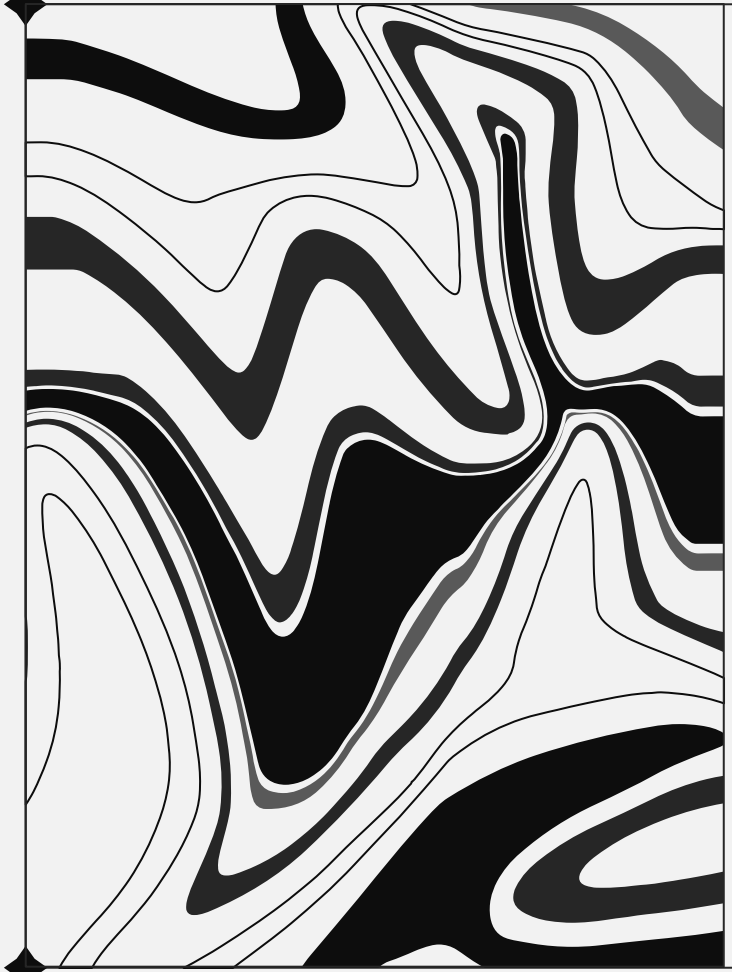

Design Patterns

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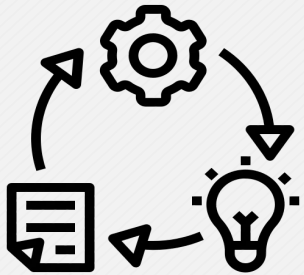
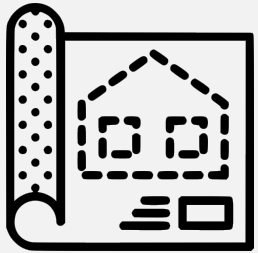
Introduction

what is a design pattern?

They are solutions to problems that occur in software design.



They are like pre-made blueprints that can be customized to solve a design problem.

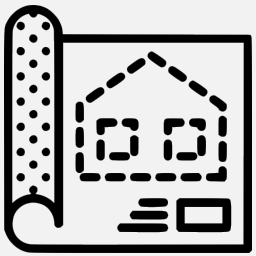


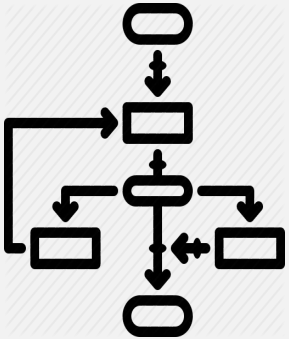
what is a design pattern?

Design patterns

≠

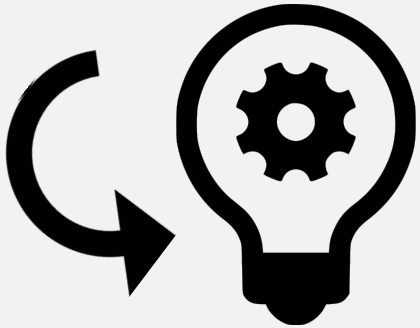
Algorithms

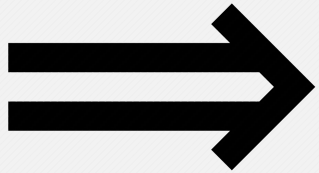




what is a design pattern?

They are common solutions to common problems in OOD.





NEW PATTERN

Design pattern beginnings

A Pattern Language (1977):
Christopher Alexander

Design Patterns (1994):
Erich Gamma – Richard Helm
Ralph Johnson – John Vlissides

What is its use?

They are a toolkit of solutions to common problems in software design.

They define a common language that you can use to facilitate communication.

Classification

Idioms: More basic and lower level patterns

Architecture patterns: More universal and higher level patterns.

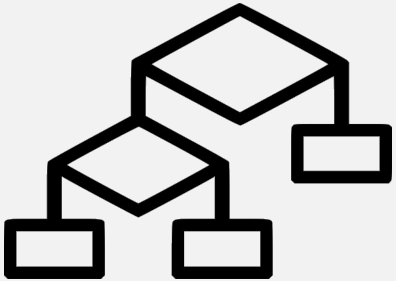
Design patterns differ in:
- Complexity
- Level of detail
- Scalability.

Classification

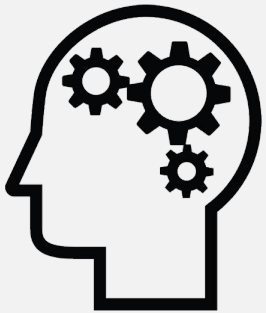
All patterns can be classified by their purpose.

Creational patterns

Structural patterns



Behavioral patterns



Some design patterns

Link to the page

02

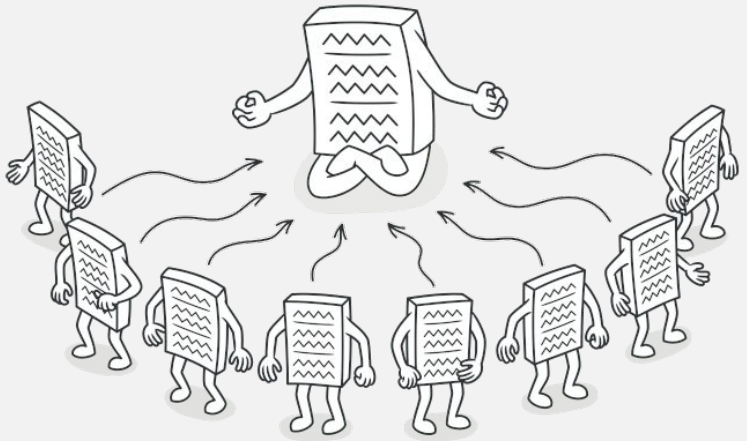
Creational Patterns

Singleton

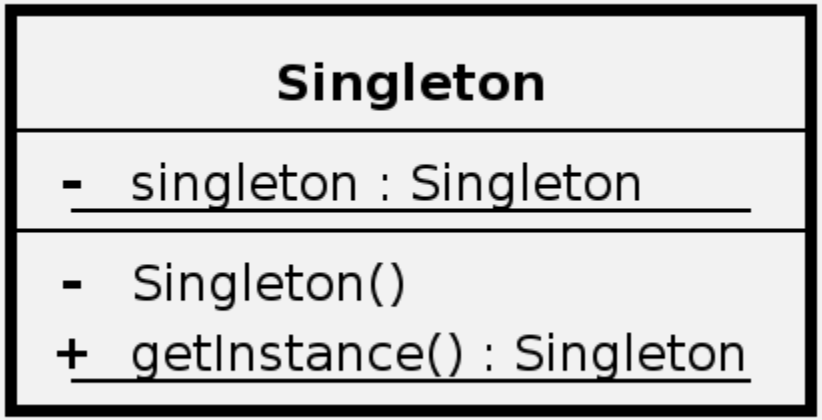
Each class has a single instance, but we have to provide a global access point to that instance.

Popularity:

★★★★☆

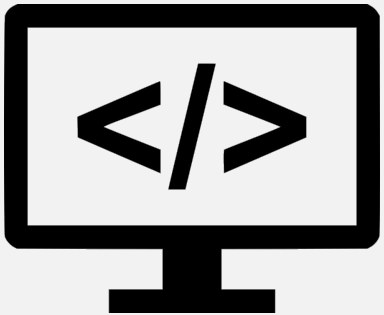


UML Diagram


Singleton
- singleton : Singleton
- Singleton()
+ getInstance() : Singleton

Solution

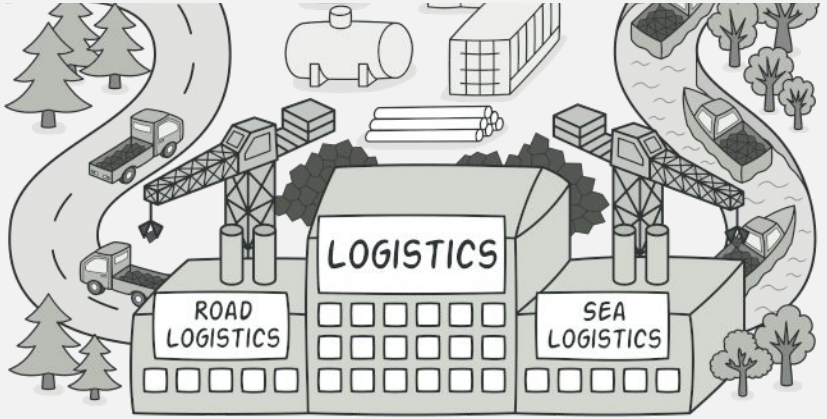
Let’s go to the code...



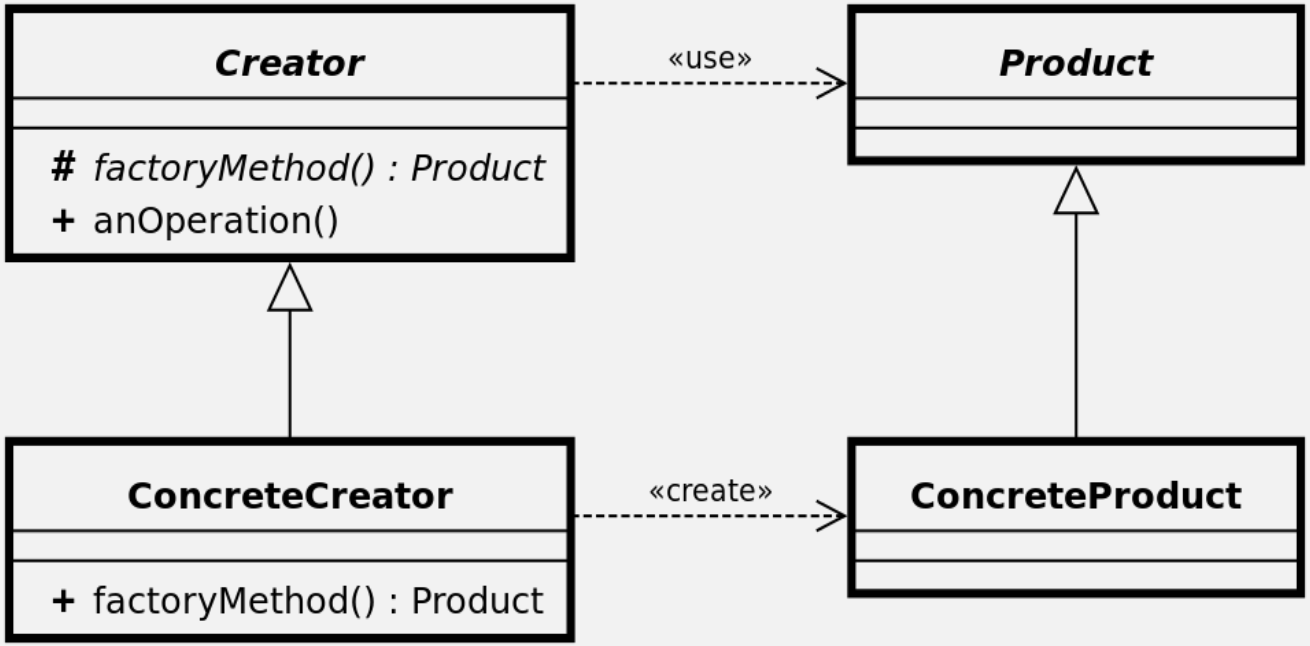
Factory Method

Define an interface for creating an object but let the subclasses decide which class to instantiate.

<u>Popularity</u>:

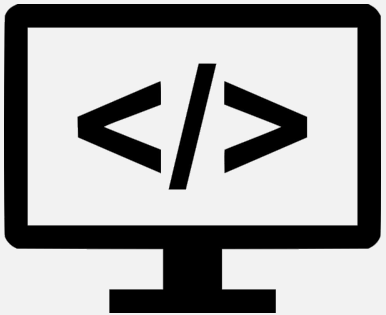


UML Diagram


Creator
factoryMethod() : Product
+ anOperation()
«use»
Product
ConcreteCreator
+ factoryMethod() : Product
«create»
ConcreteProduct

Everything is better with an example

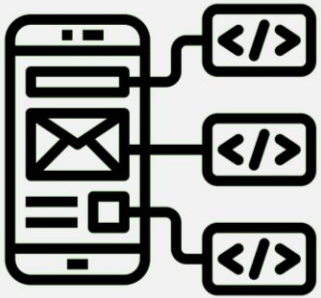
Let’s go to the code...



03

Structural Patterns

Structural patterns - Adapter



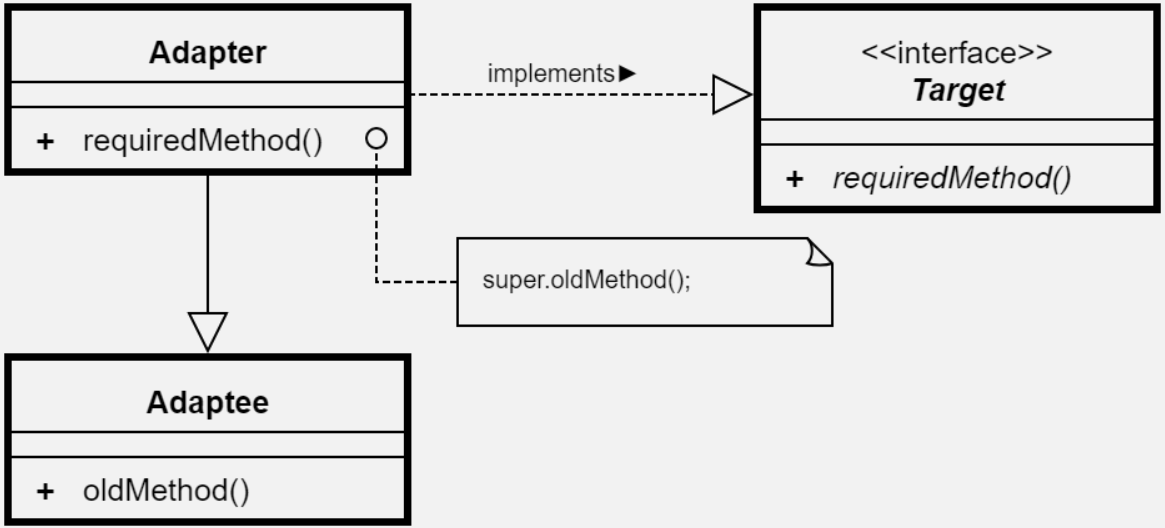
“Interface”

Popularity:

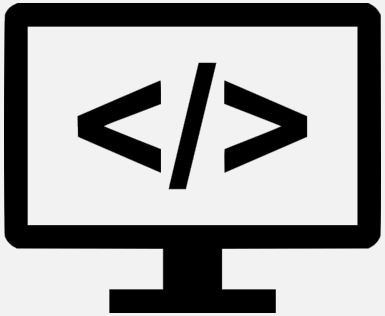
★★★★★

Structural patterns – Adapter

UML Diagram



Structural patterns - Adapter



src/Structural_patterns

04

Behavioral patterns

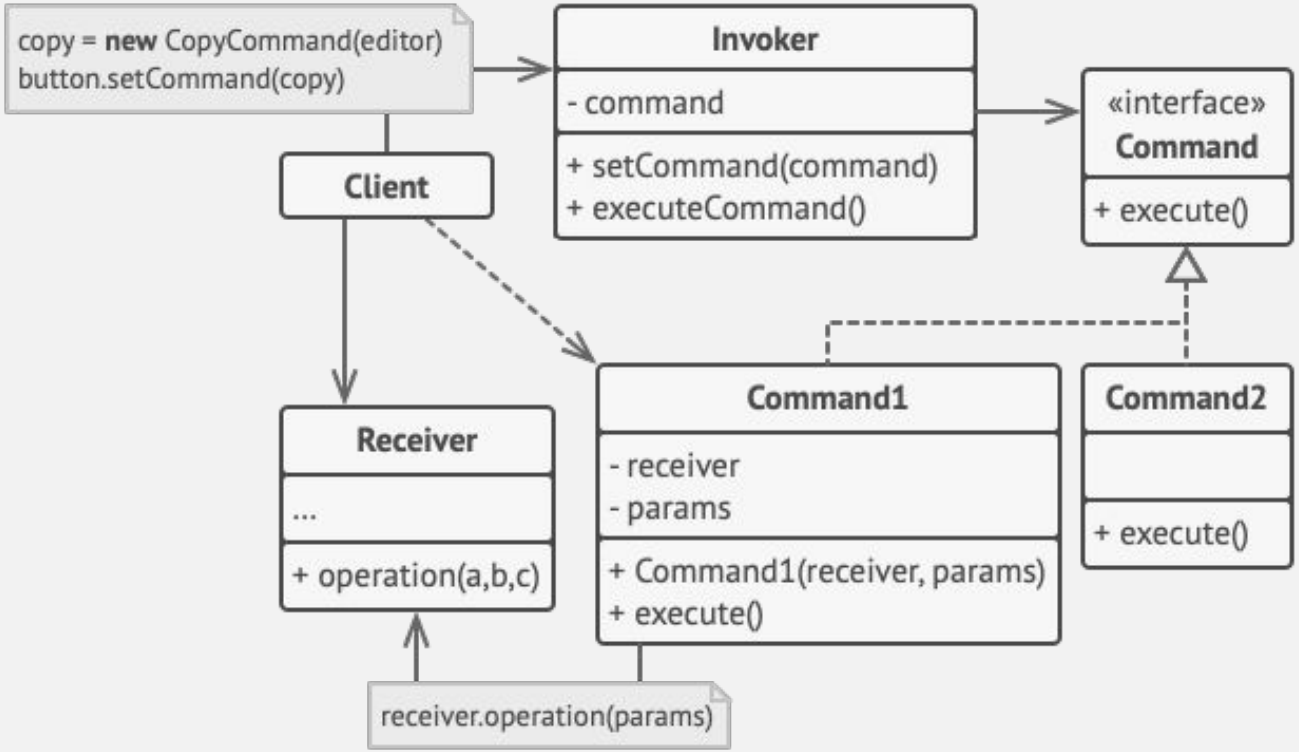
Behavioral patterns - Command

“Encapsulate”

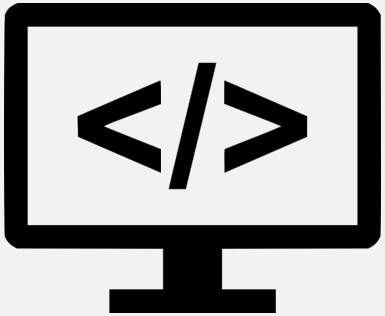
Popularity:

★★★★★

UML Diagram

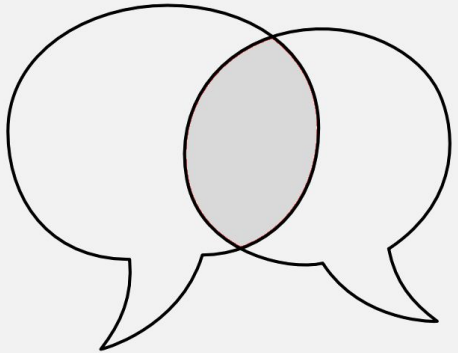

copy = new CopyCommand(editor)
button.setCommand(copy)
Invoker
- command
+ setCommand(command)
+ executeCommand()
«interface»
Command
+ execute()
Client
Receiver
...
+ operation(a,b,c)
Command1
- receiver
- params
+ Command1(receiver, params)
+ execute()
Command2
+ execute()
receiver.operation(params)

Behavioral patterns - Command



src/Behavioral_patterns/Command

Behavioral patterns - Strategy

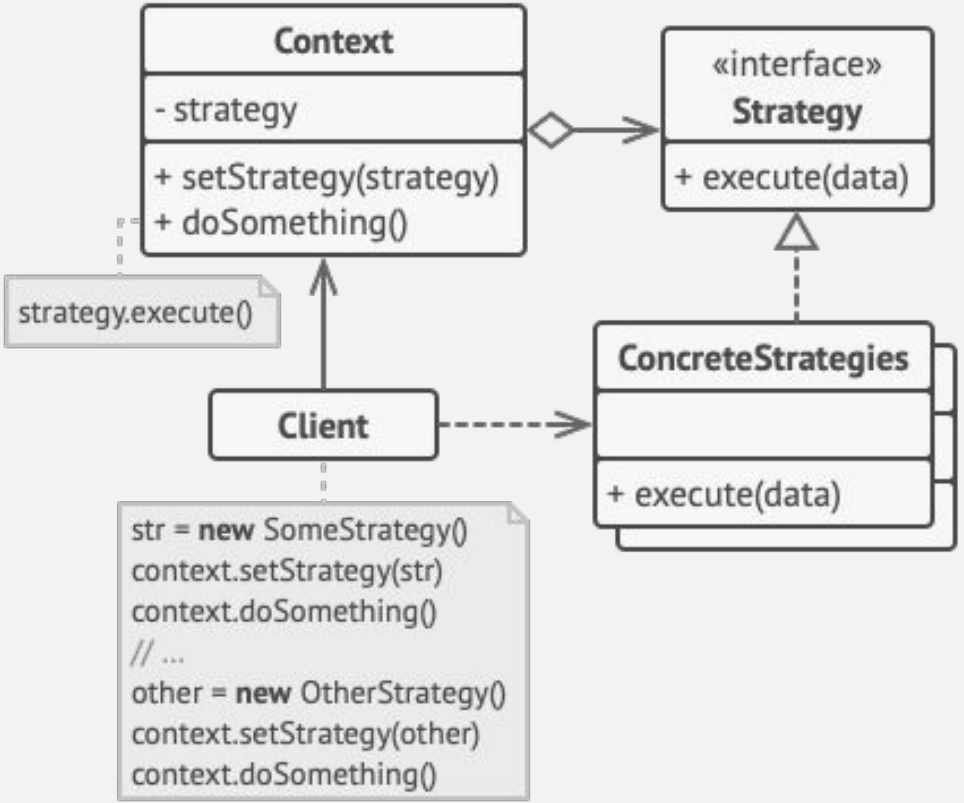


“Context”

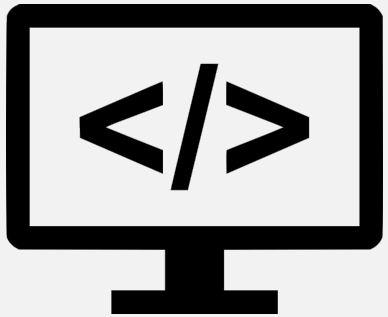
Popularity:

★★★★★

UML Diagram


Context
- strategy
+ setStrategy(strategy)
+ doSomething()
«interface»
Strategy
+ execute(data)
strategy.execute()
ConcreteStrategies
+ execute(data)
Client
str = new SomeStrategy()
context.setStrategy(str)
context.doSomething()
// ...
other = new OtherStrategy()
context.setStrategy(other)
context.doSomething()

Behavioral patterns - Strategy



src/Behavioral_paterns/Strategy

05

Conclusions

06

References

Structural pattern:
https://www.dottedsquirrel.com/adapter-pattern-javascript/

Example of Adapter pattern:
https://dev.to/wecarrasco/adapter-pattern-with-javascript-4lgi

Another example of Adapter pattern:
https://dev.to/carlillo/design-patterns---adapter-2pi3

Command pattern:
https://www.dofactory.com/javascript/design-patterns/command#:~:text=The%20Command%20pattern%20encapsulates%20actions,requests%20are%20called%20event%20handlers.

Strategy pattern:
https://www.dofactory.com/javascript/design-patterns/strategy

Some design patterns in Java:
https://java-design-patterns.com/patterns/

TypeScript 4 Design Patterns and Best Practices
https://learning.oreilly.com/library/view/typescript-4-design/9781800563421/

Code examples:
https://github.com/PacktPublishing/TypeScript-4-Design-Patterns-and-Best-Practices

Example of singleton:
https://www.dofactory.com/javascript/design-patterns/singleton

Example of Factory method:
https://www.dofactory.com/javascript/design-patterns/factory-method

Factory Method UML Diagram
https://commons.wikimedia.org/wiki/File:Factory_Method_UML_class_diagram.svg

Singleton UML Diagram
https://www.simogrima.com/php/php-design-pattern-singleton/

THANKS!

Do you have any questions?

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Helena García Díaz
<helena.garcia.diaz.20@ull.edu.es>