"CRIMINAL RECORD MANAGEMENT SYSTEM"

A

Project Report

submitted

in partial fulfillment

for the award of the Degree of

Bachelor of Technology

in Department of Information Technology

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Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Department of Information Technology

CERTIFICATE

This is to certify that Ms Ayushi Katyayan, a student of B.Tech(Information Technology) VIII semester has submitted his/her Project Report entitled ”Criminal Record Management System” under my guidance.

Mentor

Name: Mr. Praveen Kumar Yadav

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Coordinator

Name: Dr. Priyanka Yadav

Designation: Assistant Professor

Signature.....

CERTIFICATE

This is to certify that Mr. Akshat Tanwar, a student of B.Tech(Information Technology) VIII semester has submitted his/her Project Report entitled ”Criminal Record Management System” under my guidance.

Mentor

Name: Mr. Praveen Kumar Yadav

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DECLARATION

We hereby declare that the report of the project entitled ”Criminal Record Management System” is a record of an original work done by us at Swami Keshvanand Institute of Technology, Management and Gramothan, Jaipur under the mentorship of ”Mr. Praveen Kumar Yadav”(Dept. of Information Technology) and coordination of ”Dr. Priyanka Yadabv” (Dept.of Information Technology). This project report has been submitted as the proof of original work for the partial fulfillment of the requirement for the award of the degree of Bachelor of Technology (B.Tech) in the Department of Information Technology.It has not been submitted anywhere else, under any other program to the best of our knowledge and belief.

Team Members **Signature**

Team Member1: Ayushi Katyayan (21ESKIT029)

Team Member2: Akshat Tanwar (21ESKIT010)

Acknowledgement

A project of such a vast coverage cannot be realized without help from numerous sources and people in the organization.We take this opportunity to express our gratitude to all those who have been helping us in making this project successful.

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Last but not least we would like to thank all those who have directly or indirectly helped and cooperated in accomplishing this project.

Team Members:
Team Member1: Ayushi Katyayan (21ESKIT029)
Team Member2: Akshat Tanwar (21ESKIT010)

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Chapter 1
Introduction

1.1 Problem Statement and Objective

The Criminal Record Management System (CRMS) aims to centralize criminal record management to improve accessibility and efficiency across law enforcement agencies. It ensures quick and easy access to crime-related information, particularly in rural and remote areas. The system, inspired by the successful implementation in Mexico City, seeks to address rising crime rates in India by providing timely information to authorities.

1.2 Literature Survey / Market Survey / Investigation and Analysis

A review of existing systems across various regions has revealed key challenges faced by law enforcement in managing criminal records. Studies indicate that centralized systems improve efficiency in criminal investigations. For example, Mexico City's CRMS has led to a reduction in crime rates by improving data accessibility.

Region/Country	**System Used**	**Key Features**	**Impact/Outcome**
Mexico City	Centralized CRMS	Real-time updates, Biometric integration	15% decrease in crime rate, improved arrest rate
India (State-wise systems)	Fragmented local databases	Manual record entry, lack of interoperability	Slower investigations, redundant entries
USA (NCIC)	National Crime Information Center	Nationwide database, Law enforcement accessible	Fast background checks, efficient tracking
UK	Police National Computer (PNC)	Vehicle tracking, criminal history, fingerprints	Improved coordination across departments

Table 1.1: Comparison of Criminal Record Management Systems

1.3 Introduction to Project

The Criminal Record Management System (CRMS) is designed to modernize and streamline the way criminal data is handled by law enforcement agencies. The system aims to eliminate the limitations of manual record-keeping by providing a centralized digital platform that facilitates the registration, tracking, and retrieval of criminal records in real-time. It will enhance operational efficiency by enabling officers and administrators to access relevant data instantly through a user-friendly interface. The system will also support features such as data validation, search filtering, and role-based access control to maintain the integrity and security of sensitive information.

CRMS will be accessible across multiple devices, including desktops, tablets, and smartphones, ensuring field officers can perform critical operations without the need for a physical presence at the police station. With cloud deployment and responsive web design, the platform will deliver consistent performance and accessibility regardless of the device or location.

1.4 Proposed Logic / Algorithm / Business Plan / Solution / Device

The proposed solution follows a modular architecture that separates concerns across the backend, frontend, and database layers. The backend will be developed using Node.js and Express.js, ensuring scalability and fast data handling. A relational database like MySQL or PostgreSQL will be used to structure and store criminal records efficiently, allowing for normalized data relationships and optimized querying.

The frontend will be developed using Angular, ensuring a dynamic and responsive user interface. The UI will focus on minimalism and accessibility, enabling officers to quickly perform tasks such as adding new records, updating existing ones, and performing advanced searches using multiple filters like name, location, or crime type.

For secure data handling, the system will implement encrypted API communication using HTTPS and token-based authentication (such as JWT). Each user role (admin, officer, viewer) will have specific permissions, reducing the risk of unauthorized access.

The business plan includes phased deployment—starting with a few districts or states—and incorporating feedback for iterative improvement. Training modules and user documentation will accompany each release to ensure smooth adoption by law enforcement personnel. In the long term, the system could also be monetized by offering it as a SaaS solution to private security firms or other government agencies.

1.5 Scope of the Project

The scope of the CRMS project encompasses both software development and practical deployment in real-world policing environments. Initially, the project will focus on implementing the core modules—user management, criminal data entry, search functionality, and reporting—in a pilot phase within selected Indian states. This phase will serve as a foundation for testing usability, performance, and security features.

In future expansions, the system will integrate additional features such as facial recognition support, fingerprint matching, and predictive analytics using machine learning algorithms to identify crime patterns and potential threats. The long-term goal includes interlinking CRMS with national databases like CCTNS (Crime and Criminal Tracking Network Systems) and providing an API for seamless data exchange with other justice and public safety systems.

Moreover, the project anticipates expansion into multilingual support, offline data caching for remote regions, and compliance with national cybersecurity standards. By addressing the need for a centralized, digital law enforcement tool, CRMS aims to revolutionize crime data management in India and set a benchmark for future e-governance initiatives.

Chapter 2
Software Requirement Specification

2.1 Overall Description

The Criminal Record Management System (CRMS) aims to provide an efficient, centralized digital solution for managing criminal records across various law enforcement bodies. The system will allow police stations and government authorities to register, update, and search for criminal records with ease. One of the major strengths of the CRMS lies in its ability to facilitate real-time data exchange with national crime databases such as CCTNS (Crime and Criminal Tracking Network Systems), ensuring that law enforcement personnel always have access to accurate, up-to-date information.

2.2 Product Perspective

The CRMS will function as a complementary tool to existing law enforcement systems. It will act as an interface layer between users and centralized databases, offering seamless access to vital information. The system will be available as both a web portal and a mobile application, ensuring maximum accessibility and usability across different types of devices and working conditions.

2.2.1 System Interfaces

Interface	Description
Database	Connection to national crime databases such as CCTNS
Mobile App	Android/iOS interface for on-field criminal data access
Web Interface	Secure web portal for record registration and management
Authentication System	Integration with government-issued officer credentials

Table 2.1: System Interfaces

2.2.2 User Interfaces

The system will provide a responsive, user-friendly interface for law enforcement officers. The web interface will offer dashboards, forms for data entry, and analytics panels, while the mobile interface will allow officers to quickly access or register information on the go. Features like autocomplete, quick search, and input validation will enhance the user experience and reduce human error.

2.2.3 Hardware Interfaces

The CRMS is designed to be hardware-agnostic. It will be accessible on desktops, laptops, tablets, and smartphones. Police officers may be issued tablets for use in the field, with offline storage enabled to ensure functionality even without an active internet connection. On the backend, the system will run on cloud-based servers to support load balancing and failover mechanisms.

2.2.4 Software Interfaces

The application will interact with a relational database (e.g., PostgreSQL or MySQL) through an ORM (Object-Relational Mapping) layer. RESTful APIs will be provided for integration with third-party systems, such as government analytics tools or judicial case management systems. Middleware will be used for secure data exchange and logging.

2.2.5 Communications Interfaces

All communication between clients and servers will be encrypted using SSL/TLS protocols. Additionally, token-based authentication (such as JWT) will be employed to secure API access. The system will support HTTPS by default, ensuring data confidentiality and integrity.

2.2.6 Memory Constraints

To ensure smooth performance on mobile devices with limited memory, the application will implement optimized queries, data caching, and lazy loading where appro-

priate. The mobile app will include options to store minimal essential data locally and synchronize with the server upon reconnection.

2.2.7 Operations

The CRMS will support 24/7 operations, with scheduled maintenance windows. It will include features such as automated backups, error logging, health monitoring, and disaster recovery protocols to ensure continuous availability and data integrity.

2.2.8 User Characteristics

The primary users of the CRMS will be law enforcement officers, including constables, inspectors, and administrative staff. Given the varying levels of technical knowledge, the interface will be designed with intuitive workflows, minimal text inputs, guided forms, and tooltips to assist users with navigation.

2.2.9 Constraints

The application must be scalable to accommodate an increasing number of users and data entries. It should be modular to support enhancements without significant rework. All data must comply with data protection laws and government security guidelines. The system should be adaptable for multilingual use across different regions.

2.2.10 Assumptions and Dependencies

The proper functioning of the CRMS depends on consistent internet access for synchronization, although offline data collection modes will be available. It is also assumed that law enforcement agencies will provide users with modern digital devices and maintain secure physical access to these devices.

Chapter 3

System Design Specification

3.1 System Architecture

The CRMS follows a client-server architecture where mobile and tablet clients interact with a centralized server for criminal record management. The server is responsible for data storage, security, and communication with external systems.

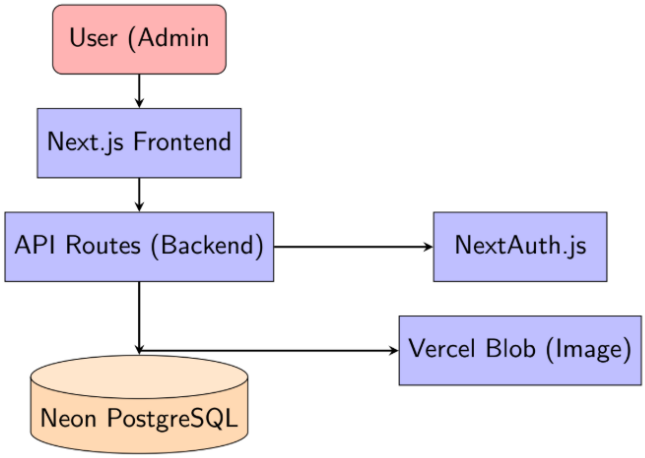

Figure 3.1: System Architecture Diagram

3.2 Module Decomposition Description

The system is divided into modules for:

- User Authentication
- Criminal Record Registration
- Data Retrieval and Searching
- Reporting and Analytics

3.3 High Level Design Diagrams

3.3.1 Use Case Diagram

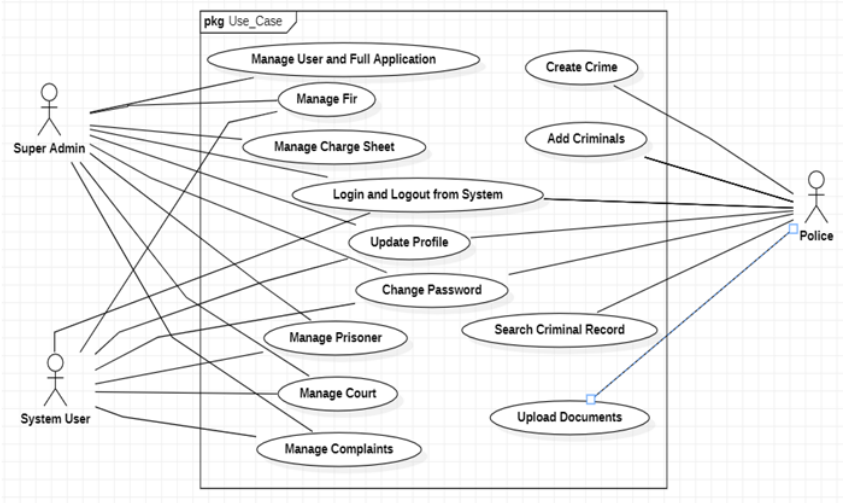

Figure 3.2: Use Case Diagram

3.3.2 Activity Diagram

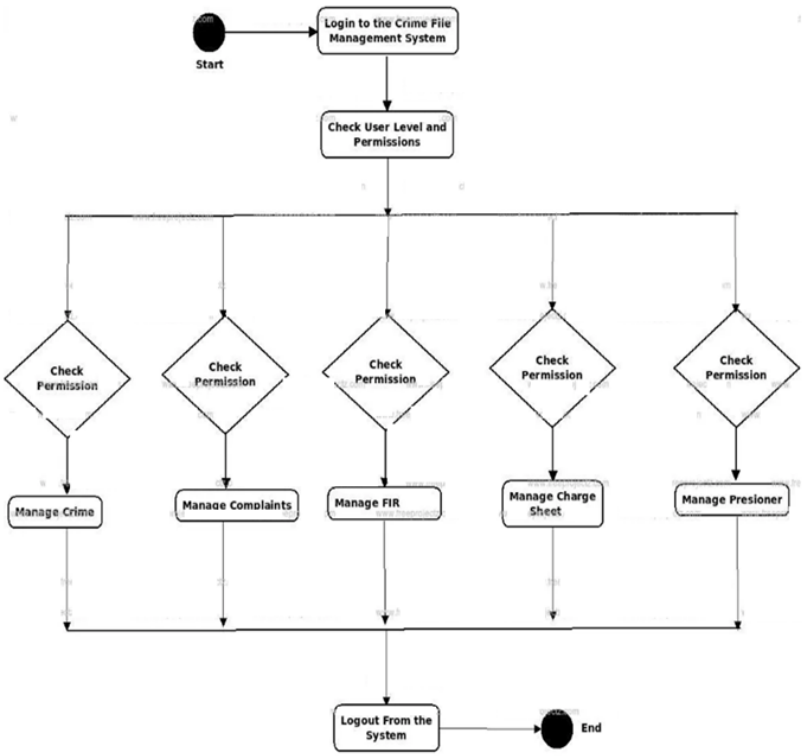

Figure 3.3: Activity Diagram

3.3.3 Data-Flow Diagram

Figure 3.4: Data-Flow Diagram (Level 0)

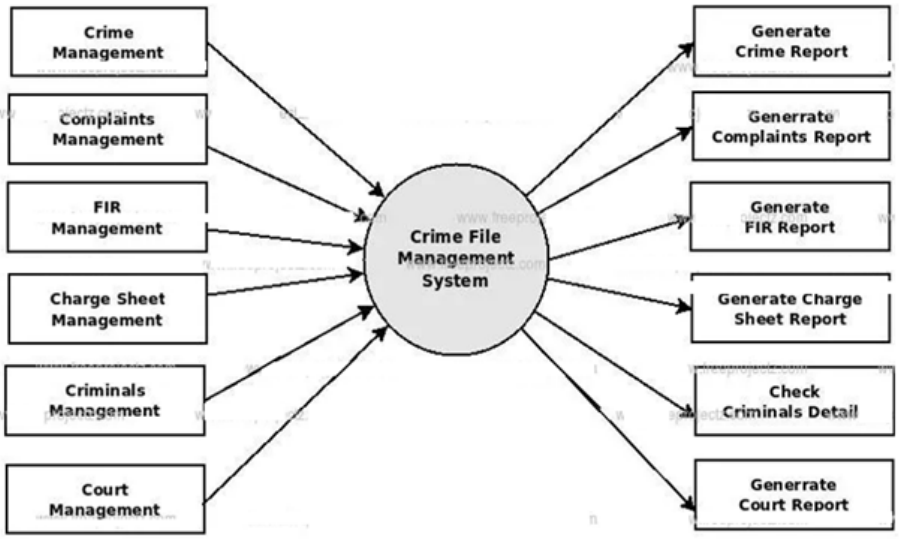

Figure 3.5: Data-Flow Diagram (Level 1)

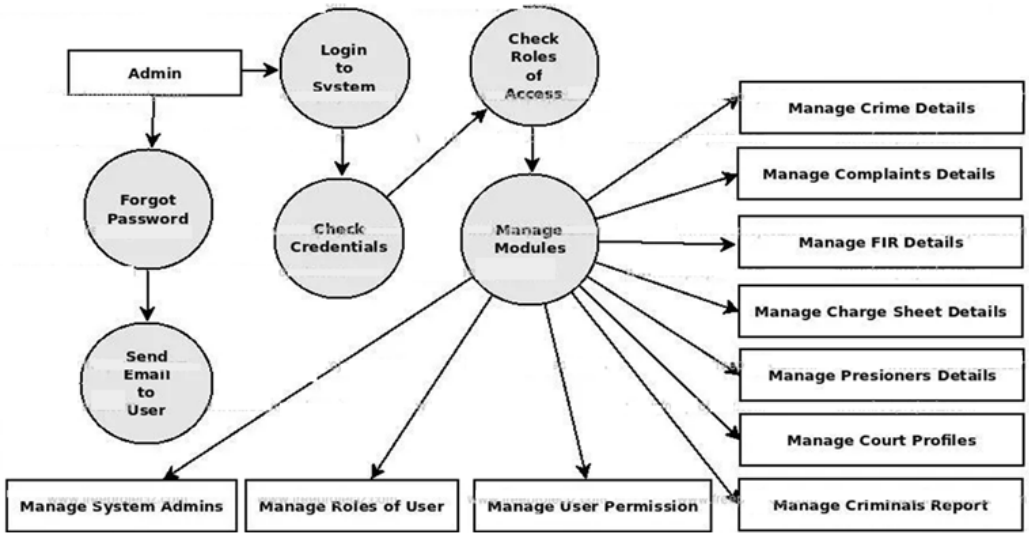

Figure 3.6: Data-Flow Diagram (Level 2)

3.3.4 Class Diagram

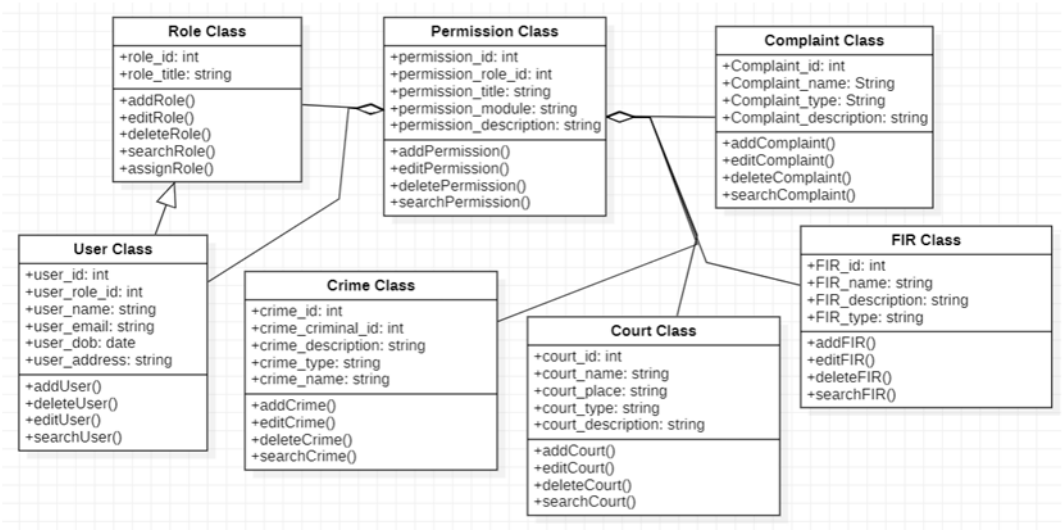

Figure 3.7: Class Diagram

Chapter 4
Methodology and Team

4.1 Introduction to Waterfall Framework

The CRMS development process adopts the **Waterfall model**, a linear and sequential approach where each phase of the software development life cycle (SDLC) is clearly defined and completed before the next one begins. The primary phases include:

- **Requirement Analysis:** Detailed study of user needs and system expectations to outline comprehensive software requirements.
- **System Design:** Creation of system architecture, data models, and interface layouts based on the gathered requirements.
- **Implementation:** Development of the application using appropriate technologies, ensuring modular and maintainable code.
- **Testing:** Rigorous testing including unit, integration, and system tests to identify and fix bugs.
- **Deployment:** Deployment of the system on production environments such as Vercel and NeonDB.
- **Maintenance:** Periodic updates, bug fixes, and performance enhancements post-deployment.

The Waterfall model was chosen due to its structured nature, which is ideal for government-related systems that require thorough documentation, traceability, and formal approvals after each phase. It also allows for milestone-based progress tracking and quality control.

4.2 Team Members, Roles & Responsibilities

The CRMS project was successfully executed by a dedicated and collaborative team. Each member contributed significantly to different phases of the development life cycle, ensuring the system's reliability and usability.

- **Akshat Tanwar (Frontend Developer)** Responsible for designing and developing the user interface using HTML, CSS, and Angular. Implemented mobile responsiveness, form validation, and dashboard components.
- **Ayushi Katyayan (Backend Developer)** Handled the server-side logic and APIs using Node.js. Developed secure login systems, RESTful endpoints for data management, and ensured data consistency.
- **Ayushi Katyayan (Database Engineer)** Designed the MySQL/NeonDB schema for efficient data storage. Ensured optimized query performance, indexing, and implemented backup strategies.
- **Akshat Tanwar (QA and Testing Lead)** Conducted test case design, unit testing, and integration testing. Ensured bug tracking and resolution before final deployment.
- **Akshat Tanwar (Deployment Lead)** Led the deployment process of the CRMS application. Managed hosting on Vercel for the frontend and NeonDB for the database. Configured environment variables and ensured seamless integration between frontend, backend, and database services.

The team's collaborative effort ensured the delivery of a robust, scalable, and user-friendly Criminal Record Management System.

Chapter 5
Centering System Testing

5.1 Functionality Testing

The system will undergo functionality testing to ensure that all core features are working as intended. This includes testing each module such as user authentication, criminal record registration, record search, data update, and deletion functionalities. Test cases will be written for both valid and invalid inputs to ensure the robustness of the system. Special attention will be given to edge cases, such as duplicate entries or incomplete data submissions, to validate system behavior.

5.2 Performance Testing

Performance testing will evaluate the responsiveness, stability, and scalability of the CRMS. The system will be tested under various load conditions to simulate real-world usage scenarios involving hundreds or thousands of users accessing and querying the database simultaneously. Key metrics such as response time, throughput, CPU usage, and memory consumption will be monitored. Stress testing and load testing tools like Apache JMeter or Postman will be used to analyze system performance under extreme conditions.

5.3 Usability Testing

Usability testing will be conducted by a diverse group of users, including police officers with minimal technical background. The focus will be on the clarity of the interface, ease of navigation, form completion time, and overall user satisfaction. Feedback from these tests will be used to iteratively improve the UI/UX design. Tools like user session recording and post-test surveys will be used to gather qualitative insights and identify potential usability bottlenecks.

5.4 Security Testing

Security testing will ensure that the system is protected against common vulnerabilities such as SQL injection, cross-site scripting (XSS), and unauthorized access. Role-based access control will be validated to ensure users can only access features relevant to their permissions. Penetration testing will be performed to identify any weak points in the authentication, authorization, and data encryption mechanisms.

5.5 Compatibility Testing

The system will be tested on different browsers (Chrome, Firefox, Edge, Safari) and devices (desktops, tablets, smartphones) to ensure consistent performance and appearance. This will help verify that the CRMS is fully responsive and accessible on various platforms without any visual or functional errors.

5.6 Regression Testing

As the system evolves and new features are added, regression testing will be regularly performed to ensure that previously working functionalities remain unaffected. Automated testing tools will be leveraged for efficient testing of repeated actions.

5.7 Acceptance Testing

Before deployment, acceptance testing will be conducted with key stakeholders, including law enforcement officials and project supervisors. This testing will verify that the system meets all business requirements and works effectively in real-world scenarios. Any feedback received will be used to perform final refinements.

Chapter 6
Test Execution Summary

The Test Execution Summary Report provides a comprehensive overview of the testing process, documenting the status of tests, resources consumed, and outcomes. This report serves as a final document summarizing all tests executed during the project lifecycle. It is an essential tool for the client, offering transparency and insight into the testing results.

The Test Execution Summary includes the following key details:

- Test Case ID generated
- Total number of resources consumed
- Number of Passed Test Cases
- Number of Failed Test Cases
- Status of Test Cases (Pass/Fail)

The report captures essential information on all the test cases executed during the project, ensuring that the client is well-informed about the system's robustness, reliability, and performance. Below is a summary table containing test case details:

Each row in the table corresponds to a specific test case, including its unique Test Case ID, a brief description of the test, its result (pass/fail), and the resources consumed during its execution. The total number of resources consumed refers to the computational resources, such as CPU time and memory usage, required to execute the test case.

From the table, we can see the breakdown of test results: - Test Cases `TC-001`, `TC-003`, and `TC-005` passed successfully, confirming that key functionalities like user login, data retrieval, and logout work as intended. - Test Cases `TC-002` and

S.No	Test Case Id	Test Case Description	Test Case Status	No. of Resources Consumed
1	TC-001	User Login functionality	Passed	87837
2	TC-002	Criminal record registration	Failed	5415
3	TC-003	Data retrieval from database	Passed	7507
4	TC-004	Record deletion functionality	Failed	7560
5	TC-005	User logout process	Passed	6344

Table 6.1: Summary of Test Cases and Resources Consumed

`TC-004` failed during execution, indicating issues in criminal record registration and record deletion, which require further investigation and fixing.

The summary report is invaluable for tracking the progress of the project and identifying any areas that may need improvement. The next steps in the project will involve addressing the failed test cases and optimizing the system to ensure all functionalities work flawlessly across different scenarios.

Chapter 7
Project Screen Shots

This section provides a snapshot of the system's user interface and functionality. Below are screenshots from various sections of the CRMS, showcasing the simplicity and user-friendly design.

7.1 Vercel Interface

- Shows the live deployment status and build logs for the frontend hosted on Vercel.

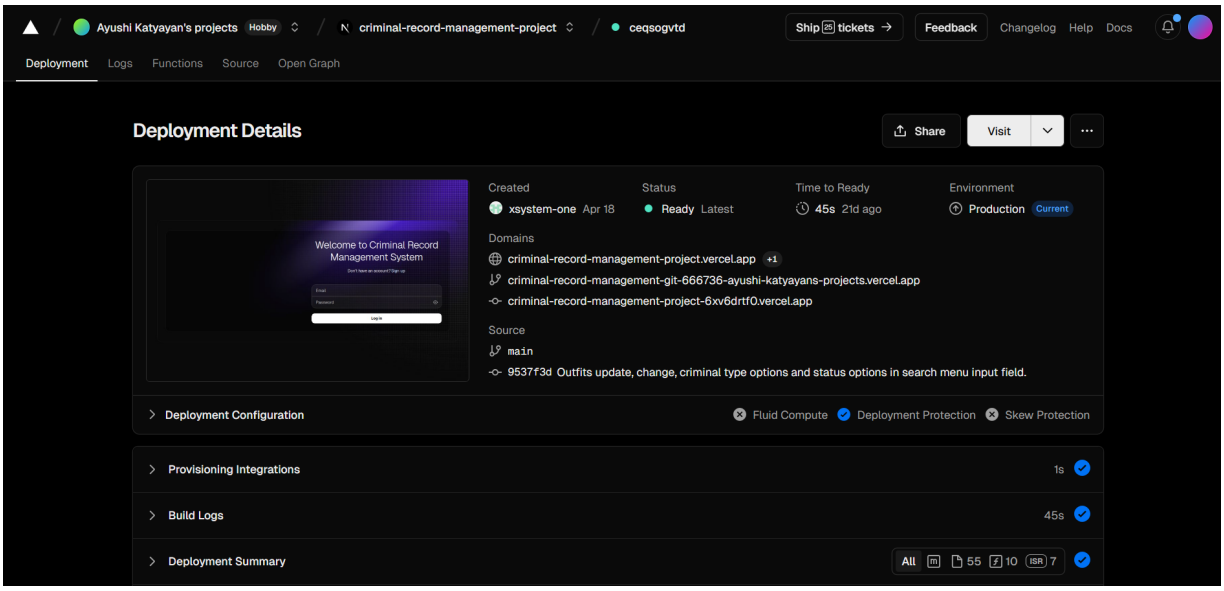

Figure 7.1: Deployment Interface

7.2 Neon Console

- Displays the backend PostgreSQL/NeonDB console used for managing and querying data directly.

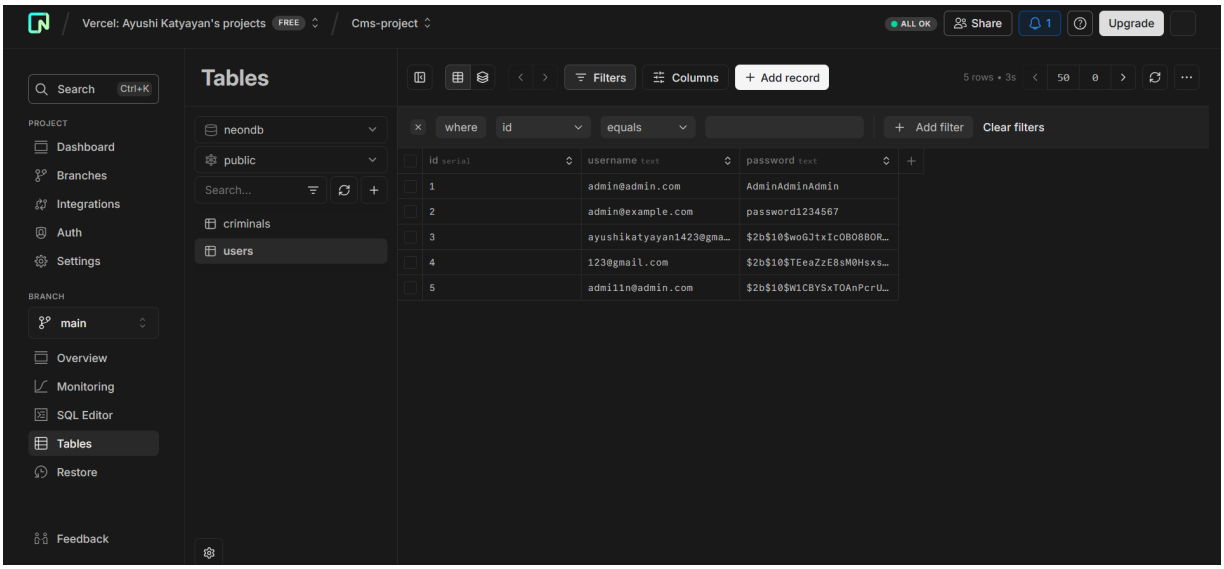

Figure 7.2: Database Console

7.3 Login Page

- Allows registered users to securely log in to the CRMS system using email and password.

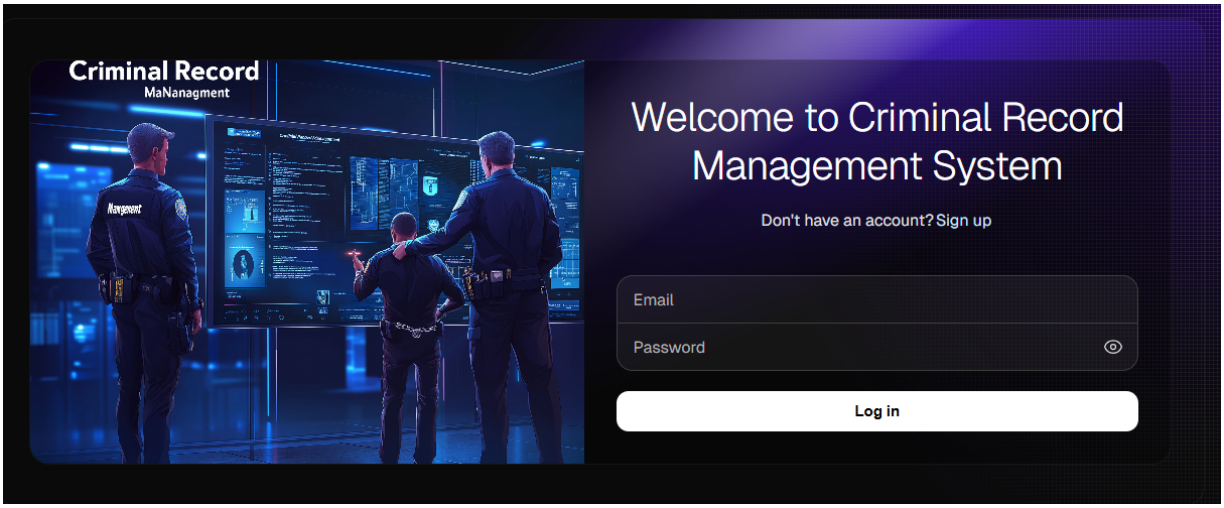

Figure 7.3: Login Page

7.4 User Table - Neon

- Shows the structure and content of the ‘users‘ table storing login and access credentials.

id serial	username text	password text
1	admin@admin.com	AdminAdminAdmin
2	admin@example.com	password1234567
3	ayushikatyayan1423@gma…	$2b$10$woGJtxIcOBO8BOR…
4	123@gmail.com	$2b$10$TEeaZzE8sM0Hsxs…
5	admi11n@admin.com	$2b$10$W1CBYSxTOAnPcrU…

Figure 7.4: Login Users Table

7.5 Dashboard

- Provides an overview of the system, including navigation options and quick stats.

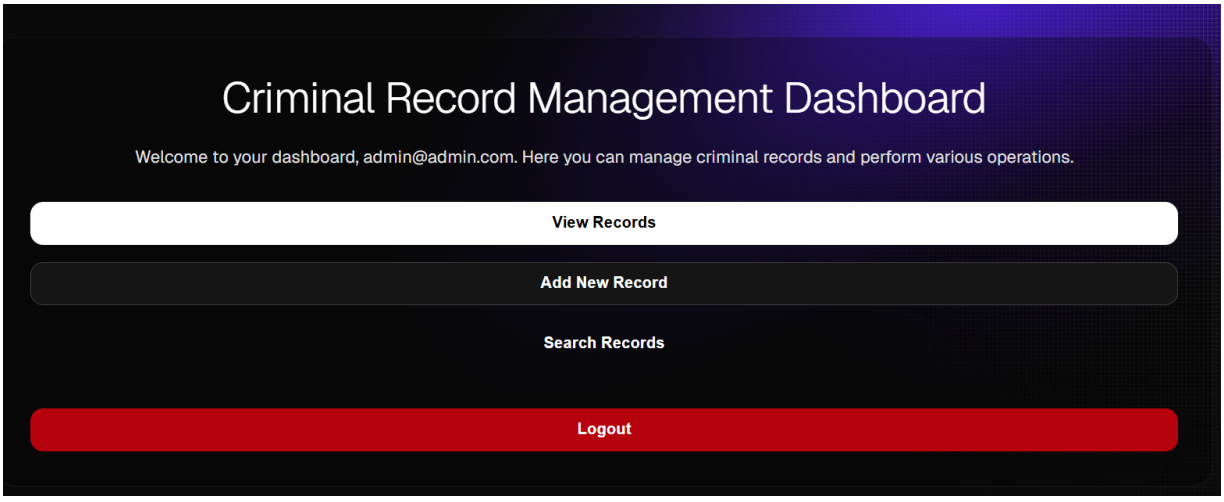

Figure 7.5: Dashboard Page

7.6 Add Record

- Enables users to input new criminal records into the database via structured forms.

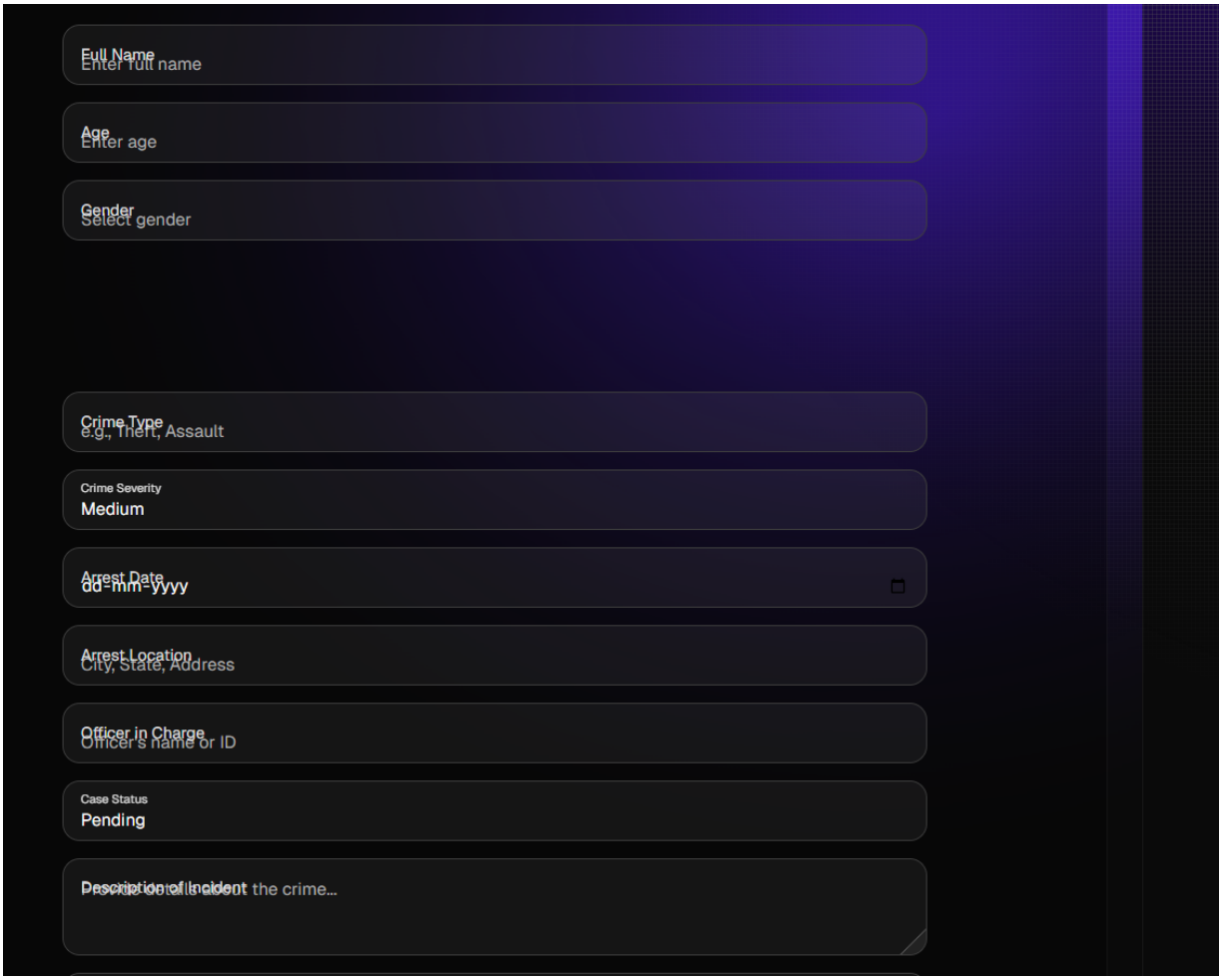

Figure 7.6: Add Criminal Record Interface

7.7 Records Interface - Vercel

- Displays all stored criminal records in a tabular format with edit and delete options.

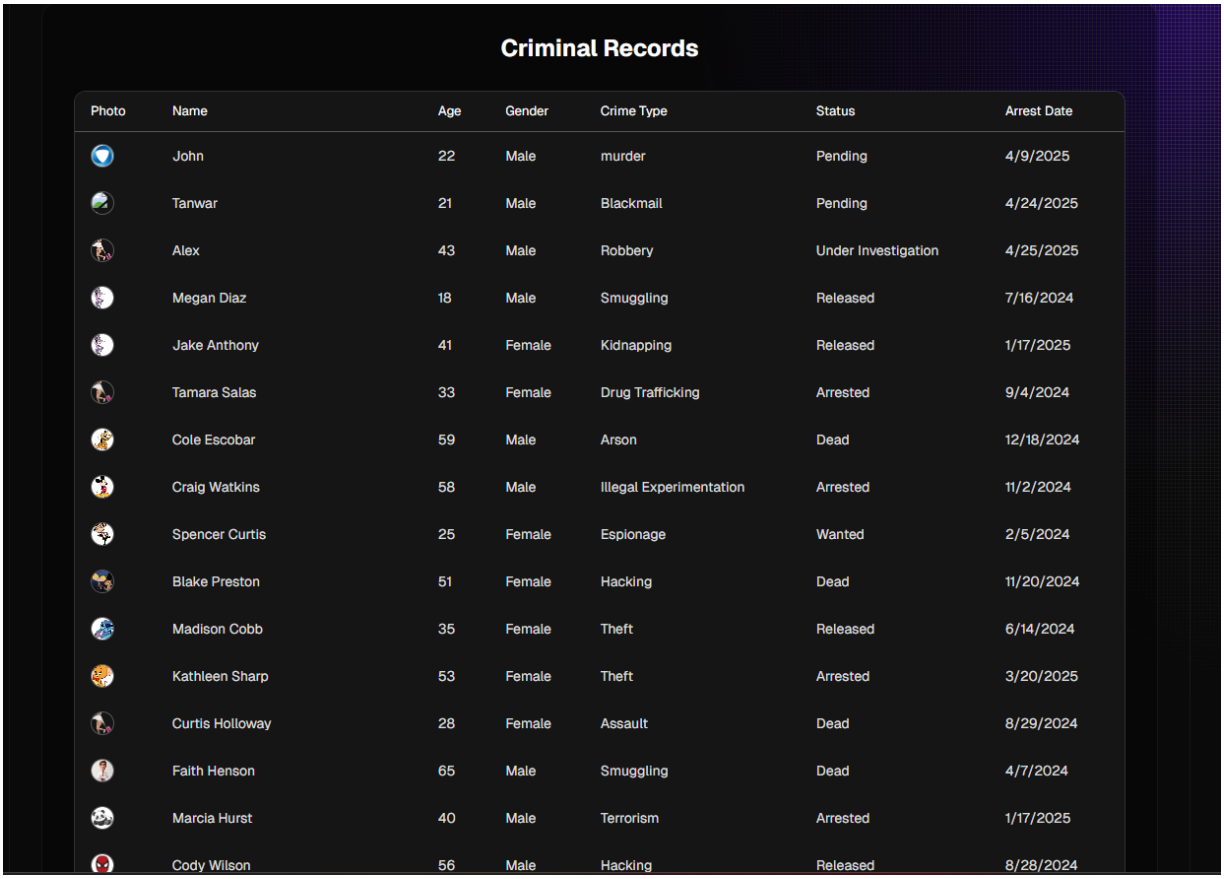

Figure 7.7: Criminal Records Interface (Vercel)

7.8 Criminal Table - Neon

- Backend view of the ‘criminals‘ table showing raw data storage with schema structure.

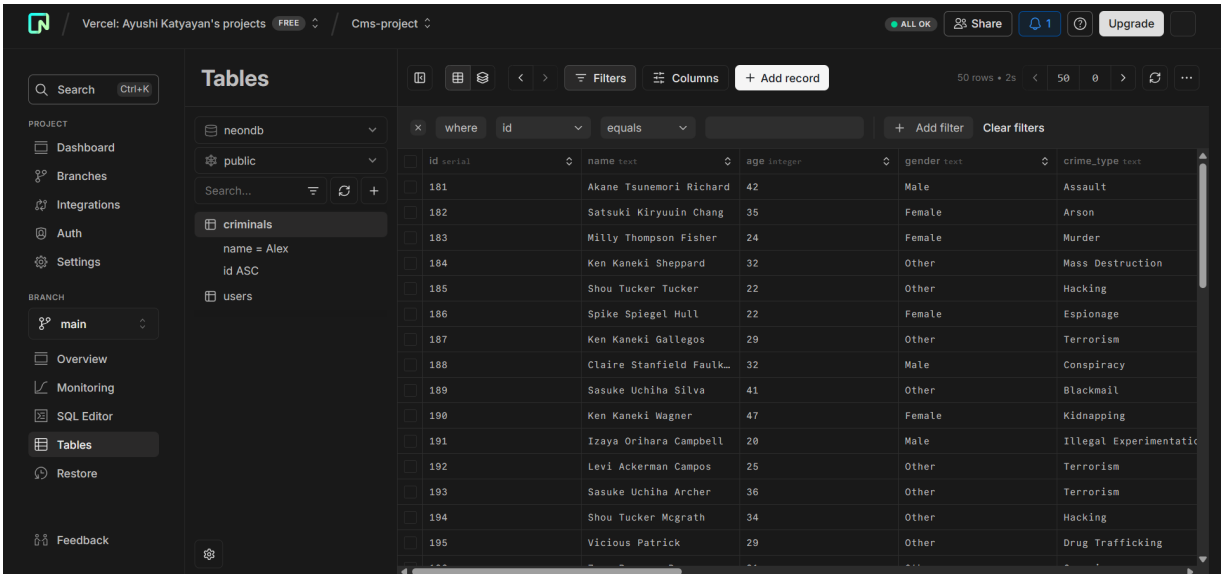

Figure 7.8: Criminal Table in Neon Console

7.9 Search Feature

- Enables users to filter and locate specific records based on keywords or IDs quickly.

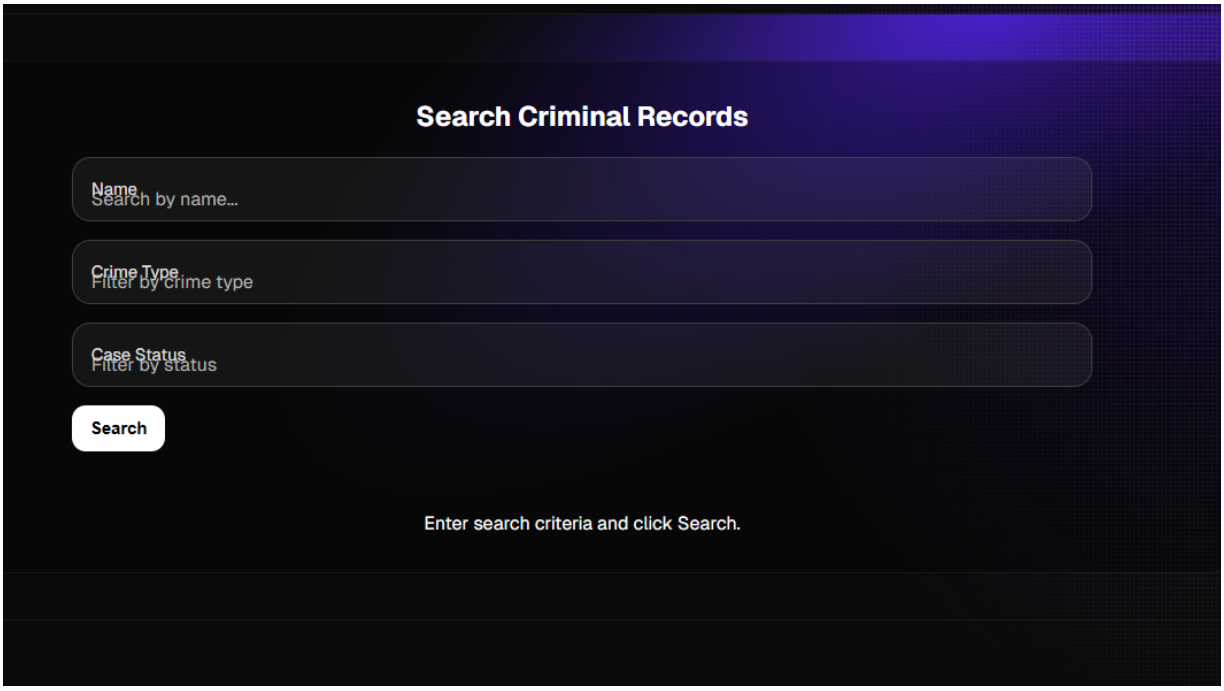

Figure 7.9: Search Functionality

Chapter 8
Project Summary and Conclusions

The Criminal Record Management System (CRMS) has successfully been developed to streamline the management of criminal records for law enforcement agencies. The system provides an intuitive interface for police officers to register, retrieve, and manage criminal records efficiently. The system's design emphasizes security, scalability, and user-friendliness, ensuring it can be deployed effectively across a wide range of law enforcement agencies in India.

8.1 Conclusion

The CRMS will play a crucial role in improving the speed and efficiency with which law enforcement officers access criminal data. By digitizing criminal records, it reduces reliance on manual processes, thereby minimizing human error and improving data accuracy. Furthermore, the system's scalability ensures that it can be extended to accommodate future technological advancements, such as machine learning for crime prediction.

The project has achieved its primary objective of creating a user-friendly and secure criminal record management platform. The system is ready for deployment and will significantly aid in crime prevention and law enforcement operations.

Chapter 9
Future Scope

While the CRMS meets the current requirements for criminal record management, there are several opportunities for enhancement and expansion in the future:

9.1 Integration with National Crime Databases

Future versions of the CRMS will integrate with national crime databases, allowing for real-time updates on criminal records and ensuring that officers across India have the latest information at their fingertips. This will also allow for better cross-state data synchronization and quicker sharing of criminal records.

9.2 Machine Learning for Predictive Policing

Machine learning algorithms can be integrated into the CRMS to analyze crime patterns and predict areas at higher risk of criminal activity. This can assist law enforcement agencies in proactively addressing potential threats by deploying resources to high-risk areas, improving crime prevention efforts.

9.3 Mobile App Enhancements

The mobile application will be enhanced to include features such as facial recognition for criminal identification, geolocation tracking for incident reporting, and push notifications for updates on criminal records. This will make it easier for officers and citizens to report crimes or find relevant criminal information on the go.

9.4 Cloud-Based Storage

To improve scalability and accessibility, the CRMS will be migrated to the cloud. This will ensure that the system can handle a growing amount of data while main-

taining high availability and security. Cloud storage will also improve disaster recovery capabilities and data redundancy, ensuring that critical information is protected and always accessible.

9.5 Integration with Other Government Systems

In the future, CRMS can be integrated with other governmental systems, such as the judicial records system, to provide a more comprehensive solution for managing criminal and legal data. This will create a unified platform for law enforcement agencies, courts, and other government bodies to access and share relevant data efficiently.

9.6 AI-Powered Crime Scene Investigation Assistance

Incorporating AI technology to assist in crime scene investigation will allow CRMS to analyze physical evidence more efficiently, such as identifying patterns from crime scene photos, videos, and other forensic data. This could assist investigators in making connections between crimes, improving case resolution times.

9.7 Real-Time Video Integration with Surveillance Cameras

Integrating CRMS with surveillance camera networks will enable law enforcement to monitor real-time footage and automatically compare it against criminal databases for any known suspects. This could significantly improve response times and help catch criminals in the act.

9.8 Blockchain for Secure Record Management

Implementing blockchain technology could provide an additional layer of security, ensuring that criminal records cannot be tampered with once entered into the system. Blockchain's decentralized nature can help prevent unauthorized access or alterations to criminal data, ensuring its integrity.

9.9 Enhanced Data Visualization and Reporting

To provide more actionable insights for law enforcement, the CRMS will integrate enhanced data visualization tools. This will include real-time dashboards, heatmaps of criminal activity, and detailed reports that can aid in decision-making and resource allocation.

9.10 Integration with International Crime Databases

In an effort to combat international crime, future versions of CRMS may integrate with international criminal databases, allowing law enforcement agencies to track criminals across borders. This will assist in identifying suspects who have committed crimes in other countries and aid in international investigations.

9.11 Smart Case Management System

To streamline case investigations, CRMS can be enhanced with a smart case management system that tracks the progress of each case, from filing to resolution. The system can provide automatic reminders, deadlines, and updates to ensure that cases are handled efficiently and on time.

References

[1] *Criminal Record Management System using Angular, Node.js, and MySQL*; Manish Singh, Department of Computer Science, Ajay Kumar Garg Engineering College, April 2025.

[2] *National Integrated Information and Criminal Justice System*; National Informatics Centre (NIC), Ministry of Home Affairs, Government of India, 2018. Available: `https://digitalpolice.gov.in`

[3] *A Secure and Centralized Criminal Record Management System using Blockchain Technology*; L. Meijer, P. Rana, and T. Batra, IEEE International Conference on Advanced Computing, 2020.

[4] *Inter-Operable Criminal Justice System (ICJS)*; Ministry of Home Affairs, Government of India. Available: `https://mha.gov.in/sites/default/files/ICJS_ProjectDetails.pdf`

[5] *Digitization of Criminal Records and Case Tracking using Web Technologies*; Shweta Rani and A. Malhotra, International Journal of Computer Applications, vol. 183, no. 10, pp. 25–30, Sept. 2021.