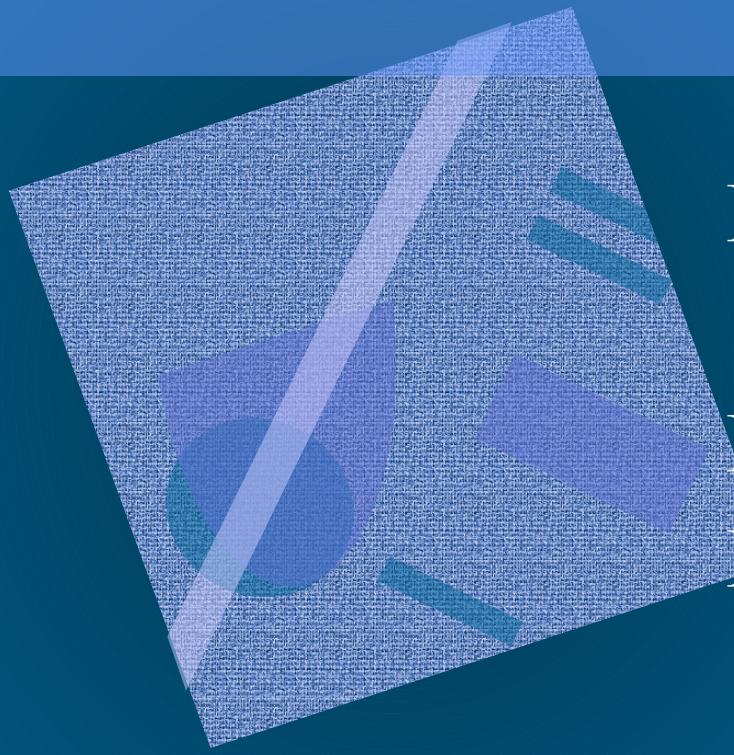
Design Patterns Study Group



Proxy Pattern

Fred Stluka

February 19, 1998

Name

- Proxy Pattern
- AKA: Surrogate

Intent

- Provide a surrogate or placeholder for another object to control access to it
- An object structural pattern

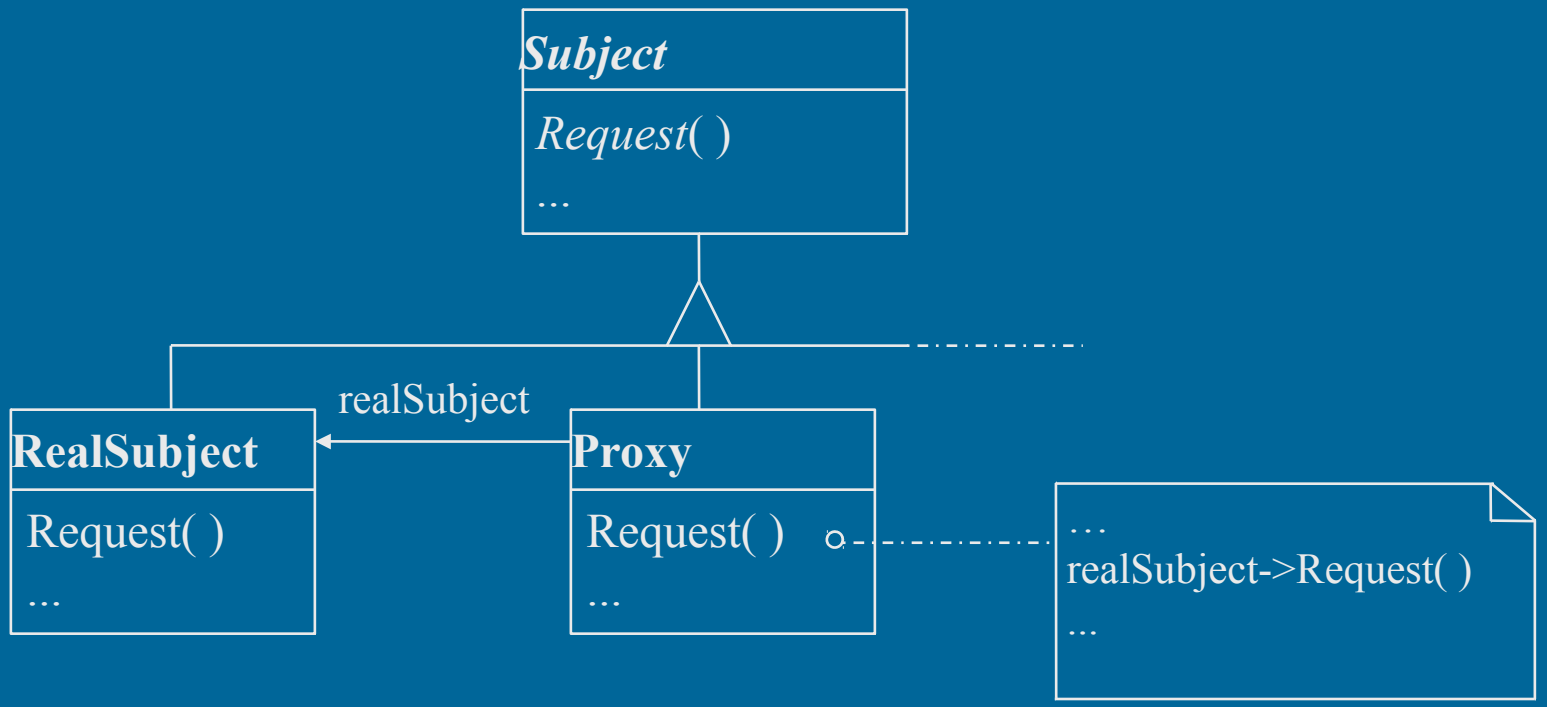
Motivation

- Efficiency
- Access Control
- Lifetime Management
- “Solve any problem in computer science with one more level of indirection”

Applicability

- Virtual Proxy
  - Defer the cost of creation, initialization, or access
- Remote Proxy
  - Local proxy for an object on another computer
- Access Control Proxy
  - Enforce access rights, or control shared access
- Lifetime Management Proxy
  - Reference counting, persistence
- Others...

Structure


Subject
Request( )
...
realSubject
RealSubject
Request( )
...
Proxy
Request( )
...
...
realSubject->Request( )
...

Participants

- Subject
  - Defines common interface to RealSubject and Proxy
- RealSubject
  - Real object, hidden and protected by proxy
- Proxy
  - Controls access to (and lifetime of?) RealSubject
  - Encodes and transmits requests to remote RealSubject
  - Caches info about remote or deferred RealSubject

Collaborations

- Client accesses Proxy as though it were RealSubject
- Proxy forwards requests to RealSubject
- Proxy may handle some requests directly
- Proxy may perform additional work before and/or after forwarding the request

Consequences

- Virtual Proxy can:
  - Defer creation of RealSubject
  - Defer initialization of RealSubject
  - Defer copying of RealSubject (copy-on-write)
  - Defer all operations on RealSubject (convert to batch stream to be processed later)
- Remote Proxy can also:
  - Provide location transparency
  - Reduce number of cross-processor trips by caching local info or batching operations

Consequences (cont.)

- Access Control Proxy can:
  - Enforce access rights
  - Control shared access (locking)
- Lifetime Management Proxy can:
  - Do “garbage collection” based on reference count
  - Defer loading and saving of persistent objects
- Others?

Implementation

- Inheritance and delegation
  - Con: Lots of boilerplate code
- Overloading "**->**" (C++)
  - Con: Can't distinguish between operations.
- "doesNotUnderstand" (Smalltalk)
  - Con: Inefficient
  - Con: Does not handle all operations

Known Uses

- MS COM/DCOM stubs and proxies
- MS VB *.OCA files
- Internet firewall
- Disk cache
- NeXTStep remote proxies
- CORBA?
- Java?

Related Patterns

- Adapter
  - Changes the interface
- Decorator
  - Primary purpose is to add functionality
- Flyweight
  - A special purpose lightweight Proxy for efficiency

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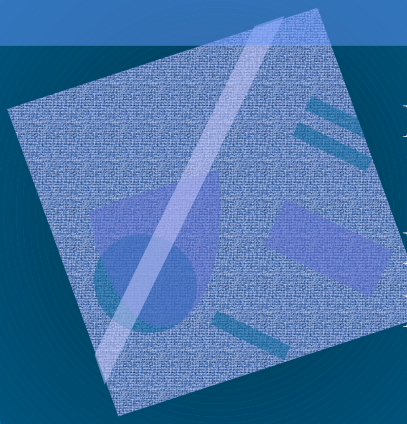

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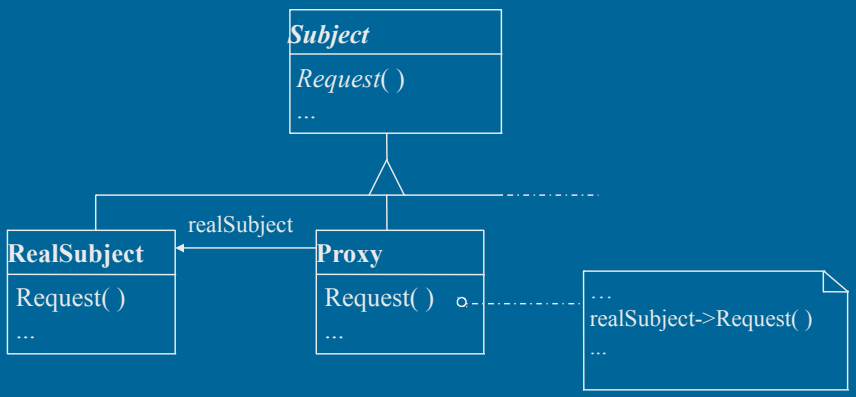
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