

UNIVERSITY OF TRANSPORT AND COMMUNICATIONS  
FACULTY OF INFORMATION TECHNOLOGY



**GRADUATION PROJECT REPORT**

TOPIC:

**BUILDING A WEB APPLICATION FOR  
READING NOVELS**

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Course	:	61

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## **LIST OF ABBREVIATIONS**

<b>Abbreviation</b>	<b>Meaning in English</b>
AI	Artificial Intelligence
API	Application Programming Interface
CDN	Content Delivery Network
CSS	Cascading Style Sheets
DB	Database
HTML	Hyper Text Markup Language
HTTP	Hyper Text Transfer Protocol
ID	Identity/Identification
JS	Javascript
JSON	JavaScript Object Notation
QR	Quick Response
SD	Sequence Diagram
SEO	Search Engine Optimization
TS	TypeScript
UC	Use Case
UI	User Interface
URL	Uniform Resource Locator
XML	Xtensible Markup Language

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## ASSURANCE STATEMENT

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I hereby assure that this is the graduation project conducted by me under the guidance of Dr. Nguyen Kim Sao in the Department of Networks and Information Systems, Faculty of Information Technology, University of Transport and Communications.

The results presented in this graduation project are truthful and not a verbatim copy of any other work.

Ha Noi, June 1, 2024

Student

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\*\*\*

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Despite my best efforts, I acknowledge that there may still be shortcomings and limitations in my work. I sincerely hope for your understanding and look forward to receiving constructive feedback from professors and friends to improve my project.

Thank you very much!

Ha Noi, June 1, 2024

Student

Lê Công Hoan

# INTRODUCTION

## 1. Reasons for choosing the topic

In today's digital age, the landscape of literature consumption is rapidly evolving, with online platforms becoming increasingly prevalent. Recognizing this trend, I have chosen to embark on the development of a web application specifically tailored for reading novels. The decision stems from several compelling reasons:

**Accessibility:** A significant number of readers encounter difficulties accessing a diverse range of novels due to geographical or financial limitations. By creating a centralized platform, the web application will democratize access to literature, offering users a vast collection of novels from various corners of the globe.

**Convenience:** Traditional methods of procuring and engaging with novels often entail significant time and effort. Transitioning to a digital solution streamlines the reading experience, allowing users to effortlessly browse, select, and enjoy novels across multiple devices, thereby enhancing their overall reading experience.

**Cost Efficiency:** The financial burden associated with purchasing physical books can be prohibitive for many individuals. Through the provision of affordable or even free access to a wide array of novels, the web application aims to make literature more economically accessible to a broader audience.

**Modern User Experience:** In an era characterized by heightened digital expectations, users seek seamless and engaging online interactions. The web application will be meticulously designed, incorporating modern aesthetics and user-friendly features such as customizable reading settings, bookmarking capabilities, and intuitive navigation, thereby meeting the evolving needs and preferences of contemporary readers.

**Promoting Literary Diversity:** Embracing the richness of literary diversity is paramount in fostering a vibrant literary landscape. The platform will showcase works spanning diverse authors and genres, championing lesser-known novels and providing a platform for emerging writers to showcase their talents. By facilitating exploration across various literary styles and cultures, the web application will enrich the reading experience and promote cultural appreciation.

Driven by these considerations, I have committed to the development of a **web application for reading novels**. Through its comprehensive solution, the application aims to redefine the way individuals engage with literature in the digital age, fostering a more accessible, diverse, and immersive reading experience for all.

## 2. Summary of the problem solving content

The application site serves four main user levels:

- **Guest:** Guests can access and view content for free.
- **Reader:** Readers have access to both free and paid content. They can purchase novels, read for free, rate stories, make online payments, and bookmark their reading progress.
- **Writer:** Writers can write and publish stories, including inserting images, manage their own stories, and track revenue generated from their works.
- **Administrator:** Administrators have the highest level of control. They can approve submissions, manage revenue, oversee user accounts, edit writers' posts, generate statistics, and generate reports.

This user level system ensures that each user group has access to the features relevant to their role, creating a seamless and tailored experience for all users.

## 3. Research methods

- Requirements analysis: Starting with understanding the project requirements, especially the essential features for the online novel reading website. Careful analysis will help identify the key components of the system.
- Infrastructure design: Determining the system architecture, including integrating technologies like Next.js, Clerk, MongoDB, Cloudinary. Ensuring these components work together efficiently.
- Incremental development: Developing each part of the system, including both front-end and back-end. Using Next.js for the front-end and the back-end, MongoDB for the database, Cloudinary for multimedia resource management and PayOs for payment.
- Chatbot AI: The chatbot will be built using Coze, a powerful platform for creating intelligent and engaging AI chatbots. Coze will enable the chatbot to understand natural language, provide personalized novel recommendations, offer helpful information about the content of the novels, and create an interactive and enjoyable reading experience for users.
- Testing and Debugging: Conducting testing to ensure the stability and reliability of the system. Debugging issues and optimizing source code if necessary.
- Deployment and Evaluation: Deploying the system to the production environment and monitoring its performance. Ensuring the system operates efficiently

and reliably after deployment. Deploying to [Vercel](#) and evaluated using the [Google speed insights](#).

## 4. Project structure

- Chapter 1: This chapter provides a comprehensive survey of existing solutions and technologies relevant to the project. It includes an analysis of various frameworks, databases, and tools used for development, offering insights into their suitability and application.
- Chapter 2: This chapter delves into the detailed analysis and design of the system, identifying system actors and requirements. It includes various diagrams and database designs to illustrate the system's architecture and interactions.
- Chapter 3: This chapter refers to the process of designing, building, and deploying a system. This includes tasks such as UI design for different user roles, configuring domain names, integrating authentication and payment systems

# CHAPTER 1: SURVEY AND TECHNOLOGIES

## 1.1 Survey

### 1.1.1 Objectives

The objective of this survey is to gather feedback and information from the online novel reading community regarding specific and important factors in their website usage experience. The specific objectives are:

- To better understand users' online novel reading needs: Conduct a specific analysis of the types of novels users are interested in, their novel reading habits, and their priorities when choosing an online novel reading website.
- To learn about important features: Explore user opinions on features such as per-chapter payment options, bookmarking functionality, novel storage capabilities, new chapter notifications, and online payment options.
- To analyze the user interface and user experience: Investigate user preferences for an intuitive and easy-to-use interface, as well as feedback on the overall experience of using the online novel reading website.
- To uncover expectations from novel writers: The survey will also focus on gathering information from the group of novel writers to better understand their expectations and needs when using this platform to share and manage their work.

### 1.1.2 Website survey

#### ❖ Website 1: Truyện FULL

- URL: <https://truyenfull.com>
- Homepage:

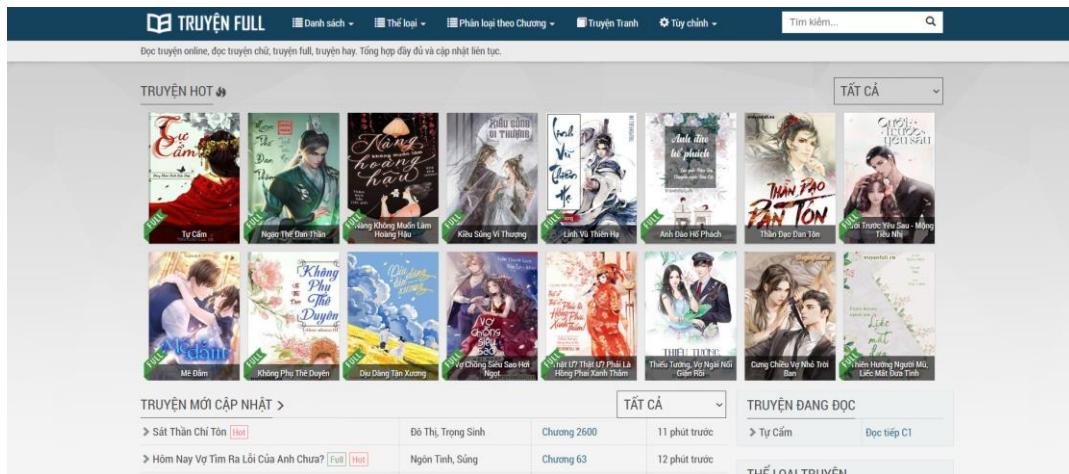


Figure 1.1 Home page Truyen Full

Menu bar with categories: List, Genres, Chapter-based Classification, Comics, Customization.

The screenshot shows the Truyen Full website's novel details page for 'Tự Cẩm'. At the top, there's a navigation bar with categories like 'Danh sách', 'Thể loại', 'Phân loại theo Chương', 'Truyện Tranh', 'Tùy chỉnh', and a search bar. Below the navigation is a breadcrumb trail: 'Truyện / Tự Cẩm'. The main content area has a title 'TỰ CẨM' with a 5-star rating of 8.2/10 from 2655 reviews. It includes a summary: 'Trong kinh thành mọi người đều đón待 rồng trong Khương già thì Tứ tiểu thư nổi tiếng là một đại tuyệt sắc mỹ nhân. Nhưng đáng tiếc là nàng lúc nàng xinh đẹp nhất lại bị phu An quốc công chôn trúng'. Below the summary is a note: 'Không chỉ vậy mà đêm trước khi Khương Tư xuất giá, vì hôn phu cùng nữ nhân khác nhảy sống tự tử...'. On the left, there's a sidebar with 'THÔNG TIN TRUYỆN' containing the book cover, author information (Đông Thiên Dịch Liêu Diệp), genre (Ngôn Tình, Trọng Sinh, Cổ Đại), source (Wattpad.com/user/khuynhvu1892), and status (Trạng thái: Full). On the right, there are sections for 'TRUYỀN CÙNG TÁC GIẢ' (with links to 'Chưởng Hoan' and 'Thiều Quang Đến Chậm') and 'TRUYỀN ĐANG HOT' (a list of 7 trending novels with titles like 'Thần Dao Đan Tôn', 'Linh Vũ Thiên Hạ', etc.).

**Figure 1.2** Novel details Truyen Full

This screenshot shows the comments section for a novel on the Truyen Full website. It features a list of comments from users like 'Tho Nguyen', 'Cao Thùy Linh', and 'Thanh Huynh'. Each comment includes a profile picture, the user's name, their role as an editor ('Mê editor'), and a short message. For example, 'Tho Nguyen' writes: 'Mê editor của truyện này quá nha. Không biết bạn còn làm bộ nào nữa không để tìm đọc nha 😊'. The interface includes a text input field for new comments, a pagination bar at the bottom, and a sorting option 'Sắp xếp theo'.

**Figure 1.3** Comments Truyen Full

Novel Information Page:

Displays novel, novel introduction, reviews, comments (using Facebook, no separate member accounts).

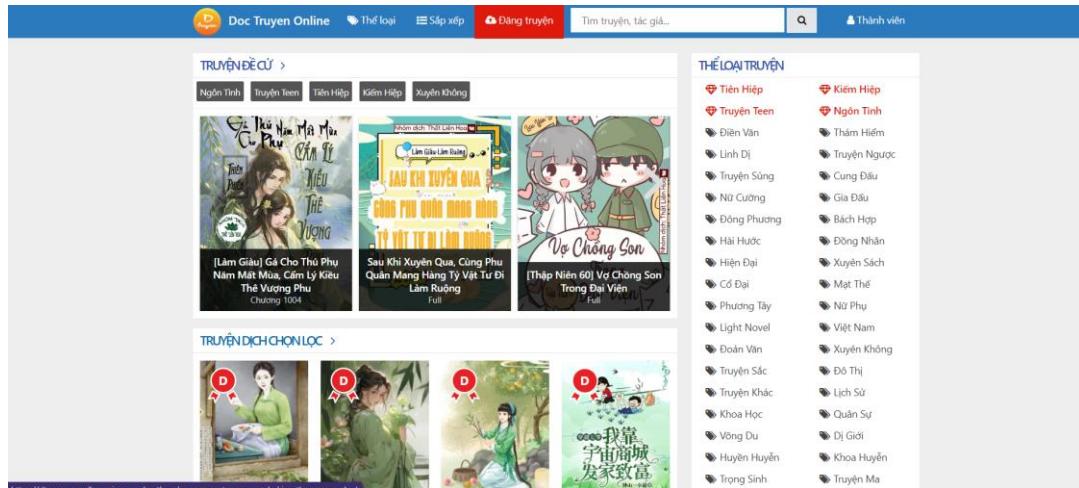


**Figure 1.4 Chapter detail Truyen Full**

The page reads the switch buttons, select the program.

❖ *Website 2: DTruyen*

- URL: <https://dtruyen.com>
- Homepage:



**Figure 1.5 Home page DTruyen**

The website has a toolbar including: categories, sorting, story posting, search, membership (register/login).

The main interface on the home page displays categories: nominated stories, self-selected translated stories, on the right is a bar displaying by story genre.

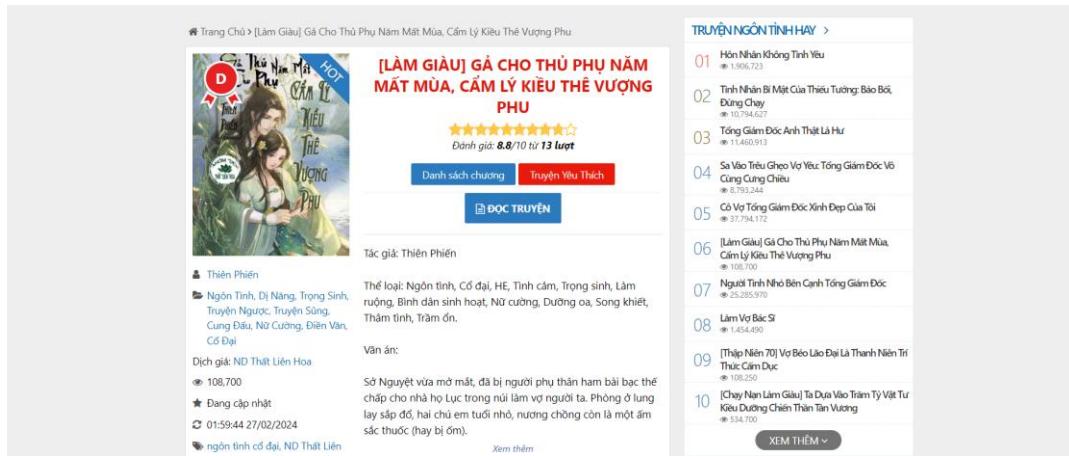


Figure 1.6 Novel details DTruyen

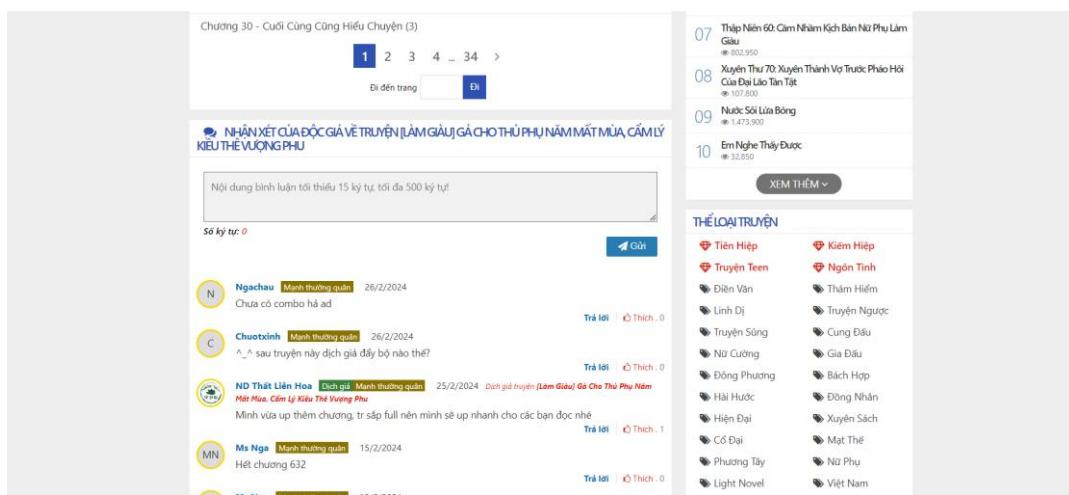


Figure 1.7 Comments DTruyen

Information page displays: story images, introduction, chapter list..., comments (website has integrated comments with private account, facebook or google)

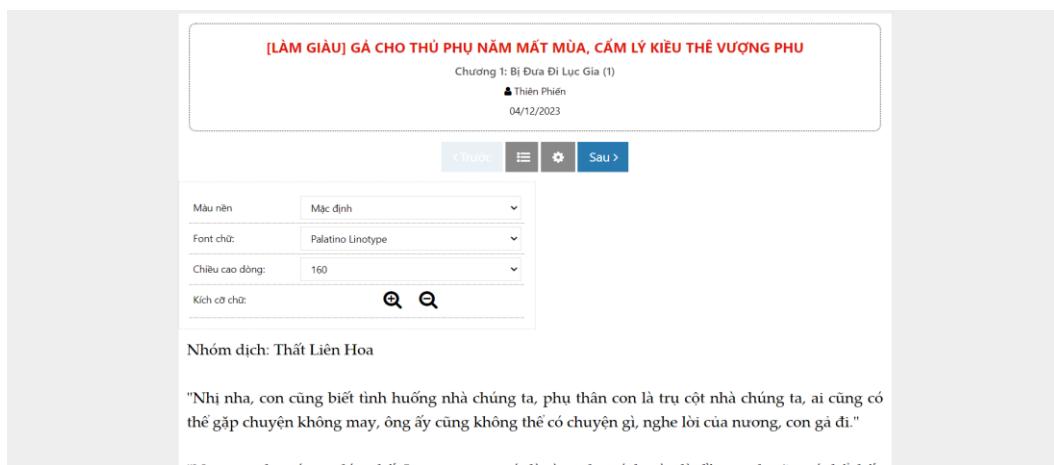


Figure 1.8 Chapter detail DTruyen

The story reading page includes chapter names, transitions, chapter selection, background color settings, font, height, and font size.

### 1.1.3 Survey results

After conducting a practical survey, observed that many websites for reading stories have similar features. Users can choose stories, search by genre or keyword, and receive suggestions for related works. They also want the ability to pay for stories by chapter, bookmark their reading position, save favorite stories, and receive notifications when new chapters are released. Support for online payment is also an important feature that users expect.

From the perspective of story writers, they desire an online platform that allows them to easily write and publish their stories. They need a simple and user-friendly interface that enables them to upload story chapters, manage content, and add images if necessary. They also want the ability to manage revenue from story sales, view statistics on the number of reads, and receive feedback from readers.

From the business perspective, they need to ensure the system operates stably to update information and story prices daily. Although the main features on the websites are similar, integrating special features such as paying for stories by chapter and notifications for new chapters can create differentiation and attract customers. An easy-to-use interface with many integrated features will attract more readers and determine the success of the website.

## 1.2 Frameworks

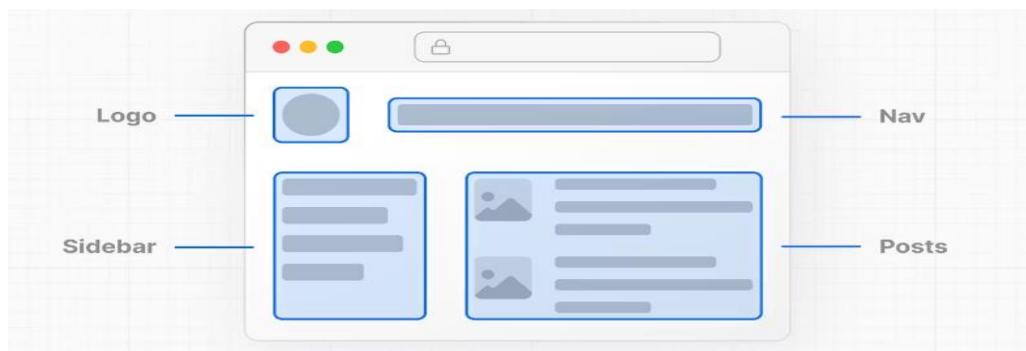
### 1.2.1 Next.js

Next.js is a flexible React framework that gives you building blocks to create fast, full-stack web applications.

- ❖ *What is React.js?*

[React](#) is a JavaScript library for building interactive user interfaces.

By user interfaces (UI), we mean the elements that users see and interact with on-screen.



**Figure 1.9** React components

By library, we mean React provides helpful functions (APIs) to build UI but leaves it up to the developer where to use those functions in their application.

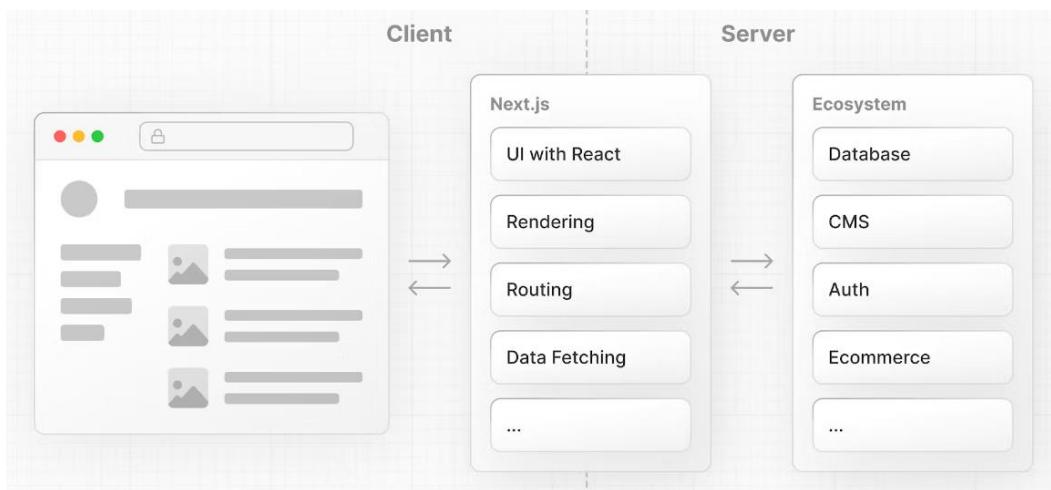
Part of React's success is that it is relatively unopinionated about the other aspects of building applications. This has resulted in a flourishing ecosystem of third-party tools and solutions, including Next.js.

It also means, however, that building a complete React application from the ground up requires some effort. Developers need to spend time configuring tools and reinventing solutions for common application requirements.

#### ❖ *What is Next.js?*

Next.js is a React framework that gives you building blocks to create web applications.

By framework, we mean Next.js handles the tooling and configuration needed for React, and provides additional structure, features, and optimizations for your application.



**Figure 1.10** Next.js Client & Server components

You can use React to build your UI, then incrementally adopt Next.js features to solve common application requirements such as routing, data fetching, and caching - all while improving the developer and end-user experience.

Whether you're an individual developer or part of a larger team, you can use React and Next.js to build fully interactive, highly dynamic, and performant web applications[1].

**Table 1.1** Features of Next.js

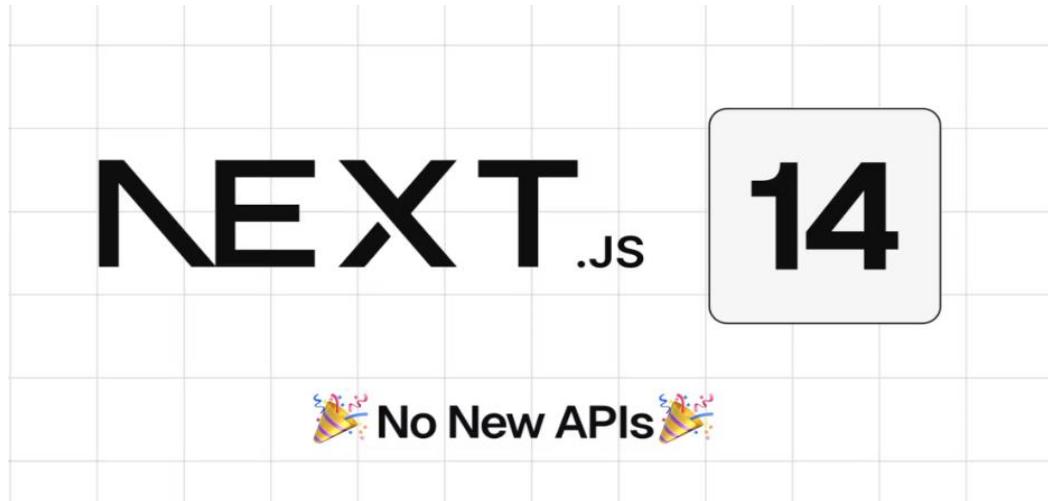
Feature	Description
Routing	A file-system based router built on top of Server Components that supports layouts, nested routing, loading states, error handling
Rendering	Client-side and Server-side Rendering with Client and Server Components. Further optimized with Static and Dynamic Rendering on the server with Next.js. Streaming
Data Fetching	Simplified data fetching with <code>async/await</code> in Server Components, and an extended <code>fetch</code> API for request memorization, data caching and revalidation.
Styling	Support for your preferred styling methods, including CSS Modules, Tailwind CSS, and CSS-in-JS
Optimizations	Image, Fonts, and Script Optimizations to improve your application's Core Web Vitals and User Experience.
TypeScript	Improved support for TypeScript, with better type checking and more efficient compilation, as well as custom TypeScript Plugin

❖ *Next.js architecture*

**Table 1.2** Next.js architecture

Architecture	Description
Accessibility	Next.js prioritizes accessibility, ensuring that web applications meet performance and quality standards for easy access by all users, including those with disabilities.
Fast Refresh	This feature allows seamless editing of JavaScript code without the need for page refreshes, facilitating smooth and efficient development workflows.
Next.js Compiler	Utilizing an integrated compiler, Next.js compiles source code into highly optimized JavaScript for enhanced performance and rapid page loading.
Supported Browsers	Next.js supports a variety of popular browsers, including the latest versions of Chrome, Firefox, Safari, and Edge, ensuring consistent performance across platforms.
Turbopack	Turbopack optimizes page loading by pre-processing necessary JS, CSS, and image files, thereby reducing load times and improving overall user experience.

❖ *What's new in Next.js 14?*



**Figure 1.11** Logo Next.js 14

At [Next.js Conf](#), Next.js 14 is our most focused release with:

- [Turbopack](#): 5,000 tests passing for App & Pages Router:
  - 53% faster local server startup.
  - 94% faster code updates with Fast Refresh.
- [Server Actions](#): Progressively enhanced mutations:
  - Integrated with caching & revalidating.
  - Simple function calls or works natively with forms.
- [Partial Prerendering](#): Fast initial static response and streaming dynamic content.
- [Next.js Learn](#): Free course teaching the App Router, authentication, databases, and more [2].

## 1.2.2 Clerk



**Figure 1.12** Clerk authentication

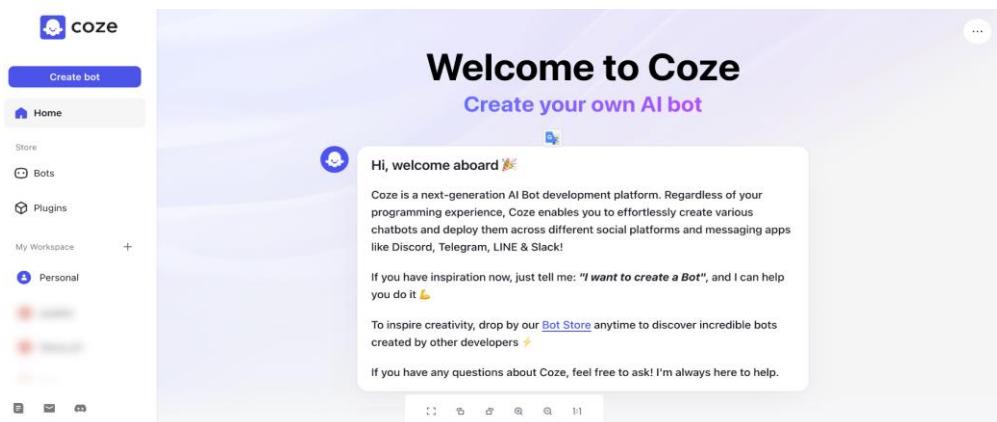
**Clerk** is an authentication and user management suite that helps businesses manage user registration, login, and access control. It provides a variety of features:

- Self-service user registration and login: Users can create their own accounts and sign in to your application without any intervention from your team.
- Social login: Users can sign in to your application using their existing social media accounts, such as Google, Facebook...
- Email and password authentication: Users can create accounts and sign in using their email address and password.
- Two-factor authentication (2FA): Add an extra layer of security to your accounts by requiring users to enter a code from their phone or authenticator app in addition to their password.
- Role-based access control (RBAC): Control which users have access to which parts of your application by assigning them roles.
- User management: Manage your users from a single dashboard, including adding, editing, and deleting users.
- Audit logs: Track user activity and see who has accessed what data.

❖ *Highlights:*

Clerk has raised \$30M in Series B funding led by [CRV](#), with participation from [Stripe](#), and existing investors [Andreessen Horowitz](#) and [Madrona](#) [3].

#### 1.2.4 Coze



**Figure 1.13 Coze AI**

❖ *Overview*

Coze is a one-stop AI chat bot development platform. Regardless of your programming skills, Coze allows you to swiftly create a wide range of chat bots powered by AI, capable of handling everything from simple questions to complex conversations. Furthermore, you can publish your bots to various applications, fostering dynamic interaction with users on those applications.

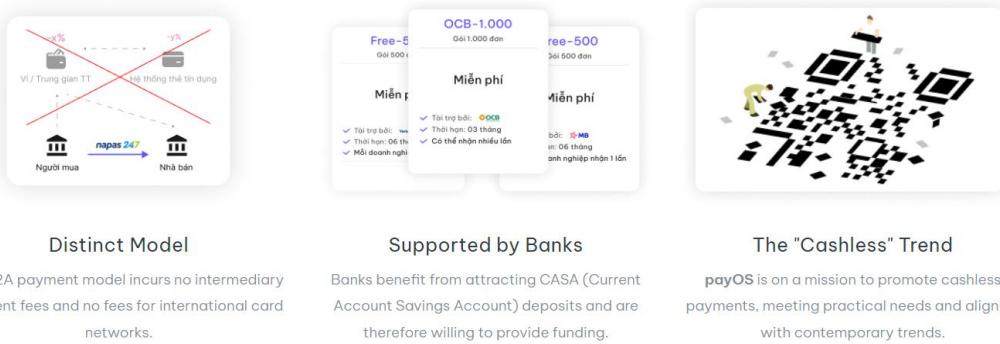
❖ *Why Coze?*

Coze facilitates and simplifies the process of AI bots development with the following features:

- Knowledge: add your own data to bot.
- Database & variable: long-term memory.
- Scheduled tasks: automatically execute tasks.
- Workflow: flexible task flow.
- Multi agents: run multiple tasks in one bot [4].

### 1.2.3 PayOS

PayOS is a payment gateway that uses the user's bank account to verify payments.



**Figure 1.14 Why is PayOs free?**

❖ Award: First Prize at DigiTrans Smart City 2023

PayOS by Casso was honored with the First Prize in the 2023 Smart City Initiative Competition. This award recognizes the impressive contributions that Casso and its payOS project have made to society in recent years [5].

❖ *05 Differences Between VietQR Pro and VietQR and E-wallets:*

- **Automatic Payment Confirmation:** VietQR Pro has strong automatic payment confirmation, unlike regular VietQR.
- **Easy Transaction Reconciliation:** VietQR Pro deposits funds directly, simplifying reconciliation, unlike intermediaries that hold funds for T+ periods.
- **Low Cost:** VietQR Pro charges under 1,500 VND per transaction, cheaper than e-wallets' fixed fees plus 2% discount fees.
- **Immediate Funds Availability:** VietQR Pro credits your account instantly, even on holidays, unlike intermediaries.

- **Simple Registration:** Registering with payOS for VietQR Pro is quick and straightforward, unlike the lengthy processes with e-wallets [6].

## 1.3 Database and media storage

### 1.3.1 MongoDB

MongoDB is an open-source NoSQL database management program, ideal for managing large sets of distributed data. Unlike relational databases, MongoDB uses collections and documents (key-value pairs) instead of tables and rows. It is used for high-volume data storage, supporting features like ad-hoc queries, indexing, load balancing, aggregation, and server-side JavaScript execution.

❖ *What is MongoDB Atlas?*

MongoDB Atlas is a multi-cloud developer data platform that simplifies and accelerates data-driven development. It offers:

- Global Deployment: Deploy databases in over 90 regions across AWS, Azure, and Google Cloud.
- Scalability: Built-in best practices and automation for secure and reliable operations.
- Unified Query API: Access and query data for various use cases from a single platform.
- Performance Optimization: Advanced tools to maintain performance even as traffic and features scale.

❖ *Advantages:*

- Performance: Uses RAM for faster queries; requires adequate RAM and indexing.
- Speed and Availability: Document-based with replication; 100 times faster than relational databases.
- Simplicity: Easy-to-learn query syntax, more intuitive than SQL.
- Easy Setup: Quick installation; supports modern JavaScript frameworks.
- Flexibility: Dynamic schema for non-structured data; adapts to changing needs.
- Sharding: Distributes large datasets across servers; automatic data distribution.
- Scalability: Horizontal scalability (sharding) expands storage.
- Ad-hoc Queries: Supports non-standard queries.
- Documentation: Accurate and detailed.
- Support: Available through community forums, Atlas, Cloud Manager...

❖ *Disadvantages:*

- Transactions: Limited multi-document ACID support, risking data corruption.
- Joins: Lack of join support requires manual coding.
- Indexing: Incorrect indexing leads to poor performance.
- Data Limits: Document size limited to 16 MB; nesting limited to 100 levels.
- Duplicates: Data duplication from lack of ACID compliance.
- Memory Usage: High storage requirements due to data redundancy.
- Expert Insight: Performance and security concerns; less flexible for various queries compared to normalized relational databases.

### 1.3.2 Cloudinary

Cloudinary is a cloud-based media management platform that provides a comprehensive set of features for storing, managing, optimizing, and delivering images and videos for web and mobile applications.

❖ *Features:*

- Media Storage: Secure, scalable cloud storage for images and videos.
- Image and Video Manipulation: On-the-fly manipulation (resizing, cropping, rotating, filters, effects).
- Optimization: Automatic optimization for fast loading and performance.
- Delivery CDN: Global CDN for fast, reliable media delivery.
- Responsive Images: Delivers appropriately sized images for different devices, reducing load times.
- Video Transcoding: Converts videos into various formats and resolutions.
- Digital Asset Management (DAM): Organizes and manages digital assets with tagging, categorization, and search.

❖ *Advantages:*

- Scalability: Seamlessly handles large volumes of media and traffic spikes.
- Ease of Use: Intuitive interface and comprehensive APIs for easy media management.
- Performance: Optimization features and global CDN ensure fast loading and optimal performance.
- Cost-Effective: Flexible pricing plans based on usage, avoiding upfront costs.

❖ *Disadvantages:*

- Costs: Usage-based costs can add up, especially for high-volume applications.
- Vendor Lock-in: Dependence on Cloudinary may limit flexibility and control.
- Learning Curve: Requires a learning curve for developers new to the platform.

#### 1.4.1 Tailwind CSS

Tailwind CSS is a utility-first CSS framework that provides a collection of low-level CSS classes that you can combine to build user interfaces.

❖ *Advantages:*

- Flexible: Tailwind CSS allows you to create almost any UI you can imagine.
- Easy to use: Tailwind CSS's CSS classes are named in a descriptive way, making them easy to learn and use.
- Highly customizable: You can easily customize Tailwind CSS's CSS classes to fit your needs.
- Lightweight: Tailwind CSS only includes the CSS you need, which helps reduce your website's size.

❖ *Disadvantages:*

- Can be difficult to learn: The learning curve for Tailwind CSS can be steeper than for traditional CSS frameworks.
- Can be verbose: Writing HTML with Tailwind CSS can lead to more code than using traditional CSS frameworks.
- Smaller community: The Tailwind CSS community is still relatively small compared to traditional CSS frameworks.

❖ *Additionally:*

- Tailwind CSS can be used with CSS preprocessors like PostCSS and Preact.
- There are many resources available for learning Tailwind CSS, including the official documentation, tutorials, and video tutorials.
- The Tailwind CSS community is growing rapidly and there is a lot of activity happening.

#### 1.4.2 Shadcn UI

Shadcn UI is an open-source library that provides beautifully designed, accessible, and customizable UI components for web applications.

❖ *Key features:*

- Beautiful design: The components are designed in a modern and visually appealing style.
- Accessible: The components are built with accessibility in mind, ensuring that they can be used by all users.
- Customizable: The components can be customized to fit your needs and branding.
- Open source: Shadcn UI is licensed under the Massachusetts Institute of Technology (MIT) license, allowing you to use and modify it for free.

❖ *Benefits:*

- Save time: Using Shadcn UI can save you development time because you don't have to build UI components from scratch.
- Improve usability: The UI components are designed to be easy to use, which can improve the user experience for your application.
- Increase consistency: Using Shadcn UI can help you ensure that the UI of your application is consistent.

### 1.4.3 Material UI

Material UI is an open source React component library that implements Google's Material Design. It's comprehensive and can be used in production out of the box.

❖ *Key features:*

- React components: Material UI provides a wide range of React components that implement Material Design components, such as buttons, cards, menus, and dialogs.
- Theming: Material UI allows you to easily customize the look and feel of your application with its theming system.
- Accessibility: Material UI components are built with accessibility in mind, ensuring that they can be used by all users.
- Responsiveness: Material UI components are responsive and will adapt to different screen sizes.

❖ *Benefits:*

- Save time: Using Material UI can save you development time because you don't have to build UI components from scratch.
- Improve usability: The UI components are designed to be easy to use, which can improve the user experience for your application.
- Increase consistency: Using Material UI can help you ensure that the UI of your application is consistent.

❖ *Additionally:*

- Material UI is a popular choice for enterprise applications.
- Material UI has a large and active community.
- There are many third-party libraries and tools available for Material UI.

## 1.5 Development Tools and Environments

### 1.6.1 Visual Studio Code

Visual Studio Code is a powerful source code editor that supports multiple programming languages and integrates with various development tools. It offers features such as IntelliSense, debugging, and Git integration, making it a preferred choice for developers. Its extensions marketplace allows for further customization, enhancing productivity and streamlining development workflows.

### 1.6.2 Git

Git is a distributed version control system that enables developers to track changes in their codebase, collaborate with team members, and maintain a history of project versions. It is an essential tool for modern software development, allowing for efficient branching, merging, and version management. It also supports various workflows, including feature branching and forking, catering to both individual and team-based projects.

### 1.6.3 GitHub

GitHub is a web-based platform for hosting Git repositories. It provides a range of features such as pull requests, issue tracking, and continuous integration, making it easier for teams to collaborate on projects. GitHub also offers GitHub Pages for hosting static websites and GitHub Actions for automating workflows. With a large community of developers, GitHub facilitates open-source contributions and knowledge sharing, enhancing collaborative project development. It also supports advanced project management tools like project boards and integrates with a wide array of third-party services to extend its functionality.

### 1.6.4 Vercel

Vercel is a platform for deploying and hosting web applications, particularly optimized for frontend frameworks like Next.js, React, and other static site generators. Vercel provides features such as automatic deployments from Git repositories, serverless functions, and performance optimizations. It simplifies the deployment process and ensures that applications are fast, secure, and scalable. Vercel's edge network and built in CDN deliver low-latency experiences, while its integration with popular development tools streamlines the entire development-to-deployment workflow.

## **CHAPTER 2: SYSTEM ANALYSIS AND DESIGN**

### **2.1 System actors and requirements**

#### **2.1.1 Actor Reader**

**Table 2.1** Reader actor function requirements

No	Feature Name	Description
1	Register	Allows users to register and log in using a username and password or via Google/Facebook.
2	Read Novels	Enables users to read novels available on the platform.
3	Continue Reading	Allows users to continue reading novels they have previously started.
4	Bookmark Novels	Users can bookmark their favorite novels for easy access later.
5	Nominate Novels	Users can nominate novels they find interesting for others to read.
6	Rate Novels	Enables users to rate the novels they have read.
7	View Chapter List	Allows users to view the list of chapters for a particular novel.
8	Customize Reading Settings	Users can customize the reading page settings according to their preferences.
9	Search Novels	Provides a search function with auto-complete or search by genres/rankings.
10	Upgrade Account	Users can upgrade to a premium account for additional features.
11	Online Payment	Supports online payment via QR code or direct bank transfer.
12	Report Issues	Allows users to report any issues they encounter on the platform.
13	View Guidelines	Users can view guidelines on how to use the application.

### 2.1.2 Actor Writer

**Table 2.2** Writer actor function requirements

No	Feature Name	Description
1	Login	Allows writers and admins to log in with their respective roles.
2	Add/Edit/Delete Novels	Writers can add, edit, and delete their novels on the platform.
3	Manage Published Novels	Enables writers to manage their published novels, including updates and status changes.
4	Add/Edit/Delete Chapters	Writers can add, edit, and delete chapters for each of their novels.
5	Manage Chapters	Allows writers to manage chapters by organizing and updating content.
6	View Statistics	Writers can view statistics related to their novels' performance and reader engagement.
7	Report Issues	Enables writers to report any issues they encounter on the platform.

### 2.1.3 Actor Administrator

**Table 2.3** Administrator actor function requirements

No	Feature Name	Description
1	Login	Allows admins to log in with their admin role.
2	View Statistics	Enables admins to view platform-wide statistics and performance metrics.
3	Manage Pending Chapters	Admins can review and manage chapters that are pending approval.
4	Manage Novels	Allows admins to oversee and manage all novels on the platform.
5	Manage Accounts	Admins can manage user accounts, including creating, editing, and deleting accounts.
6	Manage Writers	Enables admins to manage writer accounts and their associated content.
7	Handle Reports	Admins can handle and respond to reports submitted by users or writers.

 *Non-functional requirements:*

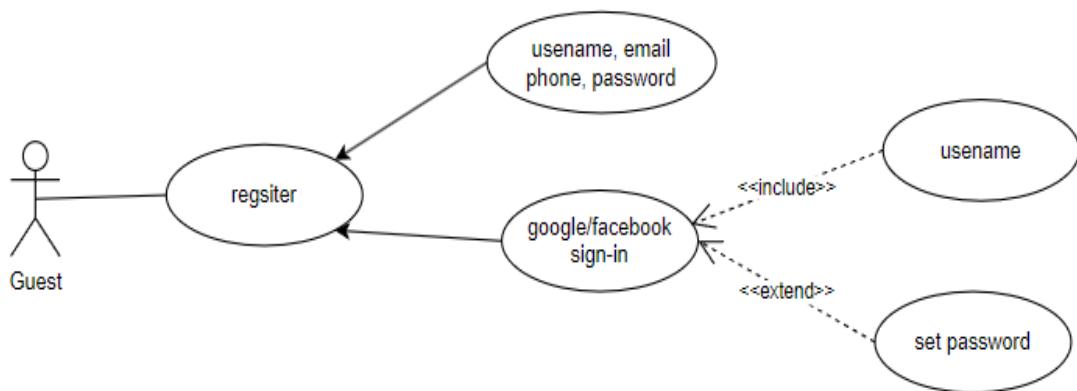
**Table 2.4** Non-functional requirements:

No	Feature Name	Description
1	User-Friendly Interface	The interface must be intuitive and easy to navigate.
2	Easy Search	The search function should be easy to use and support autocomplete to assist users in finding novels quickly.
3	System Optimization	Features should be optimized for efficient performance and automation.
4	Real-Time Synchronization	Features should be optimized for efficient performance and automation.
5	Scalability	The system should scale horizontally to handle increasing users and data.
6	Support and Documentation	Provide comprehensive user guides, FAQs, and a support system with a 24-hour response time.

## 2.2 Diagrams

### 2.2.1 Use case diagram

❖ *Register*



**Figure 2.1** Register UC diagram

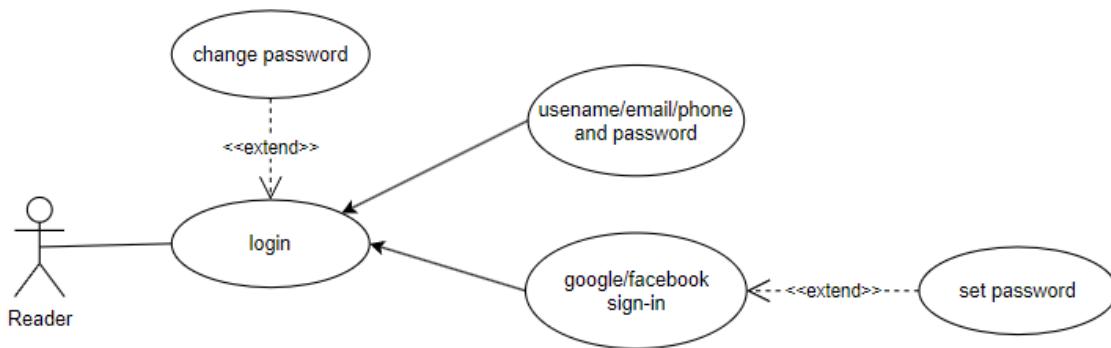
➤ Notes:

- **Username/Email/Phone and Password:** The primary method for logging in with traditional credentials.
- **Google/Facebook Sign-in:** An alternative method for logging in using social media accounts.

**Table 2.5** Describe the register UC

<b>Actor</b>	Guest
<b>Use case name</b>	UC Register
<b>Description</b>	Allows users to register an account using a username and password, or via Google/Facebook.
<b>Precondition</b>	The user must have access to the registration page.
<b>Postcondition</b>	A new user account is created and the user is logged in.
<b>Main flow</b>	<ol style="list-style-type: none"> <li>1. The user navigates to the registration page.</li> <li>2. The user chooses to register via username/password or Google/Facebook.</li> <li>3. For username/password:             <ol style="list-style-type: none"> <li>3.1. The user enters a unique username and password.</li> <li>3.2. The system validates the input and creates the user account.</li> </ol> </li> <li>4. For Google/Facebook:             <ol style="list-style-type: none"> <li>4.1. The user clicks the Google/Facebook login button.</li> <li>4.2. The system redirects to the respective authentication provider.</li> <li>4.3. The user grants permission and is authenticated.</li> <li>4.4. The system receives authentication response and creates the user account.</li> </ol> </li> <li>5. The user is logged in and redirected to the home page.</li> </ol>
<b>Alternative path</b>	<ol style="list-style-type: none"> <li>3.1a. The user inputs invalid data. The system displays an error message.</li> <li>3.1b. The username is already taken. The system prompts the user to choose a different username.</li> <li>4.2a. The user denies permission. The system displays an error message and returns to the registration page.</li> </ol>

❖ *Login*



**Figure 2.2** UC Login

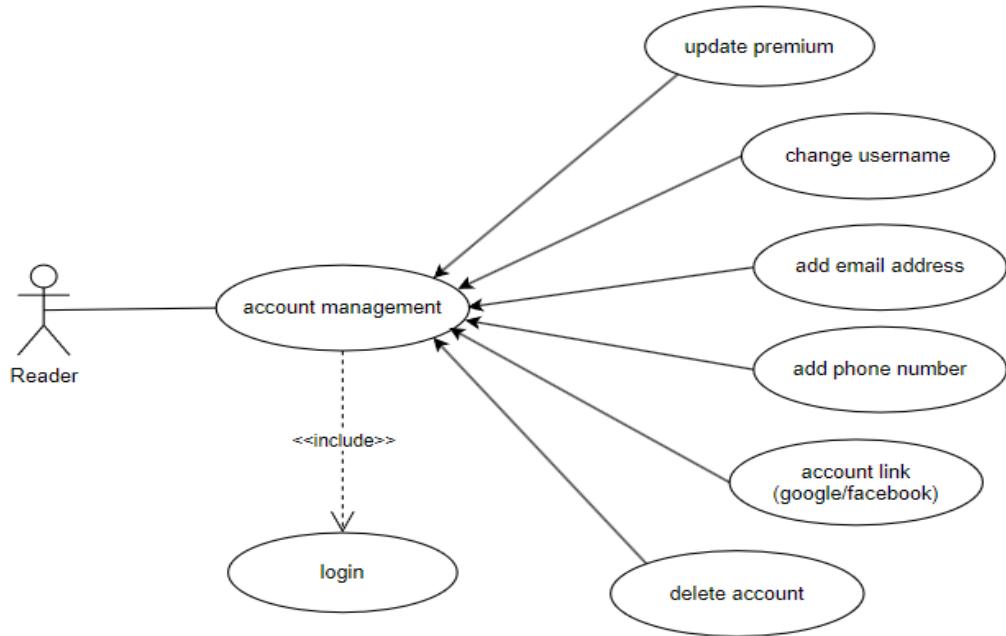
➤Notes:

- **Change Password:** Allows readers to change their password (extends login process).
- **Set Password:** Allows readers to set a new password after signing in with Google/Facebook (extends Google/Facebook sign-in).

**Table 2.6** Describe the login UC

<b>Actor</b>	User (Reader/Writer/Administrator)
<b>Use case name</b>	UC Login
<b>Description</b>	Allows users to log in using a username and password or via Google/Facebook.
<b>Precondition</b>	The user must have an existing account.
<b>Postcondition</b>	The user is logged into the system.
<b>Main flow</b>	<ol style="list-style-type: none"> <li>1. The reader navigates to the login page.</li> <li>2. The reader selects the login method: username/password or Google/Facebook sign-in.</li> <li>3. If username/password is chosen, the reader enters their credentials.</li> <li>4. If Google/Facebook sign-in is chosen, the reader is redirected to the respective authentication page.</li> <li>5. The system verifies the credentials and logs the reader into the system.</li> </ol>
<b>Alternative path</b>	3.1a. The reader selects the "forgot password" option. The system guides the reader through the password recovery process.

❖ *Account management*



**Figure 2.3** UC Account management

➤Notes:

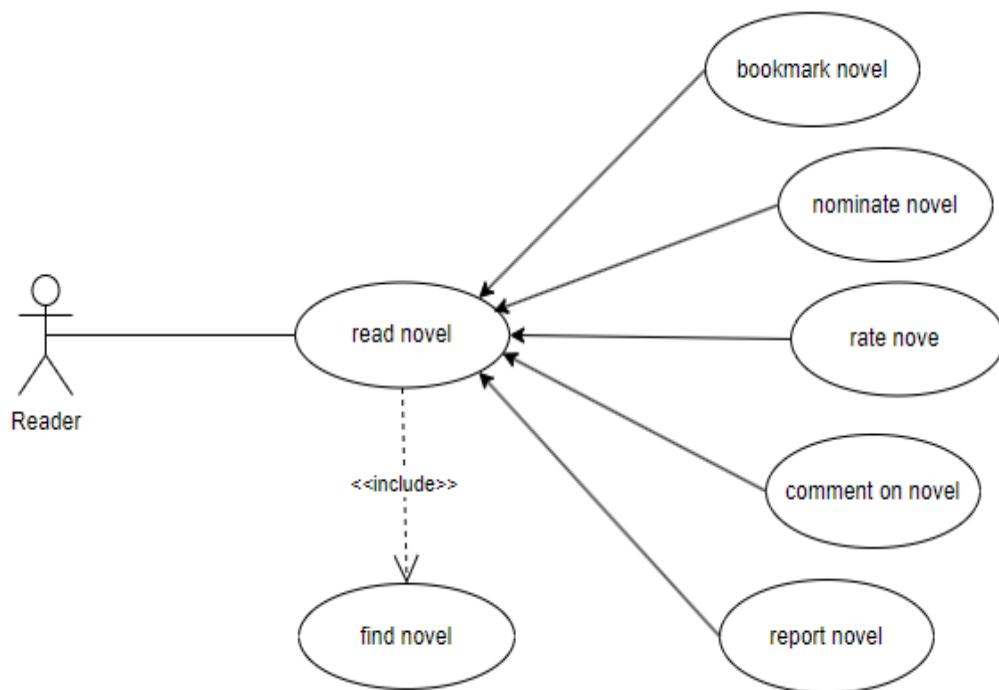
- **Update Premium:** Allows readers to upgrade their account to premium status.
- **Change Username:** Allows readers to change their username.
- **Add Email Address:** Allows readers to add an email address to their account.
- **Add Phone Number:** Allows readers to add a phone number to their account.
- **Account Link (Google/Facebook):** Allows readers to link their account with Google or Facebook for easy login.
- **Delete Account:** Allows readers to delete their account from the system.

**Table 2.7** Describe the account management UC

<b>Actor</b>	Reader
<b>Use case name</b>	UC Account Management
<b>Description</b>	Allows readers to manage their account settings, including updating premium status, changing username, adding email and phone number, linking accounts with Google/Facebook, and deleting the account.
<b>Precondition</b>	The reader must be logged into the system.
<b>Postcondition</b>	The reader's account settings are updated as requested.

<b>Main flow</b>	1. The reader navigates to the account management section. 2. The reader selects the desired account management action (e.g., update premium, change username). 3. The system performs the requested action and confirms the update.
<b>Alternative path</b>	2.1a. The reader decides to update multiple settings in one session. The system allows sequential updates without leaving the account management section.

❖ *Read novel*



**Figure 2.4 UC Read novel**

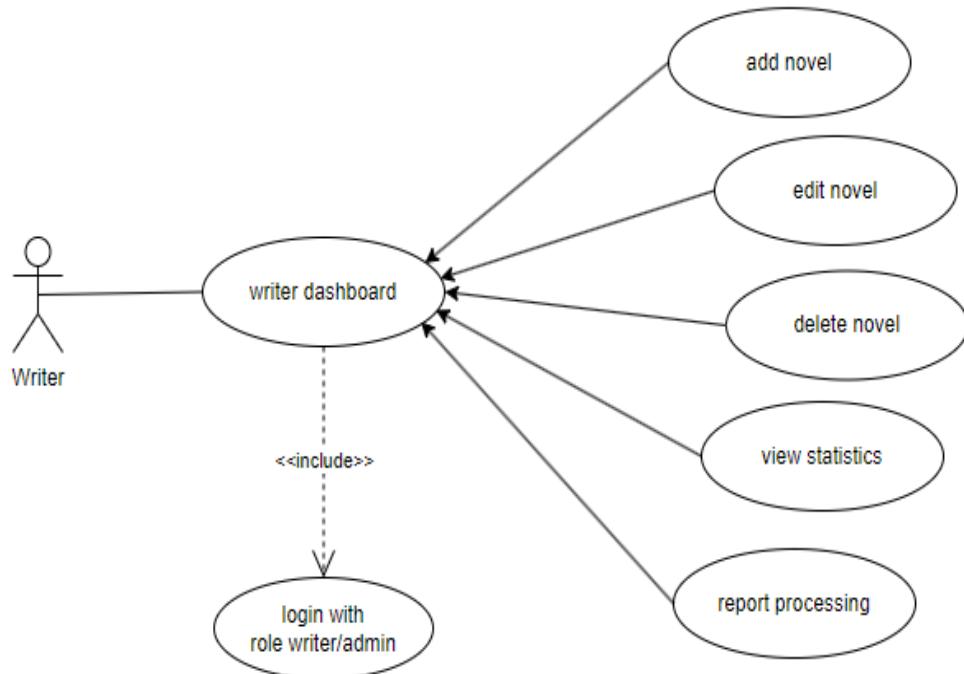
➤Notes:

- **Find Novels:** Allows readers to search for novels using various criteria.
- **Bookmark Novel:** Allows users to bookmark the novel for future reference.
- **Nominate Novel:** Allows users to nominate the novel for others to read.
- **Rate Novel:** Allows users to rate the novel.
- **Comment on Novel:** Allows users to leave comments on the novel.
- **Report Novel:** Allows users to report on the novel.

**Table 2.8** Describe the read novel UC

<b>Actor</b>	User
<b>Use case name</b>	UC Read Novels
<b>Description</b>	Allows users to read novels available on the platform.
<b>Precondition</b>	The user must be logged into the system.
<b>Postcondition</b>	The user reads the selected novel.
<b>Main flow</b>	<ol style="list-style-type: none"> <li>1. The user navigates to the novels page.</li> <li>2. The user selects a novel from the list.</li> <li>3. The system loads the novel's content.</li> <li>4. The user reads the novel.</li> <li>5. The user can bookmark, nominate, rate, and comment on the novel.</li> </ol>
<b>Alternative path</b>	<p>2.1a. The user searches for a specific novel. The system displays the search results.</p> <p>2.1b. The user filters novels by genre or ranking. The system displays the filtered results.</p>

❖ *Writer dashboard*

**Figure 2.5** UC Writer dashboard

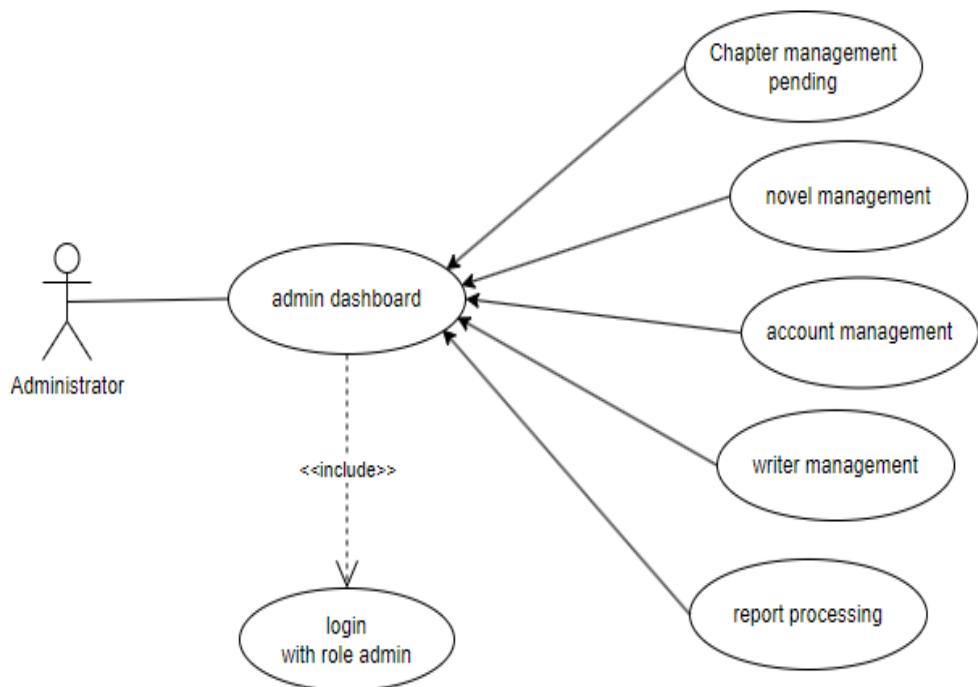
➤Notes

- **Add Novel:** Writers can add new novels to the platform, providing all necessary information such as title, description, and content.
- **Edit Novel:** Writers can edit the details of their existing novels.
- **Delete Novel:** Writers can delete their novels from the platform.
- **View Statistics:** Writers can view performance metrics and reader engagement statistics for their novels.
- **Report Processing:** Writers can handle and respond to reports related to their novels.

**Table 2.9** Describe the writer dashboard UC

<b>Actor</b>	Writer
<b>Use case name</b>	UC Writer Dashboard
<b>Description</b>	Allows writers to manage their novels, including adding, editing, deleting, viewing statistics, and processing reports.
<b>Precondition</b>	The writer must be logged into the system.
<b>Postcondition</b>	The writer can successfully manage their novels on the platform.
<b>Main flow</b>	<ol style="list-style-type: none"> <li>1. The writer navigates to the novel management page.</li> <li>2. The writer chooses an action: add novel, edit novel, delete novel, view statistics, or report processing.</li> <li>3. The system executes the chosen action and updates the novel data accordingly.</li> </ol>
<b>Alternative path</b>	2.1a. If the writer/administrator is not logged in, the system prompts for login.

❖ *Admin dashboard*



**Figure 2.6** UC Admin dashboard

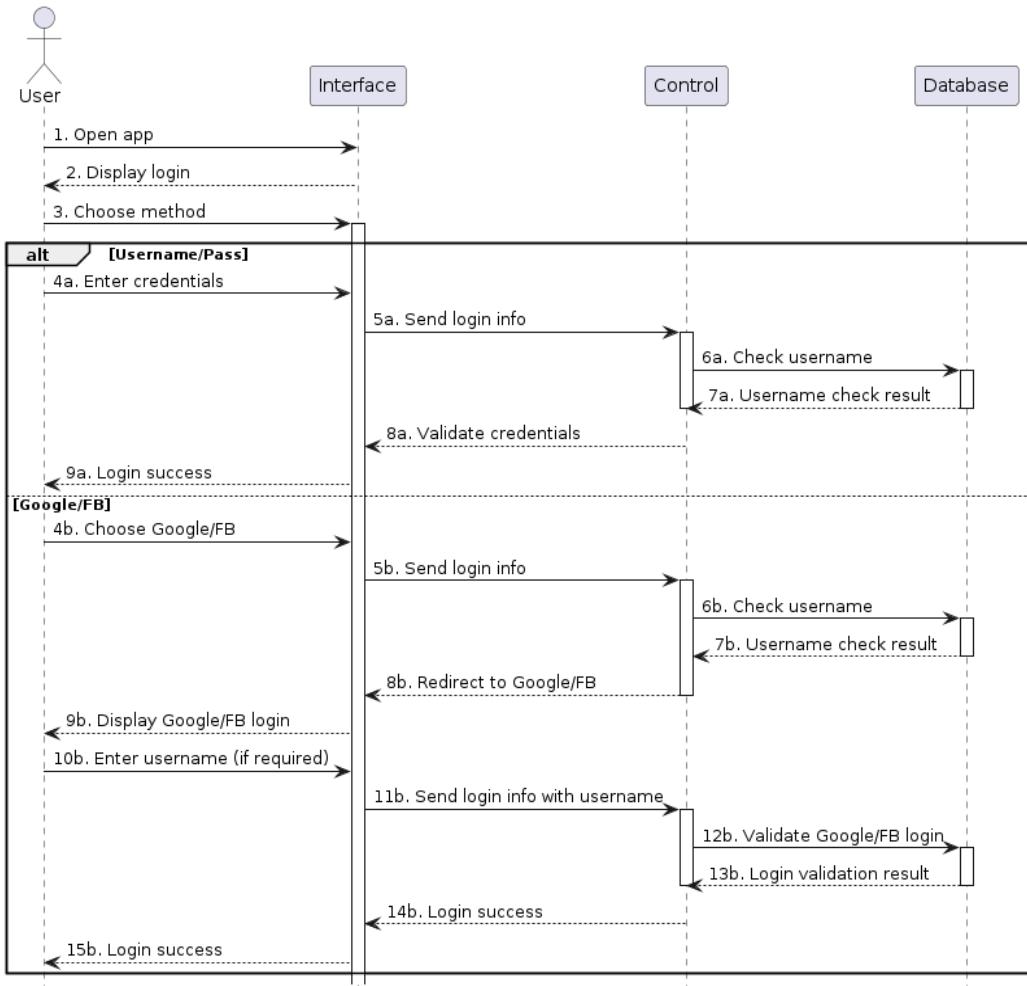
➤Notes

- **Chapter Management Pending:** Admins can review and approve or reject pending chapters.
- **Novel Management:** Admins can oversee and manage all novels on the platform.
- **Account Management:** Admins can manage user accounts, including creating, editing, and deleting accounts.
- **Writer Management:** Admins can manage writer accounts and their associated content.
- **Report Processing:** Admins can handle and respond to reports submitted by users or writers.

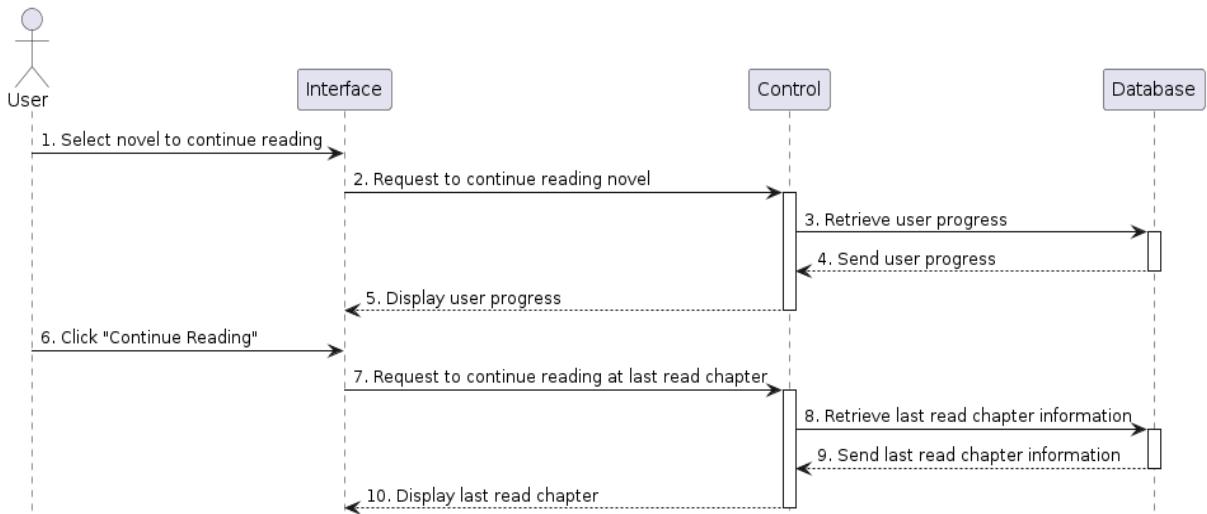
**Table 2.10** Describe the admin dashboard UC

<b>Actor</b>	Administrator
<b>Use case name</b>	UC Admin Dashboard
<b>Description</b>	Allows administrators to perform a variety of management tasks, including managing chapters, novels, user accounts, writers, and processing reports.
<b>Precondition</b>	The administrator must be logged into the system with the appropriate role.
<b>Postcondition</b>	The administrator can successfully manage platform-wide settings and data.
<b>Main flow</b>	<ol style="list-style-type: none"> <li>1. The administrator navigates to the admin dashboard.</li> <li>2. The administrator selects an action: manage pending chapters, manage novels, manage accounts, manage writers, or process reports.</li> <li>3. The system executes the chosen action and updates the relevant data accordingly.</li> </ol>
<b>Alternative path</b>	2.1a. If the administrator is not logged in, the system prompts for login with admin role.

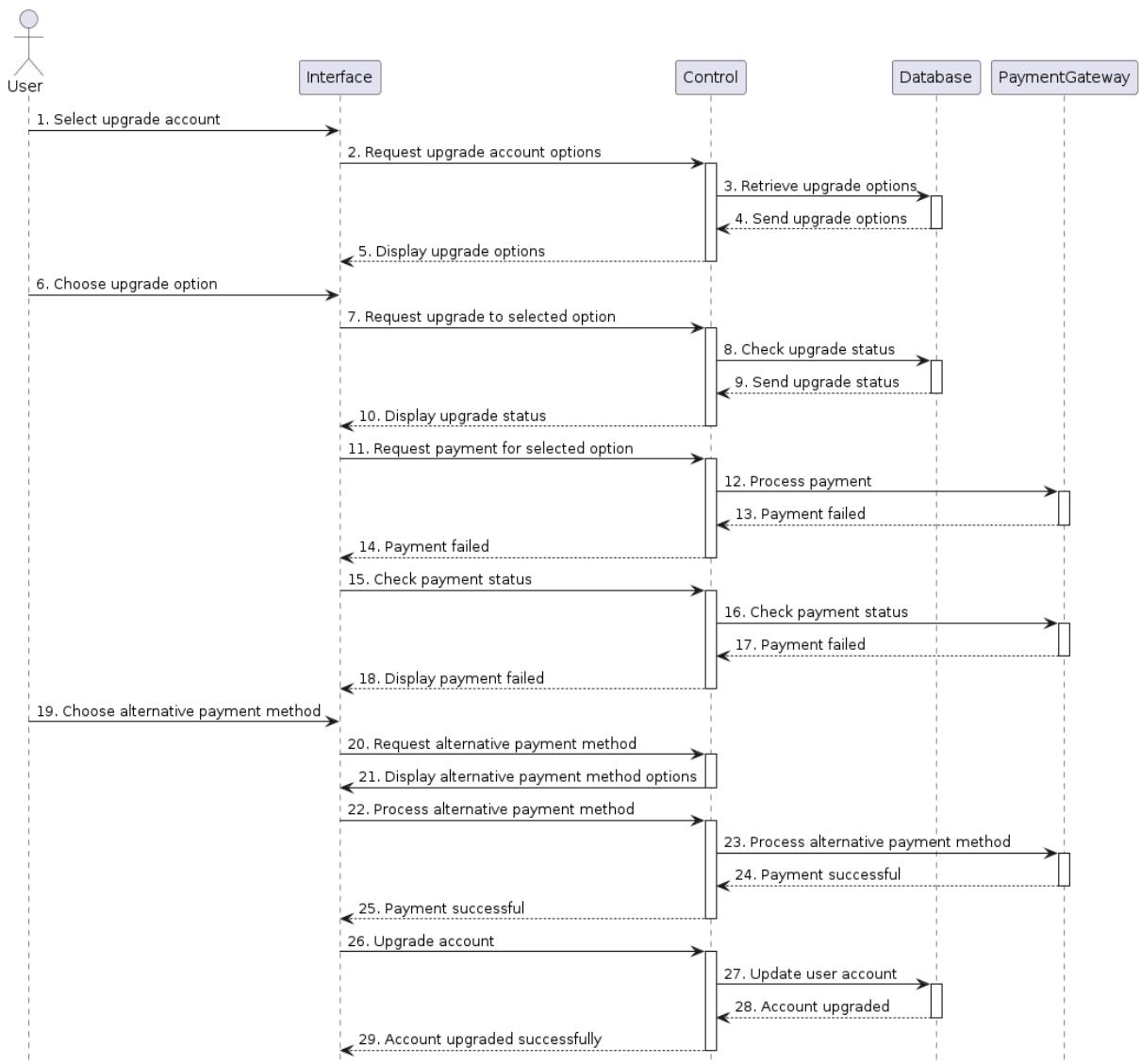
## 2.2.2 Sequence diagram



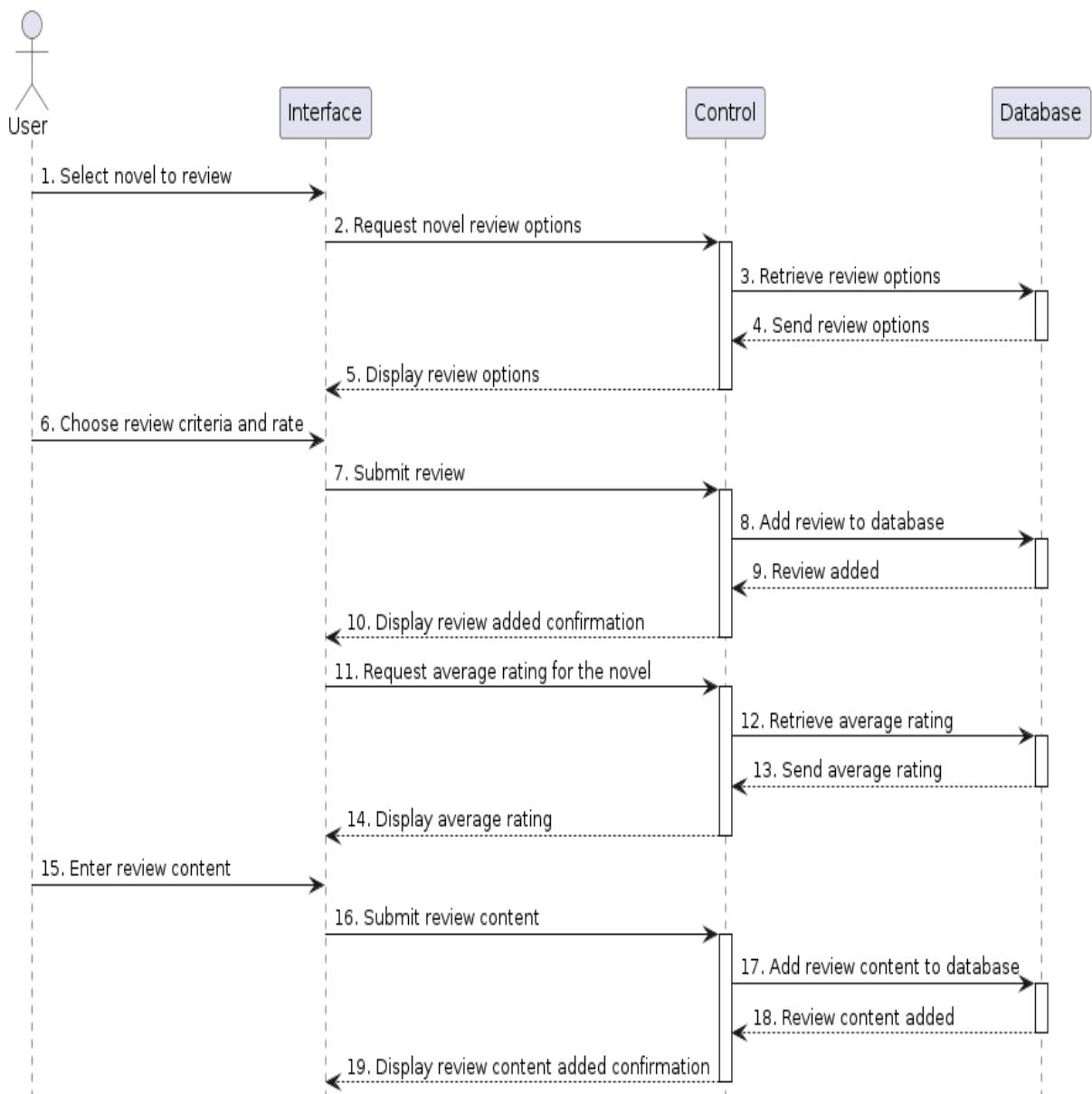
**Figure 2.7 SD Login/Register**



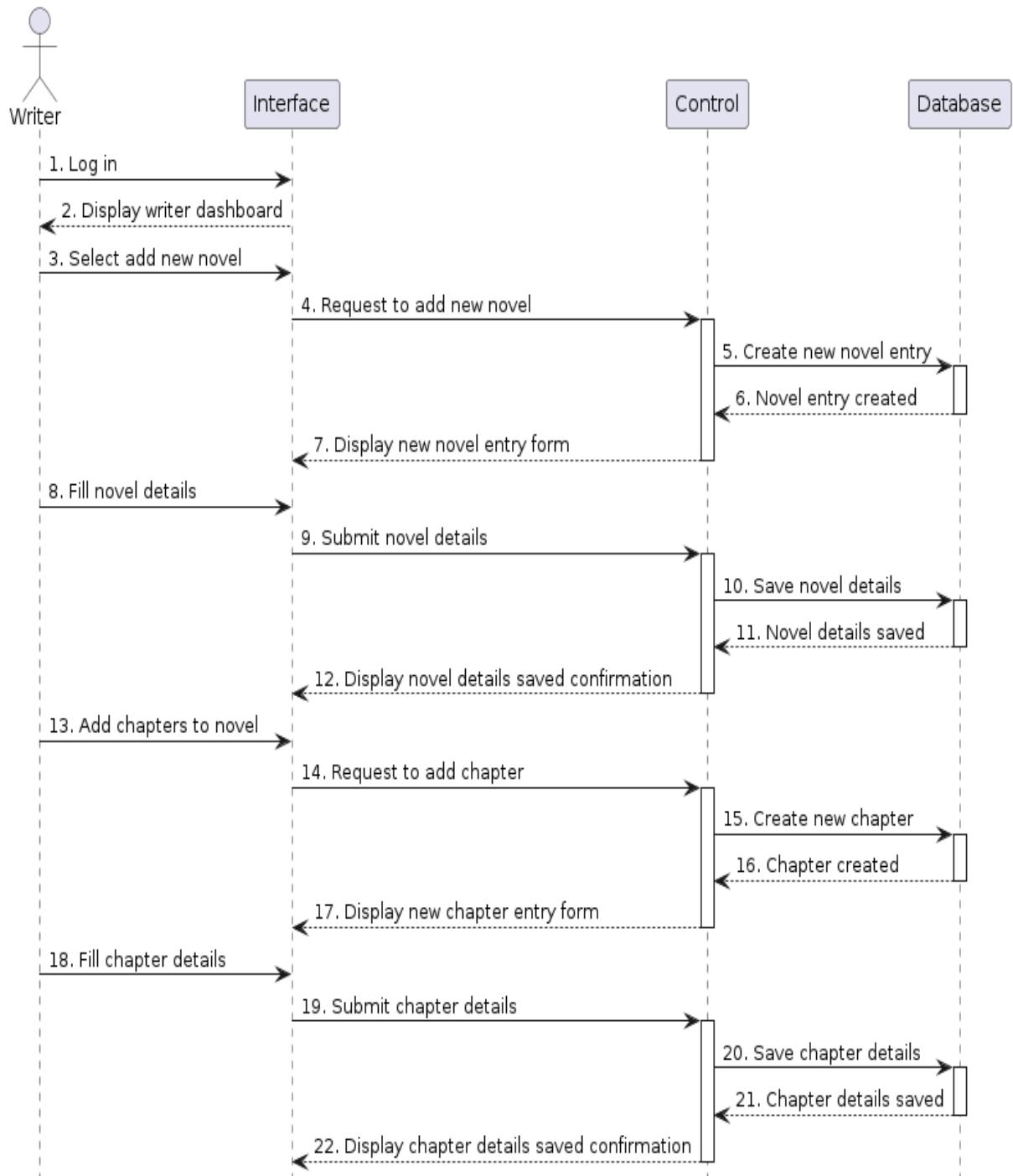
**Figure 2.8 SD Continue reading process**



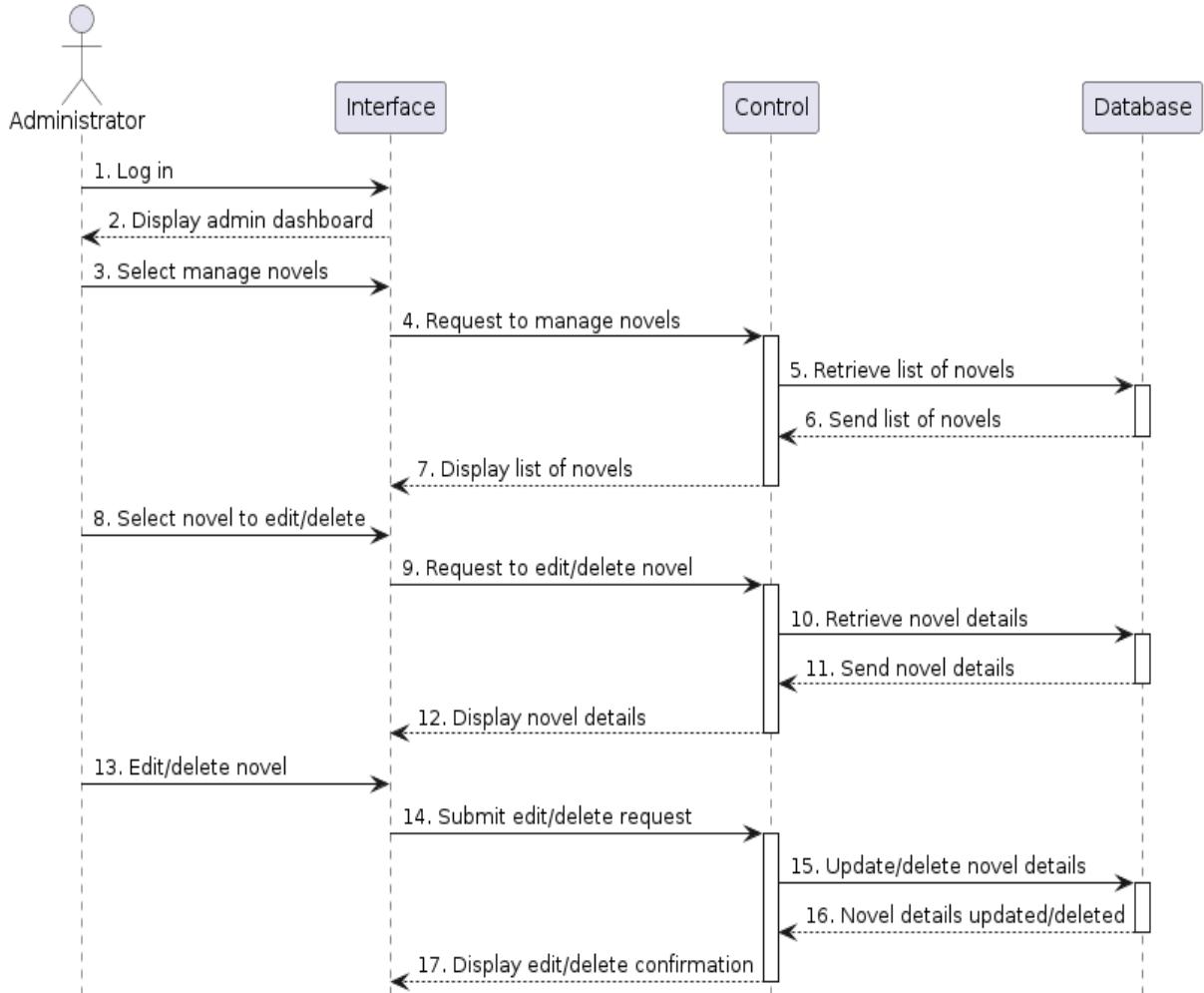
**Figure 2.9** SD Upgrade account process with payment handling



**Figure 2.10** SD Novel review process



**Figure 2.11 SD Add new novel process**



**Figure 2.12** SD Manage novels process for administrator

## 2.3 Database design

### 2.3.1 Collection User

**Table 2.11** Collection User

No	Attribute Name	Data type	Required	Default	Description
1	_id	ObjectId	true		Unique identifier for the user, indexed
2	clerkId	String	true		Employee ID, required and unique, indexed
3	firstName	String	true		First name
4	lastName	String	true		Last name
5	username	String	true		Username
6	email	String	true		Email address

7	avatar	String			Avatar image URL
8	role	String		reader	User role: reader/writer/admin
9	publicMetadata	Object			Public metadata about the user
9.1	frameAvatar	String		null	Frame avatar
9.2	premium	Object			Premium information
9.2.1	state	Boolean		false	Premium status
9.2.2	startDate	Date		null	Premium start date
9.2.3	endDate	Date		null	Premium end date
10	createdAt	Date			Record creation
11	updatedAt	Date			Record update

### 2.3.2 Collection Novel

**Table 2.12** Collection Novel

No	Attribute Name	Data type	Required	Default	Description
1	_id	ObjectId	true		Unique identifier for the novel, indexed
2	novelName	String	true		Name of the novel
3	novelSlug	String	true		Slug for the novel, indexed
4	author	String	true		Author of the novel
5	genres	Array	true		Genres of the novel
5.1	label	String	true		Label of the genre
5.2	value	String	true		Value of the genre
6	tags	Array		[]	Tags associated with the novel
7	urlCover		true		URL of the novel's cover image
8	uploader		true		Uploader of the novel
9	description		true		Description of the novel
10	reviews	Object			Review statistics of

					the novel
10.1	count	Number		0	Count of reviews
10.2	avgScore	Number		0	Average score of the reviews
10.3	avgScoreCharacter	Number		0	Average score for characters
10.4	avgScorePlot	Number		0	Average score for plot
10.5	avgScoreWorld	Number		0	Average score for world-building
10.6	totalScoreCharacter	Number		0	Total score for characters
10.7	totalScorePlot	Number		0	Total score for plot
10.8	totalScoreWorld	Number		0	Total score for world-building
11	nominationCount	Number			Number of nominations received
12	readCount	Number			Number of times the novel has been read
13	chapterCount	Number			Number of chapters in the novel
14	commentCount	Number			Number of comments on the novel
15	state	String		Dang ra	State of the novel
16	isLock	Boolean		false	Indicates if the novel is locked
17	isPublic	Boolean		false	Indicates if the novel is public
18	publishedDate	Date		null	Indicates if the novel is public or private
19	createdAt	Date			Record creation
20	updatedAt	Date			Record update

### 2.3.3 Collection Chapter

**Table 2.13** Collection Chapter

No	Attribute Name	Data type	Required	Default	Description
1	_id	ObjectId	true		Unique identifier for the chapter, indexed
2	novelSlug	String	true		Slug of the associated novel, indexed
3	chapterName	String	true		Name of the chapter
4	chapterIndex	Number	true		Index of the chapter
5	content	String	true		Content of the chapter
6	state	String		chưa đã duyệt	State of the chapter
7	isApprove	Boolean			Indicates if the chapter has been approved
8	isLock	Boolean			Indicates if the chapter is locked
9	isPublic	Boolean			Indicates if the chapter is public or private
10	publishedDate	Date			Date when the chapter was published
11	createdAt	Date			Record creation
12	updatedAt	Date			Record update

### 2.3.4 Collection Review

**Table 2.14** Collection Review

No	Attribute Name	Data type	Required	Default	Description
1	_id	ObjectId	true		Unique identifier for the review, indexed
2	clerkId	String	true		ID of the user who created the review
3	novelSlug	String	true		Slug of the reviewed novel, indexed
4	valueCharacter	Number	true		Rating for characters

5	avgScore	Number		0	Average score for the review
6	valuePlot	Number	true		Rating for plot of the novel
7	valueWorld	Number	true		Rating for world-building of the novel
8	reviewContent	String	true		Content of the review
9	createdAt	Date			Record creation
10	updatedAt	Date			Record update

### 2.3.5 Collection Comment

**Table 2.15** Collection Comment

No	Attribute Name	Data type	Required	Default	Description
1	_id	ObjectId	true		Unique identifier for comment, indexed
2	clerkId	String	true		ID of the user who created the comment
3	novelSlug	String	true		Slug of the novel the comment belongs to, indexed
4	message	String	true		Content of the comment
5	parentId	String		null	ID of the parent comment, indexed,
6	likes	Array			Array of user IDs who liked the comment
7	createdAt	Date			Record creation
8	updatedAt	Date			Record update

### 2.3.6 Collection Issue

**Table 2.16** Collection Issue

No	Attribute Name	Data type	Required	Default	Description
1	_id	ObjectId	true		Unique identifier for the monthly statistics entry, indexed
2	clerkId	String	true		Identifier for the clerk reporting the issue, indexed
3	novelSlug	String			Slug of the novel related to the issue, indexed
4	title	String	true		Title of the issue
5	content	String	true		Detailed content of the issue
6	messageReply	String			Reply message to the report
6	isResolved	Boolean		false	Indicator of whether the issue is resolved
7	createdAt	Date			Record creation
8	updatedAt	Date			Record update

### 2.3.7 Collection Bookmark

**Table 2.17** Collection Bookmark

No	Attribute Name	Data type	Required	Default	Description
1	_id	ObjectId	true		Unique identifier for the bookmark, indexed
2	clerkId	String	true		ID of the user who created the bookmark, indexed
3	novelSlug	String	true		Slug of the novel being bookmarked, indexed
4	createdAt	Date			Record creation
5	updatedAt	Date			Record update

### 2.3.8 Collection Reading

**Table 2.18** Collection Reading

No	Attribute Name	Data type	Required	Default	Description
1	_id	ObjectId	true		Unique identifier for the reading record, indexed
2	clerkId	String	true		ID of the user who is reading, indexed
3	novelSlug	String	true		Slug of the novel being read, indexed
4	chapterIndex	Number		0	Index of the last read chapter
5	createdAt	Date			Record creation
6	updatedAt	Date			Record update

### 2.3.9 Collection Nomination

**Table 2.19** Collection Nomination

No	Attribute Name	Data type	Required	Default	Description
1	_id	ObjectId	true		Unique identifier for the nomination, indexed
2	clerkId	String	true		ID of the user who made the nomination, indexed
3	novelSlug	String	true		Slug of the nominated novel, indexed
4	createdAt	Date			Record creation
5	updatedAt	Date			Record update

### 2.3.10 Collection Order

**Table 2.20** Collection Order

No	Attribute Name	Data type	Required	Default	Description
1	_id	ObjectId	true		Unique identifier for the order, indexed
2	clerkId	String	true		ID of the clerk associated with the order
3	orderType	String	true		Type of the order
4	status	String	true		Status of the order
5	orderCode	Number	true		Code associated with the order
6	amount	Number	true		Amount of the order
7	description	String	true		Description order
8	bin	String	true		Bank Identification Number
9	accountName	String	true		Name associated with the account
10	accountNumber	String	true		Number of the account
11	paymentLinkId	String	true		ID linking to the payment
12	qrCode	String	true		QR code associated with the order
13	checkoutUrl	String	true		URL for checkout
14	transaction	Object			Details transaction
14.1	description	String			Description transaction
14.2	reference	String			Reference ID of the transaction
14.3	transactionDateTime	String			Date and time of the transaction
15	createdAt	Date			Record creation
16	updatedAt	Date			Record update

### 2.3.11 Collection MonthlyStats

**Table 2.21** Collection MonthlyStats

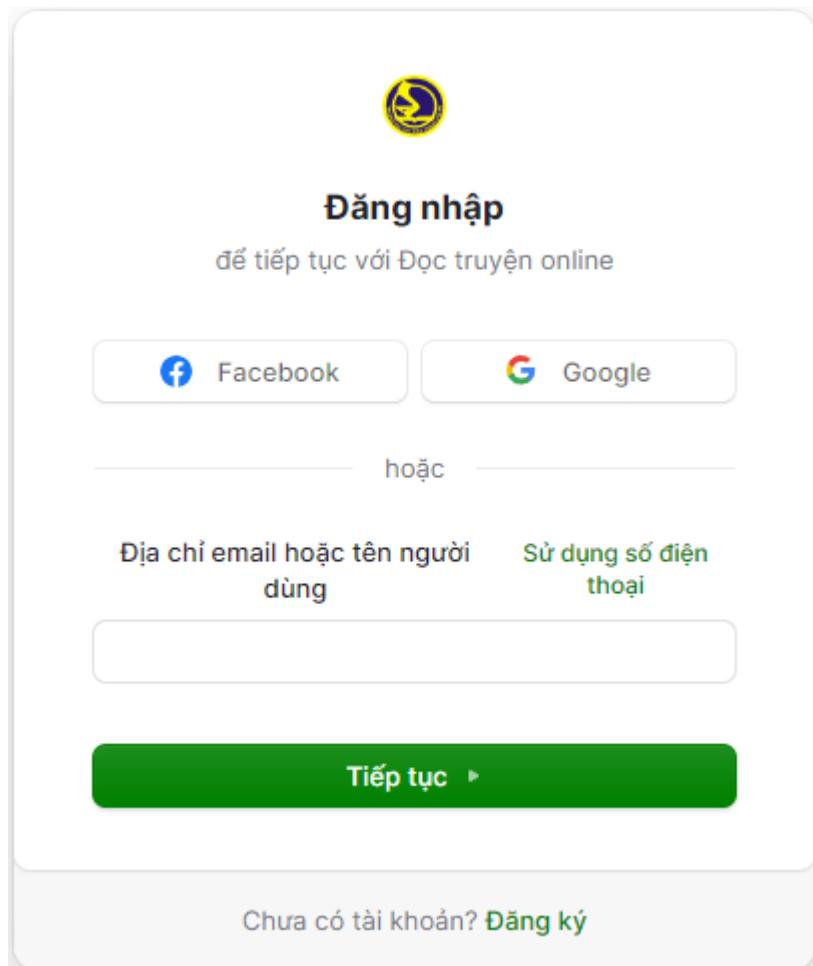
No	Attribute Name	Data type	Required	Default	Description
1	_id	ObjectId	true		Unique identifier for the monthly statistics entry, indexed
2	clerkId	String	true		ID of the clerk associated with the statistics, indexed
3	month	Number	true		Month for which the statistics are recorded
4	year	Number	true		Year for which the statistics are recorded
5	novelSlug	String	true		Slug of the novel associated with the statistics
6	readCount	Number		0	Number of read the novel was read in the month
7	nominationCount	Number		0	Number of nominations the novel received in the month
8	createdAt				Record creation
9	updatedAt				Record update

## CHAPTER 3: SYSTEM CONSTRUCTION

### 3.1 User interface design

#### 3.1.1 Reader side interface

➤URL: <https://doctruyen.io.vn>



**Figure 3.1 UI Login**

Users can log in using their email/username/phone or via a link through their Facebook/Google account.

**Thể loại**   **Bảng xếp hạng**   **Tim truyện...**   **Đăng truyện**   **Hoan Le**

# VÕ HIỆP NỘI ỨNG

# Theo Max Cấp Thần Công

## BẮT ĐẦU VÔ ĐỊCH

**TƯỞNG THANG BINH DƯƠNG HAM NGƯ**

**THỊNH HÀNH**

- Tự Cầm**  
Trong kinh thành mọi người đều đón đợi  
rằng ở trong Khuông già thi Tú tiêu thư nổi  
tiếng là một đại ...  
[Tinh Tiểu Tắc](#)  
[Võng Du](#) [Tiên Hiệp](#)
- Nàng không muốn làm hoàng hậu**  
Phụ mẫu Văn Kiều mất sớm, một mình nàng  
tự buôn bán nhỏ, còn nhận được một thư  
sinh nghèo mì thanh m...  
[Thẩm Bích Sắc](#)  
[Ký Áo](#) [Đô thị](#) [Canh Kỹ](#)
- Linh vũ thiên hạ**  
Lục Thiếu Du, linh hồn bị xuyên qua đến thế  
giới khác, nhập vào thân thể của một thiếu  
giá không có ...  
[Vũ Phong](#)  
[Canh Kỹ](#) [Kiếm hiệp](#) [Huyền Huyễn](#)
- Không phu thê duyên**  
Nghe nói Thái cô nương Hoắc gia là một  
hắn nữ, một kiêm vũ động Bình Nam thành,  
sức lực vô cùng lớn ...  
[Vu Thị Dực](#)  
[Đồng Nhẫn](#) [Võng Du](#) [Khoa Huyền](#)

**ĐANG ĐỌC**

- Tự Cầm**  
Đang đọc: 2/2 [Đọc tiếp](#)
- Ngạo Thế Đan Thần**  
Đang đọc: 3/3 [Đọc tiếp](#)
- Linh vũ thiên hạ**  
Đang đọc: 1/1 [Đọc tiếp](#)
- Nàng không muốn làm hoàng hậu**  
Đang đọc: 2/3 [Đọc tiếp](#)

**HƯỚNG DẪN**

- Làm thế nào để đăng ký tài khoản?
- Tôi có thể tìm truyện theo thể loại nào?
- Làm thế nào để thay đổi cài đặt đọc truyện?
- Tôi có thể lưu truyện để đọc sau không?
- Làm thế nào để báo cáo lỗi về truyện hoặc chương?

**CHƯƠNG VỪA LÊN**

Chương:	Tên Chương	Tác giả	Điều kiện	Thời gian
Chương: 1	Chương 1	Tự Cầm	Dịu dàng tân xương	10 ngày trước
Chương: 2	Tai nghe là giá	Tự Cầm	Tự Cầm	11 ngày trước
Chương: 1	Dêm	Tự Cầm	Tự Cầm	11 ngày trước
Chương: 1	Nhân phẩm có vấn đề	Linh vũ thiên hạ	Kiểu súng vi thương	17 ngày trước
Chương: 2	Tú Hồn	Kiểu súng vi thương	Kiểu súng vi thương	17 ngày trước
Chương: 1	Trùng Sinh	Kiểu súng vi thương	Kiểu súng vi thương	17 ngày trước
Chương: 3	Oan gia ngõ hẹp!	Nàng không muốn làm hoàng hậu	Nàng không muốn làm hoàng hậu	17 ngày trước
Chương: 2	Ngũ hoàng tử bùi thùa tư trả về!	Nàng không muốn làm hoàng hậu	Nàng không muốn làm hoàng hậu	17 ngày trước
Chương: 1	Nàng không tin Yến Định lại lừa nàng chuyện lớn đến vậy!	Nàng không muốn làm hoàng hậu	Nàng không muốn làm hoàng hậu	17 ngày trước
Chương: 3	Âm dương thần mạch	Ngạo Thế Đan Thần	Dịu dàng tân xương	34 ngày trước

**TOP LUỢT ĐỌC**

Tác giả	Tên sách	Luợt đọc
<b>Ngạo Thế Đan Thần</b>	2311	
Tự Cầm	Canh Kỹ Khoa Huyền Võng Du	603
Nàng không muốn làm hoàng hậu	Tinh Tiểu Tắc	21
3	Kiểu súng vi thương	5
4	Dịu dàng tân xương	2
5	Linh vũ thiên hạ	2
6	Thần đạo đan tôn	0
7	Thiếu tướng, vợ ngài nỗi giận rồi	0
8	Mê đắm	0
9	Không phu thê duyên	0

**TOP ĐỀ CỦ**

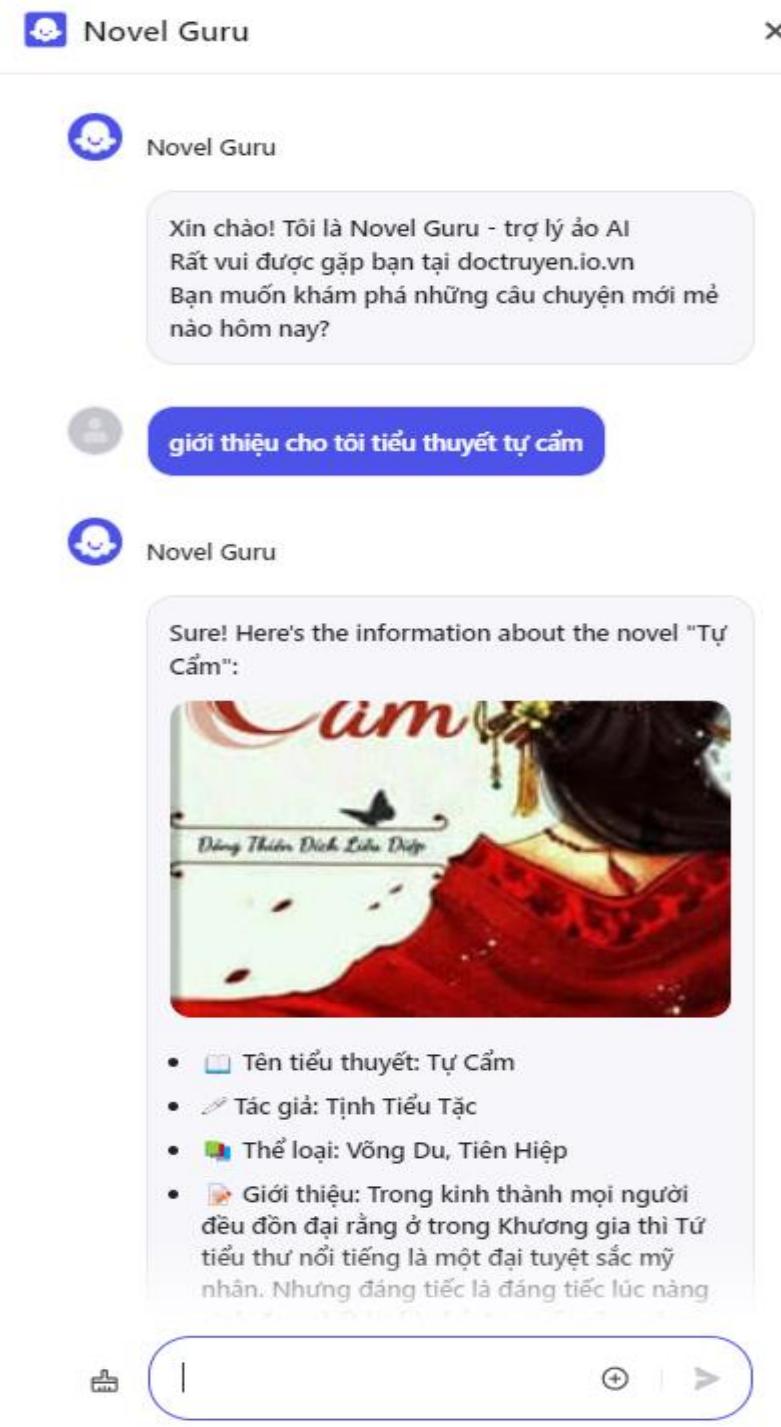
Tác giả	Tên sách	Luợt đọc
<b>Tự Cầm</b>	5	
Tự Cầm	Dịu dàng tân xương	2
Ngạo Thế Đan Thần	1	
3	Linh vũ thiên hạ	1
4	Kiểu súng vi thương	1
5	Thần đạo đan tôn	0
6	Thiếu tướng, vợ ngài nỗi giận rồi	0
7	Mê đắm	0
8	Nàng không muốn làm hoàng hậu	0
9	Không phu thê duyên	0

Đọc truyện là nền tảng mở trực tuyến, miễn phí đọc truyện chữ được convert hoặc dịch kỹ lưỡng, do các converter và dịch giả đóng góp, rất nhiều truyện hay và nổi bật được cập nhật nhanh nhất với đủ các thể loại tiên hiệp, kiếm hiệp, huyền ảo ...

Code by: HoanCuTe ❤

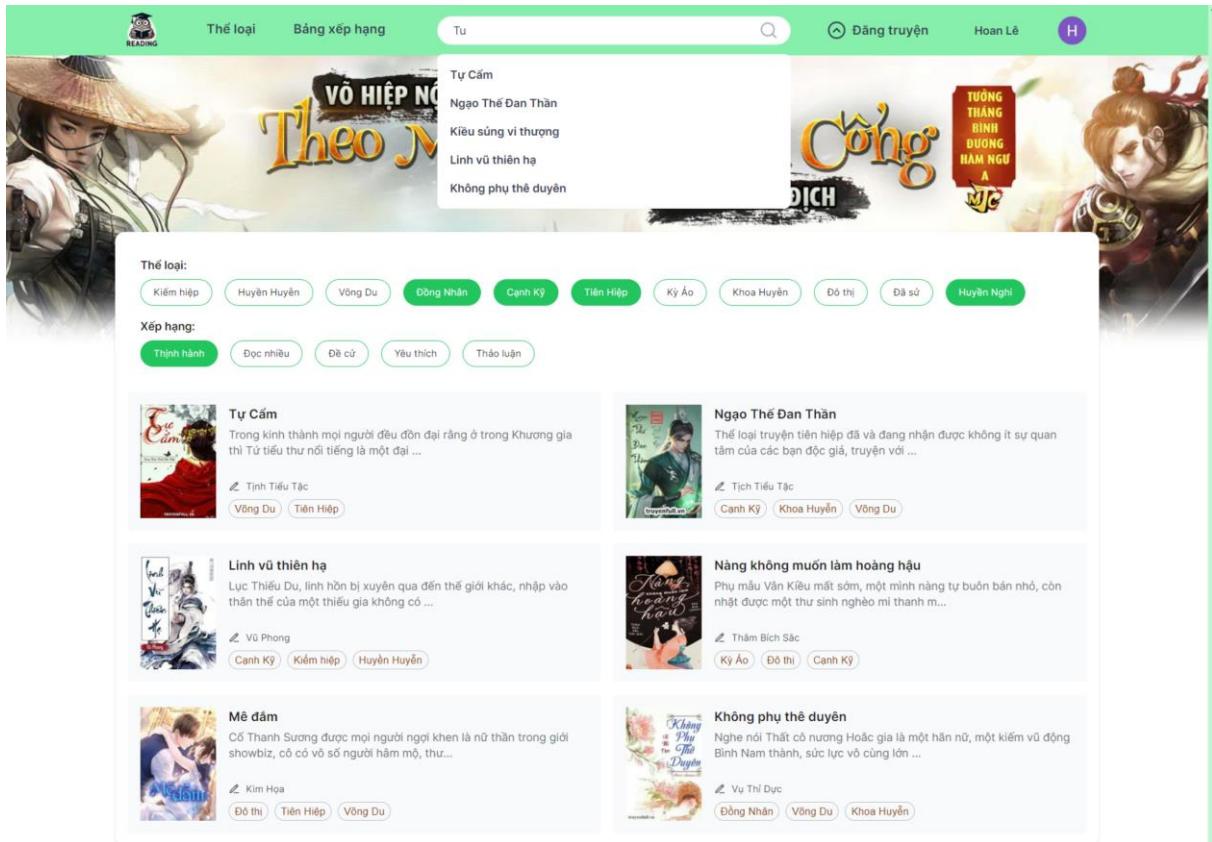
Figure 3.2 UI Home page

The home page will include sub-UIs such as: THỊNH HÀNH, ĐANG ĐỌC, CHƯƠNG VỪA LÊN, TOP LUỢT ĐỌC, TOP ĐỀ CỦ



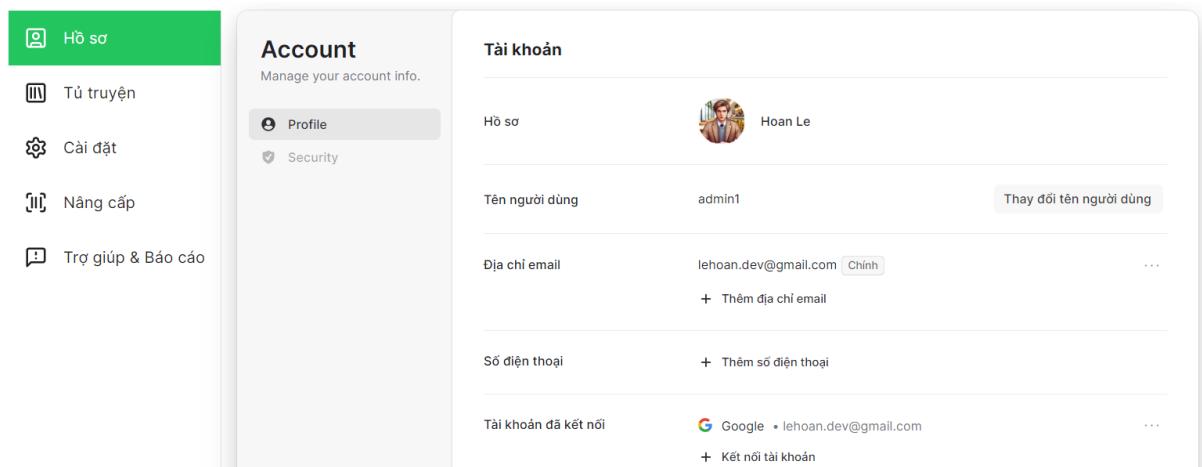
**Figure 3.3 UI Chatbot AI “Novel Guru”**

AI Chatbot "Novel Guru": Users can chat directly with the virtual assistant Guru through the window at the bottom right corner of the screen. The assistant can answer questions about how to use the website or recommend any novels available on the website.



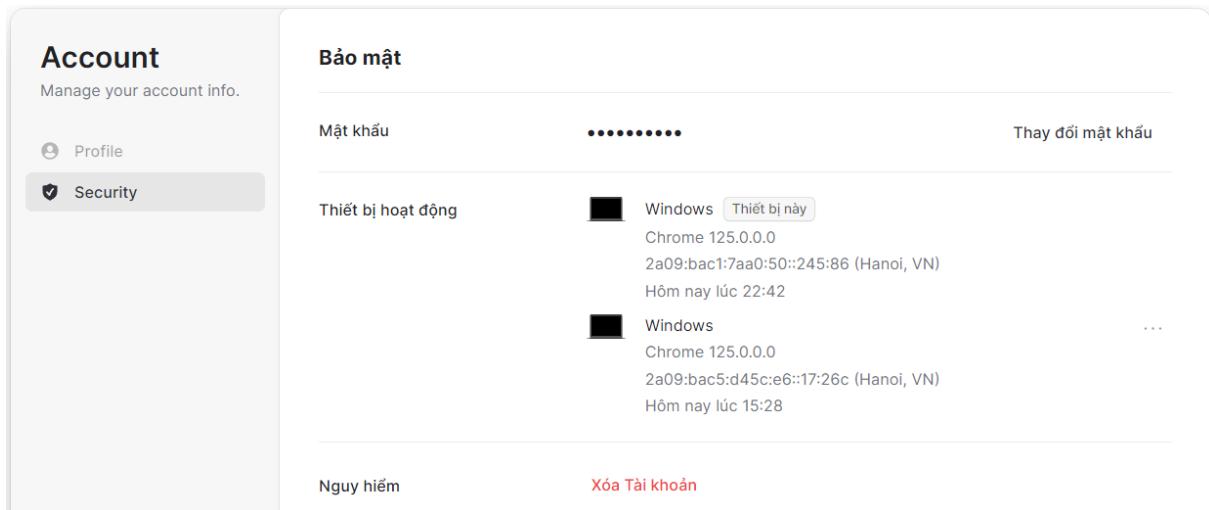
**Figure 3.4** UI Search novel

**Auto-Complete Search System:** Users only need to type a few keywords, and it will return up to 5 novels that closely match those keywords.



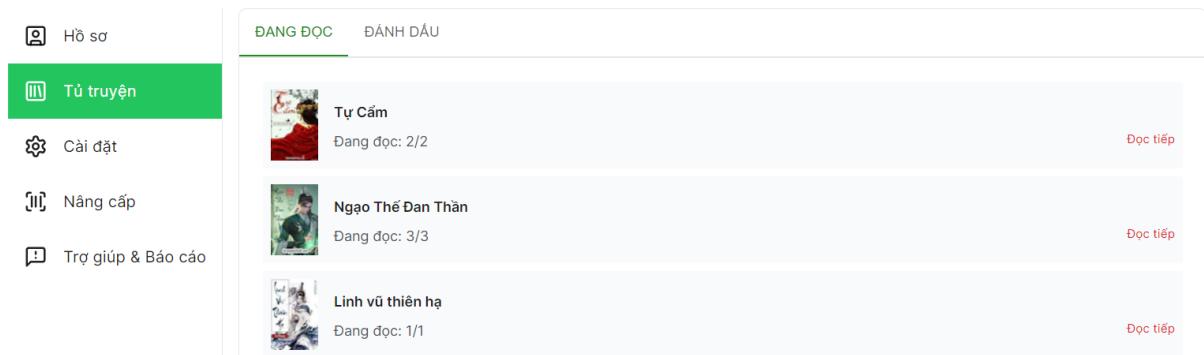
**Figure 3.5** UI Profile account

**Profile Account UI:** Users can customize their account settings with functions such as editing their username, adding an email or phone number, and linking their account with Google/Facebook.



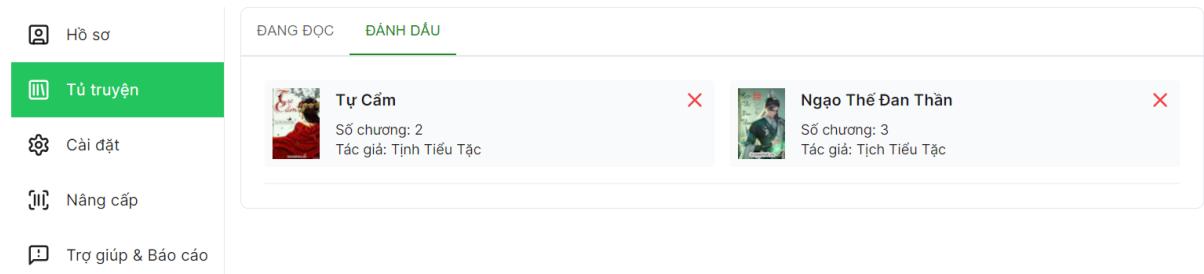
**Figure 3.6** UI Security account

Account Security: Users can change their password, manage logged-in devices, and delete their account for security purposes.



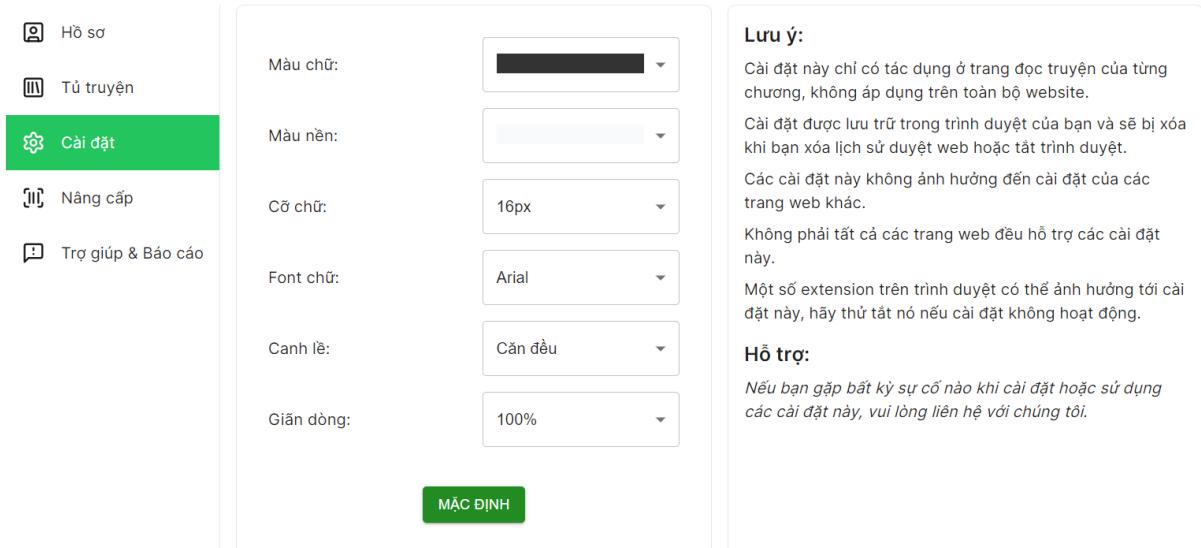
**Figure 3.7** UI Reading tracker

Reading Tracker UI: Manage the novels currently being read, allowing users to click on "Đọc tiếp"



**Figure 3.8** UI Bookmarked tracker

Bookmarked Tracker UI: Manage bookmarked novels, allowing users to view or delete bookmarked novels.



**Figure 3.9** UI Setting theme

Theme Settings: Users can customize:

- Màu chữ
- Màu nền
- Cỡ chữ
- Phông chữ
- Canh lè
- Giãn dòng

These settings can be accessed either in the account/settings section or directly on the chapter page for immediate adjustments.



**Figure 3.10** UI Update account

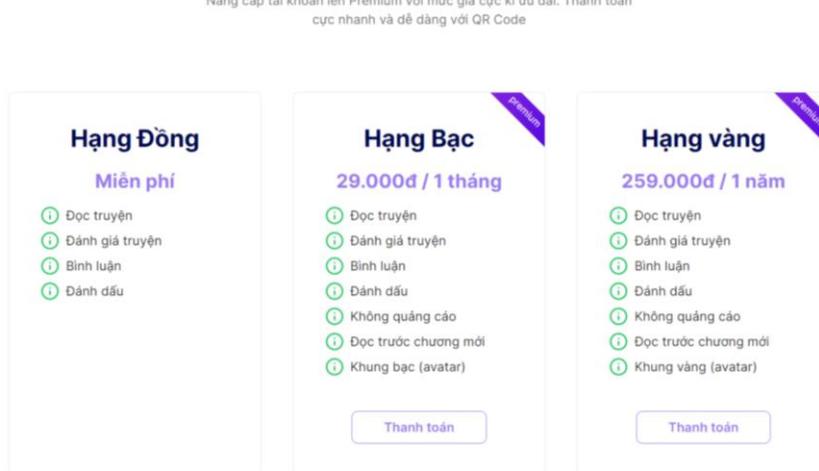
Account Update UI: Manage the account's upgrade status to premium, displaying detailed information such as avatar frame, upgrade tier, upgrade date, and expiration date.

The screenshot shows a user interface for reporting. On the left, there's a sidebar with icons for 'Hồ sơ' (Profile), 'Tú truyện' (Story Box), 'Cài đặt' (Settings), 'Nâng cấp' (Upgrade), and a green button for 'Trợ giúp & Báo cáo' (Help & Report). The main area has three sections: 'Báo cáo' (Report) with fields for 'Người gửi' (Hoan Le - lehoan.dev@gmail.com), 'Tiêu đề', and 'Mô tả', followed by a 'GỬI BÁO CÁO' (Send Report) button; 'HƯỚNG DẪN' (Guidelines) with a list of questions about reporting features; and a section for 'Danh sách báo cáo đã gửi:' (List of submitted reports) showing a single entry for '12 giờ trước truyện Tự Cấm vi phạm bản quyền' (12 hours ago story Self-Banned for copyright violation) with a 'Chưa giải quyết' (Unresolved) status.

**Figure 3.11 UI Report**

Report: Users can submit reports with a title and content. The detailed list of submitted reports, along with their resolution status, will be displayed here.

## Trải nghiệm đọc truyện không quảng cáo, đọc trước các chương sắp ra cùng với Premium



**Figure 3.12 UI Select premium**

Users can choose suitable premium upgrades.

The default account tier is Bronze - free.

Additionally, there are two paid options:

- Silver tier (29,000vnd/month)
- Gold tier (259,000vnd/year).



**Figure 3.13 UI Payment order**

Payment order: Users can make payments by directly transferring funds to the bank through two methods:

- Scan QR code.
- Transfer with specific transaction details.



Trong kinh thành mọi người đều đồn đại rằng ở trong Khương gia thi Tứ tiểu thư nổi tiếng là một đại tuyệt sắc mỹ nhân. Nhưng đáng tiếc là đáng tiếc là đáng tiếc lúc nàng xinh đẹp nhất lại bị phủ An quốc công chọn trúng. Không chỉ vậy mà đêm trước khi Khương Tự xuất giá, vị hôn phu cùng nữ nhân khác nhảy sông tự tử..

**Figure 3.14 UI Novel details**

Novel details display: detailed introduction about the novel including: novel name, cover image, genre, author, status, number of chapters, reads count, number of nominations, ratings. Below is the menu tab with:

- Giới thiệu
- Đánh giá
- Danh sách chương
- Bình luận
- Đè cử



**Figure 3.15 UI chapter detail**

Display the content of the chapter. Here, users can use the management bar at the top to navigate:

- Chương trước
- Cài đặt
- Danh sách chương
- Đánh dấu
- Nghe kể truyện
- Chương sau

When clicking on "Nghe kể truyện" a media bar will appear at the bottom.

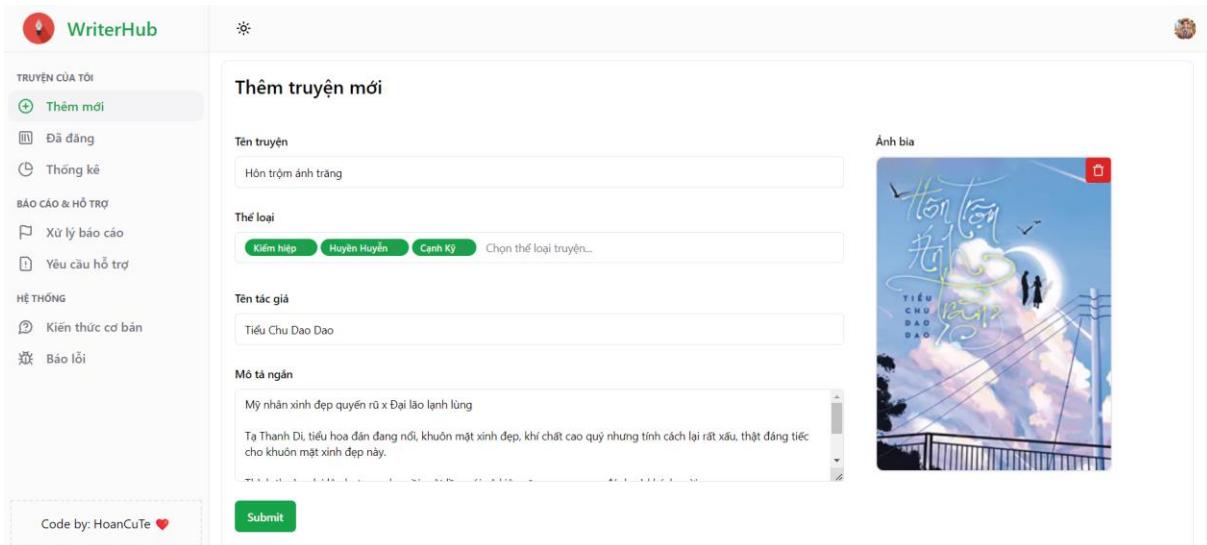
### 3.1.2 Writer side interface

➤URL: <https://writer.doctruyen.io.vn>



**Figure 3.16 UI Writer dashboard**

Display an overview of the writer's dashboard.



**Figure 3.17 UI Add new novel**

Writers can add a new novel with the following details:

- Tên truyện (notify you if the novel name is a duplicate)
- Thể loại (select)
- Mô tả ngắn
- Ảnh bìa

WriterHub		⋮					
TRUYỆN CỦA TÔI		⋮	Tim kiếm theo tên truyện				
+		Thêm mới	View				
+	Đã đăng		Tên truyện ↑	Chương ↑	Lượt đọc ↑	Trạng thái ↑	Ngày đăng ↑
			Tự Cầm	2	604	Đang ra	23/04/2024 09:56
			Ngạo Thế Đan Thần	3	2311	Đang ra	+ Thêm chương mới
			Nàng không muốn làm hoàng hậu	3	21	Đang ra	: Danh sách chương
			Kiều sủng vi thương	2	5	Đang ra	↔ Chính sửa truyện
			Linh vũ thiên hạ	1	2	Đang ra	➡ Đọc truyện
			Mê đắm	0	0	Đang ra	✖ Xóa
			Không phu thê duyên	0	0	Đang ra	10/05/2024 23:11
			Thần đạo đan tốn	0	0	Đang ra	10/05/2024 23:14
			Thiếu tướng, vợ ngài nói giận rồi	0	0	Đang ra	10/05/2024 23:15

**Figure 3.18 UI Novel management for Writer**

Display a novel management table where writers can:

- Thêm chương mới
- Danh sách chương
- Chính sửa truyện
- Đọc truyện
- Xóa

Danh sách chương					<button>+ Thêm chương mới</button>
STT ↑	Tên chương ↑	Trạng thái ↑	Công khai ↑	Khóa ↑	
1	Địa ngục linh chi 1	<span style="background-color: green; color: white; padding: 2px;">đã duyệt</span>	Có	<span style="color: green;">🔓</span>	<span style="color: green;">ลบ Xóa</span>
2	Địa ngục linh chi 2	<span style="background-color: green; color: white; padding: 2px;">đã duyệt</span>	Có	<span style="color: green;">🔓</span>	<span style="color: green;">ลบ Xóa</span>
3	Âm dương thần mạch	<span style="background-color: green; color: white; padding: 2px;">đã duyệt</span>	Không	<span style="color: green;">🔒</span>	<span style="color: green;">ลบ Xóa</span>

0 of 3 row(s) selected.

Rows per page 10

Page 1 of 1

&lt;&lt; &lt; &gt; &gt;&gt;

**Figure 3.19** UI Chapter management for Writer

Display a chapter management table where writers can:

- Thêm chương mới
- Chính sửa chương
- Xóa

**Figure 3.20** UI Add new chapter

Writers can add a new chapter with the following details:

- Tên chương
- STT chương (chèn chương/chương tiếp)
- Nội dung

### 3.1.3 Admin side interface

➤ URL: <https://admin.doctruyen.io.vn>

The screenshot shows a table titled "Danh sách truyện" (List of novels) under the "AdminHub" header. The table has columns: Tên truyện (Title), Hiện thị (Visible) (with a switch), Chương (Chapters), Lượt đọc (Reads), Trang thái (Status), Ngày đăng (Published Date), and three more columns for actions: Thông tin truyện (Story info), Danh sách chương (List of chapters), Đọc truyện (Read story), and Xóa (Delete). There are 10 rows of data, each representing a different novel. A sidebar on the left lists various admin tasks like "Danh sách truyện", "Tất cả", etc.

Tên truyện	Hiển thị ↑	Chương ↑	Lượt đọc ↑	Trang thái ↑	Ngày đăng ↑
Tự Cẩm	<input checked="" type="checkbox"/>	2	604	Đang ra	23/04/2024 09:56
Ngạo Thủ Đan Thần	<input checked="" type="checkbox"/>	3	2311	Đang ra	
Nàng không muốn làm hoàng hậu	<input checked="" type="checkbox"/>	3	21	Đang ra	
Kieu sủng vị thương	<input checked="" type="checkbox"/>	2	5	Đang ra	
Linh vũ thiên hạ	<input checked="" type="checkbox"/>	1	2	Đang ra	10/05/2024 23:09
Mê đắm	<input checked="" type="checkbox"/>	0	0	Đang ra	10/05/2024 23:11
Không phụ thề duyên	<input checked="" type="checkbox"/>	0	0	Đang ra	10/05/2024 23:11
Thần đạoдан tôn	<input type="checkbox"/>	0	0	Đang ra	10/05/2024 23:14
Thiếu tướng, vợ ngài nỗi giận rồi	<input type="checkbox"/>	0	0	Đang ra	10/05/2024 23:15
Dịu dàng tận xương	<input type="checkbox"/>	1	2	Đang ra	17/05/2024 23:45

Figure 3.21 UI Novel management for Admin

Display a novel management table where the admin can perform actions such as:

- Hiển thị (switch)
- Thông tin truyện
- Danh sách chương
- Đọc truyện
- Xóa

The screenshot shows a detailed view of a novel titled "Tự Cẩm". The top part displays the novel's cover and its title. Below the cover is a summary table with the following data:

Tên truyện	Tự Cẩm
Thể loại	Võ Đô, Tiên Hiệp
Số chương	2
Lượt đọc	604
Đè cù	5
Tác giả	Tịnh Tiêu Tặc
Người đăng	admin1

Below the table is a "Mô tả" (Description) section containing a paragraph about the novel's plot. At the bottom, there is a "Đánh giá: 8.8/10 (có 3 đánh giá)" (Rating: 8.8/10 (3 reviews)) section with three bullet points: "Tính cách nhân vật: 8", "Nội dung cốt truyện: 8.3", and "Bối cảnh thế giới: 10".

Figure 3.22 UI Preview novel details

Display detailed information about a novel and ratings.

### Danh sách chương

STT ↑	Tên chương ↑	Hiển thị ↑	Khóa ↑	Duyệt ↑	Trạng thái ↑	Xoa ↑
1	Nàng không tin Yến Đinh lại lừa nàng chuyện lớn đến vậy!	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<span style="background-color: green; color: white; padding: 2px;">đã duyệt</span>	<span style="color: blue;">Xoa</span>
2	Ngủ hoàng tử bùi thừa tư trời vè!	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<span style="background-color: green; color: white; padding: 2px;">đã duyệt</span>	<span style="color: blue;">Xoa</span>
3	Oan gia ngõ hẹp!	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<span style="background-color: lightgray; color: gray; padding: 2px;">chưa duyệt</span>	<span style="color: blue;">Xoa</span>

**Figure 3.23** UI Chapter management for Admin

Display a chapter management table where the admin can perform actions such as:

- Hiển thị (switch)
- Khóa (switch)
- Duyệt (switch)
- Xóa

### Danh sách tài khoản

Họ và tên ↑	Username ↑	Email ↑	Vai trò ↑	Premium ↑
Hoan Cu Te	writer1	hoanvipboi@gmail.com	Writer	Không
Hacker X	hacker_x	huyt56545@gmail.com	Reader	Có
Hoan Lê	user12312312312	leconghoancute69@gmail.com	Reader	Có
Hoan Lê	testcai	leconghoancute68@gmail.com	Reader	Không

0 of 4 row(s) selected.

Rows per page: 10 | Page 1 of 1 | << | < | > | >>

**Figure 3.24** UI Account management for Admin

Display an account management table where the admin can manage each account and assign roles with three roles available: reader, writer, admin.

Thông tin tài khoản

 reader-vip-1	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">First name</td> <td>Hacker</td> </tr> <tr> <td>Last name</td> <td>X</td> </tr> <tr> <td>Username</td> <td>hacker_x</td> </tr> <tr> <td>Email</td> <td>huyt56545@gmail.com</td> </tr> <tr> <td>Vai trò</td> <td>reader</td> </tr> <tr> <td>Premium</td> <td>reader-vip-1   Từ 11/05/2024 đến 11/06/2024</td> </tr> <tr> <td>Ngày tạo</td> <td>09/05/2024 06:38</td> </tr> </table>	First name	Hacker	Last name	X	Username	hacker_x	Email	huyt56545@gmail.com	Vai trò	reader	Premium	reader-vip-1   Từ 11/05/2024 đến 11/06/2024	Ngày tạo	09/05/2024 06:38
First name	Hacker														
Last name	X														
Username	hacker_x														
Email	huyt56545@gmail.com														
Vai trò	reader														
Premium	reader-vip-1   Từ 11/05/2024 đến 11/06/2024														
Ngày tạo	09/05/2024 06:38														

**Figure 3.25** UI Preview account

Display detailed information about one account.

Tìm kiếm theo tên truyện		View		
		Người tạo ↑	Trạng thái ↑	Ngày tạo ↓
<input type="checkbox"/>	Title ↑	hacker_x	Đã giải quyết	27/05/2024 23:02
<input type="checkbox"/>	góp ý Ngao Thé Đan Thần	admin1	Chưa giải quyết	28/05/2024 22:48
<input type="checkbox"/>	truyện Tự Cấm vi phạm bản quyền			

0 of 2 row(s) selected.      Rows per page: 10      Page 1 of 1      << < > >>

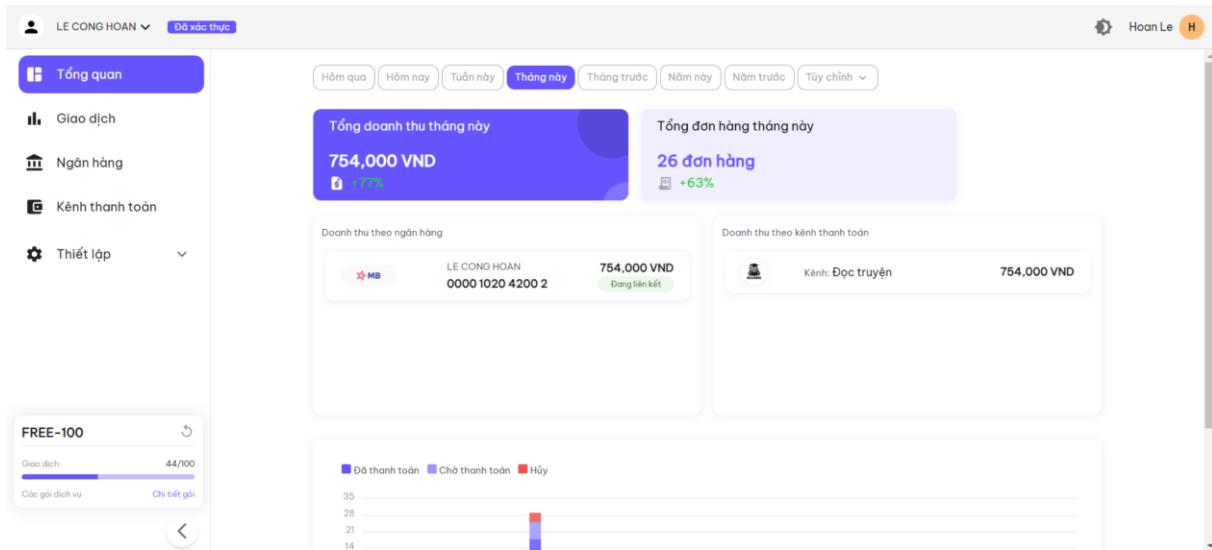
**Figure 3.26** UI Report management

Display a table for managing the list of reports.

<p><b>Báo cáo</b></p> <p>ID báo cáo: 6654ae8294b048b74954ca1e            Tiêu đề: góp ý Ngao Thé Đan Thần            Nội dung: ngôn ngữ đà kích, không hợp main chính</p>	<p><b>Người tạo</b></p> <p>Username: hacker_x            Email: huyt56545@gmail.com            Vai trò: reader</p>
<p><b>Trả lời</b></p> <p>Nội dung</p> <div style="border: 1px solid #ccc; padding: 5px; min-height: 100px;">           bộ phận admin đã tiếp nhận ý kiến của bạn và phản ánh đến nhà viết truyện!            cảm ơn bạn đã báo cáo         </div> <p><b>Gửi</b></p>	<p><b>Người trả lời</b></p> <p>Username: Hoan Le            Email: lehoan.dev@gmail.com</p>

**Figure 3.27** UI Report details

Display detailed information about one report. The admin can directly respond to the report here.



**Figure 3.28 UI Order dashboard**

Display an overview of orders from PayOS.

DANH SÁCH CỘT								Xuất dữ liệu
Kênh thanh toán	Tổng tiền	Ngày tạo	Mô tả	Số tài khoản	Mã đơn hàng	Trạng thái	Chi tiết	
Đọc truyền	29,000	22-05-2024 23:25:17	CSUTXA5BIC0 PREMIUM1T	0000 1020 4200 2	116981	Đã thanh toán		
Đọc truyền	29,000	16-05-2024 10:29:40	CSWQPQ81376 PREMIUM1T	0000 1020 4200 2	180413	Hủy		
Đọc truyền	29,000	15-05-2024 18:44:16	CSY7II8SMP6 PREMIUM1T	0000 1020 4200 2	456633	Hủy		
Đọc truyền	29,000	11-05-2024 08:40:25	CSQOQRR8JS9 PREMIUM1T	0000 1020 4200 2	624775	Đã thanh toán		
Đọc truyền	29,000	09-05-2024 15:37:44	CSLB04MZ3V4 PREMIUM1T	0000 1020 4200 2	864039	Đã thanh toán		
Đọc truyền	29,000	09-05-2024 13:39:11	CS8MIUOSTNO PREMIUM1T	0000 1020 4200 2	751159	Đã thanh toán		

**Figure 3.29 UI Order management**

Display a detailed table of orders where the admin can view and export data.

## 3.2 Deployment

### 3.2.1 Deploy Next.js on Vercel

- Step 1: Set up Vercel account:
  - Go to [Vercel](#).
  - Sign up for an account if you haven't already.
- Step 2: Connect your git repository:
  - Link your GitHub account to Vercel.
  - Import your Next.js project repository.
- Step 3: Configure project settings:
  - Select the project you want to deploy.

- Set the root directory if your Next.js app is in a subdirectory.
- Step 4: Configure environment variables:

**Table 3.1** Environment variables Vercel

No	Key	Description
1	NODE_ENV	Environment in which the application is running
2	MONGO_URI	MongoDB Atlas connection string
3	NEXT_PUBLIC_CLERK_PUBLISHABLE_KEY	Clerk publishable API key for the frontend
4	CLERK_SECRET_KEY	Clerk secret API key
5	CLERK_WEBHOOK_SECRET	Clerk webhook secret
6	NEXT_PUBLIC_CLERK_SIGN_IN_URL	URL for the Clerk sign-in page
7	NEXT_PUBLIC_CLERK_SIGN_UP_URL	URL for the Clerk sign-up page
8	NEXT_PUBLIC_CLERK_SIGN_IN_FORCE_REDIRECT_URL	URL to which users are redirected after signing in
9	NEXT_PUBLIC_CLERK_SIGN_UP_FORCE_REDIRECT_URL	URL to which users are redirected after signing up
10	NEXT_PUBLIC_CLOUDINARY_CLOUD_NAME	Cloudinary cloud name for storing images
11	PAYOS_CLIENT_ID	PayOS client ID for payment integration
12	PAYOS_API_KEY	PayOS API key for payment integration
13	PAYOS_CHECKSUM_KEY	PayOS checksum key for securing payment requests

### 3.2.2 Domain name configuration

- Step 1: Set up Tenten account:
  - Go to [Tenten](#).
  - Choose domain name: “doctruyen.io.vn”
  - Payment.
  - Check the results returned in the email.

- Step 2: Set up NS (Name Server):

Tên miền	doctruyen.io.vn
NS1	ns1.vercel-dns.com (*)
NS2	ns2.vercel-dns.com (*)

**Figure 3.30** Set up Name Server

- Step 3: Set up DNS (Domain Name Server):

	Tên	Loại	Giá trị	Độ ưu tiên	Thao tác
<input type="checkbox"/>	admin	CNAME	admin.doctruyen.io.vn	0	<a href="#">Sửa</a> <a href="#">Xóa</a>
<input type="checkbox"/>	writer	CNAME	writer.doctruyen.io.vn	0	<a href="#">Sửa</a> <a href="#">Xóa</a>

**Figure 3.31** Set up Domain Name Server

### 3.2.3 Integrate Clerk for Authentication

- Step 1: Set up Clerk account:
  - Go to [Clerk](#).
  - Sign up for an account if you haven't already.
  - Create a Clerk Application.
  - Note down the ‘Frontend API’ and ‘API Key’.
- Step 2: Set up Organizations:
  - Create Organizations.
  - Note down the ‘Organization ID’.
  - Add administrator.
- Step 3: Set up Organizations:
  - Create Organizations (name, slug, owner, logo).

Name

Logo



**Upload image** **Remove**

Slug ? Optional

Owner



Hoan Le  
lehoan.dev@gmail.com

**cancel** **Create**

**Figure 3.32 Create Organizations**

- Note down the ‘Organization ID’.
- Add administrator.
- Create permissions:

Permission	Key ↑	...
reader-vip tài khoản nâng cấp lên premium	org:reader:vip	
tạo truyện tạo truyện mới	org:writer:create	

**Figure 3.33 Create permissions**

- Create roles:

Role ↑	Key	Permissions
<b>Admin</b> <span>Creator role</span> Role with elevated permissions in the organization.	org:admin	org:sys_profile:manage, org:sys_profile:delete, org:sys_memberships:read, org:sys_memberships:manage, org:sys_domains:read, org:sys_domains:manage, org:writer:create
<b>Đọc giả</b> <span>Verified domains role</span> Role with non-privileged permissions in the organization.	org:reader	org:sys_memberships:read
<b>Nhà viết truyện</b> Nhà viết truyện	org:writer	org:writer:create

**Figure 3.34 Create roles**

- Step 4: Customize session token:

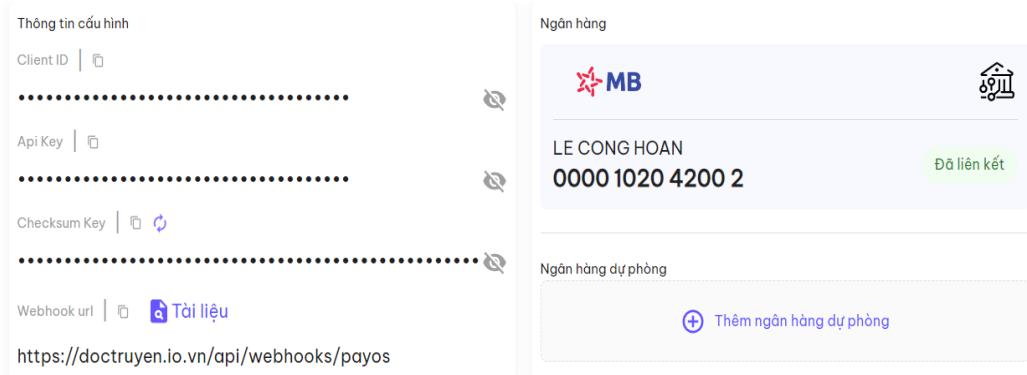
```
{
  "id": "{{user.id}}",
  "email": "{{user.primary_email_address}}",
  "avatar": "{{user.image_url}}",
  "full_name": "{{user.full_name}}",
  "public_metadata": "{{user.public_metadata}}"
}
```

**Figure 3.35** Customize session token

- Step 5: Set up endpoint webhook.

### 3.2.4 Integrate PayOS for Payment

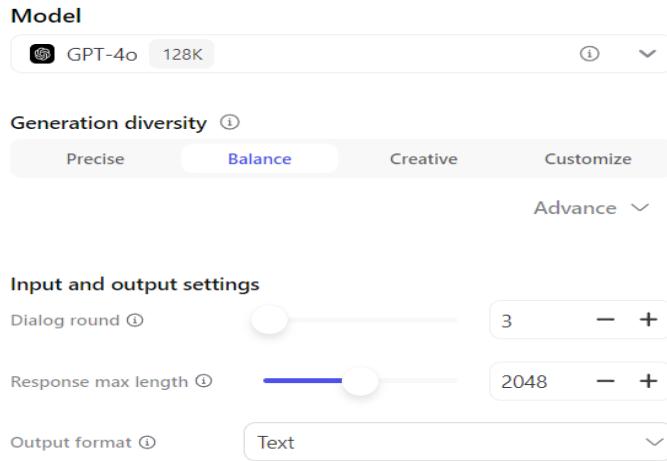
- Step 1: Set up PayOS account:
  - Go to [PayOS](#).
  - Sign up for an account if you haven't already.
- Step 2: Set up organization.
- Step 3: Setup payment channel:



**Figure 3.36** Setup payment channel

### 3.2.5 Integrate Chatbot AI for Coze

- Step 1: Set up Coze account:
  - Go to [Coze](#).
  - Sign up for an account if you haven't already.
- Step 2: Create bot:
  - Set up workspace, bot name...
  - Sign up for an account if you haven't already.
- Step 3: Model Configuration: GPT-4o (128k)



**Figure 3.37** Model configuration

- Step 4: Add persona & prompt
- Step 5: Create Knowledge:
  - Text Format: text data.
  - Table Format: JSON data via API.
- Step 6: Test preview.
- Step 7: Publish with Web SDK.

### 3.3 Evaluate website with Page Speed Insights

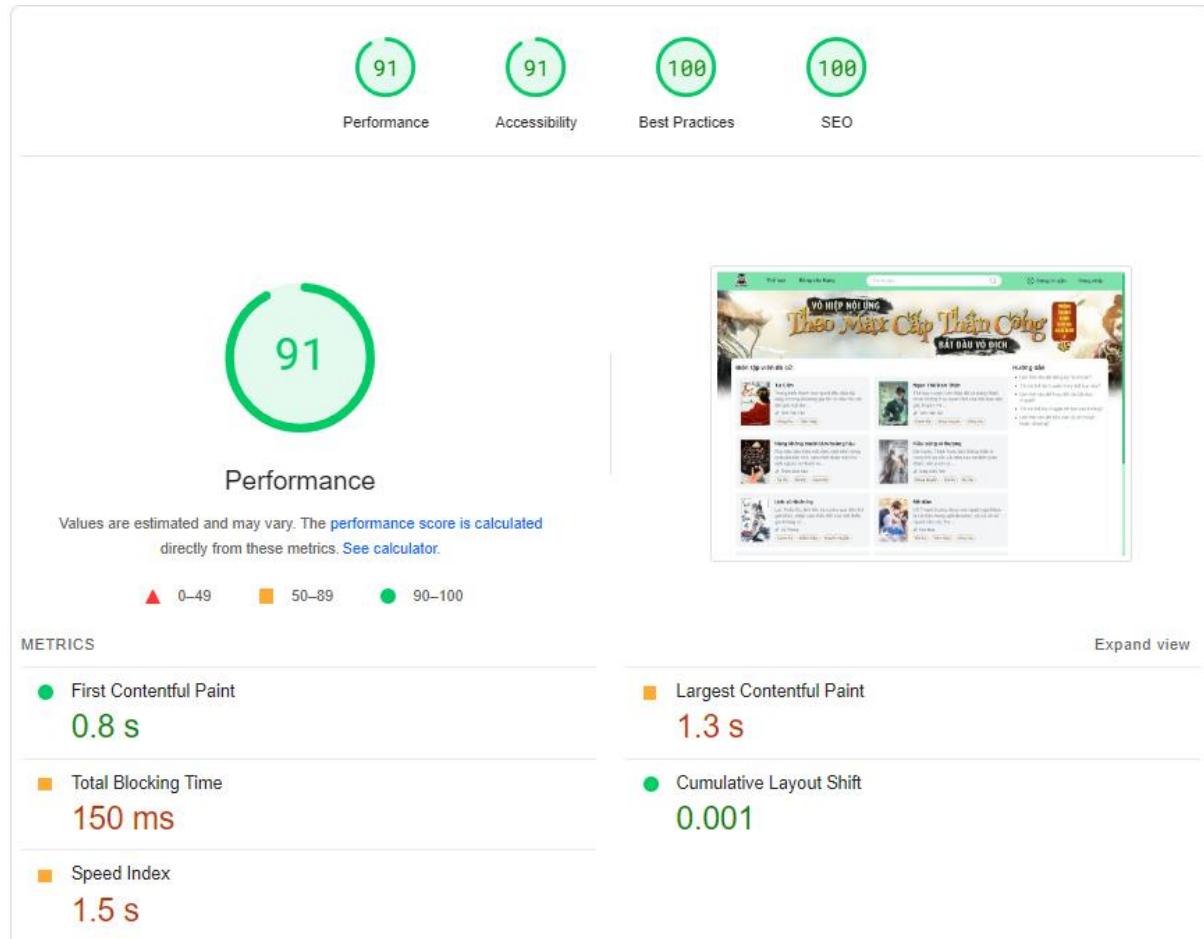
Steps to use Page Speed Insights:

- Step 1: Access Page Speed Insights
  - Visit the [Google Page Speed Insights](#) website.
- Step 2: Enter Your URL:
  - In the text box, enter the URL of the web page you want to test.
  - Click the "Analyze" button.
- Step 3: Review the Results:
  - PageSpeed Insights will analyze your web page and provide a score out of 100 for both mobile and desktop performance.
  - The results are divided into several sections.

The site audit summary provides a comprehensive overview of the website's performance, highlighting strengths and areas for improvement. By analyzing factors such as: performance, accessibility, best practices and SEO.

**Table 3.2** Site audit summary

No.	Category	Description	Key Metrics/Areas	Improvement Tips
1	Performance	Measures page load speed and interactivity.	First Customer Program, Last Customer Program, Speed Index, Time to Insight, Throwback Thursday, Clear Screen	Optimize images, minify CSS/JS, use browser caching, lazy load images, reduce server response times, use a CDN
2	Accessibility	Ensures content is accessible to all users, including those with disabilities.	Color Contrast, Alt Text, Keyboard Navigation, Aria Attributes, Labels	Use semantic HTML, check color contrast, provide alt text, ensure focus states, use aria landmarks
3	Best Practices	Focuses on common pitfalls and best practices in web development.	Security (HTTPS), Performance Best Practices (resource loading), Progressive Web Apps principles	Use HTTPS, avoid deprecated APIs, ensure safe links, optimize resource loading
4	SEO	Optimizes site for search engines to improve visibility.	Meta Tags (title, description, viewport), Structured Data (JSON- Linked Data), Mobile-Friendliness, Crawlability (XML sitemap)	Add meta tags, use structured data, ensure mobile-friendliness, improve crawlability with an XML sitemap and robots.txt



**Figure 3.38** Test result Google speed inside

**Table 3.3** Scoring results Google speed inside

No	Report time	Performance	Accessibility	Best Practices	SEO
1	24/5/2024 8:17:51 PM	94	91	100	100
2	25/5/2024 9:20:24 PM	92	91	100	100
3	26/5/2024 9:19:42 PM	91	93	100	100
4	27/5/2024 9:34:32 PM	91	92	100	100
5	28/5/2024 8:25:13 PM	92	91	100	100

# CONCLUSION AND RECOMMENDATIONS

## 1. Advantages and challenges

- About the advantages: During the three-month period, under the enthusiastic guidance of Dr. Nguyen Kim Sao, I had ample time to prepare, gather information, and apply new technologies. With a solid foundation in Next.js, I was able to explore and utilize various resources related to TypeScript, Next.js, MongoDB, Clerk and Coze available on the Internet. The extensive documentation and support from the Clerk support team in Discord greatly facilitated the successful completion of the project.

- Regarding the challenges: While working on the project, I encountered several issues, particularly with the PayOs payment library, which lacked proper documentation. This required me to invest significant time in self-study and writing supplementary documentation.

## 2. Achievements

- Successfully developed a web application with three distinct interfaces for readers, writers, and administrators, encompassing all essential functionalities.
- Implemented cutting-edge technology techniques, resulting in high performance and efficiency.
- Enhanced understanding of Next.js, Clerk, and the website development process, effectively integrating them together.
- Expanded knowledge of MongoDB and its application in database management.
- Acquired proficiency in utilizing Git and GitHub for code management, as well as deploying applications to Vercel, including domain name pointing.

## 3. Remaining issues

- The platforms being used are all on free tiers, thus may not adequately handle high loads of requests when there is a large volume of traffic.
- The full potential of Next.js SEO capabilities has not been fully utilized.
- The daily training data for the AI model through the API is limited in size, potentially restricting the effectiveness and accuracy of the model's learning process.

## 4. Future directions

- Mobile Application Development
- Integration with Push Notifications

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