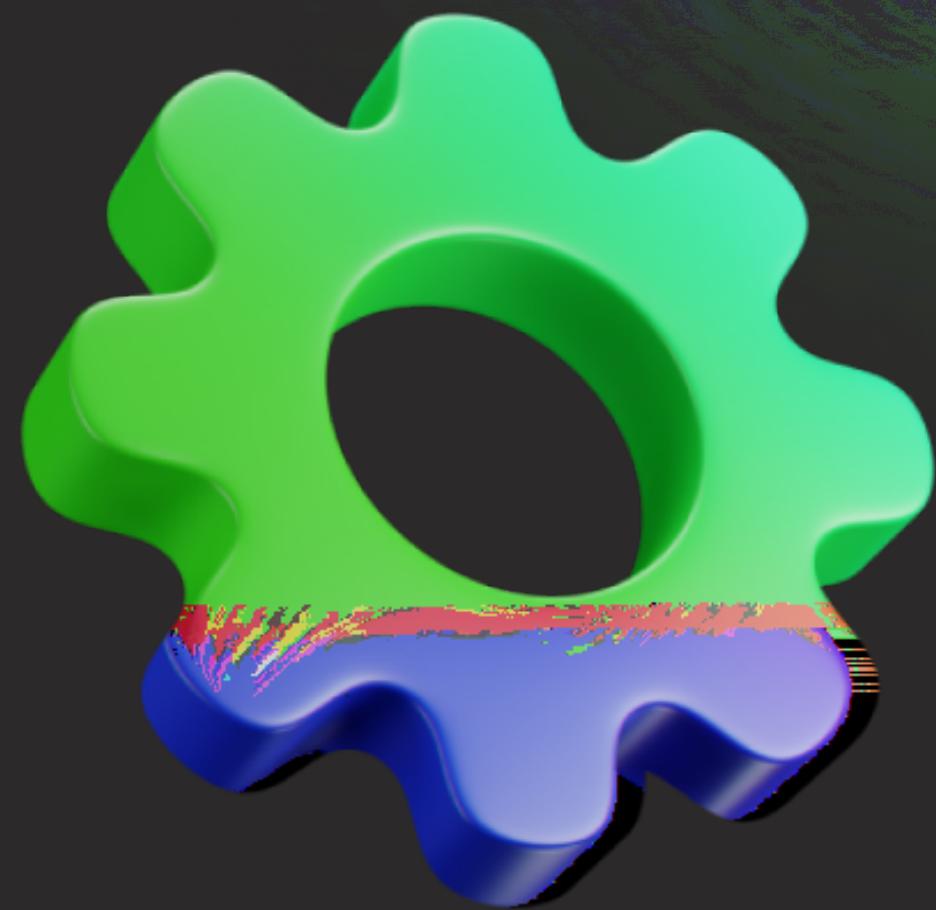


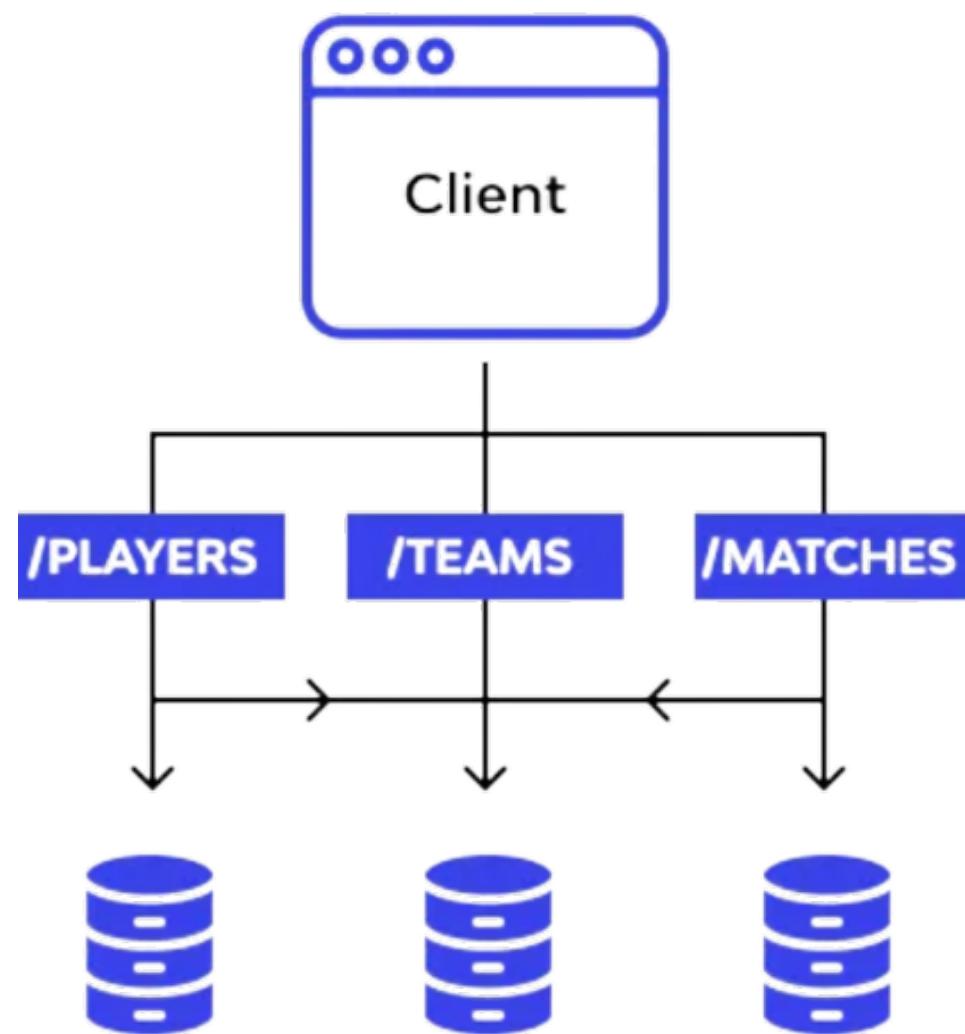
Exploring Key System Design Concepts In Software Engineering



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REST is an architectural style for developing web services that use HTTP methods to create, read, update, and delete resources, identified by URLs. It's stateless, making it scalable and flexible for internet applications.



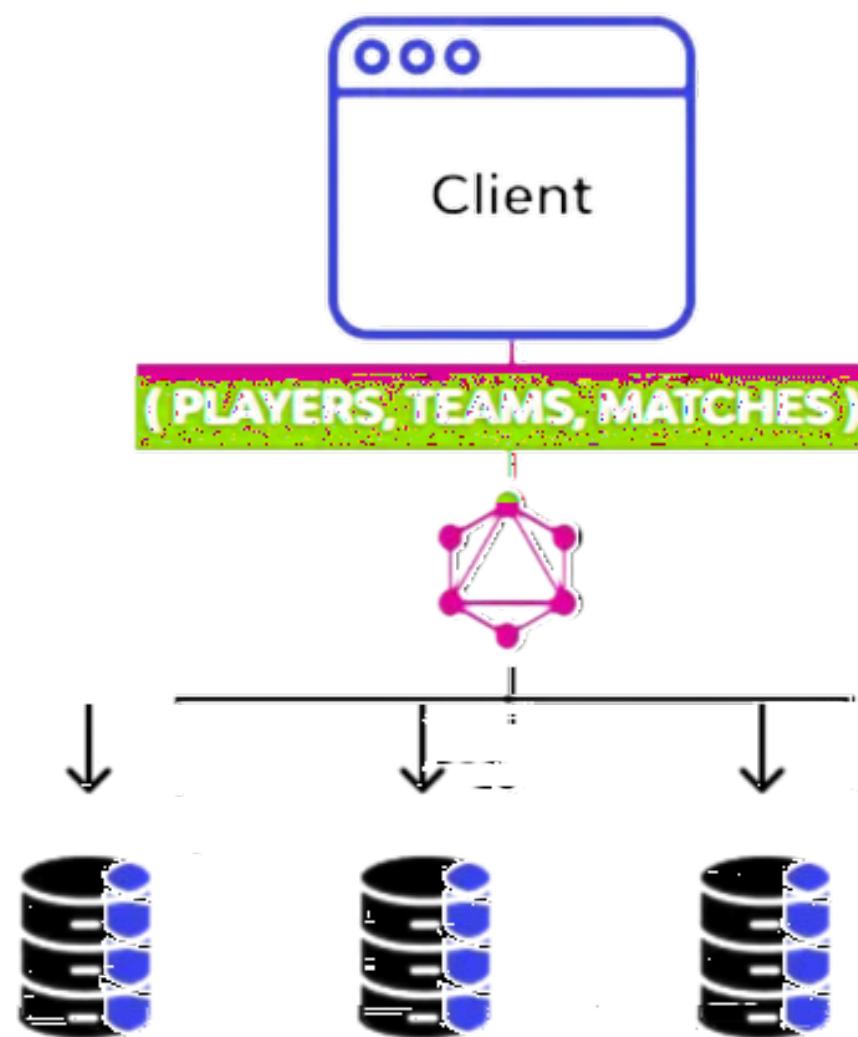
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11. GraphQL

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GraphQL uses one endpoint for requests, allowing clients to specify the data they need precisely. In contrast, REST uses multiple fixed endpoints, which may result in over-fetching or under-fetching of data. GraphQL offers greater flexibility and efficiency for complex applications.



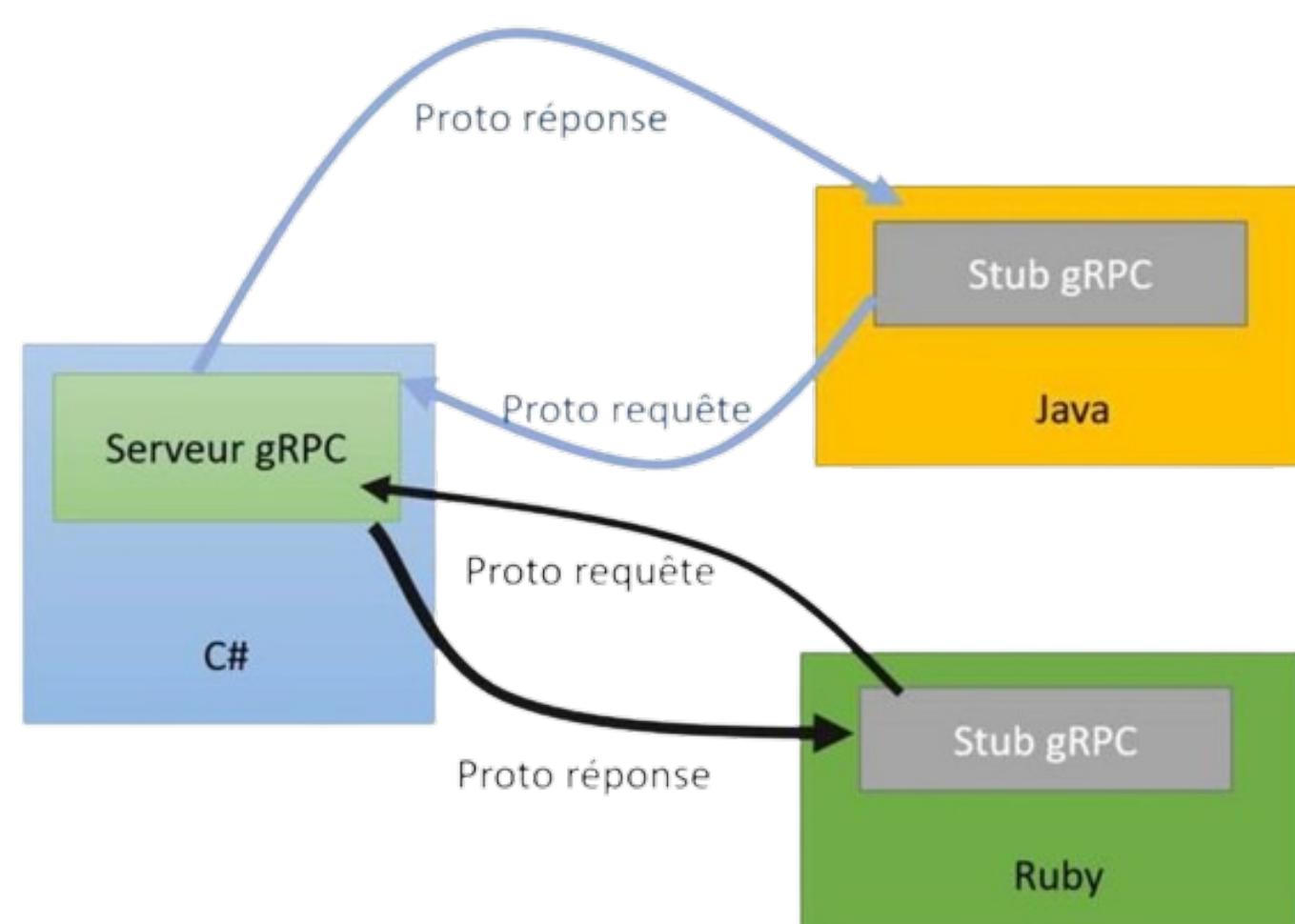
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12. Grpc :

3/11

gRPC is a technology that enables super-fast communication between computer programs using Protocol Buffers to efficiently pack and transmit data, making it ideal for responsive websites and apps.



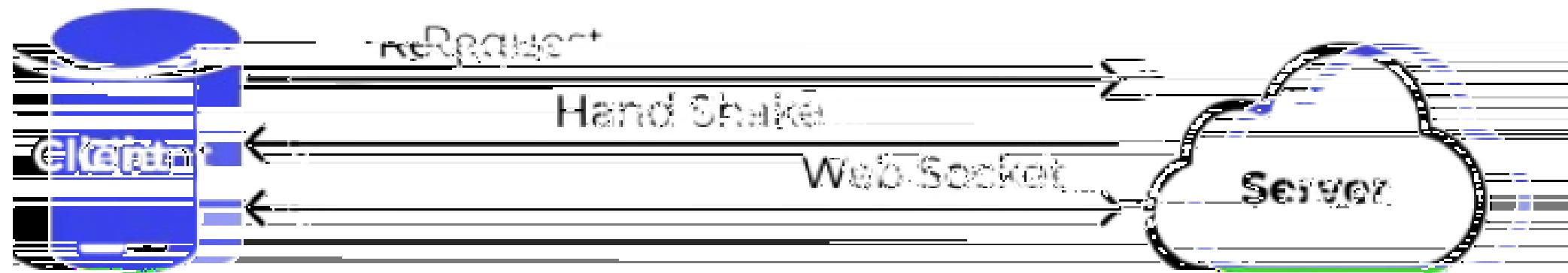
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13. WebSocket

4/11

WebSockets enable websites and servers to have quick, two-way conversations, making them ideal for instant messaging, online gaming, and other applications that require immediate responses and updates.



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14. Structured Query Language (SQL)

5/11

SQL, or Structured Query Language, is used for managing and manipulating relational databases. It allows you to create, retrieve, update, and delete data from databases, making it essential for storing and retrieving information in various software applications, from websites to business systems.

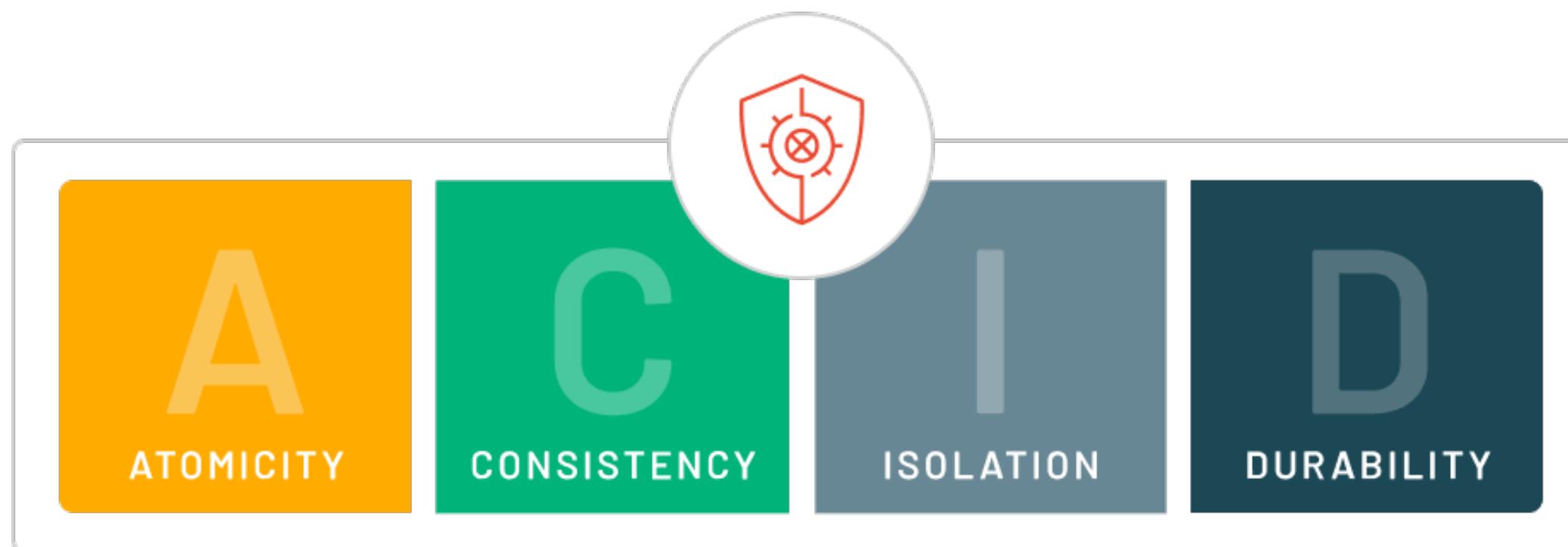


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ACID is a set of rules that make sure database transactions work reliably:

- **Atomicity:** Transactions are like a switch; they either fully complete or leave no trace.
- **Consistency:** Data always follows the rules, staying accurate.
- **Isolation:** Transactions operate independently, without interference.
- **Durability:** Completed changes are permanent, surviving system failures.



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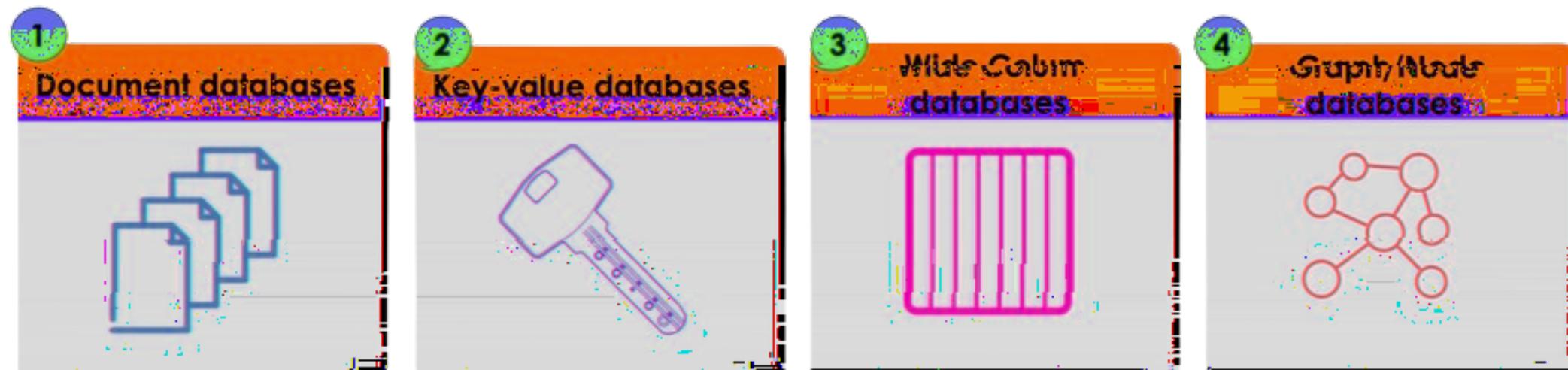
16. NoSQL

7/11

NoSQL databases are a type of database management system designed for flexible and scalable data storage, particularly well-suited for handling diverse, large-scale, and dynamic data.

They serve different data models and use cases:

- Document-oriented databases are suitable for content management.
- Key-value stores are ideal for web app caching.
- Column-family databases handle time-series data.
- Graph databases excel in social networks and recommendations.



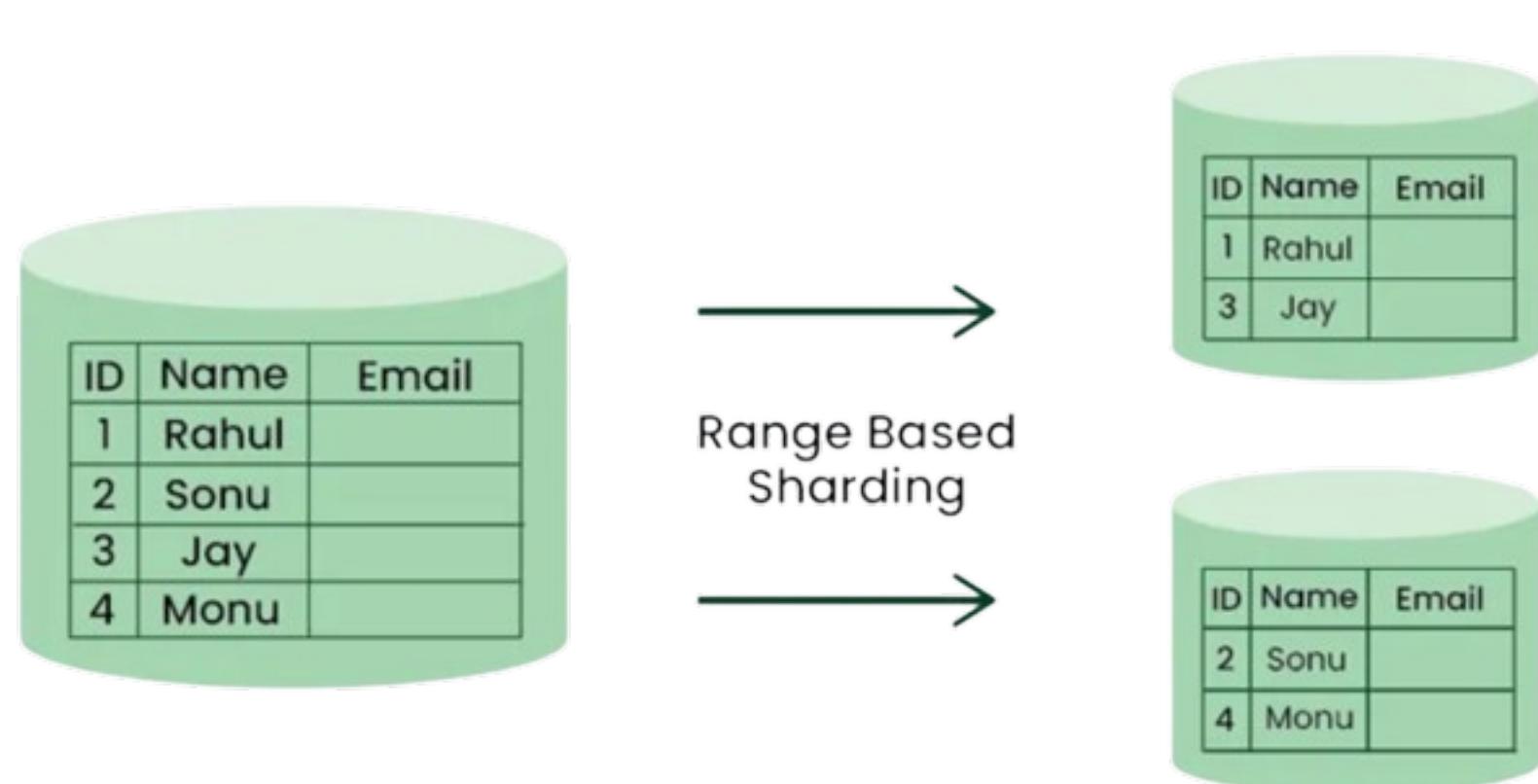
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17. Sharding

8/11

Sharding is a technique that divides a database into smaller, manageable parts stored on separate servers, improving scalability for distributed systems that handle extensive data volumes and access patterns efficiently. Benefits include enhanced performance, reduced query response times, and the ability to handle large-scale data growth.



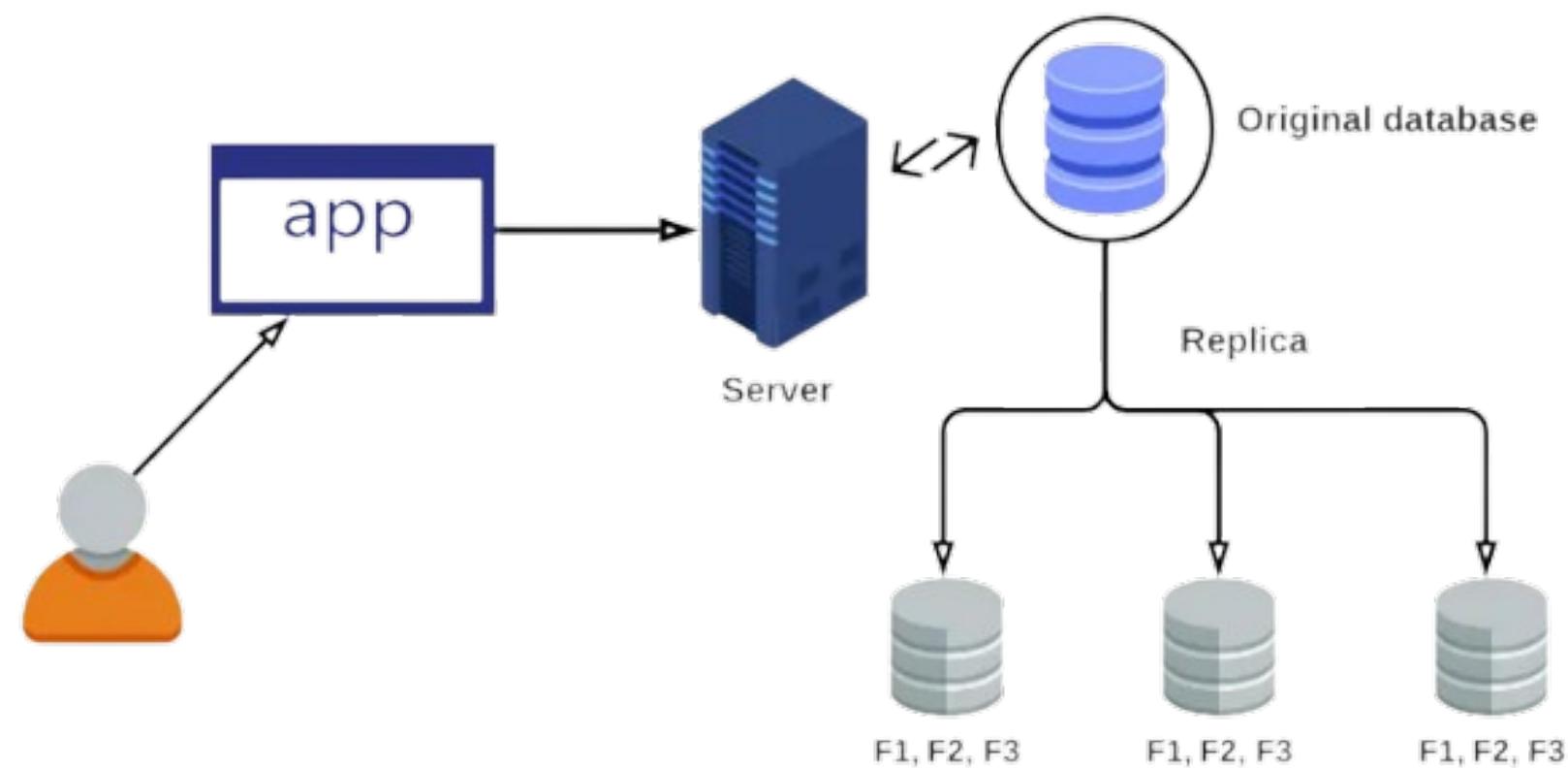
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18. Replication

9/11

Replication is a database strategy that duplicates data across multiple servers or nodes, providing benefits such as improved data availability, fault tolerance, and enhanced read performance in distributed systems.



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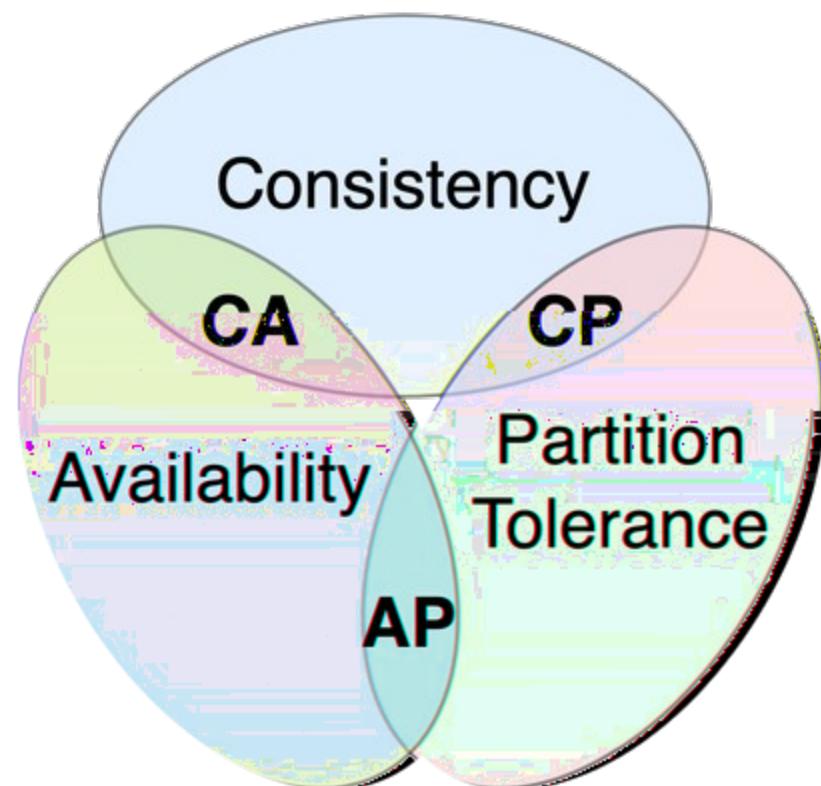
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19. CAP theorem

10/11

The CAP theorem says that in a distributed system, you can't have perfect consistency, availability all the time, and handle network issues at once; you have to prioritize one or make trade-offs.

1. **Consistency and Availability (CA)**: A traditional bank's ATM ensures your balance is always correct (consistent), but if it loses connection, it might not allow transactions (unavailable).
2. **Consistency and Partition Tolerance (CP)**: A flight booking system maintains consistent seat data, but during network issues, you can't book seats (unavailable).
3. **Availability and Partition Tolerance (AP)**: Social media platforms like Twitter prioritize availability; you can tweet even if you don't immediately see all others' tweets (not strictly consistent)



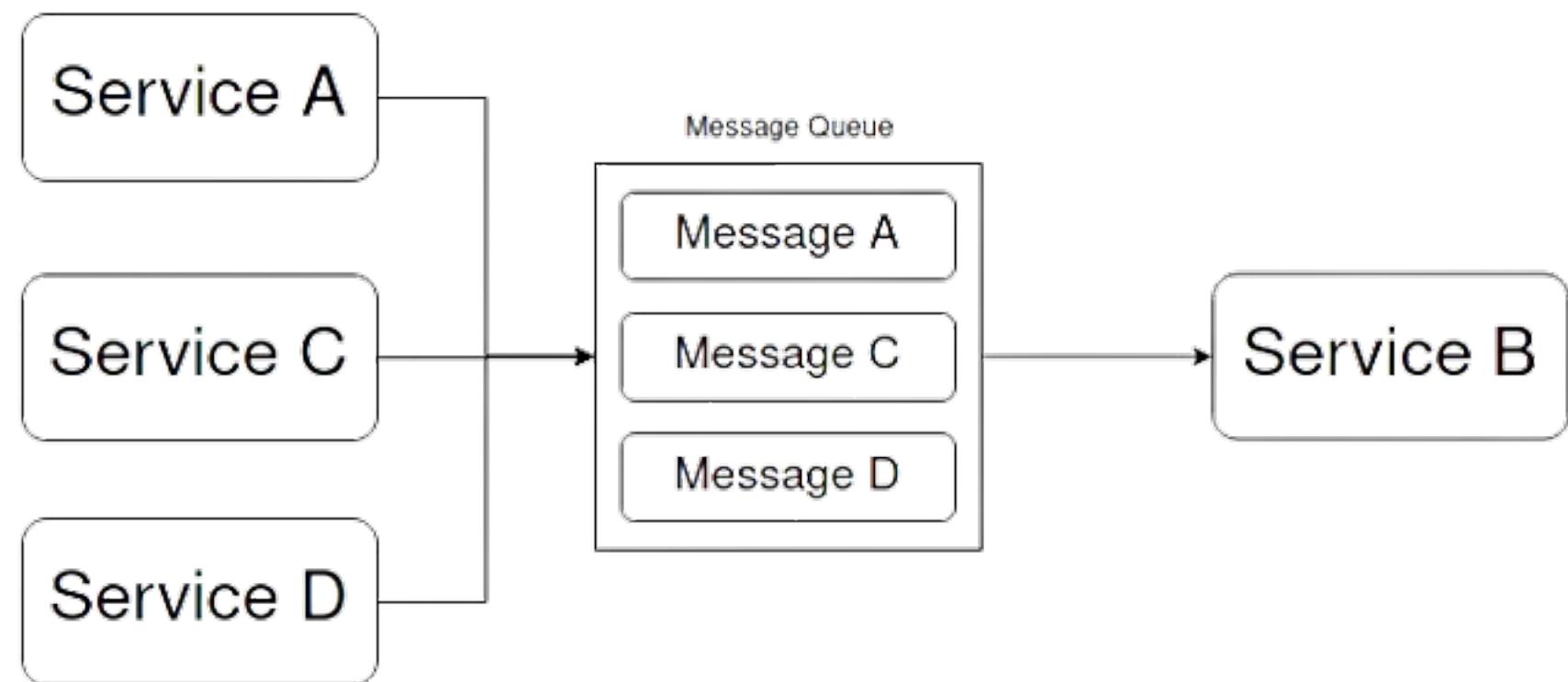
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20. Message queue

11/11

A **message queue** is a digital waiting line for messages, improving communication and processing in systems. For instance, in a chat application, when you send a message, it's placed on the board, and the other person picks it up to read and respond, ensuring messages are delivered and processed in order.



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