



Methods and tools for the development of Design database for a bank app

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Abstract

the banks have a thirty terabytes of information that grows fifteen percent per year, and this data have to be secure, easy to found and show. that´s the reason to have a simple, fast and scalable database, protecting the documentation, and thinking in the future with the reduction of redundancy for less cost in vane for this type of archive

Introducción

Since the creation of databases in 1884, significant advancements have been made to ensure data safety and integrity. This is particularly crucial for financial records, where data loss or incorrect modifications can have severe consequences. In the era of the internet, the demand for immediacy requires processing times in the thousandths of seconds to efficiently manage finances.

Modern information systems use data description tables to enhance data independence, allowing changes in data representation without disrupting application programs, although this flexibility remains somewhat limited . Understanding Relational Algebra (RA) can significantly improve query performance by optimizing SQL query execution **McMaster2012**. Additionally, the Entity-Relationship (ER) model and JSON files facilitate data order and security while enabling seamless communication between backend and frontend systems.

Methodology

use the user stories for begin to found a pattern between the entities and functions or actions, see various names of objects , persons o entity that repeat and identify her attributes. in this case was necessary to create it because there aren´t client, thinking in the security was important use a transaction code to verify the identity of the user. Also will be possible see the client who owe a lot of money to have a report of debt. thinking and making an exam of the requirements extract the limits of the database, thinking in only the internal system, or if this system can be connected to other banks, do actions like transaction to another bank. using the 10 steps ontology to create the MER it´s easy to identify the relations, attributes and needs of the database with the base of the user stories with the operators of RA, its a way to test the results and

functionality of the diagram the diagram ans the user stories make it more easy to do this task, and with the triggers and functions

Results

The generated result presents a simplified diagram using a semantic and client-oriented vocabulary. This is crucial for review purposes, especially when involving stakeholders who may provide additional data, suggest new functionalities, or require specific queries for analysis. By employing relational algebra, a universal language closely related to database management, the aim is to better understand the purpose behind their requirements.

1.project the date and account of movements of user whose name is Pedro ,before April 9,2024:

$$\Pi_{date,amount}(\sigma_{date < "April 9, 2024"}(Movement\ history) >) \\ \cap (\sigma_{name = "Pedro"}(user))$$

Most of these queries are essential for clients to access, particularly the transaction records sorted chronologically by date. This necessity drove the decision to automate and insert them into a trigger. The trigger is activated whenever a new transaction occurs and updates periodically on an hourly basis.

```
CREATE VIEW productos_Luisa AS
SELECT fProduct.id, fpType.name AS 'Type name', mHistory.name AS 'History name', mHistory.date
FROM financial_product fProduct
INNER JOIN users usr ON usr.id_number = fProduct.user_fk
INNER JOIN financial_product_type fpType ON fpType.id = fProduct.status_fk
INNER JOIN movement_history mHistory ON mHistory.financial_product_fk
WHERE usr.name = 'Luisa'
GROUP BY fProduct.id, fpType.name, mHistory.name, mHistory.date;

SELECT * FROM productos_Luisa;
```

In the process of writing queries, it was possible to find tasks necessary to obtain a report or update depending on specific actions, for this reason it was decided to implement triggers and automate with functions, to obtain reports. Another decision was to implement the use of fast APIs to make it easier to enter additional data, thinking about the scalability of the database, making it more efficient to have multiple requests without losing performance and implementing a connection with any programming language.

```
{
  "productos_luisa": [
    {
      "id": 5,
      "Type name": "Savings account",
      "History name": "Deposit",
      "date": "2024-06-11T17:58:16"
    },
    {
      "id": 5,
      "Type name": "Savings account",
      "History name": "Withdrawal",
      "date": "2024-06-11T17:58:16"
    },
    {
      "id": 5,
      "Type name": "Savings account",
      "History name": "Transfer",
      "date": "2024-06-11T17:58:16"
    },
    {
      "id": 5,
      "Type name": "Savings account",
      "History name": "Payment",
      "date": "2024-06-11T17:58:16"
    },
    {
      "id": 5,
```

Discusion

The results obtained demonstrate that the developed system can effectively manage SQL queries and the ER model, providing accurate and useful data for decision making. the method shows that the RA, the different decisions and methods was necessary to achieve the goals