

Making Software Based on  
Human-Driven Design  
Case Study: SQL for non-experts

m5251108 HIDA Masataka

# Topics

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- Problems of SQL
- Benefits by this study
- Case Study: SQL for non-experts
  - Approach
  - Prototype design based on HDD
  - Visual SQL
  - Definition of words
- Future

# Introduction/Motivations

This study includes these contents

1. To think nerd impressions of computers
2. To break barriers in learning (case study: SQL and DB)
3. Comfortable Software

# Motivation 1/2

Programming has a nerd impression. Because of...

- Using a computer
- Hardware looks constructed from many difficult parts.
- Amount of text and messages / poor UI
- Complex Grammar, Rules, Regulations

# Motivation 2/2

## Barriers in learning

1. **Between general people and professional or computers**

For beginners, it takes a long time to get used to computer operations, professional terms, user interfaces.

(Related to nerd impressions)

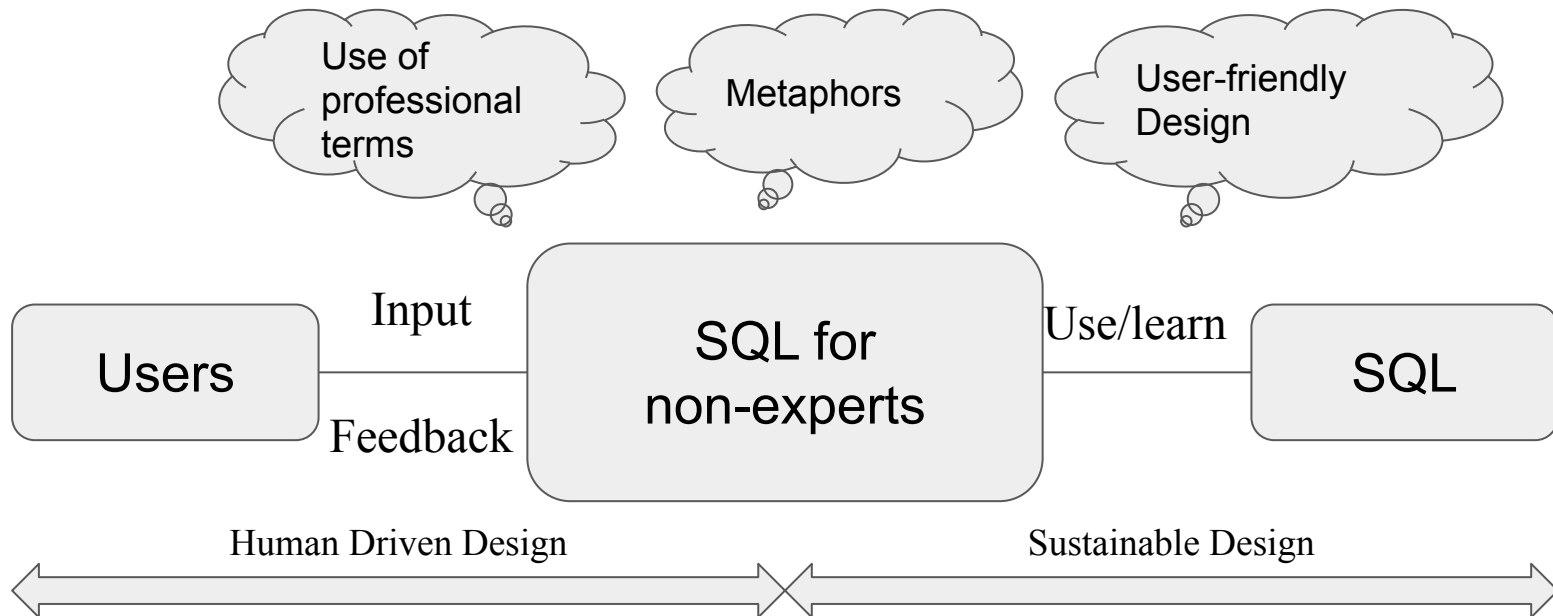
2. **In education**

Difficulties in learning of a teacher occur over and over among students.

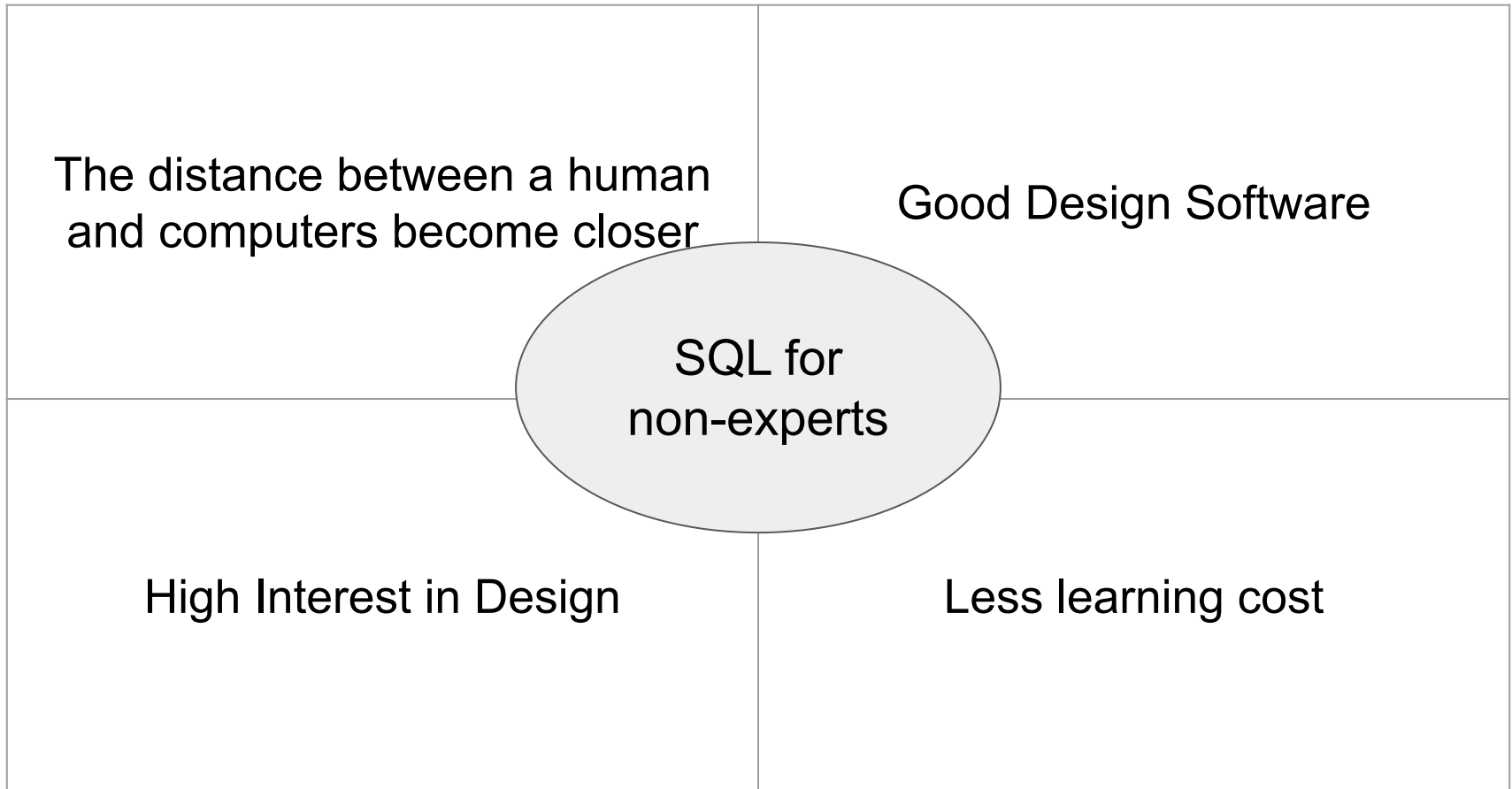
# Approach

To research and break the barrier, we use a case study:

## SQL for non-experts



# Benefits by this study



# Why SQL?

A. The concept of Database exists in both our daily life and programming fields. So that would be a bridge.

ex) A bookshelf , a refrigerator, a cabinet... in daily life

-> Beginners could use the software without recognition that they are using programming language.

-> Programmers and students could learn SQL and advanced database structure.



# Problems in people using database

## Non-experts and General people

- Their DB has redundancy among tables.

It would be difficult to understand for other people.

- If this situation occurs in a team development?

## Experts and Students

- It takes a high learning cost to teach/learn SQL
  - How to start
  - Key restrictions
  - Efficient database structure
  - Why it is efficient...

# Problems of SQL

- On a command line
  - If you make a wrong SQL sentence, it takes a time to re-write the SQL sentence.
  - If you show a view or a table, your commands and other views sometimes go away.
  - Then you re-input the past command again.

# **SQL with HDD (1/4)**

## **For more understandable and visual SQL...**

### **Human-Driven Design(HDD)**

A concept for interaction between human and computer.

HDD respects human values and needs.

By the concept of design, we try to find the solution of trouble in SQL learning.

# SQL with HDD (2/4)

<b>The human and social perspective</b>	<b>Participation</b>
<b>Responsibility</b>	<b>Sustainability of Design</b>

# SQL with HDD (3/4)

<p><b>The human and social perspective</b></p> <p>“HDD promotes a human perspective on technology design in profound way”</p>	<p><b>Participation</b></p> <p>“HDD seeks users’ active, co-creative involvement throughout the design plan”</p>
<p><b>Responsibility</b></p> <p>”HDD goes beyond the design of products and systems to the well-being of people and sustainability.”</p>	<p><b>Sustainability of Design</b></p> <p>“Present sustainable development meets the needs of the present without compromising the ability of future generations to meet their needs”</p>

# SQL with HDD (4/4)

<p><b>The human and social perspective</b></p> <p>People can use SQL without a recognition that it is SQL. Like it is one of things in our everyday life.</p>	<p><b>Participation</b></p> <p>Difficulties and problems raised by SQL users are helpful factors to think SQL ex) students</p>
<p><b>Responsibility</b></p> <p>Contribution to database field through learning SQL knowledge</p>	<p><b>Sustainability of Design</b></p> <p>They can use the system with less stress following their learning levels</p>

# Case Study: To design SQL for non-experts

Following concepts of design, HDD, and other factors, we reconsider the design of SQL for non-experts

- Labeling stakeholders
- GUI with
  - User-Friendly Feedback
  - Metaphor
  - Query by Object(QbO)
  - Database structure view
- Definition of words / Our recognition

# Case Study: To design SQL for non-experts

## Labeling 1/6

Reasons to group stakeholders

- To make clear who is the target.
- To think about what function the software is needed.

Level	notes
1	Non experts General
2	Non experts Students
3	Experts Students
4	Experts Database masters



# Case Study: To design SQL for non-experts

## Labeling 2/6

- Level 1: Perfectly new to SQL.
  - All function are needed but they might be not familiar with computers.

Level	notes
1	Non experts General
2	Non experts Students
3	Experts Students
4	Experts Database masters

# Case Study: To design SQL for non-experts

## Labeling 3/6

- Level 2: New to SQL but have experience to use computer a little.
  - SQL suggestion
  - QbO
  - SQL Sentence Input Form

Level	notes
1	Non experts General
2	Non experts Students
3	Experts Students
4	Experts Database masters

# Case Study: To design SQL for non-experts

## Labeling 4/6

- Level 3: Students who have learned SQL by a course or a book.
  - Architecture View
  - Information about restrictions of attribute ex) NULL, Primary keys...

Level	notes
1	Non experts General
2	Non experts Students
3	Experts Students
4	Experts Database masters

# Case Study: To design SQL for non-experts

## Labeling 5/6

- Level 4: Database Master who use SQL as they want.
  - This level can use not only SQL but computers and other languages
  - They will use function for level 1-3 efficiently for themselves.

Level	notes
1	Non experts General
2	Non experts Students
3	Experts Students
4	Experts Database masters

# Case Study: To design SQL for non-experts

## Labeling 6/6

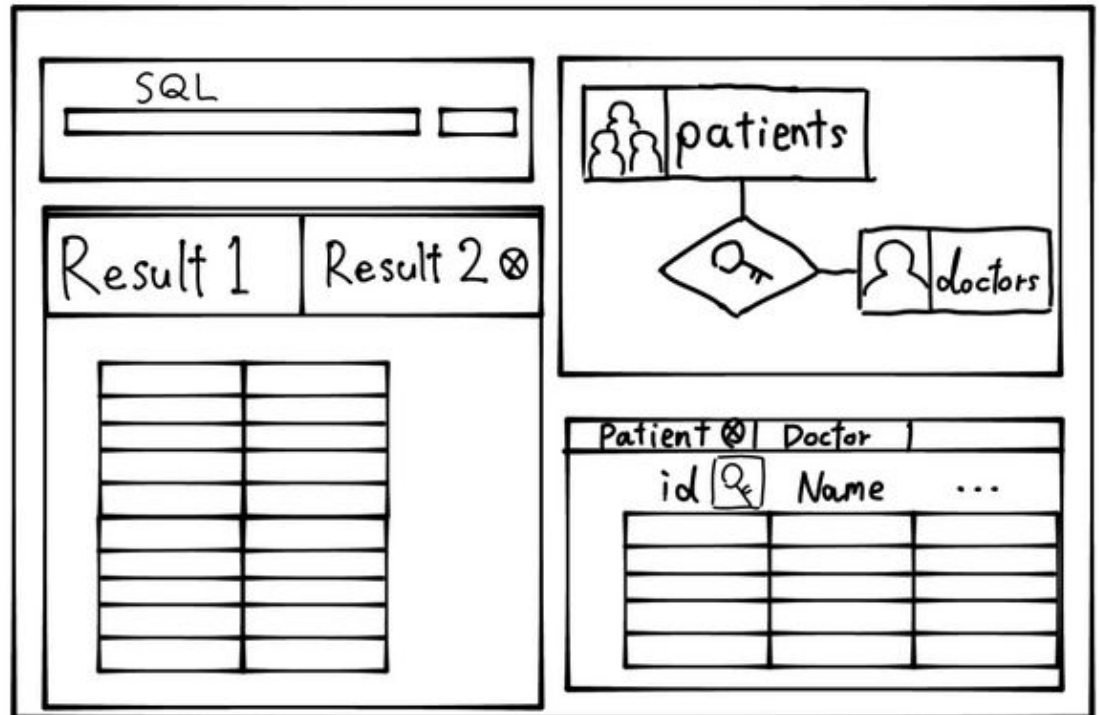
Basically, lower level people do not need higher level options.

Some function is still difficult for non-experts, but if the software has only the function for level 2, they do not use it because their purpose and process do not match and they do not have to use SQL. And such a software for too specific purpose will be waste. Redundancy of function will make opportunity to user improve their skills.

# Case Study: To design SQL for non-experts UI (With Database Structure View)

This window provides  
users database  
abstracts after  
importing unknown  
database file.

For Level 2-4

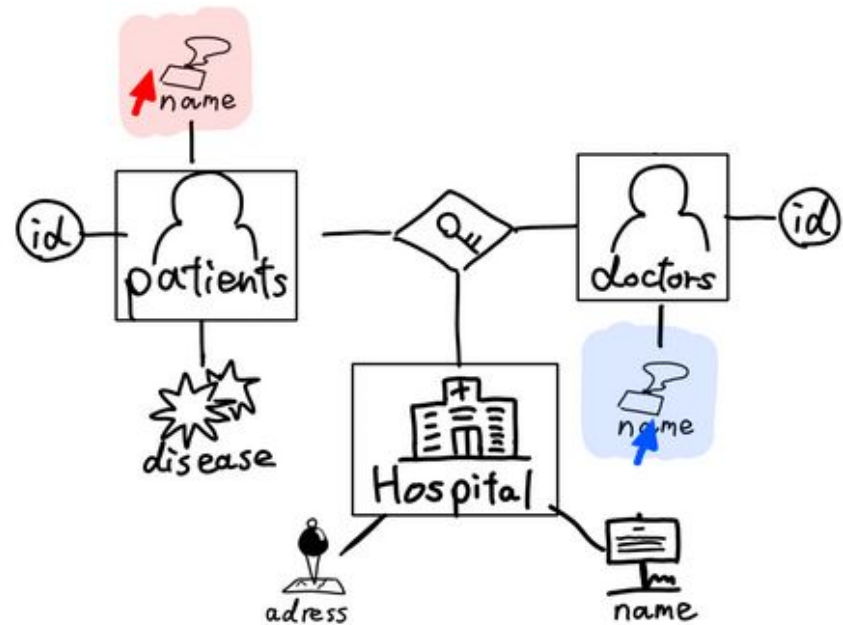


# Case Study: To design SQL for non-experts UI (QbO)

Graphical UI.

Because icons are generated based on attribute name, it is easy to know what existing on DB.

For level 1-4

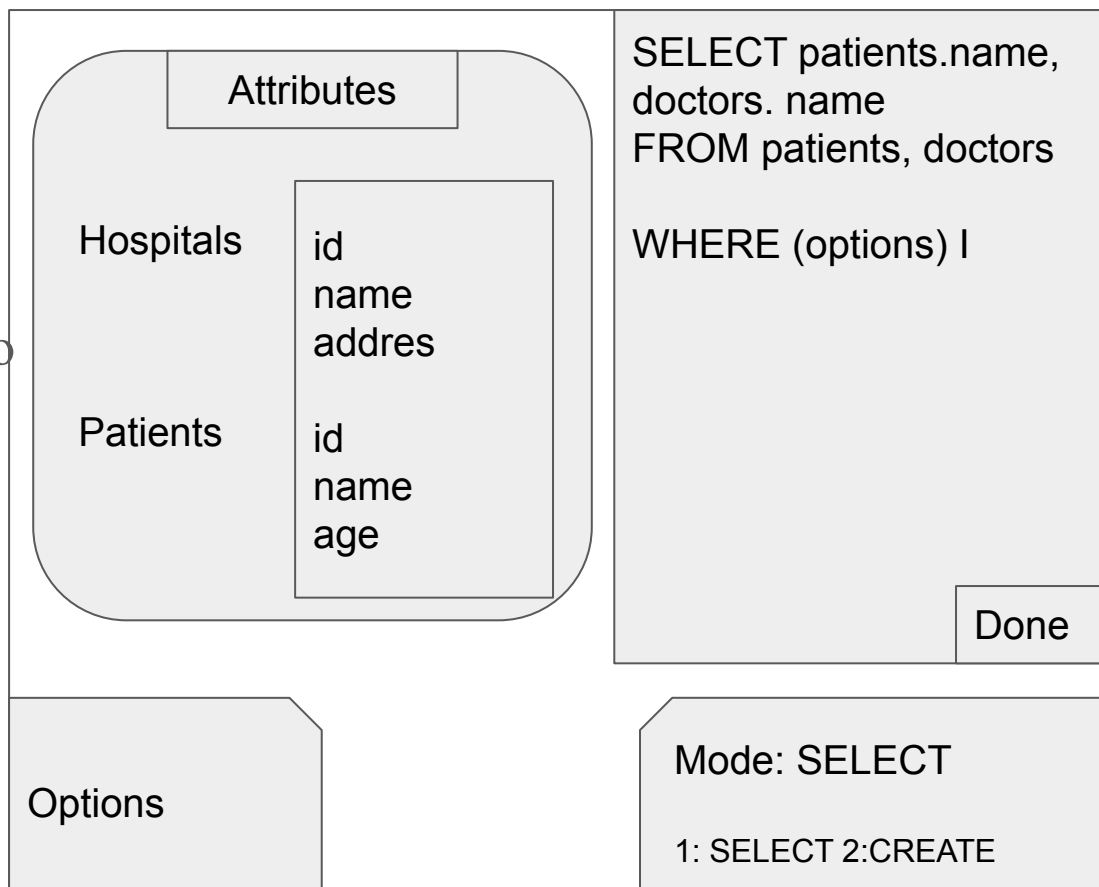


```
SELECT patients.name, doctors.name  
FROM patients, doctors  
WHERE ...
```

# Case Study: To design SQL for non-experts UI (Generating SQL sentence)

For level 2-4

Attributes windows will change corresponding to your mode.



In each window, a mouse pointer will change and it means what user can do



# Case Study: To design SQL for non-experts UI (Generating SQL sentence) 2

In the  
case with  
QbO.

Attributes

```
graph TD
    patients[patients] --- Q{Q}
    doctors[doctors] --- Q
    patients --- disease((disease))
    Hospital[Hospital] --- address[address]
    Hospital --- name[name]
```

SELECT patients.name,  
doctors. name  
FROM patients, doctors  
WHERE (options) |

Done

Options

Mode: SELECT  
1: SELECT 2: CREATE

# Definition of words

For generals, some terms do not work as metaphor for the professional meaning.

That is the reason why misunderstandings and barriers occurs.

ex) Smart Design: What is smart?

# Definition of words example

Ex) Attribute (Column in SQL)

This word sometimes ambiguous and non-experts do not understand. Why is “element name” not good?

Ex) Field (in database)

One cell in an Excel spreadsheet. But field has an impression of “space”

# Future

- To Create prototype
- More research about...
  - User-friendly design
  - Balance of usage of terms

# Conclusion

It is ideal to use professional skills and difficult thing without the recognition that it is difficult.

Individuals' high interest in design makes everything clear.

As a result, misunderstandings and waste conflicts would be reduced.

With HDD, software should be considered about sustainability of design.

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