# Database Homework

## Week 02

### 1. List four applications you have used that most likely employed a database system. What kinds of data are stored in this DB?

**Answer:**

Here are four applications:

1. **WeChat**:

* **Personal Information**:
* Stored data includes phone numbers, ID numbers, ages, and locations, which are essential for user identification.
* **Social Connections**:
* Relationships with friends are managed through a social graph, allowing one to efficiently query and update user connections.
* **Content Submitted**:
* Official accounts followed by users are stored in a relational database, facilitating quick retrieval of content and interactions from these accounts.

1. **Tik-tok**:

* **Personal Information**:
* Similar to WeChat, user profiles include sensitive data like phone numbers and ID numbers, which are securely stored and accessed for authentication and personalization.
* **User Content**:
* Videos posted by users are stored in large binary object (BLOB) fields in the database, allowing for the storage of multimedia content alongside.
* **Engagement Data**:
* Information about liked videos and user comments is structured in tables to enable fast querying and analytics, helping Tik-tok recommend content based on user interactions.

1. **Taobao**:

* **Personal Information**:
* User profiles include detailed personal data, essential for creating secure accounts and processing orders.
* **Product Information**:
* Each product's data (price, quantity, specifications) is stored in a structured format, allowing for efficient searching and filtering by users.
* **Transaction Data**:
* Orders and seller information are managed through transaction tables, ensuring data integrity and providing insights into sales trends and inventory management.

1. **Bilibili**:

* **Personal Information**:
* User data, including contact information and demographics, is crucial for account management and content personalization.
* **Content Data**:
* Video information (e.g., title, duration, uploader) and manga content are organized in a way that allows easy retrieval and categorization, enhancing user experience.

### 2. List five responsibilities database of a management system. For each responsibility. Explain the problems that would arise if the responsibility were not discharged.

**Answer:**

**1. Data Storage, Retrieval, and Update**

**Responsibility**: Efficiently store, retrieve, and update data in the database.

**Problems if Not Discharged**:

① **Data Loss**

② **Inefficient Queries**: Users may experience slow performance.

**2. Data Integrity and Consistency**

**Responsibility**: Ensure that the data remains accurate and consistent across the database.

**Problems if Not Discharged**:

① **Data Anomalies**: Inconsistent data can lead to unreliable information.

② **Violation of Business Rules**: Failure to enforce constraints can result in invalid data entries, disrupting operations.

③ **Increased Errors**: Users may make decisions based on flawed data, leading to operational inefficiencies or financial losses.

**3. Data Security**

**Responsibility**: Protect sensitive data from unauthorized access and breaches.

**Problems if Not Discharged**:

① **Data Breaches**: Unauthorized access can lead to data theft, compromising user privacy and organizational integrity.

② **Legal Consequences**: Non-compliance with data protection regulations can result in hefty fines and legal issues.

**4. Backup and Recovery**

**Responsibility**: Provide mechanisms for data backup and recovery in case of failures.

**Problems if Not Discharged**:

① **Irrecoverable Data**: In the event of hardware failure or data corruption, without backups, critical data may be permanently lost.

② **Extended Downtime**: Recovery processes may take longer, leading to business interruptions and loss of revenue.

**5. User Access and Authorization**

**Responsibility**: Manage user permissions and access controls to the database.

**Problems if Not Discharged**:

① **Unauthorized Access**: Users may gain access to sensitive data they shouldn't see, leading to potential misuse or data leaks.

② **Operational Risks**: Employees could inadvertently modify or delete critical data, causing disruptions in business processes.