Project Report On

ArtFlake: A Virtual Art Gallery

Submitted in partial fulfillment for the award of

Post Graduate Diploma in Advanced Computing

from

Centre of Development of Advanced Computing (C-DAC), Pune

by

Payal Wankhede - 240340120128

Rahul Soni - 240340120143

Rajashri Puranik - 240340120146

Rashi Tugaon - 240340120147

Rohit Inchale - 240340120155

under the guidance of

Ms. Tejaswini Apte

Centre of Development of Advanced Computing (C-DAC), Pune

Certificate

This to certify that the project titled “**ArtFlake: A Virtual Art Gallery**” is submitted by **Payal Wankhede, Rahul Soni, Rajashri Puranik, Rashi Tugaon, Rohit Inchale** in partial fulfillment of the requirements for the award of the Post Graduate Diploma in Advanced Computing, C-DAC ACTS, Pune. The work is comprehensive, complete and fit for final evaluation.

Head, C-DAC ACTS	**Ms. Tejaswini Apte**
Pune, India	Project Guide

Acknowledgment

This project **“ArtFlake: A Virtual Art Gallery”** was a great learning experience for us and we are submitting this work to Advanced Computing Training School (CDAC ACTS).

We are grateful to **Ms. Tejaswini Apte** for her valuable guidance and support during the during the course of project work. Her valuable insights helped us to overcome the intricacies of the development of this project.

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Payal Wankhede - 240340120128
Rahul Soni - 240340120143
Rajashri Puranik - 240340120146
Rashi Tugaon - 240340120147
Rohit Inchale - 240340120155

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1. Introduction

ArtFlake is an innovative virtual art gallery platform designed to elevate the experience of art enthusiasts and collectors. This platform allows users to seamlessly browse, explore, and purchase artwork from a diverse collection of artists. By offering an intuitive and engaging environment, ArtFlake makes discovering and acquiring art both enjoyable and accessible.

Powered by a sophisticated blend of technologies, ArtFlake redefines the way users interact with art in the digital space. The platform's back-end is built using Spring Boot and Spring Data JPA, ensuring reliable user authentication, efficient data management, and smooth communication between server and client components. The integration of RESTful Web Services enables seamless data retrieval and interaction, providing users with a responsive and dynamic experience.

The front-end of ArtFlake is meticulously crafted using React.js, resulting in a visually stunning and user-friendly interface. The use of standard web technologies like HTML and Tailwind CSS ensures a consistent and immersive experience across devices. Data is managed using a robust MySQL database, facilitating efficient storage and retrieval of user information, artwork details, and transaction records.

ArtFlake prioritizes security and convenience, integrating secure payment gateways to enable seamless transactions. Users can confidently purchase artwork using a variety of payment options, enhancing the overall shopping experience.

Moreover, ArtFlake's user-responsive design ensures optimal performance and usability for various web browsers for desktops. The platform dynamically adjusts its layout and features to provide an intuitive and aesthetically pleasing interface. Leveraging React.js for dynamic content rendering, ArtFlake ensures real-time updates, creating a personalized and engaging experience for users.

With its commitment to accessibility, and user satisfaction, ArtFlake sets a new standard for online art galleries, making the art world more accessible to all.
ArtFlake sets a new standard for online art galleries by bridging the gap between artists and art enthusiasts. Whether you're an established collector or someone exploring art for the first time, ArtFlake provides a welcoming environment that caters to all levels of interest and expertise. By offering a seamless and intuitive user experience, ArtFlake not only democratizes access to art but also fosters a deeper connection between creators and admirers. This commitment ensures that anyone, regardless of location or background, can explore, appreciate, and acquire art, contributing to a more vibrant and diverse art community.

2. Software Requirement and Specifications

Server:

Processor: Intel Core i5 or equivalent AMD processor.

RAM: Minimum 8GB RAM.

Storage: SSD storage for improved performance.

Network: Ethernet or Wi-Fi connectivity.

Operating System: Linux distribution (Ubuntu, CentOS) preferred for server deployment.

Client Devices:

Processor: Dual-core processor or higher.

RAM: Minimum 4GB RAM.

Storage: Sufficient storage for caching and local data.

Network: Ethernet or Wi-Fi connectivity.

Browser: Compatible with latest versions of popular browsers like Google Chrome, Mozilla Firefox, and Safari

3. Tools and Technologies Used

- Spring Boot
- Spring Data JPA
- RESTful Web
- Spring Web
- Spring Security
- JWT
- MYSQL Workbench 8.0 CE
- React JS
- React Router DOM
- Axios
- HTML and CSS
- DaisyUI
- Bootstrap
- Git

Spring Boot

Spring Boot is a powerful, open-source Java-based framework used for building standalone, production-grade Spring applications with minimal configuration. It simplifies the development process by providing pre-configured templates and embedded servers, making it easier to develop and deploy applications quickly. In the Virtual Art Gallery project, Spring Boot is used to develop the backend services that handle business logic, data processing, and communication with the database.

Spring Data JPA

Spring Data JPA is a part of the Spring Data family that simplifies data access in

Java applications. It provides an abstraction layer on top of JPA (Java Persistence API), enabling developers to easily interact with databases using repository interfaces without the need to write complex queries. In the Virtual Art Gallery project, Spring Data JPA is used to perform CRUD (Create, Read, Update, Delete) operations on the database entities like artists, artworks, and galleries.

RESTful Web Services

RESTful Web Services are a set of standards and practices for building scalable and maintainable web services using HTTP protocols. They are designed to interact with resources identified by URLs, making it easier to create and consume web APIs. In the Virtual Art Gallery project, RESTful Web Services are used to expose the backend functionality to the frontend, enabling operations such as viewing artworks, managing user profiles, and handling gallery data.

Spring Web

Spring Web is a module within the Spring Framework that provides comprehensive support for web-based applications, including building RESTful services and handling HTTP requests. It integrates seamlessly with other Spring modules, making it an essential component for developing web applications. In the Virtual Art Gallery project, Spring Web is responsible for processing incoming HTTP requests, routing them to the appropriate controllers, and returning the corresponding responses.

Spring Security

Spring Security is a robust framework for securing Java applications. It provides authentication, authorization, and other security-related services, such as protecting endpoints and managing user roles. In the Virtual Art Gallery project, Spring Security is used to ensure that only authenticated and authorized users can access certain parts of the application, such as managing artwork or galleries.

JWT (JSON Web Token)

JWT is an open standard for securely transmitting information between parties as a JSON object. It is commonly used for authentication and authorization purposes in web applications. In the Virtual Art Gallery project, JWT is used to implement token-based authentication, allowing users to log in securely and maintain their session without repeatedly entering credentials.

MySQL Workbench 8.0 CE

MySQL Workbench is a unified visual tool for database design, development, and administration. It provides a user-friendly interface for managing MySQL databases, including designing schemas, running queries, and managing data. In the Virtual Art Gallery project, MySQL Workbench 8.0 CE is used to design the database schema, manage the data, and interact with the database during development and testing.

React JS

React JS is a popular JavaScript library for building user interfaces, especially for single-page applications (SPAs). It allows developers to create reusable UI components and manage the state of the application efficiently. In the Virtual Art Gallery project, React JS is used to build the frontend, enabling users to interact with the gallery, view artworks, and manage their profiles in a dynamic and responsive manner.

React Router DOM

React Router DOM is a routing library for React applications, allowing developers to create and manage routes within the application. It provides a seamless way to handle navigation and render components based on the URL path. In the Virtual Art Gallery project, React Router DOM is used to create a smooth navigation experience, allowing users to move between different pages, such as the gallery, artist profiles, and artwork details.

Axios

Axios is a promise-based HTTP client for JavaScript, commonly used for making HTTP requests from the browser to interact with APIs. It simplifies the process of sending and receiving data over the network. In the Virtual Art Gallery project, Axios is used to communicate with the backend services, such as fetching artworks, submitting user data, and handling authentication requests.

HTML and CSS

HTML (Hypertext Markup Language) and CSS (Cascading Style Sheets) are the foundational technologies for building web pages. HTML structures the content, while CSS styles and layouts the page, making it visually appealing. In the Virtual Art Gallery project, HTML and CSS are used to create the structure and style of the web pages, ensuring that the user interface is both functional and aesthetically pleasing.

DaisyUI

DaisyUI is a utility-first CSS framework built on top of Tailwind CSS. It provides a set of customizable components and design elements that follow modern design principles. In the Virtual Art Gallery project, DaisyUI is used to streamline the styling process, allowing developers to build responsive and consistent UI components quickly without writing extensive custom CSS.

Bootstrap

Bootstrap is a widely-used CSS framework that provides pre-designed components, grid systems, and utilities for building responsive web applications. It simplifies the development process by offering ready-to-use elements such as buttons, forms, and navigation bars. In the Virtual Art Gallery project, Bootstrap is used alongside other styling tools to ensure that the application is responsive and maintains a consistent look and feel across different devices.

Git

Git is a distributed version control system that tracks changes in source code during software development. It allows multiple developers to collaborate on a project, manage different versions, and maintain a history of changes. In the Virtual Art Gallery project, Git is used to manage the source code, enabling team collaboration, version control, and deployment workflows.

4. Project Database Diagram

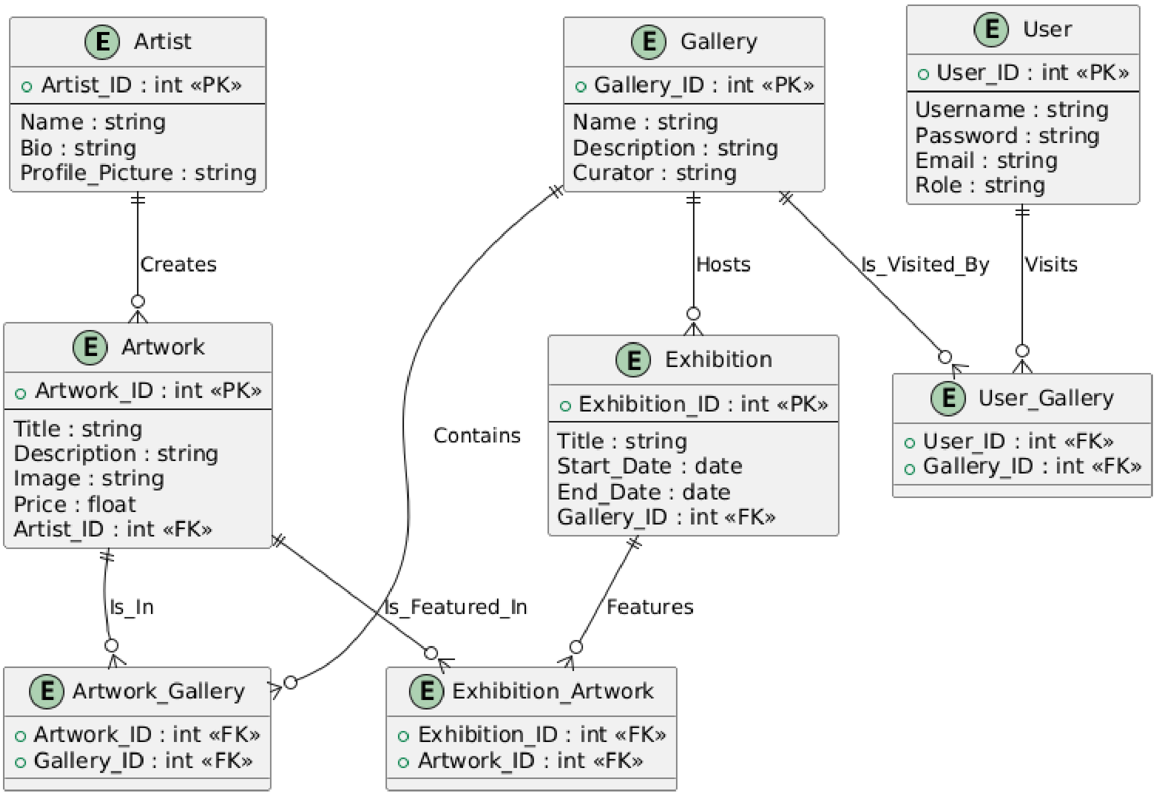
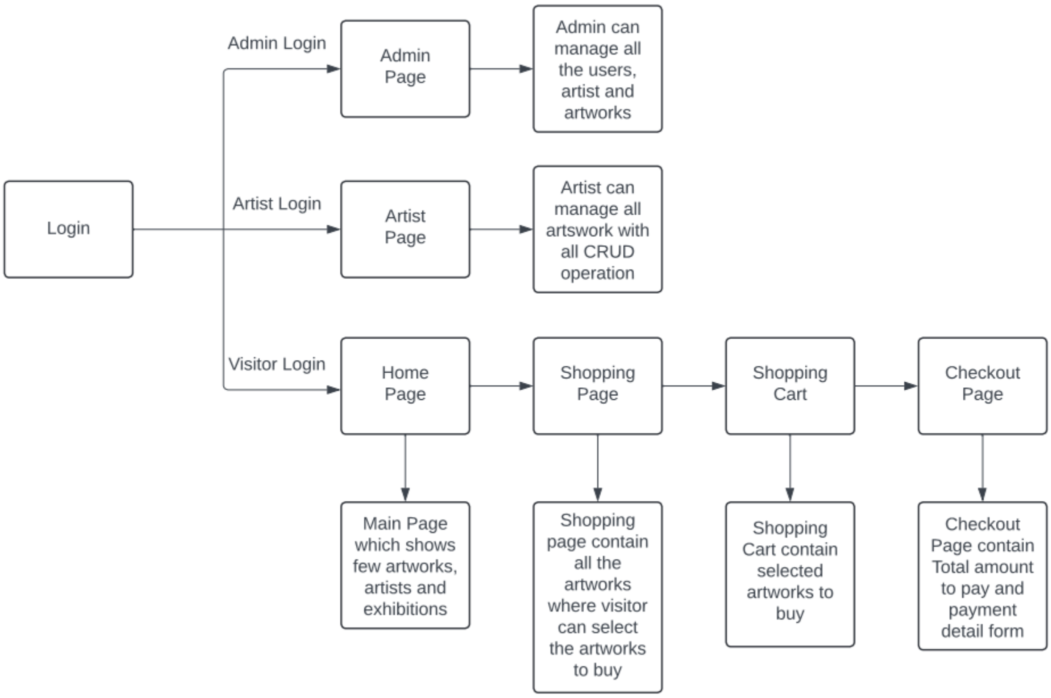


Figure: ArtFlake Database Diagram



Admin Login
Admin Page
Admin can manage all the users, artist and artworks
Login
Artist Login
Artist Page
Artist can manage all artswork with all CRUD operation
Visitor Login
Home Page
Shopping Page
Shopping Cart
Checkout Page
Main Page which shows few artworks, artists and exhibitions
Shopping page contain all the artworks where visitor can select the artworks to buy
Shopping Cart contain selected artworks to buy
Checkout Page contain Total amount to pay and payment detail form

Figure: ArtFlake Data Flow Diagram

5. Entity Requirement Diagram

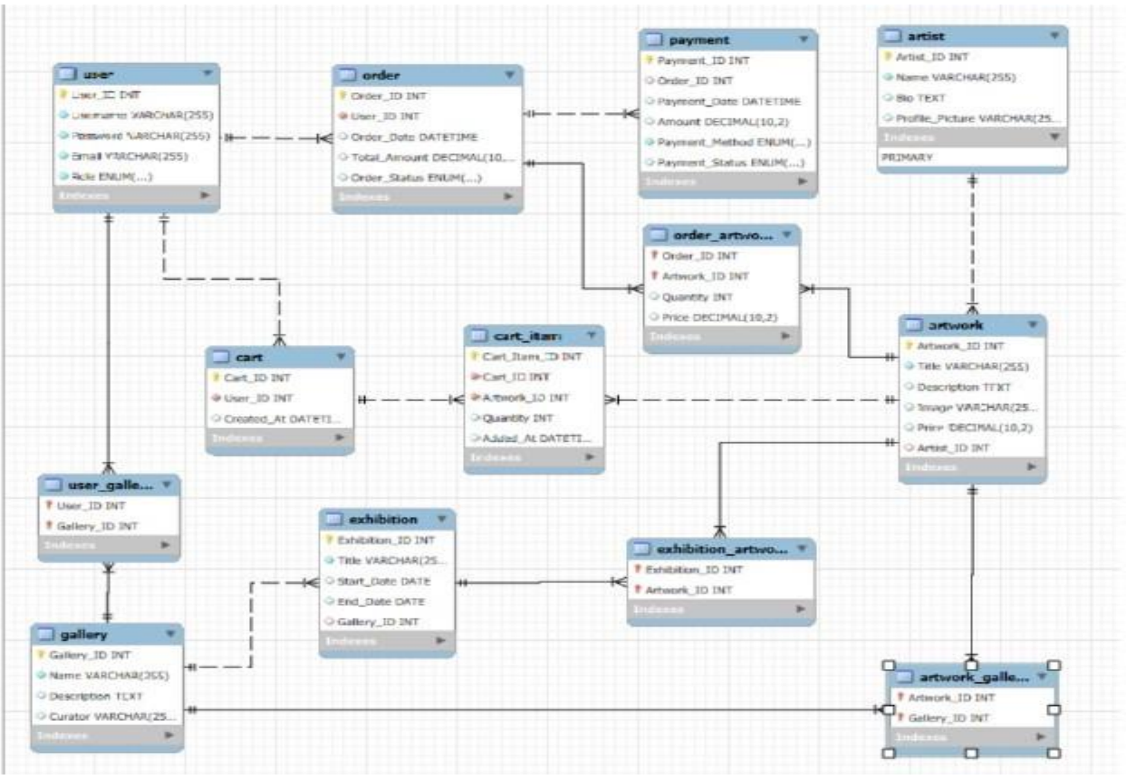


Figure: ER Diagram for ArtFlake

6. Advantages

Spring Data JPA

1. **Simplified Data Access**: Spring Data JPA abstracts away the complexities of interacting with databases by providing a repository layer. This allows developers to perform CRUD operations without writing boilerplate code, speeding up development.
2. **Automatic Query Generation**: It automatically generates SQL queries based on method names defined in repositories, reducing the need for manual query writing and minimizing errors.
3. **Support for Complex Queries**: Even though it abstracts basic queries, Spring Data JPA also allows for custom queries using JPQL (Java Persistence Query Language) or native SQL when more complex operations are needed.
4. **Integration with Spring Ecosystem**: Seamlessly integrates with other Spring modules, such as Spring Boot and Spring Security, ensuring consistency and reducing configuration overhead.
5. **Transactional Management**: Spring Data JPA supports declarative transaction management, ensuring data integrity and consistency across the application.

React Router DOM

1. **Seamless Navigation**: React Router DOM allows for easy and efficient routing in single-page applications (SPAs), providing users with a smooth navigation experience without full-page reloads.
2. **Component-Based Routing**: It leverages React's component-based architecture, making it easy to define routes as components and manage complex routing logic within the application.
3. **Dynamic Routing**: React Router DOM supports dynamic routing, allowing

developers to pass parameters through the URL and render specific components based on the route, which is essential for features like viewing individual artwork details.

4. **Nested Routes**: It allows for the creation of nested routes, which helps in organizing the application's structure and improving maintainability by grouping related views together.
5. **Declarative Approach**: Routes are defined declaratively, making the code more readable and easier to maintain, especially in larger applications with multiple pages and complex navigation requirements.

JSON Web Token (JWT)

1. **Stateless Authentication**: JWT enables stateless authentication, meaning the server does not need to store session data. This reduces the load on the server and allows the application to scale more easily.
2. **Security**: JWT provides a secure way to transmit user information between the client and server as the token is signed, ensuring that it cannot be tampered with. It can also be encrypted for additional security.
3. **Easy Integration**: JWT is easily integrated with front-end frameworks like React and back-end frameworks like Spring Security. This makes it straightforward to implement secure authentication and authorization in the Virtual Art Gallery project.
4. **Flexibility**: JWTs can carry additional metadata, such as user roles or permissions, which can be used to implement fine-grained access control within the application.
5. **Cross-Domain Support**: JWT can be used across different domains, which is beneficial if the Virtual Art Gallery project has a separate API server and web application server, allowing for secure communication between them.

7. Screenshots

1. Use-case diagram

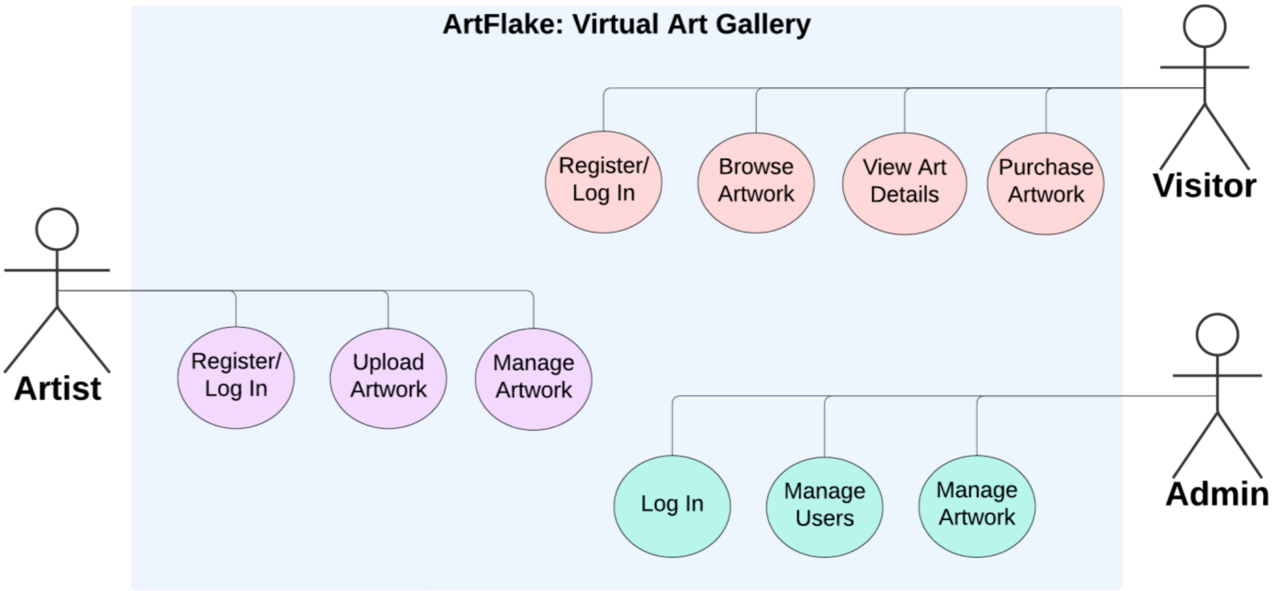
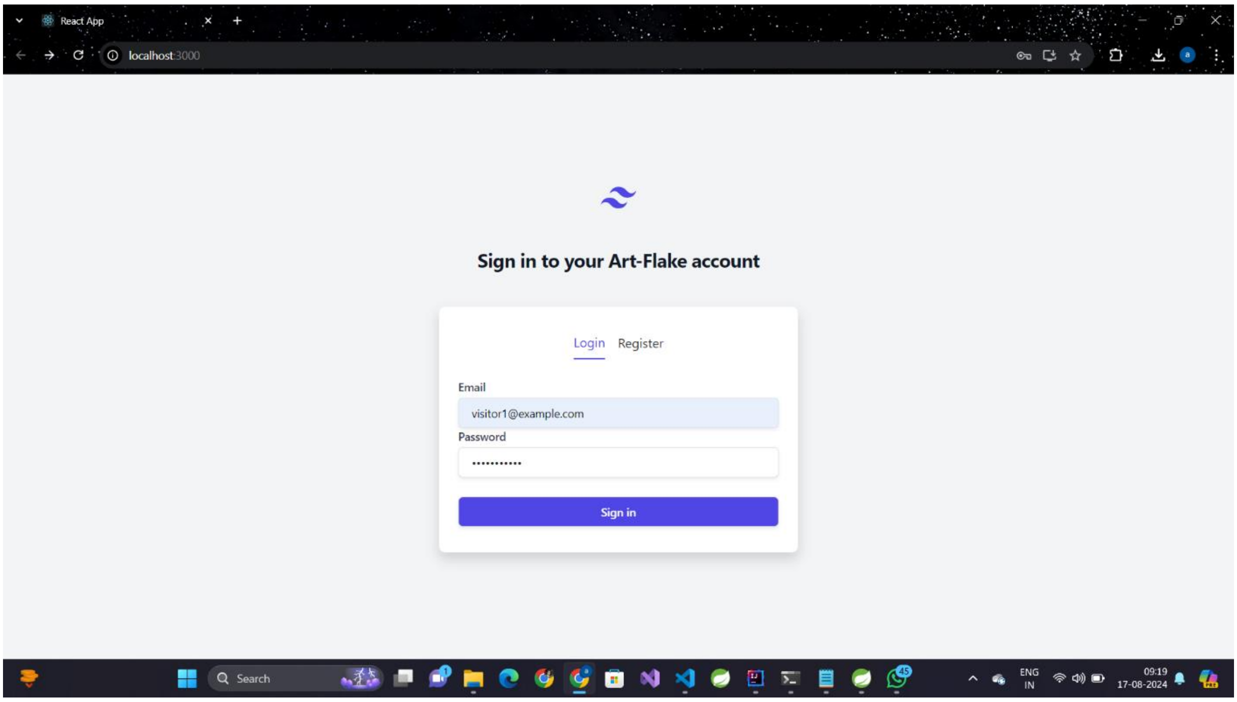


Figure: Use-case diagram for ArtFlake

2. Visitor related Functionalities



Sign in to your Art-Flake account

Login Register

Email

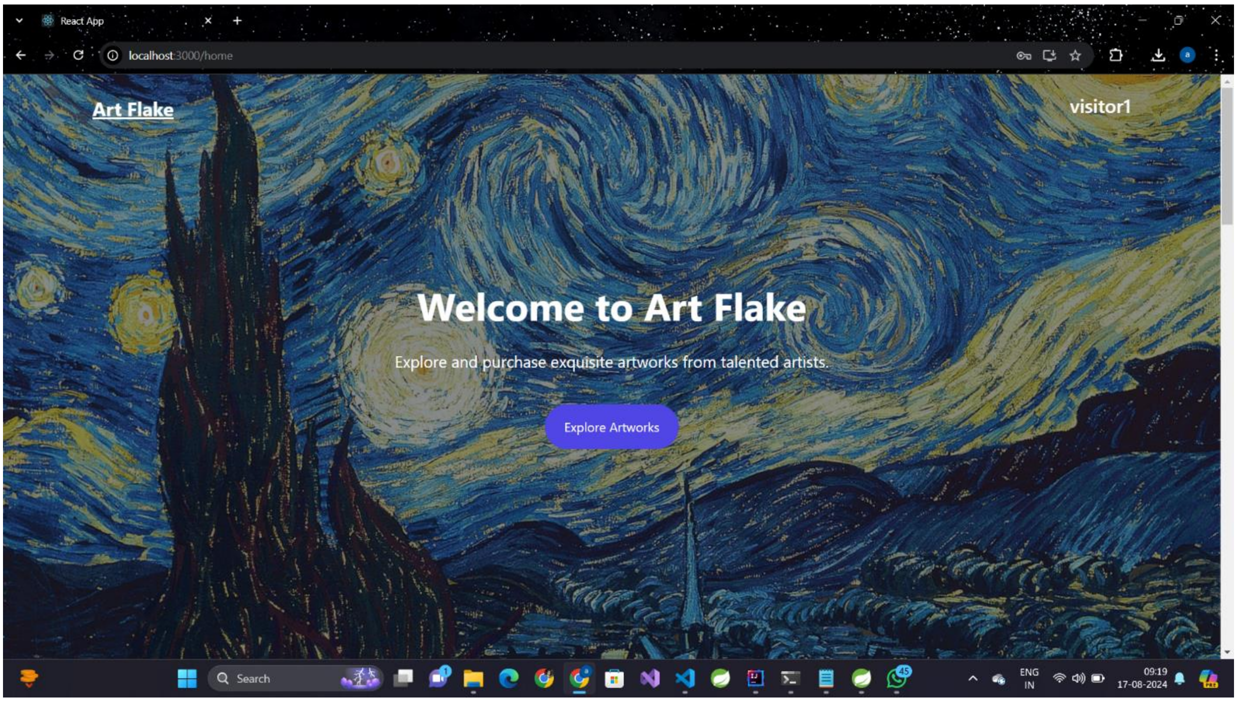
visitor1@example.com

Password

•••••••••••

Sign in

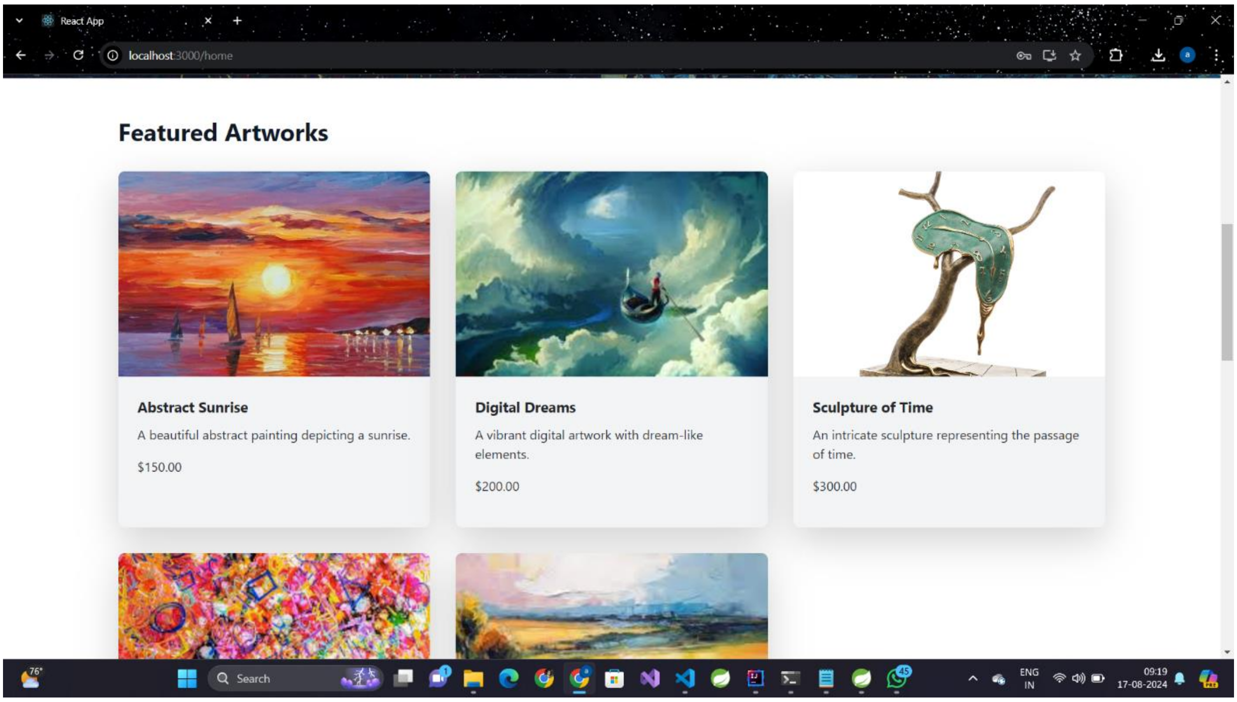
Figure: Visitor Log in Page



Welcome to Art Flake

Explore and purchase exquisite artworks from talented artists.

Figure: Visitor Home Page



Featured Artworks

Abstract Sunrise

A beautiful abstract painting depicting a sunrise.

$150.00

Digital Dreams

A vibrant digital artwork with dream-like elements.

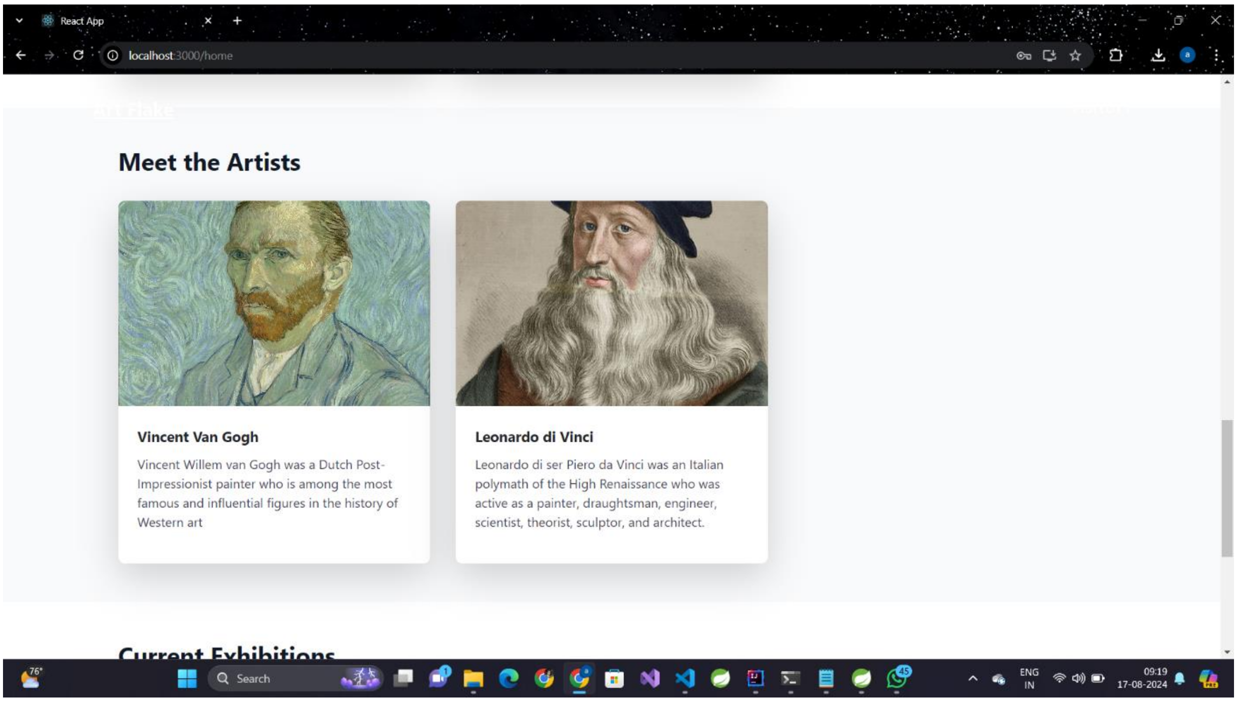
$200.00

Sculpture of Time

An intricate sculpture representing the passage of time.

$300.00

Figure: Visitor can browse over artwork



Meet the Artists

Vincent Van Gogh

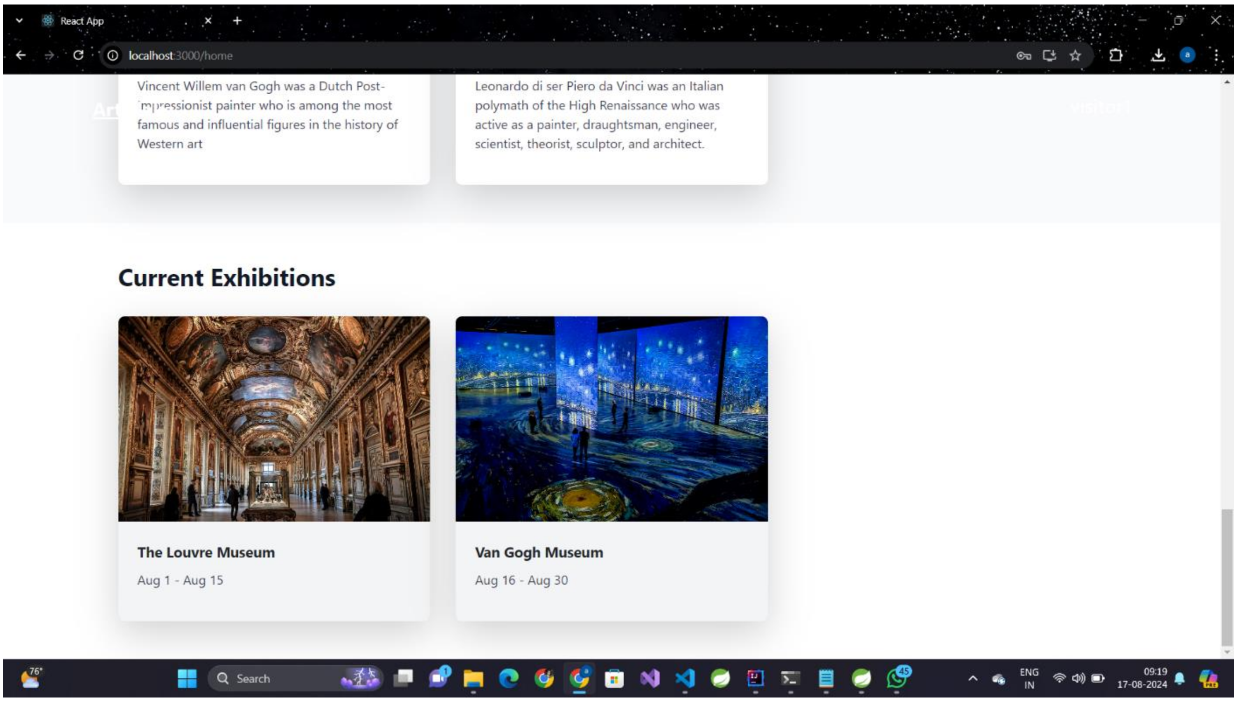
Vincent Willem van Gogh was a Dutch Post-Impressionist painter who is among the most famous and influential figures in the history of Western art

Leonardo di Vinci

Leonardo di ser Piero da Vinci was an Italian polymath of the High Renaissance who was active as a painter, draughtsman, engineer, scientist, theorist, sculptor, and architect.

Current Exhibitions

Figure: Visitor can browse through Artists



Vincent Willem van Gogh was a Dutch Post-Impressionist painter who is among the most famous and influential figures in the history of Western art

Leonardo di ser Piero da Vinci was an Italian polymath of the High Renaissance who was active as a painter, draughtsman, engineer, scientist, theorist, sculptor, and architect.

Current Exhibitions

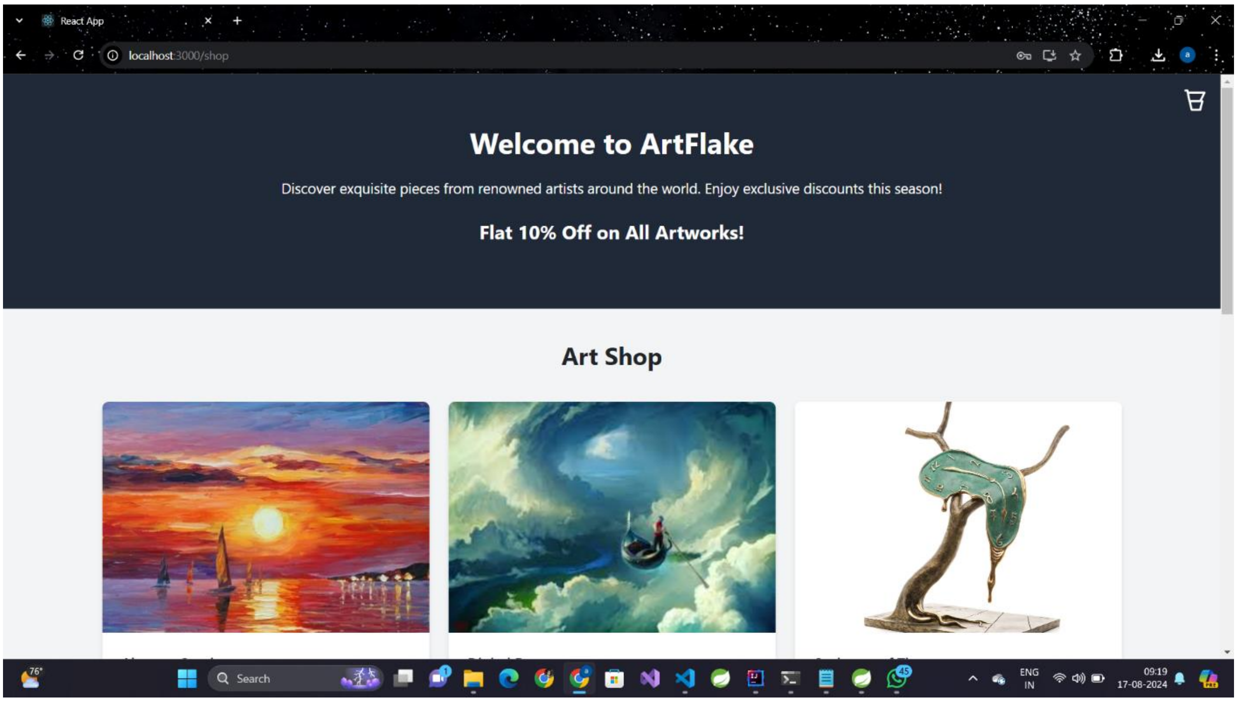
The Louvre Museum

Aug 1 - Aug 15

Van Gogh Museum

Aug 16 - Aug 30

Figure: Visitor can see listed exhibitions



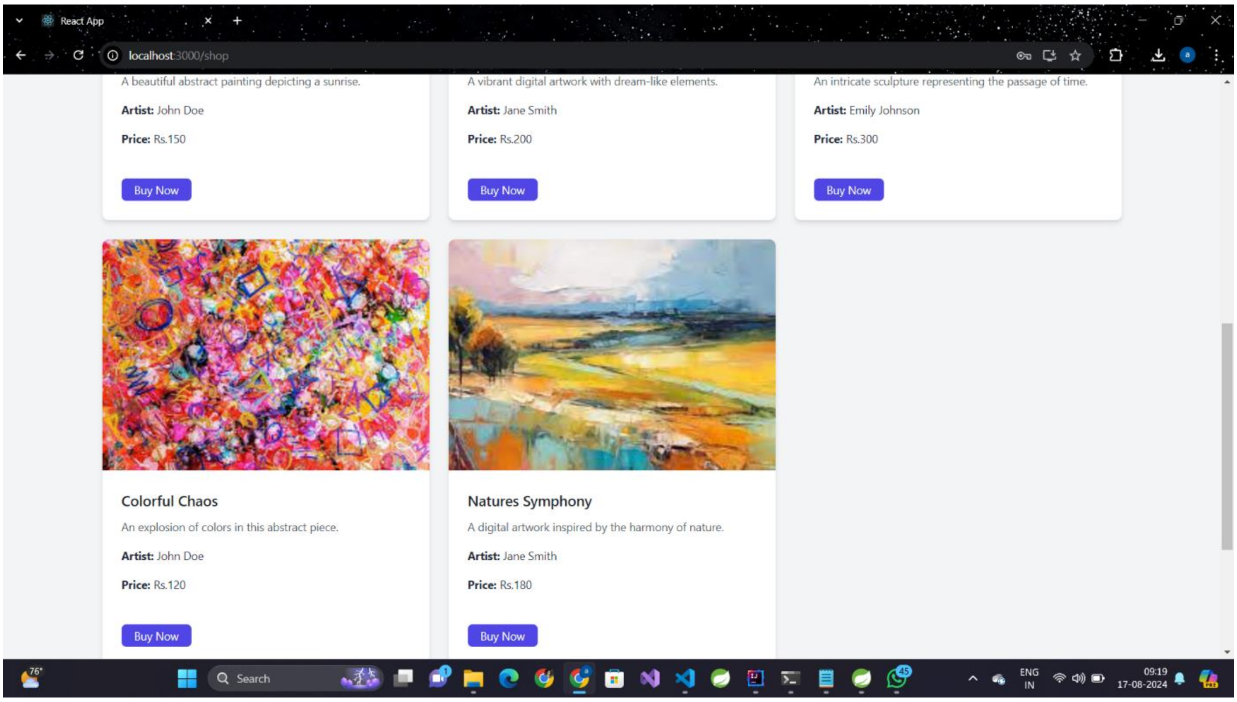
Welcome to ArtFlake

Discover exquisite pieces from renowned artists around the world. Enjoy exclusive discounts this season!

Flat 10% Off on All Artworks!

Art Shop

Figure: Shop Home Page



A beautiful abstract painting depicting a sunrise.

Artist: John Doe

Price: Rs.150

A vibrant digital artwork with dream-like elements.

Artist: Jane Smith

Price: Rs.200

An intricate sculpture representing the passage of time.

Artist: Emily Johnson

Price: Rs.300

Colorful Chaos

An explosion of colors in this abstract piece.

Artist: John Doe

Price: Rs.120

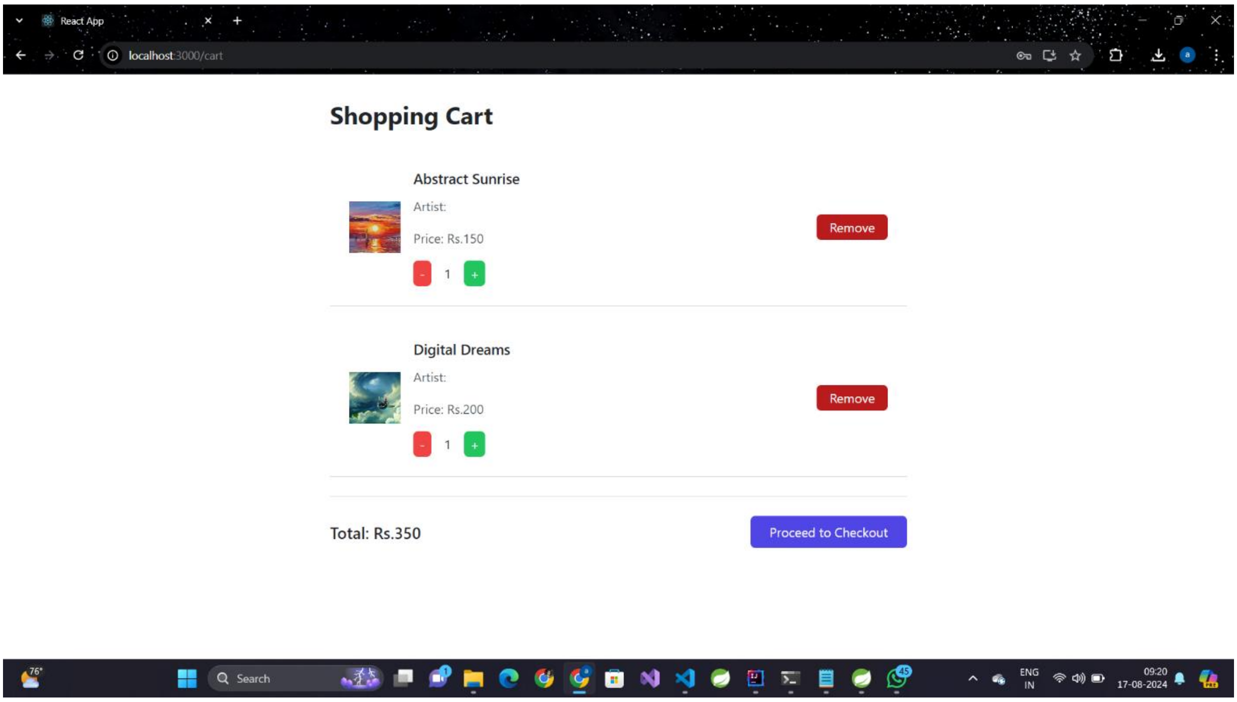
Natures Symphony

A digital artwork inspired by the harmony of nature.

Artist: Jane Smith

Price: Rs.180

Figure: Visitor can add artwork to the cart



Shopping Cart

Abstract Sunrise

Artist:

Price: Rs.150

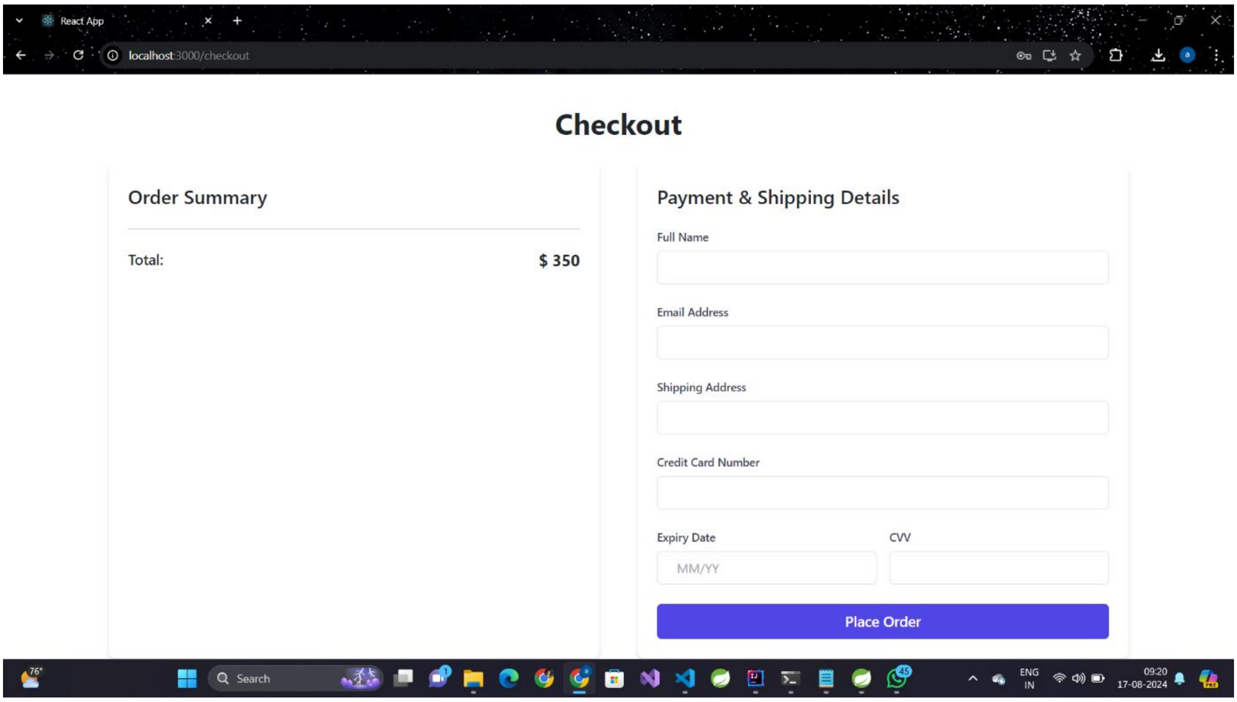
Digital Dreams

Artist:

Price: Rs.200

Total: Rs.350

Figure: Cart



Checkout

Order Summary

Total: $ 350

Payment & Shipping Details

Full Name

Email Address

Shipping Address

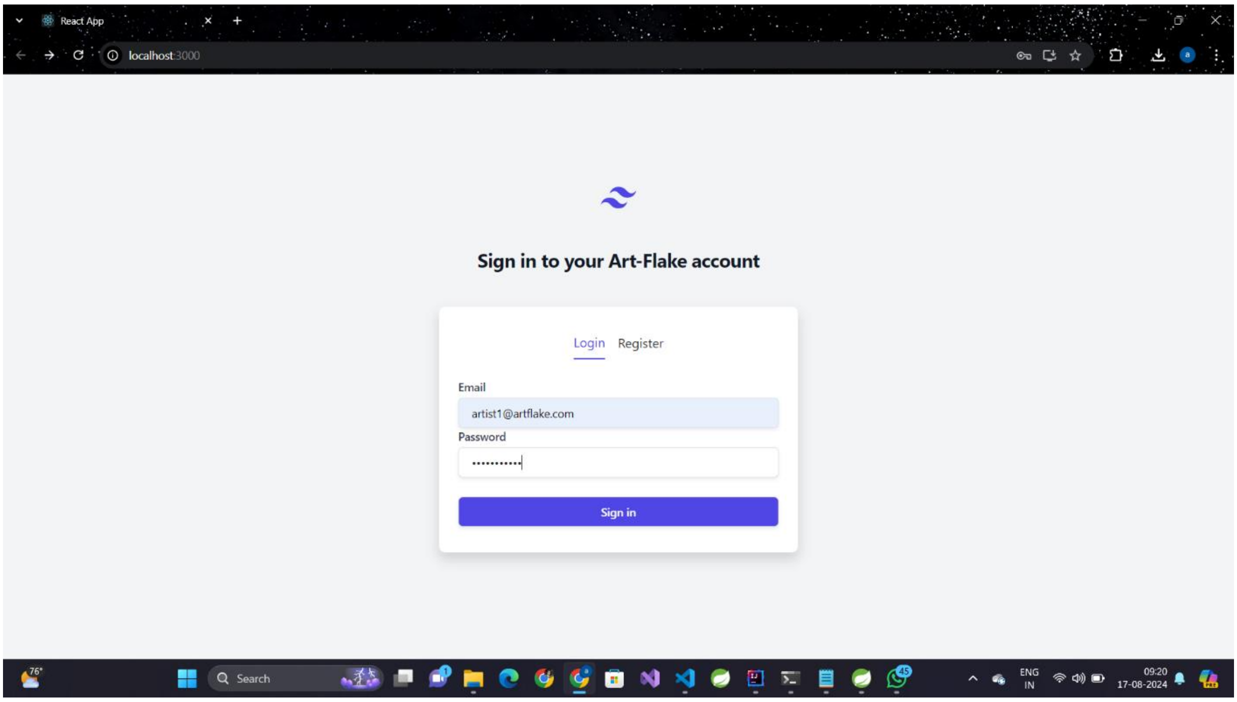
Credit Card Number

Expiry Date MM/YY

CVV

Figure: Checkout Page

3. Artist related Functionalities

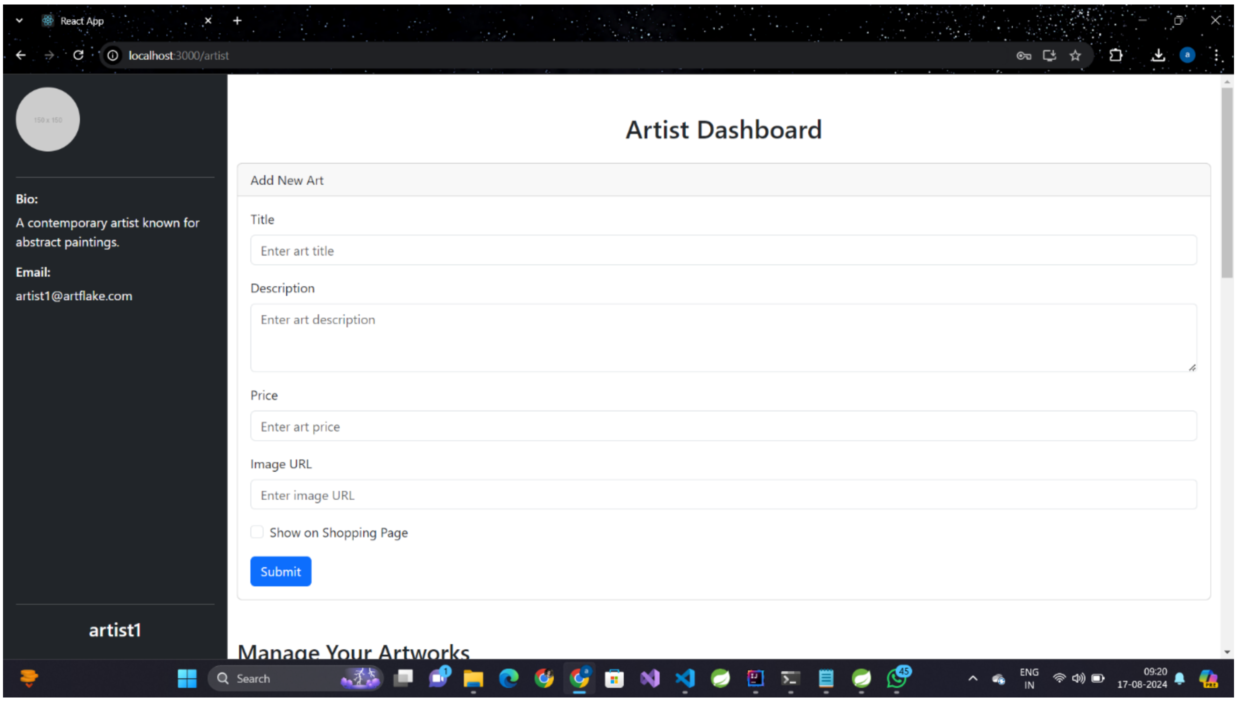


Sign in to your Art-Flake account

Email: artist1@artflake.com

Password: ••••••••••••

Figure: Artist Log in Page



Artist Dashboard

Bio:
A contemporary artist known for abstract paintings.

Email:
artist1@artflake.com

artist1

Add New Art

Title: Enter art title

Description: Enter art description

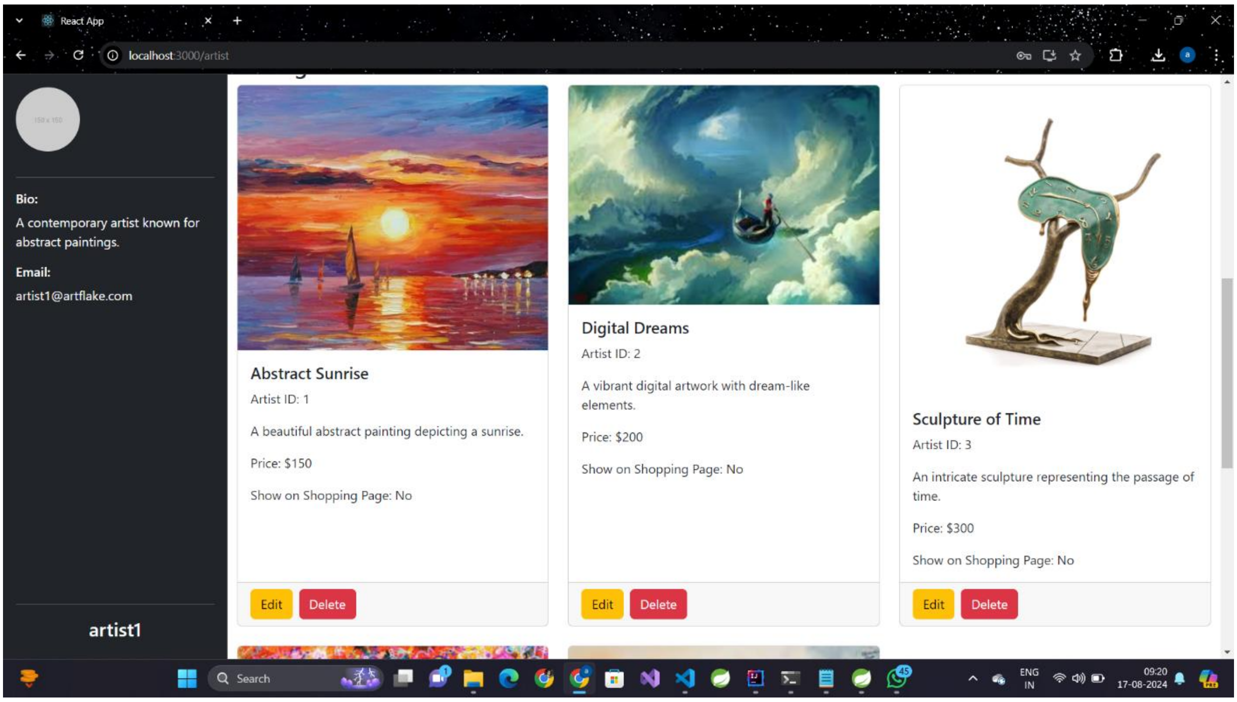
Price: Enter art price

Image URL: Enter image URL

□ Show on Shopping Page

Manage Your Artworks

Figure: Artist Dashboard



Bio:

A contemporary artist known for abstract paintings.

Email:

artist1@artflake.com

artist1

Abstract Sunrise

Artist ID: 1

A beautiful abstract painting depicting a sunrise.

Price: $150

Show on Shopping Page: No

Edit Delete

Digital Dreams

Artist ID: 2

A vibrant digital artwork with dream-like elements.

Price: $200

Show on Shopping Page: No

Edit Delete

Sculpture of Time

Artist ID: 3

An intricate sculpture representing the passage of time.

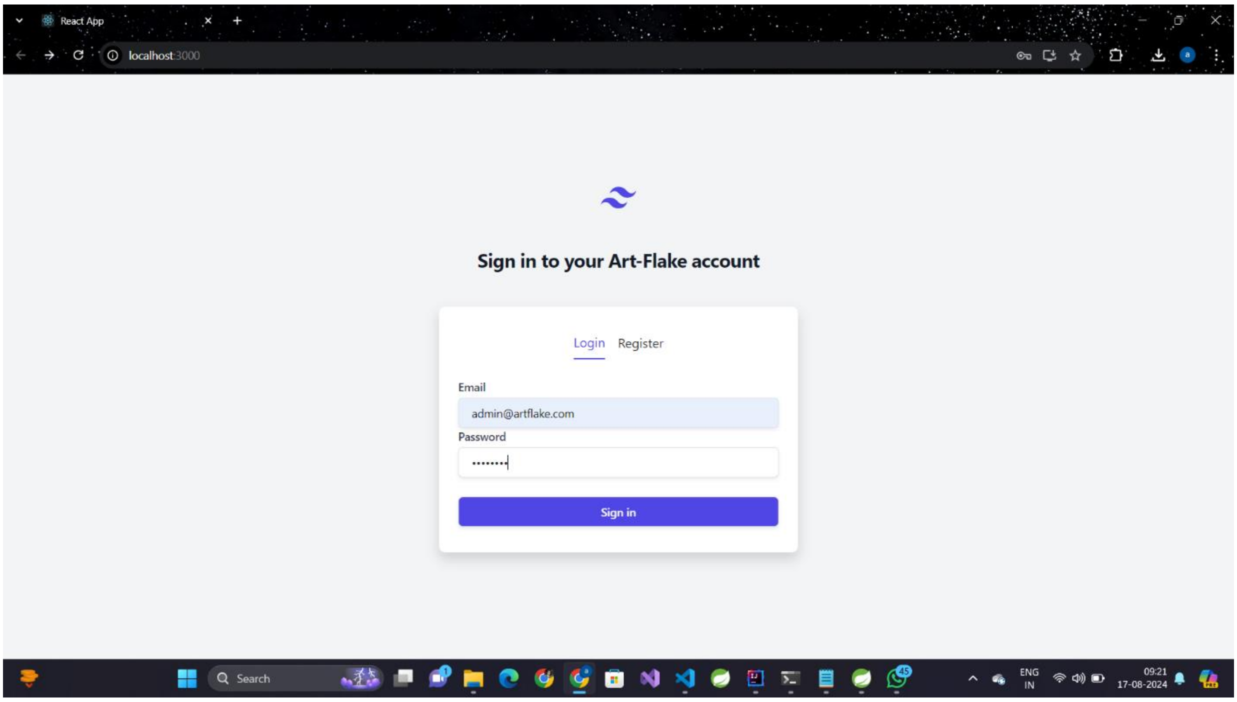
Price: $300

Show on Shopping Page: No

Edit Delete

Figure: Artist can manage artwork

4. Admin related functionalities



Sign in to your Art-Flake account

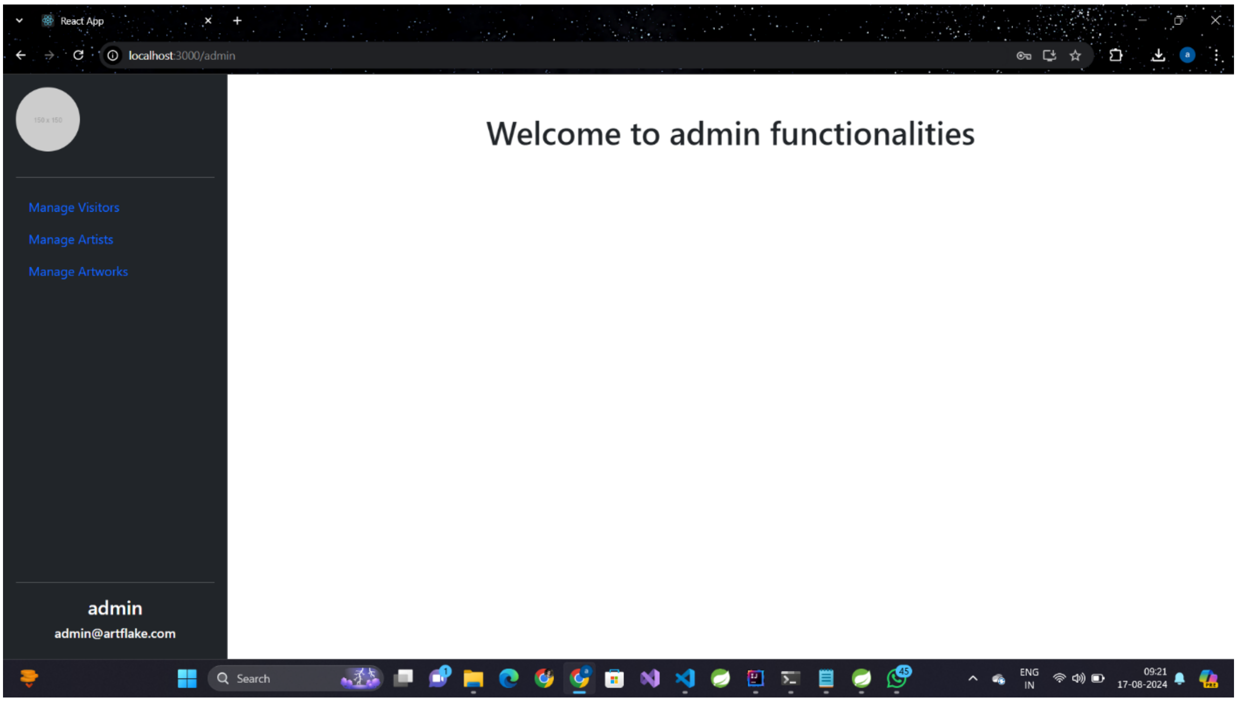
Login Register

Email: admin@artflake.com

Password: ••••••••

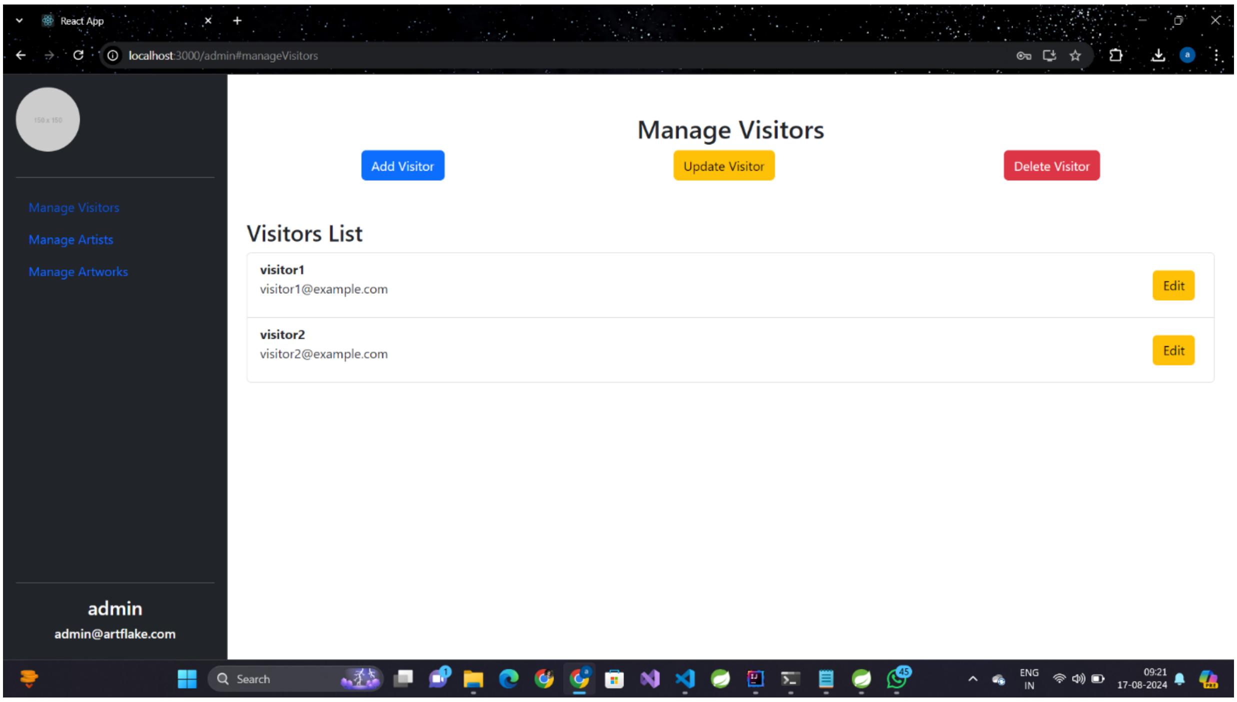
Sign in

Figure: Admin Log in Page



Welcome to admin functionalities

Figure: Admin Dashboard



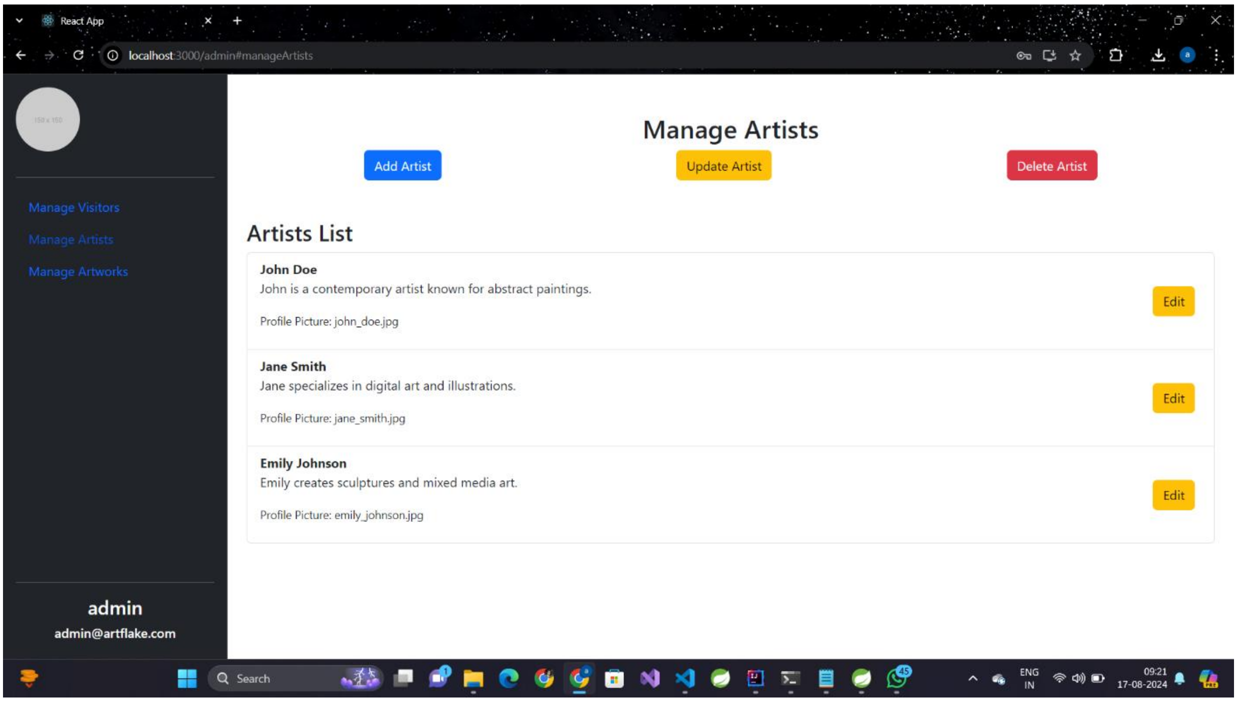
Manage Visitors

Visitors List

visitor1
visitor1@example.com

visitor2
visitor2@example.com

Figure: Manage Visitors



Manage Artists

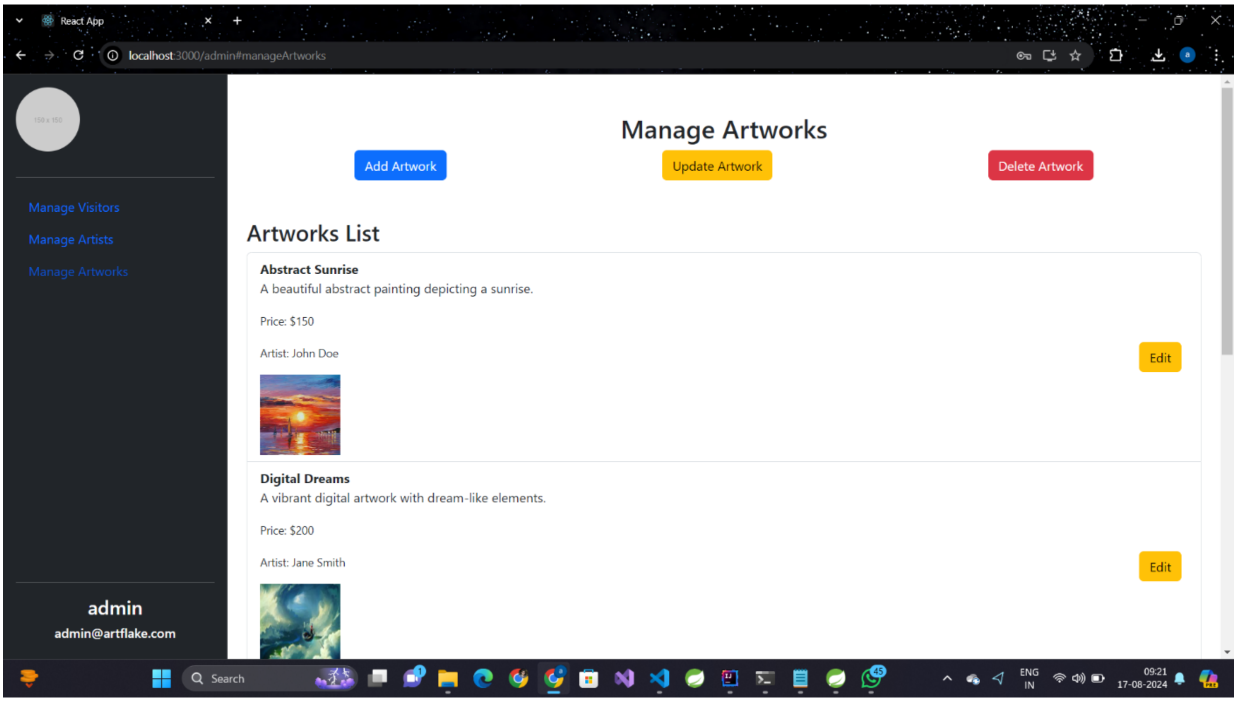
Artists List

John Doe
John is a contemporary artist known for abstract paintings.
Profile Picture: john_doe.jpg

Jane Smith
Jane specializes in digital art and illustrations.
Profile Picture: jane_smith.jpg

Emily Johnson
Emily creates sculptures and mixed media art.
Profile Picture: emily_johnson.jpg

Figure: Manage Artists



Manage Artworks

Artworks List

Abstract Sunrise
A beautiful abstract painting depicting a sunrise.
Price: $150
Artist: John Doe

Digital Dreams
A vibrant digital artwork with dream-like elements.
Price: $200
Artist: Jane Smith

Figure: Manage Artwork

8. Future Scope

- Payment Gateway Integration:
  - Support for credit/debit cards, digital wallets, and international currencies to cater to a broad audience.
  - Simplify the checkout process, automate invoicing, and provide detailed transaction analytics to optimize sales and financial management.
- Expansion of Features and Functionalities:
  - ArtFlake can integrate advanced features like virtual reality (VR) and augmented reality (AR) to provide immersive art viewing experiences. Users could virtually "walk through" galleries or visualize how a piece of art would look in their own space.
  - The introduction of AI-driven recommendations could enhance user engagement by suggesting art based on individual tastes and browsing history.
  - A social component could be added, allowing users to follow artists, leave comments, and share their favourite pieces on social media, creating a more interactive and community-driven platform.
- Enhanced Artist Support:
  - ArtFlake could offer tools and resources for artists to manage their portfolios, track sales, and analyse user engagement.
  - An artist mentorship or collaboration program could be introduced,

where emerging artists can connect with established ones, fostering growth and learning within the artistic community.

- Scalability and Performance Optimization:
  - As the user base grows, further scalability measures can be implemented to ensure that the platform remains fast, reliable, and capable of handling increased traffic.
  - Continuous performance optimization, along with the adoption of cloud-based solutions, would ensure that ArtFlake remains a high-performance platform as it expands.
- Mobile App Development:
  - Offer on-the-go access with a mobile-optimized interface for a seamless browsing and purchasing experience.
  - Keep users informed about new artwork, special offers, and updates through personalized alerts.
  - Facilitate seamless transactions within the app and support subscription models for premium features.

9. Conclusion

In conclusion, ArtFlake is more than just a virtual art gallery- it's a transformative platform that brings the art world to the fingertips of users everywhere. By integrating a robust backend with a dynamic and responsive frontend, ArtFlake offers a seamless and engaging experience for both artists and art lovers. The use of cutting-edge technologies like Spring Boot, React.js, and MySQL ensures that the platform is not only powerful and secure but also scalable and easy to maintain. ArtFlake stands out for its commitment to accessibility, making art more approachable and available to a diverse audience. Whether you're an artist looking to showcase your work or a collector seeking unique pieces, ArtFlake provides a user-friendly and immersive environment that meets your needs. With secure transactions, real-time updates, and a visually appealing interface, ArtFlake redefines how people interact with art online, setting a new benchmark for virtual galleries.

As ArtFlake continues to grow and evolve, it remains dedicated to its mission of connecting people with art in innovative and meaningful ways, ensuring that the beauty and value of art are accessible to all.

10. References

1. https://spring.io/projects/spring-boot

2. https://spring.io/projects/spring-data-jpa

3. https://restfulapi.net/

4. https://www.mysql.com/

5. https://spring.io/projects/spring-web

6. https://reactjs.org/