field visits, interviews, and direct interactions, we were able to define the user categories of our platform, as presented in the following table:

Category	**Description**
Lawyers	Main users who provide legal services through the platform.
Clients	Those looking for a lawyer to handle their cases.
UNOA	The official body that oversees the registration and management of lawyers.
Visitors and Interested Users	They include law students or people who want to read legal articles.

Table 2.1: User Categories and Descriptions

2.2.4 Identifying Goals and Needs of Each User

I. Clients

Clients are platform users who seek legal services. Their key needs include the following:

- Search for a suitable lawyer.
- Submit a request to assign a lawyer to their case.
- Communicate with the assigned attorney through a secure messaging system.
- Know hearing dates and important updates to their case as they happen.
- Participate in legal discussions and exchange views with others.
- Read legal articles and advice to understand their rights and responsibilities.

II. Lawyers

Lawyers are the main service providers on the platform. Their key needs include:

- A professional profile displaying their personal and professional information.
- Managing client case requests.
- A secure messaging system to communicate with clients.
- Send documents and updates remotely to clients.
- Publish legal articles to enhance their professional presence.
- Managing documents related to cases in an organized manner.

III. Bar Association

The Bar Association acts as a regulatory body. Its essential needs include:

- Manage the lawyer database (add, edit, delete).
- Access a dedicated interface for administrative monitoring and statistics.

IV. Visitors and Legal Enthusiasts

These users do not interact with the platform in a professional capacity, but they need to read published legal articles on the homepage.

2.2.5 Study of Legal and Regulatory Constraints

During the system analysis, we encountered several legal restrictions that must be respected in the design and development of the application, including the following:

- **Prohibition of lawyer evaluation systems**
  Our interviews with legal experts revealed that Algerian law explicitly prohibits the evaluation or rating of lawyers, as it is considered a form of advertising. This is to protect their credibility and avoid defamation. According to Article 12 of the laws regulating the legal profession, "A lawyer is prohibited from seeking clients, promoting himself, or suggesting such a thing" [38].

- **Official Verification of Lawyer Identities**

  No individual may register as a lawyer on the platform without verification from an officially recognized entity like the Bar Association.

- **Data Privacy Protection**

  A secure messaging system must be implemented to ensure the confidentiality of documents and communication between lawyers and clients.

- **Content Moderation**

  All content published in forums and legal articles must be monitored to prevent the dissemination of misleading information or content that conflicts with the law.

- **Simple User Interface**

  The platform must offer a clear and user-friendly interface, especially for nonspecialists, with multilingual support (Arabic, English, and French).

2.3 Specifications Document (Cahier des Charges)

This section serves as a specification document outlining the project's general context, specific and general objectives, as well as functional and non-functional requirements. It also defines the expected deliverables to ensure the platform aligns with user needs and legal constraints.

2.3.1 Project Context

In light of the challenges faced by Algerian lawyers and citizens in accessing legal information and the technicality of legal processes, innovative digital solutions are needed that facilitate the simplification of these processes and the accessibility of legal services. Although some traditional tools are within reach, the lack of integrated online platforms is the main challenge facing legal services provision, especially in terms of legal consultations, follow-up cases, and enhancing credible legal content.

As a result, this project aims at developing an integrated and secure web platform for lawyers' communication with citizens, distant remote monitoring of cases, and a platform for

publishing legal articles and enriching discussions through specialized forums. The project comes in line with digital transformation initiatives in the Algerian legal system and is completely in accordance with the legal rules for the legal practice and data protection legislation.

The platform was created following a scientific methodology that involved a field study conducted, such as direct interviews with specialized lawyers, direct observation field visits to the Bar Association and the Administrative Court, and law student surveys in order to ensure that the solutions provided are aligned with users' actual needs.

2.3.2 Project Objectives

The main objective of this project is to develop and deploy a smart digital platform that deals in legal services for Algeria. The platform is designed to facilitate access to legal aid, simplify communication between citizens and lawyers, and provide a secure environment for posting and handling legal information.

I.General Objective

To create an integrated digital platform that supports online tracking of cases, management of legal documents, and sharing of legal content accessible to the public.

II. Specific Objectives

This part outlines the key objectives of the platform, such as:

- Enable easy search of lawyers by location.
- Provide lawyers with a secure environment for case request, file, and client communication management.
- Integrate a message system on every user's dashboard to allow direct and private messaging.
- Publish quality legal articles written by experts to encourage public legal literacy.
- Create a moderated legal discussion forum accessible to clients and visitors for the sake of legal exchanges and discussions.

- Ensure the platform aligns with national laws on confidentiality.
- Offer a multilingual, friendly, and responsive interface to serve all types of users.

2.3.3 Functional and Non-Functional Requirements

This section outlines the essential features the platform must support (functional requirements), as well as the quality attributes (non-functional requirements).

I. Functional Requirements

The functional requirements define the core capabilities that the digital legal platform must provide to ensure effective operation. These capabilities are structured to meet the specific roles and responsibilities of each user type. The requirements include the following.

1. Registration and Login

In this function, there are four types of users: Admin, Bar Association, Lawyer, and Client. Clients can register directly through a simple form. Lawyers, however, cannot self-register, they are added by the Bar Association, which sends them an activation link to complete their profiles. Admin and Bar Association accounts are created manually in advance. For enhanced security and user convenience, the system includes email verification and a password recovery option.

2. Bar Association Dashboard

The Bar Association Dashboard is designed for use by the Bar Association Supervisor. Through this dashboard, the supervisor can register new lawyers by entering basic details such as name, email, and area of practice. They can also send activation links for lawyers to complete their registration, as well as modify or remove lawyer records. In addition, the dashboard provides access to analytics related to registered lawyers.

3. Client Dashboard

The Client Dashboard is designed for use by the Client. It offers advanced attorney search functionality based on geographic location, allowing clients to easily find suitable lawyers. Clients can send case initiation requests to lawyers by providing their name, email, case summary, and location. They receive and review status notifications for each request, indi-

cating whether it has been approved or denied. Upon approval, a private chat is activated, and clients can begin tracking the progress of their case. The dashboard also allows clients to upload and manage case related documents, view a case tracking calendar with hearing dates, updates, and results, interact in forums, and update their personal profile information.

4. Lawyer Control Panel

The Lawyer Control Panel is customized for use by the lawyer. Through this panel, lawyers receive case opening requests from clients and can accept or reject them, triggering immediate notifications to the client. Once a request is accepted, the lawyer can open a new case . They can request specific documents from the client and attach additional files to the case. Lawyers can also define session details such as dates and locations, enter session results (e.g., adjourned, judgment pronounced), and update the overall case status (in process, closed, successful, etc.). Each case includes its own calendar, where the lawyer can view the case timeline and add new appointments related to hearings, meetings, or important deadlines. The panel also allows lawyers to manage past cases by archiving, editing, or deleting them. Additionally, lawyers can engage in live chat with clients, create multiple chat groups for complex cases, publish legal articles, and edit their personal data.

5. Case Tracking

The Case Tracking function is accessible to both the attorney and the client. It allows users to monitor key case details such as the title, type, case number, and the parties involved. The system displays a hearing schedule that includes the date, location, and subject of each session. Both the client and the lawyer can upload documents related to the case, ensuring that all important files are organized and accessible. The case status is continuously updated and may include labels such as In Process, Closed, or Postponed. A shared visual calendar is available for both parties, providing a clear overview of case developments, upcoming hearings, and important milestones. Additionally, the system sends real-time notifications about updates.

6. Internal Chat

The Internal Chat function is available to attorneys and clients, sometimes supporting group chats. It enables one-on-one conversations tied to specific cases, allowing direct communication. When permitted, group chats between multiple clients and lawyers can be created to facilitate collaboration. The chat supports file sharing to exchange documents and evidence

easily. Users receive push notifications to stay updated on new messages, and the entire chat history is saved for future reference.

7. Interactive Forums

The Interactive Forums are designed for clients and organized by case type. Clients can post topics or questions and engage with others through comments and replies. Visitors can browse the forums freely but cannot participate. An admin supervises the forum content, with the ability to edit, hide, or delete posts to ensure discussions remain appropriate and helpful.

8. Legal Articles

The Legal Articles section is accessible to lawyers, visitors, and clients. Lawyers can write and publish articles that appear both on their personal pages and the home page. Authors have the ability to edit or archive their own articles at any time. An admin moderates all articles to maintain quality and relevance.

9. Admin Control Panel

The Admin Control Panel is designed for use by administrators. Admins can view all users along with their details and access summaries of all cases. They manage forums by editing, deleting, or creating sections, and moderate articles to ensure content quality. Admins also control homepage content, view general system statistics, and edit system settings such as the logo, links, and support information.

10. Home Page (Landing Page)

The Home Page serves all visitors and users by providing functionality to search for lawyers based on geographic location, access the latest legal articles, and review recent forum posts. Additionally, the page includes sections such as About Us and Contact Us, which offer a comprehensive introduction to the platform, its creators, and the range of services available. This overview facilitates user understanding and engagement with the platform's offerings.

II. Non-Functional Requirements

1. Usability

The platform features a simple and intuitive user interface designed to accommodate a wide range of users, including lawyers, clients, and visitors. It fully supports multilingual func-

tionality, offering complete compatibility with Arabic (right-to-left layout), French, and English. The user experience remains consistent across all devices, including desktops, mobile phones, and tablets. In addition, the platform includes a dark mode feature implemented using Tailwind CSS, enhancing accessibility and visual comfort.

2. Performance

The system is optimized for speed and efficiency, with a response time of under three seconds for basic operations. It is designed to support over 500 concurrent users without performance degradation. The underlying database architecture is capable of handling more than 10,000 user records, ensuring scalability and reliability in real-world use.

3. Security

Security is a foundational aspect of the platform. Passwords are encrypted using the bcrypt hashing algorithm to protect user credentials. All data transmissions occur over HTTPS, ensuring secure communication between client and server. The platform enforces fine-grained, role-based access control (RBAC), granting permissions based on user type. Additionally, users receive email alerts for critical actions such as password changes, further strengthening account protection.

4. Scalability

The platform is built to accommodate growth, with the capacity to support an increasing number of users and case-related activities. It features a fully decoupled front-end and back-end architecture, enabling independent scaling and maintenance. The database design is prepared for future horizontal scaling through sharding, allowing for efficient distribution of data across multiple servers as usage expands.

5. Maintainability

Maintainability is ensured through a modular architecture on the front end, where reusable components, route-based views, layouts, routes, and context are logically separated. This structure simplifies the design and state management processes. On the back end, the system follows the Model–View–Controller (MVC) architectural pattern: the Model manages data and logic, the View presents the interface based on model data, and the Controller handles user inputs and orchestrates the appropriate responses. This architecture facilitates the easy addition of features or modifications without compromising the integrity of the overall system.

2.3.4 Expected Deliverables

Project completion expected deliverables are classified into three wide categories:

I. Technical Deliverables

- Complete source code: Frontend (React.js) and backend (Laravel).
- REST API documentation: Endpoints, methods, parameters, and responses, generated using Postman.

II. Documentation Required

- Full technical report: Explaining the analysis, design, architecture, development, and constraints faced.
- Technical documentation: For developers.
- UML diagrams: Use case, class, sequence, and activity diagrams to represent the functional and behavioral platform architecture.
- Conceptual Data Model (CDM) and Logical Data Model (LDM): Detailed diagrams of data structure, entities, their relationships, and integrity rules.

III. Testing Deliverables

- Unit test output: Completed with PHPUnit for backend tests.
- Functional and integration tests: To ensure user flows consistency.

2.4 Selected Tools and Technologies

Choosing the appropriate tools and technologies is a strategic step in the development of any software project. In our case, we selected modern and widely adopted web development technologies to ensure performance, security, scalability, and maintainability.

2.4.1 Frontend Tools

React.js: is a component-based JavaScript library used to build dynamic and interactive user interfaces. It simplifies the creation of single-page applications (SPAs) with a focus on performance and maintainability[39].

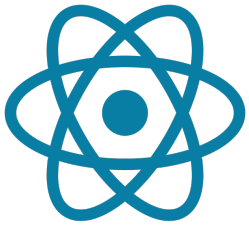

Figure 2.1: React Logo

Reasons for Selection

- Developed and maintained by Facebook.
- Uses a virtual DOM for faster updates.
- Supports a declarative approach to designing UI components.
- Ensures better application control with one-way data binding.

TypeScript: Is JavaScript with syntax for types.TypeScript is a strongly typed programming language that builds on JavaScript, giving you better tooling at any scale[40].

Figure 2.2: Typescript Logo

Reasons for Selection

- TypeScript adds additional syntax to JavaScript to support a tighter integration with your editor. Catch errors early in your editor.
- TypeScript code converts to JavaScript, which runs anywhere JavaScript runs: In a browser, on Node.js, Deno, Bun and in your apps.
- TypeScript understands JavaScript and uses type inference to give you great tooling without additional code.

Tailwind CSS: is a utility-first CSS framework that simplifies web development by providing a set of pre-designed utility classes.These utility classes enable you to build custom designs without writing any custom CSS, promoting consistency, scalability, and efficiency [41].

Figure 2.3: Tailwind CSS Logo

Reasons for Selection

- **Utility-first approach:** Tailwind allows custom designs without writing custom CSS, making the development process more streamlined.
- **Responsive by default:** Tailwind simplifies the creation of responsive designs with built-in utility classes.
- **Granular control:** It offers extensive control over your design, enabling precise customization and faster prototyping.

2.4.2 Backend Tools

Laravel: is an open-source PHP framework, which is robust and easy to understand. It follows a model-view-controller design pattern. Laravel reuses the existing components of different frameworks which helps in creating a web application. The web application thus designed is more structured and pragmatic [42].

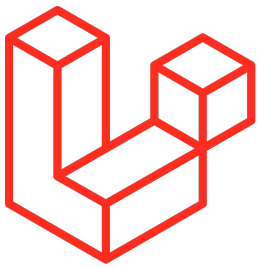

Figure 2.4: Laravel Logo

Reasons for Selection

- The web application becomes more scalable, owing to the Laravel framework.
- Considerable time is saved in designing the web application, since Laravel reuses the components from other frameworks in developing web applications.
- It includes namespaces and interfaces, thus helps to organize and manage resources.

REST API: stands for REpresentational State Transfer API. It is a type of API (Application Programming Interface) that allows communication between different systems over the internet. REST APIs work by sending requests and receiving responses, typically in JSON format, between the client and server [43].

Figure 2.5: Rest API Logo

Reasons for Selection

- RESTful APIs are based on a client-server model, where the client and server operate independently, allowing scalability.
- Responses from the server can be explicitly marked as cacheable or non-cacheable to improve performance.

Laravel Octane with Swoole: Laravel Octane is an open source package that boosts your Laravel application performance through stateful PHP programming. The package itself comes with dependencies and libraries for new features and compatibility with high-performance servers such as RoadRunner and Swoole [44].

Reasons for Selection

- **Octane Workers:** Preloads multiple worker processes to handle incoming requests quickly.
- **Concurrent Tasks:** Allows executing multiple tasks at the same time (in parallel).
- **Ticks (Intervals):** Executes specific tasks repeatedly at defined time intervals.
- **Octane Cache:** High-speed in-memory cache powered by Swoole tables and can handle millions of operations per second.

Laravel Reverb: Reverb is a first-party WebSocket server for Laravel applications, bringing real-time communication between client and server directly to your fingertips. Open source and an Artisan command away [45].

Reasons for Selection

- Reverb provides fast and efficient real-time communication, capable of handling thousands of simultaneous connections while minimizing latency compared to traditional methods like HTTP polling.
- Reverb integrates directly with Laravel's broadcasting system, making it easy to implement real-time features. It also supports official Laravel tools like Forge for deployment and Pulse for monitoring.

NGINX: is open-source web server software used for reverse proxy, load balancing, and caching. It provides HTTPS server capabilities and is mainly designed for maximum performance and stability. It also functions as a proxy server for email communications protocols, such as IMAP, POP3, and SMTP [46].

Figure 2.6: Nginx Logo

Reasons for Selection

- Nginx reduces load time and latency, delivering content quickly to enhance user experience.
- It intelligently manages incoming traffic to improve application responsiveness and ensure smooth browsing.

PHPUnit: is a programmer-oriented testing framework for PHP. It is an instance of the xUnit architecture for unit testing frameworks [47].

Reasons for Selection

- Official PHP testing framework, fully supported by Laravel.
- Ensures reliable backend testing (API, controllers, services).
- Enables automated testing to catch bugs early and prevent regressions.
- Provides clean, maintainable, and structured test code.

2.4.3 Database Tools

MySQL: is an open source relational database management system (RDBMS) that's used to store and manage data. Its reliability, performance, scalability, and ease of use make MySQL a popular choice for developers [48].

Figure 2.7: MySql Logo

Reasons for Selection

- A comprehensive relational database system.
- The open source advantage of MySQL.
- Reliable and scalable enough for organizations with very large data sets and vast numbers of users.

Redis: is the world's fastest in-memory database. It provides cloud and on-prem solutions for caching, vector search, and NoSQL databases that seamlessly fit into any tech stack—making it simple for digital customers to build, scale, and deploy the fast apps our world runs on [49].

Figure 2.8: Redis Logo

Reasons for Selection

- Enhances data access speed for frequently accessed resources (e.g., forums or profiles).
- Works efficiently with Laravel for session and cache management.
- Extremely low latency and high availability.

2.5 Conclusion

In this chapter, we conduct a thorough analysis to ensure that the legal platform we build meets real requirements, respects Algerian legal constraints, and offers operational, scalable, and secure services

The chapter gives a realistic plan of action for the platform design and construction based on evidence from the field. By setting the primary user groups and their intentions and expectations, we were in a position to make the system facilities accommodate realistic usage scenarios.

We paid particular attention to the legal and regulatory environment, towards ensuring that the platform is fully compliant with Algerian law and professional requirements. This included

defining general and specific objectives of the platform as well as formalizing functional and non-functional requirements in the specifications document.

Furthermore, we selected development tools and technology suitable to each level of the system frontend, backend, and database—according to performance, usability, and maintainability needs.

This analysis is a solid and well-organized basis for the following project phases, allowing the processes of architectural design, development, and testing to continue with clarity and confidence.

Chapter 3

Design

3.1 Introduction

Building upon the comprehensive analysis of user needs and system requirements established in Chapter 2, this chapter presents the architectural design of the Kadiyati platform. Chapter 2 identified the diverse needs of lawyers, clients, and the Bar Association, highlighting the importance of secure communication, efficient case management, and regulatory compliance within the Algerian legal context. It also outlined the functional and non-functional requirements that would guide the platform's development.

Chapter 3 translates these requirements into a coherent system design, presenting a blueprint that supports all identified functionalities while maintaining security, scalability, and performance. This chapter details the conceptual architecture of the system using a three-tier approach that clearly separates concerns, facilitates maintenance, and allows for future expansion. The chapter also explores data modeling, showing how the platform's information will be structured and related, ensuring data integrity and efficient access patterns. By establishing this design foundation, we create a bridge between the requirements analysis of Chapter 2 and the implementation details that will follow in Chapter 4, ensuring that the developed system will effectively meet the needs of all stakeholders in the Algerian legal community.

In this chapter, we will explore the following sections:

- **System Architecture**, describes the three-tier structure and its layers.
- **UML Diagrams**, presents use case, class, and sequence diagrams to illustrate system in-

teractions.

- **Data Modeling**, details the conceptual and logical data models for data organization.
- **System Modules**, outlines the functional modules driving the platform's capabilities.
- **Conclusion**, summarizes the design approach and its benefits for scalability and user experience.

3.2 System Architecture

The Kadiyati platform implements a three-tier architecture that organizes the system's components into distinct logical layers: Presentation, Application, and Data. This architectural approach provides a clear separation of concerns, enhances maintainability, and supports scalability as user demands grow. Each tier has specific responsibilities and communicates with adjacent tiers through well-defined interfaces, ensuring a cohesive system where interactions drive functionality.

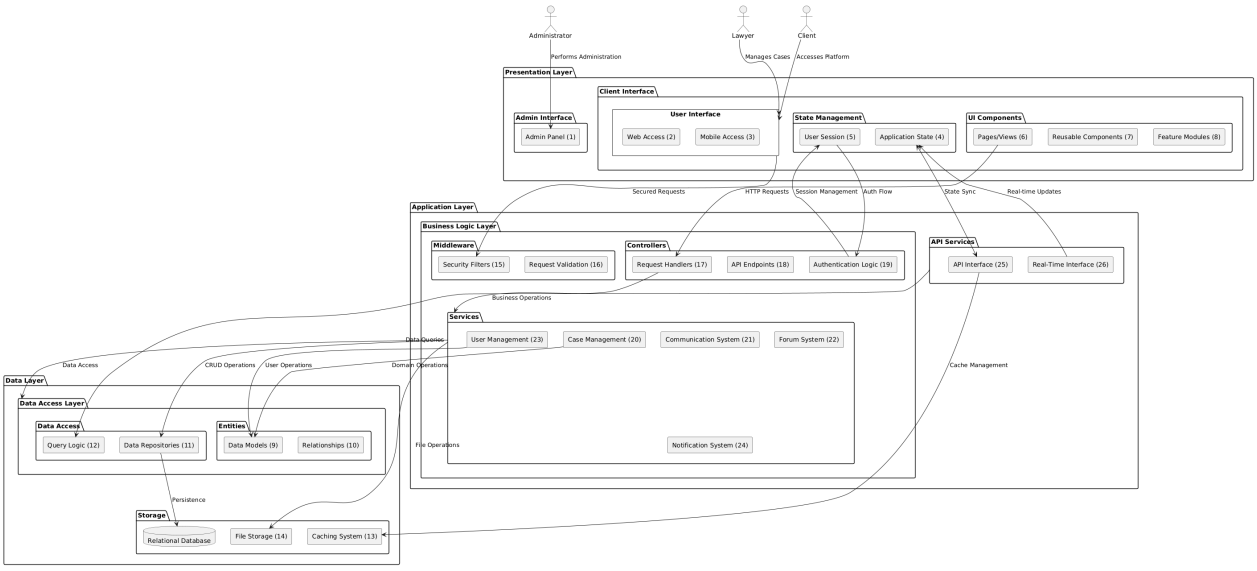

Figure 3.1: System Architecture of Kadiyati Platform

3.2.1 Inter-Tier Interactions

The Presentation Layer interacts with the Application Layer through standardized request-response interfaces, enabling user actions (e.g., case submissions) to initiate business logic processing. The Application Layer, in turn, coordinates with the Data Layer via structured data access protocols, facilitating efficient data persistence and retrieval. This interaction model ensures a seamless flow of information across tiers, where each layer depends on the output of the adjacent layer, supporting a scalable and adaptable system design.

3.2.2 Presentation Layer

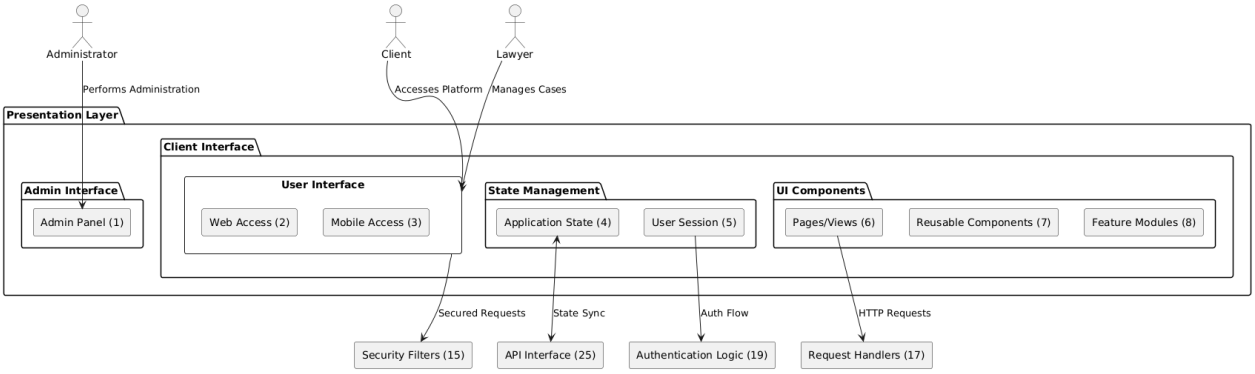

Figure 3.2: Presentation Layer

The Presentation Layer serves as the interface between users and the system, providing intuitive and accessible ways for clients, lawyers, and administrators to interact with the platform. This layer relies on the Application Layer to process user inputs and relies on structured responses to update user interfaces dynamically.

Client Interface

The client interface is built using a modular user interface design that organizes functionality into cohesive, reusable components, fostering consistent user experiences:

- **User Interface Components**: Provide access through various devices, ensuring a uniform experience across platforms.

- **UI Components**: Include reusable elements like forms, buttons, and dialog boxes that maintain visual consistency throughout the application.
- **Feature Modules**: Encapsulate related functionality for specific domains such as case management, messaging, and forum participation, interacting with the Application Layer for processing.
- **State Management**: Maintains application state and user session information, coordinating data flow with the Application Layer to ensure synchronization.

This modular approach enables efficient development, easier maintenance, and a consistent user experience, achieved through well-defined interactions with the underlying layers.

Admin Interface

The administration interface provides specialized tools for platform oversight, relying on the Application Layer to manage and process administrative tasks:

- Comprehensive dashboards for monitoring system activity, updated through data from the Application Layer.
- User management interfaces for controlling access, coordinating with authentication services in the Application Layer.
- Content moderation tools for forums and legal articles, interacting with the Application Layer for data validation and updates.
- System configuration panels for customizing platform behavior, dependent on the Application Layer's configuration logic.

3.2.3 Application Layer

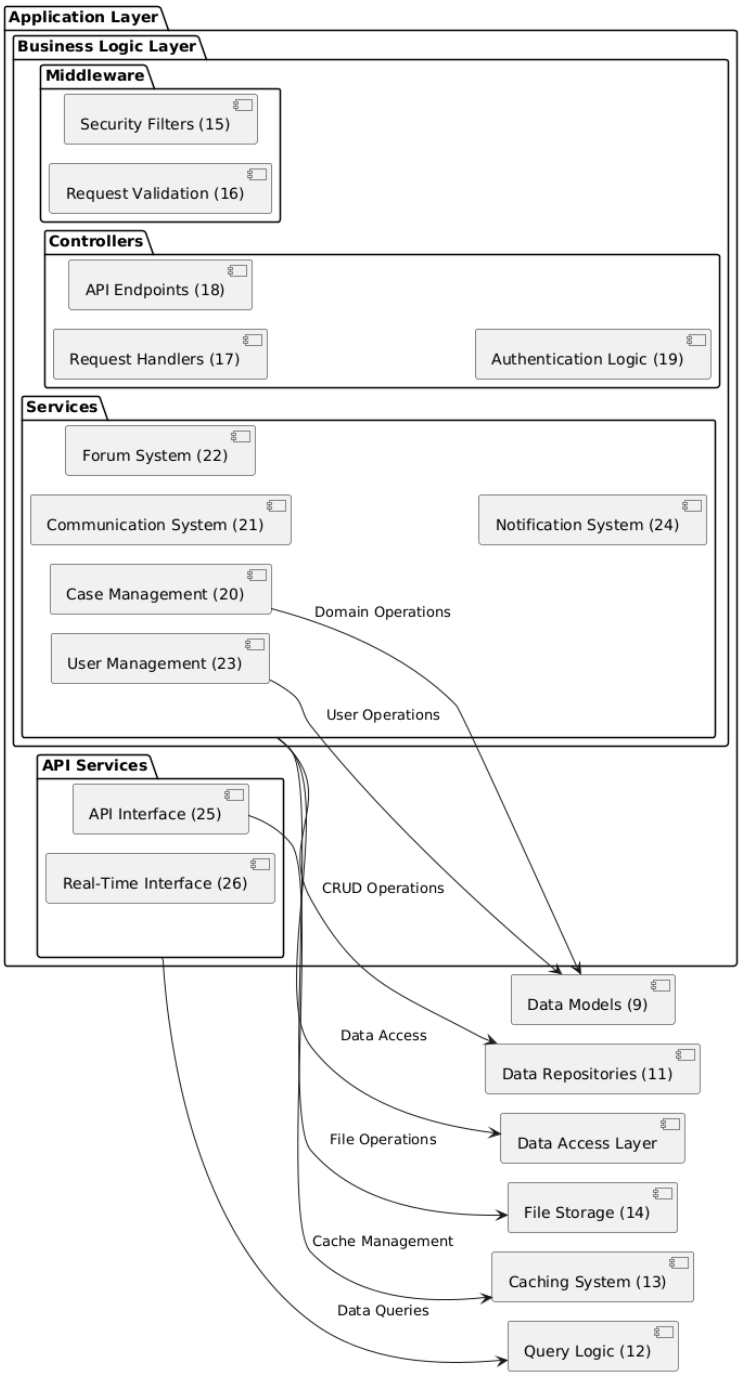

Figure 3.3: Application Layer

The Application Layer contains the core business logic of the platform, processing requests from the Presentation Layer and coordinating access to the Data Layer. This layer or-

ganizes functionality into distinct components that collaborate to fulfill system requirements, relying on clear interfaces for inter-tier communication.

Controllers

Controllers act as intermediaries between the Presentation Layer and business logic, facilitating interaction by:

- **Request Handlers**: Process incoming requests, validate inputs, and route them to appropriate services within the layer.
- **API Endpoints**: Provide structured access to system functionality, serving as the bridge for Presentation Layer interactions.
- **Authentication Logic**: Verify user identities and permissions, enabling secure communication with the Presentation Layer.

These components ensure that user actions from the Presentation Layer are effectively translated into business operations.

Services

Services implement the core business capabilities of the platform, interacting with controllers and the Data Layer to:

- **Case Management**: Handles case-related operations, coordinating with the Data Layer for persistence and the Presentation Layer for updates.
- **Communication System**: Manages messaging, relying on the Data Layer for user data and the Presentation Layer for user notifications.
- **Forum System**: Supports discussion management, interacting with the Data Layer for content storage and the Presentation Layer for user access.
- **User Management**: Manages user-related tasks, bridging the Presentation Layer's user interfaces with the Data Layer's storage.

- **Notification System**: Delivers alerts, coordinating with the Data Layer for event data and the Presentation Layer for real-time updates.

Middleware

Middleware components process requests before they reach controllers, enhancing interaction security and efficiency:

- **Security Filters**: Enforce access controls, ensuring secure data flow between the Presentation and Application Layers.
- **Request Validation**: Validate inputs, facilitating reliable communication with services and the Data Layer.

API Services

API Services provide standardized interfaces for client communication, acting as a conduit between the Presentation Layer and the Application Layer's logic:

- **API Interface**: Exposes endpoints for structured data exchange, enabling Presentation Layer access to system functionality.
- **Real-Time Interface**: Supports dynamic interactions, facilitating real-time updates between the Presentation and Application Layers.

3.2.4 Data Layer

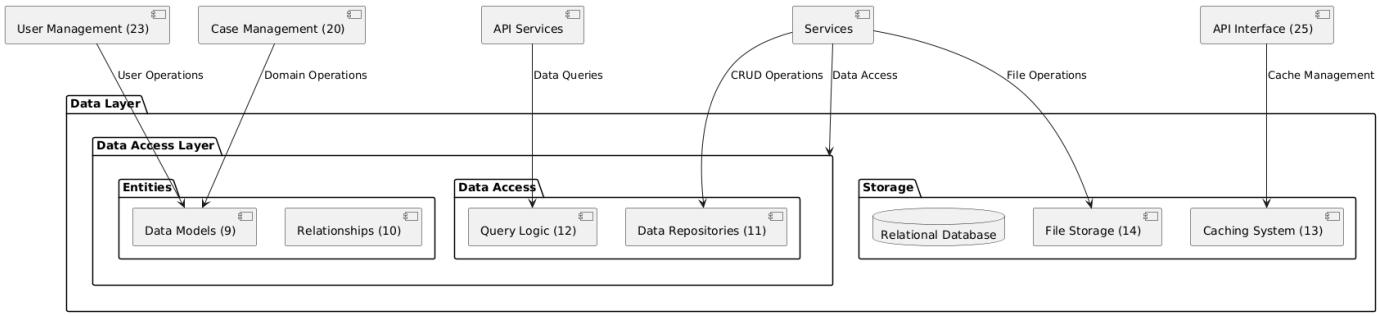

Figure 3.4: Data Layer

The Data Layer manages persistent storage and retrieval of system information, ensuring data integrity, security, and efficient access. This layer interacts with the Application Layer to fulfill data requests and updates, supporting the platform's operational needs.

Data Access Layer

The Data Access Layer mediates between business logic and storage systems, facilitating interaction by:

- **Entities/Models**: Define the structure and relationships of system data, serving as the foundation for Application Layer queries.
- **Data Repositories**: Provide abstracted access to storage, enabling the Application Layer to perform data operations efficiently.

These components ensure that the Application Layer's requests are translated into actionable storage operations.

Storage

The Storage components persist system data across various systems, interacting with the Data Access Layer to:

- **Relational Database**: Stores structured data, responding to queries from the Data Access Layer for user accounts, cases, and forum content.
- **Caching System**: Improves performance by storing frequently accessed data, supporting the Data Access Layer's efficiency.
- **File Storage**: Manages documents and media files, providing the Data Access Layer with access to case-related assets.

3.2.5 Cross-Layer Communication

Communication between the three tiers follows specific patterns that emphasize their interdependence:

1. **Client-Application Communication**:

    - User interface components initiate requests, which are routed to the Application Layer's controllers.
    - Controllers process these requests, invoking services to perform business operations.
    - Services return results, which controllers transform into responses for the Presentation Layer.
    - The Presentation Layer updates based on these responses, completing the interaction cycle.

2. **Application-Data Communication**:

    - Services request data operations, which are handled by the Data Access Layer's repositories.
    - Repositories translate these into storage operations, leveraging models for data structure.
    - Storage systems persist or retrieve data, returning results through repositories to services.
    - This flow ensures the Application Layer receives the necessary data to fulfill user requests.

3. **Real-Time Communication**:

    - Real-time interfaces establish dynamic connections with the Presentation Layer.
    - System events trigger updates, which flow through the Application Layer to the Presentation Layer.
    - This enables continuous interaction without requiring manual refreshes, enhancing user experience.

3.2.6 Key User Flows

The architecture supports these primary user journeys through coordinated tier interactions:

- **Client Journey**: Clients access the platform, search for lawyers, and submit requests, with the Presentation Layer coordinating with the Application Layer to process and store data, and the Data Layer ensuring persistence.
- **Lawyer Journey**: Lawyers manage profiles and cases, with the Presentation Layer facilitating input, the Application Layer handling business logic, and the Data Layer storing updates.
- **Administrator Journey**: Administrators oversee the system, with the Presentation Layer providing tools, the Application Layer managing operations, and the Data Layer supporting data oversight.

3.3 UML Diagrams

3.3.1 Use Case Diagrams

Lawyer and Client Use Cases

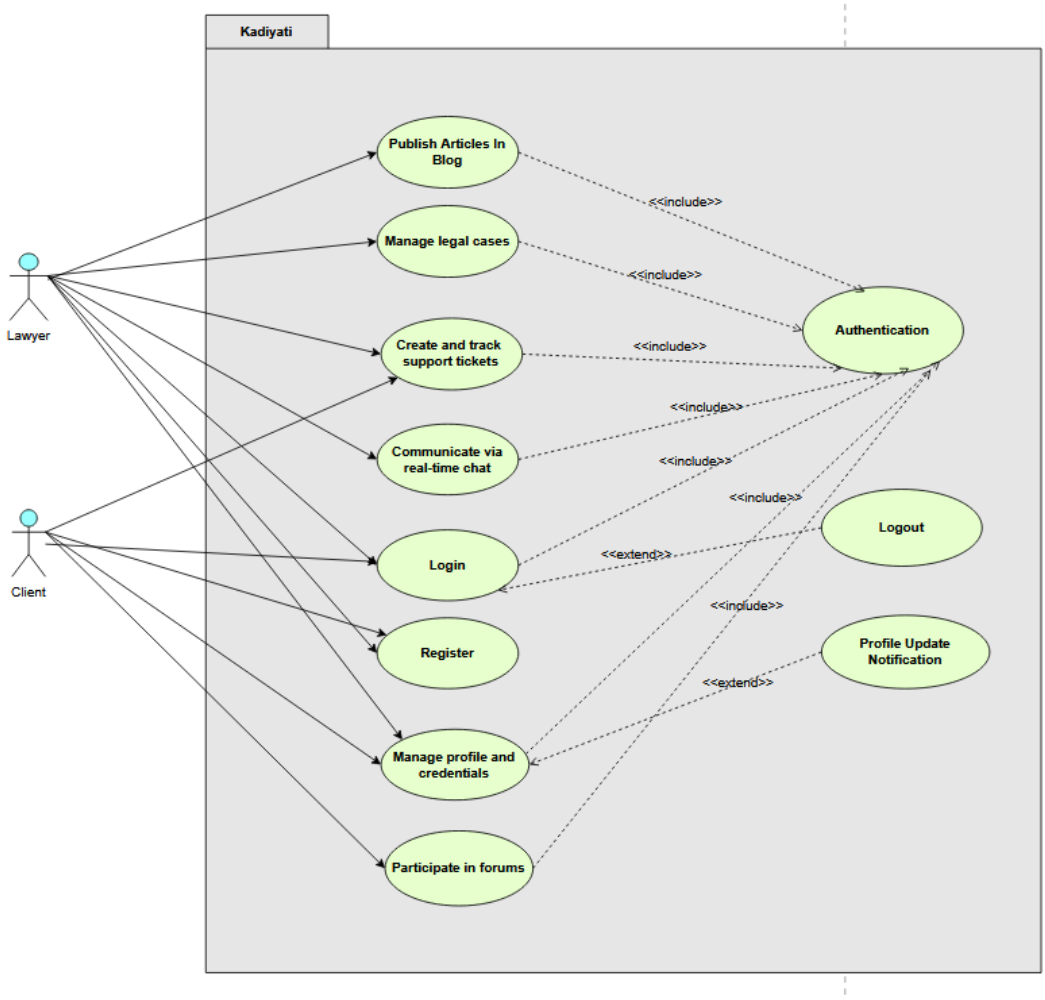

Figure 3.5: Use Case Diagram - Lawyer and Client Interactions

Administrator and Visitor Use Cases

Figure 3.6: Use Case Diagram - Administrator and Visitor Interactions

3.3.2 Class Diagram

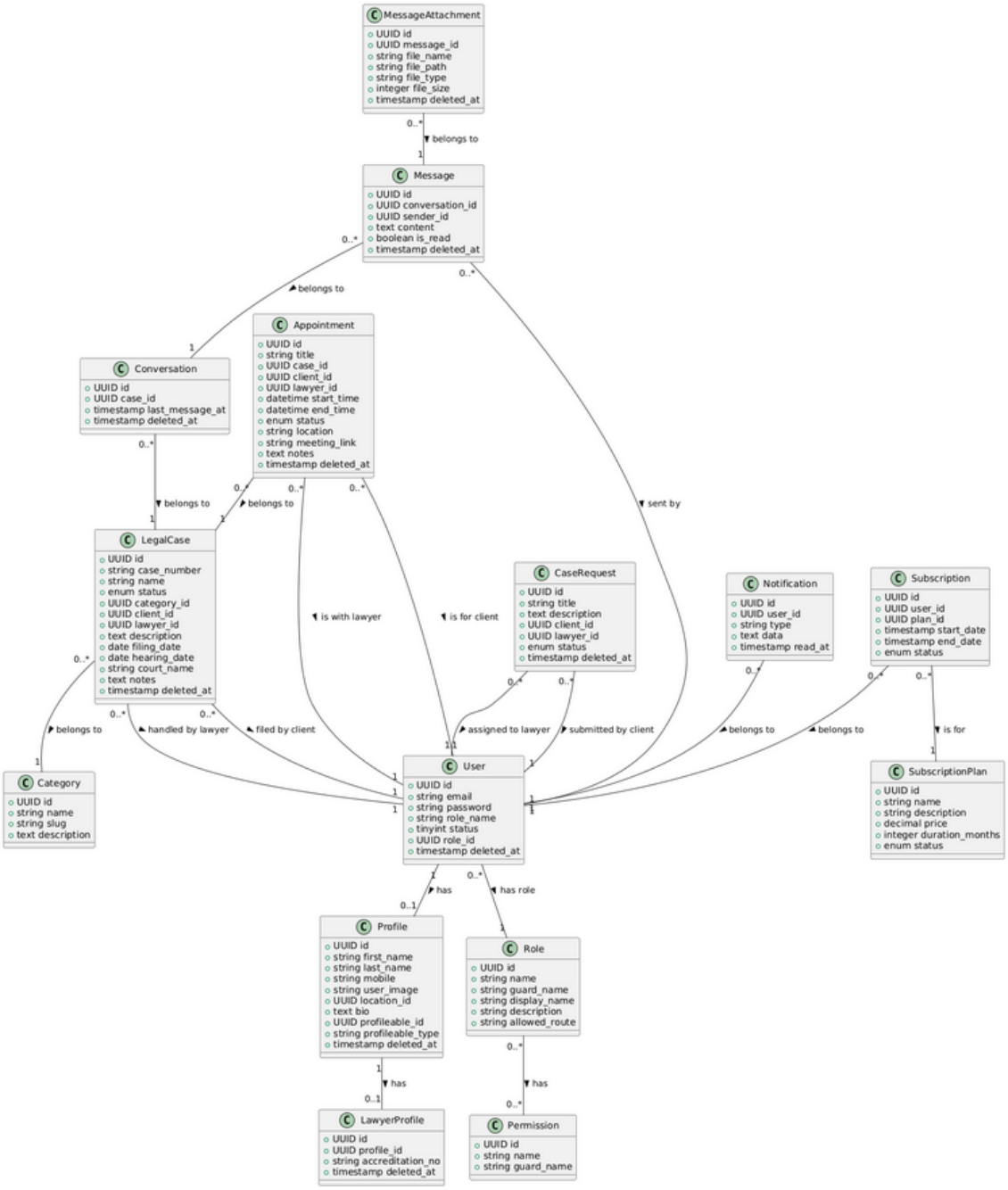

Figure 3.7: Class Diagram - Data Model for Kadiyati Platform

The class diagram in Figure A.1 presents the core data model of the Kadiyati platform, focusing on key classes (User, LegalCase, CaseRequest, Message, Appointment, Notification, Subscription, Conversation) for readability and clarity. The full diagram is provided in the annex for

a detailed view.

3.3.3 Sequence Diagram

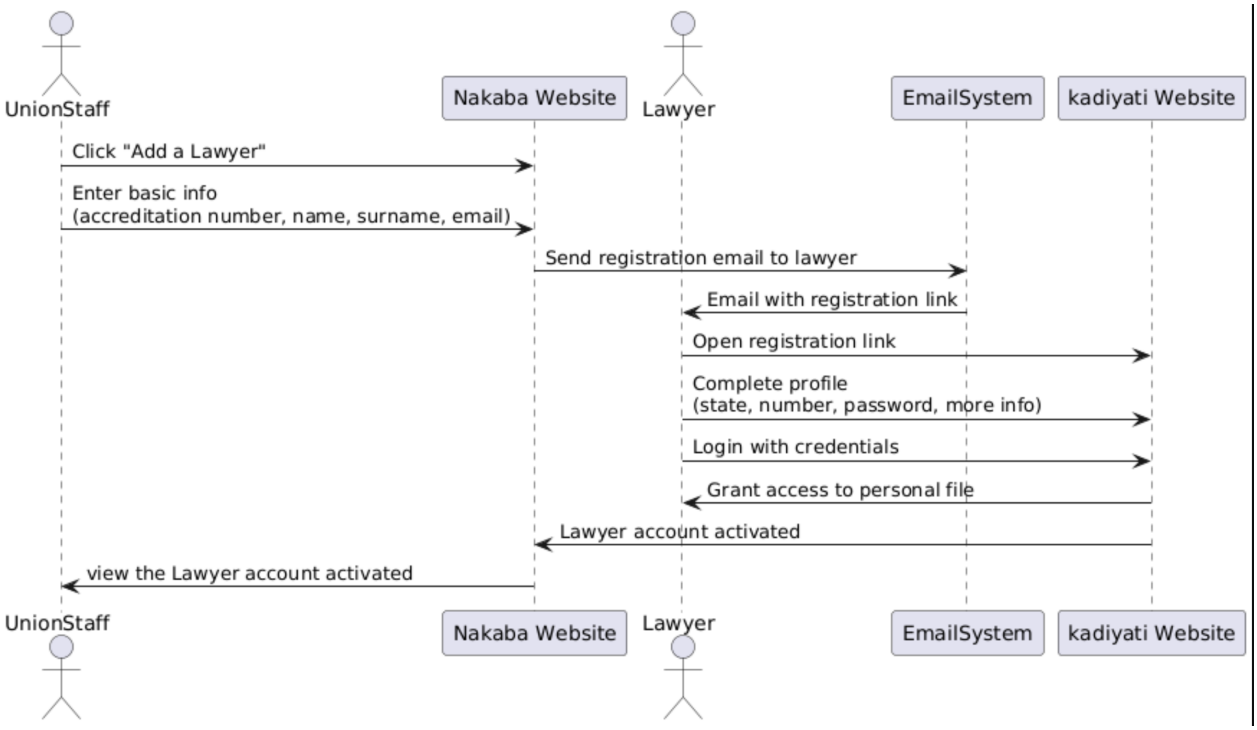

Figure 3.8: Sequence diagram for adding a new lawyer from the Nakaba platform to the Kadiyati platform

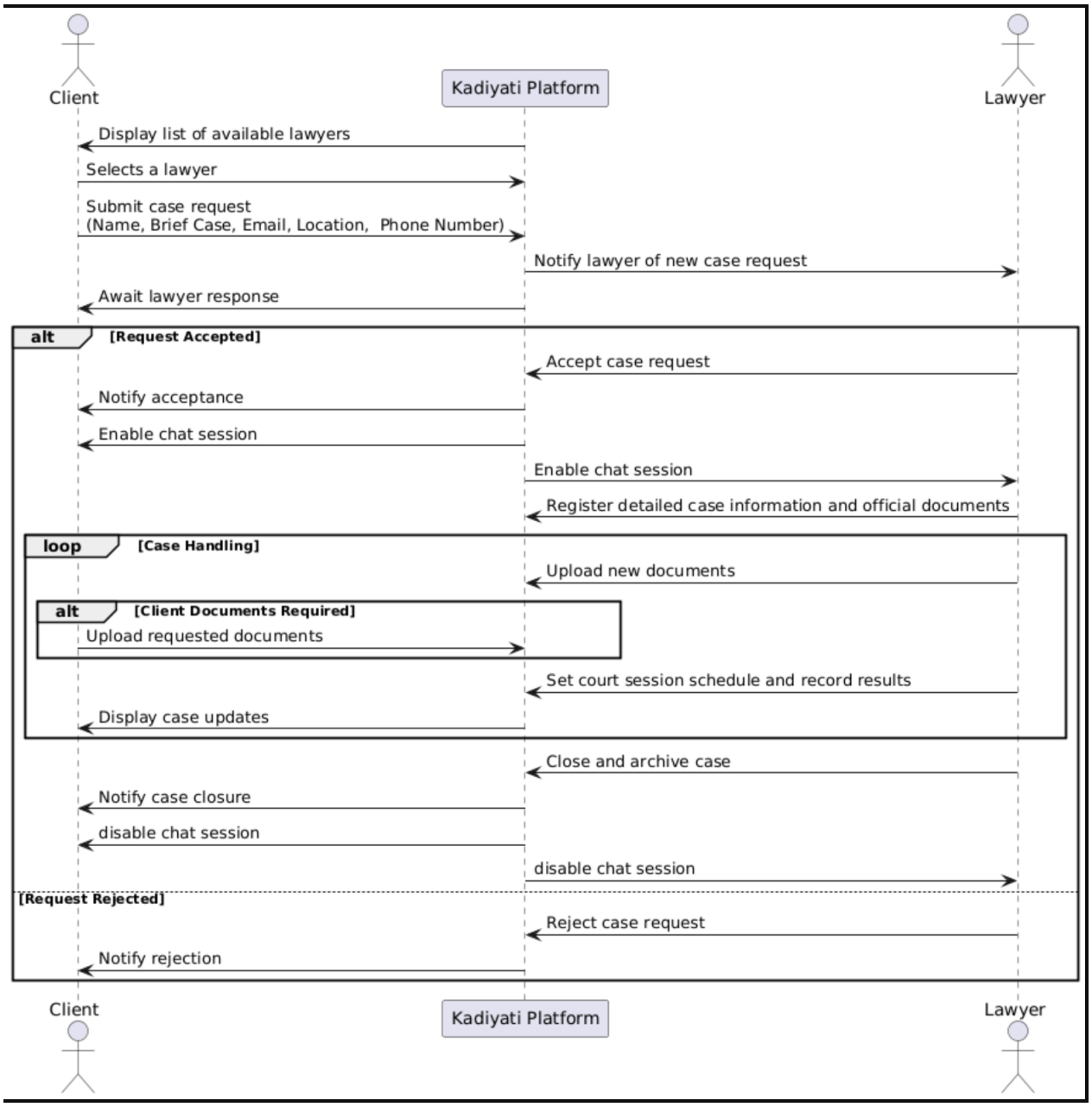

Figure 3.9: Sequence Diagram for Case creation and management process in Kadiyati between Client and Lawyer

3.4 Data Modeling

3.4.1 Conceptual Data Model (MCD)

The conceptual data model represents the high-level entity relationships in the Kadiyati platform, identifying the key domain objects and their associations:

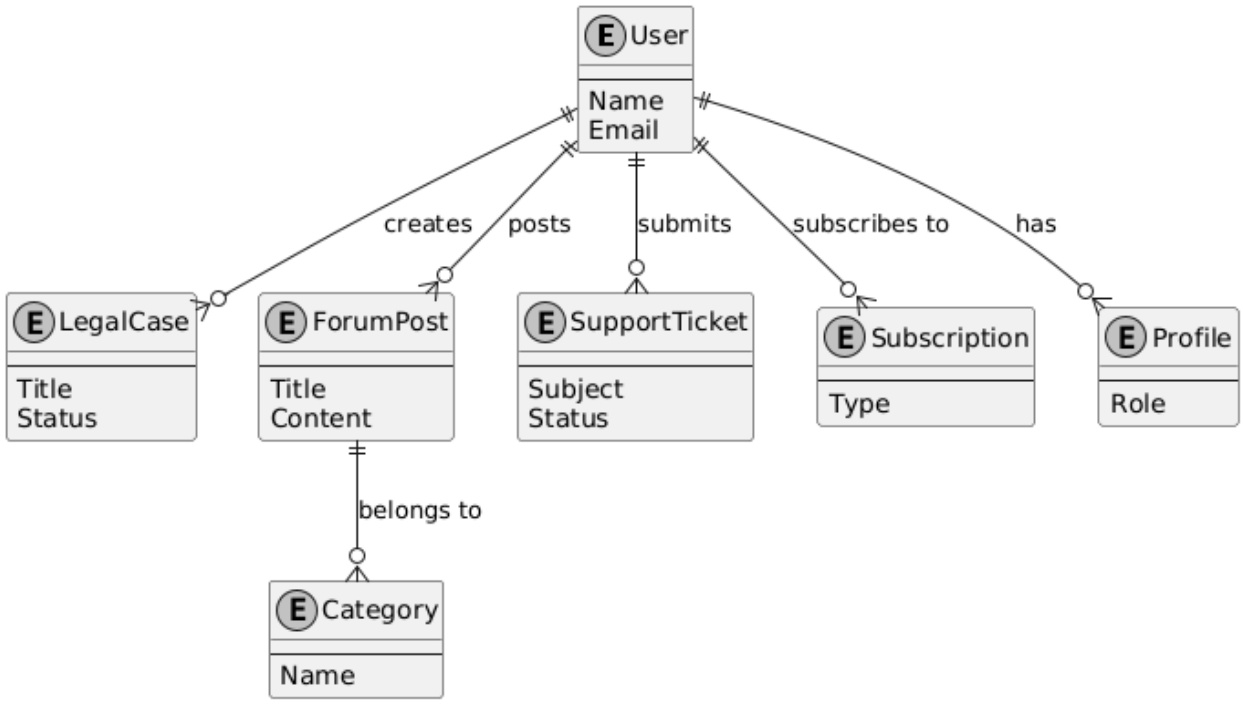

Figure 3.10: Conceptual Data Model (MCD) showing entity relationships

Core Entities

The MCD identifies the fundamental entities required for the Kadiyati platform, focusing on the conceptual representation of data without implementation details.

- **User:** Represents all system users, including clients, lawyers, and administrators, defined by their identity (e.g., Name, Email).
- **Profile:** Stores user-specific information, such as their role (e.g.lawyer, admin) and bio, to differentiate user types.
- **LegalCase:** Represents a legal case managed within the system, with details like title, status, and description.

Key Relationships

The MCD defines the conceptual relationships between entities to reflect Kadiyati's functionality at a high level.

- A User has one Profile, which specifies their role (e.g., client, lawyer, admin).
- A User can create multiple LegalCases, representing cases they initiate or manage.
- A LegalCase belongs to one Category for classification.

3.4.2 Logical Data Model (MLD)

The MLD builds on the MCD to define the logical structure of Kadiyati's data, including tables, attributes, primary keys (PK), foreign keys (FK), and relationships with cardinality. It prepares the data design for database implementation while remaining independent of specific database technologies.

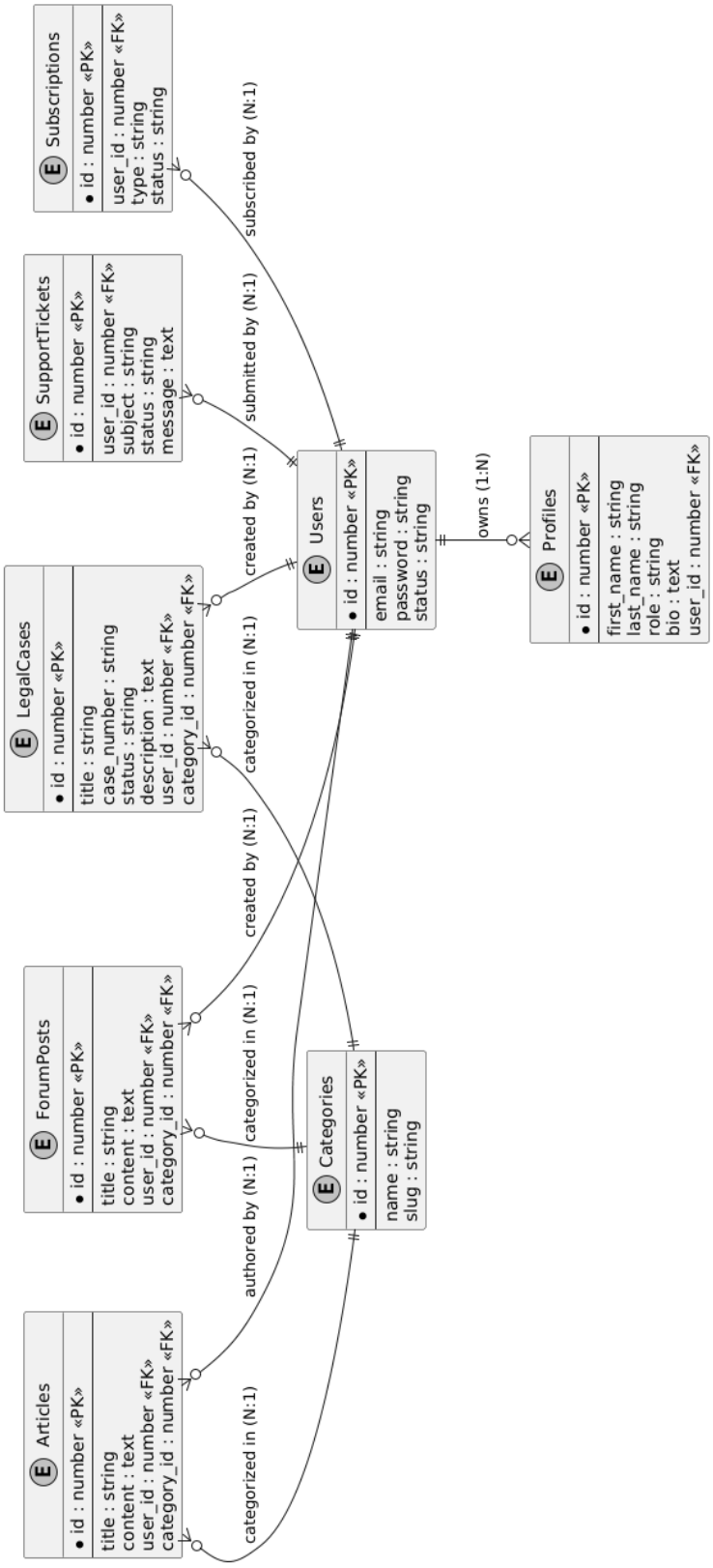

Figure 3.11: Logical Data Model (MLD) showing database schema

Core Entities

The MLD represents entities as tables with detailed attributes and keys to support relational database design.

- **Users:** Represents all system users, with attributes like email (string), password (string), and status (string). Primary key: id (number).
- **Profiles:** Stores user-specific details, such as first_name (string), last_name (string), role (string, e.g., client, lawyer, admin), and bio (text), linked to a user via user_id (FK). Primary key: id (number).
- **LegalCases:** Represents legal cases with attributes like title (string), case_number (string), status (string), and description (text), linked to a user (client or lawyer) via user_id (FK) and to a category via category_id (FK). Primary key: id (number).

Key Relationships

The MLD defines logical relationships between tables using primary and foreign keys, with cardinality to ensure data integrity.

- A User has one Profile (one-to-one relationship), linked via the foreign key user_id in Profiles, defining the user's role and details.
- A User can create multiple LegalCases (one-to-many relationship), linked via the foreign key user_id in LegalCases, with roles (client, lawyer) determined by the Profile.
- A LegalCase belongs to one Category (many-to-one relationship), linked via the foreign key category_id in LegalCases for classification.

3.5 System Modules

The Kadiyati platform is organized into functional modules that encapsulate specific business capabilities, designed to work collaboratively to meet the platform's objectives. These

modules interact seamlessly, with each relying on the others to deliver a cohesive legal service ecosystem, as illustrated in the system modules diagram.

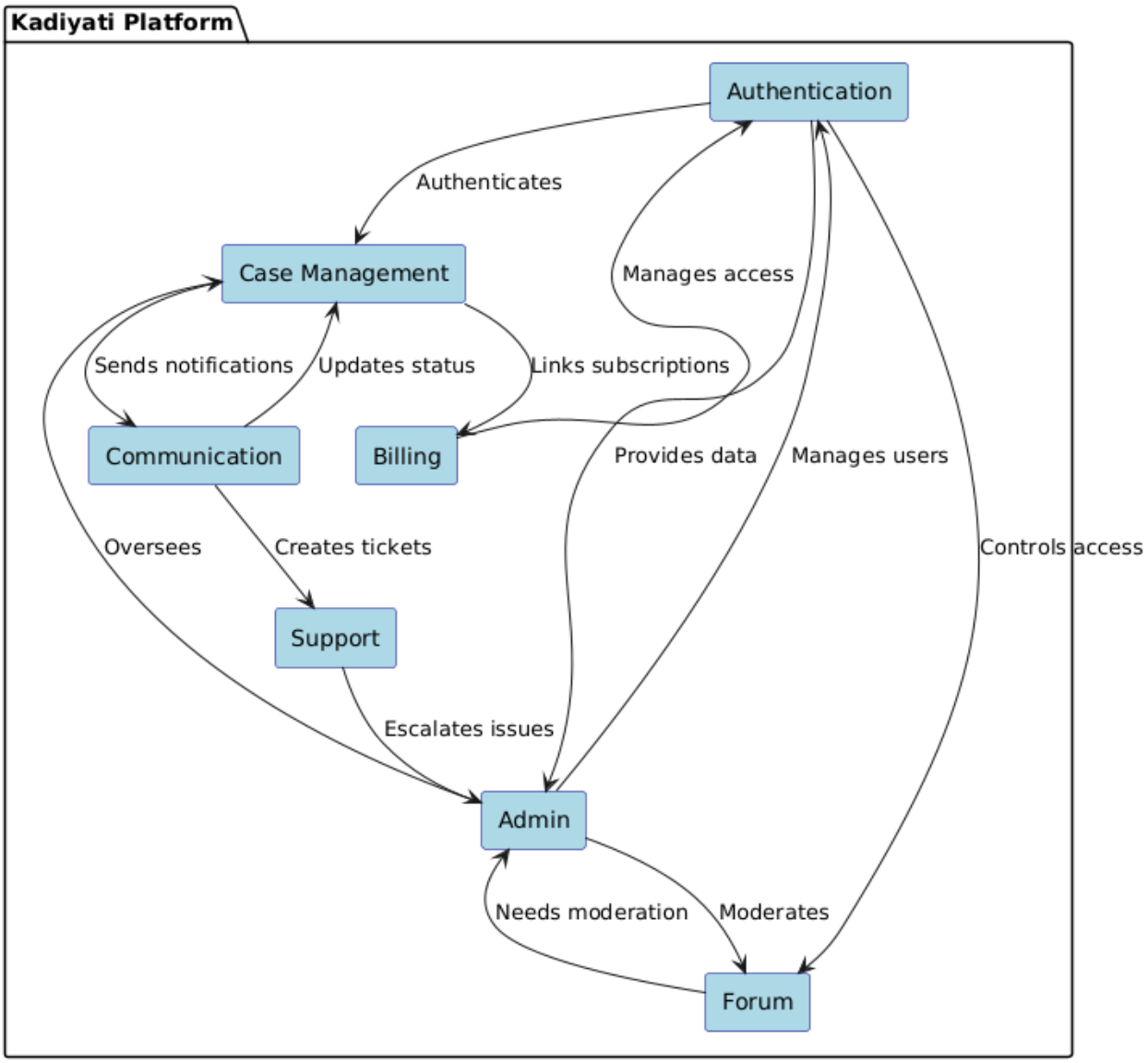

Figure 3.12: System Modules Diagram

3.5.1 Authentication Module

- **User Authentication:** Manages login processes and session control, providing secure access credentials that enable interactions with the Case Management and Communication Modules.

- **Access Management:** Defines and enforces permission levels, ensuring that the Case Management and Communication Modules operate within authorized boundaries, while supporting administrative oversight across the platform.

This module serves as the foundation for secure user interactions, facilitating access and coordination with other modules.

3.5.2 Case Management Module

- **Case Creation and Management:** Allows lawyers to create and manage legal cases, leveraging the Authentication Module for user verification and coordinating with the Communication Module to notify relevant parties.
- **Status Updates:** Generates real-time updates on case progress, interacting with the Communication Module to distribute notifications to users, ensuring timely information flow.
- **Subscription Linking:** Integrates with the Billing Module to associate user subscriptions with case services, enabling the Authentication Module to validate access based on payment status.

This module depends on the Authentication Module for security and collaborates with the Communication Module for user engagement, forming a dynamic link in the system.

3.5.3 Communication Module

- **Notification System:** Delivers updates and alerts to users, receiving case-related information from the Case Management Module and relying on the Authentication Module to target authorized recipients.
- **Support Oversight:** Manages support interactions, coordinating with the Authentication Module to verify user identities and facilitating escalation processes that may involve the Case Management Module for case-related issues.

This module acts as a bridge, enhancing user experience by integrating notifications and support across the platform, dependent on inputs from other modules.

3.6 Conclusion

The design of the Kadiyati platform demonstrates a comprehensive approach to creating a robust legal service platform. By implementing a well-structured system architecture with clear component separation, adopting a detailed data model that captures all essential relationships, and organizing functionality into cohesive modules, the system achieves both technical excellence and user-centered design principles. This architectural foundation ensures the platform can scale effectively, maintain high performance under load, and adapt to evolving requirements while providing a seamless experience for both legal professionals and clients.

Chapter 4

Development Process and Environment

4.1 Introduction

Building on the architectural foundation and design principles outlined in Chapter 3, this chapter delves into the practical implementation and development of the Kadiyati and Nakaba platforms, designed to connect lawyers with clients and streamline legal service management. Chapter 3 provided a detailed blueprint, encompassing system architecture, data modeling, and modular organization, which set the stage for a robust and scalable platform. This chapter translates those designs into reality, detailing the curated development environment, including tools and technologies used for coding, database management, API development, version control, and collaboration. It further explores the implementation of key modules, user interfaces tailored for clients, lawyers, and administrators, and evaluates the system's performance and responsiveness. By documenting the technical processes and their outcomes, this chapter illustrates the strategies employed to achieve the project's objectives and paves the way for a comprehensive evaluation of the platform's success.

4.2 Development Environment

The development environment was carefully curated to support coding, database management, API development, version control, and team collaboration. The following tools and technologies are utilized:

4.2.1 Development Tools

- **Visual Studio Code**: Visual Studio Code is a lightweight yet powerful source code editor that runs on your desktop and is available for Windows, macOS, and Linux. We chose it because it supports a wide range of programming languages, especially JavaScript, which is the primary language used in our platform for front-end development. Compared to heavier IDEs, VS Code offers faster performance, integrated terminal support, and excellent Git integration, all while being free and open source [50].

- **Node.js**: is a free, open-source, cross-platform JavaScript runtime environment ,we use it in our project to run frontend development tools such as bundlers and compilers. It enables efficient execution of JavaScript-based build processes directly on the local machine, improving workflow and speed [51].

- **NPM**:(Node Package Manager) is the default package manager for Node.js and the largest registry of JavaScript packages. In our project, npm is used to manage frontend dependencies like frameworks, libraries, and build tools. It simplifies the installation and updating of packages, helping maintain a consistent and scalable frontend development environment [52].

- **PhpStorm**: PhpStorm is an integrated development environment (IDE) editor that lets developers program, test, debug and complete code for several frameworks including Symfony, Drupal, Laravel , We chose PhpStorm because it provides strong and comprehensive support for the most popular PHP frameworks, along with an enhanced debugging experience compared to other less specialized IDEs [53].

4.2.2 Web Server and Local Development

- **NGINX:** NGINX is open-source web server software used for reverse proxy, load balancing, and caching. It provides HTTPS server capabilities and is mainly designed for maximum performance and stability. We chose NGINX for its very high performance and excellent stability in handling heavy traffic, with a simpler and more efficient setup compared to other servers [46].

- **XAMPP**: XAMPP is a cross-platform web server that is free and open-source. XAMPP is a short form for Cross-Platform, Apache, MySQL, PHP, and Perl. XAMPP is a popular cross-platform web server that allows programmers to write and test their code on a local web-server. We chose XAMPP for its simplicity and fast installation, which speeds up the local development environment compared to setting up each component individually [54].

4.2.3 Database Management

- **HeidiSQL**: HeidiSQL is free software for people who work with databases, and aims to be intuitive to use. "Heidi" lets you connect to a variety of databases, like MariaDB, MySQL. We use it for its ease of use and wide database support compared to other tools that may be more complex or costly [55].

4.2.4 API Development and Testing

- **Postman**: Postman is an all-in-one API platform for designing, testing, delivering, and monitoring APIs. Built for teams, it simplifies collaboration, organization, and building secure, reliable APIs faster. We chose Postman because it combines ease of use with strong team collaboration features, outperforming traditional API testing tools [56].

4.2.5 Version Control and Collaboration

- **Git**:Git is a version control system that tracks changes in files and facilitates team collaboration through independent branches and intelligent merging of changes. We chose Git because it is the most widely used and flexible version control system with superior merging capabilities compared to alternatives.

- **GitHub**: GitHub is a cloud-based platform for hosting, sharing, and collaborating on code. It allows storing code repositories, tracking changes, reviewing code, and collaborating

without conflicts. It is built on Git. We chose GitHub for its widespread adoption, user-friendly interface, and strong support for developer collaboration compared to less popular platforms [57].

- **ClickUp**: ClickUp is an online project management software that has a huge set of features and ease of use. It accommodates collaboration among teams, setting tasks, and tracking work progress with various degrees of customization and transparency. We chose ClickUp for being highly adaptable and able to provide quality insights about projects, with more customizability than the majority of other project management tools [58].

- **Figma**: Figma Design is for people to create, share, and test designs for websites, mobile apps, and other digital products. We chose Figma because it provides an instant collaborative environment for cross-team feedback and edits, outperforming traditional design tools that rely on static files [59].

4.3 Implementation of Modules

This section presents the implementation of the main modules and user interfaces of both platforms: **kadiyati** (our primary platform) and the **Nakaba platform**. Each module is illustrated with screenshots and detailed descriptions.

4.3.1 Kadiyati Platform

Landing Page

The home page of the "Kadiyati" platform displays a simplified interactive interface that allows users to search for lawyers according to specific criteria, explaining the steps for using the platform in a flexible and organized manner that facilitates access to digital legal services and displays a collection of legal articles.

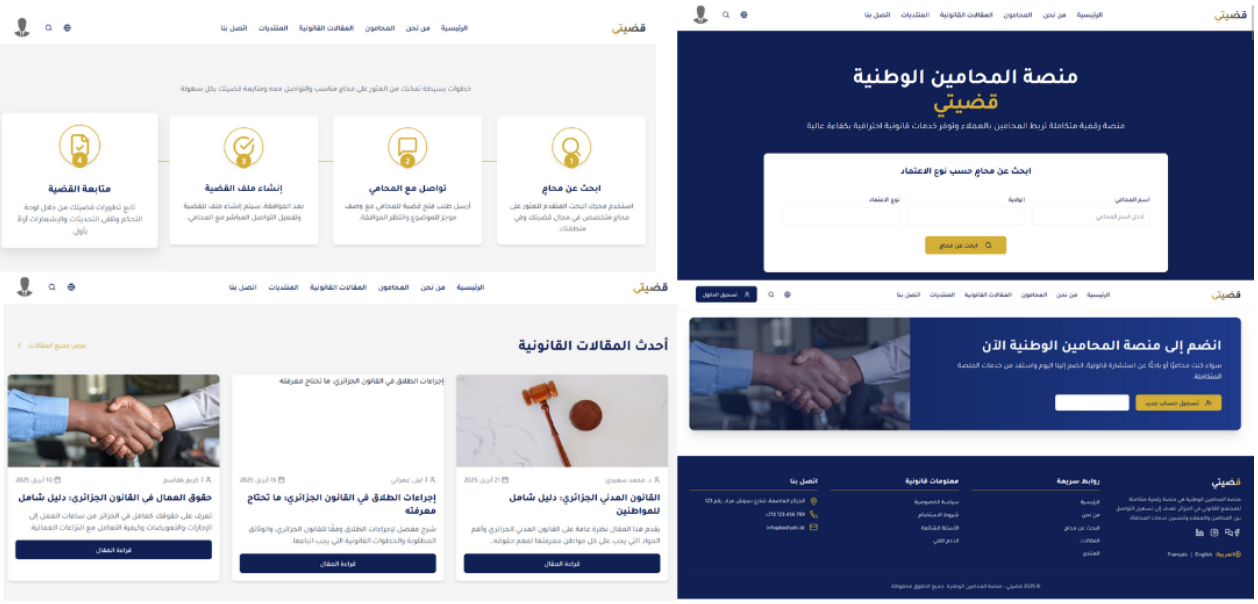

Figure 4.1: landing page

Client Dashboard

- This interface displays the client's list of cases, indicating the status of each case as open, closed, or pending.

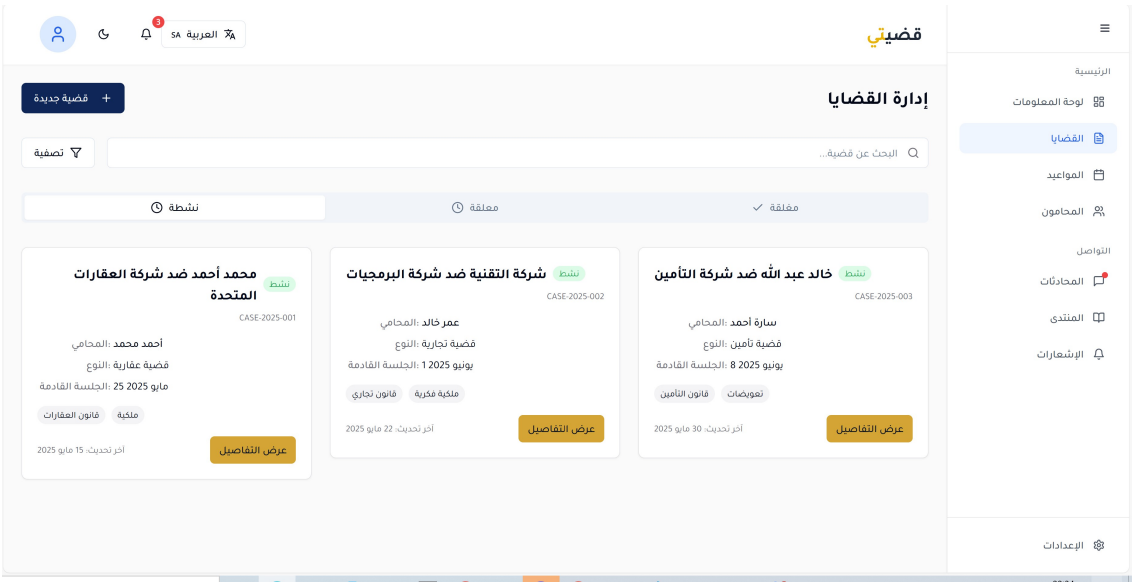

Figure 4.2: Cases Management

- This interface presents a directory of lawyers, including their names, profile pictures. When

a specific lawyer is selected and the “Open Case Request” button is clicked, a pop-up form appears, allowing the client to enter personal details, contact information, and a brief description of the case to initiate the request.

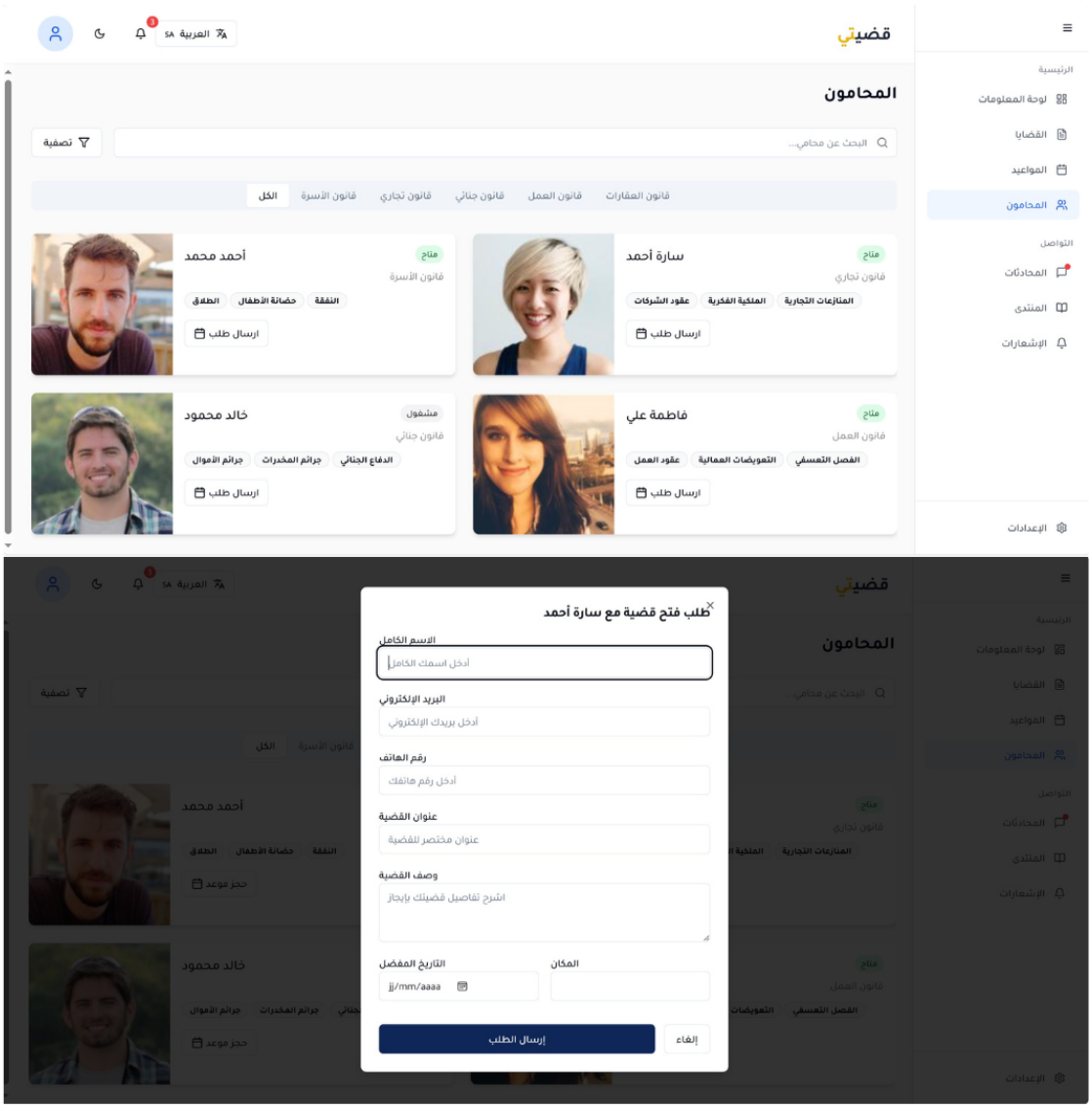

Figure 4.3: Request to Open Case

- The platform includes a legal forum structured by case categories such as Criminal , Family Law, Real Estate Law. Clients can access and browse discussion posts by selecting a specific forum.

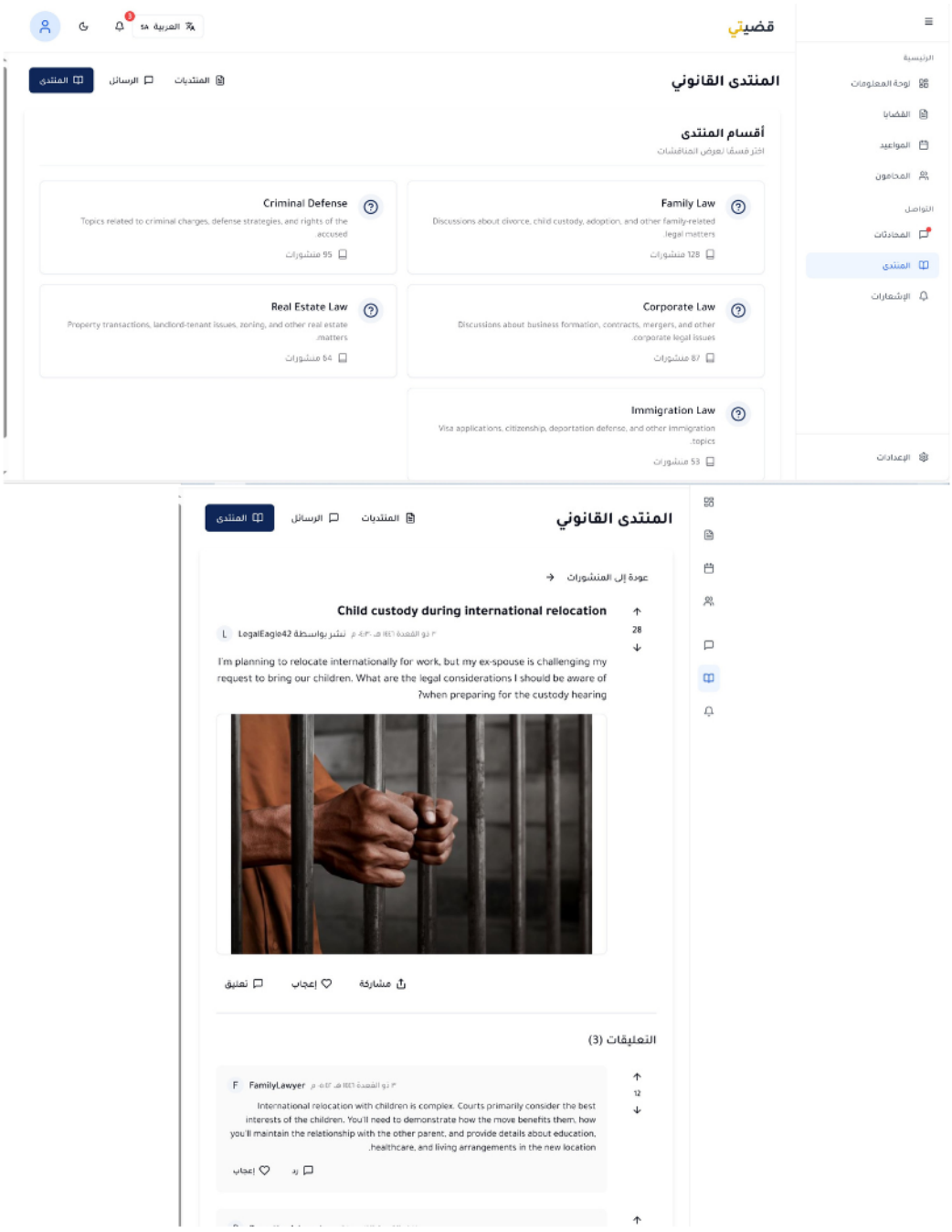

Figure 4.4: Legal Forum

Lawyer Dashboard

The control panel displays a comprehensive view of the lawyer's activities, including the number of cases and their statuses, with the ability to easily manage requests and move between departments.

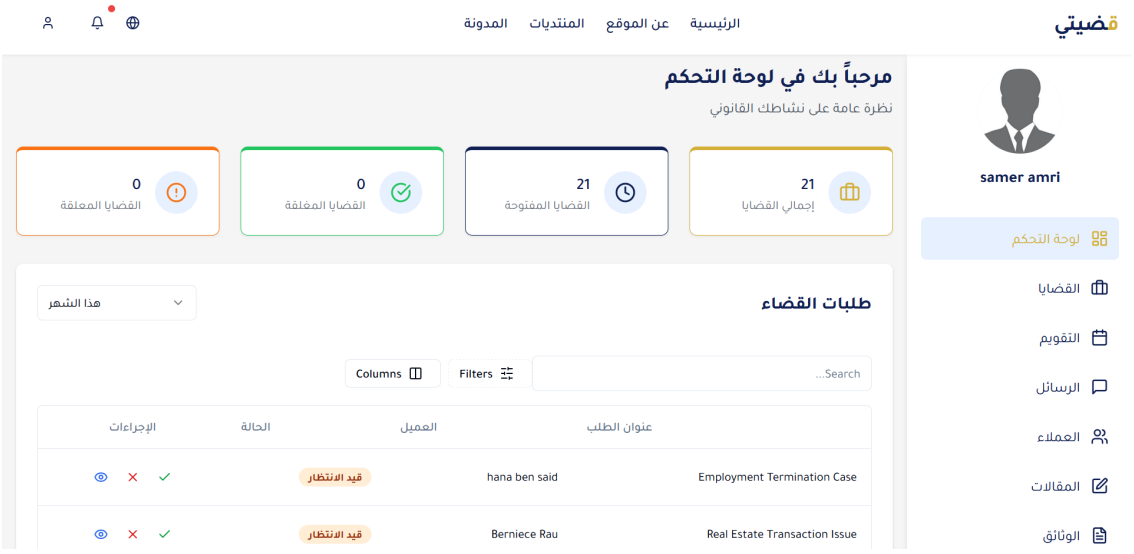

Figure 4.5: Lawyer's dashboard

This page displays the lawyer's case list, with detailed information about each case such as its number, parties, type, competent court, and date of hearing.

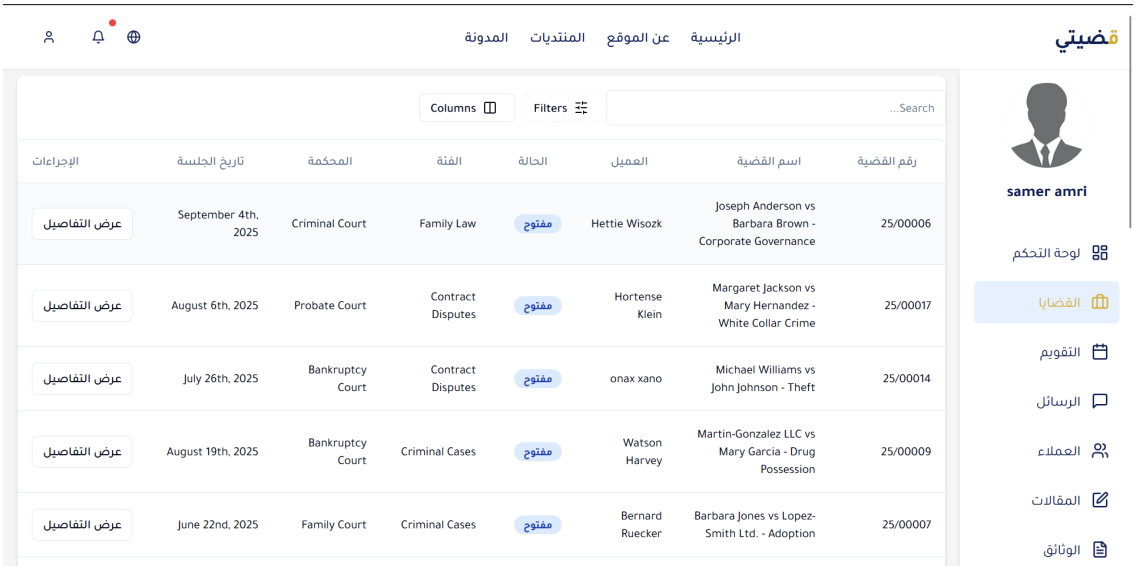

Figure 4.6: Detailed view of the lawyer's active cases

This page shows the lawyer's schedule on the calendar, with details of meetings and specific appointments for each case on a given day.

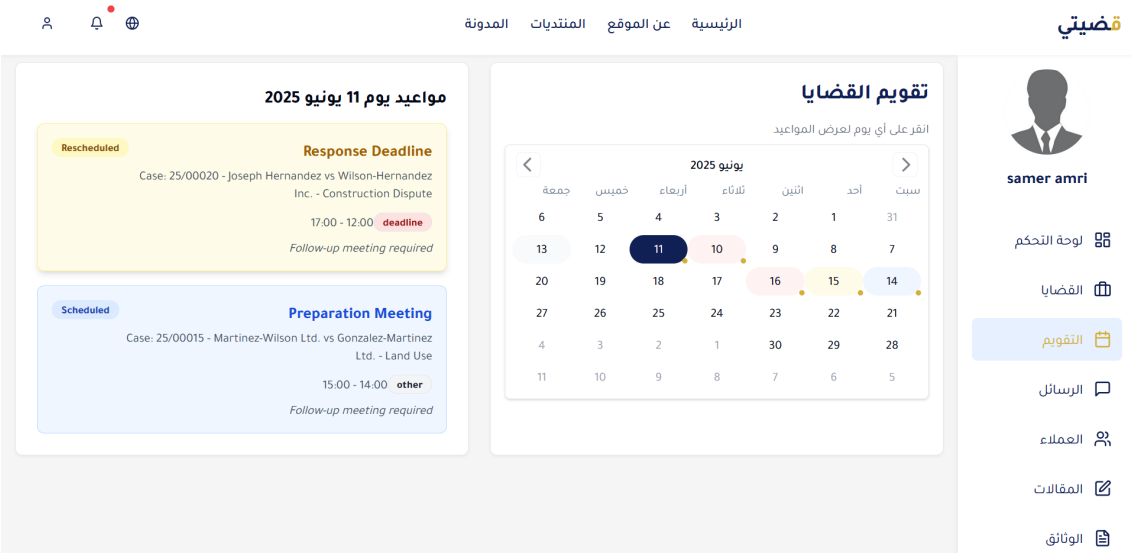

Figure 4.7: Court calendar.

Shared Interfaces Between Lawyer and Client

This image displays a chat interface, indicating a direct messaging feature for communication between parties, such as a lawyer and client, upon the initiation of a case.

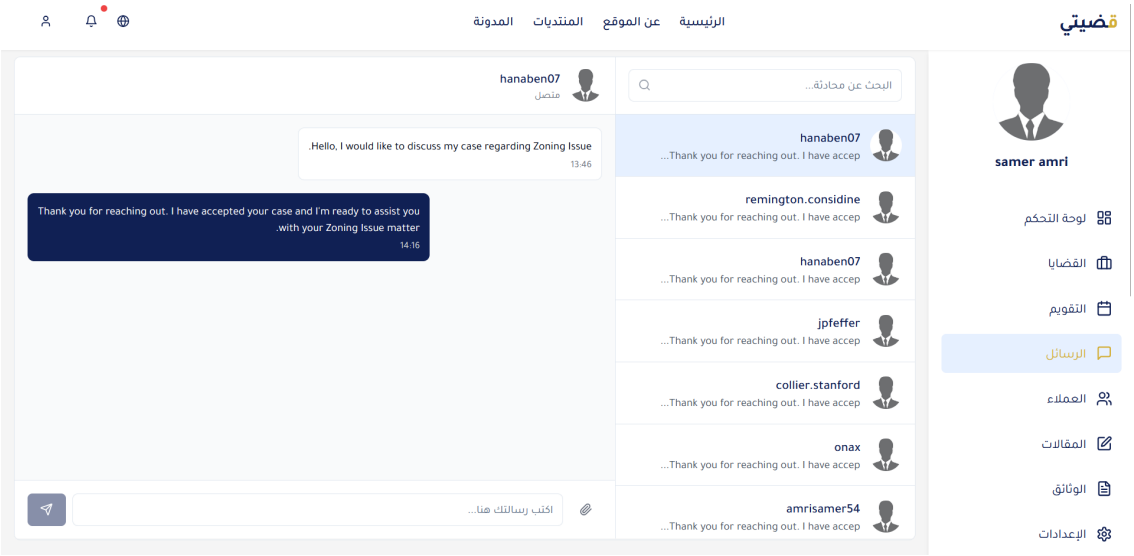

Figure 4.8: chat screen for exchanging messages

This image shows a calendar-based case tracking system, designed to display all scheduled appointments and court sessions with their descriptions, along with attached case documents. This feature is accessible to both lawyer and client.

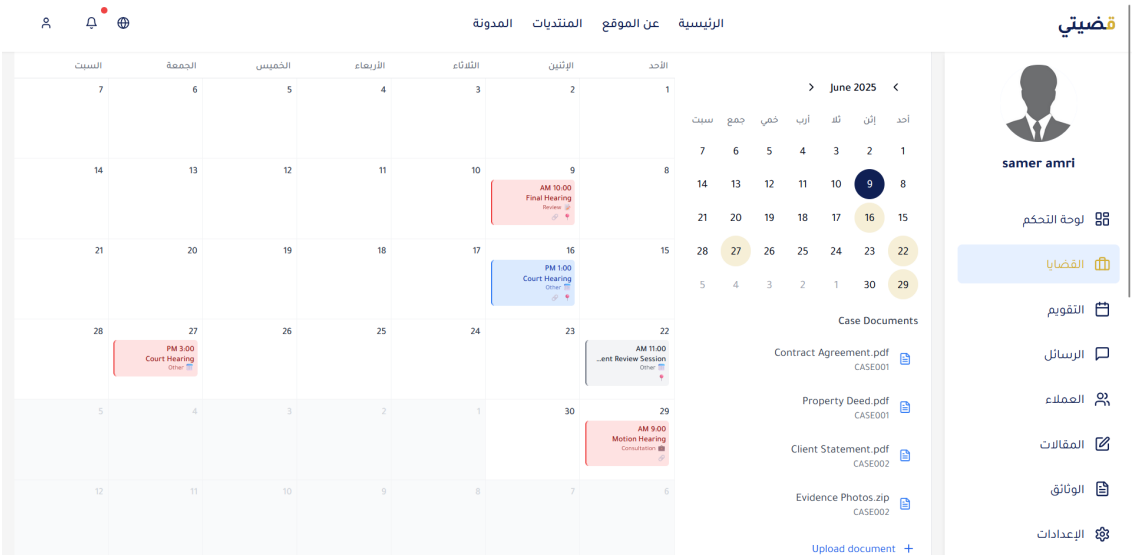

Figure 4.9: case tracking calendar .

Admin Dashboard

This image displays the main dashboard of an administrative panel, offering an overview of key statistics such as active cases, total registered lawyers, and total registered clients. It also includes graphs showing the trend of ongoing cases over time. This represents a partial view of the extensive functionalities available in the dashboard.

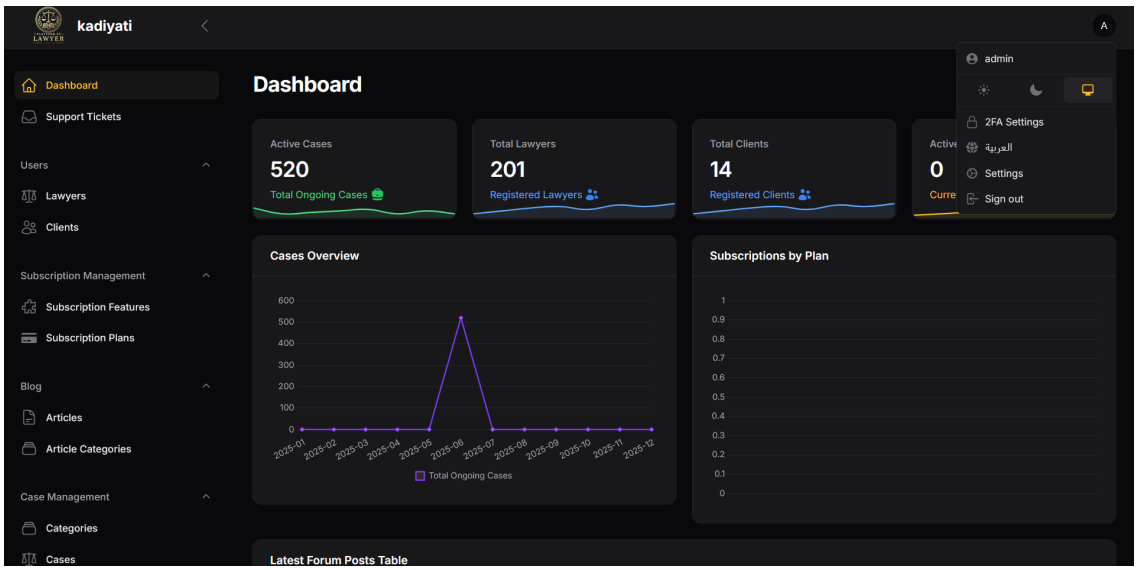

Figure 4.10: Admin Main Dashboard

This image shows a section of the administrative dashboard specifically dedicated to "Clients," displaying a list of registered clients . It also provides options to edit, delete, or resend verification for each client. This is another example of the various management operations available within the comprehensive administrative interface.

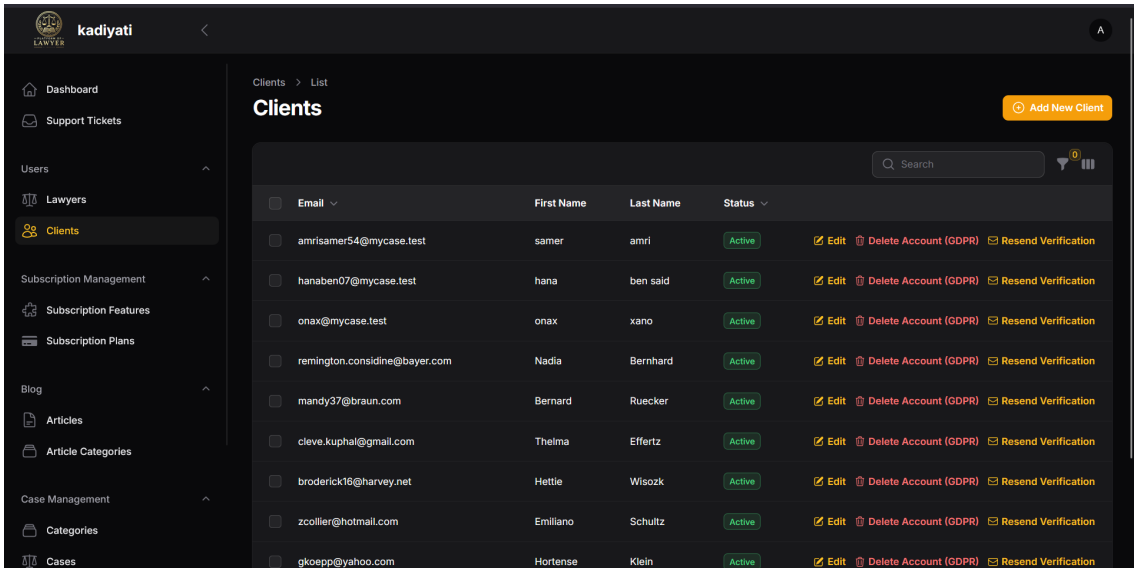

Figure 4.11: Admin Dashboard: Client Management.

4.3.2 Nakaba Platform

Nakaba Dashboard

The NAKABA dashboard is an administrative interface designed for Bar Association supervisors to manage lawyer registrations, track statistics, and perform account modifications. It also provides the ability to add new lawyers through a dedicated interface and remove existing ones when necessary. Below are its key features, as shown in the provided screenshot:

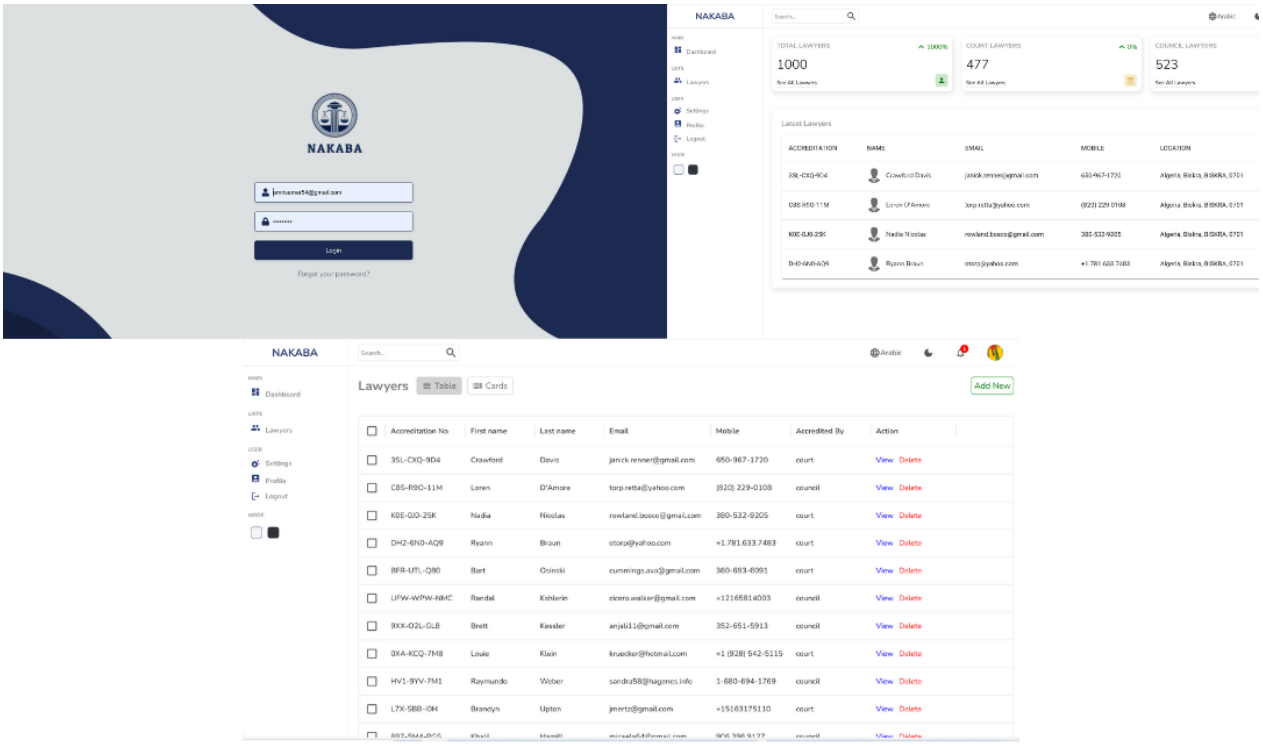

Figure 4.12: nakaba platform

4.4 Conclusion

This chapter has provided a comprehensive overview of the implementation and development of the Kadiyati and Nakaba platforms, demonstrating how the design principles from Chapter 3 were effectively translated into a functional system. Through a carefully curated development environment, leveraging tools like Visual Studio Code, Node.js, Laravel, and Figma, the platforms were built to ensure seamless communication, efficient case management, and robust user engagement. The detailed implementation of modules, including user dashboards and real-time communication features, underscores the platforms' ability to meet diverse user needs. Performance evaluations confirm the system's reliability and responsiveness, aligning with the project's goals of accessibility and scalability. This implementation lays a solid foundation for future enhancements, such as expanding platform features, ensuring the continued evolution of these legal service platforms.

Chapter 5

Conclusion and Perspectives

5.1 Conclusion

In the midst of ongoing global digital transformations, it has become essential to rethink how legal services are delivered, in a way that aligns with technological advancement and the evolving needs of citizens. This thesis began with an in-depth diagnosis of the traditional structure of the justice sector in Algeria, highlighting key challenges such as limited access to lawyers, procedural delays, low levels of legal awareness, and the difficulty of digital integration within a conventional legal framework.

In response to these challenges, this work proposed a national digital platform aimed at Algerian lawyers, with the goal of facilitating communication between lawyers and clients, enabling remote case follow-up, and providing accessible legal education. The platform is designed within a framework that respects legal confidentiality and adheres to the ethical and regulatory standards of the profession. Its development followed a scientific methodology involving field analysis, interviews with practicing lawyers and legal experts, visits to judicial institutions, and academic consultation, to ensure compatibility with the realities of legal practice in Algeria.

Throughout the thesis, the analytical, technical, and developmental dimensions of the project were explored — from the legal system assessment, to the definition of technical and functional specifications, to the architectural design and implementation using modern development tools and frameworks.

The progress achieved so far represents a promising step toward improving digital access to

justice in Algeria. It also contributes to enhancing transparency and alleviating burdens on both lawyers and citizens. This work aspires to support the national digital transformation strategy and to inspire further initiatives across other areas of the legal field.

5.2 Future Expectations

Looking ahead, the “Kadiyati” platform aim to expand its digital legal services and align with national justice digitization goals. Key future developments include:

Enhancing Data Security through End-to-End Encryption

In a future version of the platform, a key area for improvement concerns the security of the exchanged and stored data, especially given the sensitive and confidential nature of the information handled between lawyers and clients. Since this data may be hosted on servers managed by third parties, it is recommended to implement an end-to-end encryption (E2EE) mechanism.

This mechanism would involve encrypting data at the client side (via the web application), before it is transmitted to the server. As a result, the data would be stored in encrypted form, and only the intended recipient (the relevant client or lawyer) would be able to decrypt it locally. The server would therefore have no access to the data in plain text, greatly reducing the risk in the event of a system breach.

This perspective would significantly strengthen user trust in the platform, while aligning with cybersecurity best practices for applications that handle confidential data.

Mobile Application

A dedicated app will offer users secure messaging, real-time case tracking, and legal service access on smartphones with an optimized interface.

Integration with National Justice Platform

The platform will connect to Algeria’s official digital justice portal via secure APIs, allowing direct access to court rulings without in-person visits.

Legal Forums and Advisory Body

Forums will be improved with topic categorization and moderation tools. A legal advisory section will enable clients to consult with lawyers through secure online payments.

AI Legal Chatbot

An intelligent chatbot will answer frequent legal questions in Arabic and French, directing complex inquiries to human experts and supporting legal awareness.

These advancements aim to improve efficiency, accessibility, and digital engagement in Algeria's legal ecosystem.

Appendix A

Annex A: Class Diagram

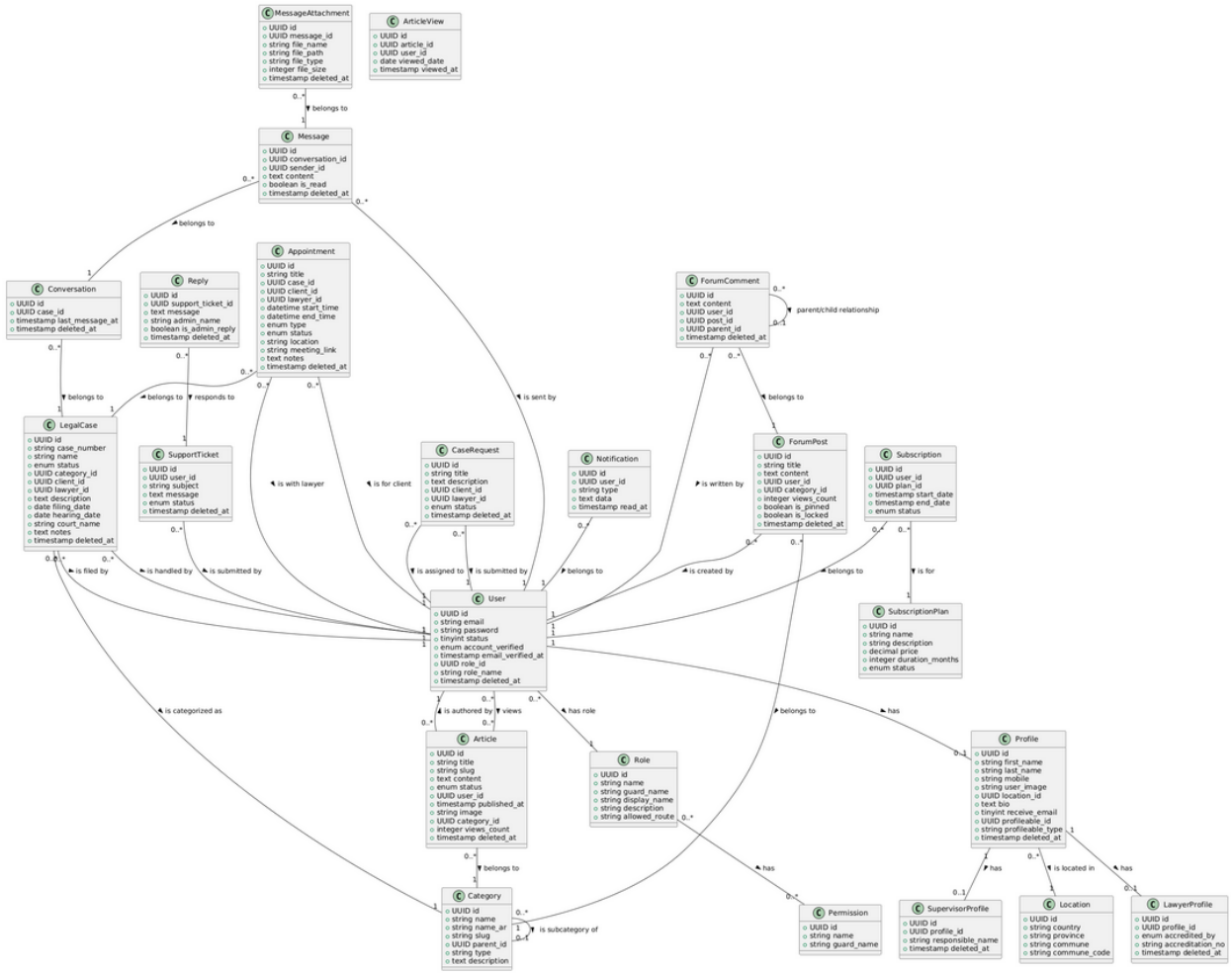

Figure A.1: Full Class Diagram

Appendix B

Annex B: System Architecture

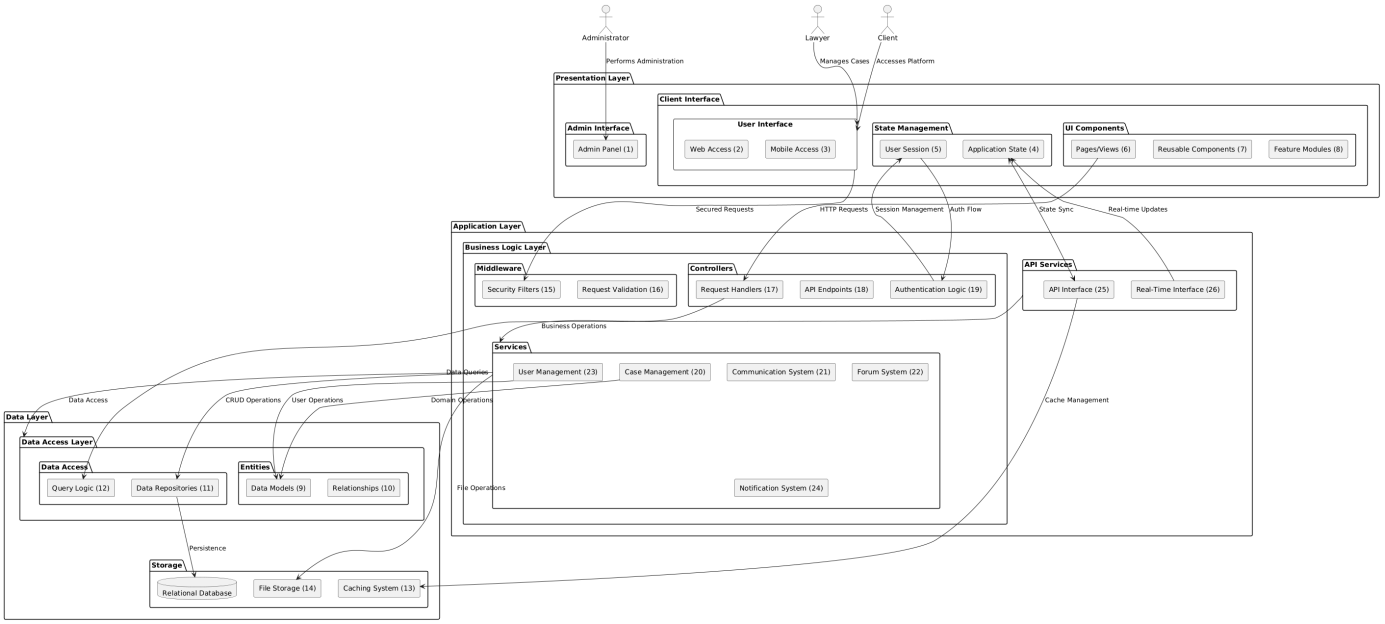

Figure B.1: System Architecture

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