K.RAMAKRISHNAN
COLLEGE OF ENGINEERING
An Autonomous Institution
Permanently Affiliated to Anna University Chennai, Approved by AICTE New Delhi,
ISO 9001:2015, 14001:2015 certified institution, Accredited by NBA and with A grade by NAAC
Samayapuram, Tiruchirappalli – 621 112, Tamilnadu, India.

A Project Report

on

DIGITAL NOTICE BOARD SYSTEM

Submitted in partial fulfillment of requirements for the award of the course

of

CGB1201 – JAVA PROGRAMMING

Under the guidance of

Mrs. P. GEETHA, M.E.,

Submitted By

SANA FATHIMA (8115U23AM043)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
(ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)

K. RAMAKRISHNAN COLLEGE OF ENGINEERING
(Autonomous)

TRICHY-621 112

DECEMBER 2024

K. RAMAKRISHNAN COLLEGE OF ENGINEERING

(Autonomous Institution affiliated to Anna University, Chennai)

TRICHY-621 112

BONAFIDE CERTIFICATE

Certified that this project report on **" DIGITAL NOTICE BOARD SYSTEM"** is the bonafide work of **SANA FATHIMA J (8115U23AM043)** who carried out the project work during the academic year 2024 - 2025 under my supervision.

Signature

Mr. P.GEETHA,

ASSISTANT PROFESSOR,

Department of Artificial Intelligence and Data Science,

K. Ramakrishnan College of Engineering, Samayapuram, Trichy-621 112.

Signature

Dr. B.KIRAN BALA

HEAD OF THE DEPARTMENT,

Department of Artificial Intelligence and Data Science,

K. Ramakrishnan College of Engineering, Samayapuram, Trichy-621 112.

.

Submitted for the End Semester Examination held on …….

INTERNAL EXAMINER **EXTERNAL EXAMINER**

DECLARATION

I jointly declare that the project report on **"DIGITAL NOTICE BOARD SYSTEM "** is the result of original work done by us and best of our knowledge, similar work has not been submitted to **"ANNA UNIVERSITY CHENNAI"** for the requirement of Degree of BACHELOR OF ENGINEERING. This project report is submitted on the partial fulfillment of the requirement of the award of the course **CGB1201- JAVA PROGRAMMING**

SIGNATURE

SANA FATHIMA J

ACKNOWLEDGEMENT

It is with great pride that I express our gratitude and indebtedness to our institution**,"K.RAMAKRISHNAN COLLEGE OF ENGINEERING (Autonomous)",**for providing us with the opportunity to do this project. I extend our sincere acknowledgment and appreciation to the esteemed and honorable Chairman, **Dr. K. RAMAKRISHNAN, B.E.,** for having provided the facilities during the course of our study in college.

I would like to express our sincere thanks to our beloved Executive Director, **Dr.S. KUPPUSAMY, MBA, Ph.D.,** for forwarding our project and offering an adequate duration to complete it .

I would like to thank **Dr. D. SRINIVASAN, M.E., Ph.D., FIE., MIIW.,MISTE., MISAE., C. Engg.,** Principal, who gave the opportunity to frame the project to full satisfaction.

I would like to thank **Dr. B. KIRAN BALA, B.Tech., M.E., M.B.A., Ph.D., M.I.S.T.E., U.A.C.E.E., IAENG**, Head of the Department of Artificial Intelligence and Machine Learning, for providing his encouragement in pursuing this project.

I wish to convey our profound and heartfelt gratitude to our esteemed project guide **Mr.P.GEETHA M.E**, Department of Artificial Intelligence and data Science, for her incalculable suggestions, creativity, assistance and patience, which motivated us to carry out this project.

I render our sincere thanks to the Course Coordinator and other staff members for providing valuable information during the course.

I wish to express our special thanks to the officials and Lab Technicians of our departments who rendered their help during the period of the work progress

INSTITUTE VISION AND MISSION

VISION OF THE INSTITUTE:

To achieve a prominent position among the top technical institutions.

MISSION OF THE INSTIITUTE:

M1: To best owstandard technical education parexcellence through state of the art infrastructure, competent faculty and high ethical standards.

M2: To nurture research and entrepreneurial skills among students in cutting edge technologies.

M3: To provide education for developing high-quality professionals to transform the society.

DEPARTMENT VISION AND MISSION

DEPARTMENT OF CSE(ARTIFICIAL INTELLIGENCE AND MACHINELEARNING)

Vision of the Department

To become a renowned hub for Artificial Intelligence and Machine Learning

Technologies to produce highly talented globally recognizable technocrats to meet

Industrial needs and societal expectations.

Mission of the Department

M1: To impart advanced education in Artificial Intelligence and Machine Learning,

Built upon a foundation in Computer Science and Engineering.

M2: To foster Experiential learning equips students with engineering skills to

Tackle real-world problems.

M3: To promote collaborative innovation in Artificial Intelligence, machine Learning, and related research and development with industries.

M4: To provide an enjoyable environment for pursuing excellence while upholding

Strong personal and professional values and ethics.

Programme Educational Objectives (PEOs):

Graduates will be able to:

PEO1: Excel in technical abilities to build intelligent systems in the fields of Artificial Intelligence and Machine Learning in order to find new opportunities.

PEO2: Embrace new technology to solve real-world problems, whether alone or As a team, while prioritizing ethics and societal benefits.

PEO3: Accept lifelong learning to expand future opportunities in research and Product development.

Programme Specific Outcomes (PSOs):

PSO1: Ability to create and use Artificial Intelligence and Machine Learning Algorithms, including supervised and unsupervised learning, reinforcement Learning, and deep learning models.

PSO2: Ability to collect, pre-process, and analyze large datasets, including data Cleaning, feature engineering, and data visualization..

PROGRAM OUTCOMES(POs)

Engineering students will be able to:

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2.Problemanalysis: Identify,formulate,reviewresearchliterature,andanalyzecomplex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectivelyon complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

ABSTRACT

The **Digital Notice Board System** aims to modernize communication systems by transitioning from physical bulletin boards to a dynamic and flexible digital platform. This system is designed to display notices in real-time, offering multimedia capabilities such as text, images, and videos, and can be remotely managed by authorized administrators.The project emphasizes the use of Java technologies for creating a robust, user-friendly system with a centralized management interface and distributed display units. It integrates secure login for user authentication, dynamic content updating for immediate notifications, and multimedia support to enhance information delivery.

ABSTRACT WITH POs AND PSOs MAPPING

ABSTRACT	POs MAPPED	PSOs MAPPED
The Digital Notice Board system is a software application designed to replace traditional notice boards with a dynamic digital solution. It allows authorized users to post, update, and delete notices, ensuring efficient and organized communication. Notices are displayed on a digital interface, making it accessible to the intended audience in real-time. The system provides user-friendly functionality and enhances the notice management process.	PO1 PO2 PO2,PO5 PO3,PO4	PSO1 PSO2

Note: 1- Low, 2-Medium, 3- High

SUPERVISOR **HEAD OF THE DEPARTMENT**

TABLE OF CONTENTS

CHAPTER 1

INTRODUCTION

1.1 Objective

The objective of the Digital Notice Board System is to provide a centralized platform for managing and displaying notices efficiently and in real time. It eliminates the need for manual updates, saving time and reducing effort. The system overcomes the limitations of traditional notice boards by supporting dynamic, multimedia-rich content such as images, videos, and animations. Through automation, it enables users to create, edit, and delete announcements remotely via a user-friendly interface. Immediate synchronization ensures that updates are reflected across all connected displays without delay. This enhances communication by delivering timely and relevant information to the intended audience. The system is accessible from anywhere, offering flexibility to administrators. It also supports scheduling, allowing notices to appear or expire automatically. By addressing traditional inefficiencies, the system promotes streamlined, impactful, and modernized communication.

1.2 Overview

The Digital Notice Board System utilizes Java's powerful features to implement a reliable client-server model, ensuring seamless communication between the central server and display units. It incorporates secure user authentication to restrict access, safeguarding the integrity of the displayed information. The system supports multimedia-rich notices, allowing users to include images, videos, and animations to enhance engagement. Its scalability enables integration with multiple display units, making it adaptable to various organizational needs. Administrators can remotely manage notices from a centralized platform, ensuring real-time updates across all

connected displays. The use of Java ensures platform independence and robust performance. This system is ideal for deployment in educational institutions, corporate environments, and public spaces where efficient communication is critical. It streamlines notice management, replacing manual processes with automated, dynamic updates. The flexibility and security of the system make it a versatile solution for modern communication challenges.

1.3 Java Programming Concepts

 Swing and AWT: These libraries are used to design the graphical user interface (GUI), allowing administrators to interact with the system easily and perform tasks like creating, editing, and managing notices.

 JDBC (Java Database Connectivity): JDBC facilitates seamless connectivity to the database, ensuring efficient storage, retrieval, and management of notices and user credentials.

 Multithreading: This feature is employed to handle multiple simultaneous operations, such as processing user inputs, updating content dynamically, and managing real-time synchronization across display units without lag.

 Networking: Java's networking capabilities enable effective implementation of the client-server model, ensuring continuous communication and real-time updates between the centralized server and connected display units.

CHAPTER 2

PROJECT METHODOLOGY

2.1Proposed Work

The Digital Notice Board System works by connecting a centralized server to multiple digital display units. The server stores notices in a database and pushes updates to the connected displays whenever content is created or modified.

Key Features:

Centralized Management: A web-based or desktop admin interface allows for easy content creation and control.

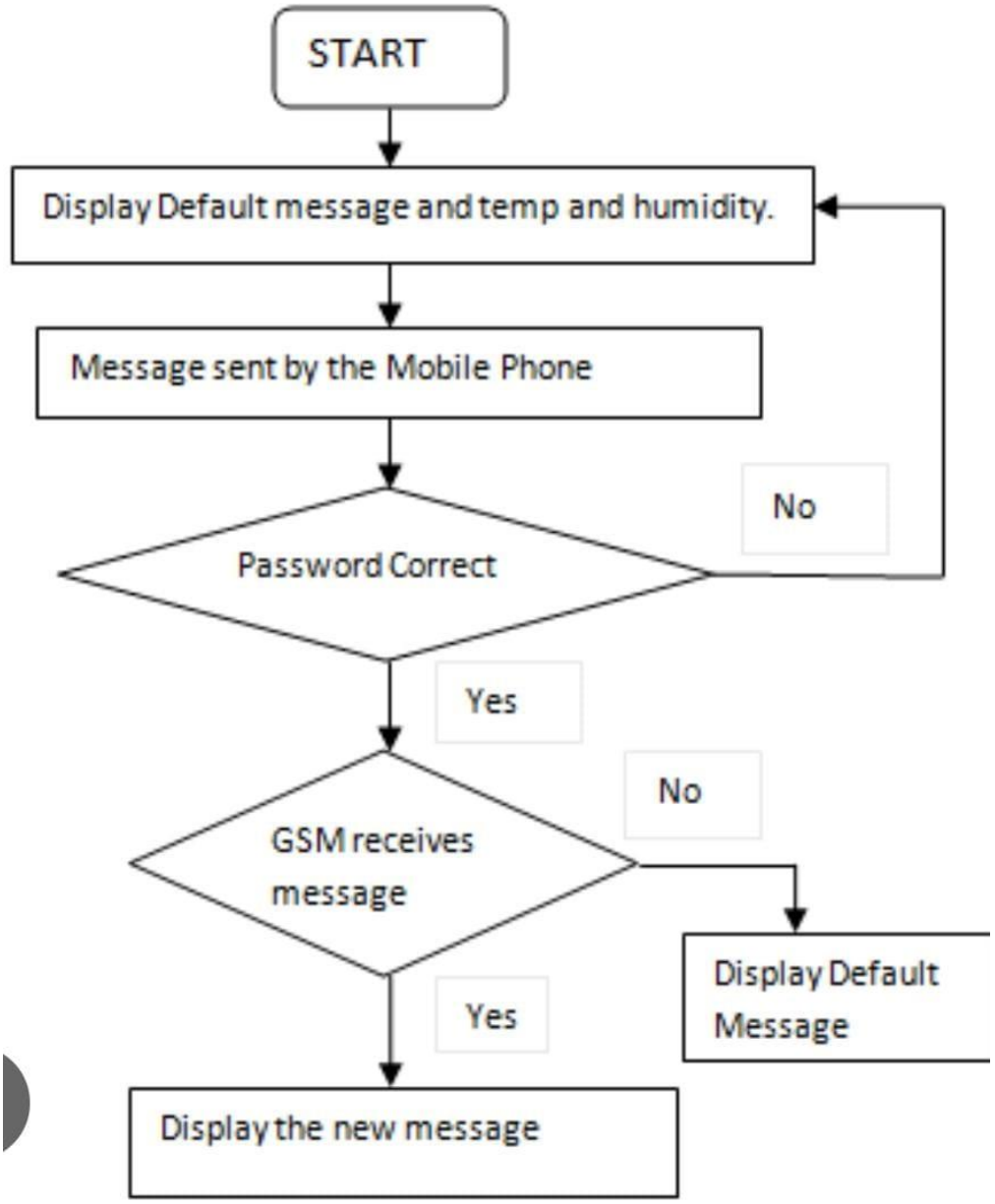
Real-Time Updates: Notices are displayed instantly on connected devices.

Multimedia Support: Text, images, and videos can be displayed for better engagement.

Secure Access: Only authenticated users can manage the system.

Scalability: The system can integrate additional displays without performance degradation.

2.2 Block Diagram



CHAPTER 3

MODULE DESCRIPTION

3.1 User Authentication Module

This module focuses on securing access to the system by implementing a login mechanism for administrators. It ensures that only authorized personnel can manage the notices by requiring valid credentials. User credentials, such as usernames and passwords, are encrypted before being stored in the database. During login, the module verifies the input by comparing the encrypted data with the stored values. This prevents unauthorized access and ensures data security.

3.2 Notice Management Module

The Notice Management Module is central to the system's functionality. It allows administrators to create, edit, delete, and view notices. Notices can include text, images, or multimedia content. Additionally, administrators can schedule notices for specific dates and times, enabling automated updates. The system also prioritizes notices based on their importance, ensuring critical announcements are displayed prominently. This module communicates directly with the database to store and retrieve notices efficiently.

3.3 Display Controller Module

This module is responsible for synchronizing the display of notices across all connected devices. Using Java's networking capabilities, the Display Controller updates the content dynamically whenever a new notice is added or modified. It ensures that all display screens show the most recent information without delays. The module also handles scenarios such as device reconnection or content refresh, maintaining a consistent and real-time display experience.

3.4 Multimedia Integration Module

The Multimedia Integration Module enhances the notice board's capability by supporting various rich media formats, including images, videos, and animations. It utilizes Java's built-in libraries, such as JavaFX and Swing, to render multimedia content seamlessly. This feature makes the notice board more engaging and visually appealing, which is especially useful for announcements, events, or promotional content. The module also optimizes media for different screen resolutions, ensuring compatibility across devices.

3.5 Admin Dashboard Module

The Admin Dashboard serves as the interface through which administrators manage the system. It provides a graphical user interface (GUI) designed for simplicity and efficiency. Key features include tools for managing notices, monitoring connected display statuses, and viewing system logs. The dashboard also tracks user activities and system performance, offering insights into system usage. This centralized interface streamlines the management process, making it easy for administrators to oversee the entire system.

CHAPTER 4

RESULTS AND DISCUSSION

```
=== Digital Notice Board ===
1. Post New Notice
2. Update Notice
3. Delete Notice
4. View Notices
5. Exit
Enter your choice: 1
Enter notice message: hi
Notice added successfully!

=== Digital Notice Board ===
1. Post New Notice
2. Update Notice
3. Delete Notice
4. View Notices
5. Exit
Enter your choice: 2
Enter Notice ID to update: 1
Enter new notice message: hlo
Notice updated successfully!

=== Digital Notice Board ===
1. Post New Notice
2. Update Notice
3. Delete Notice
4. View Notices
5. Exit
Enter your choice: 2
Enter Notice ID to update: 0
Notice ID not found.
```

```
=== Digital Notice Board ===
1. Post New Notice
2. Update Notice
3. Delete Notice
4. View Notices
5. Exit
Enter your choice: 3
Enter Notice ID to delete: 1
Notice deleted successfully!

=== Digital Notice Board ===
1. Post New Notice
2. Update Notice
3. Delete Notice
4. View Notices
5. Exit
Enter your choice: 4
No notices to display.

=== Digital Notice Board ===
1. Post New Notice
2. Update Notice
3. Delete Notice
4. View Notices
5. Exit
Enter your choice: 1
Enter notice message: hlo sana
Notice added successfully!
```

```
=== Digital Notice Board ===
1. Post New Notice
2. Update Notice
3. Delete Notice
4. View Notices
5. Exit
Enter your choice: 4

Current Notices:
ID: 2 | Message: hlo sana

=== Digital Notice Board ===
1. Post New Notice
2. Update Notice
3. Delete Notice
4. View Notices
5. Exit
Enter your choice: 5
Exiting...

=== Code Execution Successful ===
```

DESCRIPTION:

The given output represents the simulation of a Digital Notice Board application, where users can manage notices using a menu-driven interface. Below is a description of the actions performed in this scenario:

Application Features

1. Post New Notice: Add a new notice with a unique ID and a message.
2. Update Notice: Modify an existing notice by its ID.
3. Delete Notice: Remove a notice by its ID.
4. View Notices: Display all current notices.
5. Exit: Close the application.

Execution Walkthrough

1. Post a Notice: A new notice with the message "hi" was successfully added. The system assigns it a unique ID (e.g., ID 1).
2. Update a Notice: The notice with ID 1 was updated from "hi" to "hlo".

When trying to update a non-existent ID (ID 0), the system handled it gracefully by displaying "Notice ID not found."

3. Delete a Notice: The notice with ID 1 was deleted successfully.
4. View Notices: After deletion, the system indicated that there were no notices to display.
5. Post Another Notice: A new notice with the message "hlo sana" was added, assigned ID

6. View Notices Again: The system displayed the existing notice:

ID: 2 | Message: hlo sana

7. Exit: The application was exited after displaying the menu for the final time.

Key Characteristics of the Output

Dynamic ID Assignment: Notice IDs are generated sequentially and retained after deletion.

Robust Handling: The application gracefully handles invalid operations (e.g., updating or deleting non-existent notices).

User Feedback: Success and error messages provide clear feedback for each action.

Functionality: Covers the basic CRUD (Create, Read, Update, Delete) operations in a user-friendly interface.

This demonstrates a well-structured, functional implementation of a Digital Notice Board system.

CHAPTER 5
CONCLUSION

The **Digital Notice Board System** represents a significant leap forward in modernizing communication methods, offering a seamless and efficient solution to replace traditional notice boards. With its ability to streamline the creation, updating, and display of notices, it ensures that information is disseminated quickly and effectively. By supporting various content formats like text, images, and videos, the system caters to diverse needs, making it versatile for institutions, organizations, and businesses. Moreover, its dynamic and interactive nature allows for instant updates, ensuring the content is always relevant and up-to-date.

Key Features of the Current System

1. **Efficiency**: Administrators can post or update notices instantly, eliminating delays associated with traditional physical boards.
2. **Accessibility**: Digital notice boards can reach a wider audience, particularly when integrated with remote or networked displays.
3. **Diverse Content Formats**: The system's support for multimedia such as videos and images enhances the communication of complex or visually driven information, improving user engagement.
4. **Scalability**: Digital systems allow for expansion, such as connecting multiple displays across different locations while maintaining centralized control.

While the current system already provides an impressive foundation, there are several **future enhancements** that can further extend its functionality and usability. Below is a detailed discussion of the proposed improvements:

1. Mobile App Integration

- **What It Entails**:

  By integrating the Digital Notice Board System with a mobile application, administrators and users can manage and access notices on the go. This app would allow:

  - Posting, updating, or deleting notices directly from smartphones.
  - Receiving real-time notifications whenever a new notice is added.
  - Allowing users to browse previous notices or search for specific announcements.

- **Benefits**:
  - **Convenience**: Administrators can update notices without being tied to a desktop or local network.
  - **Wider Access**: Employees, students, or other end-users can check notices directly on their devices, ensuring they never miss important updates.
  - **Offline Capability**: Some features could be available offline, syncing with the system once connected to the internet.

- **Example Use Case**:

  A school principal traveling for a conference can still post urgent updates or announcements to the school's digital notice board using their mobile app.

2. AI Integration

- **What It Entails**:

  Artificial Intelligence can be leveraged to automate and optimize various aspects of the notice board system. AI could:

  - Analyze user behavior (e.g., which notices are read most often).

- Automatically prioritize notices based on predefined rules, such as urgency or relevance.
- Suggest optimal display times for notices to maximize visibility.

- **Benefits**:
  - **Enhanced User Experience**: AI ensures that critical notices are highlighted or displayed more frequently, preventing them from being overlooked.
  - **Automation**: Reduces manual workload by organizing and scheduling notices without administrator intervention.
  - **Insights and Analytics**: AI can provide insights, such as which types of notices are most effective or frequently accessed.
- **Example Use Case**:

  In a corporate environment, AI could detect that meeting-related notices are viewed more often on Monday mornings and prioritize such notices during those times.

3. Cloud Deployment

- **What It Entails**:

  Deploying the Digital Notice Board System on the cloud enables centralized management and global access. The cloud infrastructure would:
  - Store all notices and multimedia content.
  - Facilitate remote access and control for administrators.
  - Allow multiple devices in different locations to sync with the same server.
- **Benefits**:
  - **Scalability**: Supports expansion to any number of display screens, even across geographically distant locations.
  - **Reliability**: Cloud systems ensure high uptime and data backup, minimizing the risk of data loss.

- **Remote Management**: Administrators can manage the system from anywhere, whether they're at the office, home, or another city.

- **Example Use Case**:

  A retail chain with stores in multiple cities could display synchronized promotional messages or updates across all branches through a cloud-based system, managed from a single location.

The Big Picture

Integrating these enhancements would transform the Digital Notice Board System into a **next-generation communication platform**, making it not only efficient but also intelligent and globally accessible.

1. **Mobile App Integration** ensures that the system is not confined to a specific device or location, enabling administrators to act instantly.
2. **AI Integration** brings smart capabilities, helping organizations make data-driven decisions to improve notice relevance and user engagement.
3. **Cloud Deployment** expands the system's scope, ensuring scalability for businesses or institutions with multiple branches or campuses.

These advancements reflect a commitment to future-proofing the system, adapting it to the evolving needs of users and leveraging emerging technologies. The Digital Notice Board System will thus continue to be a vital tool for modern communication, bridging the gap between information providers and their audiences.

APPENDIX

(Coding)

```
import java.util.HashMap;
import java.util.Scanner;

class Main {
    private HashMap<Integer, String> notices = new HashMap<>();
    private int noticeIdCounter = 1;

    public void run() {
        Scanner scanner = new Scanner(System.in);
        while (true) {
            System.out.println("\n=== Digital Notice Board ===");
            System.out.println("1. Post New Notice");
            System.out.println("2. Update Notice");
            System.out.println("3. Delete Notice");
            System.out.println("4. View Notices");
            System.out.println("5. Exit");
            System.out.print("Enter your choice: ");

            int choice = scanner.nextInt();
            scanner.nextLine(); // Consume newline

            switch (choice) {
                case 1 -> postNotice(scanner);
                case 2 -> updateNotice(scanner);
```

```
            case 3 -> deleteNotice(scanner);
            case 4 -> viewNotices();
            case 5 -> {


System.out.println("Exiting...");
                scanner.close();
             return;
            }
            default -> System.out.println("Invalid choice. Try again.");
        }
    }
 }

  private void postNotice(Scanner scanner) {
     System.out.print("Enter notice message: ");
     String message = scanner.nextLine();
     if (!message.trim().isEmpty()) {
        notices.put(noticeIdCounter++, message);
        System.out.println("Notice added successfully!");
     } else {
        System.out.println("Notice message cannot be empty.");
     }
  }

  private void updateNotice(Scanner scanner) {
     System.out.print("Enter Notice ID to update: ");
     int noticeId = scanner.nextInt();
```

```
        scanner.nextLine(); // Consume newline
        if (notices.containsKey(noticeId)) {
            System.out.print("Enter new notice message: ");
            String newMessage = scanner.nextLine();
            if (!newMessage.trim().isEmpty()) {
                notices.put(noticeId, newMessage);


System.out.println("Notice updated successfully!");
            } else {


System.out.println("Notice message cannot be empty.");
            }
        } else {
            System.out.println("Notice ID not found.");
        }
    }

    private void deleteNotice(Scanner scanner) {
        System.out.print("Enter Notice ID to delete: ");
        int noticeId = scanner.nextInt();
        scanner.nextLine(); // Consume newline
        if (notices.containsKey(noticeId)) {
            notices.remove(noticeId);
            System.out.println("Notice deleted successfully!");
        } else {
            System.out.println("Notice ID not found.");
```

```
        }
    }

    private void viewNotices() {
        if (notices.isEmpty()) {
            System.out.println("No notices to display.");
        } else {
            System.out.println("\nCurrent Notices:");
            notices.forEach((id, message) -> System.out.println("ID: " + id + " |
Message: " +

message));
        }
    }

    public static void main(String[] args) {
        new Main().run();
    }
}
```

REFERENCES:

Books

1. **"Effective Java" by Joshua Bloch**
    - A must-read book for Java developers, offering best practices and design patterns for writing clean and efficient Java code.
2. **"Head First Java" by Kathy Sierra and Bert Bates**
    - A beginner-friendly book that uses visual and interactive learning techniques to teach Java concepts.

Online Tutorials and Documentation

1. **GeeksforGeeks – Java Tutorials**
    - Comprehensive Java tutorials covering core concepts, advanced topics, and practical examples.

Website: https://www.geeksforgeeks.org

2. **W3Schools – Java Tutorial**
    - Offers an easy-to-follow guide for learning Java, including examples and quizzes.

Website: https://www.w3schools.com/java

3. **JavaWorld**
    - Features Java news, programming tips, and tutorials on Java technologies and frameworks.

Website: https://www.javaworld.com

Video Tutorials and Platforms

1. **Udemy – Java Masterclass**
    - Paid courses like "Java Programming Masterclass for Software Developers" offer structured lessons and practical exercises.

Website: https://www.udemy.com

2. **Coursera – Java Programming and Software Engineering Fundamentals**
    - Courses offered by institutions like Duke University provide in-depth Java training, including projects and certifications.

Forums and Communities

1. **Stack Overflow**
    - A go-to platform for asking specific coding questions and finding answers from the Java community.

Website: https://stackoverflow.com

2. **Reddit – r/Java**
    - Active discussions, resources, and community support for Java developers.

Subreddit: https://www.reddit.com/r/java

Other Helpful References

1. **Pluralsight – Java Tutorials**
    - Online training videos and exercises covering Java fundamentals and advanced topics.

Website: https://www.pluralsight.com

2. **IBM Developer Java Resources**
    - Tutorials, tools, and guides for working with Java in enterprise applications.

Website: https://developer.ibm.com/technologies/java

3. **LearnJava Online**
    - Free interactive tutorials and challenges to improve your Java programming skills.

Website: https://www.learnjavaonline.org