Comprehensive Database Design Documentation for a News Summarizer Application

This documentation is designed to guide industrial training participants through the process of designing and implementing a database for a news summarizer application. The design adheres to industry best practices, ensuring scalability, maintainability, and performance.

Database Design Considerations and Best Practices

1. **Normalization**: The schema is designed to be in Third Normal Form (3NF), which helps in minimizing redundancy and maximizing data integrity:
   - **Primary Key**: Each table has a primary key that uniquely identifies each record.
   - **No Transitive Dependency**: Non-key attributes depend only on the primary key.
2. **Foreign Keys**: Used to establish relationships between tables, maintaining referential integrity and ensuring data consistency.
3. **Data Types and Constraints**: Appropriate data types (e.g., `varchar`, `int`, `datetime`) optimize storage and improve query performance. Constraints ensure adherence to data rules, enhancing quality.
4. **Scalability and Performance**: The relational table structure supports easy indexing and partitioning, facilitating efficient data retrieval as the dataset grows.
5. **Security Considerations**: Sensitive information is separated into different tables and referenced by IDs, supporting better security practices.

> Below is a step-by-step guide to creating a database schema considering various entities involved and their relationships

Entities and Their Attributes

1. **News**: Represents individual news articles.
   - **Attributes**: id, category_id, reporter_id, publisher_id, datetime, title, body, link
2. **Category**: Represents the category of the news (e.g., Sports, Politics).
   - **Attributes**: id, name
3. **Reporter**: Represents the reporter of the news article.
   - **Attributes**: id, name, email
4. **Publisher**: Represents the publisher who publish the news article.
   - **Attributes**: id, name, email, head_office_address, phone_number, website, facebook, twitter, linkedin, instagram
5. **Image**: Represents images associated with the news article.

- **Attributes**: id, news_id, image_url

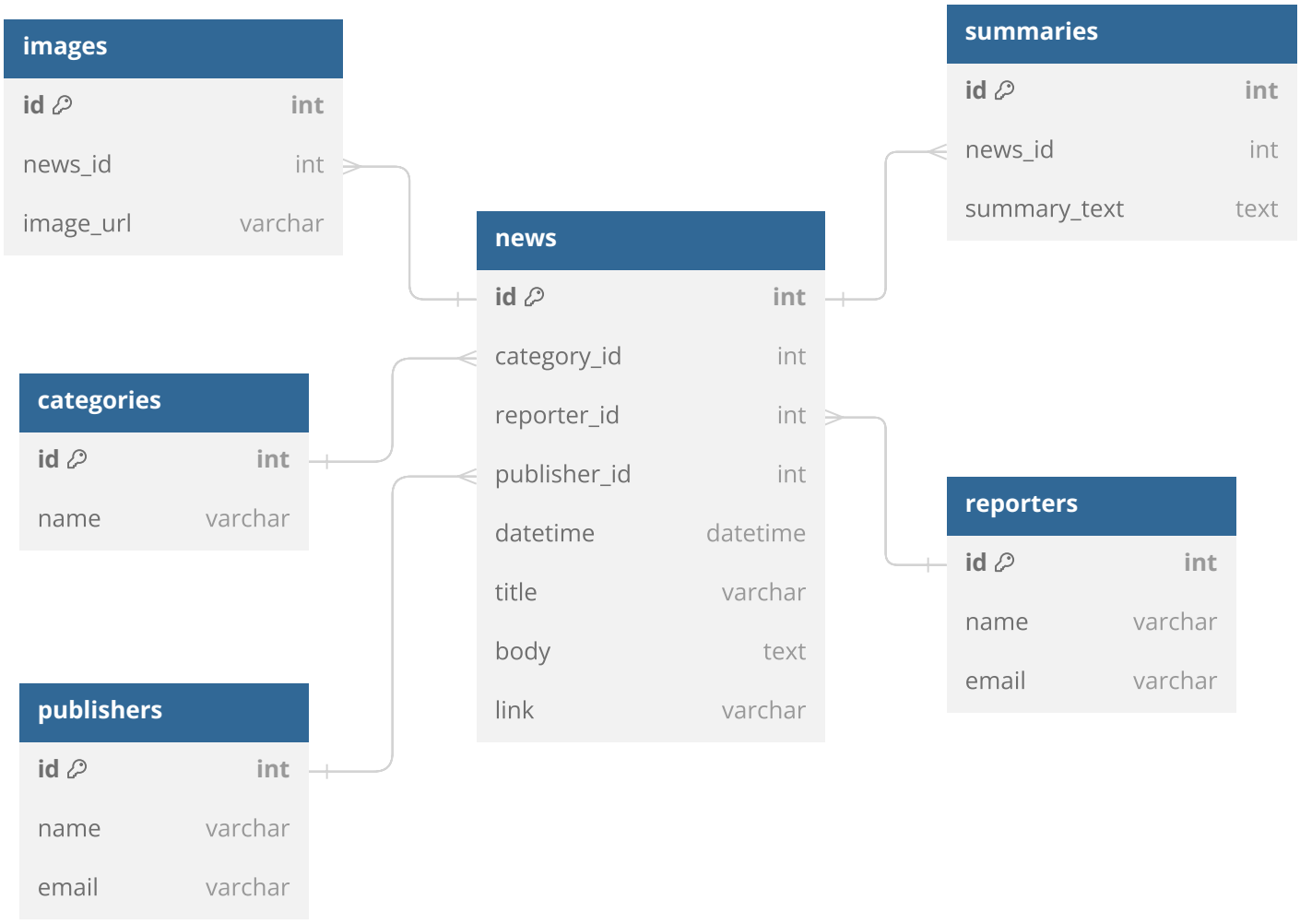
6. **Summary**: Represents the summarized version of the news article, generated by a Language Learning Model (LLM).
    - **Attributes**: id, news_id, summary_text

Relationships

- A **News** article belongs to one **Category**, one **Reporter**, and one **Publisher**
- A **News** article can have multiple **Images**.
- Each **News** article has one **Summary**.

DB Diagram

👆 News Summaraizer DB Diagram - Click here 👆



Explanation

- **Primary Keys (pk)**: Uniquely identifies each record in a table.
- **Foreign Keys (ref)**: Establishes a link between two tables.

- **Attributes Types**: `varchar` for strings, `int` for integers, `datetime` for date and time, `text` for longer text fields.
- **Increment**: Automatically increments the primary key value for new records.

Implementation Strategy

1. **Create the Tables**: Begin by creating the tables in your database management system (DBMS) according to the schema provided.
2. **Populate the Tables**: Insert initial data into `categories`, `authors`, and `editors` first, as these are referenced by the `news` table.
3. **Maintain Data Integrity**: Use transactions to maintain integrity, especially when inserting or updating data across multiple tables.
4. **Indexing**: Apply indexes on frequently queried columns (e.g., `category_id`, `author_id`, `editor_id` in the `news` table) to speed up search operations.
5. **Security Measures**: Implement role-based access controls in the DBMS to restrict who can view or modify certain data.

Synthetic Data Example

```
categories:
| id | name     | description       |
|----|----------|-------------------|
| 1  | Politics | Political news    |
| 2  | Sports   | Sports activities |

reporters:
| id | name       | email                |
|----|------------|----------------------|
| 1  | John Doe   | johndoe@example.com  |
| 2  | Jane Smith | janesmith@example.com|

publishers:
| id | name       | email                |
|----|------------|----------------------|
| 1  | BBC | bbc@example.com   |
| 2  | AL Jazeera    | aljazeera@example.com   |

news:
| id | category_id | reporter_id | publisher_id | datetime            | title         |
|----|-------------|-------------|--------------|---------------------|---------------|
| 1  | 1           | 1           | 1            | 2023-01-01 10:00:00 | Election 2023 |
| 2  | 2           | 2           | 2            | 2023-01-02 15:00:00 | Soccer Match  |

images:
| id | news_id | image_url                      |
|----|---------|--------------------------------|
| 1  | 1       | http://example.com/img1.jpg    |
| 2  | 2       | http://example.com/img2.jpg    |

summaries:
| id | news_id | summary_text                   |
|----|---------|--------------------------------|
| 1  | 1       | Short summary of Election 2023 |
| 2  | 2       | Summary of Soccer match        |
```

This comprehensive approach ensures that participants not only understand how to design and implement a database but also appreciate the importance of best practices in database architecture.