Design Pattern

SINGLETON

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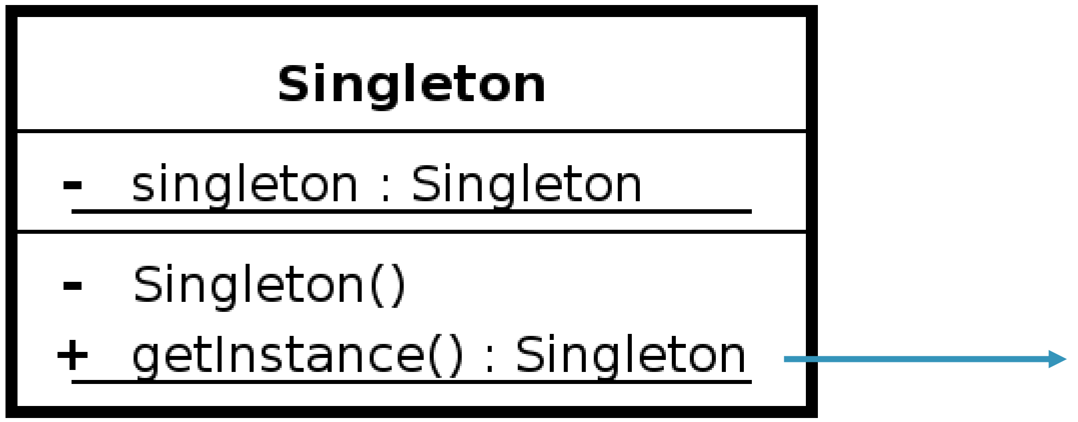
Definition

What is Singleton pattern?

DEFINITION

- restricts the instantiation of a class to one object



Class operation
=> Shared by all instances.

Provide

- Ensure that only one instance of the singleton class ever exists
- Global access to that instance.

Where use Singleton?

- Printer spool(Simultaneous Peripheral Operation On-Line)
- File System
- Windows Administrator
- Abstract factory, Builder, Prototype patterns
- Façade, State objects
- Etc…

Advantages

Why use Singleton?

Advantages

1. Control the access to the (unique) instance
2. Not pollute the global namespace
3. Allow refinement about operation and representation
   - Polynomial (select instance in runtime)
4. Free in exchange for number of instance
5. More flexible than using class operation
   - If we need more instance

Disadvantages

Negative aspects of singleton

DISADVANTAGE

Paraphrased from Brian Button:

1. They are generally used as a global instance, why is that so bad? Because you hide the dependencies of your application in your code, instead of exposing them through the interfaces. Making something global to avoid passing it around is a code smell.
2. They violate the single responsibility principle: by virtue of the fact that they control their own creation and lifecycle.
3. They inherently cause code to be tightly coupled. This makes faking them out under test rather difficult in many cases.
4. They carry state around for the lifetime of the application. Another hit to testing since you can end up with a situation where tests need to be ordered which is a big no no for unit tests. Why? Because each unit test should be independent from the other.

IMEPLEMENTATION

How to ingleton?

ISSUE

1. Ensure that only one instance of the singleton class ever exists
2. Subclassing the `Singleton` class

Ensure that only one instance

- Providing a static method that returns a reference to the instance
- Declaring all constructors of the class to be private
- Why not use global variable(instance)?
  A. Cannot ensure that only one instance (multi-declaration)
  B. Maybe to be initialized dynamically
  C. No clear ordering about constructor of global instance
  D. Always allocate memory (include in useless condition)

Subclassing the `Singleton` class

- Abstract (Polynomial) use of singleton class
- Subclass selection issue

1. Virtual imeplementation of `Instance()` operation
    - No support runtime selection
2. Condition statement in `Instance()` operation
    - Singleton class has over-information
3. Use Registry
    - Table (index=str, emelent=instance)
    - Need `Lookup()` operation

Examples

Sample code of singleton

Thank you