ONLINE NEWS PORTAL SYSTEM

A PROJECT REPORT

Submitted by

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ABSTRACT

In the modern age of information, a robust and efficient online news portal system is essential for disseminating accurate and timely news to the public. With the growing reliance on digital news platforms, it is crucial to design a system that can handle a wide variety of content types, maintain data integrity, and ensure user satisfaction. This project aims to develop a comprehensive online news portal system with relations encompassing user details, login, permissions, roles, articles, advertisements, categories, breaking news, subscriptions, subscribers, transactions, editors, and authors. By leveraging modern technologies and best practices in software development, this project aims to deliver a scalable, reliable, and user-centric online news portal system that meets the evolving needs of today's digital audience. Through continuous iteration and refinement, the system will strive to uphold journalistic integrity, promote informed discourse, and contribute to a well-informed and engaged society.

PROBLEM STATEMENT

In today's digital age, online news portals serve as crucial platforms for disseminating information, shaping public opinion, and fostering informed discourse. However, despite the proliferation of online news portals, several drawbacks persist in existing systems, hindering their effectiveness and user experience. Our project aims to address these shortcomings and revolutionize the landscape of online news portals through the development of a comprehensive relational database and frontend interface.

Drawbacks of Existing Online Portals:

- **Fragmented User Experience:** Many existing online news portals suffer from a fragmented user experience, with disjointed navigation, inconsistent layouts, and lack of personalized content recommendations. This leads to user frustration and disengagement.
- **Limited Interactivity:** Traditional online news portals often offer limited opportunities for user interaction and engagement beyond reading articles. Users are unable to participate in discussions, share opinions, or contribute their own content, thereby stifling community-building and user involvement.
- **Security and Privacy Concerns:** Online news portals are prime targets for cybersecurity threats, including data breaches, malware attacks, and privacy violations. Weak security measures and inadequate privacy safeguards can undermine user trust and compromise sensitive information.

Our project seeks to overcome these drawbacks and usher in a new era of online news portals characterized by enhanced usability, interactivity, and personalization.

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CHAPTER 1

In today's digitally connected world, the circulation of news and information has undergone a profound transformation, with online news portals emerging as primary sources for accessing real-time updates and in-depth analysis. Building and managing such platforms necessitates a comprehensive understanding of both the functional requirements and the underlying database architecture. This report aims to explore the process of developing a relational database model for an online news portal system, encompassing various entities and attributes essential for its operation.

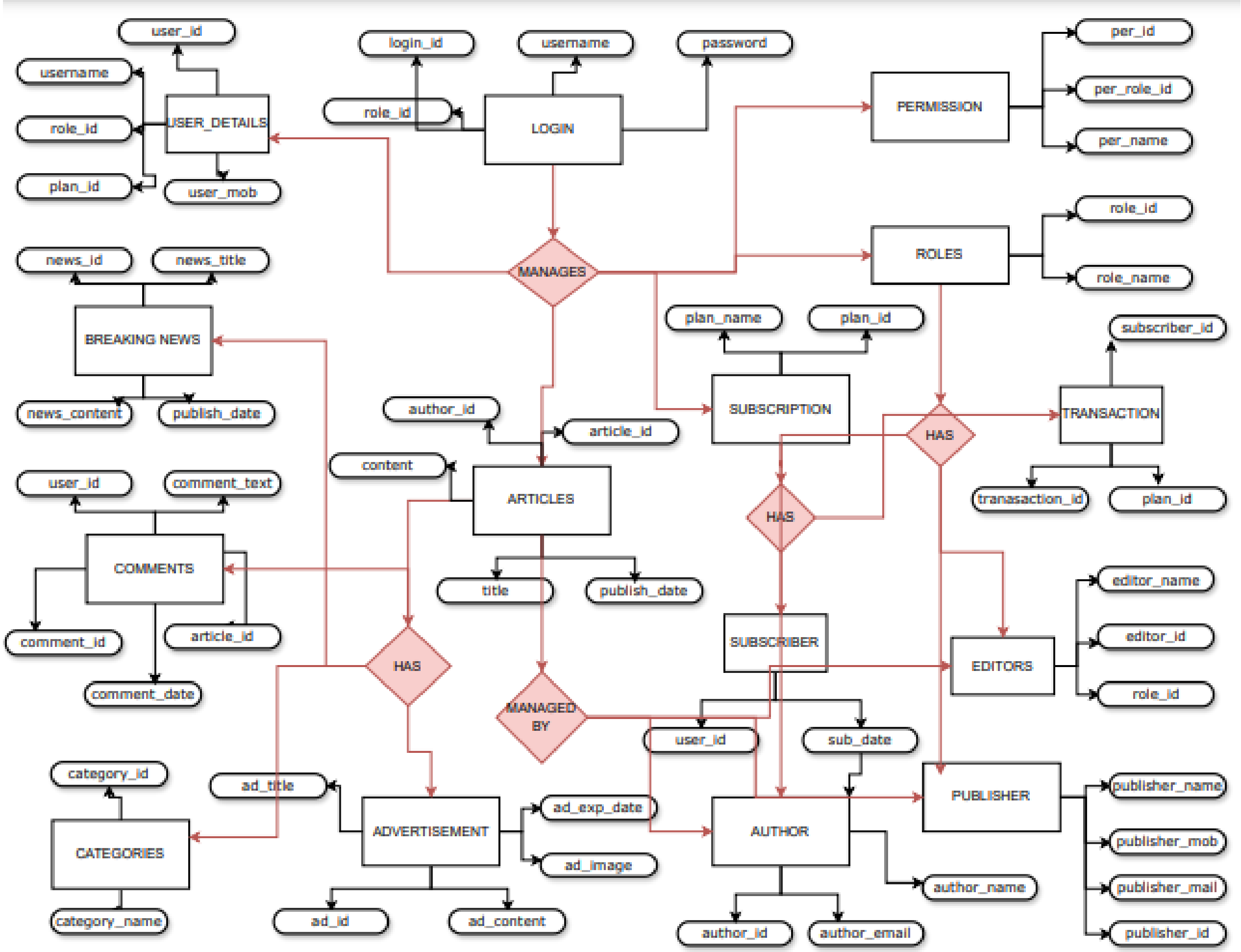
At the heart of any data-driven application lies the database, serving as the backbone for storing, retrieving, and managing information efficiently. For an online news portal, this entails not only storing articles and user data but also managing aspects such as user authentication, subscription plans, advertisement placement, and editorial workflows. A relational database model provides a structured approach to organizing these diverse entities and their relationships, facilitating seamless data management and retrieval.

Central to the database model are the entities, representing the key elements of the system, each characterized by a set of attributes that define its properties and characteristics. Entities such as users, articles, categories, subscriptions, advertisements, and comments form the core building blocks of the news portal system. Attributes associated with these entities capture relevant information, ranging from user credentials and article content to subscription plans and advertisement details. Practical implementation of the relational database model involves translating the conceptual schema into a concrete representation using database management systems (DBMS) such as MySQL or Oracle database. This entails defining tables for each entity and specifying the relationships between them through foreign key constraints. Additionally, data types and constraints are assigned to attributes to ensure data integrity and consistency.

Furthermore, the database is intricately connected to the frontend of the online news portal. Using HTML, CSS, and JavaScript, the frontend interface is designed to interact with the database, allowing users to navigate through articles, view categories, subscribe to newsletters, and interact with various features seamlessly.

To illustrate the practical application of the relational database model, a demo online news portal has been developed, showcasing the integration of MySQL database with the frontend interface. By providing a holistic view of the database architecture and its integration with the frontend interface, this report aims to demonstrate the essential role of relational databases in the development of online news portals. Leveraging these technologies, organizations can build robust and scalable platforms capable of delivering timely and relevant news content to audiences worldwide, fostering informed discourse and engagement in the digital age.

E-R DIAGRAM



The ER diagram presented encompasses various entities crucial for an online news portal system, including User, Login, Roles, Permission, Advertisement, Content, News, and Latest Post. Each entity is associated with specific attributes that capture relevant information about them.

- **User:** Represents individuals who interact with the system, storing details such as username, password, and registration information.

- **Login:** Tracks user login activities, recording details like login time, IP address, and user agent.

- **Roles:** Defines different roles within the system, such as admin, editor, or subscriber, with attributes specifying role names.

- **Permission:** Governs access control by assigning permissions to roles, indicating the type of access allowed for various resources.

- **Advertisement:** Manages advertisements displayed on the portal, storing details such as ad name, type, advertiser, and budget.

- **Content:** Stores content pieces such as articles, videos, or images, along with attributes like title, description, author, and status.

- **News:** Represents news articles published on the portal, linking to content and capturing metadata like headline, publish date, category, and views count.

- **Breaking News:** Tracks the latest and breaking content posts, including news, blogs, or announcements, with attributes indicating post type, post date, and status.

The relationships depicted in the diagram reflect the connections between entities. For example, the User entity is related to Login to capture user login activities, while Roles and Permission are linked to manage access control. Furthermore, Content serves as a central entity, connected to News and Latest Post, indicating the content's role in publishing news articles and other posts.

This ER diagram provides a comprehensive overview of the entities and relationships essential for managing an online news portal system, facilitating effective database design and system development. It captures the structural components and interactions necessary to support user management, content publishing, advertising, and access control within the platform.

CHAPTER 2

In the development of the database for our online news portal system, it's crucial to design and create the appropriate database tables to store and manage the data efficiently.

Identifying Entities and Attributes:

Based on the requirements and the entities identified in the ER model, we define the tables required for each entity and their respective attributes according to the relational schema.

Relational Schema:

A relational schema in a relational database defines the structure and organization of the data stored in the database. It consists of a set of tables, each with columns (attributes) and rows (tuples), and specifies the relationships between these tables.

The relational schema for the online news portal database is as follows:

- UserDetails (user_id, username, role_id, plan_id, user_mob)
- Login (login_id, user_id, role_id, username, password)
- Permission (per_id, role_id, per_name)
- Role (role_id, user_id, role_name)
- Articles (article_id, author_id, title, content, publish_date)
- Advertisement (ad_id, category_id, ad_title, ad_content, ad_exp_date, ad_image)
- Categories (category_id, article_id, category_name)
- Comments (comment_id, article_id, comment_date, user_id, comment_text)
- Breaking news (news_id, news_title, article_id,news_content, publish_date)
- Subscription (plan_id, plan_name)
- Subscriber (sub_id,sub_date, plan_id, user_id)

- Transaction (transaction_id, plan_id,sub_id)
- Editor (editor_id, role_id, editor_name)
- Publisher (publisher_id, user_id, publisher_name, publisher_mail, publisher_mob)
- Author (author_id, user_id, author_name, author_mail)

Defining Relationships:

After analysing the relational schema, the relationships between the tables are drawn based on the ER model. This involves setting up foreign key constraints to enforce referential integrity and maintain data consistency.

Implementing Constraints:

constraints such as primary keys, foreign keys, unique constraints, and check constraints are implemented to enforce data integrity and ensure the validity of the data stored in the tables.

Setting Up Triggers and Stored Procedures:

Triggers and stored procedures are implemented to automate certain database tasks, enforce business rules, or maintain data integrity. For example, a trigger may be set up to log changes to sensitive data or enforce data validation rules before inserting or updating records.

Testing and Optimization:

Once the database tables are created, thorough testing is conducted to ensure that they function as expected and meet the requirements of the online news portal system. Additionally, performance tuning and optimization techniques may be applied to enhance the efficiency of the database operations.

Requirement Analysis:

- Efficient Content Management:
  Ensuring streamlined organization of articles, comments, and user data: The database schema has been meticulously crafted to facilitate efficient storage and retrieval of articles, comments, and user information. Techniques such as indexing and normalization have been judiciously employed to optimize database performance.

- Enhanced User Experience:
  Prioritizing intuitive interfaces for seamless article browsing and commenting: The frontend design emphasizes ease of navigation and readability, featuring clear categorization and user-friendly comment functionalities.

- Targeted Advertising:
  Strategically managing advertisements placement: Advertisements are thoughtfully integrated within the portal, taking into account user demographics, browsing patterns, and content relevance. Ad management tools have been integrated to facilitate scheduling, tracking, and optimization of ad campaigns.

- Insightful Analytics:
  Providing valuable insights into user behavior and article popularity: Analytics modules capture crucial user interactions, including page views, engagement metrics, and ad performance. Data visualization techniques have been deployed to present insights in an actionable format.

- Robust Security Measures:
  Ensuring the safeguarding of user data and secure communication channels: Encryption protocols are implemented to protect sensitive user data during transmission and storage. Access controls and authentication mechanisms are enforced to prevent unauthorized access.

- Administrative Control:
  Empowering administrators with comprehensive user management and content moderation tools: Administrative interfaces facilitate seamless management of user

accounts, roles, and permissions. Content moderation tools enable effective review and moderation of user-generated content.

- Scalability and Reliability:
  Scaling the system to handle growing traffic and data volume: The system architecture is designed to scale horizontally and vertically, leveraging load balancing, caching mechanisms, and database sharding techniques.

This holistic approach enhances efficiency, user satisfaction, and strategic advantages, reinforcing the portal's value proposition and competitive edge in the digital domain.

CHAPTER 3

Our online news portal system comprises various interconnected tables storing essential information about users, articles, categories, subscriptions, advertisements, comments, and more. Leveraging advanced database concepts, we can develop complex queries to efficiently manage and retrieve data from these tables.

Constraints:

- Ensuring Data Integrity: We'll utilize constraints to enforce data integrity rules. For instance, we'll apply foreign key constraints between tables like USERDETAILS, ARTICLES, and COMMENTS to ensure referential integrity.

- Validating Data: Check constraints can be used to validate data upon insertion or update. For example, ensuring that the email format is correct in the USERDETAILS table.

Sets:

- Combining Data: We can use set operations like union, intersection, and difference to combine datasets from different tables. For example, combining the results of queries from the ARTICLES and ADVERTISEMENT tables to display both articles and advertisements on the homepage.

Joins:

- Retrieving Related Information: Joins enable us to retrieve related information from multiple tables. For instance, using inner joins to fetch articles along with their corresponding categories from the ARTICLES and CATEGORIES tables.
- Hierarchical Data Retrieval: Leveraging self-joins to retrieve hierarchical data, such as replies to comments or nested categories.

Views:

- Abstracting Complex Queries: Creating views to abstract complex queries and simplify data access. For instance, a view can be created to display user-specific subscription details by joining the USERDETAILS, SUBSCRIPTIONS, and SUBSCRIPTION_PLANS tables.
- Enhancing Security: Views can also be used to restrict access to sensitive data by exposing only the necessary information to users with appropriate permissions.

Triggers:

- Automating Actions: Triggers can automate actions based on certain events. For example, triggering an email notification to subscribers whenever a new article is published, using triggers on the ARTICLES and SUBSCRIPTIONS tables.
- Ensuring Data Consistency: Triggers can enforce business rules and maintain data consistency. For instance, ensuring that each article has a corresponding entry in the EDITIONS table upon publication.

Cursors:

- Iterating Over Result Sets: Cursors enable us to iterate over result sets row by row. For example, using a cursor to process user subscriptions and update subscription status based on payment transactions in the SUBSCRIPTION_TRANSACTIONS table.
- Performing Batch Operations: Cursors can be used for performing batch operations or data manipulation tasks that require procedural logic.

By implementing these advanced database concepts and crafting complex queries, we can enhance the functionality, performance, and reliability of our online news portal system, providing users with a seamless and engaging experience.

CHAPTER 4

POTENTIAL PITFALLS:

While the development of an online news portal system with a SQL database backend offers numerous benefits, there are also potential pitfalls and challenges that need to be considered and addressed:

1. Scalability Concerns:

- As the user base and content volume grow, the scalability of the database becomes crucial. SQL databases may face scalability limitations, especially with large datasets and high traffic volumes.

- Potential solutions include database sharding, partitioning, or implementing distributed database systems to distribute workload and improve scalability. However, these solutions may introduce complexity and require careful planning and implementation.

2. Data Security Risks:

- Online news portals handle sensitive user information, including personal details, login credentials, and payment data for subscription services. Any security vulnerabilities in the system could lead to data breaches or unauthorized access.

- Implementing robust security measures, such as encryption, access controls, and regular security audits, is essential to protect sensitive data. Additionally, ensuring compliance with data protection regulations such as GDPR or CCPA is critical to avoid legal consequences.

3. Performance Bottlenecks:

- Poorly optimized database queries, inefficient indexing, or inadequate hardware resources can lead to performance bottlenecks and slow response times for users.

- Regular performance monitoring and optimization are necessary to identify and address bottlenecks. This may involve query optimization, index tuning, database caching, or upgrading hardware resources as needed.

4. Data Integrity Challenges:

- Maintaining data integrity is crucial for ensuring the accuracy and reliability of information presented on the news portal. However, errors such as data duplication, inconsistent data, or data loss can occur due to various factors such as software bugs, hardware failures, or human error.

- Implementing data validation rules, transaction management mechanisms, and backup and recovery procedures are essential for safeguarding data integrity. Regular data audits and quality assurance processes can help detect and rectify integrity issues proactively.

5. Regulatory Compliance:

- Online news portals must adhere to various regulatory requirements related to data privacy, content moderation, and advertising practices. Failure to comply with these regulations can result in legal liabilities, fines, or reputational damage.

- Staying informed about relevant regulations and ensuring compliance through appropriate measures such as data anonymization, content moderation policies, and transparent advertising practices is essential. Regular audits and reviews may be necessary to verify compliance and address any non-compliance issues promptly.

6. User Experience Challenges:

- The success of an online news portal depends significantly on the user experience it provides. Poorly designed interfaces, slow page loading times, or confusing navigation can frustrate users and drive them away.

- Conducting user testing, gathering feedback, and continuously iterating on the user interface and experience are essential to address usability issues and improve user satisfaction. Additionally, monitoring user engagement metrics and analytics can provide insights into user behavior and preferences, guiding further enhancements to the portal.

7. Content Moderation and Misinformation:

- Online news portals face challenges related to content moderation, including the spread of misinformation, fake news, and inflammatory content. Failing to effectively moderate content can erode trust in the platform and harm its credibility.

- Implementing robust content moderation policies, utilizing automated moderation tools, and fostering community engagement through user reporting mechanisms can help mitigate these risks. Additionally, partnering with fact-checking organizations and adhering to journalistic ethics can uphold the integrity of the content published on the portal.

Addressing these potential pitfalls requires a comprehensive approach that encompasses technical, operational, and regulatory considerations. By proactively identifying and mitigating risks, stakeholders can enhance the resilience and success of the online news portal project.

FUNCTIONAL DEPENDENCY

Functional dependency in a relational database table indicates a relationship between attributes, where the value of one attribute uniquely determines the value of another. In simpler terms, if we have two attributes, A and B, B is functionally dependent on A if knowing the value of A allows us to determine the value of B without ambiguity.

Functional dependencies are crucial in database design as they do the following:

- Crucial for Data Integrity: Functional dependencies are vital for maintaining data integrity within a database. They ensure that each attribute's value is logically determined by another attribute, reducing the risk of inconsistent or erroneous data.

- Elimination of Redundancy: By identifying functional dependencies, redundant data storage can be minimized or eliminated. This leads to more efficient database structures, reducing storage space requirements and enhancing performance.

- Normalization Process: Functional dependencies are foundational to the normalization process in database design. Normalization aims to organize data efficiently by reducing redundancy and dependency anomalies. By decomposing tables into smaller, well-structured entities, normalization helps ensure data integrity and optimize database performance.

- Enhanced Consistency: By establishing clear relationships between attributes, functional dependencies promote consistency in data representation. This consistency is crucial for accurate data retrieval, analysis, and decision-making processes.

- Simplified Maintenance: With well-defined functional dependencies, database maintenance becomes more straightforward. Updates, inserts, and deletes can be performed with confidence, knowing that the data remains consistent and adheres to the defined dependencies.

- Improved Query Performance: Database queries can benefit from well-defined functional dependencies. By organizing data efficiently and reducing redundancy, queries can be executed more quickly and with fewer resources, leading to improved overall system performance.

Understanding functional dependency is essential for designing databases that are efficient, scalable, and maintainable. It ensures data integrity, reduces redundancy, and optimizes performance, ultimately leading to more reliable and effective database systems.

The functional dependency of the Online News Portal System Database is as follows:

- UserDetails (user_id, username, role_id, plan_id, user_mob)
  - User_id -> username,role_id,user_mob

- Login (login_id, role_id, username, password)
  - Login_id -> username,password

- Permission (per_id, role_id, per_name)
  - Per_id -> per_name

- Role (role_id, user_id, role_name)
  - Role_id -> role_name

- Articles (article_id, author_id, title, content, publish_date)
  - Article_id -> author_id, title, content, publish_date

- Advertisement (ad_id, category_id, ad_title, ad_content, ad_exp_date, ad_image)
  - Ad_id -> ad_title, ad_content, ad_exp_date, ad_image

- Categories (category_id, article_id, category_name)
  - Category_id -> category_name

- Comments (comment_id, article_id, comment_date, user_id, comment_text)
  - Comment_id -> comment_date, user_id, comment_text

- Breaking news (news_id, news_title, article_id,news_content, publish_date)
  - News_id -> , news_title,news_content, publish_date

- Subscription (plan_id, plan_name)
  - Plan_id-> plan_name

- Subscriber (sub_id,sub_date, plan_id, user_id)
  - Sub_id -> sub_date, plan_id,user_id

- Transaction (transaction_id, plan_id,sub_id)
  - transaction_id -> plan_id

- Editor (editor_id, role_id, editor_name)
  - Editor_id -> editor_name

- Publisher (publisher_id, user_id, publisher_name, publisher_mail, publisher_mob)
  - Publisher_id -> publisher_name, publisher_mail, publisher_mob

- Author (author_id, user_id, author_name, author_mail)
  - Author_id -> author_name, author_mail

NORMALIZATION:

Normalization is a critical process in database design that involves organizing data to reduce redundancy and dependency anomalies, thereby improving data integrity and efficiency. There are several normalization techniques, each designed to address specific types of data redundancy and dependency. Below, we'll discuss the most common normalization forms:

The normalization techniques employed in the development of an online news portal system with a SQL database backend:

1. First Normal Form (1NF):
   The first step in normalization was to ensure that each attribute in the database tables contained atomic values and did not contain repeating groups. This involved organizing data such that each article in the news portal system was represented by a single row in the database table, with attributes such as article ID, title, content, author, and publication date stored separately.

2. Second Normal Form (2NF):
   To eliminate partial dependencies, we ensured that each non-key attribute was fully functionally dependent on the entire primary key. For example, in tables with composite primary keys consisting of article ID and category ID, attributes such as

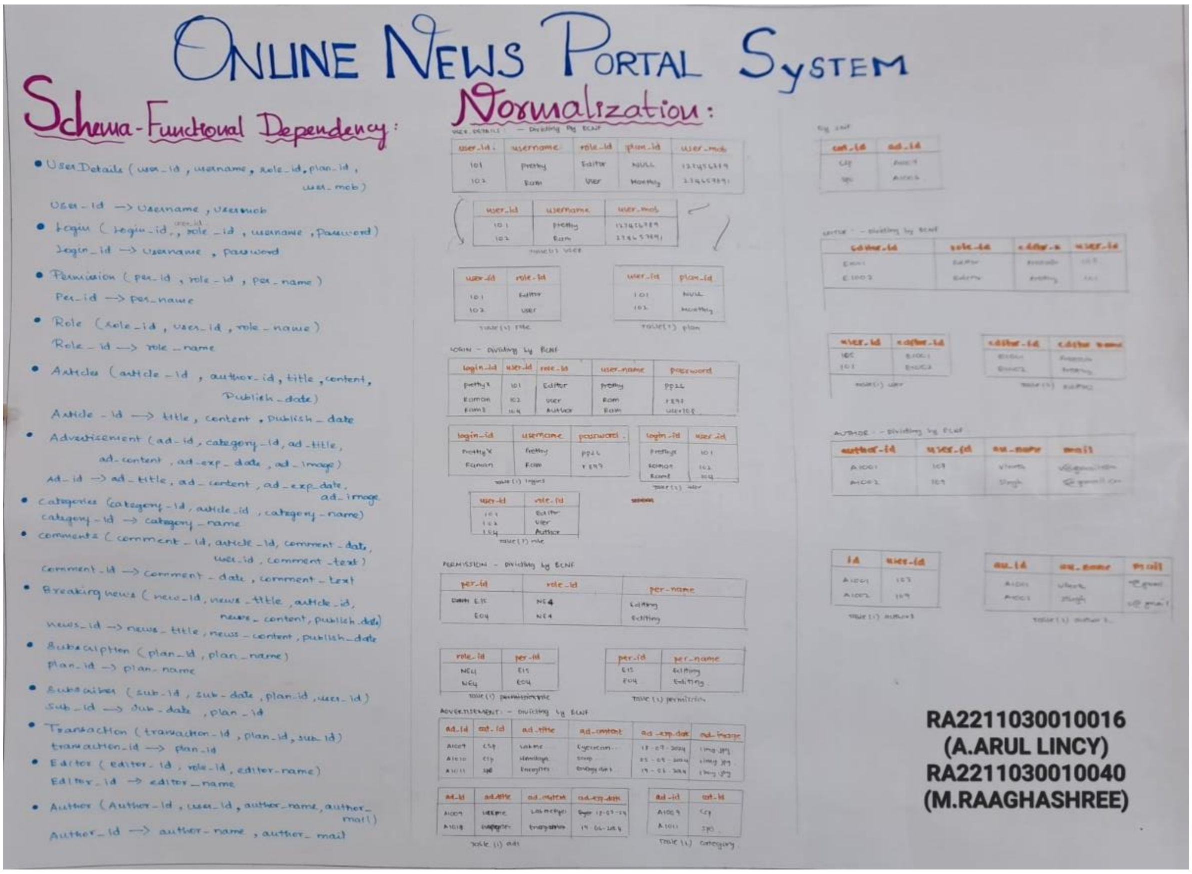
article title and content were made dependent on both article ID and category ID to achieve 2NF.

3. Third Normal Form (3NF):
   Transitive dependencies were removed by ensuring that no non-key attribute was dependent on another non-key attribute. This was accomplished by organizing data such that attributes like author contact information were not dependent on the author's name but rather on a unique identifier such as author ID.

4. Boyce-Codd Normal Form (BCNF):
   In adherence to BCNF, we ensured that every determinant in a table was a candidate key, addressing certain anomalies that may exist in 3NF tables with multiple candidate keys. For example, in tables containing attributes for user subscriptions, we ensured that every non-trivial dependency involved one of the candidate keys, such as user ID or subscription ID.

By employing these normalization techniques, we successfully designed a well-structured and efficient database schema for the online news portal system. This schema minimized redundancy and dependency anomalies, thereby enhancing data integrity and performance, and providing a solid foundation for the development of the online news portal system.

Through the normalization process, we ensured that the database could efficiently store, retrieve, and manage news articles, user subscriptions, author information, and other relevant data. Moving forward, adherence to these normalization principles will continue to play a crucial role in maintaining the integrity and scalability of the database as the online news portal system evolves and grows.



Online News Portal System

Schema-Functional Dependency:

- User Details (user_id, username, role_id, plan_id, user_mob)
  User_id —> Username, Usermob
- Login (login_id, user_id, role_id, username, Password)
  login_id —> username, password
- Permission (per_id, role_id, per_name)
  Per_id —> per_name
- Role (role_id, user_id, role_name)
  Role_id —> role_name
- Articles (article_id, author_id, title, content, Publish_date)
  Article_id —> title, content, Publish_date
- Advertisement (ad_id, category_id, ad_title, ad_content, ad_exp_date, ad_image)
  Ad_id —> ad_title, ad_content, ad_exp_date, ad_image
- Categories (category_id, article_id, category_name)
  category_id —> category_name
- comments (comment_id, article_id, comment_date, user_id, comment_text)
  comment_id —> comment_date, comment_text
- Breaking news (news_id, news_title, article_id, news_content, publish_date)
  news_id —> news_title, news_content, publish_date
- Subscription (plan_id, plan_name)
  plan_id —> plan_name
- Subscriber (sub_id, sub_date, plan_id, user_id)
  Sub_id —> sub_date, plan_id
- Transaction (transaction_id, plan_id, sub_id)
  transaction_id —> plan_id
- Editor (editor_id, role_id, editor_name)
  Editor_id —> editor_name
- Author (Author_id, user_id, author_name, author_mail)
  Author_id —> author_name, author_mail

Normalization:

USER DETAILS — Dividing By BCNF

user_id.	username	role_id	plan_id	user_mob
101	pretty	Editor	NULL	123456789
102	Ram	User	Monthly	234657891

user_id	username	user_mob
101	pretty	123456789
102	Ram	234657891

table(1) user

user_id	role_id
101	Editor
102	User

table(1) role

user_id	plan_id
101	NULL
102	Monthly

table(1) plan

LOGIN - Dividing by BCNF

login_id	user_id	role_id	user_name	password
prettyx	101	Editor	pretty	pp22
Raman	102	User	Ram	r297
Ram3	104	Author	Ram	user102

login_id	username	password.
prettyx	pretty	pp22
Raman	Ram	r297

table(1) login

login_id	user_id
prettyx	101
Raman	102
Ram3	104

table(1) user

user_id	role_id
101	Editor
102	User
104	Author

table(1) role

PERMISSION - Dividing by BCNF

per_id	role_id	per_name
E15	NE4	Editing
E04	NE4	Editing

role_id	per_id
NE4	E15
NE4	E04

table(1) permissionrole

per_id	per_name
E15	Editing
E04	Editing.

table(1) permission

ADVERTISEMENT - Dividing by BCNF

ad_id	cat_id	ad_title	ad_content	ad_exp_date	ad_image
A1009	C59	Lakme	Eyecream	17-07-2024	img.jpg
A1010	C19	Himalaya	Soap	25-08-2024	img.jpg
A1011	590	Energites	Energy drink	19-06-2024	img.jpg

ad_id	ad_title	ad_content	ad_exp_date
A1009	Lakme	Lakmeeye	17-07-24
A1011	Energite	Energydrink	19-06-2024

table(1) ads

ad_id	cat_id
A1009	C59
A1011	590

Table(1) category

by BCNF

cat_id	ad_id
C59	A1009
590	A1011

EDITOR - Dividing by BCNF

editor_id	role_id	editor_n	user_id
E1001	Editor	[illegible]	103
E1002	Editor	pretty	101

user_id	editor_id
103	E1001
101	E1002

table(1) user

editor_id	editor name
E1001	[illegible]
E1002	pretty

table(1) editor

AUTHOR - Dividing by BCNF

author_id	user_id	au_name	email
A1001	103	Vinod	v@gmail.com
A1002	109	Singh	S@gmail.com

id	user_id
A1001	103
A1002	109

table(1) authors

au_id	au_name	email
A1001	Vinod	v@gmail
A1002	Singh	v@gmail

table(1) author 1

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CHAPTER 5

In the context of our online news portal system, concurrency control and recovery mechanisms are essential components of the database management system (DBMS) responsible for ensuring data consistency, integrity, and availability, especially in multi-user environments. Here's how we plan to implement these mechanisms:

Concurrency Control:

Concurrency control prevents data anomalies and ensures that multiple transactions can execute concurrently without interfering with each other. We'll implement the following techniques:

- Lock-Based Concurrency Control: Utilizing lock-based mechanisms such as shared locks and exclusive locks to control access to data. For example, when a user is reading an article, a shared lock will be acquired to prevent other users from modifying the article simultaneously.
- Timestamp-Based Concurrency Control: Using timestamp-based protocols like timestamp ordering or timestamp ordering with optimistic concurrency control to determine the order of transactions and resolve conflicts. Timestamps will be assigned to transactions, and the DBMS will ensure that conflicting transactions are executed in a predefined order based on their timestamps.
- Multi-Version Concurrency Control (MVCC): Employing MVCC to allow concurrent transactions to access different versions of data. This approach reduces contention by allowing readers to access consistent snapshots of the database while writers create new versions of the data.

Recovery Mechanisms:

Recovery mechanisms ensure that the database remains in a consistent state even after system failures or crashes. We'll implement the following techniques:

- Write-Ahead Logging (WAL): Implementing a WAL protocol where changes to the database are first written to a log file before being applied to the database itself. In the event of a crash, the DBMS can replay the log to recover the database to a consistent state.

- Checkpointing: Periodically creating checkpoints to record the current state of the database. Checkpoints serve as recovery points that allow the DBMS to quickly restore the database to a known consistent state after a crash, reducing the amount of log replay required.

- Shadow Paging: Utilizing shadow paging as an alternative to WAL. In shadow paging, the database maintains two copies of each page: the original page and a shadow page. Changes are written to the shadow page, and only when the transaction commits are they copied to the original page. This approach simplifies recovery by avoiding the need for log management.

- Transaction Undo and Redo: Implementing undo and redo operations to compensate for incomplete or interrupted transactions. During recovery, the DBMS will undo the changes made by incomplete transactions and redo the changes made by committed transactions to restore the database to a consistent state.

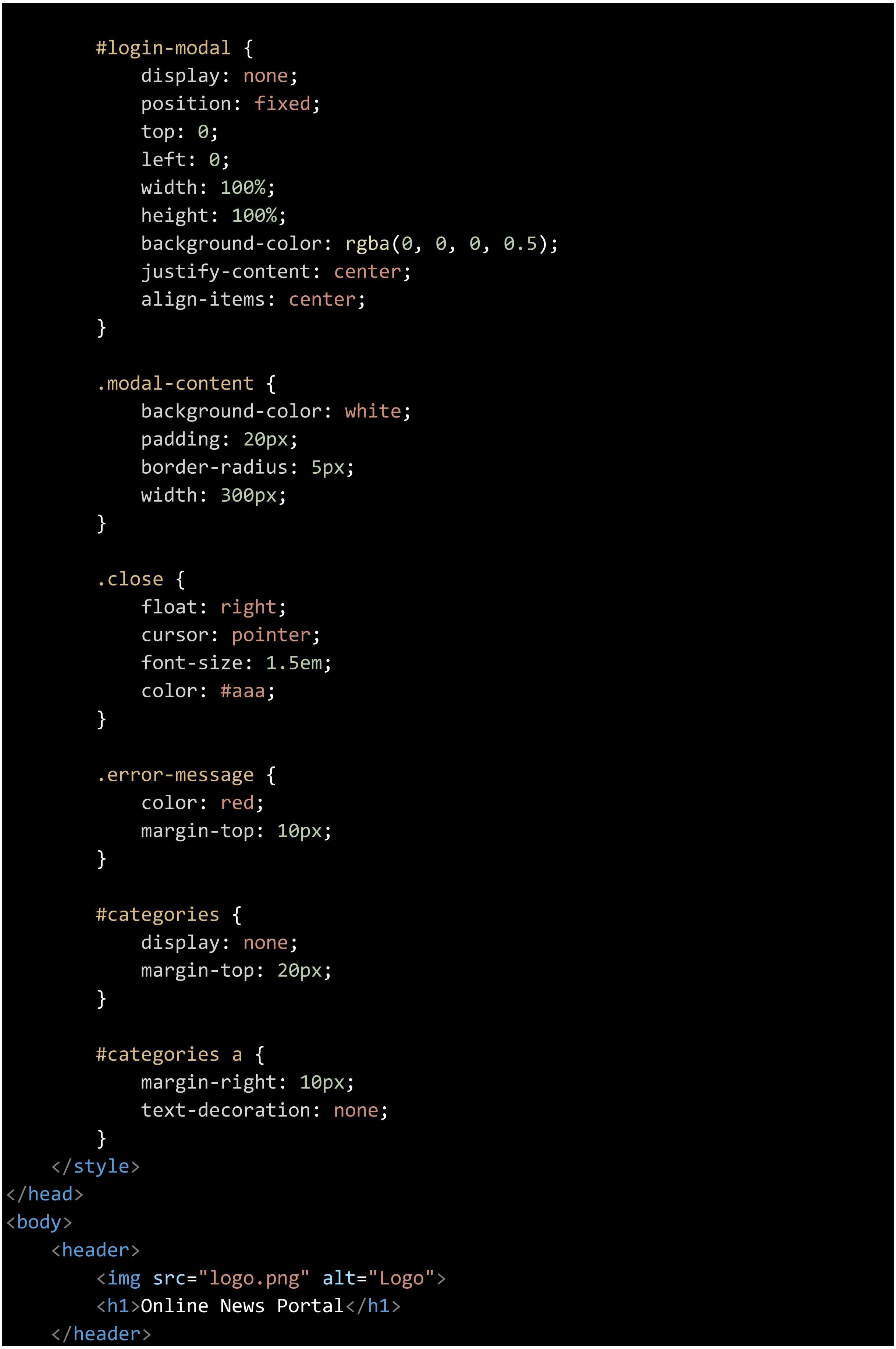
- Database Replication and Mirroring: Employing database replication and mirroring techniques to maintain redundant copies of the database across multiple servers or storage devices. In the event of a failure, the DBMS can switch to a standby replica or mirror to ensure continuous availability and data integrity.

By implementing robust concurrency control and recovery mechanisms, we ensure that our online news portal system remains resilient to failures, provides consistent access to data, and delivers a seamless user experience even under high load and concurrent access scenarios.

CHAPTER 6

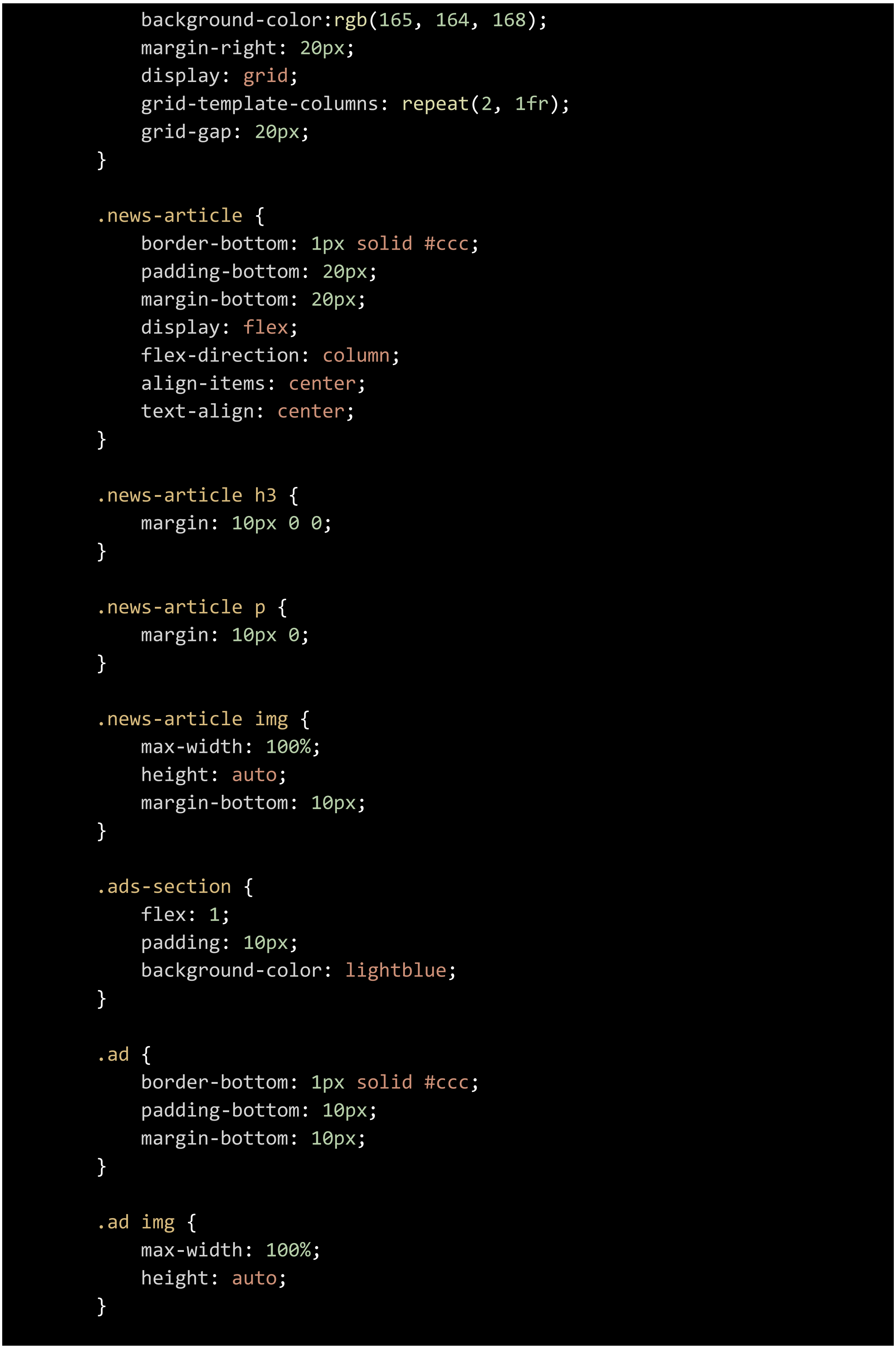
FRONTEND:

```
<!DOCTYPE html>
<html>
<head>
    <title>Online News Portal</title>
    <style>
        body {
            font-family: Arial, sans-serif;
            margin: 0;
            padding: 0;
            background-color: #f4f4f4;
            display: flex;
            justify-content: center;
            align-items: center;
            flex-direction: column;
        }

        header {
            background-color: #333;
            color: white;
            padding: 20px;
            text-align: center;
            width: 100%;
            display: flex;
            justify-content: center;
            align-items: center;
        }

        header img {
            max-width: 100px;
            margin-right: 10px;
        }

        header h1 {
            font-size: 2.5em;
            font-weight: bold;
            text-transform: uppercase;
        }

        main {
            padding: 20px;
            width: 80%;
            text-align: center;
        }
```

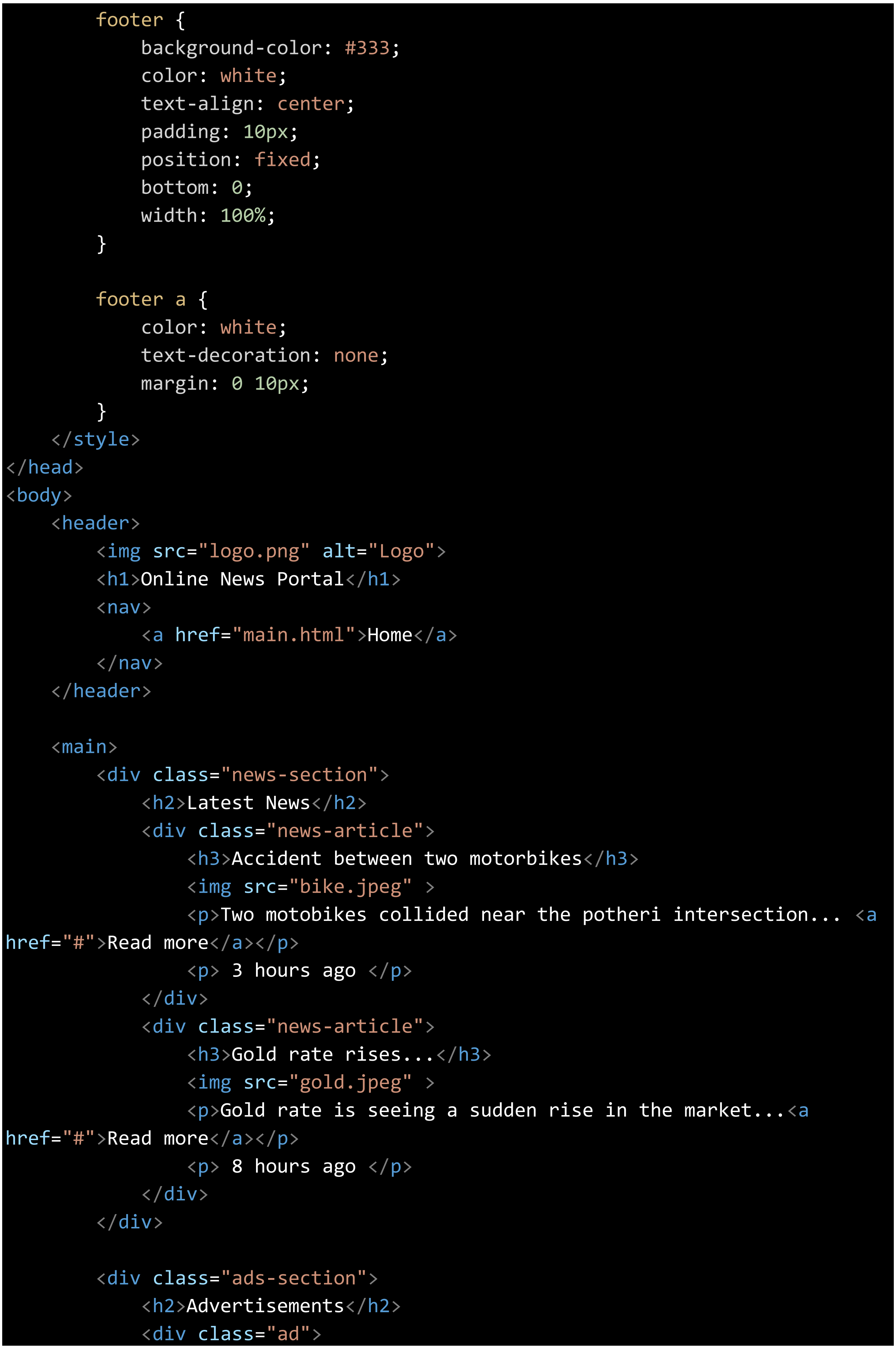


```
        #login-modal {
            display: none;
            position: fixed;
            top: 0;
            left: 0;
            width: 100%;
            height: 100%;
            background-color: rgba(0, 0, 0, 0.5);
            justify-content: center;
            align-items: center;
        }

        .modal-content {
            background-color: white;
            padding: 20px;
            border-radius: 5px;
            width: 300px;
        }

        .close {
            float: right;
            cursor: pointer;
            font-size: 1.5em;
            color: #aaa;
        }

        .error-message {
            color: red;
            margin-top: 10px;
        }

        #categories {
            display: none;
            margin-top: 20px;
        }

        #categories a {
            margin-right: 10px;
            text-decoration: none;
        }
    </style>
</head>
<body>
    <header>
        <img src="logo.png" alt="Logo">
        <h1>Online News Portal</h1>
    </header>
    <main>
        <h2>Welcome to our News Portal</h2>
        <p>Stay updated with the latest news and stories from around the 
world!</p>
        <button id="login-button" onclick="showLoginModal()">Login</button>
    </main>

    <div id="login-modal">
        <div class="modal-content">
            <span class="close" onclick="hideLoginModal()">&times;</span>
            <h3>Login</h3>
            <form id="login-form">
                <label for="username">Username:</label>
                <input type="text" id="username" name="username" required>
                <br><br>
                <label for="password">Password:</label>
                <input type="password" id="password" name="password" required>
                <br><br>
                <button type="button" onclick="validateLogin()">Login</button>
                <p id="error-message" class="error-message" 
style="display:none;">User not found</p>
            </form>
        </div>
    </div>

    <div id="categories">
        <p><strong>Categories:</strong><a href="news2.html">Latest News</a> | 
<a href="sports.html">Sports</a> | <a href="business.html">Business</a> | <a 
href="politics.html">Politics</a> | <a 
href="entertainment.html">Entertainment</a></p>
    </div>

    <script>
        function showLoginModal() {
            document.getElementById("login-modal").style.display = "flex";
        }

        function hideLoginModal() {
            document.getElementById("login-modal").style.display = "none";
            document.getElementById("error-message").style.display = "none";
        }

        function validateLogin() {
            var username = document.getElementById("username").value;
            var password = document.getElementById("password").value;

            if (username === "Raagha" && password === "123") {
                // Hide login button
                document.getElementById("login-button").style.display =
"none";
                // Show categories
                document.getElementById("categories").style.display = "block";
            } else {
                document.getElementById("error-message").style.display =
"block";
            }
        }
    </script>
</body>
</html>
```

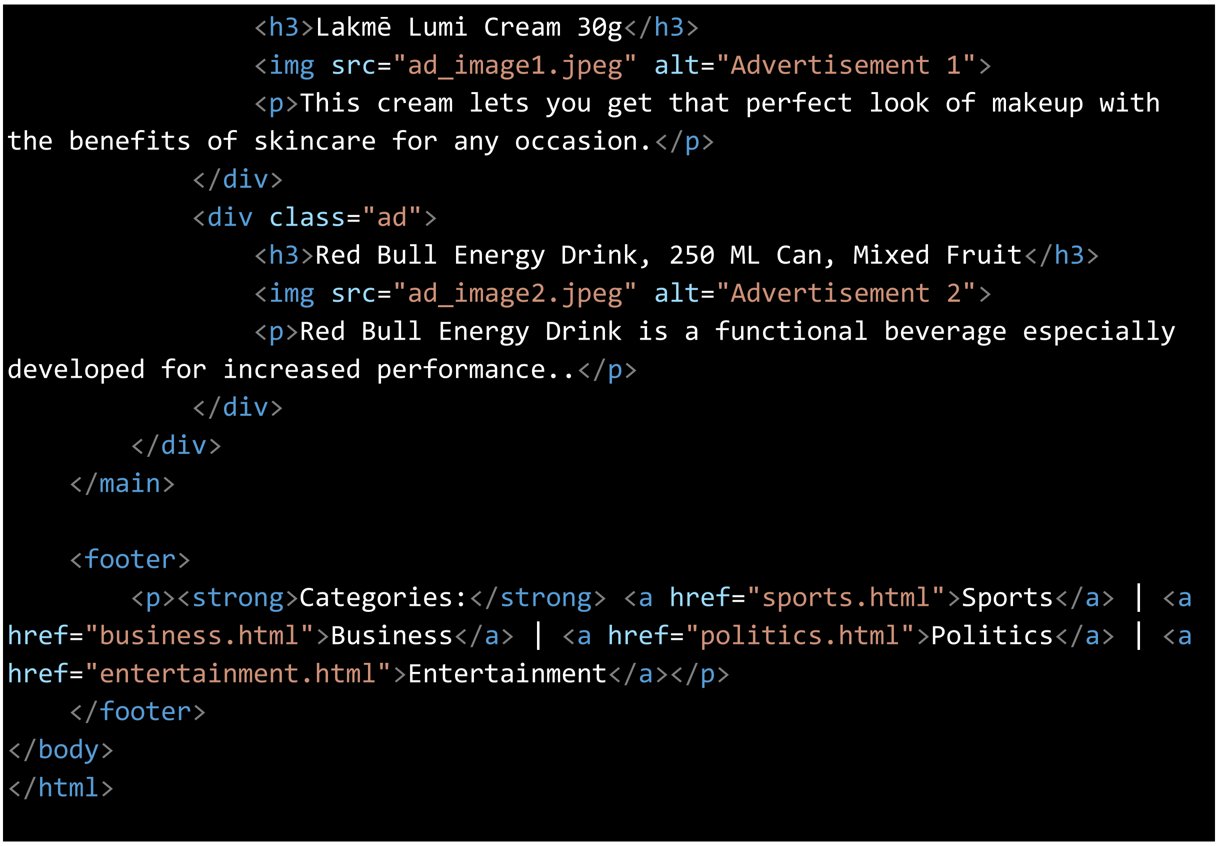
```
<!DOCTYPE html>
<html>
<head>
    <title>Online News Portal - News and Advertisements</title>
    <style>
        body {
            font-family: Arial, sans-serif;
            margin: 0;
            padding: 0;
            background-color: #f4f4f4;
        }

        header {
            background-color: #333;
            color: white;
            padding: 10px;
            text-align: center;
        }

        header a {
            color: white;
            text-decoration: none;
            margin: 0 10px;
        }

        main {
            display: flex;
            padding: 20px;
        }

        .news-section {
            flex: 2;
            padding: 10px;
```



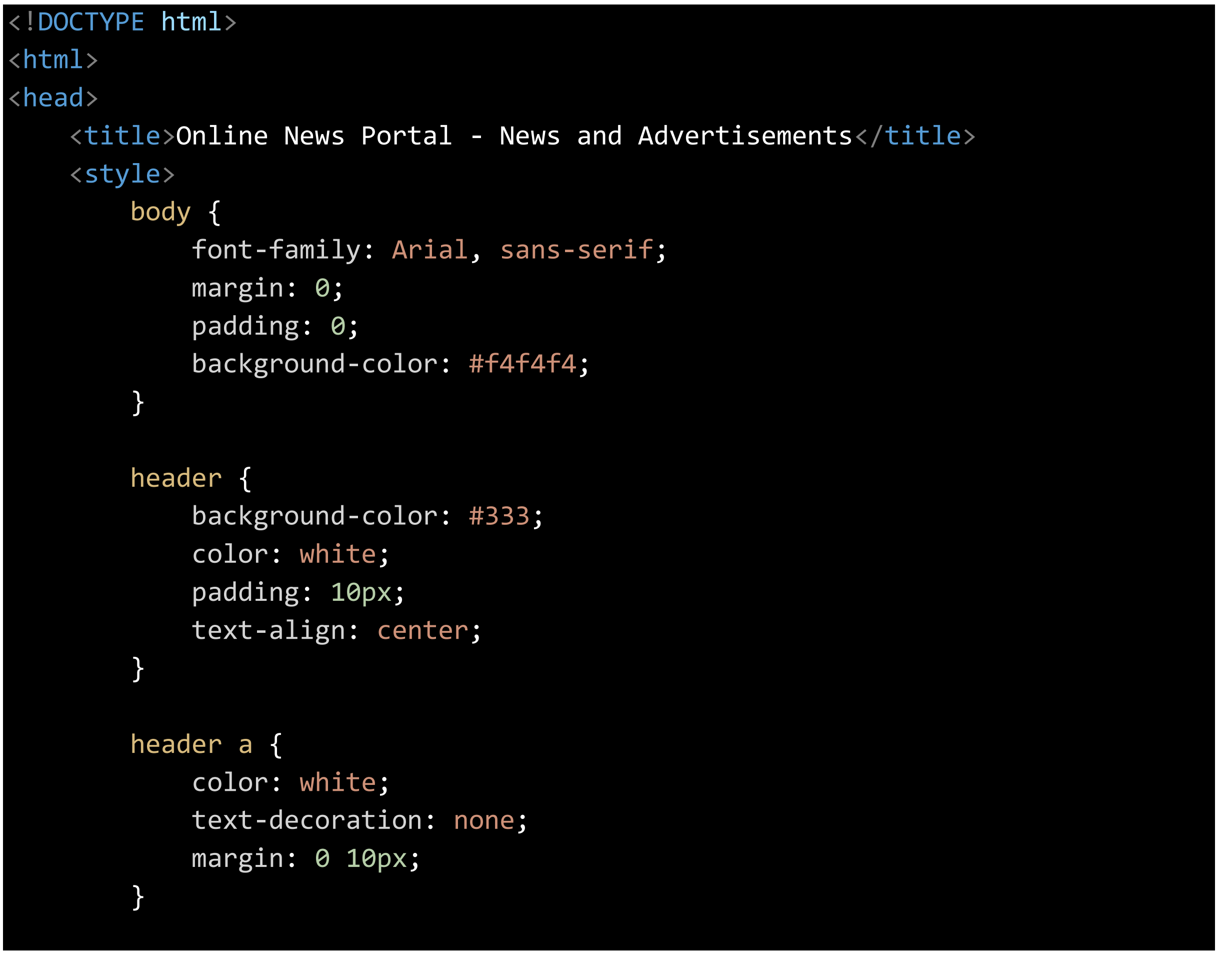
```
        background-color:rgb(165, 164, 168);
        margin-right: 20px;
        display: grid;
        grid-template-columns: repeat(2, 1fr);
        grid-gap: 20px;
    }

    .news-article {
        border-bottom: 1px solid #ccc;
        padding-bottom: 20px;
        margin-bottom: 20px;
        display: flex;
        flex-direction: column;
        align-items: center;
        text-align: center;
    }

    .news-article h3 {
        margin: 10px 0 0;
    }

    .news-article p {
        margin: 10px 0;
    }

    .news-article img {
        max-width: 100%;
        height: auto;
        margin-bottom: 10px;
    }

    .ads-section {
        flex: 1;
        padding: 10px;
        background-color: lightblue;
    }

    .ad {
        border-bottom: 1px solid #ccc;
        padding-bottom: 10px;
        margin-bottom: 10px;
    }

    .ad img {
        max-width: 100%;
        height: auto;
    }
```



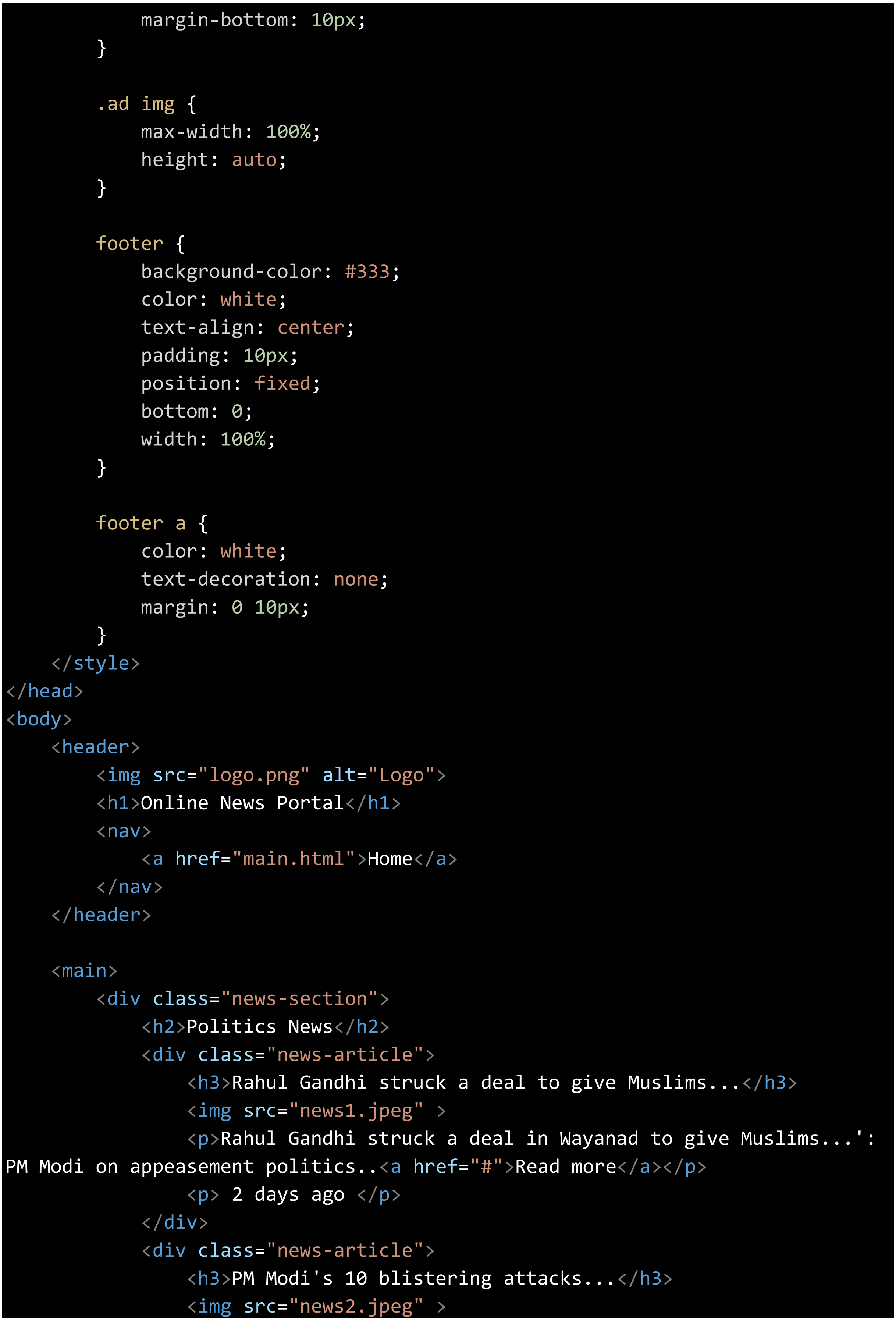
```
        footer {
            background-color: #333;
            color: white;
            text-align: center;
            padding: 10px;
            position: fixed;
            bottom: 0;
            width: 100%;
        }

        footer a {
            color: white;
            text-decoration: none;
            margin: 0 10px;
        }
    </style>
</head>
<body>
    <header>
        <img src="logo.png" alt="Logo">
        <h1>Online News Portal</h1>
        <nav>
            <a href="main.html">Home</a>
        </nav>
    </header>

    <main>
        <div class="news-section">
            <h2>Latest News</h2>
            <div class="news-article">
                <h3>Accident between two motorbikes</h3>
                <img src="bike.jpeg" >
                <p>Two motobikes collided near the potheri intersection... <a
href="#">Read more</a></p>
                <p> 3 hours ago </p>
            </div>
            <div class="news-article">
                <h3>Gold rate rises...</h3>
                <img src="gold.jpeg" >
                <p>Gold rate is seeing a sudden rise in the market...<a
href="#">Read more</a></p>
                <p> 8 hours ago </p>
            </div>
        </div>

        <div class="ads-section">
            <h2>Advertisements</h2>
            <div class="ad">
```



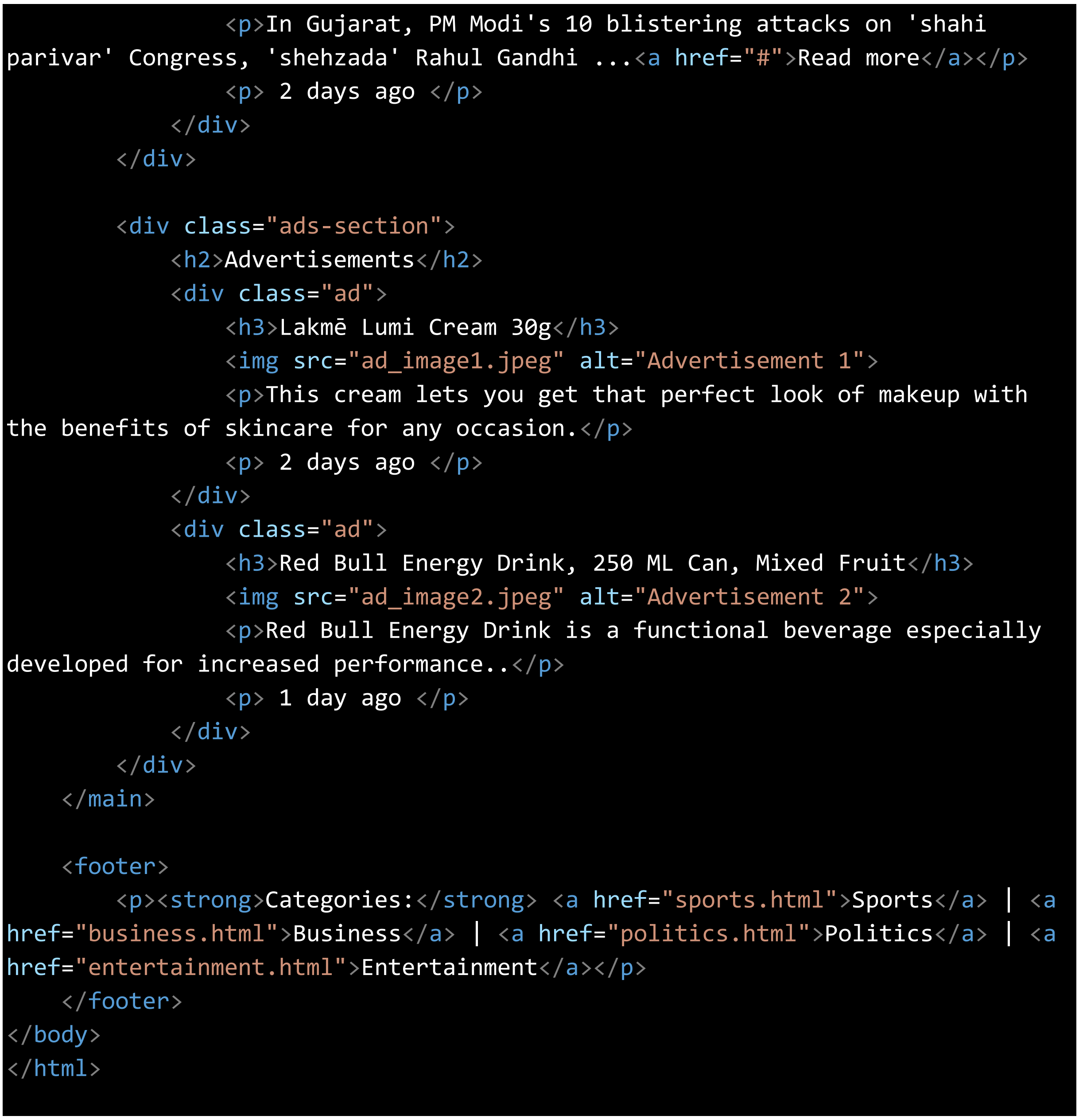
```
                <h3>Lakmē Lumi Cream 30g</h3>
                <img src="ad_image1.jpeg" alt="Advertisement 1">
                <p>This cream lets you get that perfect look of makeup with
the benefits of skincare for any occasion.</p>
            </div>
            <div class="ad">
                <h3>Red Bull Energy Drink, 250 ML Can, Mixed Fruit</h3>
                <img src="ad_image2.jpeg" alt="Advertisement 2">
                <p>Red Bull Energy Drink is a functional beverage especially
developed for increased performance..</p>
            </div>
        </div>
    </main>

    <footer>
        <p><strong>Categories:</strong> <a href="sports.html">Sports</a> | <a
href="business.html">Business</a> | <a href="politics.html">Politics</a> | <a
href="entertainment.html">Entertainment</a></p>
    </footer>
</body>
</html>
```



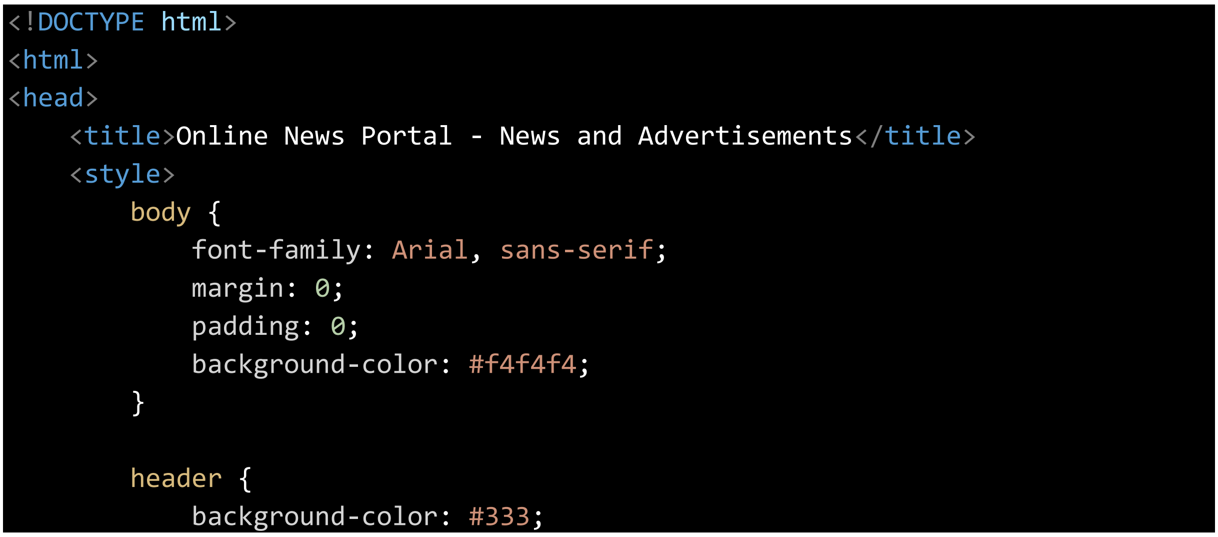
```
<!DOCTYPE html>
<html>
<head>
    <title>Online News Portal - News and Advertisements</title>
    <style>
        body {
            font-family: Arial, sans-serif;
            margin: 0;
            padding: 0;
            background-color: #f4f4f4;
        }

        header {
            background-color: #333;
            color: white;
            padding: 10px;
            text-align: center;
        }

        header a {
            color: white;
            text-decoration: none;
            margin: 0 10px;
        }
        main {
            display: flex;
            padding: 20px;
        }

        .news-section {
            flex: 2;
            padding: 10px;
            background-color: rgb(165, 164, 168);
            margin-right: 20px;
            display: grid;
            grid-template-columns: repeat(2, 1fr);
            grid-gap: 20px;
        }

        .news-article {
            border-bottom: 1px solid #ccc;
            padding-bottom: 20px;
            margin-bottom: 20px;
            display: flex;
            flex-direction: column;
            align-items: center;
            text-align: center;
        }

        .news-article h3 {
            margin: 10px 0 0;
        }

        .news-article p {
            margin: 10px 0;
        }

        .news-article img {
            max-width: 100%;
            height: auto;
            margin-bottom: 10px;
        }

        .ads-section {
            flex: 1;
            padding: 10px;
            background-color:orange;
        }

        .ad {
            border-bottom: 1px solid #ccc;
            padding-bottom: 10px;
```



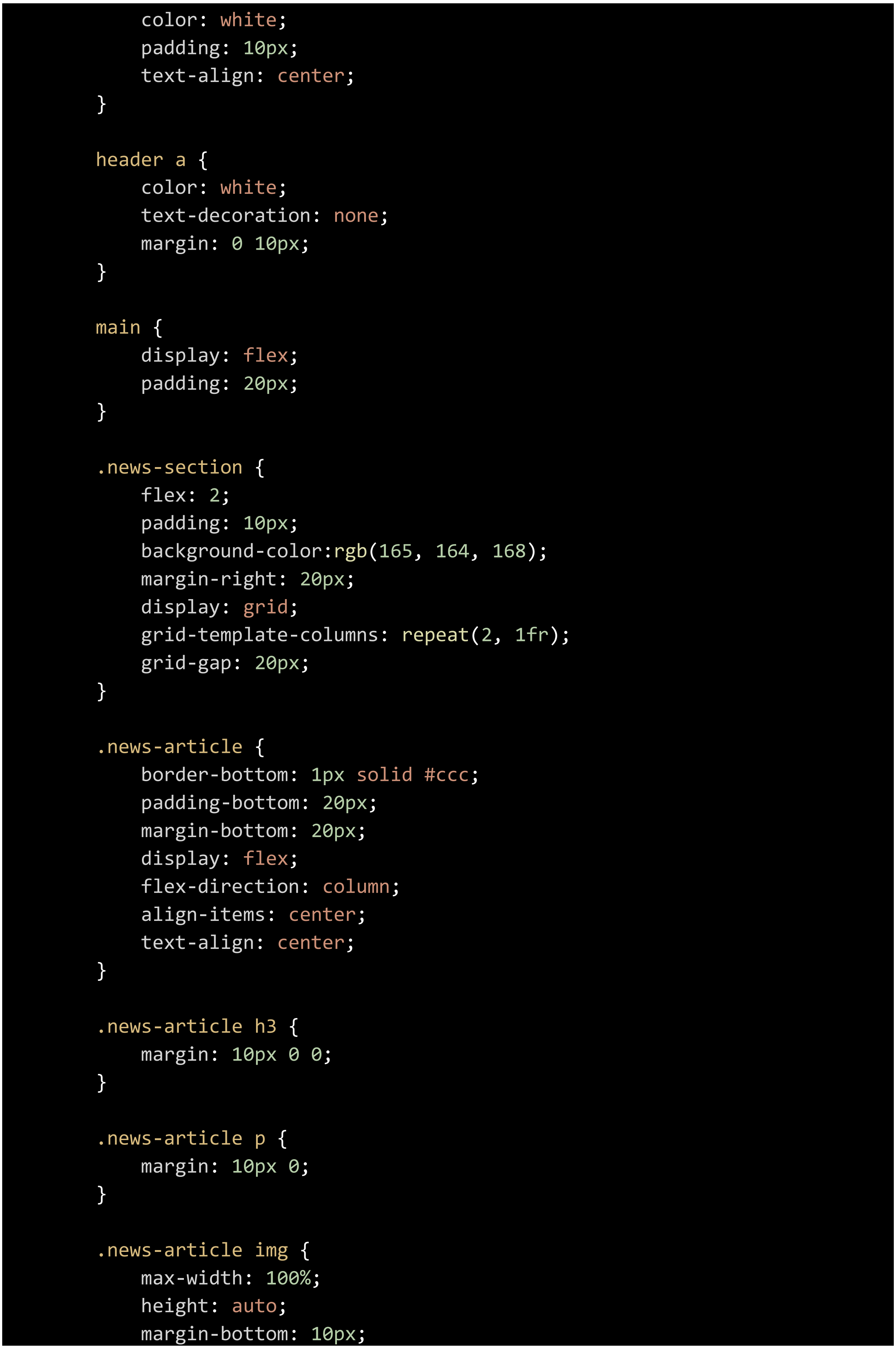
```
            margin-bottom: 10px;
        }

        .ad img {
            max-width: 100%;
            height: auto;
        }

        footer {
            background-color: #333;
            color: white;
            text-align: center;
            padding: 10px;
            position: fixed;
            bottom: 0;
            width: 100%;
        }

        footer a {
            color: white;
            text-decoration: none;
            margin: 0 10px;
        }
    </style>
</head>
<body>
    <header>
        <img src="logo.png" alt="Logo">
        <h1>Online News Portal</h1>
        <nav>
            <a href="main.html">Home</a>
        </nav>
    </header>

    <main>
        <div class="news-section">
            <h2>Politics News</h2>
            <div class="news-article">
                <h3>Rahul Gandhi struck a deal to give Muslims...</h3>
                <img src="news1.jpeg" >
                <p>Rahul Gandhi struck a deal in Wayanad to give Muslims...':
PM Modi on appeasement politics..<a href="#">Read more</a></p>
                <p> 2 days ago </p>
            </div>
            <div class="news-article">
                <h3>PM Modi's 10 blistering attacks...</h3>
                <img src="news2.jpeg" >
```



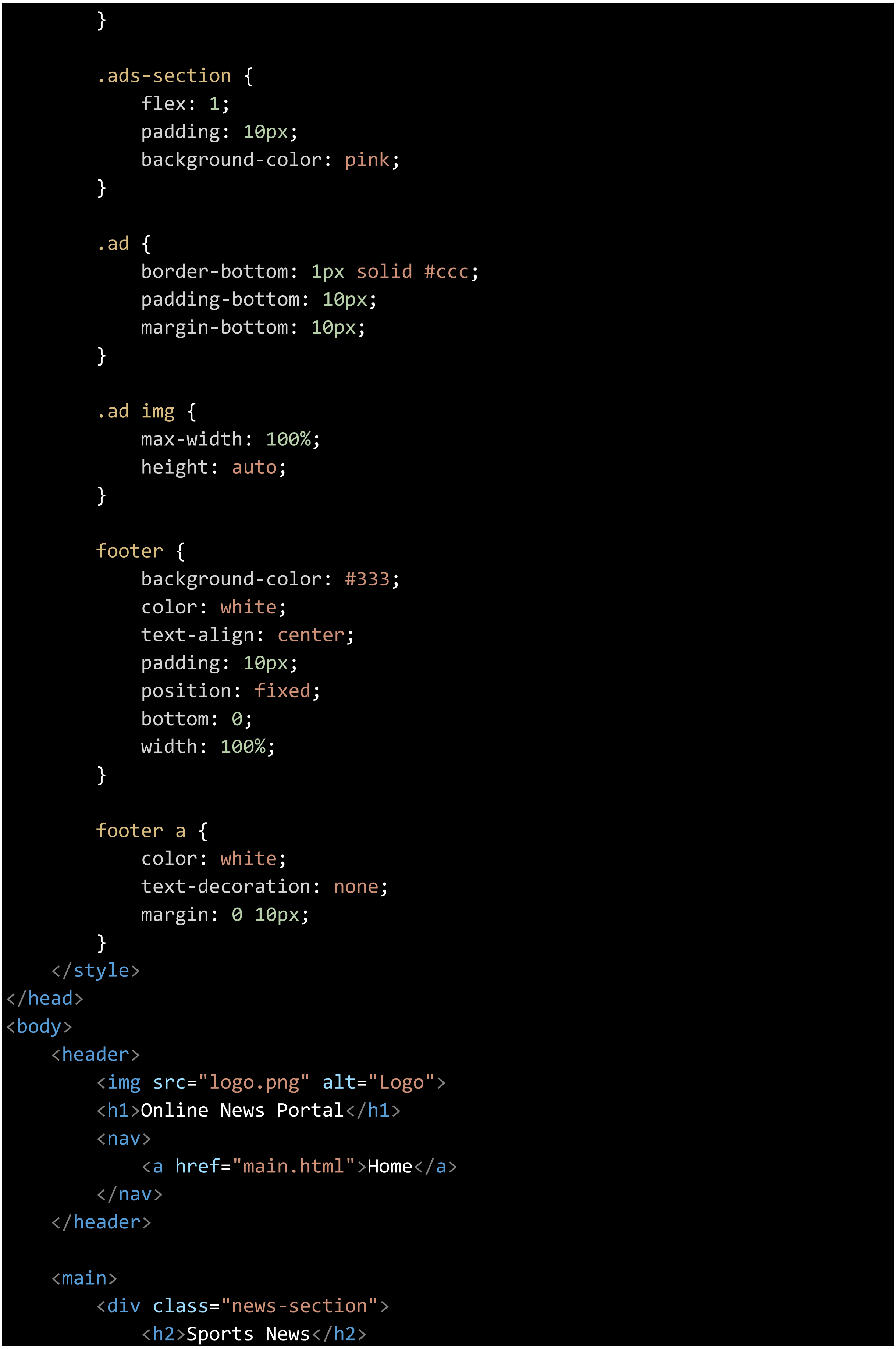
```
                <p>In Gujarat, PM Modi's 10 blistering attacks on 'shahi
parivar' Congress, 'shehzada' Rahul Gandhi ...<a href="#">Read more</a></p>
                <p> 2 days ago </p>
            </div>
        </div>

        <div class="ads-section">
            <h2>Advertisements</h2>
            <div class="ad">
                <h3>Lakmē Lumi Cream 30g</h3>
                <img src="ad_image1.jpeg" alt="Advertisement 1">
                <p>This cream lets you get that perfect look of makeup with
the benefits of skincare for any occasion.</p>
                <p> 2 days ago </p>
            </div>
            <div class="ad">
                <h3>Red Bull Energy Drink, 250 ML Can, Mixed Fruit</h3>
                <img src="ad_image2.jpeg" alt="Advertisement 2">
                <p>Red Bull Energy Drink is a functional beverage especially
developed for increased performance..</p>
                <p> 1 day ago </p>
            </div>
        </div>
    </main>

    <footer>
        <p><strong>Categories:</strong> <a href="sports.html">Sports</a> | <a
href="business.html">Business</a> | <a href="politics.html">Politics</a> | <a
href="entertainment.html">Entertainment</a></p>
    </footer>
</body>
</html>
```



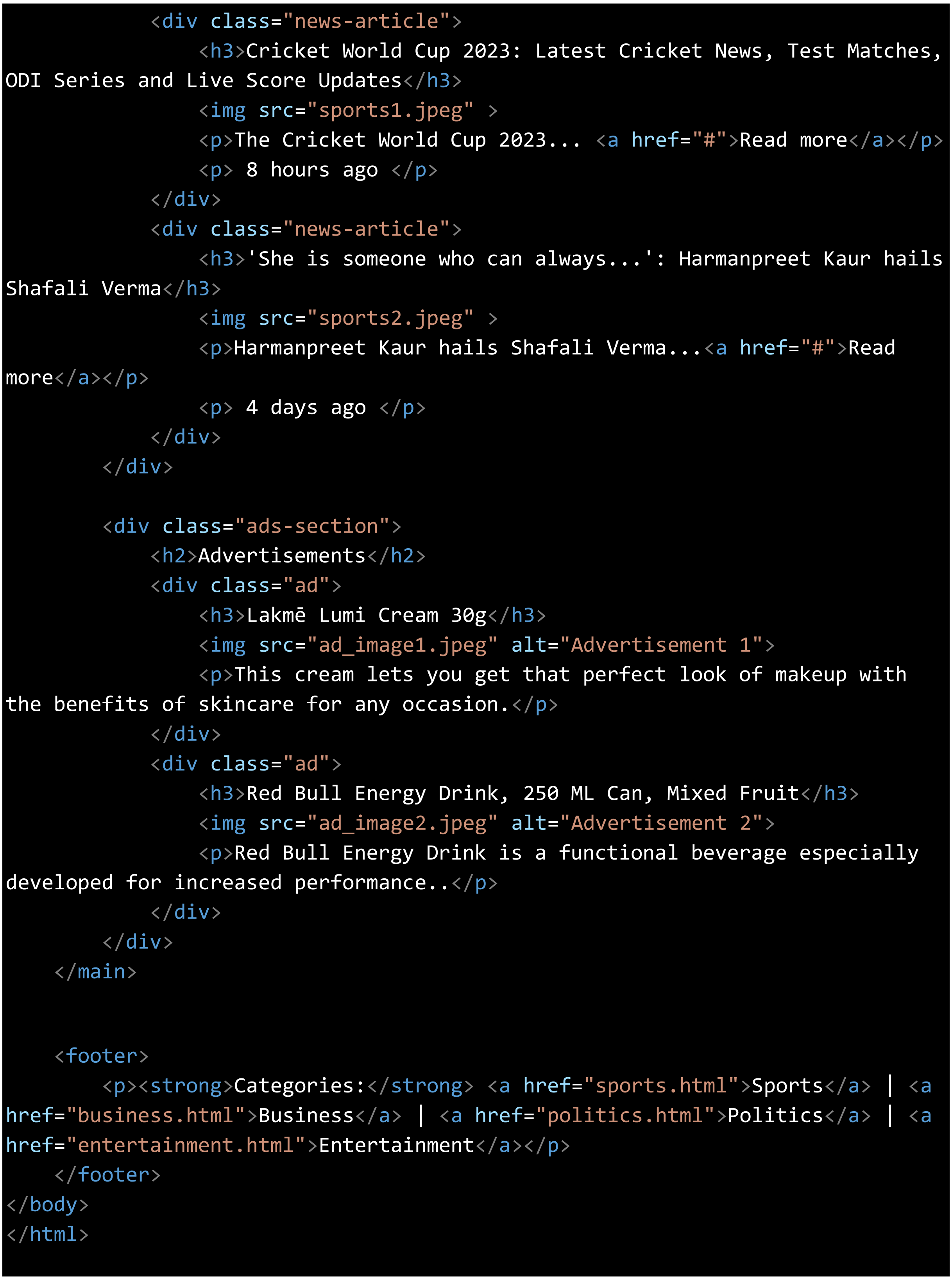
```
<!DOCTYPE html>
<html>
<head>
    <title>Online News Portal - News and Advertisements</title>
    <style>
        body {
            font-family: Arial, sans-serif;
            margin: 0;
            padding: 0;
            background-color: #f4f4f4;
        }

        header {
            background-color: #333;
```



```
        color: white;
        padding: 10px;
        text-align: center;
    }

    header a {
        color: white;
        text-decoration: none;
        margin: 0 10px;
    }

    main {
        display: flex;
        padding: 20px;
    }

    .news-section {
        flex: 2;
        padding: 10px;
        background-color:rgb(165, 164, 168);
        margin-right: 20px;
        display: grid;
        grid-template-columns: repeat(2, 1fr);
        grid-gap: 20px;
    }

    .news-article {
        border-bottom: 1px solid #ccc;
        padding-bottom: 20px;
        margin-bottom: 20px;
        display: flex;
        flex-direction: column;
        align-items: center;
        text-align: center;
    }

    .news-article h3 {
        margin: 10px 0 0;
    }

    .news-article p {
        margin: 10px 0;
    }

    .news-article img {
        max-width: 100%;
        height: auto;
        margin-bottom: 10px;
```



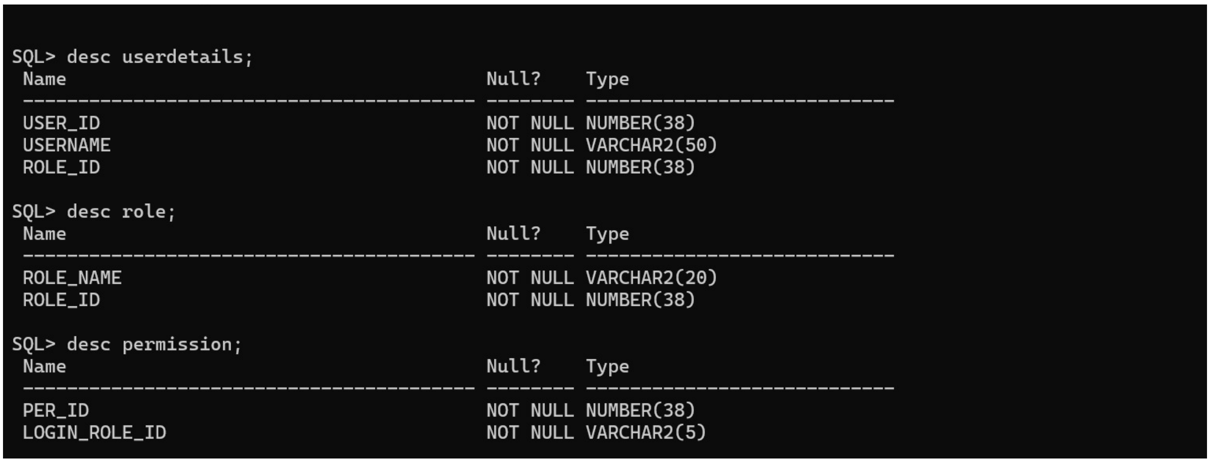
```
        }

        .ads-section {
            flex: 1;
            padding: 10px;
            background-color: pink;
        }

        .ad {
            border-bottom: 1px solid #ccc;
            padding-bottom: 10px;
            margin-bottom: 10px;
        }

        .ad img {
            max-width: 100%;
            height: auto;
        }

        footer {
            background-color: #333;
            color: white;
            text-align: center;
            padding: 10px;
            position: fixed;
            bottom: 0;
            width: 100%;
        }

        footer a {
            color: white;
            text-decoration: none;
            margin: 0 10px;
        }
    </style>
</head>
<body>
    <header>
        <img src="logo.png" alt="Logo">
        <h1>Online News Portal</h1>
        <nav>
            <a href="main.html">Home</a>
        </nav>
    </header>

    <main>
        <div class="news-section">
            <h2>Sports News</h2>
```



```
            <div class="news-article">
                <h3>Cricket World Cup 2023: Latest Cricket News, Test Matches,
ODI Series and Live Score Updates</h3>
                <img src="sports1.jpeg" >
                <p>The Cricket World Cup 2023... <a href="#">Read more</a></p>
                <p> 8 hours ago </p>
            </div>
            <div class="news-article">
                <h3>'She is someone who can always...': Harmanpreet Kaur hails
Shafali Verma</h3>
                <img src="sports2.jpeg" >
                <p>Harmanpreet Kaur hails Shafali Verma...<a href="#">Read
more</a></p>
                <p> 4 days ago </p>
            </div>
        </div>

        <div class="ads-section">
            <h2>Advertisements</h2>
            <div class="ad">
                <h3>Lakmē Lumi Cream 30g</h3>
                <img src="ad_image1.jpeg" alt="Advertisement 1">
                <p>This cream lets you get that perfect look of makeup with
the benefits of skincare for any occasion.</p>
            </div>
            <div class="ad">
                <h3>Red Bull Energy Drink, 250 ML Can, Mixed Fruit</h3>
                <img src="ad_image2.jpeg" alt="Advertisement 2">
                <p>Red Bull Energy Drink is a functional beverage especially
developed for increased performance..</p>
            </div>
        </div>
    </main>


    <footer>
        <p><strong>Categories:</strong> <a href="sports.html">Sports</a> | <a
href="business.html">Business</a> | <a href="politics.html">Politics</a> | <a
href="entertainment.html">Entertainment</a></p>
    </footer>
</body>
</html>
```

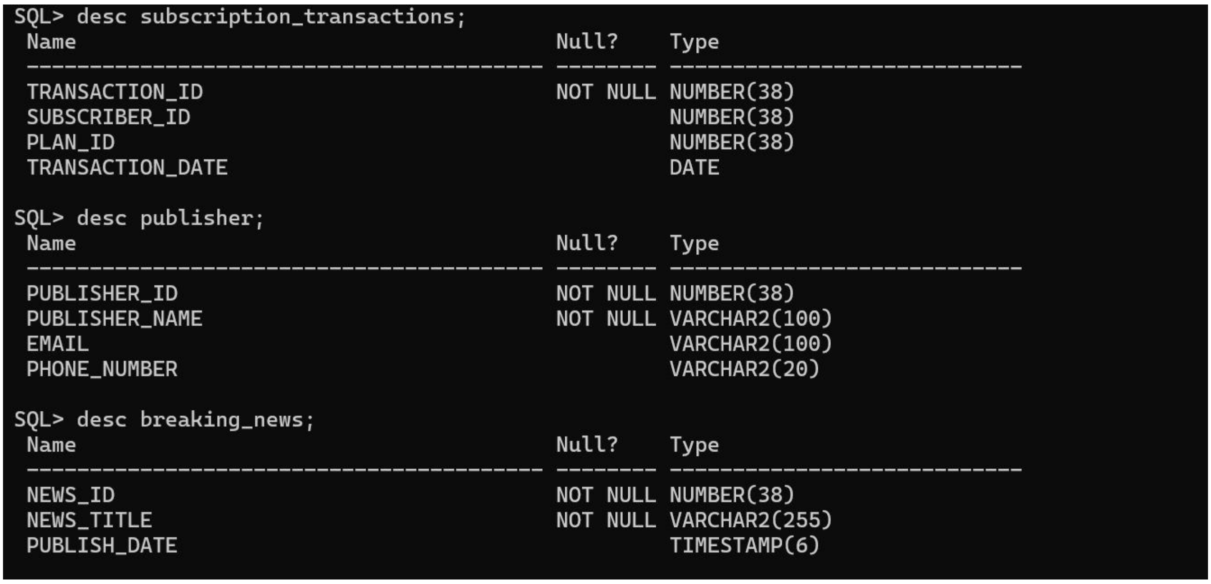
CHAPTER 7

BACKEND (DATABASE):



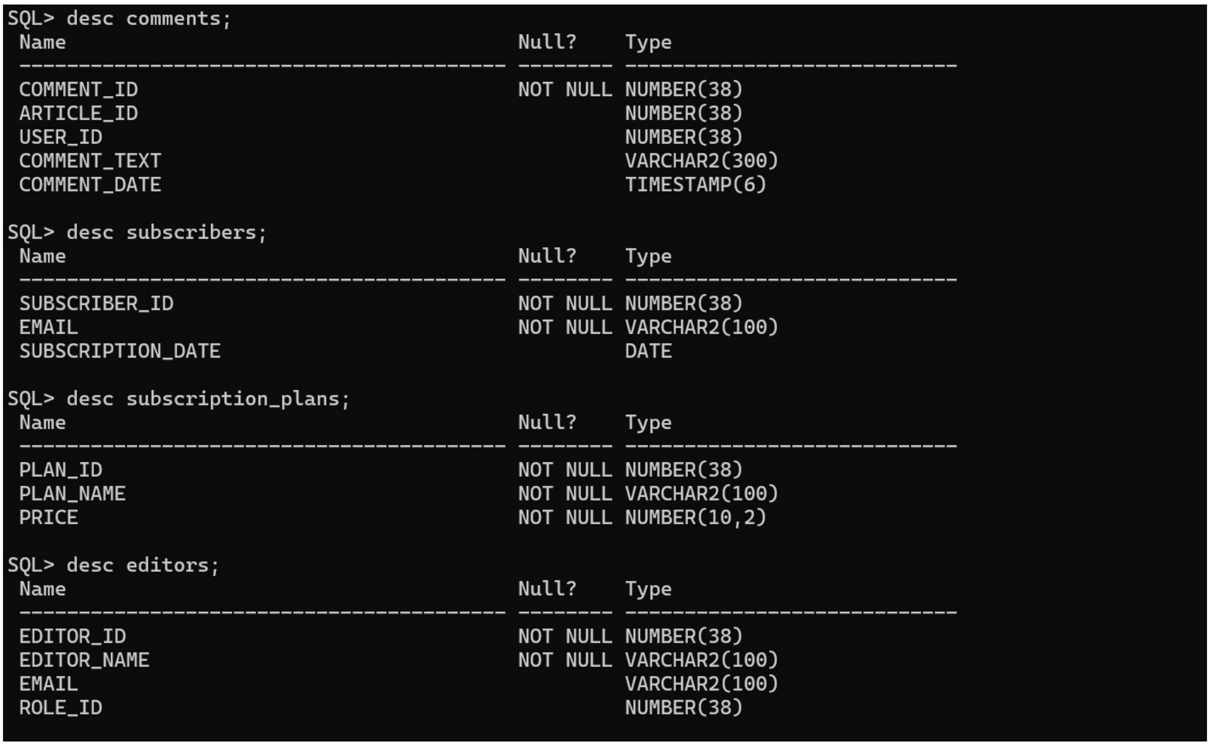
```
SQL> desc userdetails;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 USER_ID                                   NOT NULL NUMBER(38)
 USERNAME                                  NOT NULL VARCHAR2(50)
 ROLE_ID                                   NOT NULL NUMBER(38)

SQL> desc role;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 ROLE_NAME                                 NOT NULL VARCHAR2(20)
 ROLE_ID                                   NOT NULL NUMBER(38)

SQL> desc permission;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 PER_ID                                    NOT NULL NUMBER(38)
 LOGIN_ROLE_ID                             NOT NULL VARCHAR2(5)
```

Figure 7.1: Database



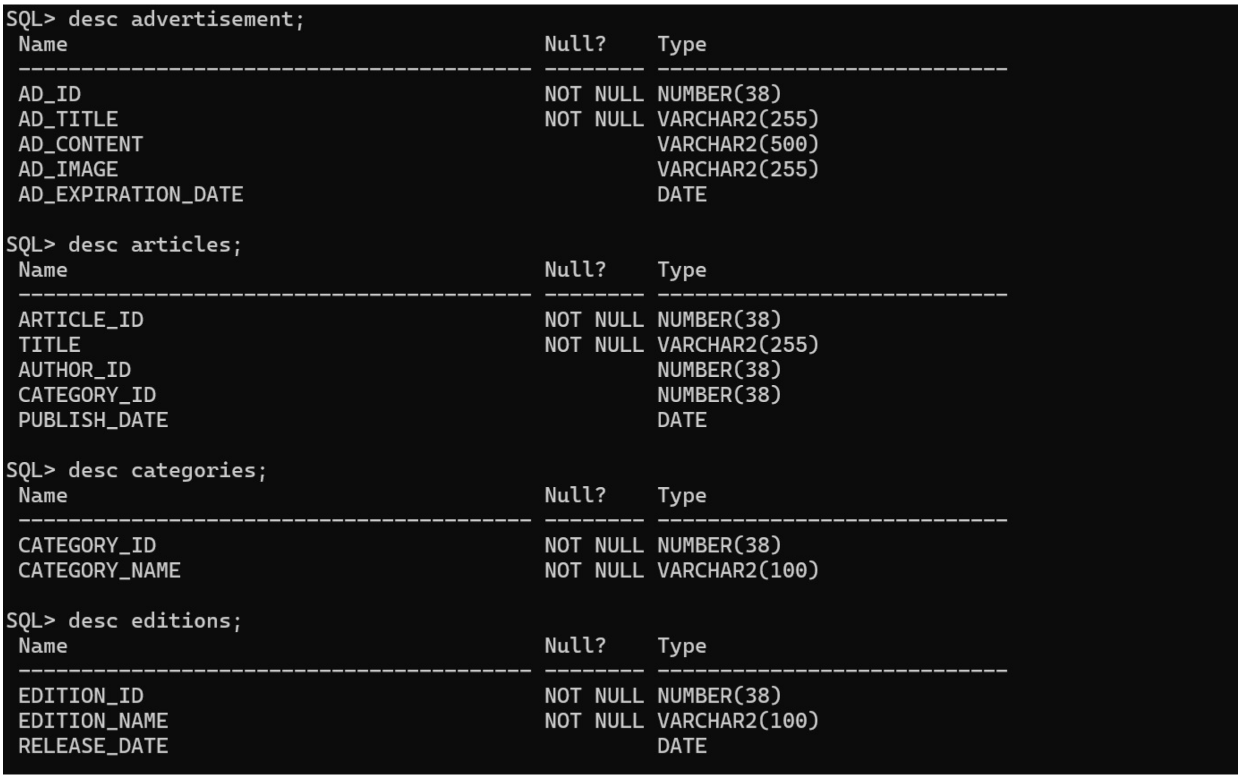
```
SQL> desc subscription_transactions;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 TRANSACTION_ID                            NOT NULL NUMBER(38)
 SUBSCRIBER_ID                                      NUMBER(38)
 PLAN_ID                                            NUMBER(38)
 TRANSACTION_DATE                                   DATE

SQL> desc publisher;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 PUBLISHER_ID                              NOT NULL NUMBER(38)
 PUBLISHER_NAME                            NOT NULL VARCHAR2(100)
 EMAIL                                              VARCHAR2(100)
 PHONE_NUMBER                                       VARCHAR2(20)

SQL> desc breaking_news;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 NEWS_ID                                   NOT NULL NUMBER(38)
 NEWS_TITLE                                NOT NULL VARCHAR2(255)
 PUBLISH_DATE                                       TIMESTAMP(6)
```

Figure 7.2: Database



```
SQL> desc comments;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 COMMENT_ID                                NOT NULL NUMBER(38)
 ARTICLE_ID                                         NUMBER(38)
 USER_ID                                            NUMBER(38)
 COMMENT_TEXT                                       VARCHAR2(300)
 COMMENT_DATE                                       TIMESTAMP(6)

SQL> desc subscribers;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 SUBSCRIBER_ID                             NOT NULL NUMBER(38)
 EMAIL                                     NOT NULL VARCHAR2(100)
 SUBSCRIPTION_DATE                                  DATE

SQL> desc subscription_plans;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 PLAN_ID                                   NOT NULL NUMBER(38)
 PLAN_NAME                                 NOT NULL VARCHAR2(100)
 PRICE                                     NOT NULL NUMBER(10,2)

SQL> desc editors;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 EDITOR_ID                                 NOT NULL NUMBER(38)
 EDITOR_NAME                               NOT NULL VARCHAR2(100)
 EMAIL                                              VARCHAR2(100)
 ROLE_ID                                            NUMBER(38)
```

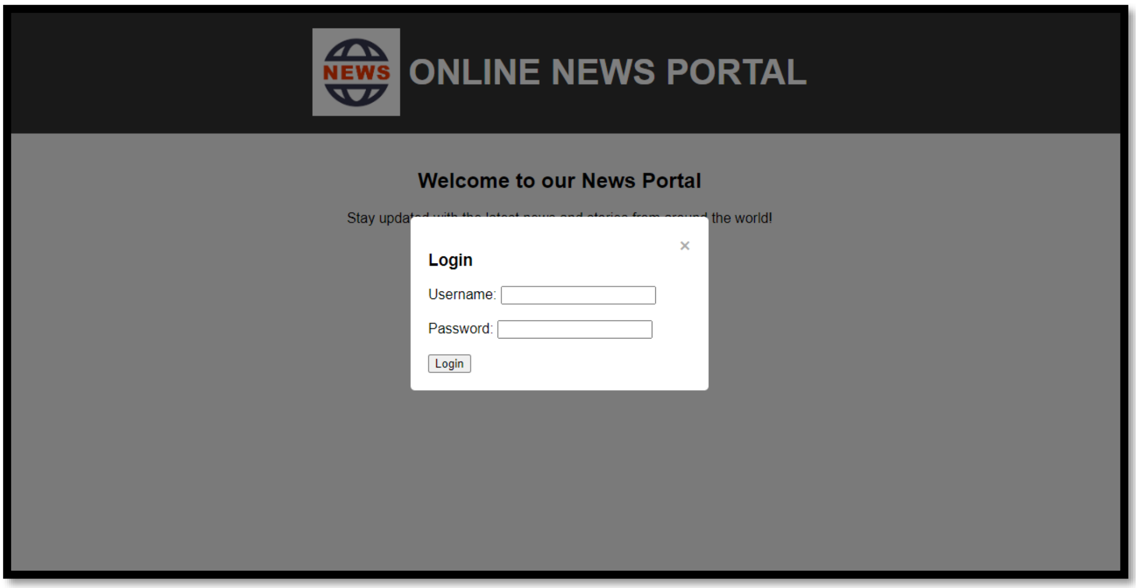
Figure 7.3: Database



```
SQL> desc advertisement;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 AD_ID                                     NOT NULL NUMBER(38)
 AD_TITLE                                  NOT NULL VARCHAR2(255)
 AD_CONTENT                                         VARCHAR2(500)
 AD_IMAGE                                           VARCHAR2(255)
 AD_EXPIRATION_DATE                                 DATE

SQL> desc articles;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 ARTICLE_ID                                NOT NULL NUMBER(38)
 TITLE                                     NOT NULL VARCHAR2(255)
 AUTHOR_ID                                          NUMBER(38)
 CATEGORY_ID                                        NUMBER(38)
 PUBLISH_DATE                                       DATE

SQL> desc categories;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 CATEGORY_ID                               NOT NULL NUMBER(38)
 CATEGORY_NAME                             NOT NULL VARCHAR2(100)

SQL> desc editions;
 Name                                      Null?    Type
 ----------------------------------------- -------- ----------------------------
 EDITION_ID                                NOT NULL NUMBER(38)
 EDITION_NAME                              NOT NULL VARCHAR2(100)
 RELEASE_DATE                                       DATE
```

Figure 7.4: Database

FRONTEND:



ONLINE NEWS PORTAL

Welcome to our News Portal

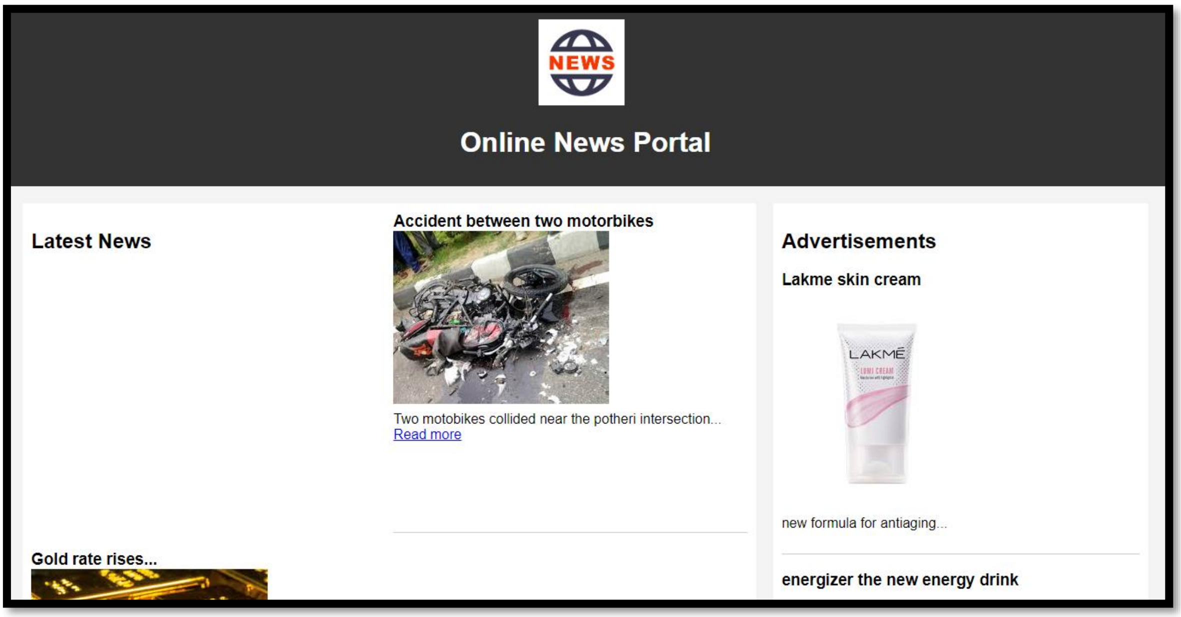
Stay updated with the latest news and stories from around the world!

Login

Username:

Password:

Figure 7.5: Login page



Online News Portal

Latest News

Accident between two motorbikes

Two motobikes collided near the potheri intersection...
Read more

Gold rate rises...

Advertisements

Lakme skin cream

new formula for antiaging...

energizer the new energy drink

Figure 7.6: Latest news page

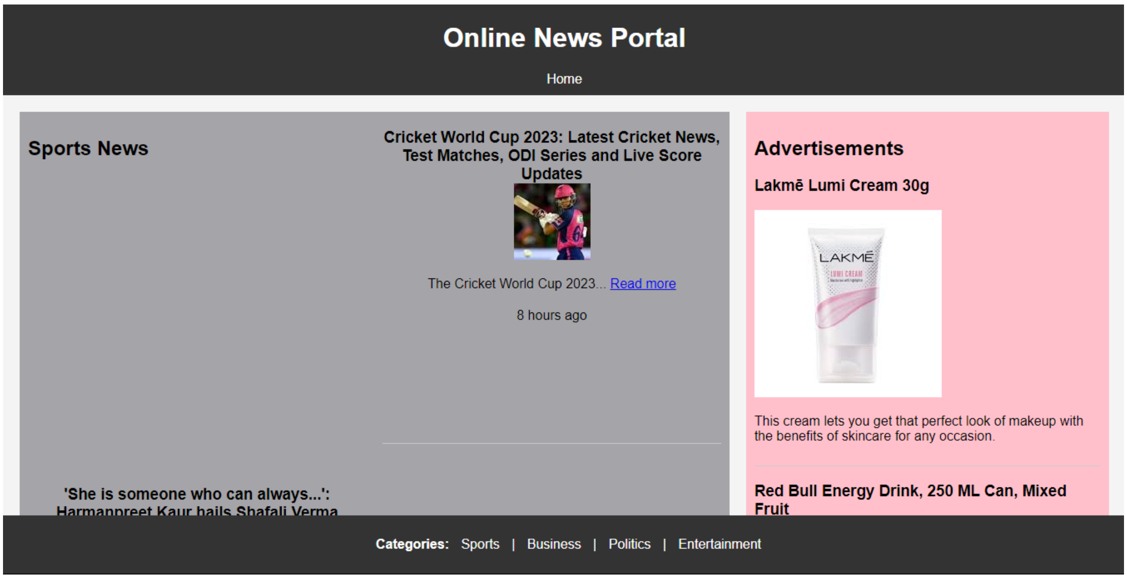


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Figure 7.7: Sports news page

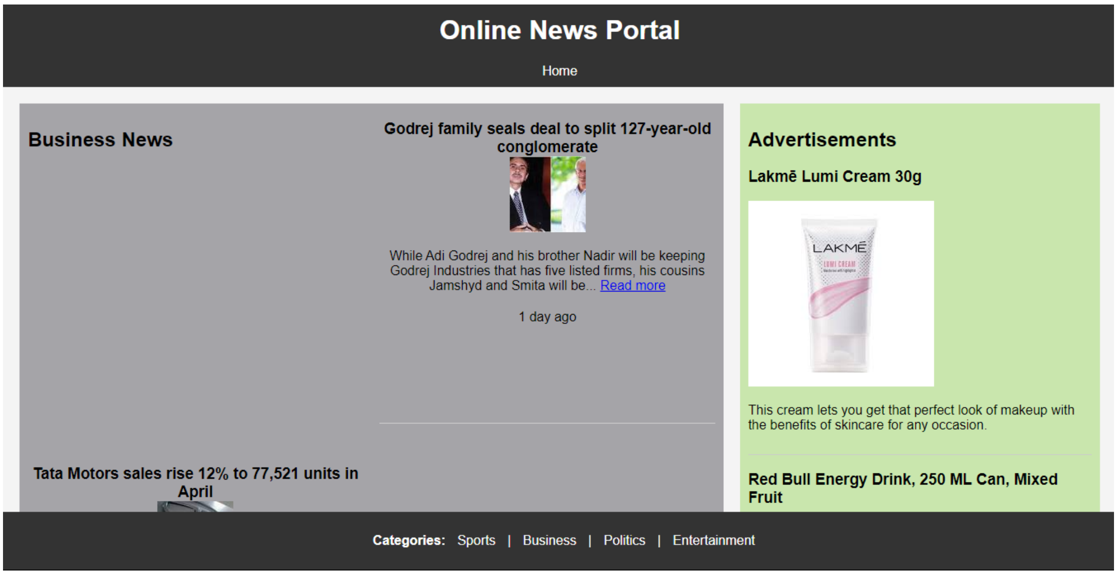

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Figure 7.8: Business news page

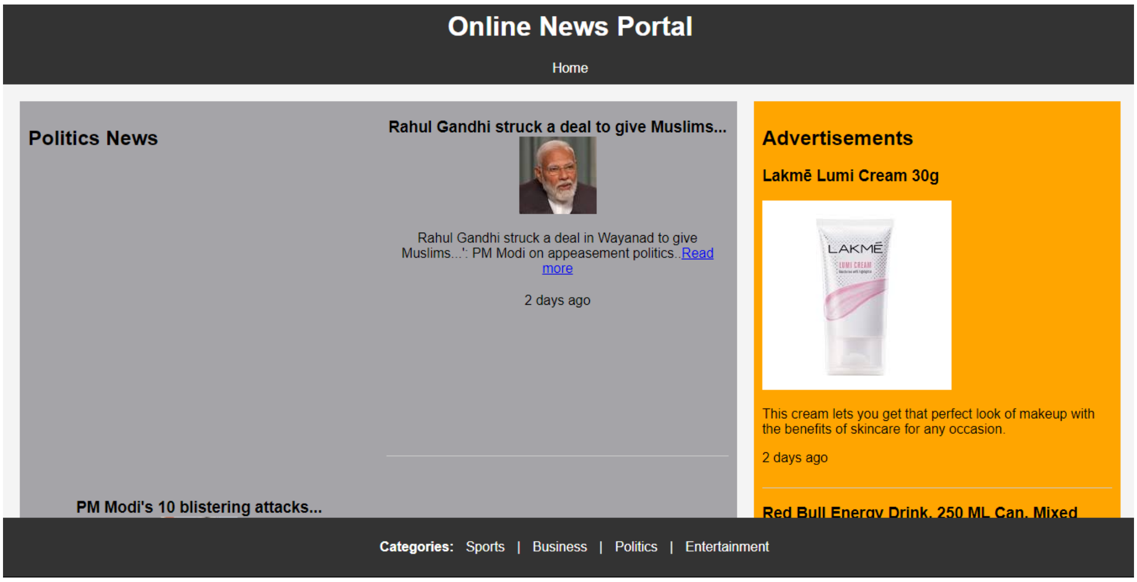

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Figure 7.9: Politics news page

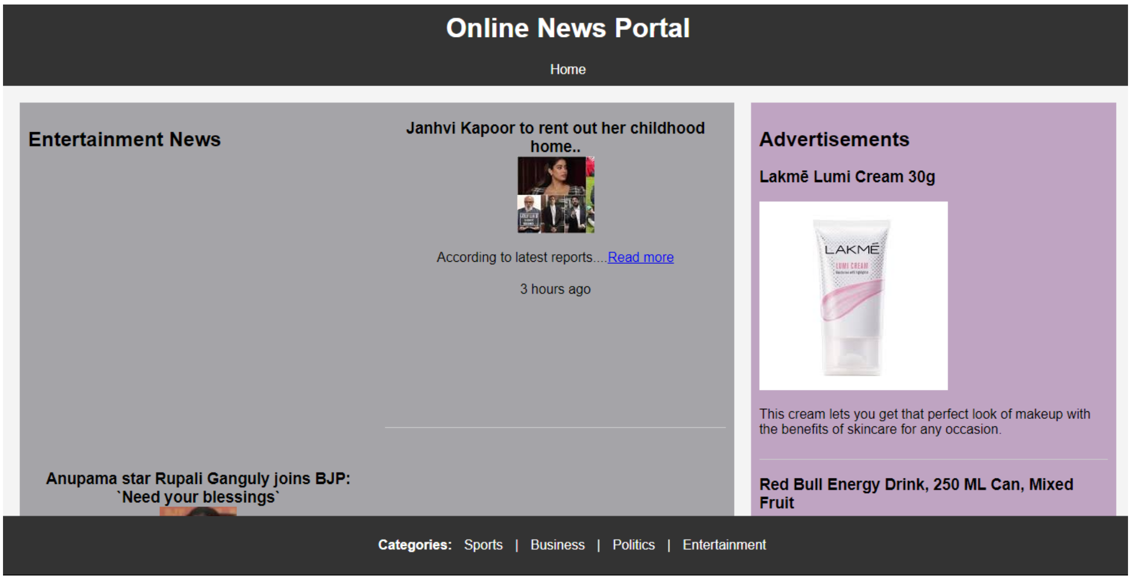

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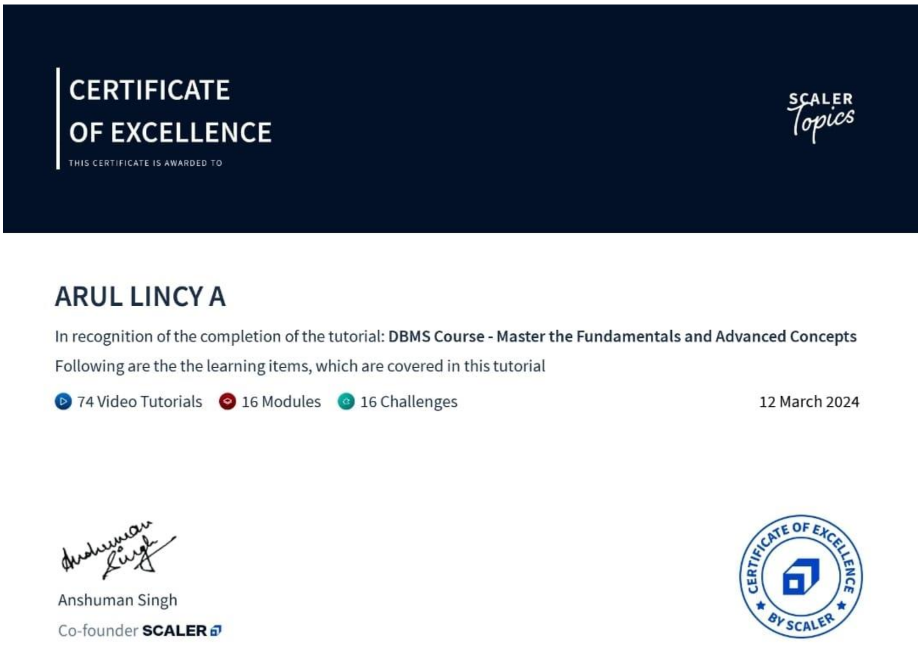
Figure 7.10: Entertainment page

CHAPTER 8



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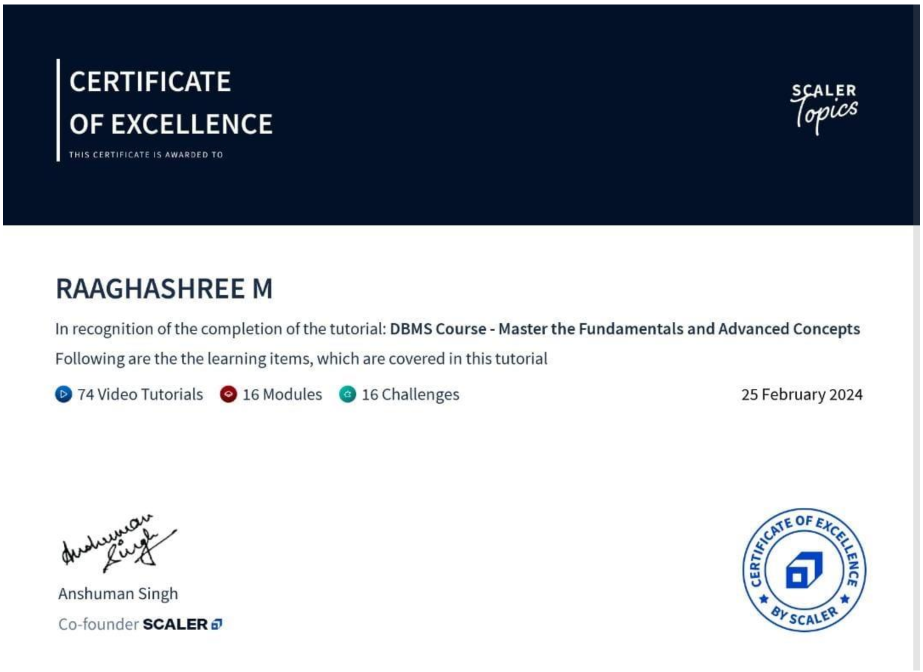

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