Clean Code

Was erwartet Sie?

- Etwas über mich
- Prinzipien & Praktiken
- Einfache Beispiele

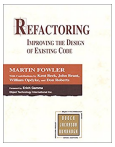
Wer ist das überhaupt?

- Sven Strittmatter (aka. Weltraumschaf)
- Mit 8 Jahren am Amiga 500 “programmiert”
- 2005 Studium abgeschlossen
- Software Architect bei iteratec GmbH

Und wie kommt der dazu?

- Design Patterns (Amazon)
  - natürlich überall Singleton benutzt

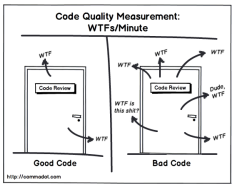
- Martin Fowler
  - Refactoring (Amazon)
  - Unit Testing
- testbarer Code
  - Google Testing Blog
  - Miško Hevery



Die Softwerkskammer Karlsruhe

- Robert Martin (aka. Uncle Bob)
  - Software Craftsmanship
  - Clean Code (Amazon)
- Softwerkskammer Stuttgart

Und überall war Legacy

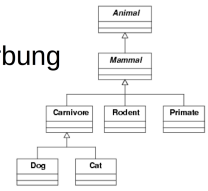


- Broken Window Theory
- Software Entropy (“software rot”)

Wie vermeidet man das?

Prinzipien & Praktiken

- DRY – Don’t Repeat Yourself
- YAGNI -You Ain’t Gonna Need It
- kleine Methoden/Klassen (mag auch der JIT)
- Dekomposition
- Vorsicht vor Optimierung
- Bevorzuge Komposition vor Vererbung
- …



Prinzipien & Praktiken

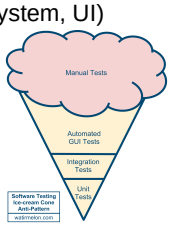
- SOLID (s. Uncle Bob)
  - Single Responsibility Principle
    - Mach nur ein Ding, aber das richtig.
  - Open Close Principle
    - Bestehenden Code nicht ändern, erweitern.
  - Liskov Substitution Principle
    - Sollte auch für Subklassen funktionieren.
  - Interface Segregation Principle
    - Kleine Interfaces, statt ein großes.
  - Dependency Inversion Principle
    - Bsp. List<T> statt ArrayList<T>.

Prinzipien & Praktiken

- weitere Heuristiken
  - Separation of Concern
  - Value vs. Service Objects
  - Mutable vs. Immutable
  - vermeide Seiteneffekte (pure Functions)
  - benutze **niemals** Singleton !!!1elf
  - vermeide Threads, und wenn doch
    - Synchronistation via Messages
    - kein Shared Memory!
    - Immutability

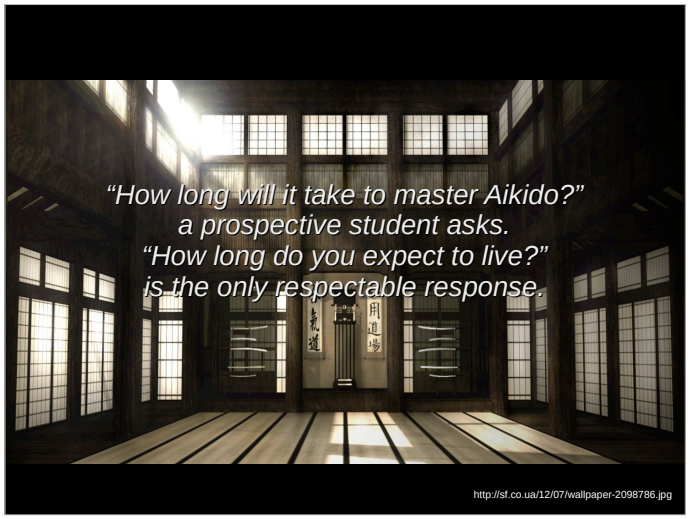
Prinzipien & Praktiken

- Reviews
  - Peer Reviews
  - Architektur Reviews
- Pair Programming
- automatisierte Tests (Unit, Integration, System, UI)
- Refactoring
  - horizontal vs. vertikal
  - commit early, commit fast
  - greppen: reflection
  - git bisect zur Fehlersuche



Tools die helfen

- Testframeworks
- IDE mit Refactoring-Tools
- Versionskontrollsystem
- Analyse-Tools (Sonar, Valgrind, …)
- Profiler (nicht raten!)



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Clean Code Developer

- http://clean-code-developer.de/
- Verschiedene Grade wie im Kampfsport
- Disziplin & Selbstreflektion
- Übung macht den Meister
  - Coding Dojos
  - Code Katas

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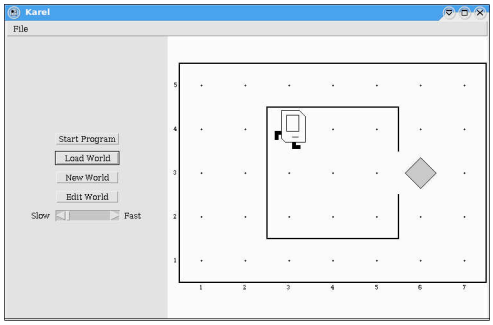
Beispiele

Dekomposition



Stanford University Course Programming Methodology CS106A (YouTube)

Dekomposition

```
abstract class SuperKarel {
    abstract public function run();

    public function beepersPresent() { /* ... */ }

    public function pickBeeper() { /* ... */ }

    public function putBeeper() { /* ... */ }

    public function move() { /* ... */ }

    public function turnArraound() { /* ... */ }
}
```

(keine) Dekomposition

```
class DoYourThing extends SuperKarel {
    public function run() {
        $this->move();
        while ($this->beepersPresent()) {
            $this->pickBeeper();
            $this->move();
            $this->putBeeper();
            $this->putBeeper();
            $this->turnArraound();
            $this->move();
            $this->turnArraound();
        }
        $this->move();
        while ($this->beepersPresent()) {
            $this->pickBeeper();
            $this->turnArraound();
            $this->move();
            $this->putBeeper();
            $this->turnArraound();
            $this->move();
        }
    }
}
```

(mit) Dekomposition

```
class OurDoubleBeepers extends SuperKarel {
    public function run() {
        $this->move();
        $this->doubleBeepersInPile();
        $this->moveBackward();
    }
}
```

(mit) Dekomposition

```
class OurDoubleBeepers extends SuperKarel {
    public function run() {
        $this->move();
        $this->doubleBeepersInPile();
        $this->moveBackward();
    }

    public function doubleBeepersInPile() {
        while ($this->beepersPresent()) {
            $this->pickBeeper();
            $this->putTwoBeepersNextDoor();
        }

        $this->movePileNextDoor();
    }

    public function moveBackward() {
        $this->turnAround();
        $this->move();
        $this->turnAround();
    }
}
```

(mit) Dekomposition

```
class OurDoubleBeepers extends SuperKarel {
    public function run() { /* … */ }

    public function doubleBeepersInPile() {/* … */ }

    public function moveBackward() { /* … */ }

    public function putTwoBeepersNextDoor() {
        $this->move();

        while ($this->beepersPresent()) {
            $this->moveOneBeeperBack();
        }

        $this->moveBackward();
    }

    public function movePileNextDoor() {
        $this->move();
        $this->putBeeper();
        $this->putBeeper();
        $this->moveBackward();
    }
}
```

(mit) Dekomposition

```
class OurDoubleBeepers extends SuperKarel {
    public function run() { /* … */ }

    public function doubleBeepersInPile() {/* … */ }

    public function moveBackward() { /* … */ }

    public function putTwoBeepersNextDoor() { /* … */ }

    public function movePileNextDoor() { /* … */ }

    public function moveOneBeeperBack() {
        $this->pickBeeper();
        $this->moveBackward();
        $this->putBeeper();
        $this->move()
    }
}
```

Dependency Injection

Goldene Regel des `new`-Operators:

- Ok für Domänen-Klassen, nicht für Services
- Ok in Tests und spezialisierten Erzeuger-Klassen, nicht in der Business-Logik

Dependency Injection

```
class FriendFinder {

   public function __construct() {
      $this->search   = new Search();
      $this->strategy = Strategy::create();
   }

}
```

- schwer zu testen (2 Abhängigkeiten)
- Don't do work in constructor!
- keine Test-Doubles möglich
- wird bei jedem Test ausgeführt
- Verkompliziert Test-Setup

Dependency Injection

```
class FriendFinder {

   public function __construct(Search $search, Strategy $strategy) {
      $this->search   = $search;
      $this->strategy = $strategy;
   }

}
```

- ermöglicht Test-Doubles
- nicht jeder Test braucht das volle Brett
- „Ask for things, don't look for things.“

Dependency Injection

- DI by Constructor (voriges Bsp.)
- DI by Setter
  - `$search->setSearch(Search $s)`
  - `$search->setStrategy(Strategy $s)`
- DI by Interface
  - http://martinfowler.com/articles/injection.html

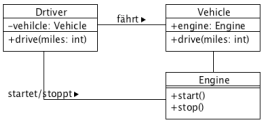
Gesetz von Demeter

Objekte sollten nur mit Objekten in ihrer unmittelbaren Umgebung kommunizieren.

Wikipedia

Gesetz von Demeter

```
class Driver {
    public function drive($miles) {
        $this->vehicle->engine->start();
        $this->vehicle->drive($miles);
        $this->vehicle->engine->stop();
    }
}
```



- schwer testbar, braucht immer Engine-Objekt
- Driver eng an Engine gekoppelt
- interner Status von Vehicle offen gelegt

Gesetz von Demeter

```
class Driver {
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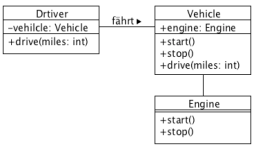
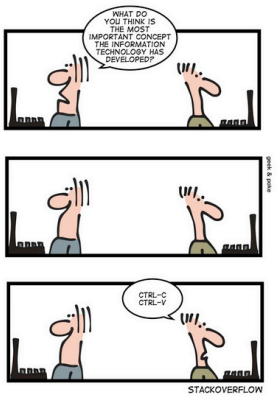


- leichter testbar
- Driver und Engine entkoppelt → leichter wartbar
- weniger fehleranfällig

Don’t Repeat Yourself (DRY)

Jede Doppelung von Code oder auch nur Handgriffen leistet Inkonsistenzen und Fehlern Vorschub.



Can You See it?

```
try {
  executeComponent(execute == null ? master : execute);
} catch (final ReplayException ex) {
  finishDebugging(obj.getDomainKey());
  resetDebugger();
  throw ex;
} catch (final KernelException ex) {
  LogManager.acquireLM().dumpStackTrace(this, VER, MN, IRecordType.TYPE_ERROR_EXC, ex);
  if (this.rules != null) {
    this.rules.setStatus(new LocaleStatus(ex.getMessage()));
  }
  finishDebugging(obj.getDomainKey());
  throw ex;
} catch (final ParserException ex) {
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  if (this.rules != null) {
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  }
  handleParserException(ex);
} catch (final Exception ex) {
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```

Komposition vor Vererbung

“Because inheritance exposes a subclass to details of its parent's implementation, it's often said that inheritance breaks encapsulation.”

Gang of Four

Komposition vor Vererbung

Komposition fördert die lose Kopplung und die Testbarkeit eines Systems und ist oft flexibler.

Komposition vor Vererbung

2 Konzepte in der OOP

1. *Whitebox-Reuse (Vererbung)*
2. *Blackbox-Reuse (Komposition)*

Komposition vor Vererbung

Whitebox-Reuse (Vererbung):

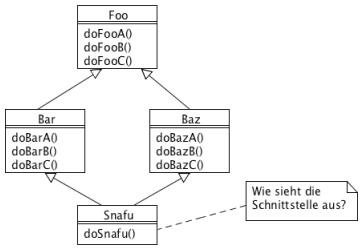
Subklasse abhängig von Elternklasse

→ unnötige Komplexität (große Hierarchien, Mehrfachvererbung)

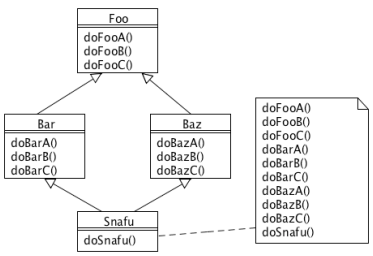
→ schlecht testbar (großer Scope, Dependencies)

→ statisch, Implementierung nicht zur Laufzeit tauschbar.

Komposition vor Vererbung



Komposition vor Vererbung

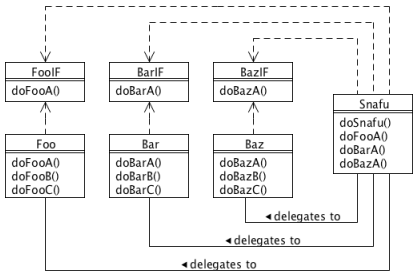


Komposition vor Vererbung

Blackbox-Reuse (Komposition):

Fördert die Entkopplung, wenn
man geeignete Interfaces benutzt.

Komposition vor Vererbung



Fragen & Diskussion

Slides: https://github.com/Weltraumschaf/Slides/tree/master/CleanCode