

Entwurfsmuster - Design Patterns

PROXY



JAN ANDRÉ SCHLÖSSER

DUPLEXMEDIA®  it4need
Making IT solutions affordable for everyone.

 it4need

 jan.schloesser

 jan-schloesser.de

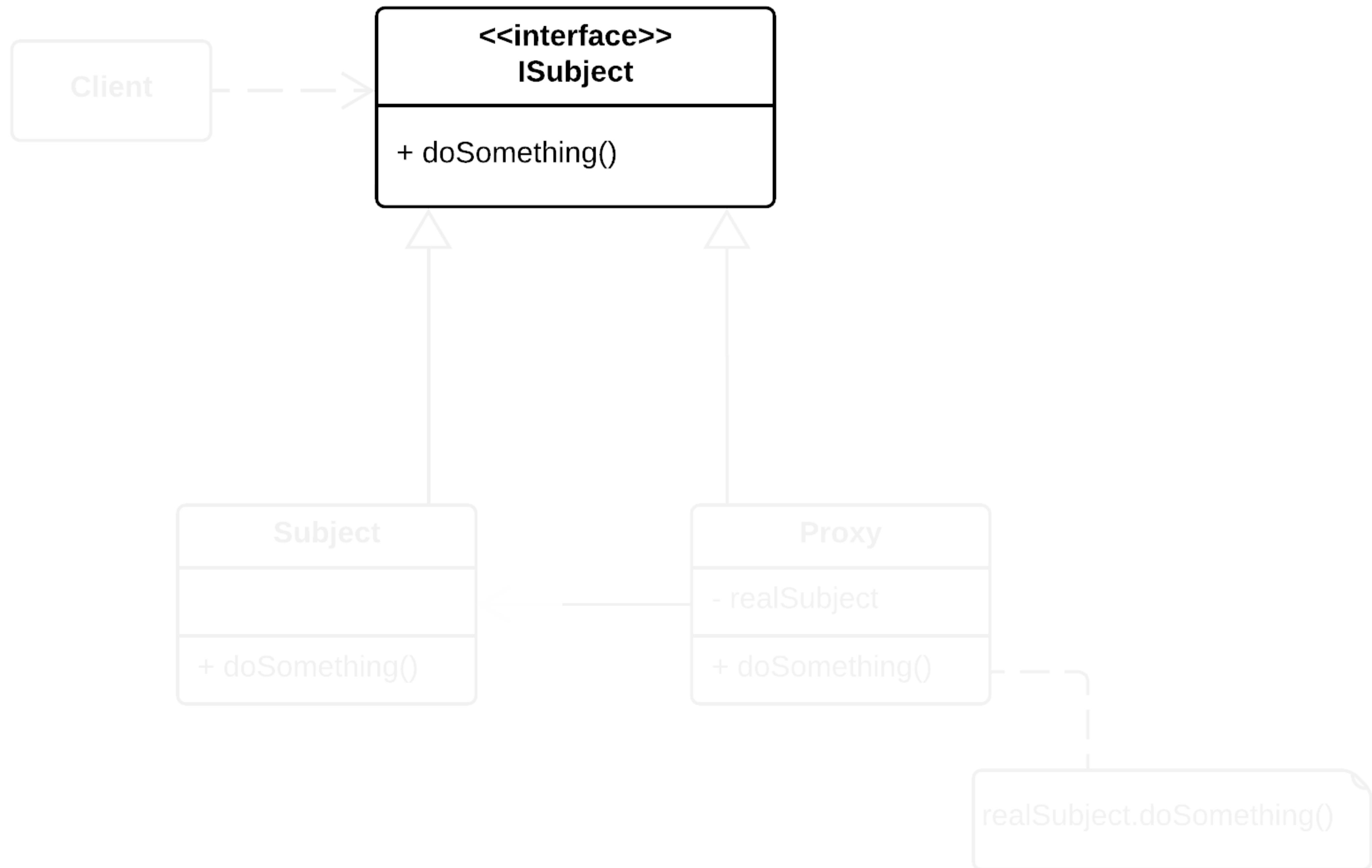
EINFÜHRUNG

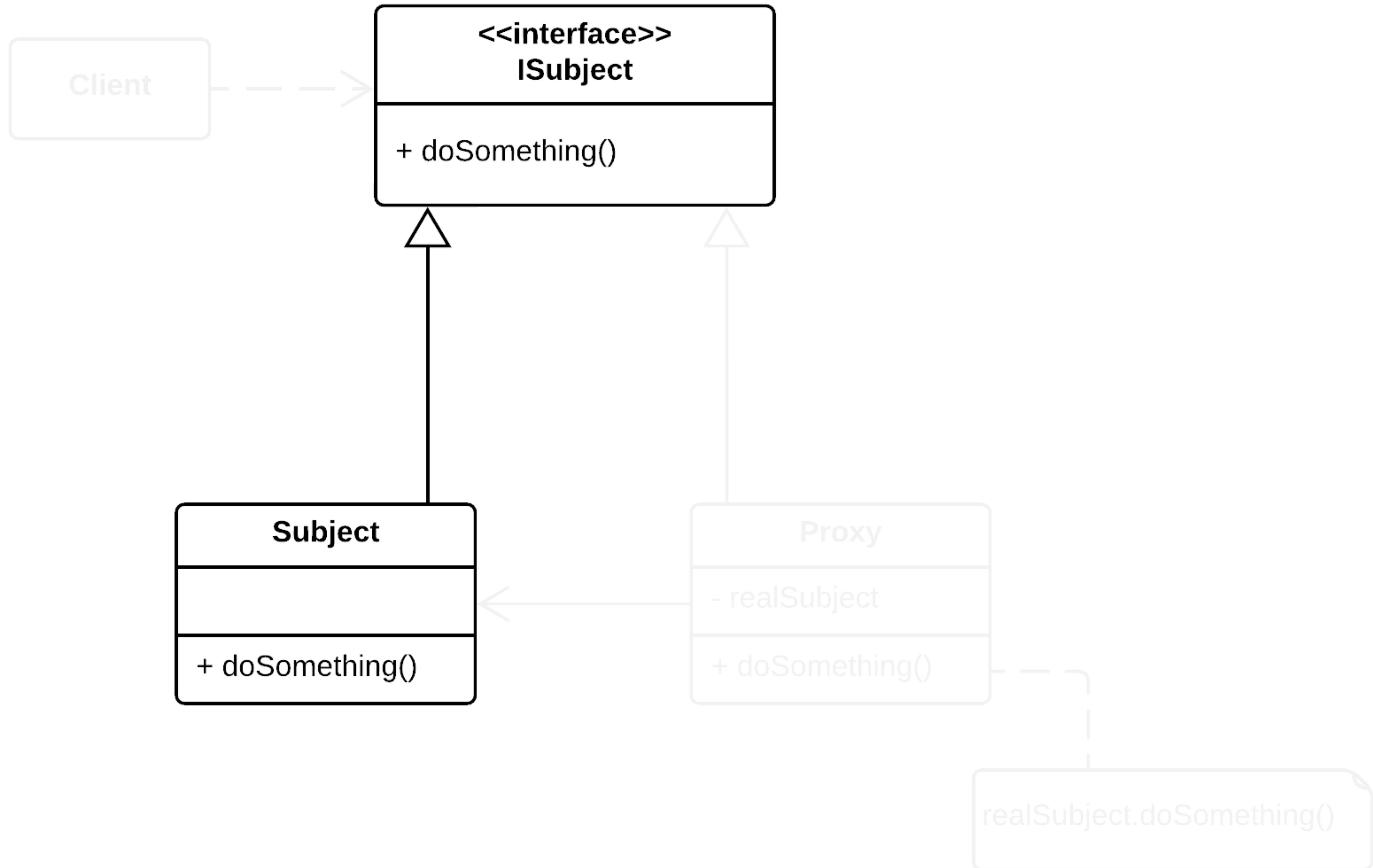
„EIN PROXY KONTROLLIERT DEN ZUGRIFF
AUF EIN OBJEKT MIT HILFE EINES
VORGELAGERTEN STELLVERTRETERS.“

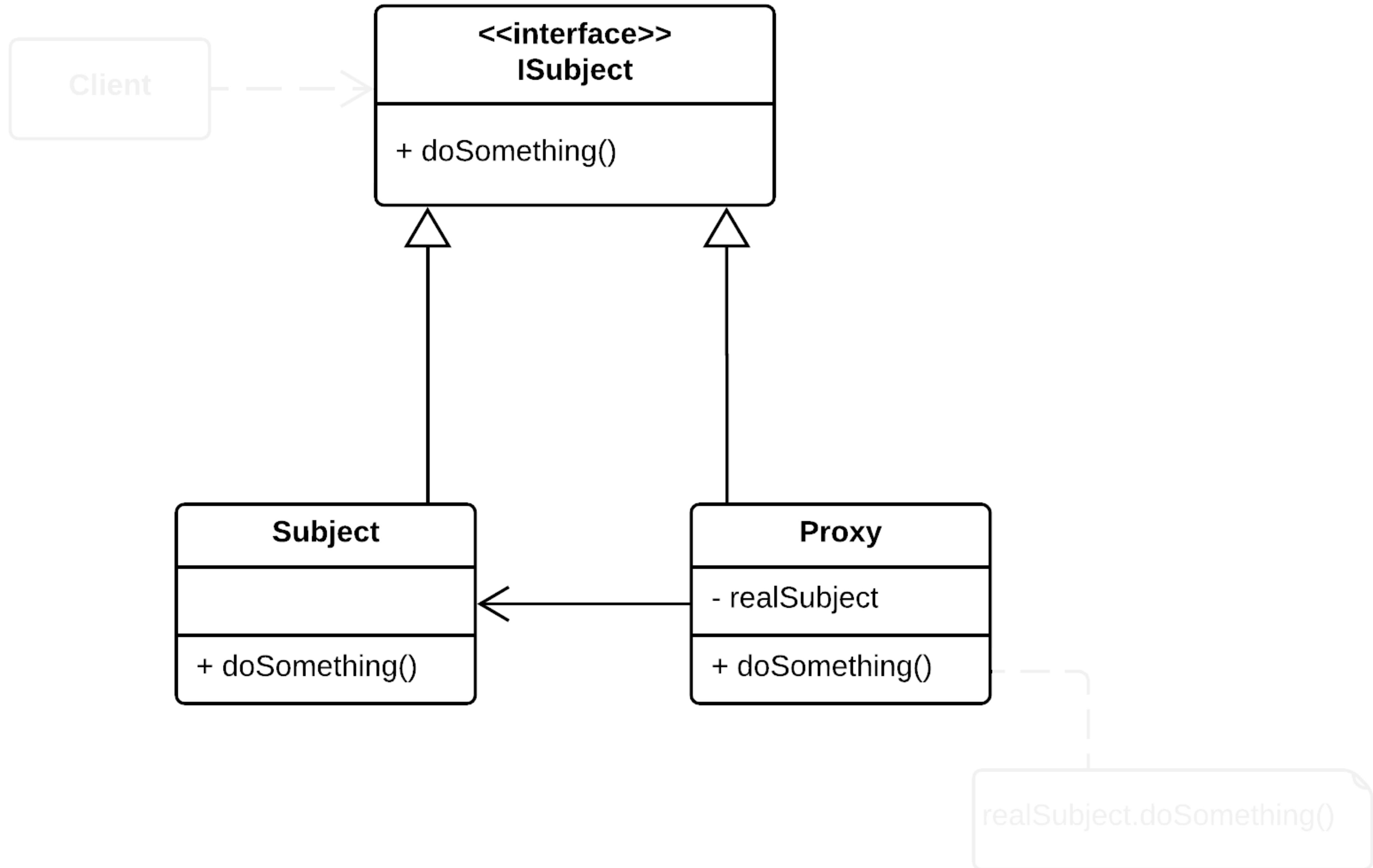
Entwurfsmuster von Kopf bis Fuß

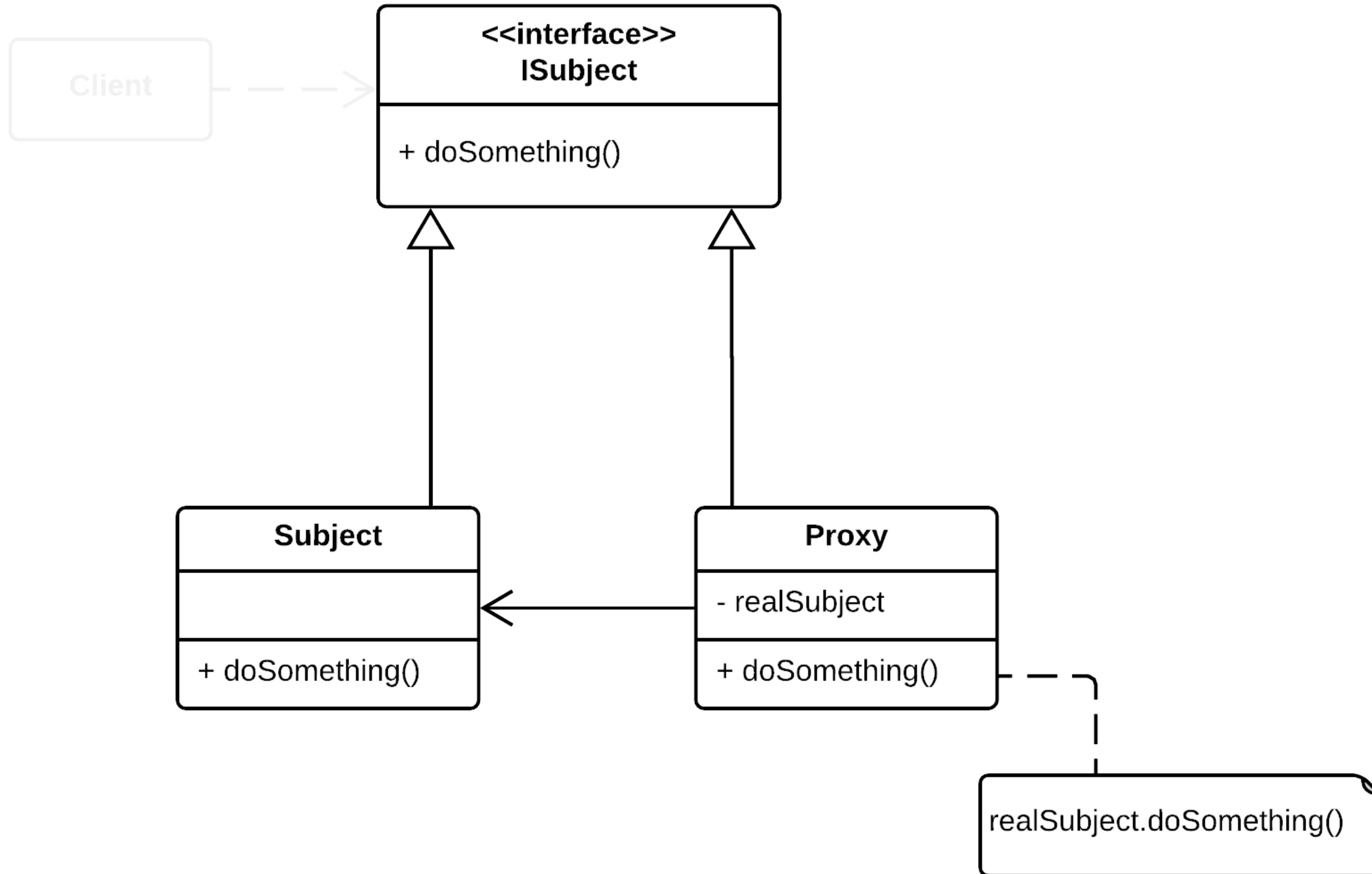
Proxy ist ein **GoF-Muster** im Bereich der **Strukturmuster**.

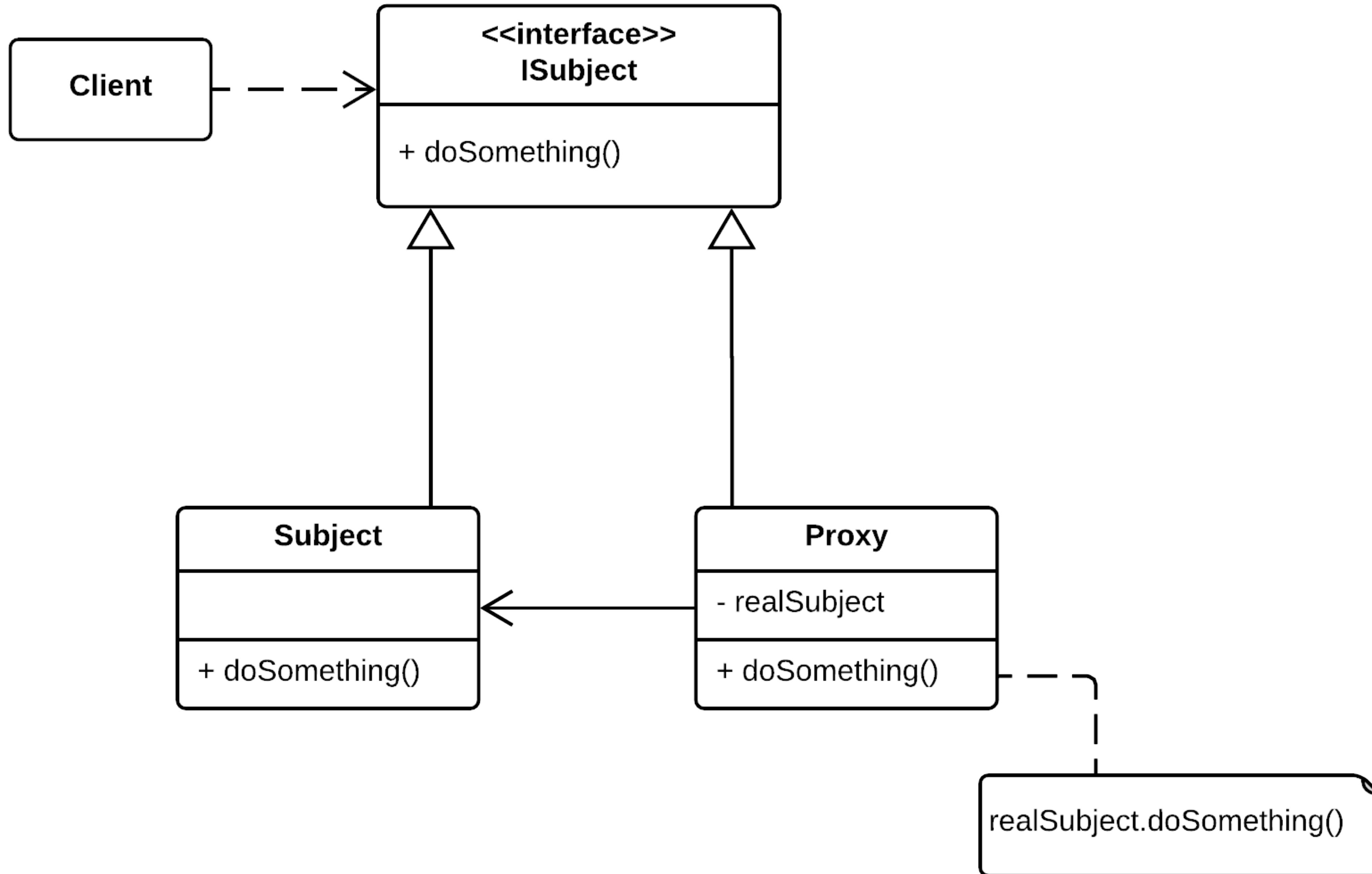
Substituiere Objekt oder stelle **Platzhalter**
zur **Zugriffskontrolle eines anderes Objekt** zur Verfügung.

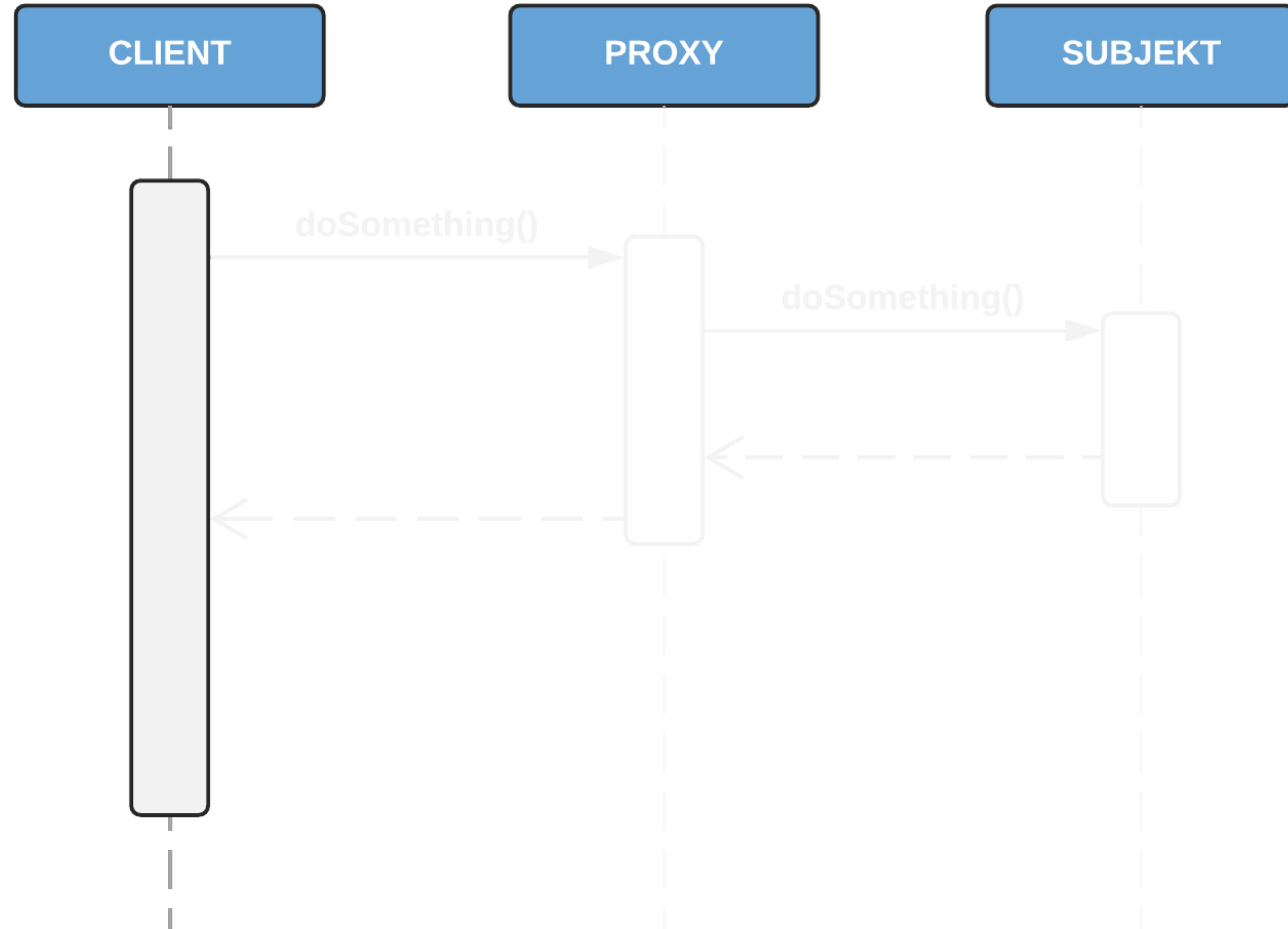


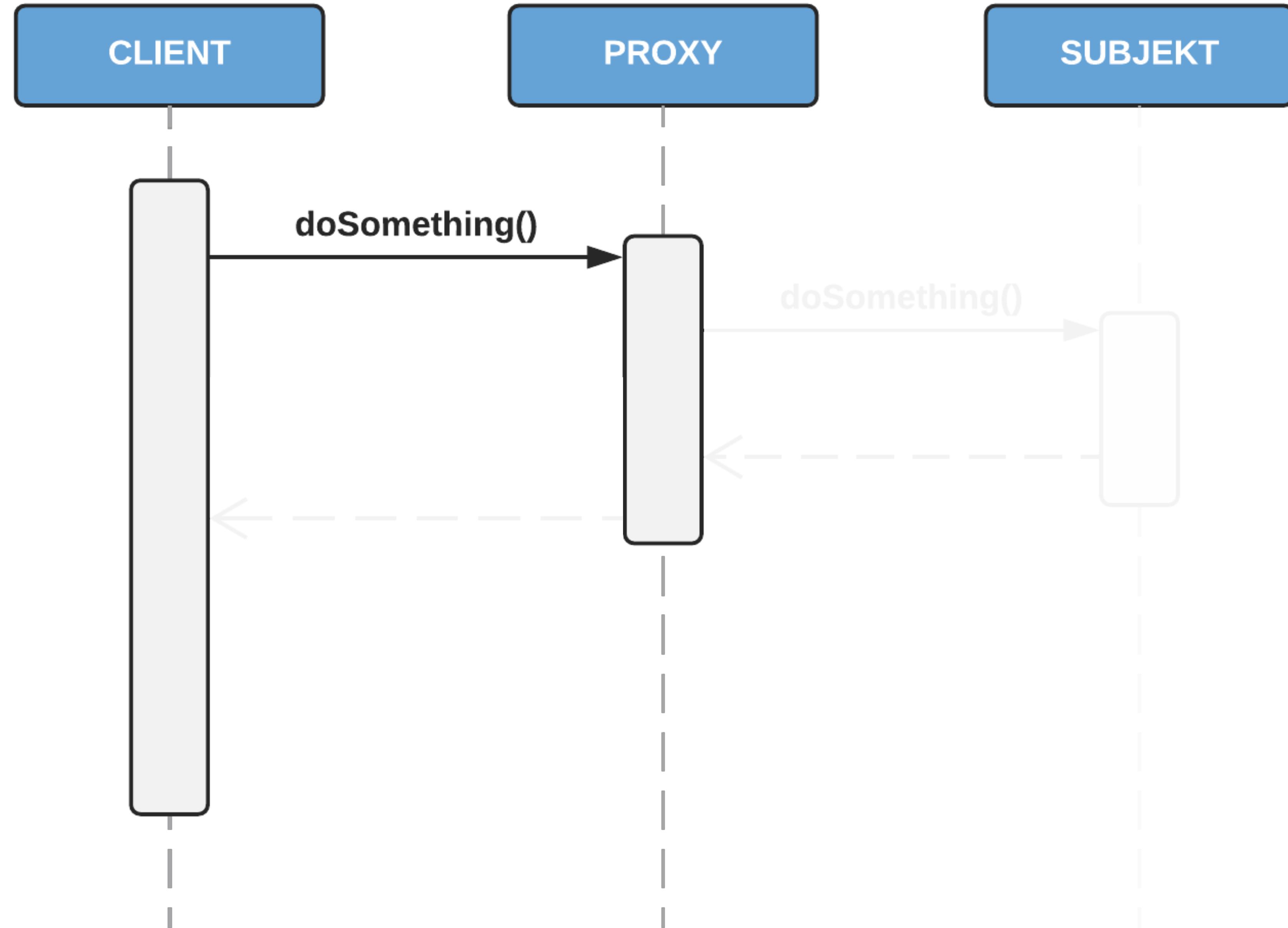


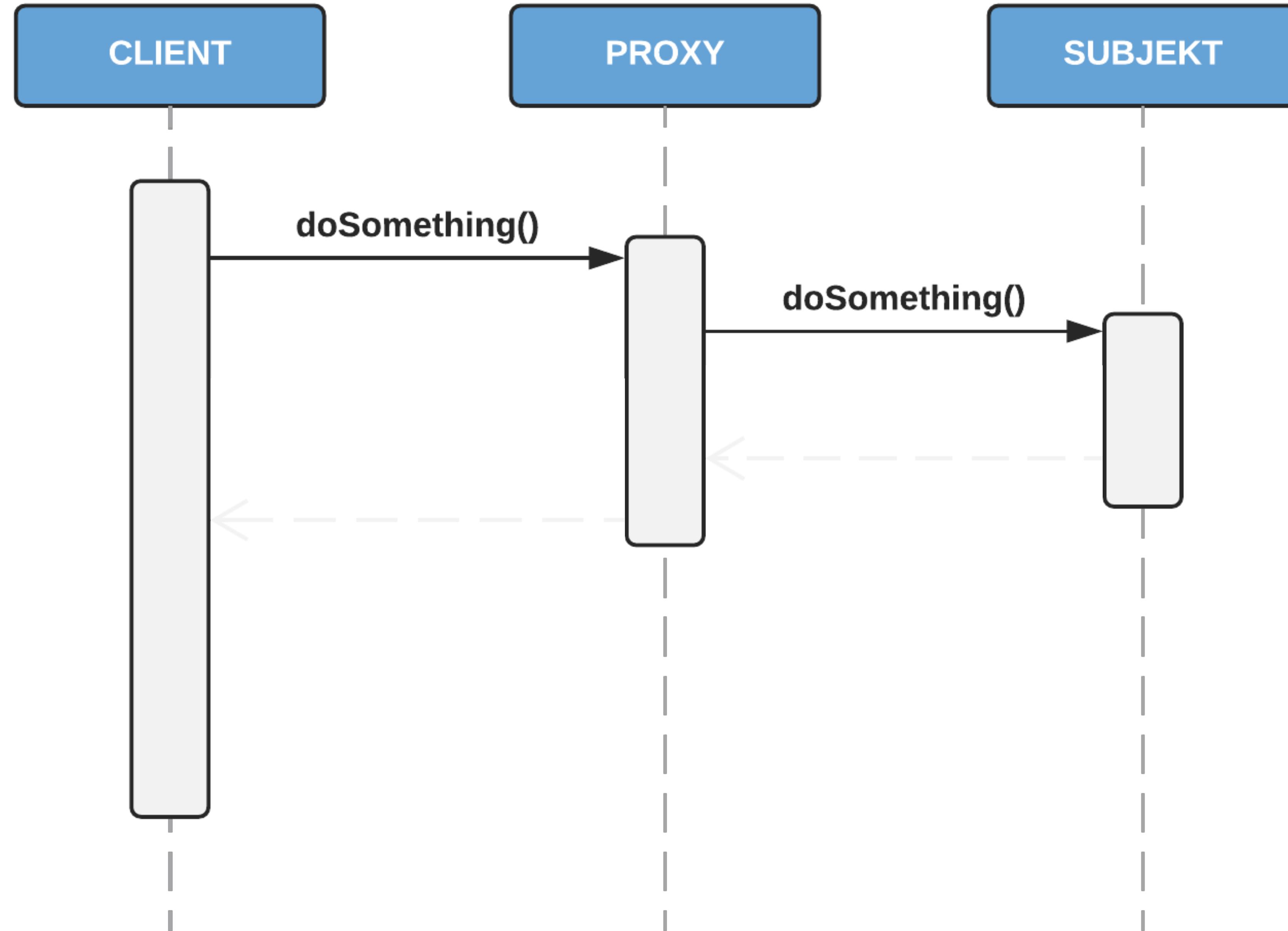


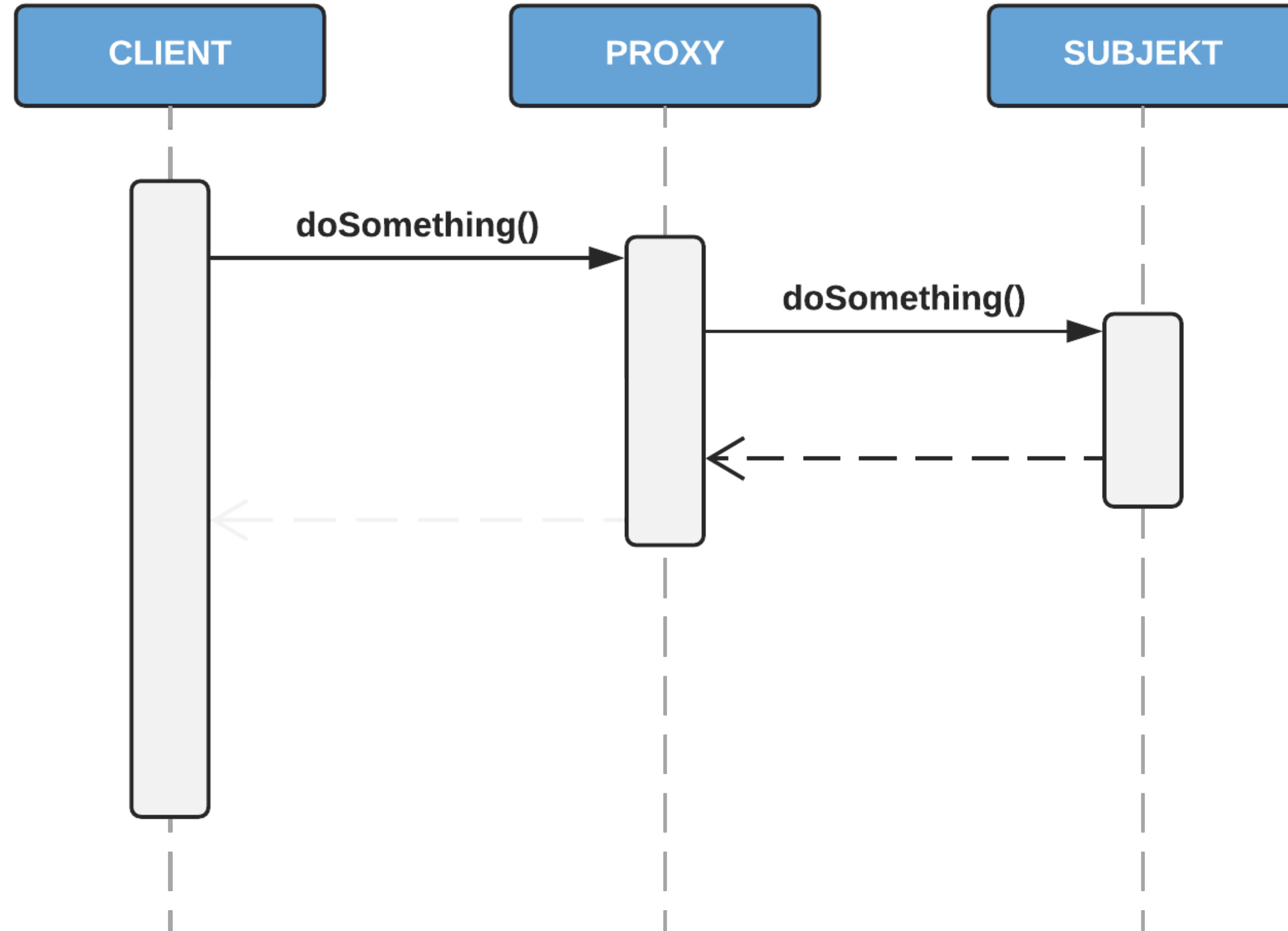


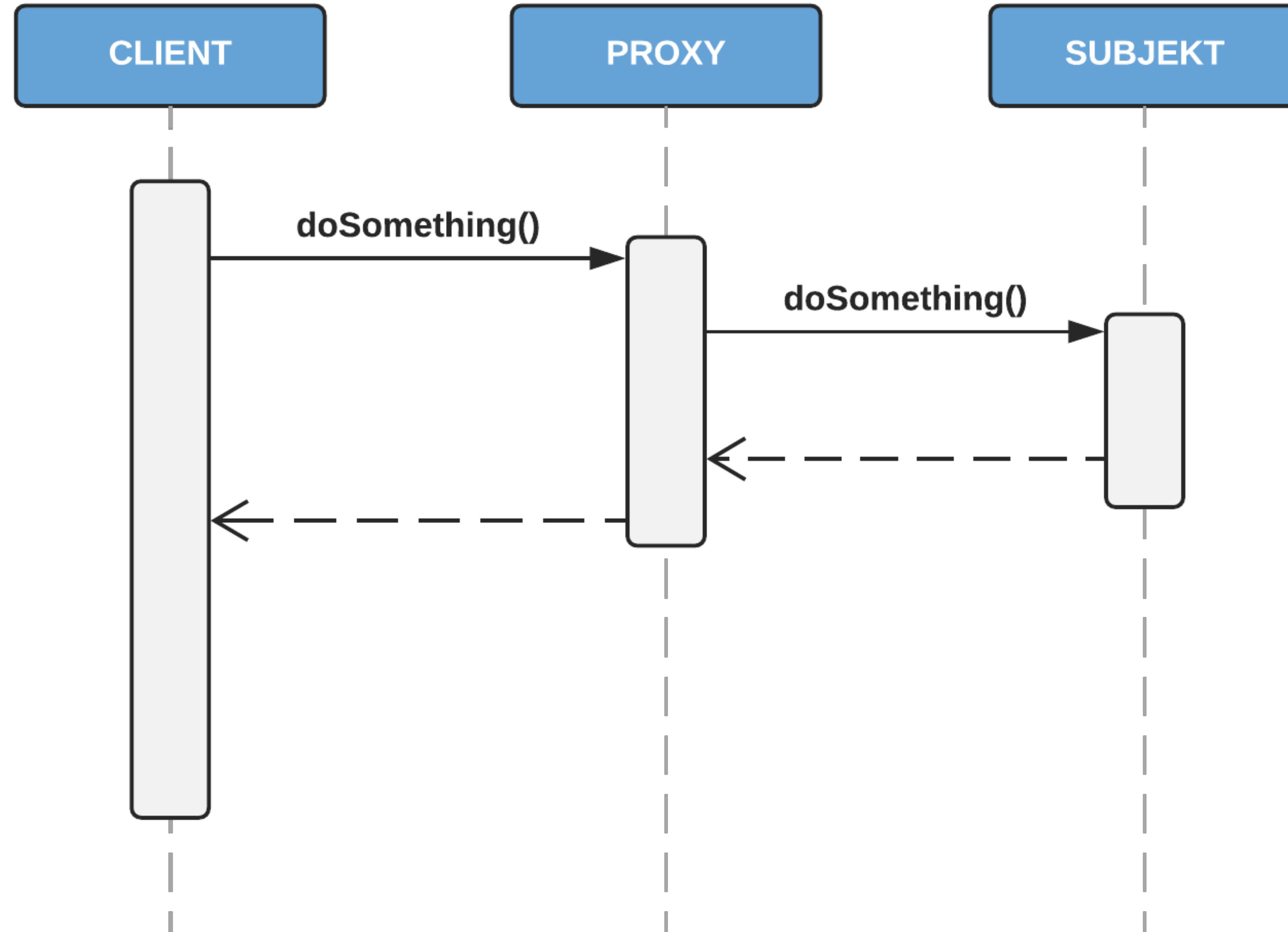












Das **Proxy** ersetzt also das **Subjekt** aufgrund des **LSP**.

ARTEN DES PROXY-MUSTERS

- ▶ **Remote Proxy**

lokaler Repräsentant für ein Objekt in einem anderen Adressraum

- ▶ **Virtual Proxy**

verzögert das Laden eines großen Objekts auf notwendigen Zeitpunkt (Lazy Loading)

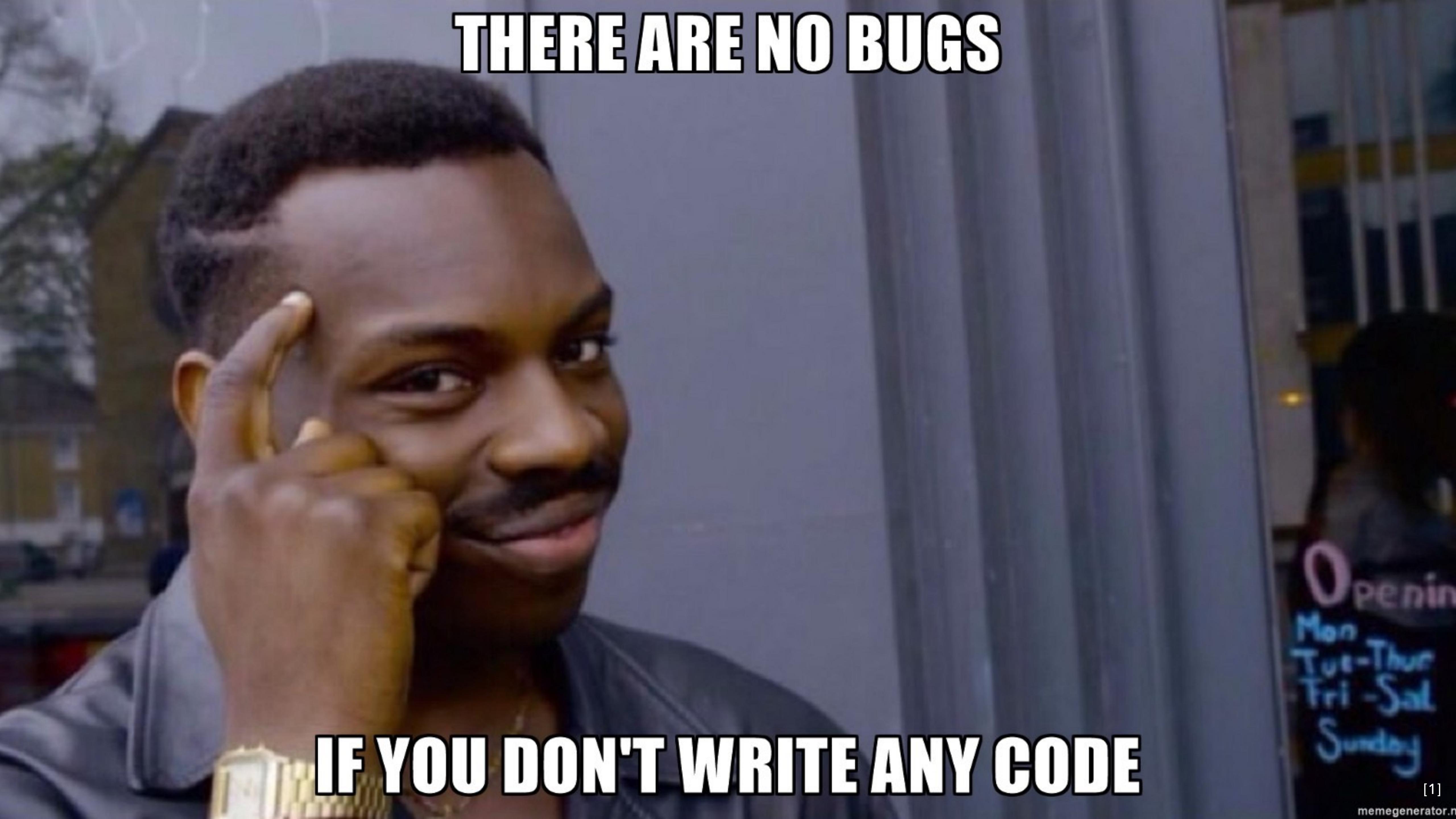
- ▶ **Protection Proxy**

limitiert den Zugriff auf das Subjekt durch bestimmte Regeln (z.B. ACL, Limits)

- ▶ **Cache Proxy**

speichert Informationen und gibt diese bei erneuten Aufruf ohne Neuberechnung zurück

PRAXIS



THERE ARE NO BUGS

IF YOU DON'T WRITE ANY CODE

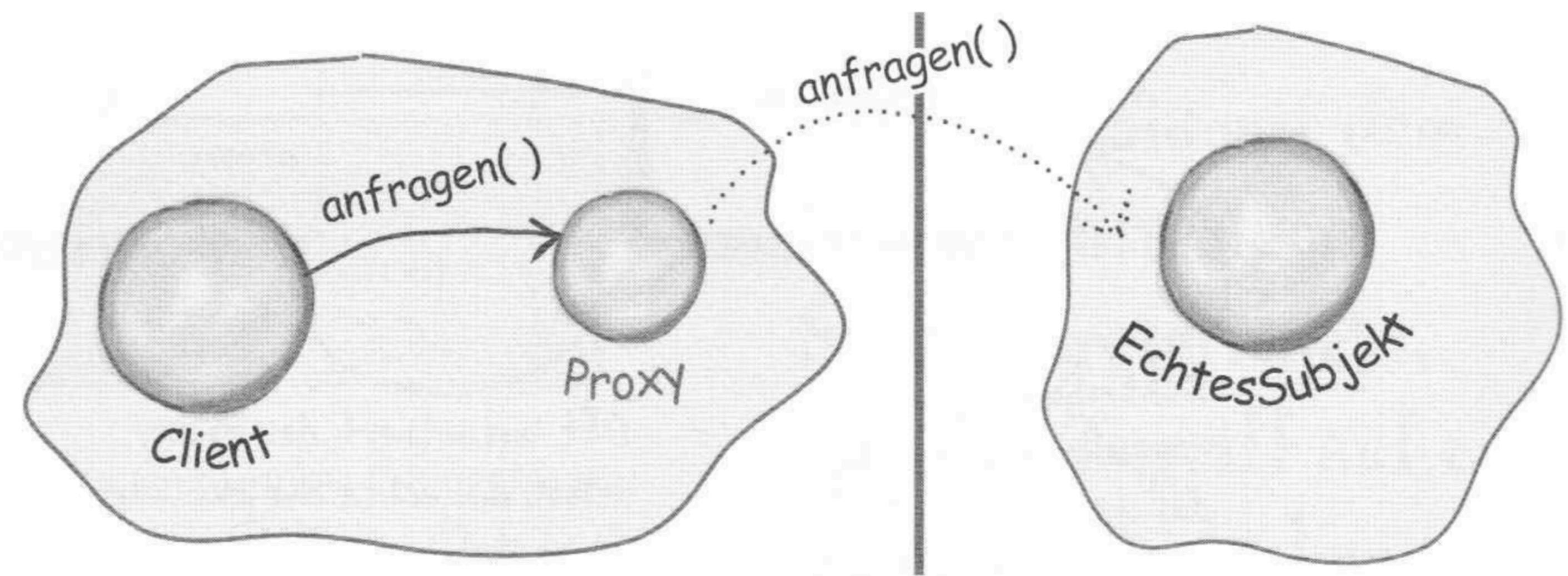
```
$ cd ~/Sites/  
$ git clone https://github.com/it4need/php-proxy-pattern
```

EINBLICK IN DIE WELT EINES PROXY-PATTERNS

REMOTE-PROXY

ALLGEMEINES

- ▶ Lokaler Stellvertreter für ein Objekt außerhalb des eigenen Adressbereich
- ▶ Client denkt, er kommuniziert mit echtem Objekt
- ▶ Reales Objekt = Subjekt
- ▶ Stellvertreter = Proxy



SIMULATE REMOTE REQUEST

```
<?php

sleep(2); // simulate extensive calculations...
ResponseAsJson(['id' => 'B_93756', 'score' => 81.9, 'owner' => 'server_b']);

function ResponseAsJson($data)
{
    header('Content-Type: application/json');
    echo json_encode($data);
    exit;
}
```

INTERFACE

```
<?php

namespace ProxyPatterns\RemoteProxy;

interface IReport
{
    public function generateReport();

    public function getId();

    public function getOwner();

    public function getScore();
}
```

SUBJEKT

```
<?php

namespace ProxyPatterns\RemoteProxy;

class ReportSubject implements IReport
{
    private $owner;
    private $id;
    private $score;

    public function __construct($id, $owner, $score)
    {
        $this->setId($id);
        $this->setOwner($owner);
        $this->setScore($score);
    }

    private function setScore($score)
    {
        $this->score = $score;
    }

    public function generateReport()
    {
        $string = '';
        foreach(['id', 'owner', 'score'] as $property) {
            $uc_property = ucfirst($property);
            $string .= $uc_property . ':' . $this->{"get{$uc_property}"}() . "\n";
        }
        return rtrim($string);
    }

    public function getScore()
    {
        return $this->score;
    }
}
```

PROXY

```
<?php

namespace ProxyPatterns\RemoteProxy;

use ProxyPatterns\RemoteProxy\Exceptions\ReportNotFoundException;
use Zttp\Zttp;

class ReportProxy implements IReport
{
    private $report;

    public function __construct($report_url)
    {
        $this->setReport($report_url);
    }

    private function setReport($report_url)
    {
        $json_report = Zttp::get($report_url);
        if ($json_report->status() != 200) {
            throw new ReportNotFoundException();
        }
        $report = json_decode($json_report->getBody());
        $this->report = new ReportSubject($report->id, $report->owner, $report->score);
    }

    public function generateReport()
    {
        return $this->report->generateReport();
    }

    public function getScore()
    {
        return $this->report->getScore();
    }
}
```

UNIT TESTS WON'T FAIL

IF THEY DON'T EXIST

AUSSCHNITT UNIT-TEST (HOW TO USE)

```
<?php

use ProxyPatterns\RemoteProxy\Exceptions\ReportNotFoundException;
use ProxyPatterns\RemoteProxy\ReportProxy;

class RemoteProxyTest extends PHPUnit\Framework\TestCase
{
    /**
     * @test
     */
    public function get_correct_from_remote_report()
    {
        $report = new \ProxyPatterns\RemoteProxy\ReportProxy($this->test_server . '/SimulateRemoteRequest.php');

        $this->assertEquals('B_93756', $report->getId());
        $this->assertEquals("server_b", $report->getOwner());
        $this->assertEquals(81.9, $report->getScore());
    }

    /**
     * @test
     */
    public function get_correct_report_from_server_remote()
    {
        $report = new \ProxyPatterns\RemoteProxy\ReportProxy($this->test_server . '/SimulateRemoteRequest.php');

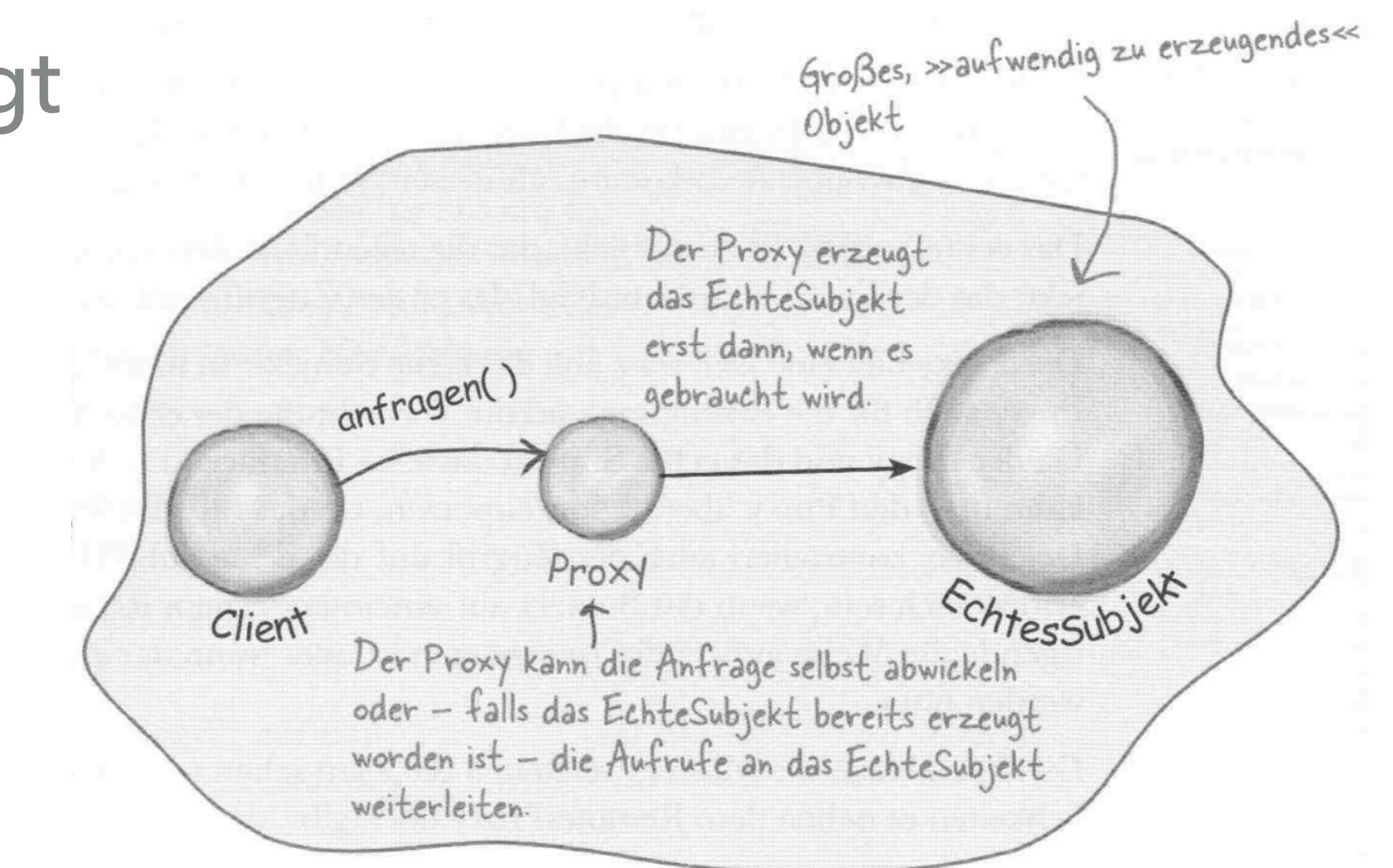
        $this->assertInternalType("string", $report->generateReport());
        $this->assertEquals("Id: B_93756\nOwner: server_b\nScore: 81.9", $report->generateReport());
    }
}
```

EINBLICK IN DIE WELT EINES PROXY-PATTERNS

VIRTUAL-PROXY

ALLGEMEINES

- ▶ ermöglicht Lazy Loading (Laden bei Bedarf)
- ▶ aufwendig zu erzeugtes Objekt = Subjekt
- ▶ Proxy instanziert Subjekt erst, wenn benötigt
- ▶ falls bereits erzeugtes Subjekt:
einfache Delegation an Subjekt



INTERFACE

```
<?php  
  
namespace ProxyPatterns\VirtualProxy;  
  
interface IImage  
{  
    public function getSize();  
}
```

SUBJEKT

```
<?php

namespace ProxyPatterns\VirtualProxy;

class ImageSubject implements IImage
{
    protected $img_data;

    public function __construct($image)
    {
        $this->img_data = file_get_contents($image);
    }

    public function getSize()
    {
        $img_properties = getimagesizefromstring($this->img_data);

        return [ 'width' => $img_properties[0], 'height' => $img_properties[1] ];
    }
}
```

PROXY

```
<?php

namespace ProxyPatterns\VirtualProxy;

class ImageProxy implements IImage
{

    private $image;
    private $subject;

    public function __construct($image)
    {
        $this->image = $image;
    }

    public function getSize()
    {
        if ($this->subject == null) {
            $this->subject = new ImageSubject($this->image);
        }

        return $this->subject->getSize();
    }

}
```

AUSSCHNITT UNIT-TEST (HOW TO USE) - 1

```
<?php

class VirtualProxyTest extends PHPUnit\Framework\TestCase
{

    const TEST_IMAGE = __DIR__ . '/../../assets/images/big_image.jpg';

    /**
     * @test
     */
    public function image_subject_consumes_two_times_memory_after_creating_two_instances_of_the_image()
    {
        $first_memory = $this->memory_usage_in_mb();
        $image = new ProxyPatterns\VirtualProxy\ImageSubject(self::TEST_IMAGE); // image: ~ 4.8MB, after: first_memory+image
        $second_memory = $this->memory_usage_in_mb();
        $image2 = new ProxyPatterns\VirtualProxy\ImageSubject(self::TEST_IMAGE); // image: ~ 4.8MB, after: second_memory+image
        $third_memory = $this->memory_usage_in_mb();

        $memory_usage_of_image = $second_memory - $first_memory;
        $memory_usage_of_image_after_second_load = $third_memory - $second_memory;

        $this->assertEquals($memory_usage_of_image, $memory_usage_of_image_after_second_load);
        $this->assertEquals($memory_usage_of_image_after_second_load, $this->get_test_file_size_in_mb());
        $this->assertEquals($image->getSize(), $image2->getSize());
    }

}
```

AUSSCHNITT UNIT-TEST (HOW TO USE) - 2

```
<?php

class VirtualProxyTest extends PHPUnit\Framework\TestCase
{

    const TEST_IMAGE = __DIR__ . '../../../../../assets/images/big_image.jpg';

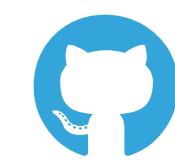
    /** @test */
    public function image_proxy_only_consumes_memory_after_called_getSize_method()
    {
        $first_memory = $this->memory_usage_in_mb();
        $image = new ProxyPatterns\VirtualProxy\ImageProxy(self::TEST_IMAGE); // image: ≈ 4.8MB
        $second_memory = $this->memory_usage_in_mb();

        $this->assertEquals($second_memory, $first_memory);
        $this->assertEquals($this->get_test_image_size(), $image->getSize());

        $third_memory = $this->memory_usage_in_mb(); // image is actually loaded by $image->getSize() above
        $memory_usage_of_image = $third_memory - $second_memory;

        $this->assertEquals($memory_usage_of_image, $this->get_test_file_size_in_mb());
    }
}
```

Weitere **Beispiele** des Proxy-Patterns im **Repository**.



it4need/php-proxy-pattern

FAZIT

VORTEILE

- ▶ können den Zugang zu Objekten kontrollieren
- ▶ funktionieren auch, wenn das Subjekt-Objekt noch nicht im Speicher ist
- ▶ helfen die Geschwindigkeit der Applikation zu steigern
- ▶ ermöglichen die Fernkommunikation zwischen Objekten
- ▶ Client bemerkt die Kontrolle des Objekts nicht

NACHTEILE

- ▶ können je nach Implementierung die Antwortzeit verzögern
- ▶ fügen weitere Abstraktionsschicht ein, welche die Komplexität steigert
- ▶ Zwang zur Reimplementierung der definierten Methoden in der Schnittstelle

VERGLEICH MIT ANDEREN PATTERNS

- ▶ Decorator:
 - ▶ ähnliches UML-Diagramm
 - ▶ anderes Ziel: zusätzliches Verhalten
- ▶ Facade:
 - ▶ keine Zugriffskontrolle
 - ▶ stellt eine andere Schnittstelle bereit
- ▶ Adapter
 - ▶ verändert Schnittstellendefinition, aber nicht die Geschäftslogik

DANKESCHÖN!



it4need/php-proxy-pattern

ABBILDUNGSVERZEICHNIS

- ▶ [1]: memogenerator.net
- ▶ [2]: Entwurfsmuster von Kopf bis Fuß, S. 462
- ▶ [3]: memogenerator.net
- ▶ [4]: Entwurfsmuster von Kopf bis Fuß, S. 462