Graduation Project
Design and Implementation of Digital Museum

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The collaborative efforts, guidance, and encouragement from these individuals have left an indelible impact on this project's success. We extend our deepest thanks to all those who have contributed to our journey, as their unwavering support has been truly empowering.

Abstract

A digital museum is a virtual platform that provides an immersive and interactive experience for visitors to explore exhibits and collections online. It offers a unique opportunity to showcase cultural artifacts and historical items from around the world that might not be physically accessible to all individuals. Through the use of cutting-edge technology, digital museums provide a high-quality experience that engages visitors with exhibits in a way that traditional museums cannot. Digital museums also offer the ability to constantly update exhibits, making it an ever-evolving resource for learning and discovery. The potential for digital museums to reach a global audience and foster cultural exchange makes them an essential tool for preserving and sharing our world's cultural heritage.

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Chapter 1

Introduction

1.1 Problem definition:

The problem of a real museum is the limited accessibility and exposure of cultural and historical artifacts to a wider audience. Many museums and exhibitions have limited physical space and resources, making it difficult to display all their collections to the public. In addition, there is a lack of flexibility for visitors to interact with and learn about the exhibits in a personalized and immersive manner. As a result, there is a need for a digital platform that can provide wider accessibility and increased engagement with cultural and historical artifacts.

1.2 Objectives:

The objectives of a digital museum can vary depending on the specific goals of the museum, but some common objectives include:

1. Preserving cultural heritage: Digital museums can provide an opportunity to preserve cultural heritage by digitizing and archiving artifacts, documents, and other important cultural objects for future generations.

2. Enhancing accessibility: Digital museums can provide access to cultural artifacts and exhibits to people who might not be able to visit a physical museum due to location, disability, or other factors.

3. Increasing engagement: Digital museums can engage visitors in new and interactive ways, such as through virtual tours, interactive exhibits, and online learning resources.

4. Facilitating research and education: Digital museums can provide researchers and students with access to high-quality resources, such as dig-

ital archives and databases, to facilitate research and education.

5. Promoting cultural exchange: Digital museums can promote cultural exchange by sharing exhibits and resources with other museums around the world, thereby fostering cross-cultural understanding and collaboration.

1.3 Tools:

1.Lucid chart: a web-based platform that allows users to collaborate on drawing, revising and sharing charts and diagrams.

2.Visual studio code: a source-code editor made by Microsoft for Windows, Linux and macOS.

3.Git: Git is software for tracking changes in any set of files usually used for coordinating work among programmers.

4.Github: a provider of Internet hosting for software development and version control using Git.

5.React framework: a free and opensource front end JavaScript library for building user Bootstrap a free and opensource CSS framework directed at responsive, mobilefirst frontinterfaces based on UI components.

6.Adobe XD: a vectorbased user experience design tool for web apps and mobile apps.

7.MySQL database: an open-source relational database management system.

8.Django Framework: a free and open-source, Pythonbased web framework that follows the model–template–views architectural pattern.

9.DataGrip: a database IDE that is tailored to suit the specific needs of professional SQL developers.

Chapter 2

Literature Review

2.1 Introduction:

A literature review plays a crucial role in research and projects as it offers readers an alternative perspective on how a system can be developed and constructed to enhance its efficiency and comprehensiveness.

2.2 Current model:

After dealing with the existing website as users only, we found that: The Ministry of Tourism and Antiquities offers a static single page that presents information about some selected items from the museum, time for events, the opening hours, some visiting instructions, and tickets price. It also presents a brief introduction about the reasons for building the museum.

2.3 Our model:

We aim to enhance the older model with the following terms:

Ability to reserve ticket: we provide a ticket reservation system to visitor, ticket reservation can help manage the number of visitors and ensure a smooth and enjoyable experience for everyone. By allowing visitors to reserve tickets in advance, the museum can regulate the flow of visitors and prevent overcrowding.

Cross-Platform Compatibility: Ensure the digital museum is accessible across different devices, including desktop computers, tablets, and smartphones. The web application should be optimized for various web browsers ensuring a consistent experience regardless of the user's device.

Accessible Cultural Preservation: The primary goal of a digital museum is to preserve and showcase cultural heritage and artifacts in a format that is accessible to a global audience. It aims to provide a virtual space where people can explore and learn about the art objects of the museum.

Events Appointment: Events in a digital museum, such as virtual tours, live lectures, interactive workshops, or guided experiences, often have specific time slots or durations. Communicating the event times allows visitors to plan their schedules accordingly and ensure they can participate in the events of their interest. It helps create a structured experience for visitors and ensures that events run smoothly without conflicts.

Enhanced Learning and Education: The digital museum should serve as an educational resource, providing a platform for learning and research. It aims to support formal education by offering resources for students and educators by providing a fine detail about the art objects.

Extension of physical museums: Digital museums can complement physical museums by offering additional resources and experiences. They can showcase digital replicas of objects that may be too fragile, rare, or costly to display physically. Additionally, they can provide virtual tours of physical museums, enabling people to preview art objects, plan visits, or revisit them after their physical visit.

Friendly user interface: A friendly UI optimizes usability and efficiency by minimizing unnecessary steps or actions required to access and interact with content. It streamlines processes, eliminates clutter, and ensures that common tasks can be performed easily and quickly. This improves the overall efficiency of the websites and enhances the user's satisfaction.

2.4 Conclusion:

Considering these features in the design and implementation of a digital museum, we aim to enhance engagement, satisfaction, and accessibility for visitors, contributing to a successful and impactful digital museum experience.

Chapter 3

System Analysis

3.1 Data Flow Diagrams:

3.1.1 Context level DFD Diagram

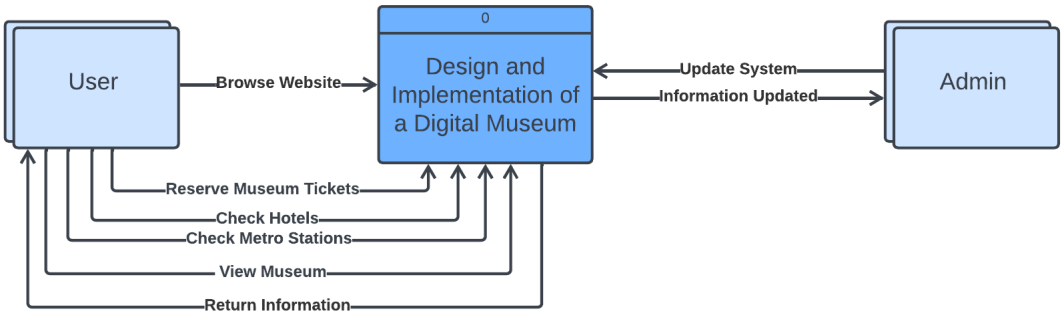

Figure 3.1: Context level DFD Diagram

3.1.2 Level 0 DFD Diagram

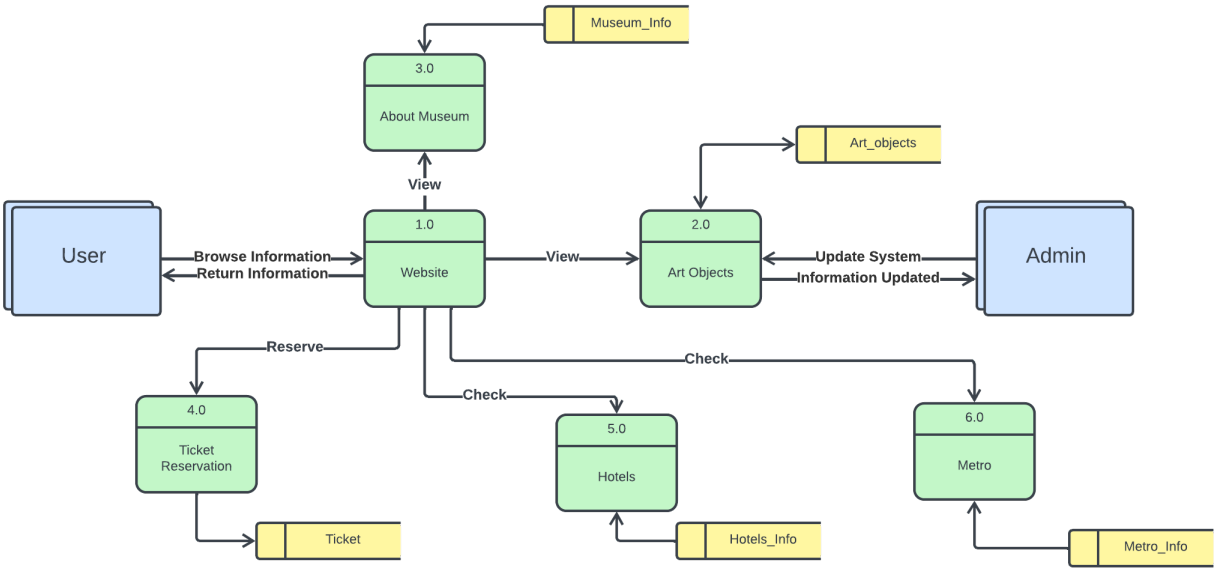

Figure 3.2: Level 0 DFD Diagram

3.2 ERD Diagram

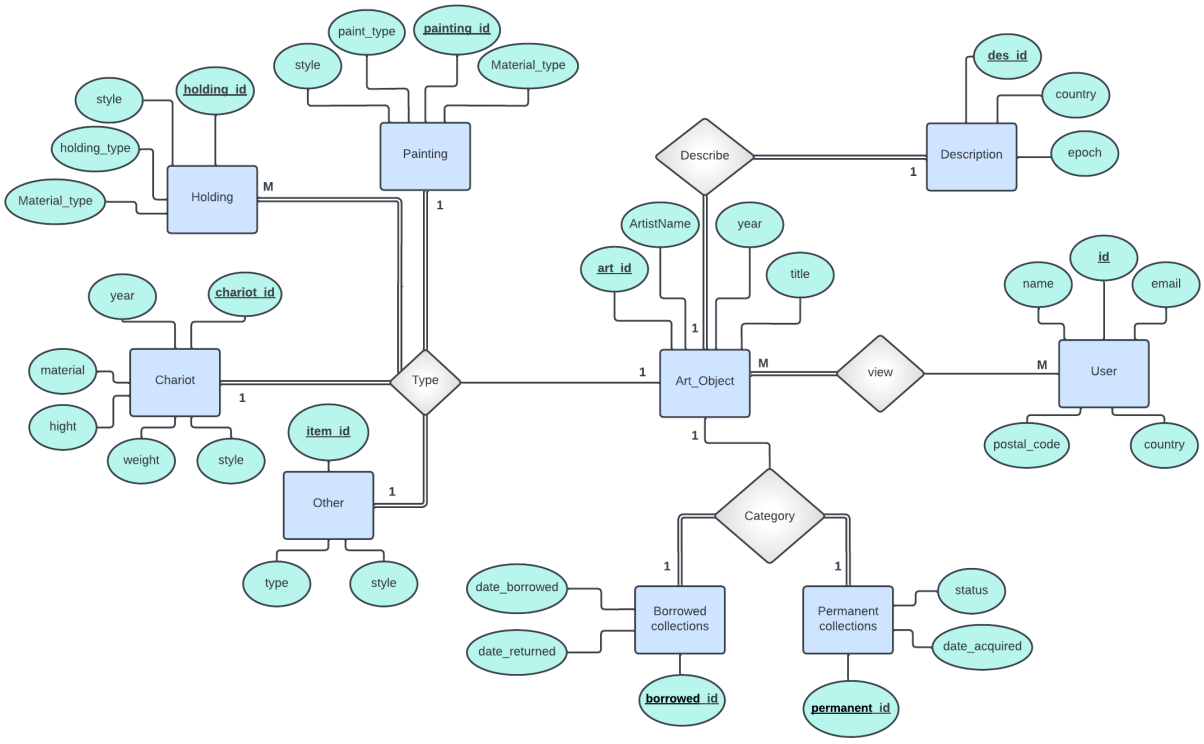

Figure 3.3: ERD Diagram

3.3 UML – Activity Diagram

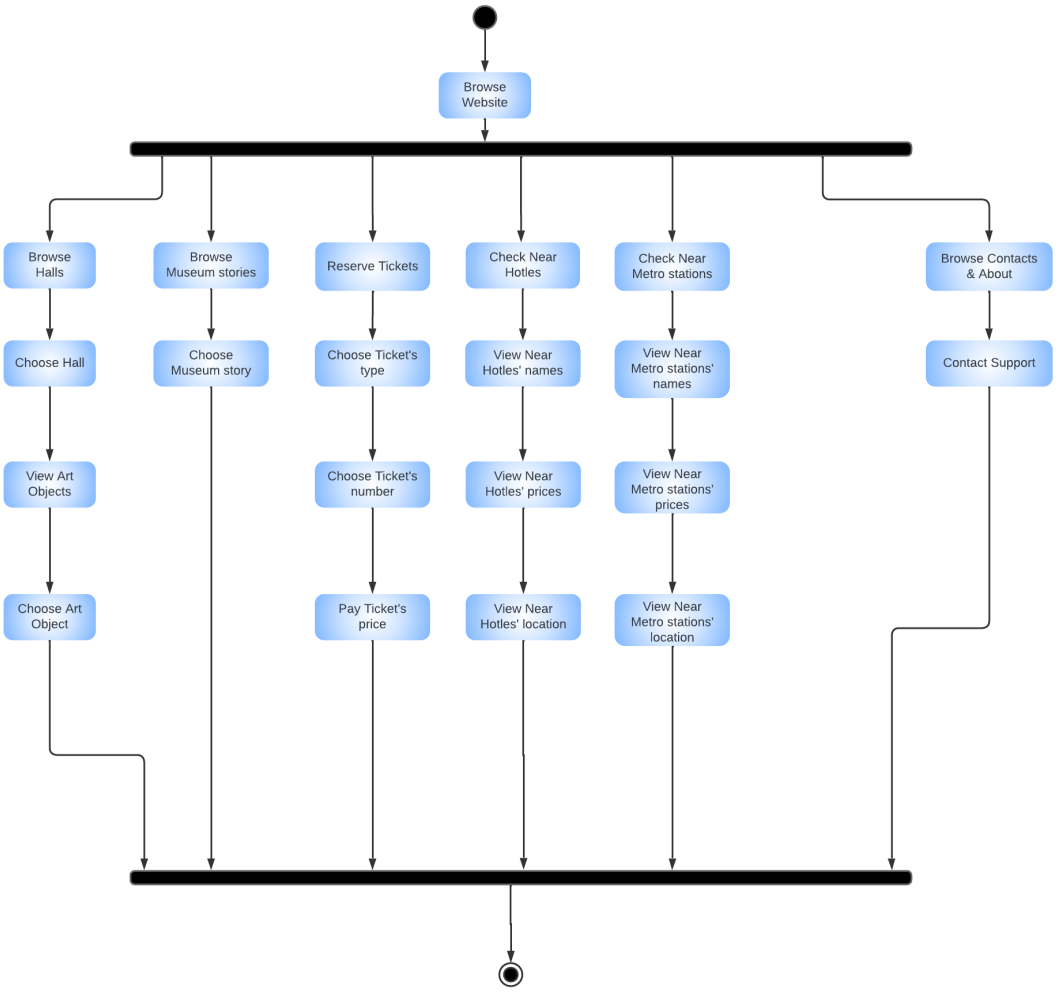

Figure 3.4: UML – Activity Diagram

3.4 GUI Block Diagram

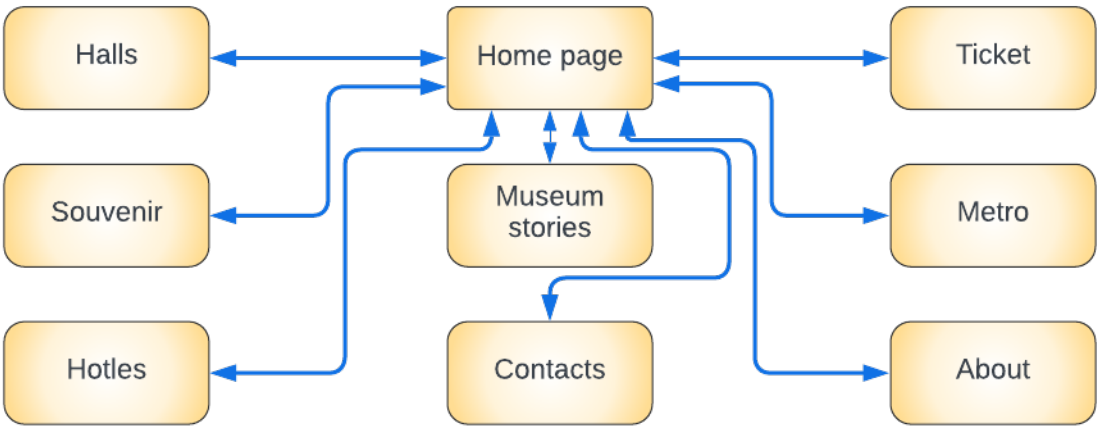

Figure 3.5: GUI Block Diagram

Chapter 4

System Design

4.1 Schema Diagram

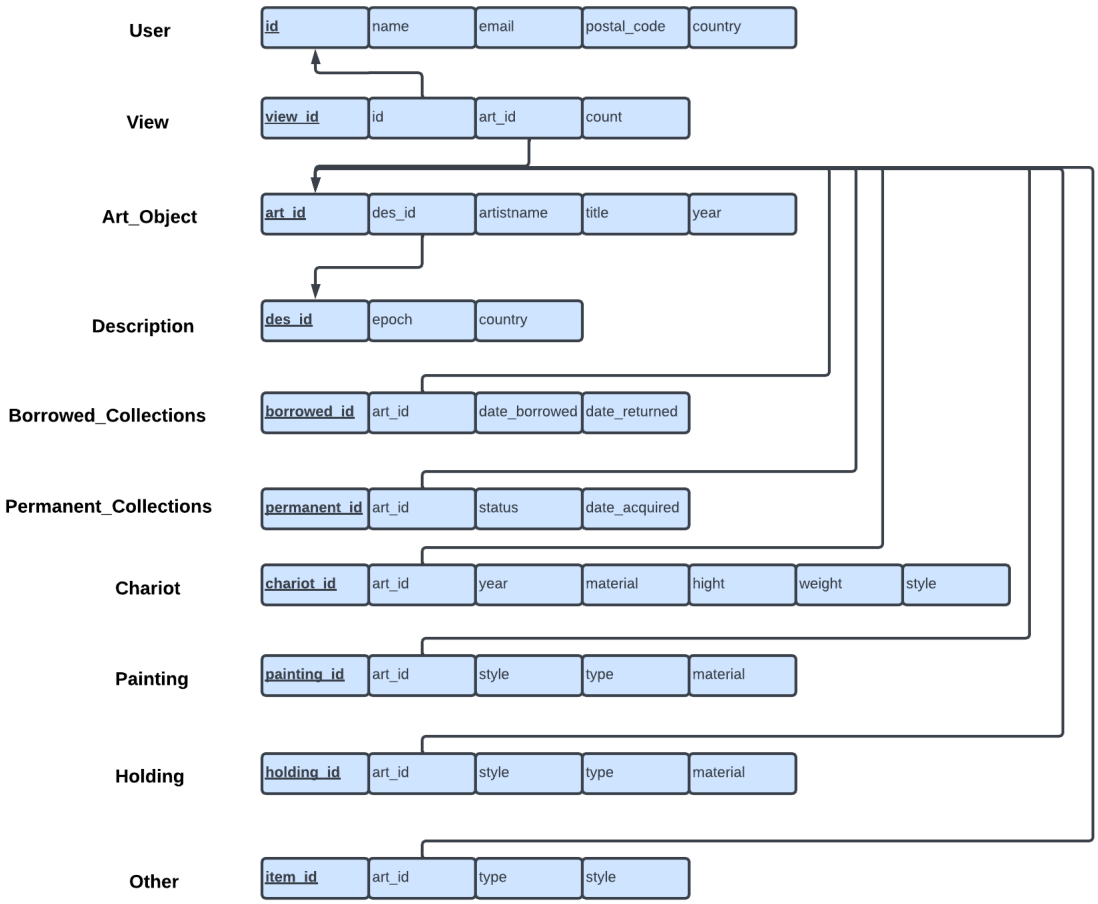

Figure 4.1: Schema Diagram

4.2 Database Model Diagram

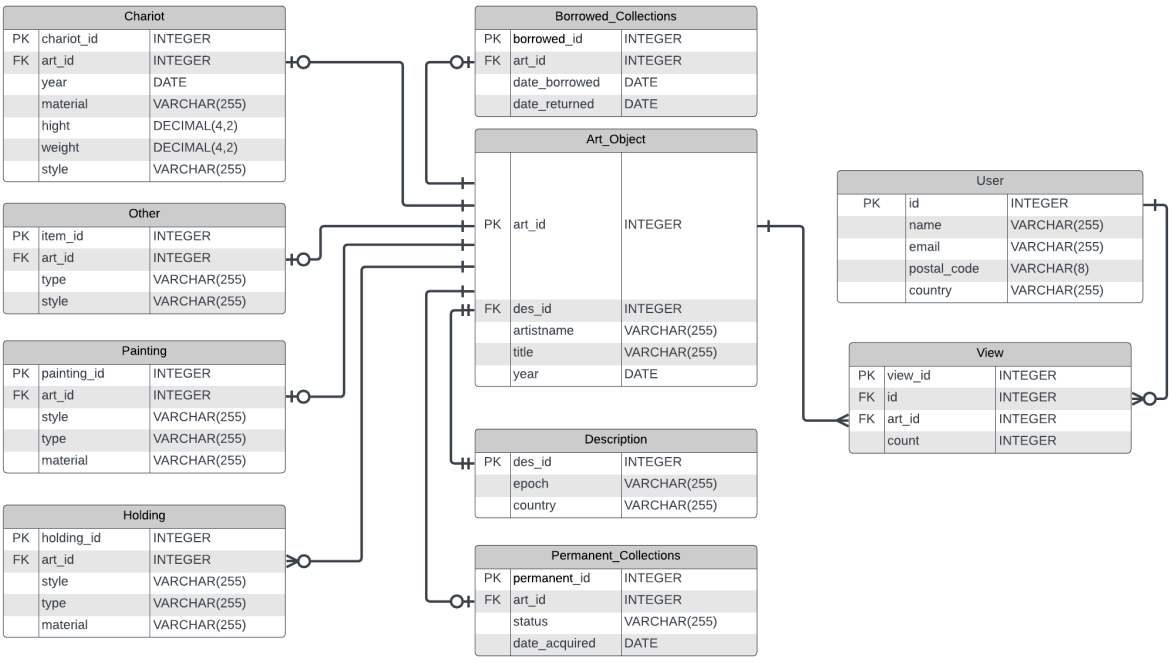

Figure 4.2: Database Model Diagram

4.3 System Architecture Design

4.3.1 MVC Architectural Pattern

MVC is an architectural pattern that is used to divide the application into three components, namely - Model, View, and Controller.

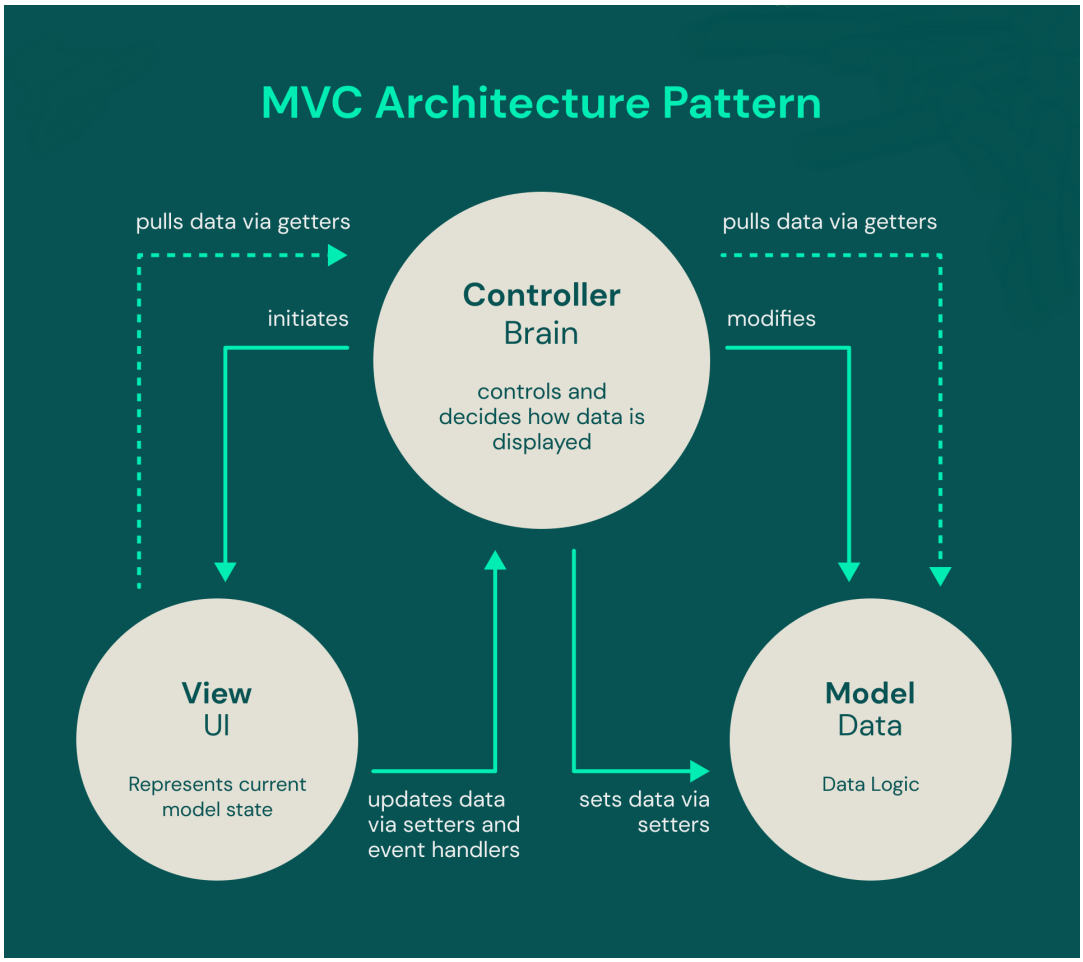

Figure 4.3: MVC Architecture Pattern Diagram

Components of an MVC Architecture

Model

This component contains all the data and business-related logic, i.e the database of an application.

View

This component is used for the UI logic and how to visually present the data, i.e the front-end of a web application or a mobile application.

Controller

This component acts as an interface between the Model and the View, and handles all the incoming requests, by using the data from the Model and sending it to the appropriate View, to render the desired output.

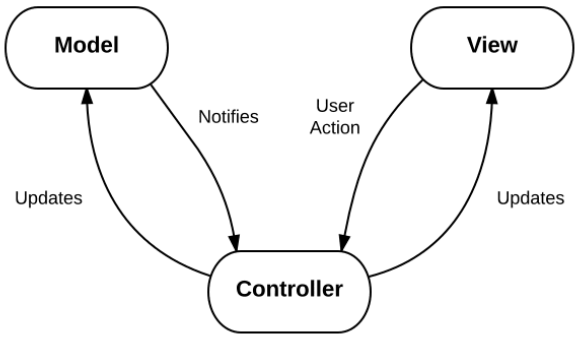

Figure 4.4: Model-View-Controller Block Diagram

4.3.2 Advantage of MVC

Loosely coupled

As explained before, each of the three components can be developed and worked on separately by different teams. This is possible because the functioning of each of the components is independent of each other. In software engineering, the degree of inter-dependence of a component or a module on other modules for its proper working is called coupling. The less the interdependence between the components, the looser the coupling between them.

Highly cohesive

Another concept is cohesion, which defines how closely all the code in a particular module supports a central purpose. In MVC, all the components are highly cohesive, which makes them highly maintainable and reduces modular complexity.

Rapid Development

Since there is a separation of concerns, different teams can work independently on the different components of the architecture, and the application can be developed at a rapid pace.

Easier to test and debug

All the different teams and departments can run tests on their own components, which is easier than running every piece together. Loosely coupled components can be developed independently and whenever there is a failure in the system, it is easier to find and fix the point of failure.

Chapter 5

Implementation

5.1 Introduction

The implementation section focuses on the practical development process of the project. It covers the chosen technologies, database design, user interface development, integration and testing strategies, deployment procedures, and maintenance considerations. This section provides insights into the technical decisions, coding practices, and development techniques employed. It showcases the successful transformation of ideas into a functioning system, setting the stage for evaluating the project's outcomes and achievements.

5.2 Technologies Used

In the implementation of this project, the following technologies were utilized to build a Digital Museum web application:

1. **Django**: a Python web framework, was used as the backend framework for developing the Digital Museum web application. It provides a robust and scalable foundation for building web applications, offering features such as URL routing, database integration, and user authentication.

2. **React**: a JavaScript library, was chosen for the frontend development of the Digital Museum web application. React enables the creation of interactive and dynamic user interfaces, allowing for efficient rendering and component-based development.

3. **AWS PostgreSQL**: Amazon Web Services (AWS) PostgreSQL was selected as the database management system for the project. AWS offers a managed PostgreSQL service, providing a reliable and scalable solution for storing and retrieving data, ensuring data integrity and performance.

4. **Git and GitHub**: Git, a distributed version control system, and GitHub, a web-based hosting service, were utilized for source code management and collaboration. These tools enable seamless code versioning, branching, and merging, facilitating effective teamwork and code maintenance.

5. **AWS S3**: Amazon Simple Storage Service (S3) was utilized for hosting and storing images in the Digital Museum web application. S3 provides a reliable and scalable solution for storing and serving static files, ensuring efficient retrieval and delivery of images.

6. **SendGrid**: SendGrid, an email delivery service, was integrated into the Digital Museum web application for sending transactional emails. It offers features such as email templates, email tracking, and deliverability management, ensuring reliable and efficient email communication.

5.3 User Interfaces

5.3.1 Introduction

The user interface (UI) is a critical component of the Digital Museum web application, serving as the visual and interactive gateway for users to engage with the system. This section focuses on describing the design, layout, and functionality of the UI, both for visitors exploring the museum and for museum staff managing the digital platform.

5.3.2 UI for Visitors

The UI for visitors aims to provide an immersive and user-friendly experience, allowing them to explore the digital museum and access relevant information. The visitor interface incorporates intuitive navigation, captivating visuals, and interactive elements to engage users and create a seamless browsing experience. The UI for visitors includes components such as the home page, hall pages, ticket reservation system, and information on available events. These interfaces are designed to facilitate easy navigation, showcase the museum's exhibits, and enable visitors to interact with the museum's offerings effectively.

Home Page

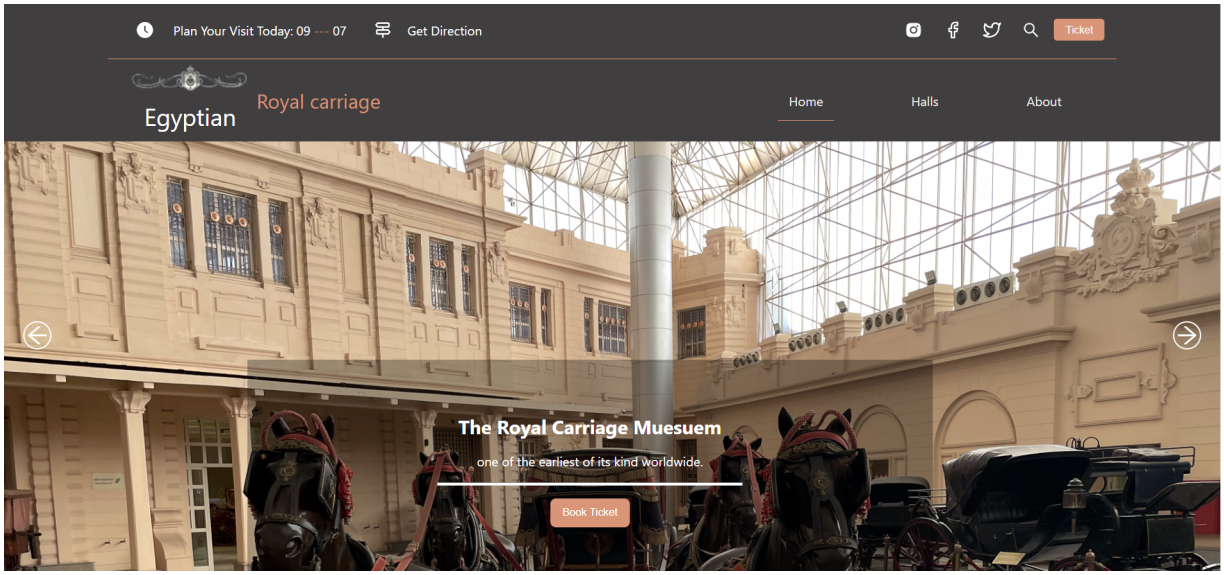

Figure 5.1: Home Page

ABOUT US

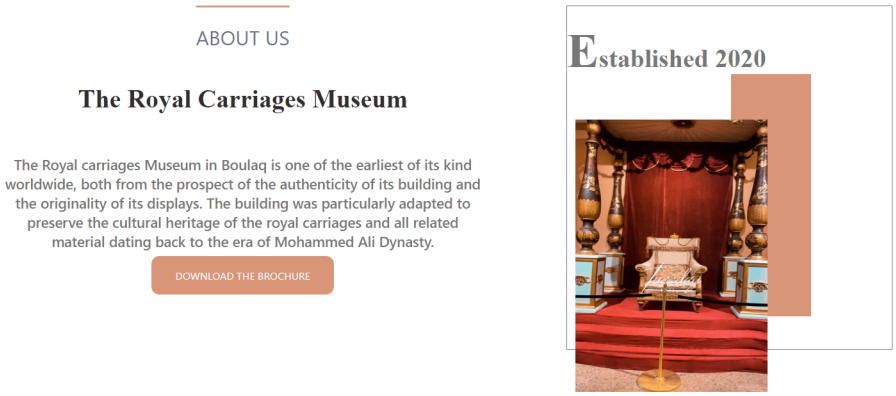

Figure 5.2: ABOUT US

INCOMING EVETNS

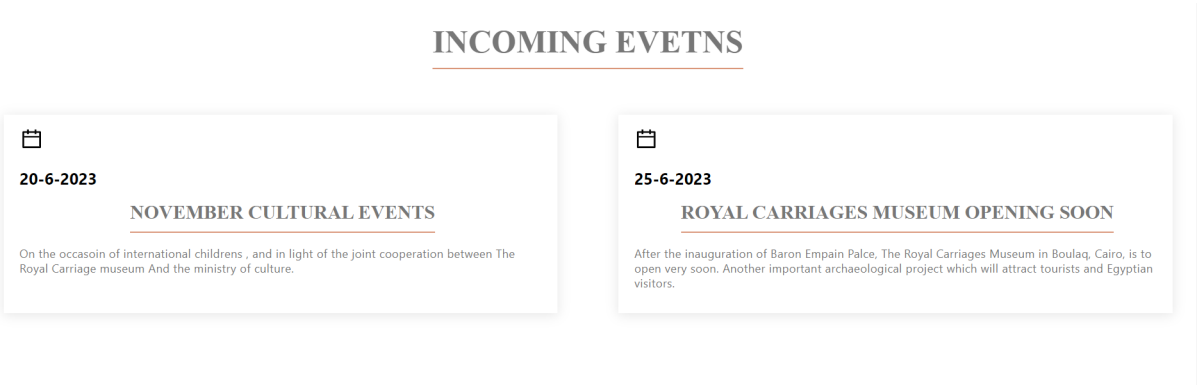

Figure 5.3: INCOMING EVETNS

Highlights

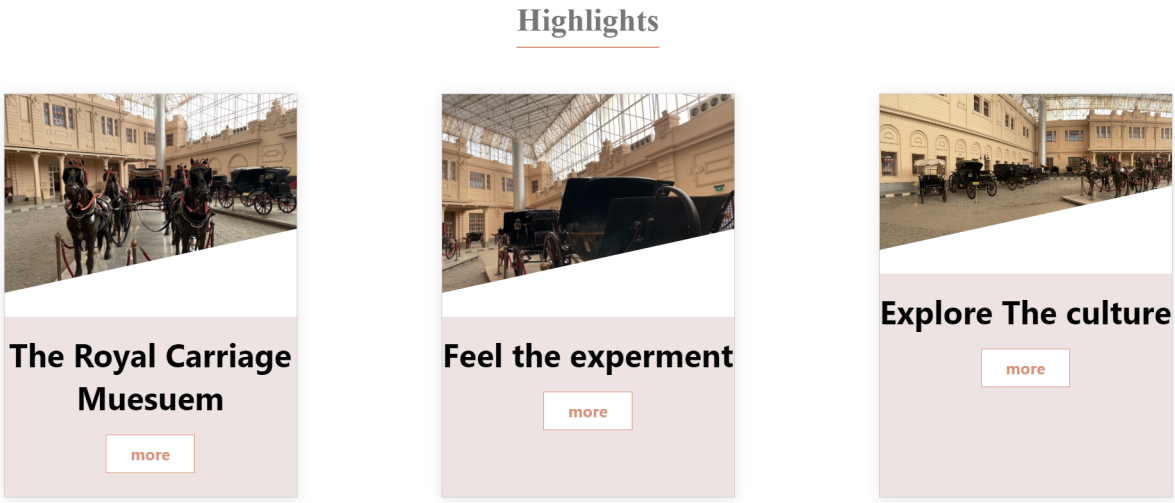

Figure 5.4: Highlights

Ticket Reservation

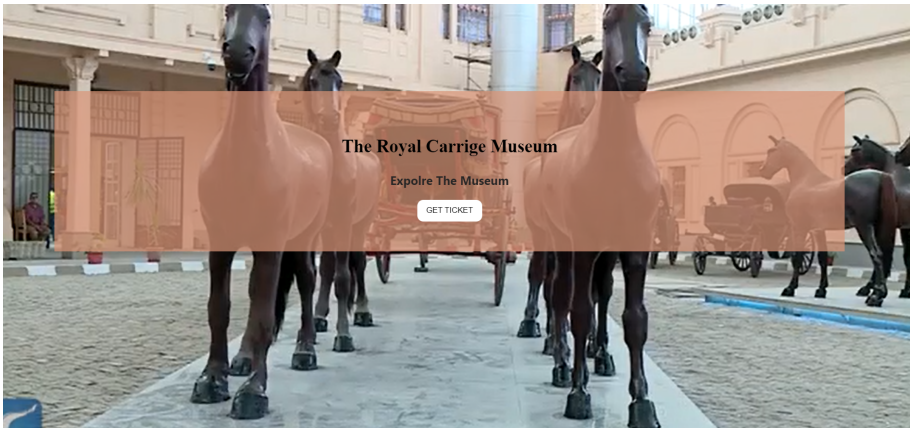

Figure 5.5: Ticket Reservation

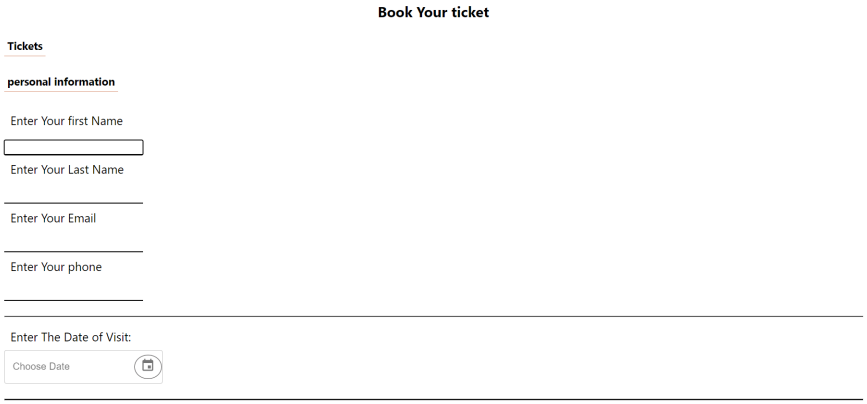

Figure 5.6: Info for Ticket Reservation

Figure 5.7: Selection Tickets for Ticket Reservation

5.3.3 UI for Museum Staff

The UI for museum staff focuses on empowering staff members to efficiently manage and curate the digital museum. It provides a range of administrative functionalities, enabling staff to handle tasks such as content management, exhibit creation, event scheduling, and ticket pricing. The staff interface encompasses components such as the login interface, admin panel, art object management, hall management, and ticket type and pricing management. These interfaces are designed to streamline administrative tasks, enhance productivity, and provide staff members with a comprehensive toolkit for managing the digital museum.

Throughout this section, we will delve into the specific UI components and their functionalities, highlighting key features, design considerations, and user interactions. We will showcase screenshots of the user interfaces to provide a visual representation of the various components and their layouts.

The user interface section aims to demonstrate the thoughtfully designed and user-centric approach taken in the development of the Digital Museum web application's UI. By providing an engaging and intuitive interface for visitors and robust management capabilities for museum staff, the UI enhances the overall user experience and contributes to the success of the digital museum platform.

Login Light Mode and Dark Mode

To cater to different user preferences, the login interface for museum staff offers both light mode and dark mode options. Staff members can choose their preferred visual theme, ensuring a comfortable and personalized experience while accessing the administrative functionalities.

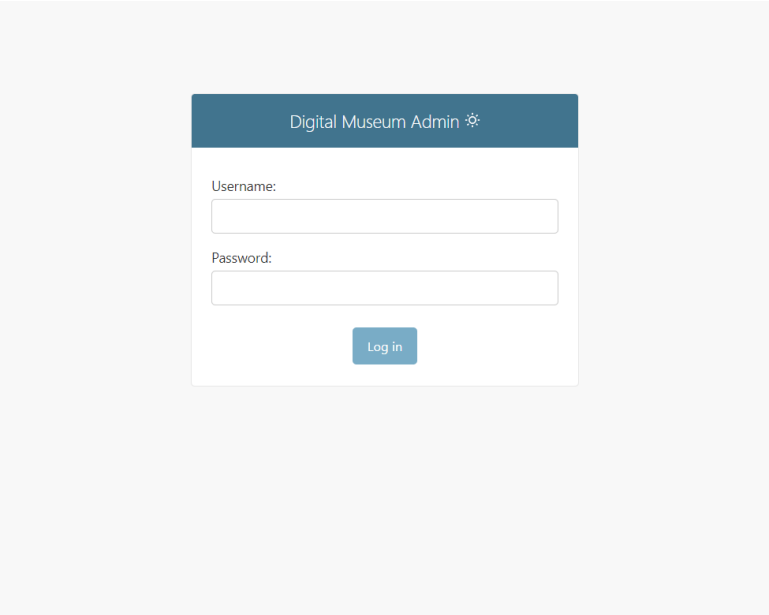

Figure 5.8: Login Interface in Light Mode

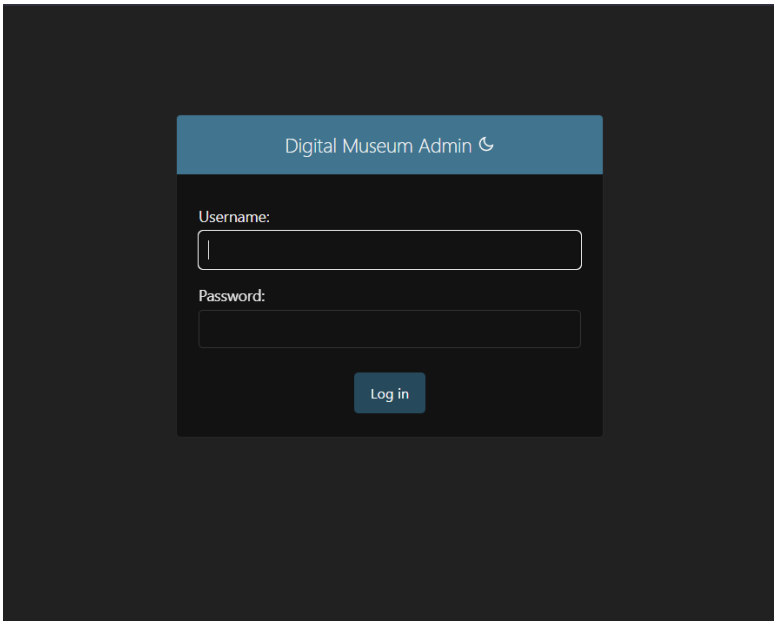

Figure 5.9: Login Interface in Dark Mode

Digital Museum Staff Site

The digital museum staff site serves as the central hub for staff members to access and manage various aspects of the digital museum. It provides a dashboard-like interface that offers quick access to essential tools, reports, and information relevant to their roles.

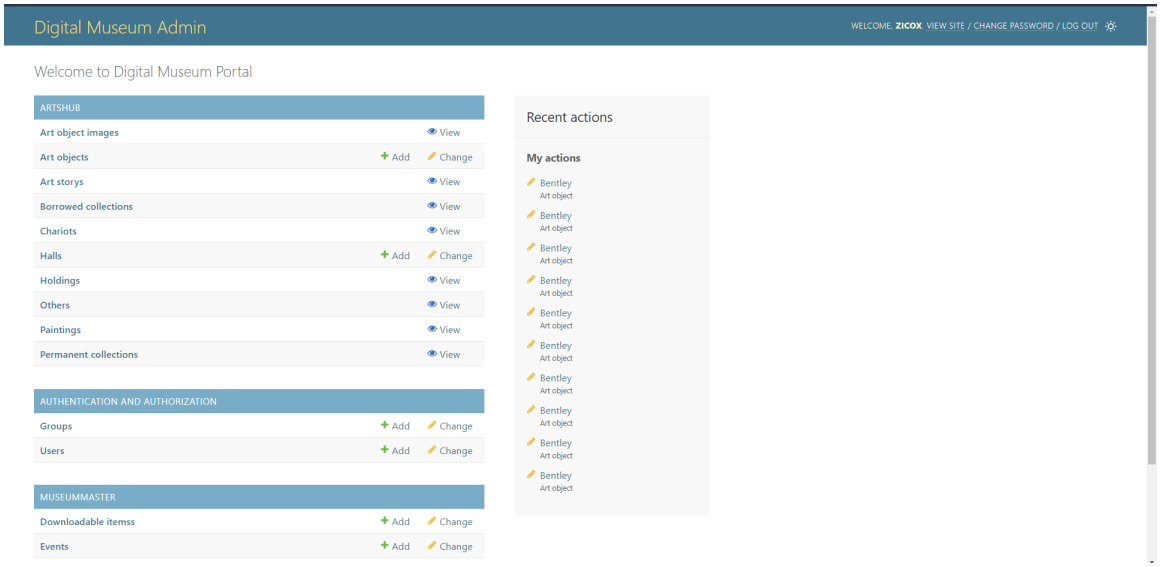

Figure 5.10: Digital Museum Staff Site

Add Staff User

The ”Add Staff User” interface allows authorized staff members to create new accounts for museum staff. This interface collects necessary information such as username, email, and password to generate user credentials and assign appropriate roles and permissions.

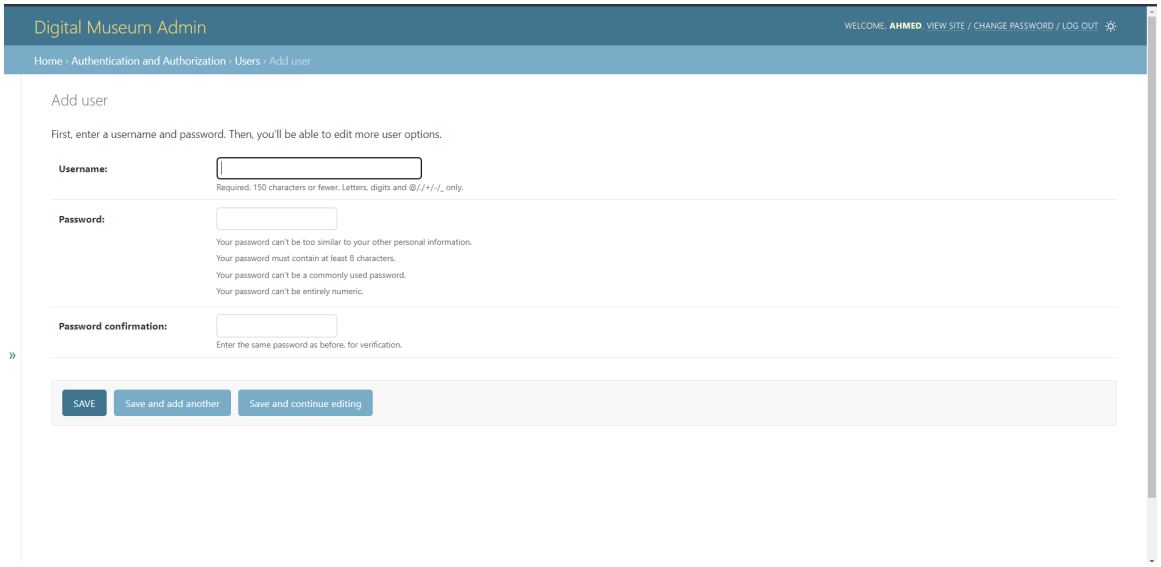

Figure 5.11: Add Staff User Interface

5.3.4 Update Staff User

The ”Update Staff User” interface enables authorized staff members to modify user information, including usernames, email addresses, and roles. This interface ensures that staff user profiles remain up-to-date and accurate.

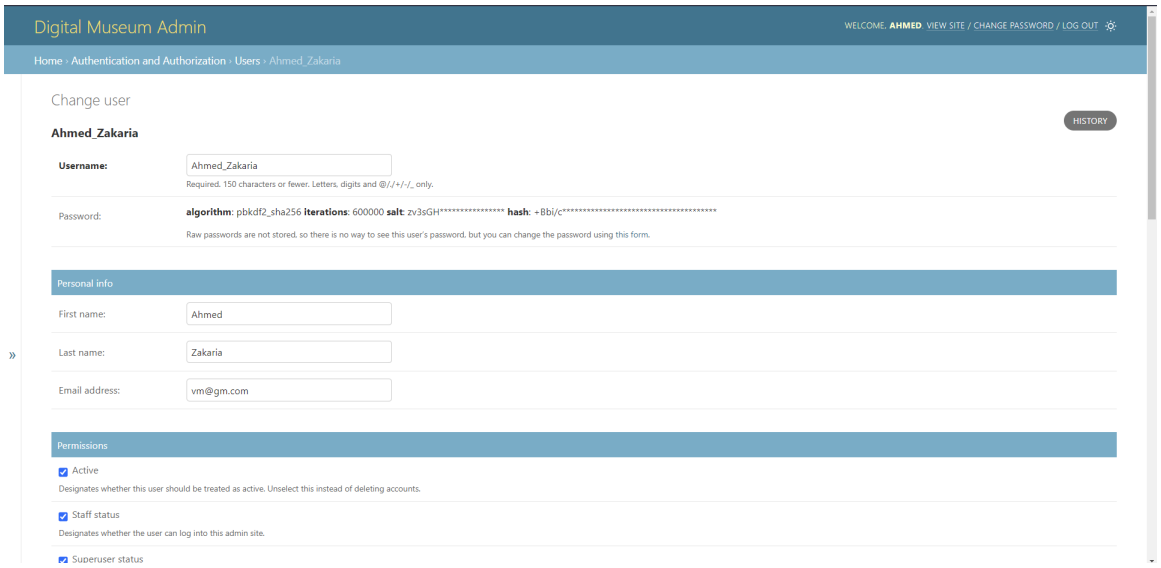

Figure 5.12: Update Staff User Interface

View Staffs

The ”View Staffs” interface presents a comprehensive list of all staff members associated with the digital museum. It displays relevant details such as usernames, email addresses, and roles, providing staff members with an overview of their colleagues.

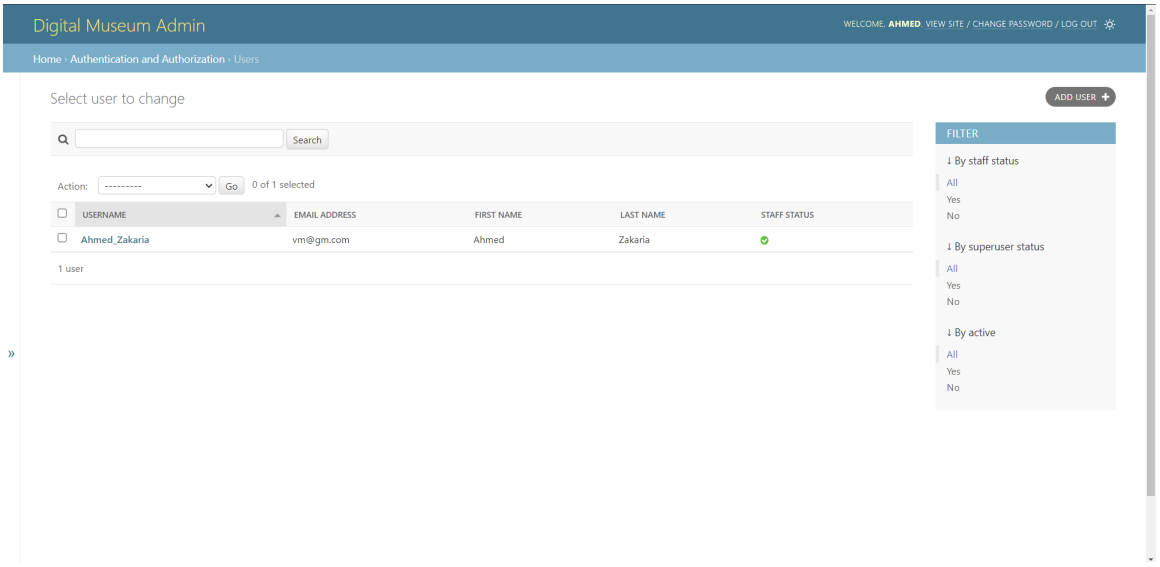

Figure 5.13: View Staffs Interface

View Halls

The ”View Halls” interface offers staff members an overview of the existing halls within the digital museum. It displays information such as hall names, descriptions, and associated art objects, allowing staff members to manage and update hall details efficiently.

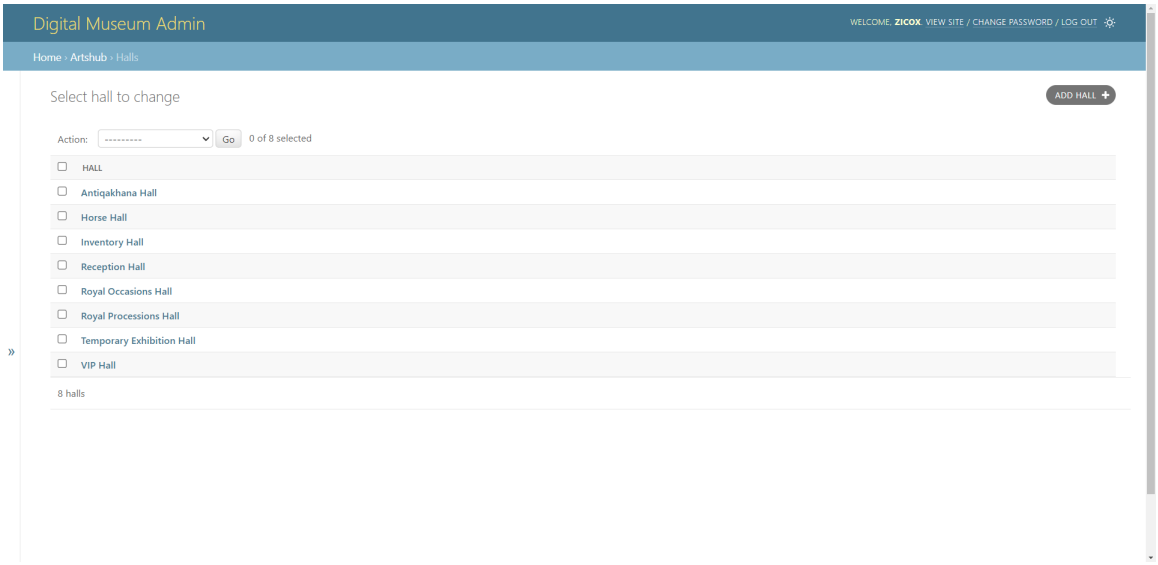

Figure 5.14: View Halls Interface

Add New Hall

The ”Add New Hall” interface facilitates the creation of new halls within the digital museum. Staff members can provide hall name ensuring the accurate representation of each hall in the digital platform.

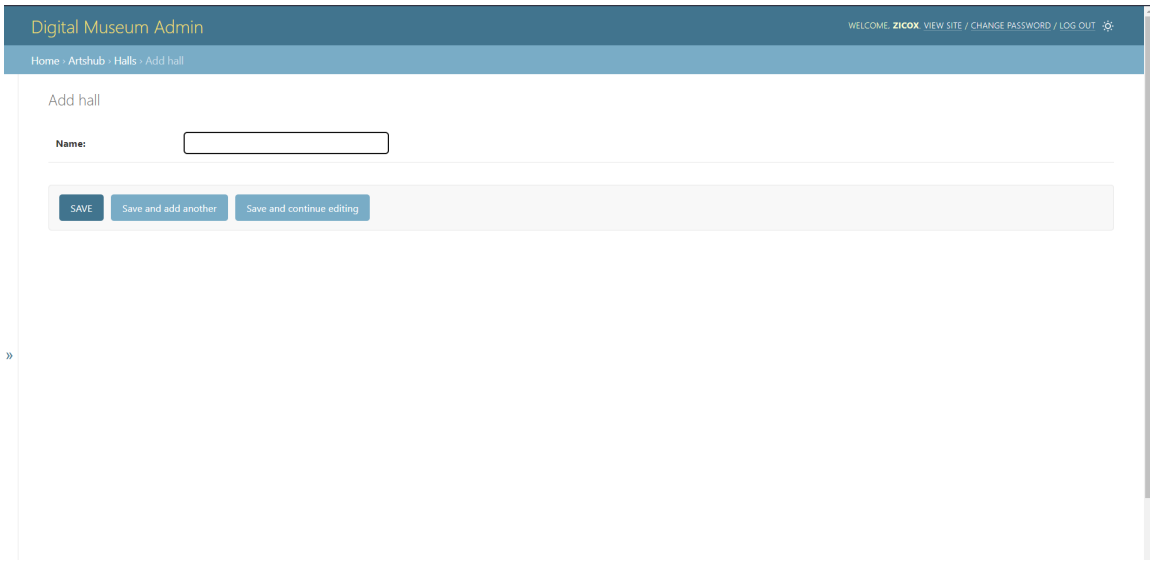

Figure 5.15: Add New Hall Interface

Update Hall

The ”Update Hall” interface enables staff members to modify information related to existing halls. It allows for changes to hall name, ensuring up-to-date and accurate representation within the digital museum.

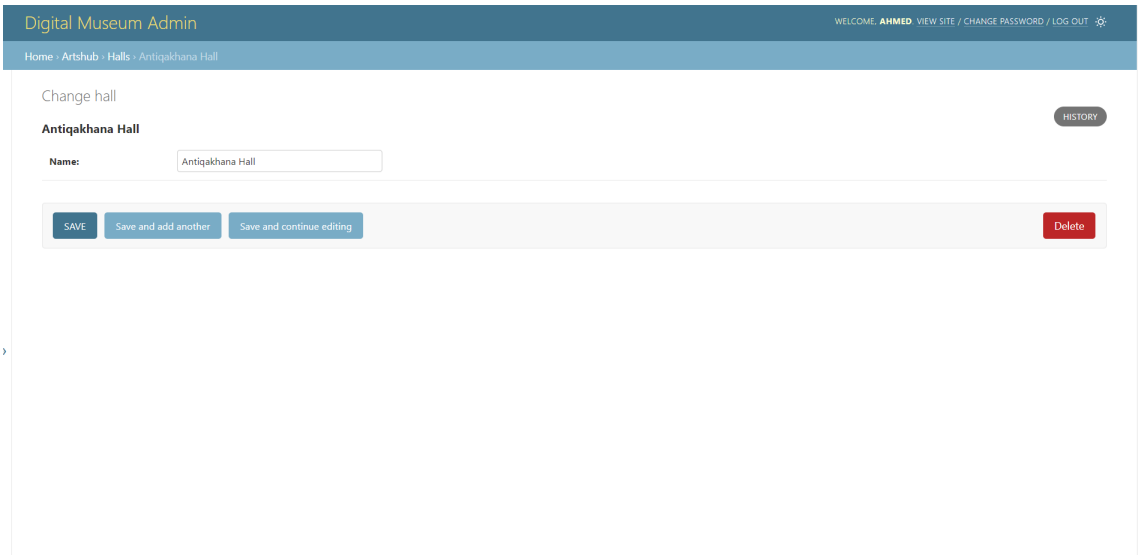

Figure 5.16: Update Hall Interface

Add Art Object

The ”Add Art Object” interface allows staff members to contribute new art objects to the museum’s digital collection. It collects information such as title, artist details, description, images, and associated hall, ensuring comprehensive documentation and accurate placement within the digital museum.

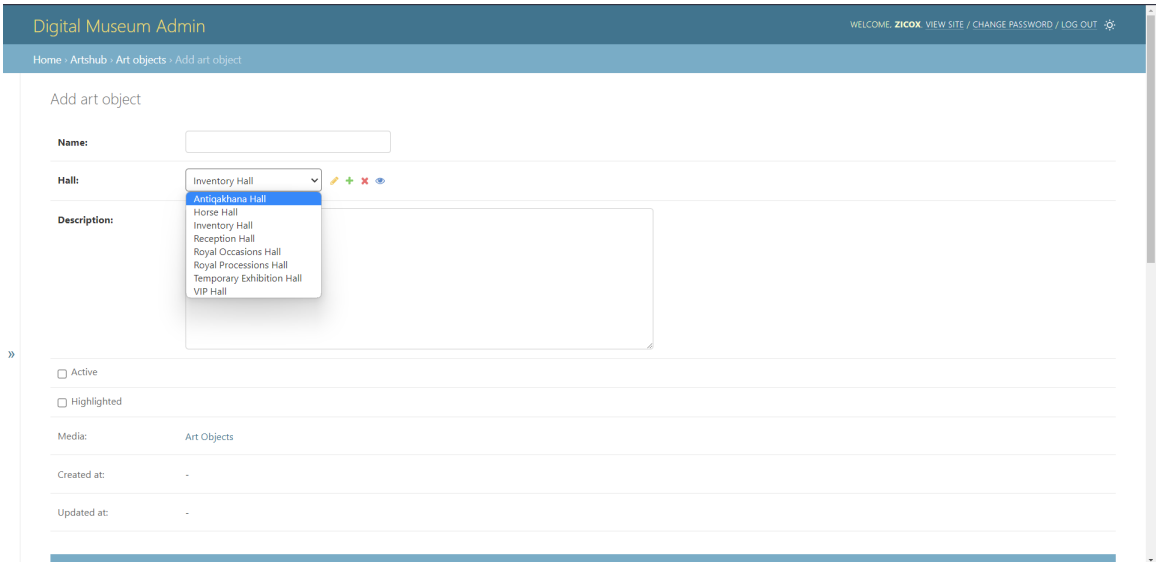

Figure 5.17: Add Art Object Interface

Update Art Object

The ”Update Art Object” interface enables staff members to modify information related to existing art objects. It allows for changes to object details such as title, artist information, description, images, and hall associations, ensuring up-to-date and accurate representation within the digital museum.

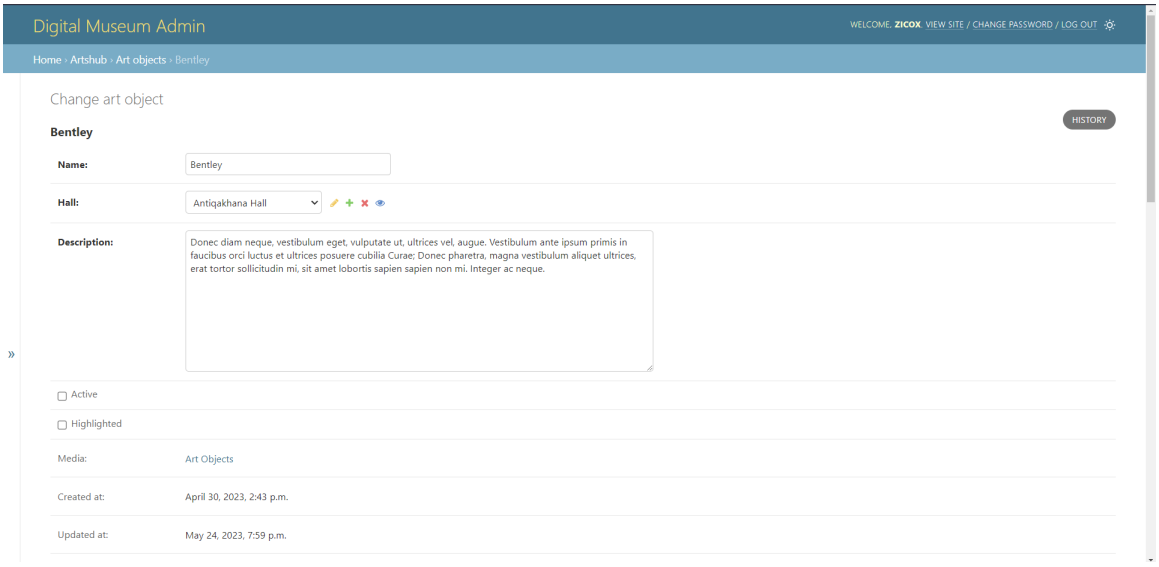

Figure 5.18: Update Art Object Interface

View Art Objects

The ”View Art Objects” interface provides staff members with a comprehensive list of all art objects within the digital museum. It displays relevant information such as titles, artists, descriptions, and hall associations, enabling efficient browsing and management of the museum’s art collection.

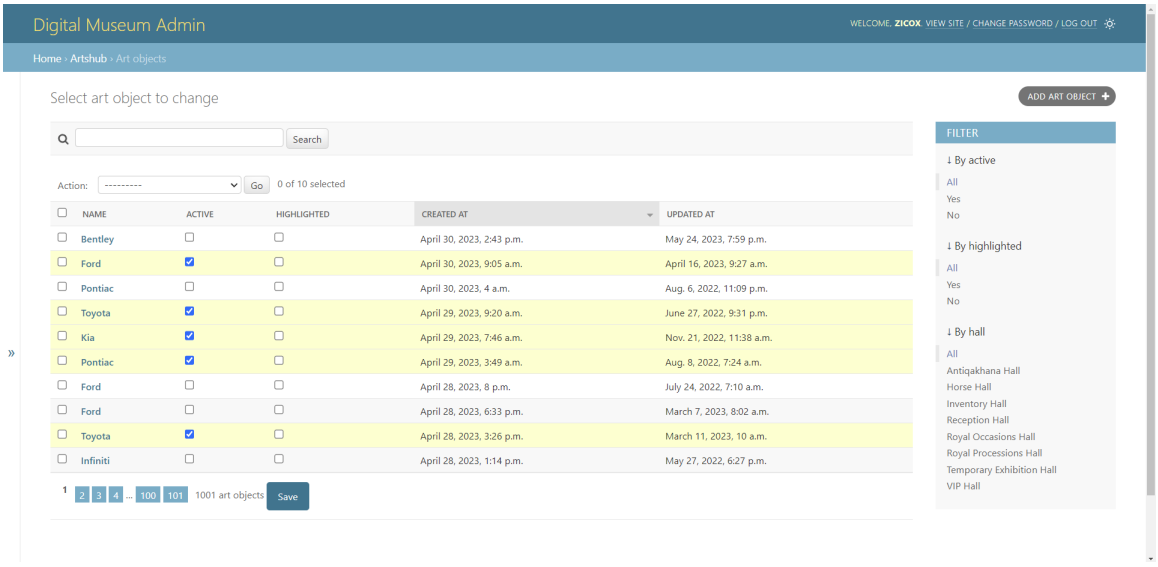

Figure 5.19: View Art Objects Interface

View Art Stories

The ”View Art Stories” interface showcases stories associated with specific art objects in the museum. It includes the title of the stories and their connection to the corresponding art objects.

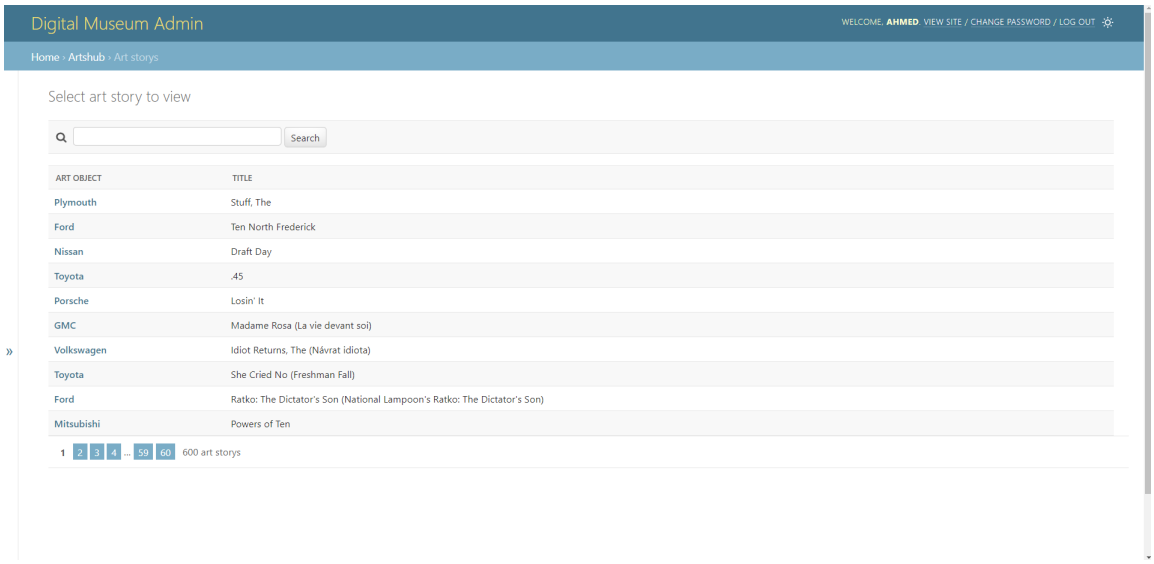

Figure 5.20: View Art Stories Interface

View Permanent Collections

The ”View Permanent Collections” interface allows staff members to explore and access the museum’s permanent collections. It provides an overview of the collections, showcasing associated art objects and relevant information.

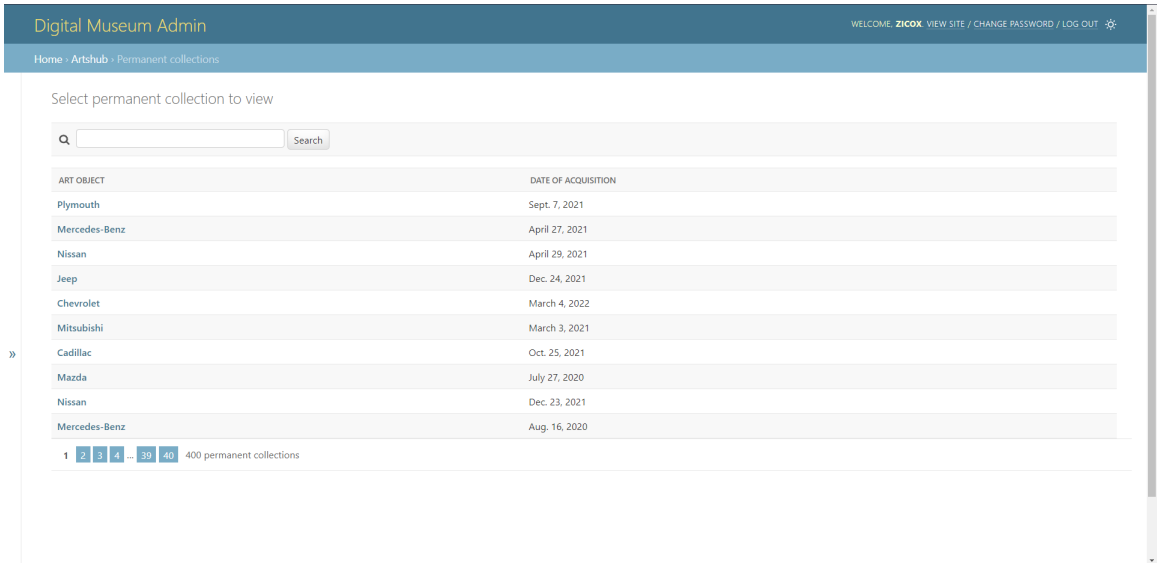

Figure 5.21: View Permanent Collections Interface

View Borrowed Collections

The ”View Borrowed Collections” interface enables staff members to track and manage the museum’s borrowed collections. It provides information on loaned artwork and artifacts, including status, and lending details.

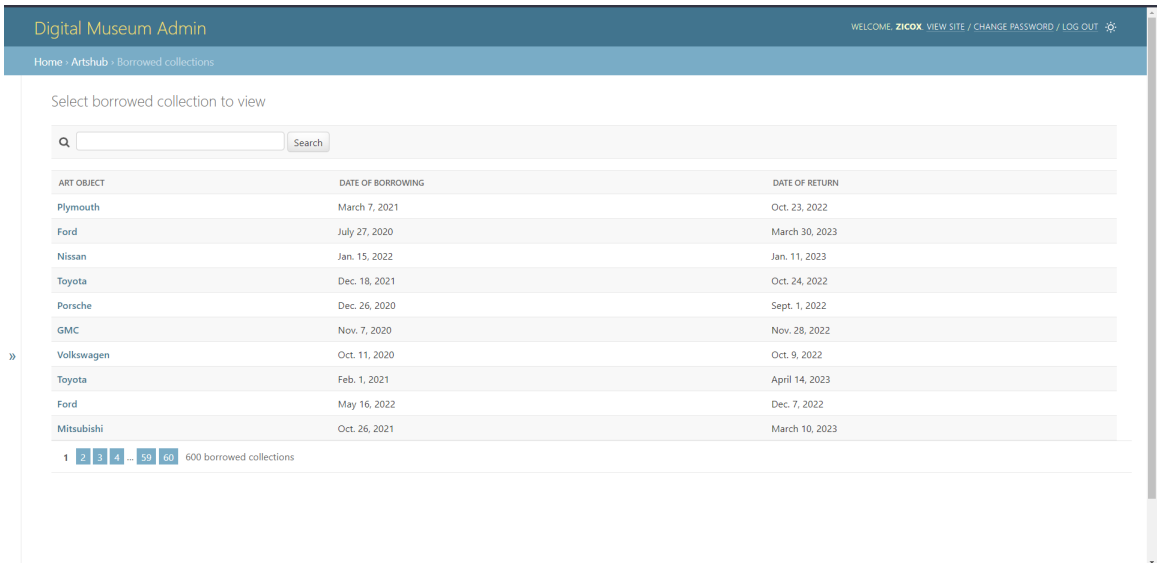

Figure 5.22: View Borrowed Collections Interface

View Holdings

The ”View Holdings” interface presents staff members with a summary of the museum’s holdings, including information on the number of art objects, categories, and overall collection statistics. This interface offers a high-level overview of the museum’s assets.

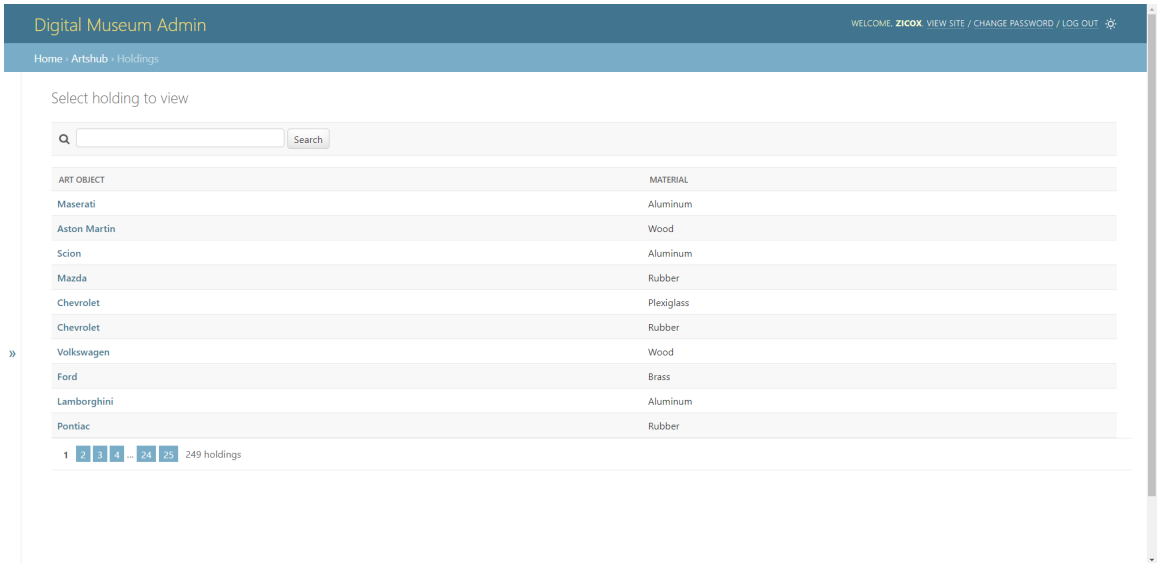

Figure 5.23: View Holdings Interface

View Paintings

The ”View Paintings” interface allows staff members to browse and access the collection of paintings within the digital museum. It displays relevant information such as the artist’s name and the art object associated with each painting.

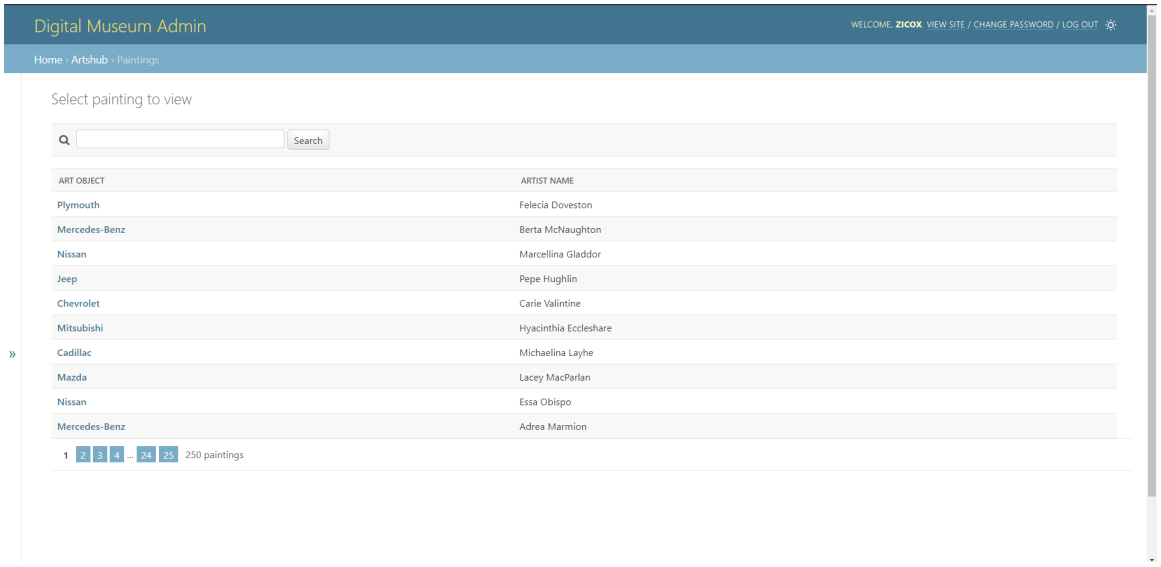

Figure 5.24: View Paintings Interface

View Chariots

The ”View Chariots” interface provides staff members with details about the chariots in the museum’s collection. It includes information such as origin, object number, chassis number, and the art object related to each chariot.

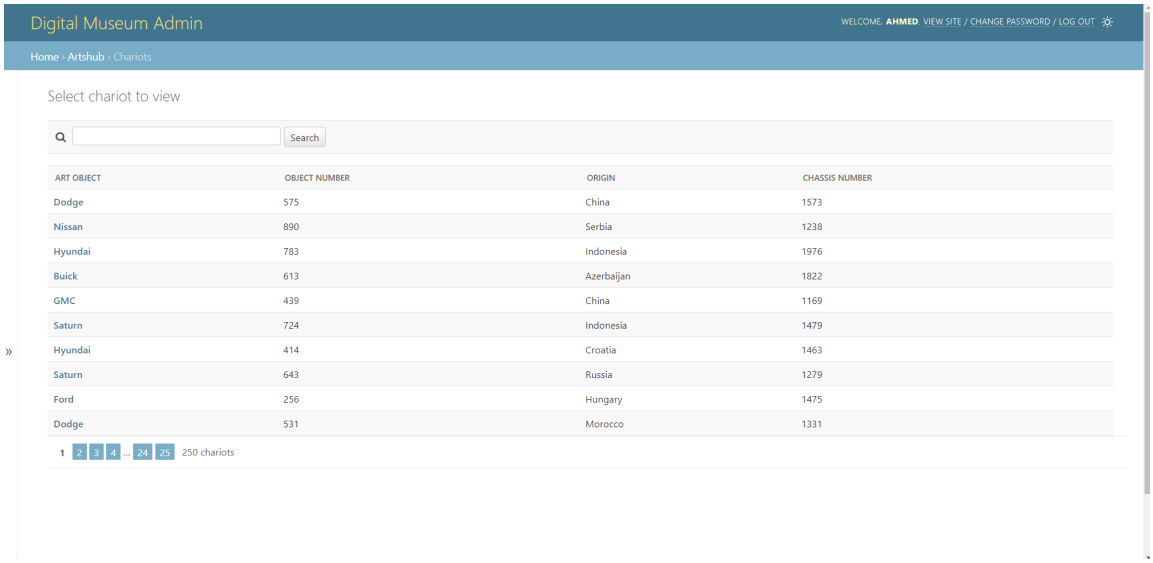

Figure 5.25: View Chariots Interface

Opening Hours

The ”View Opening Hours” interface displays the museum’s scheduled opening hours, including regular hours, special events, and any closures. Staff members can refer to this interface to ensure accurate and up-to-date information is available to visitors.

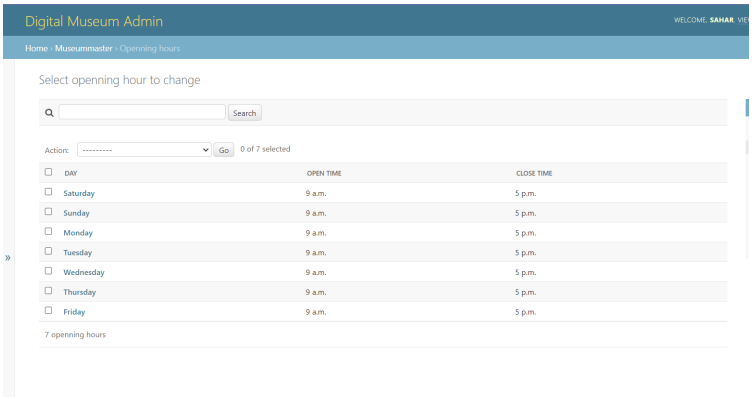

Figure 5.26: Opening Hours Interface

5.4 Back-end Implementation

5.4.1 Database Implementation

The database design of the Digital Museum web application was a crucial part of the implementation process. It involved creating tables, defining columns, establishing relationships, and optimizing performance through indexes and constraints. The following SQL code snippets showcase different aspects of the database design:

Creating Tables:

```
CREATE TABLE public."ArtsHub_artobject" (
    id bigint NOT NULL,
    created_at timestamp with time zone NOT NULL,
    updated_at timestamp with time zone NOT NULL,
    name character varying(255) NOT NULL,
    epoch character varying(255) NOT NULL,
    description text NOT NULL,
    active boolean NOT NULL,
    highlighted boolean NOT NULL,
    hall_id bigint NOT NULL,
    media_id bigint NOT NULL
);


CREATE TABLE public."ArtsHub_borrowedcollection" (
    date_of_borrowing date NOT NULL,
    date_of_return date NOT NULL,
    art_object_id bigint NOT NULL
);


CREATE TABLE public."ArtsHub_chariot" (
    object_number character varying(255) NOT NULL,
    origin character varying(255) NOT NULL,
    chassis_number character varying(255) NOT NULL,
    art_object_id bigint NOT NULL
);

```

```
29
30 CREATE TABLE public."ArtsHub_hall" (
31     id bigint NOT NULL,
32     name character varying(255) NOT NULL
33 );
34
35
36 CREATE TABLE public."ArtsHub_holding" (
37     id bigint NOT NULL,
38     material character varying(255) NOT NULL,
39     art_object_id bigint NOT NULL
40 );
41
42
43 CREATE TABLE public."ArtsHub_other" (
44     origin character varying(255) NOT NULL,
45     art_object_id bigint NOT NULL
46 );
47
48
49 CREATE TABLE public."ArtsHub_painting" (
50     artist_name character varying(255) NOT NULL,
51     art_object_id bigint NOT NULL
52 );
53
54
55 CREATE TABLE public."ArtsHub_permanentcollection" (
56     date_of_acquisition date NOT NULL,
57     art_object_id bigint NOT NULL
58 );
```

Listing 5.1: Creating Tables

Defining Constraints:

```
1
2  ALTER TABLE ONLY public."ArtsHub_artobject"
3      ADD CONSTRAINT "ArtsHub_artobject_pkey" PRIMARY KEY (id);
4
5  ALTER TABLE ONLY public."ArtsHub_borrowedcollection"
6      ADD CONSTRAINT "ArtsHub_borrowedcollection_pkey" PRIMARY KEY (
       art_object_id);
7
8  ALTER TABLE ONLY public."ArtsHub_chariot"
9      ADD CONSTRAINT "ArtsHub_chariot_pkey" PRIMARY KEY (art_object_id);
10
11 ALTER TABLE ONLY public."ArtsHub_hall"
12     ADD CONSTRAINT "ArtsHub_hall_pkey" PRIMARY KEY (id);
13
14 ALTER TABLE ONLY public."ArtsHub_holding"
15     ADD CONSTRAINT "ArtsHub_holding_pkey" PRIMARY KEY (id);
16
17 ALTER TABLE ONLY public."ArtsHub_other"
18     ADD CONSTRAINT "ArtsHub_other_pkey" PRIMARY KEY (art_object_id);
19
20 ALTER TABLE ONLY public."ArtsHub_painting"
21     ADD CONSTRAINT "ArtsHub_painting_pkey" PRIMARY KEY (art_object_id);
22
23 ALTER TABLE ONLY public."ArtsHub_permanentcollection"
24     ADD CONSTRAINT "ArtsHub_permanentcollection_pkey" PRIMARY KEY (
       art_object_id);
25
26
27 ALTER TABLE ONLY public."ArtsHub_artobject"
28     ADD CONSTRAINT "
       ArtsHub_artobject_hall_id_895c378a_fk_ArtsHub_hall_id" FOREIGN KEY (
       hall_id) REFERENCES public."ArtsHub_hall"(id) DEFERRABLE INITIALLY
       DEFERRED;
29
30
31 ALTER TABLE ONLY public."ArtsHub_borrowedcollection"
32     ADD CONSTRAINT "
       ArtsHub_borrowedcoll_art_object_id_f5e394a2_fk_ArtsHub_a" FOREIGN
       KEY (art_object_id) REFERENCES public."ArtsHub_artobject"(id)
       DEFERRABLE INITIALLY DEFERRED;
33
34
```

```
35
36 ALTER TABLE ONLY public."ArtsHub_chariot"
37     ADD CONSTRAINT "
    ArtsHub_chariot_art_object_id_b1c4992e_fk_ArtsHub_artobject_id"
    FOREIGN KEY (art_object_id) REFERENCES public."ArtsHub_artobject"(id
    ) DEFERRABLE INITIALLY DEFERRED;
38
39
40
41 ALTER TABLE ONLY public."ArtsHub_holding"
42     ADD CONSTRAINT "
    ArtsHub_holding_art_object_id_ee4aea38_fk_ArtsHub_artobject_id"
    FOREIGN KEY (art_object_id) REFERENCES public."ArtsHub_artobject"(id
    ) DEFERRABLE INITIALLY DEFERRED;
43
44 ALTER TABLE ONLY public."ArtsHub_other"
45     ADD CONSTRAINT "
    ArtsHub_other_art_object_id_621c562d_fk_ArtsHub_artobject_id"
    FOREIGN KEY (art_object_id) REFERENCES public."ArtsHub_artobject"(id
    ) DEFERRABLE INITIALLY DEFERRED;
46
47
48 ALTER TABLE ONLY public."ArtsHub_painting"
49     ADD CONSTRAINT "
    ArtsHub_painting_art_object_id_f552ce64_fk_ArtsHub_artobject_id"
    FOREIGN KEY (art_object_id) REFERENCES public."ArtsHub_artobject"(id
    ) DEFERRABLE INITIALLY DEFERRED;
50
51 ALTER TABLE ONLY public."ArtsHub_permanentcollection"
52     ADD CONSTRAINT "
    ArtsHub_permanentcol_art_object_id_23cfe829_fk_ArtsHub_a" FOREIGN
    KEY (art_object_id) REFERENCES public."ArtsHub_artobject"(id)
    DEFERRABLE INITIALLY DEFERRED;
```

Listing 5.2: Defining Constraints

Creating Indexes:

```
1
2
3  CREATE INDEX "ArtsHub_artobject_hall_id_895c378a" ON public."
       ArtsHub_artobject" USING btree (hall_id);
4
5
6
7  CREATE INDEX "ArtsHub_artobject_media_id_1e013fa8" ON public."
       ArtsHub_artobject" USING btree (media_id);
8
9
10
11 CREATE INDEX "ArtsHub_artobjectimage_art_object_id_c5a6797b" ON public.
       "ArtsHub_artobjectimage" USING btree (art_object_id);
12
13
14 CREATE INDEX "ArtsHub_holding_art_object_id_ee4aea38" ON public."
       ArtsHub_holding" USING btree (art_object_id);
```

Listing 5.3: Creating Indexes

5.4.2 Controllers Implementation

Art Object Controller

```
class ArtObjectViewSet(ReadOnlyModelViewSet):
    pagination_class = CustomPagination
    permission_classes = [AllowAny]
    filter_backends = [DjangoFilterBackend, SearchFilter]
    filterset_fields = ['hall__name', 'epoch', 'active', 'highlighted']
    search_fields = ['name', 'art_story__title','epoch', 'hall__name']
    queryset = ArtObject.objects \
        .select_related('hall') \
        .prefetch_related('images') \
        .prefetch_related('holdings') \
        .select_related('art_story') \
        .select_related('chariot') \
        .select_related('painting') \
        .select_related('other') \
        .select_related('borrowed_collection') \
        .select_related('permanent_collection') \
        .all()
    serializer_class = ArtObjectSerializer
```

Listing 5.4: Art Object Controller

Hall Controller

```
class HallViewSet(ReadOnlyModelViewSet):
    pagination_class = CustomPagination
    permission_classes = [AllowAny]
    filter_backends = [SearchFilter]
    search_fields = ['name']
    queryset = Hall.objects.all()
    serializer_class = HallSerializer
```

Listing 5.5: Hall Controller

Museum Info Controller

```
class InfoViewSet(CustomModelViewSet):
    queryset = MuseumInfo.objects.all()
    serializer_class = InfoSerializer
```

Listing 5.6: Museum Info Controller

Tickets Controllers

```
class TicketViewSet(ModelViewSet):
    queryset = Ticket.objects.all()
    serializer_class = TicketSerializer

class OrderItemViewSet(ModelViewSet):
    queryset = OrderItem.objects.select_related('ticket').all()
    def get_serializer_class(self):
        if self.request.method == 'GET':
            return ViewOrderItemSerializer
        return OrderItemSerializer


class OrderViewSet(ModelViewSet):
    queryset = Order.objects.prefetch_related('tickets__ticket').all()
    def get_serializer_class(self):
        if self.request.method == 'GET':
            return ViewOrderSerializer
        return OrderSerializer
```

Listing 5.7: Tickets Controllers

API JSON

Art Object JSON


```
{
    "id": 182,
    "name": "Brake",
    "epoch": "",
    "description": "It is an open black painted wooden carriage with four wheels. It was pulled by a pair of horses and driven by a single coachman. It was used for training new horses and for first aid in carriage processions.",
    "hall": {
        "id": 4,
        "name": "Reception Hall"
    },
    "images": [
        {
            "image": "https://arts981.s3.amazonaws.com/images/photo_2023-06-12_18-57-33.jpg?X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAV2QFCCARZAL3X7OR%2F20230613%2Feu-west-3%2Fs3%2Faws4_request&X-Amz-Date=20230613T134155Z&X-Amz-Expires=3600&X-Amz-SignedHeaders=host&X-Amz-Signature=c25da8cd4922da90704dc5461d31d1c09bc79620f651a57005720575f30dff75"
        }
    ],
    "art_story": null,
    "created_at": "2023-06-12T17:03:50.193436Z",
    "updated_at": "2023-06-12T17:03:50.193453Z",
    "active": true,
    "highlighted": false,
    "type": "chariot",
    "content": {
        "object_number": "187/7",
        "origin": "Reign of King Fouad (r. 1917-1936)",
        "chassis_number": "60"
    },
    "status": "permanent",
    "status_info": {
        "date_of_acquisition": "2023-04-15"
    }
}
```


Listing 5.8: Art Object JSON

Hall JSON

```
{
    "id": 1,
    "name": "Horse Hall"
}
```

Listing 5.9: Hall JSON

Ticket Reservation JSON

```
{
    "id": 20,
    "first_name": "Ahmed",
    "last_name": "Aakaria",
    "email": "sjahmedzakaria@gmail.com",
    "phone": "",
    "tickets": [
        {
            "id": 26,
            "ticket": {
                "id": 3,
                "ticket_type": "Foreing_Student",
                "price": 50
            },
            "amount": 3,
            "total_price": 150
        }
    ],
    "date": "2023-06-21",
    "created_at": "2023-06-11T17:06:40.520724Z",
    "total_price": 150
}
```

Listing 5.10: Ticket Reservation JSON

Museum Info JSON

```
[
    {
        "name": "The Royal Carriages Museum",
        "about": "The Royal carriages Museum in Boulaq is one of the earliest of its kind worldwide. The building was particularly adapted to preserve the cultural heritage of the royal carriages and all related material dating back to the era of Mohammed Ali Dynasty.",
        "contact_mail": "support@RCM.com",
        "contact_phone": "19564",
        "address": "Boulaq - Cairo - Egypt",
        "event": [
            {
                "name": "Wikibox",
                "date": "2022-12-24",
                "start_time": "10:50:33",
                "end_time": "15:26:00",
                "event_about": "Etiam vel augue. Vestibulum rutrum rutrum neque. Aenean auctor gravida sem.\r\n\r\nPraesent id massa id nisl venenatis lacinia. Aenean sit amet justo. Morbi ut odio."
            }
        ],
        "openinghours": [
            {
                "day": "Monday",
                "open_time": "09:00:00",
                "close_time": "17:00:00"
            }
        ],
        "downloadableItems": [
            {
                "name": "Museum Brochure",
                "link": "https://arts981.s3.amazonaws.com/files/rcm-en.pdf?X-Amz Algorithm=AWS4-HMAC-SHA256&X-Amz Credential=AKIAV2QFCCARZAL3X7OR%2F20230613%2Feu-west-3"
            }
        ]
    }
]
```

Listing 5.11: Museum Info JSON

5.5 Front-end Implementation

5.5.1 Home Page

```
import React from 'react';
import Slider from '../component/imageslider';
import Calender from '../component/calender';
import About from '../component/about';
import Events from '../component/events';
import Artcnt from '../component/artcnt';
import Rvideo from '../component/video';
import Footer from '../component/footer';
import { useEffect,useState } from 'react';
import './homepage.css'
// import Ab from "../component/swiper";
import { sliderData } from '../component/Imagesliderdata';
import {test} from '../component/data';
function HomePage() {
  // import Ab from "../component/swiper";
  const data = [
    { date: '12-4-2020', title: 'Mahmoud aly', by: 'best event ever' },
    { date: '12-4-2020', title: 'Mahmoud aly', by: 'best event ever' },
  ];
  const [Hdata,setHdata]=useState([])
  const [loading, setLoading] = useState(false);
  const artdata = sliderData;
useEffect(()=>{
  const fetchData = async () => {
  try {
    const response = await fetch("https://dmuseum.fly.dev/Meseum-Info/"
   );
    const data = await response.json();
    setHdata(data);
    setLoading(false);
  } catch (error) {
    console.error(error);
    setLoading(false);
  }
};
  fetchData();
},[])

  return( <div>
```

```
{loading ? (<h2>loading.........</h2>):

      (<div>
      <Slider />

      <About {...Hdata[0]} />
      <Calender />
      <Events calenderdata={Hdata[0]} />
      <Rvideo />
      <div className='high'>
        <h1>Highlights</h1>
      <Artcnt art={artdata} />
      <Artcnt art={test} />
      </div>
      <Footer />
      </div>
     )
 }

 </div>
  );
}
export default HomePage;
```

Listing 5.12: Home Page

```
.high h1{
  text-transform: capitalize;
  color: #777;
  font-size: 40px;
  font-weight: bold;
  margin-left: auto;
  margin-right: auto;
  padding-bottom: 10px;
  width: fit-content;
  border-bottom: 2px solid var(--second-color);
  text-transform: capitalize;
  font-family: 'prata';
}
```

Listing 5.13: Home Page Styling

```
              <p>Royal carriage</p>
            </div>
            <div className='ch2'>
              <nav class='nav'>
                <input type='checkbox' id='nav-check' />
                <div class='nav-btn'>
                  <label for='nav-check'>
                    <span></span>
                    <span></span>
                    <span></span>
                  </label>
                </div>
                <ul class='nav-list'>
                  <li>
                    <NavLink
                      to={'/'}
                      className={({ isActive }) =>
                        isActive ? classes.active : undefined
                      }
                      end>
                      Home
                    </NavLink>
                  </li>
                  <li className='me'>
                    <a>Halls</a>
                    <ul className='drop-down'>
                      {halls.map((m, index) => {
                        return (
                          <li
                            onClick={() => {
                              navigate(`/halls/${m.name}`);}}>
                            <a>{m.name}</a>
                          </li>
                        );
                      })}
                    </ul>
                  </li>
                  <li>
                    <a href='#A'>About</a>
                  </li>
                </ul>
              </nav>
```

Listing 5.14: Nav Bar

```css
.pr1 {
  background-color: var(--main-color);
  width: 100%;
}
.cnt {
  width: 80%;
  padding: 0 20px 0 15px;
  margin-left: auto;
  margin-right: auto;
  display: flex;
  align-items: center;
  justify-content: space-between;
}
.ch1 {
  display: flex;
}
.ch1 .logo1 {
  display: flex;
  flex-direction: column;
}
.ch1 .logo1 p {
  margin: 0;
  font-size: 30px;
  text-transform: capitalize;
  color: white;
  padding-bottom: 12px;
  text-align: center;
}
.ch1 .logo1 .logo {
  height: 30;
}
.ch1 {
  display: flex;
  align-items: center;
}
.ch1 p {
  font-size: 25px;
  color: var(--second-color);
}
.toggel {
  width: 20px;
}
```

Listing 5.15: Nav Bar Styling

```
const Slider = () => {
  const [currentSlide, setCurrentSlide] = useState(0);
  const slideLength = sliderData.length;

  const autoScroll = false;
  let slideInterval;
  let intervalTime = 5000;
const navigate=useNavigate()
  const nextSlide = () => {
    setCurrentSlide(currentSlide === slideLength - 1 ? 0 : currentSlide
    + 1);
    console.log("next");
  };

  const prevSlide = () => {
    setCurrentSlide(currentSlide === 0 ? slideLength - 1 : currentSlide
    - 1);
    console.log("prev");
  };

  function auto() {
    slideInterval = setInterval(nextSlide, intervalTime);
  }

  useEffect(() => {
    setCurrentSlide(0);
  }, []);

  useEffect(() => {
    if (autoScroll) {
      auto();
    }
    return () => clearInterval(slideInterval);
  }, [currentSlide]);
```

Listing 5.16: Slider

```css
.slider {
  width: 100%;
  height: 90vh;
  position: relative;
  overflow: hidden;
}

.slide {
  position: absolute;
  top: 0;
  left: 0;
  width: 100%;
  height: 100%;
  opacity: 0;
  transform: translateX(-50%);
  transition: all 0.5s ease;
  text-align: center;
}
.img {
  object-fit: cover;
}

@media screen and (min-width: 600px) {
  .slide img {
    width: 100%;
    height: 100%;
  }
}

.slide img {
  /* // width: 100%; */
  height: 100%;
}
```

Listing 5.17: Slider Styling

Chapter 6

Conclusion and Future Work

6.1 Conclusion

A digital museum web application revolutionizes the way museums interact with their audiences. By leveraging technology, it breaks down geographical barriers and opens up new possibilities for accessibility and engagement. Through virtual exhibitions, educational resources, and interactive features, visitors can explore the museum's collections and exhibitions from anywhere in the world. The application preserves cultural artifacts digitally, ensuring their long-term conservation and reducing the risk of damage. It also fosters community engagement, allowing visitors to connect, share experiences, and contribute to discussions. With data analysis, museums can gain insights into visitor behavior and preferences, leading to improved experiences. Collaborations and partnerships are facilitated, promoting knowledge sharing and joint projects. Moreover, digital platforms offer revenue opportunities through online ticket sales, memberships, and e-commerce. Overall, a digital museum web application is a powerful tool that enhances accessibility, education, preservation, and community involvement, propelling museums into the digital age.

6.2 Future Work

A digital museum web application has a wide range of potential future tasks and features to enhance the user experience and expand its capabilities. User registration and authentication can enable personalized interactions and profile management. Implementing exhibit management features allows museum administrators to easily create and update exhibits, while interactive exhibits provide dynamic and immersive experiences for visitors. A robust search system with filtering options enables users to explore the museum's collection efficiently. Social sharing and feedback features encourage engagement and promote the museum to a wider audience. Mobile-friendly design ensures accessibility on smartphones and tablets. Multilingual support caters to diverse audiences, and accessibility features make the application inclusive for users with disabilities. Events and programs can be showcased, and an analytics and reporting system provides insights for informed decision-making. These tasks contribute to a comprehensive digital museum experience that combines interactivity, accessibility, and engagement for visitors of all backgrounds.

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الملخص

المتحف الرقمي هو منصة افتراضية توفر تجربة غامرة وتفاعلية للزوار لاستكشاف المعروضات والمجموعات عبر الإنترنت. يوفر فرصة فريدة لعرض القطع الثقافية والأشياء التاريخية من جميع أنحاء العالم التي قد لا تكون متاحة لجميع الأفراد. من خلال استخدام أحدث التقنيات، توفر المتاحف الرقمية تجربة عالية الجودة تشد انتباه الزوار بالمعروضات بطريقة لا تستطيع المتاحف التقليدية تحقيقها. توفر المتاحف الرقمية أيضًا القدرة على تحديث المعروضات بشكل مستمر، مما يجعلها مصدرًا متجددًا باستمرار للتعلم والاكتشاف. إمكانية وصول المتاحف الرقمية إلى جمهور عالمي وتعزيز التبادل الثقافي يجعلها أداة أساسية للحفاظ على التراث الثقافي لعالمنا ومشاركته.

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