# Part C: Research Question

## Data of COVID-19 vaccine online booking system records

From the instruction of the system, the system records the person information such as :(1) First name; (2) Middle name; (3) Surname; (4) Gender; (5) Date of birth; (6) Are you Aboriginal and/or Torres Strait Islander; (7)Medicare number, including the reference number to the left of your name; (8) preferred language; (9) Country of birth; (10) Ethnicity; (14) Address; (15) mobile; (16)confirm mobile phone; (17) Emall; (18) Classification;

And records the person’s emergency contact information: (11) Emergency contact name; (12) Emergency contact relationship; (13) Emergency contact mobile;

And records the person’s important issues of allergies and vaccine, etc, such as: (19) Do you have any serious allergies, particularly anaphylaxis, to anything, or carry or have been prescribed an adrenaline autoinjector (EpiPen)? (20) Have you had an allergic reaction after being vaccinated before? (21) Have you had a COVID-19 vaccination before?(22) If yes, which vaccine product did you receive? (23) If yes, what was the date of your previous COVID-19 vaccination? (24) Where would you like to be vaccinated?

Besides, the system also record the date period of person prefers to take vaccination, such as: (25) Show times from; (26) show time to; (27) Vaccination centre location; (28) Date and Time.

## Two main database solutions to store the data

Traditional relational database and no-SQL database are two different types of data storage methods. In the current IT technology development process, both have played a very important role.

Traditional relational databases store data in the form of tables such as Oracle, MySQL, SQL Server, etc., it stored data in the rows and columns of the table. [标注 Database Management Systems] In the above business scenario, it is necessary to store the user's personal information and related other information, vaccination information, planned vaccination information in the web system. The stored data is structured.

The following is a solution to the above business scenarios using relational databases, I designed Person, Emergency Contact, Allergies, Vaccinated Allergies, COVID-19 vaccinate and Booking COVID-19 vaccinate 6 entities.

Person (Person ID, First name, Middle name, Surname, Gender, Date of birth, Is Islander,Medicare number, preferred language, Country of birth, Ethnicity, Address, mobile, Emall, Classification)

Emergency Contact (Person ID, Emergency contact name, Emergency contact relationship, Emergency contact mobile)

Allergies (Person ID, allergy)

Vaccinated Allergies (Person ID, vaccination, receive date)

COVID-19 vaccinate (Person ID, vaccinate date, vaccinate address)

Booking COVID-19 vaccinate (Person ID, Show times from, show time to, Vaccination centre location, Date and Time)

No-SQL database is usually used to store semi-structured or unstructured data. Take MongoDB as an example. MongoDB is a document-oriented data storage product. The supported data structure is similar to json format data. It does not need to design the table structure first and is easy to expand.【标注 mongodb in action】

The following is a solution to the above business scenarios using mongoDB databases, the form of data is like json fromat.

**{**

**"First name"**: ""**,**

**"Middle name"**: ""**,**

**"Surname"**: ""**,**

**"Gender"**: ""**,**

**"Date of birth"**: ""**,**

**"Is Islander,Medicare number"**: ""**,**

**"preferred language"**: ""**,**

**"Country of birth"**: ""**,**

**"Ethnicity"**: ""**,**

**"Address"**: ""**,**

**"mobile"**: ""**,**

**"Emall"**: ""**,**

**"Classification"**: ""**,**

**"Emergency"**: **[**

**{**

**"Emergency contact name"**: ""**,**

**"Emergency contact relationship"**: ""**,**

**"Emergency contact mobile"**: ""

**}**

**],**

**"Allergies"**: **[ ],**

**"Vaccinated Allergies"**: **[**

**{**

**"vaccination"**: ""**,**

**"receive date"**: ""

**}**

**],**

**"COVID-19 vaccinate"**: **[**

**{**

**"vaccinate date"**: ""**,**

**"vaccinate address"**: ""

**}**

**],**

**"Booking COVID-19 vaccinate"**: **{**

**"Show times from"**: ""**,**

**"show time to"**: ""**,**

**"Vaccination centre location"**: ""**,**

**"Date and Time"**: ""

**}**

**}**

## Traditional relational database systems and no-SQL database systems

The main difference between traditional relational database systems and no-SQL database systems lies in the way the data is stored. Relational data is stored in rows and columns based on a two-dimensional table. Data tables have pre-defined structures (column definitions). The structure describes the form and content of the data.[标注数据库系统概念] This is very important for data modeling. Although the predefined structure brings reliability and stability, it is difficult to modify these data but it easy to extract data.

In contrast, the way No-SQL databases store data is not two-dimensional tables, but semi-structured, and the format is more flexible, the data structure is not fixed, and it is easy to modify the data structure.[标注 nosql ]

For data storage in traditional relational databases, for higher standardization, the data is divided into the smallest relational tables to avoid duplication and to obtain streamlined space utilization. Although the management is very clear, data management becomes a bit cumbersome when a single operation is designed to multiple tables. 【数据库系统概念】However, Nosql data is stored in a flat data set, and the data may often be duplicated. A single database is rarely separated, but is stored as a whole, so that the entire block of data is more convenient to read and write.

When the data is very large, it need to consider the high concurrency possibility. The performance of traditional relational database need to improve computer performance. But the no-SQL database is naturally distributed, it can add more ordinary database servers to support higher concurrency.【mongodb，nosql 】

Traditional relational databases supports transaction, follows ACID (Atomicity, Consistency, Isolation, Durability), while Nosql databases follow the BASE principle (Basically Availble). Due to the strong data consistency of the relational database, the support for transactions is very good. Relational databases support fine-grained control of transaction atomicity and are easy to roll back transactions.【数据库系统概念】

## Conclusion and recommendations

Based on the above discussion and combined with the business scenarios of the COVID-19 vaccine online booking system, the relational database has the ability to store relevant business data and can provide good support for the web display of the booking system. Therefore, it is recommended to choose to use traditional relational database. Firstly, the COVID-19 vaccine online booking system records data is displayed in the form of a form on a web page. It belongs to structured data, and the storage structure of these data is defined in advance, so it is more appropriate to use a relational database. In addition, the data displayed through the web page is obtained by querying the database. Compared with the No-SQL database, the relational database is more friendly to query data, so it is more inclined to use the relational database. In addition, due to the support of relational databases for transactions, it is more suitable to use relational databases in the COVID-19 vaccine online booking system for the data consistency.

## Reference

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