

Strategy Design Pattern

Intent

Define a family of algorithms, encapsulate each one, and make them interchangeable.

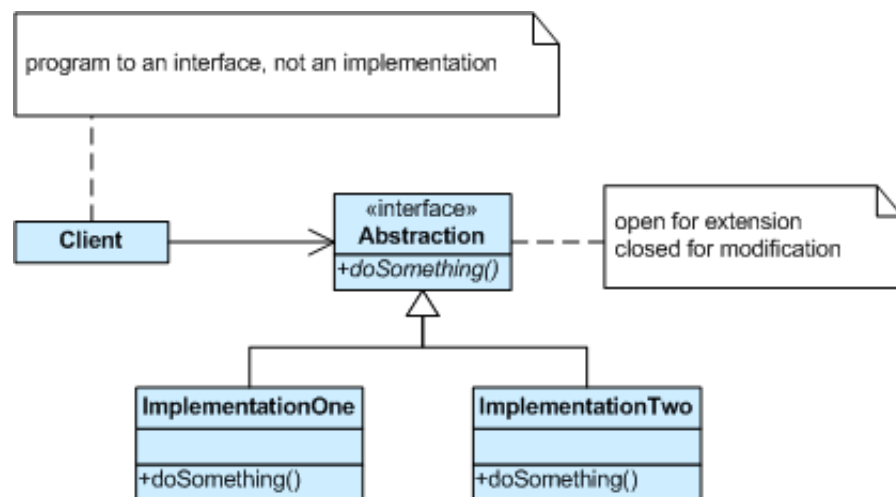
Strategy lets the algorithm vary independently from the clients that use it.

Capture the abstraction in an interface, bury implementation details in derived classes.

Problem

One of the dominant strategies of object-oriented design is the “open-closed principle”.

Figure demonstrates how this is routinely achieved - encapsulate interface details in a base class, and bury implementation details in derived classes. Clients can then couple themselves to an interface, and not have to experience the upheaval associated with change: no impact when the number of derived classes changes, and no impact when the implementation of a derived class changes.



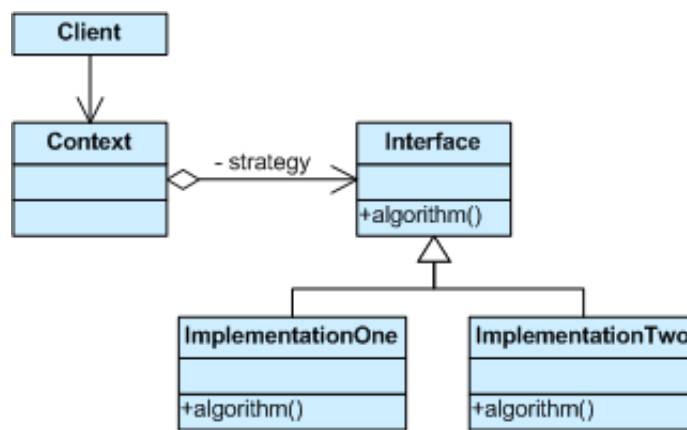
A generic value of the software community for years has been, “maximize cohesion and minimize coupling”. The object-oriented design approach shown in figure is all about minimizing coupling. Since the client is coupled only to an abstraction (i.e. a useful fiction), and not a particular realization of that abstraction, the client could be said to be practicing “abstract coupling” . an object-oriented variant of the more generic exhortation “minimize coupling”.

A more popular characterization of this “abstract coupling” principle is “Program to an interface, not an implementation”.

Clients should prefer the “additional level of indirection” that an interface (or an abstract base class) affords. The interface captures the abstraction (i.e. the “useful fiction”) the client wants to exercise, and the implementations of that interface are effectively hidden.

Structure

The Interface entity could represent either an abstract base class, or the method signature expectations by the client. In the former case, the inheritance hierarchy represents dynamic polymorphism. In the latter case, the Interface entity represents template code in the client and the inheritance hierarchy represents static polymorphism.



Example

A Strategy defines a set of algorithms that can be used interchangeably. Modes of transportation to an airport is an example of a Strategy. Several options exist such as driving one’s own car, taking a taxi, an airport shuttle, a city bus, or a limousine service. For some airports, subways and helicopters are also available as a mode of transportation to the airport. Any of these modes of transportation will get a traveler to the airport, and they can be used interchangeably. The traveler must choose the Strategy based on tradeoffs between cost, convenience, and time.

