



# AGENDA

01

## DEFINITION + INTENT

- What is this pattern?
- Why it is useful?

02

## MOTIVATION

- A real-world problem that we are facing

03

## NAIVE SOLUTION

- How to solve it traditionally

04

## SOLUTION

- How to solve it with iterator pattern

05

## PROS + CONS

- What are the advantages?
- What are the disadvantages?

06

## APPLICABILITY

- Is there any key word to indicate when to use it?

07

## OTHER REAL-WORLD PROBLEM

- Is there any key word to indicate when to use it?

08

## COMBINED PATTERN

- Which pattern can go with the iterator pattern?

09

## QUIZ

- What should be remembered after all?

# DEFINITION & INTENT

- A behavioral design pattern
- Allow users to traverse the element of a collection without knowing it's data structure

To provide a way to access the elements of an aggregate object sequentially without exposing its underlying representation.

(Gang of Four)





# MOTIVATION

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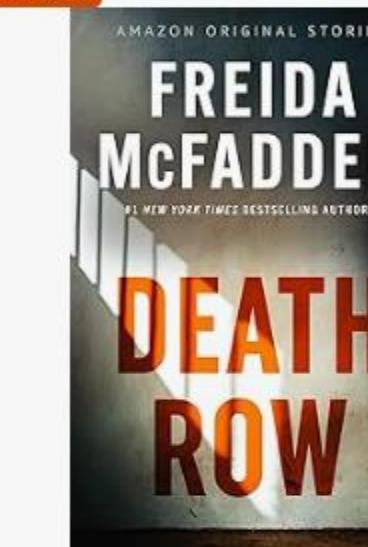
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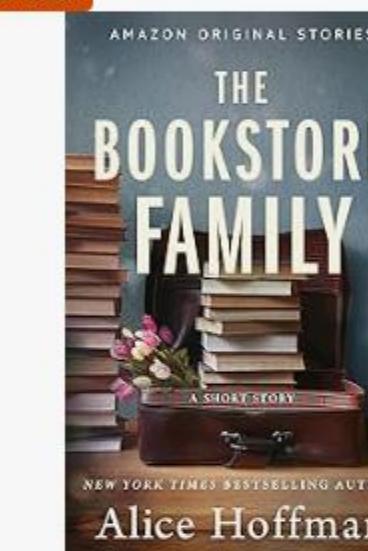
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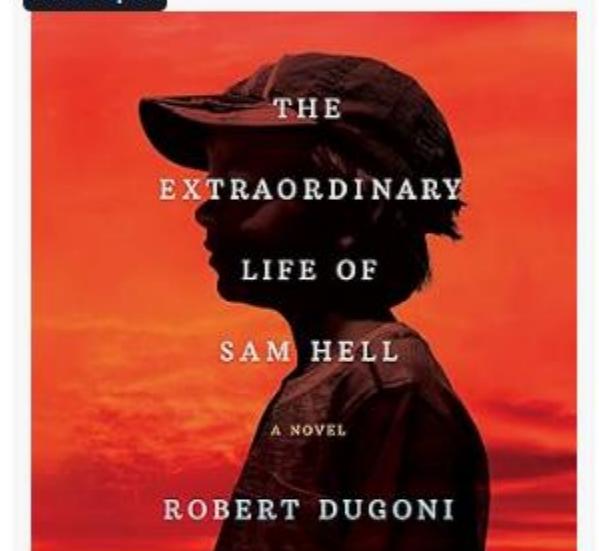
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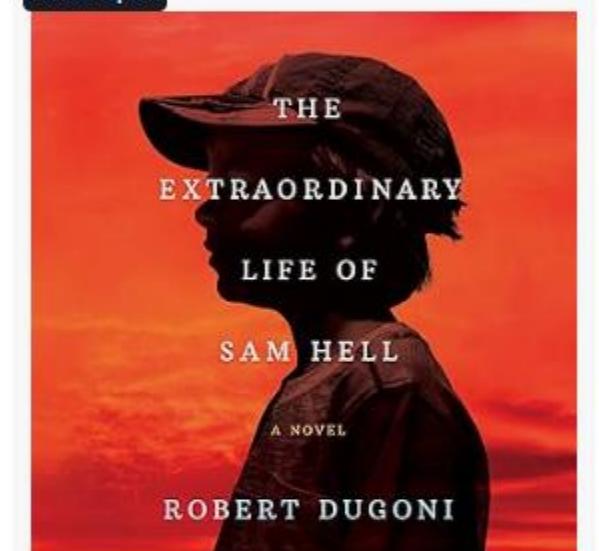
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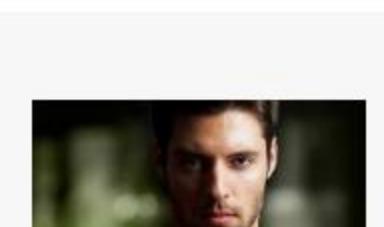
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**Color** Black

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**Form Factor** Over Ear

**Noise Control** Sound Isolation

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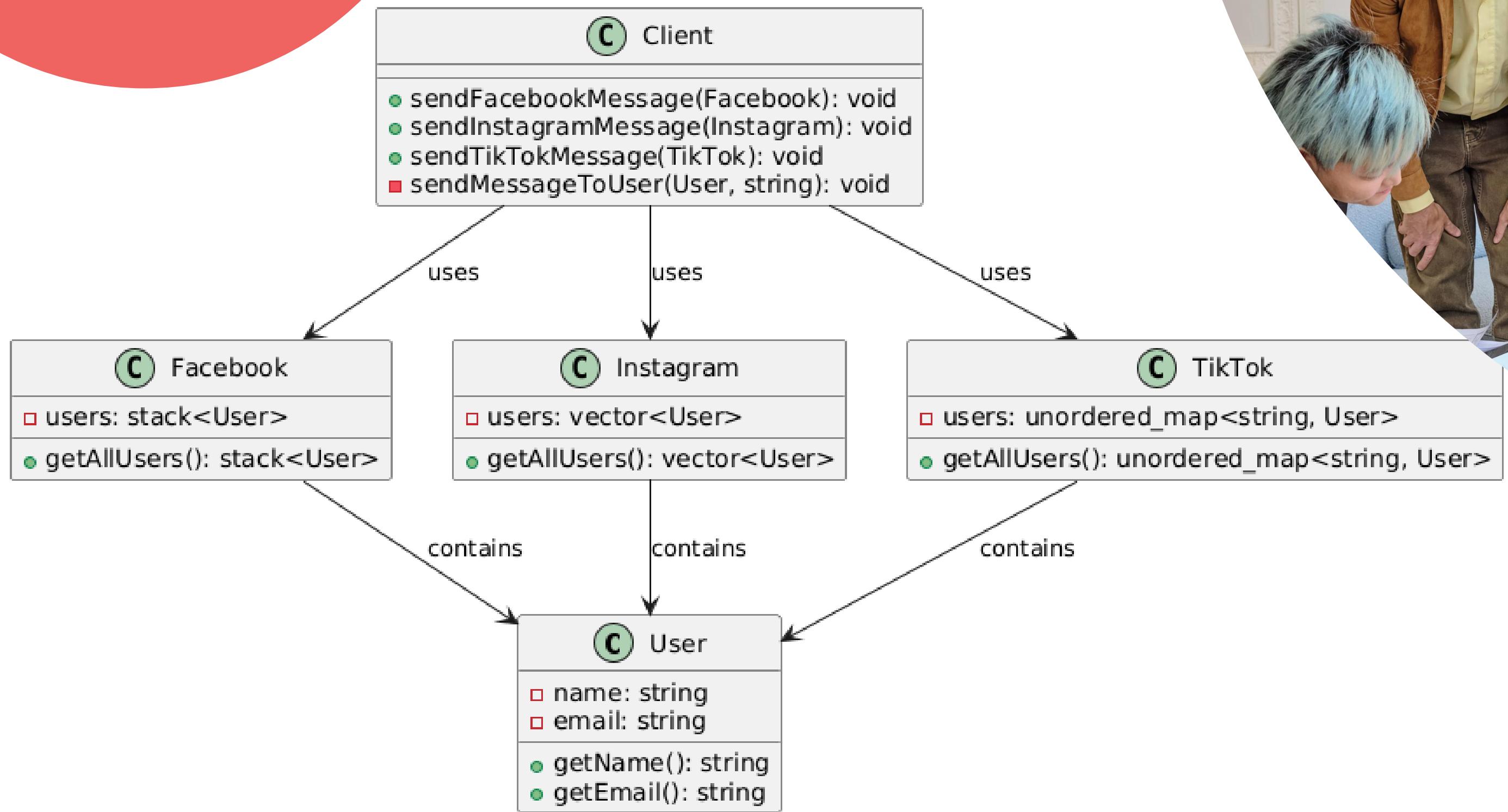
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# NAIVE SOLUTION



# NAIVE SOLUTION

**Class Client handles two different jobs**

1. Sending messages, core business logic
2. Know how to traverse properly

**Class Client depends on different types of data**

1. Different ways to store data
2. Duplicated traversal logic
3. Need a lot of effort in terms of updating



# SOLUTION

1. The idea of the code
2. A diagram for this case
3. A general diagram for all cases
4. How to implement
5. Pros and cons



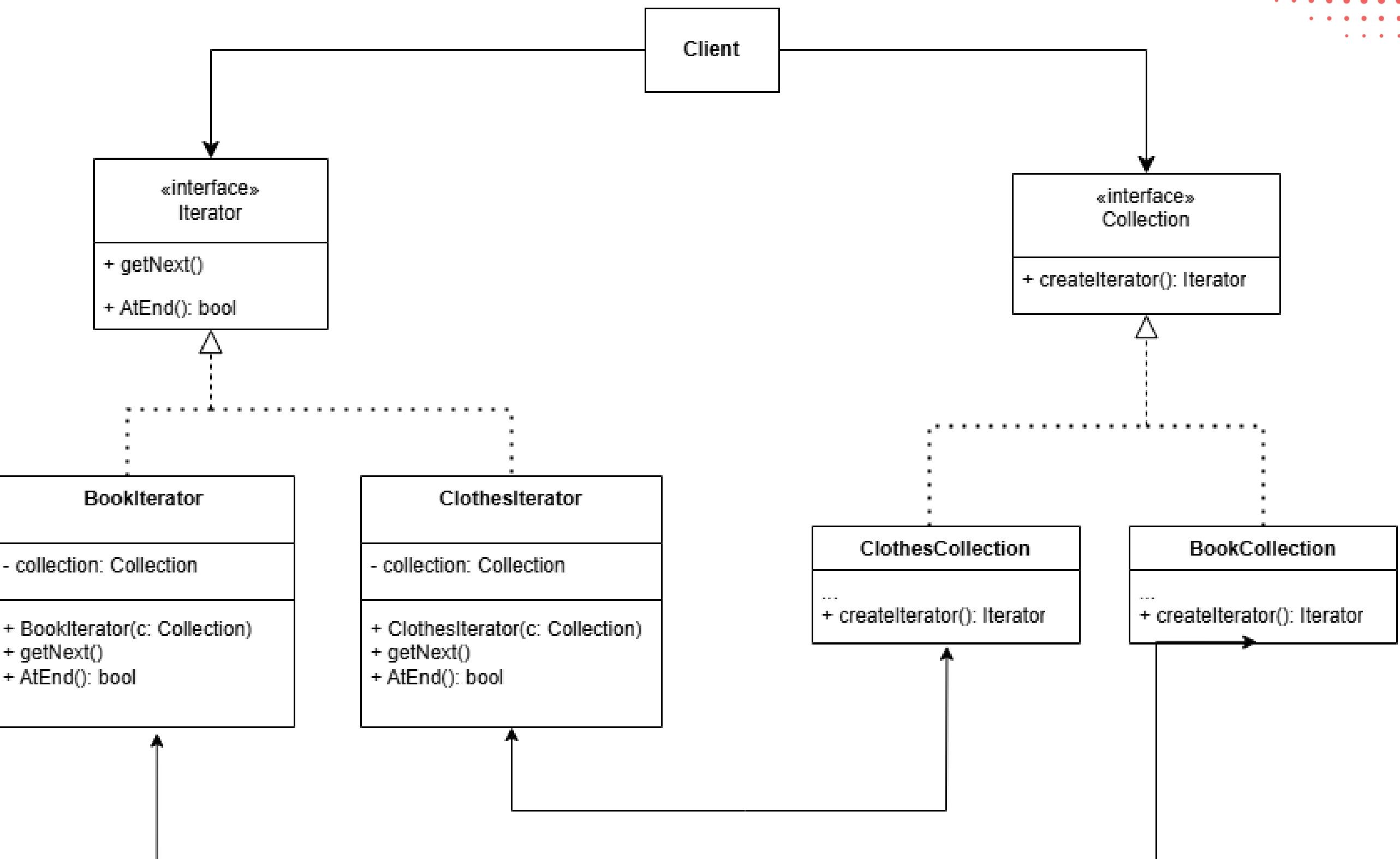
# SOLUTION



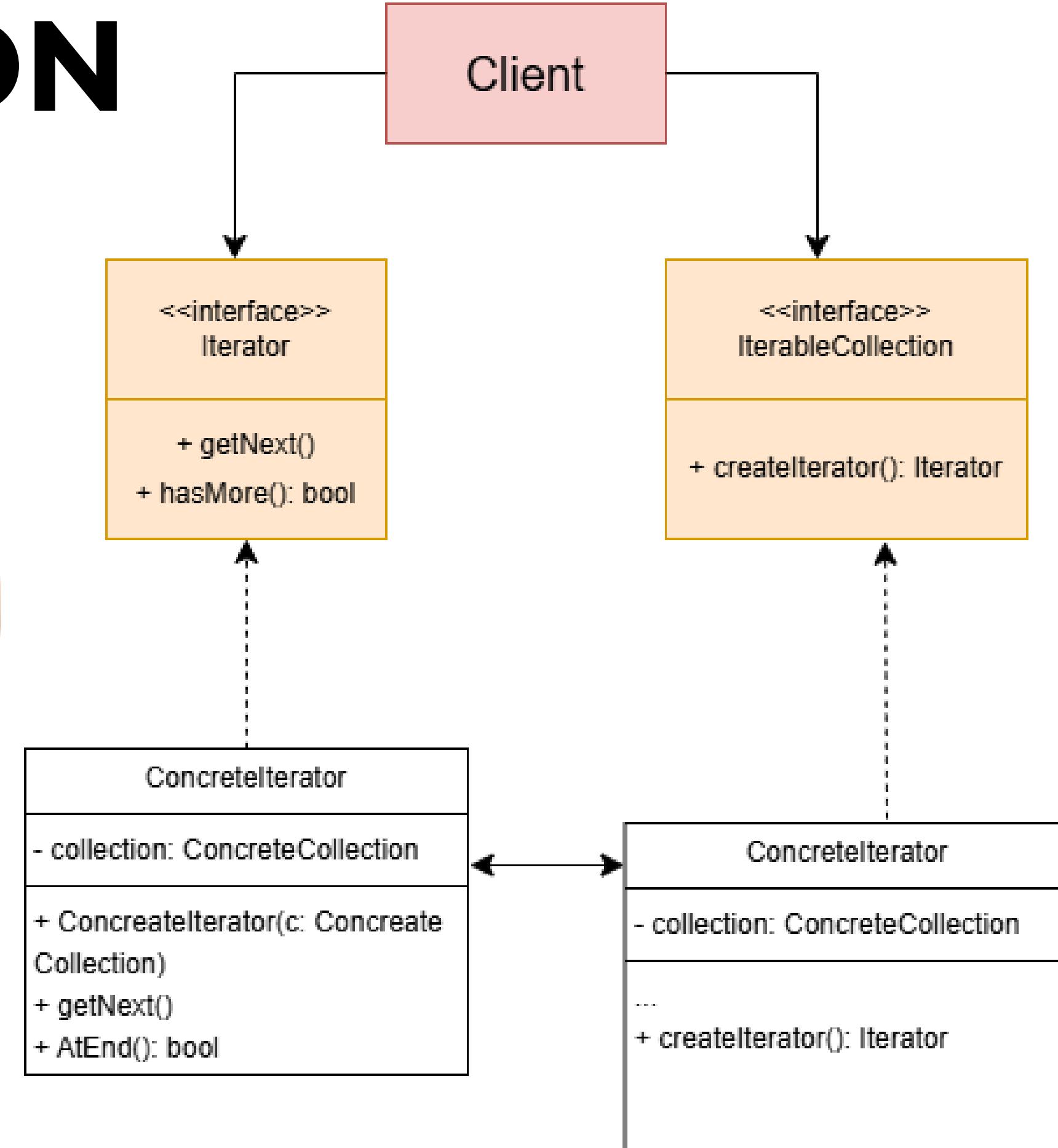
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# SOLUTION



# SOLUTION



# SOLUTION

## Useful when

1. Encapsulate the details of complex data structure
2. Traverse different data structures

## Avoid when

1. Data structures are simple
2. Using iterator costs more than naive solution



# SOLUTION

## Advantages

1. Single Responsibility
2. Open/Closed

## Disadvantages

1. Overkill for simple collections
2. Efficiency overhead



# APPLICABILITY

## Complex data structure

- Hide complexity from clients
- Show simple methods only

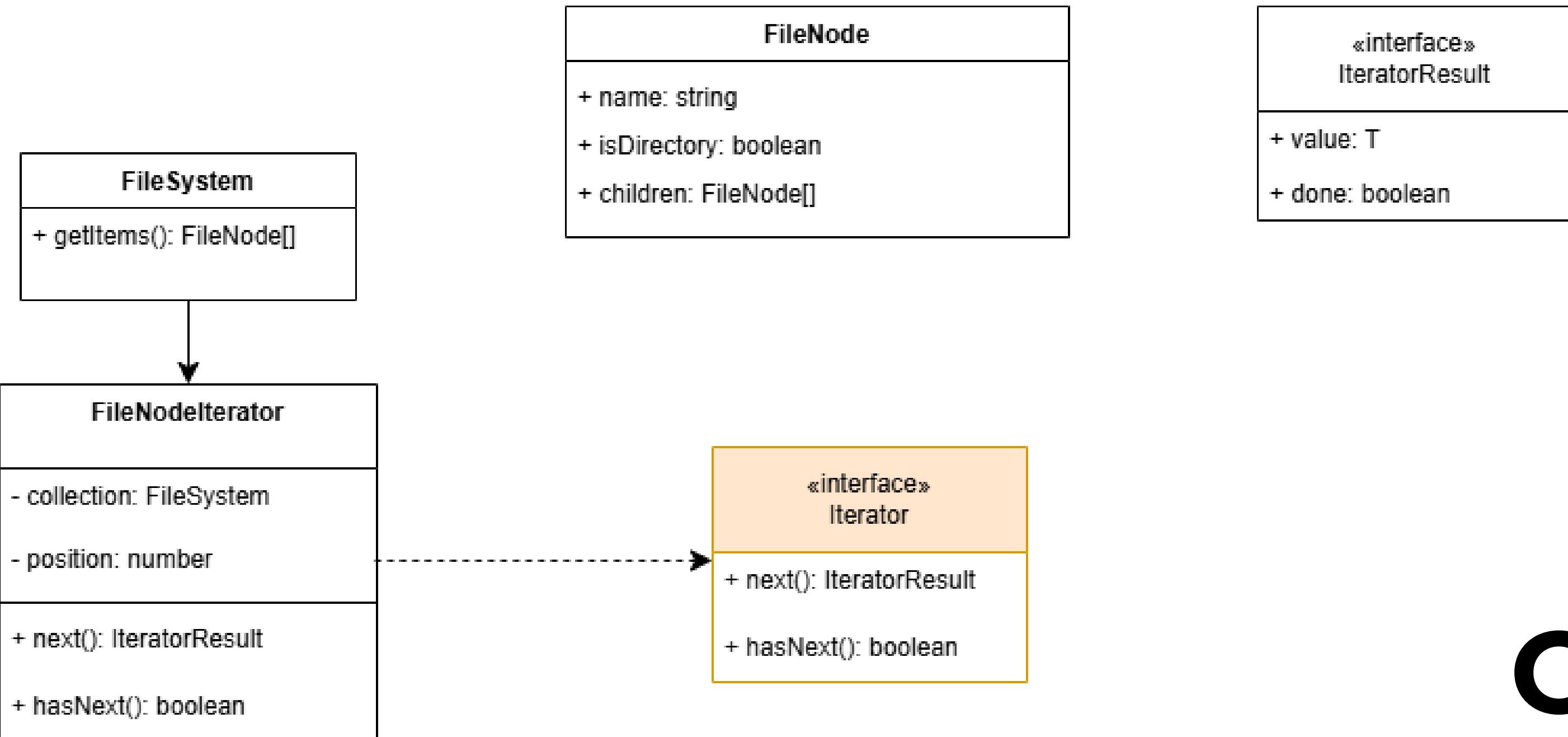
## Traverse in multiple ways

- Reduce time and effort
- Cleaner and leaner code

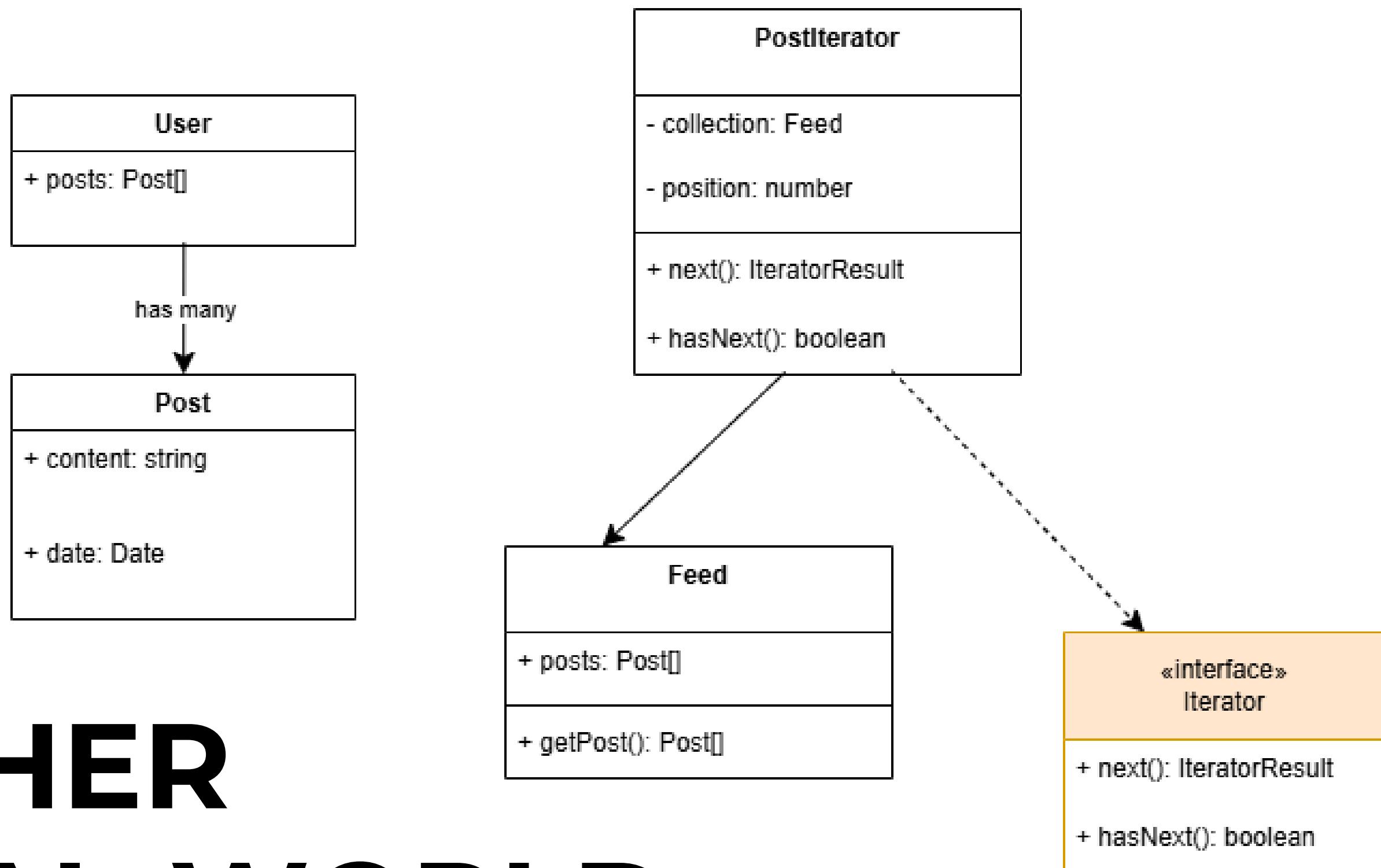
## Traverse different data type

- Traverse uniformly
- Easy to add new features





**OTHER  
REAL-WORLD  
PROBLEM**



# OTHER REAL-WORLD PROBLEM

# COMBINED PATTERN



## Composite + Iterator

- Composite: Used in building tree structure
- Iterator: Handle the traversal



# COMBINED PATTERN

## Factory Method + Iterator

- Iterator: Handle the traversal
- Factory method: create different ways by creating specific objects

```
// Ask the factory for the type of
// iterator
BookIterator *it =
library.createIterator("reverse");
```



# COMBINED PATTERN

## Visitor + Iterator

- Visitor: separate algorithm -> perform action
- Iterator: traverse through each element

# QUIZ

What is the main purpose of the Iterator design pattern?

- A. To add new behaviors to objects dynamically
- B. To traverse elements of a collection without exposing its structure
- C. To create families of related objects
- D. To encapsulate operations as objects



# QUIZ

Which of the following is NOT a benefit of using the Iterator pattern?

- A. Hides the internal structure of the collection
- B. Allows multiple traversals
- C. Improves collection performance
- D. Simplifies client code for traversal



# QUIZ

Which of the following is NOT a benefit of using the Iterator pattern?

- A. Hides the internal structure of the collection
- B. Allows multiple traversals
- C. Improves collection performance
- D. Simplifies client code for traversal



# QUIZ

In which situation would an Iterator pattern be least appropriate?

- A. You want to traverse elements of a tree
- B. You need to apply multiple traversal strategies
- C. You're using a single simple array for one-time iteration
- D. You want to avoid exposing collection internals



# QUIZ

How does Iterator relate to the Composite pattern?

- A. Iterator replaces the Composite pattern
- B. Iterator adds dynamic behavior to Composite
- C. Iterator allows traversal of Composite structures uniformly
- D. Iterator provides undo functionality for Composite objects



# QUIZ

What's the correct way to introduce a new traversal strategy (e.g., reverse) in the Iterator pattern?

- A. Modify the original collection
- B. Change the client logic
- C. Create a new iterator class implementing the same interface
- D. Rewrite the data storage logic





**THANKS FOR  
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