Programming Practices

Prof. Dr. Dirk Riehle

Friedrich-Alexander University Erlangen-Nürnberg

AMOS E02

KISS

(Keep It Simple, Silly)

YAGNI

(You Ain't Gonna Need It)

DRY

(Don't Repeat Yourself)

1. **Make it run**

2. **Make it right**

3. **Make it fast**

Definition of Big Ball of Mud [FY97]

A Big Ball of Mud is a haphazardly structured, sprawling, sloppy, duct-tape-and-baling-wire, spaghetti-code jungle. These systems show unmistakable signs of unregulated growth, and repeated, expedient repair. Information is shared promiscuously among distant elements of the system, often to the point where nearly all the important information becomes global or duplicated. The overall structure of the system may never have been well defined. If it was, it may have eroded beyond recognition. Programmers with a shred of architectural sensibility shun these quagmires. Only those who are unconcerned about architecture, and, perhaps, are comfortable with the inertia of the day-to-day chore of patching the holes in these failing dikes, are content to work on such systems.

1. **Maintainability**
   (Easier to understand)

2. **Extensibility**
   (Easier to adapt and evolve)

3. **Predictability**
   (Improves planning ability)

Technical Debt

(Ward Cunningham)

[1]   See https://youtu.be/Jp5japiHAs4

Video Lessons

- Technical Debt is a Metaphor

    - Communicates well to manager

    - (Certainly in financial services)

- Taking on debt can speed up development

    - It may be justified to learn faster

    - But you have to pay up later

- If you don't pay back debt you'll slow down

    - Paying up means refactoring

    - Still, never write poor code deliberately

1.   **Identify problem**
     (So-called "code smells")

2.   **Identify need to act**
     (Correlate occurrences)

3.   **Know how to act**
     (Refactor code)

Code Smell

- According to Fowler [F99]

  - "smells are certain structures in the code that indicate violation of fundamental design principles and negatively impact design quality"

  - also, "a code smell is a surface indication that usually corresponds to a deeper problem in the system"

- Code smells are not bugs

Example Code Smells

- Duplicated Code

- Long Method

- Large Class

- ...

Refactoring (Practice)

- Definition and purpose

    - Is a behavior-preserving transformation of existing source code

    - It is a change made to the internal structure of software to make it easier to understand and cheaper to modify without changing its observable behavior

- More on refactoring

    - Change the structure of code without changing behavior

    - Focus on non-functional features within range of specification

    - Are defined techniques that are typically language specific

    - Are ideally supported by IDEs, for example, the Eclipse JDT

- Defined by Opdyke [O92], popularized by Fowler [F99]

Example Refactorings

- Rename class

- Pull-up field

- Extract method

- …

- More at http://refactoring.com

Example Extract-Method Refactoring 1 / 2

```java
public class PhotoManager extends ObjectManager {
    protected Map<PhotoId, Photo> allPhotos = new HashMap<PhotoId, Photo>();

    public void addPhoto(Photo photo) {
        PhotoId id = photo.getId();
        assertIsNewPhoto(id);
        allPhotos.put(id, photo);
        ...
    }

    public Photo getPhotoFromId(PhotoId id) {
        Photo result = doGetPhotoFromId(id);
        if (result == null) {
            ...
            if (result != null) { allPhotos.put(id, result); }
        }
        return result;
    }

    public Set<Photo> findPhotosByOwner(String ownerName) {
        ...
        for (Iterator<Photo> i = r.iterator(); i.hasNext();) {
            Photo photo = i.next();
            allPhotos.put(photo.getId(), photo);
        }
        return r;
    }
    ...
```

```java
public class PhotoManager extends ObjectManager {

    public void addPhoto(Photo photo) {
        ...
        doAddPhoto(photo);
        ...
    }

    public Photo getPhotoFromId(PhotoId id) {
        ...
        doAddPhoto(photo);
        ...
    }

    public Set<Photo> findPhotosByOwner(String ownerName) {
        ...
        for (Iterator<Photo> i=r.iterator(); i.hasNext(); ) {
            doAddPhoto(i.next());
        }
        ...
    }

    protected void doAddPhoto(Photo myPhoto) {
        allPhotos.put(myPhoto.getId(), myPhoto);
    }

    ...
```
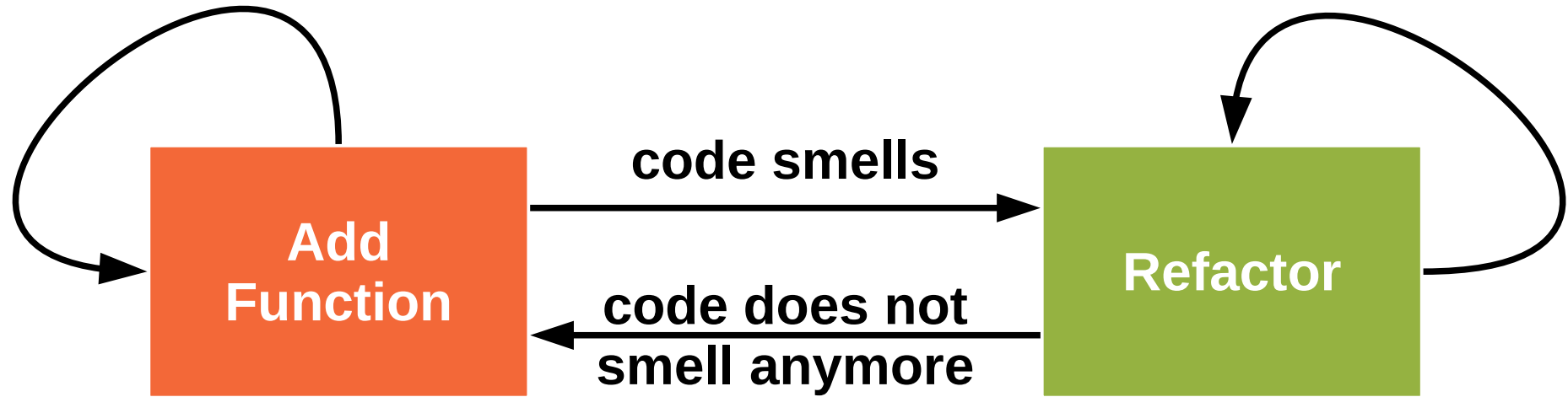
The "three strikes" rule

1st time: Just do it

2nd time: Wince at duplication

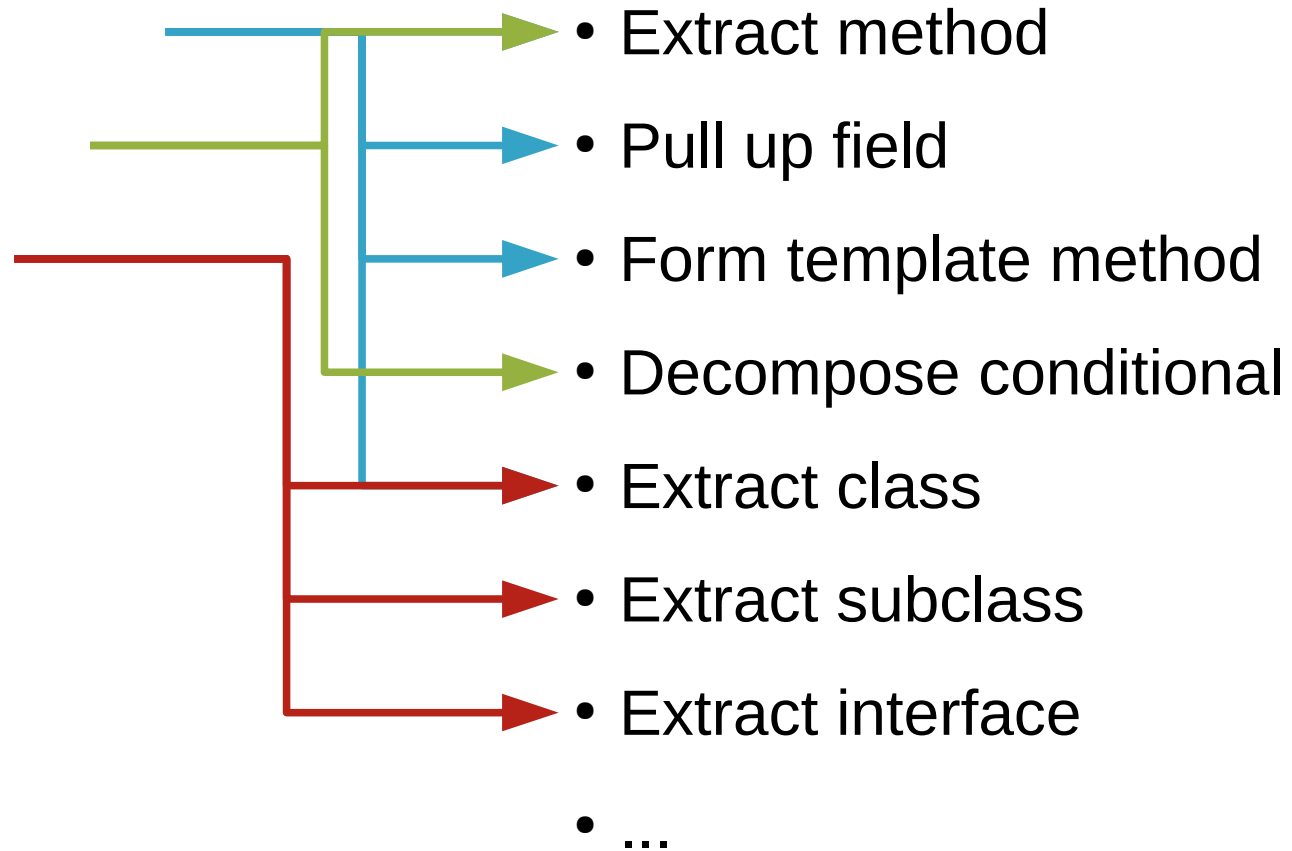### 3rd time: Refactor

Code Smells and Refactorings

- Duplicated code
- Long method
- Large class
- ...

- Extract method
- Pull up field
- Form template method
- Decompose conditional
- Extract class
- Extract subclass
- Extract interface
- ...

Example Refactoring Process

- The refactoring process can become complex

  - It may turn into a series of refactorings

- Example Removal of Switch Statement

  - Extract Method

  - Move Method

  - Replace Type Code …
    - with Subclass or
    - with State / Strategy

  - Replace Conditional ...
    - with Polymorphism

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Papyrus

Packa ⊠ **Ju JUnit**

PhotoManager.java ⊠

Outline ⊠

```java
    public void addPhoto(Photo photo) {
        PhotoId id = photo.getId();
        assertIsNewPhoto(id);
        doAddPhoto(photo);

        try {
            createObject(photo, getReadingStatement("INSERT INTO photos(id) VALUES
            Wahlzeit.saveGlobals();
        } catch (SQLException sex) {
            SysLog.logThrowable(sex);
        }
    }


    /**
     *
     */
    protected void doAddPhoto(Photo myPhoto) {
        photoCache.put(myPhoto.getId(), myPhoto);
    }


    /**
     *
     */
    public void loadPhotos(Collection<Photo> result) {
        try {
            readObjects(result, getReadingStatement("SELECT * FROM photos"));
            for (Iterator<Photo> i = result.iterator(); i.hasNext(); ) {
                Photo photo = i.next();
                if (!doHasPhoto(photo.getId())) {
                    doAddPhoto(photo);
                } else {
```

wahlzeit [trunk/wahlzeit]
- JRE System Library [java-
- src
  - org.wahlzeit.agents
  - org.wahlzeit.handlers
  - org.wahlzeit.main
  - org.wahlzeit.model
    - AbstractModelConfig
    - AccessRights.java 11
    - Administrator.java 11
    - Case.java 11 1/8/12
    - Client.java 11 1/8/12
    - EnglishModelConfig.ja
    - FlagReason.java 11 1/
    - Gender.java 11 1/8/12
    - GermanModelConfig.
    - Guest.java 11 1/8/12
    - LanguageConfigs.java
    - ModelConfig.java 11
    - Moderator.java 11 1/
    - Photo.java 11 1/8/12
    - PhotoCase.java 11 1/
    - PhotoCaseManager.ja
    - PhotoFactory.java 11
    - PhotoFilter.java 11 1/
    - PhotoId.java 11 1/8/1
    - PhotoManager.java 1
    - PhotoSize.java 11 1/8
    - PhotoStatus.java 11 1

Outline:
- org.wahlzeit.mode
- import declaration
- PhotoManager 11
  - instance : Photo
  - photoCache : Ma
  - photoTagCollect
  - getInstance() : Pl
  - hasPhoto(String)
  - hasPhoto(Photo
  - getPhoto(String)
  - getPhoto(PhotoI
  - PhotoManager()
  - doHasPhoto(Pho
  - getPhotoFromId
  - doGetPhotoFron
  - createObject(Re
  - addPhoto(Photo
  - doAddPhoto(Ph
  - loadPhotos(Coll
  - savePhoto(Photo
  - savePhotos() : v

Problems @ **Javadoc** **Declaration** **Console** ⊠ **Search**

```
<terminated> Wahlzeit [Java Application] /usr/lib/jvm/java-6-openjdk/bin/java (Feb 18, 2012 10:57:44 AM)
INFO: Started org.mortbay.http.HttpServer@100ebec
2012-02-18 10:57:45 542, level=sl, context=system, dbconnection=dbc0, threadid=1, client=system, logtype=info,
2012-02-18 10:57:45 545, level=sl, context=system, dbconnection=dbc0, threadid=1, client=system, logtype=info,
2012-02-18 10:57:45 546, level=sl, context=agent0, dbconnection=nodbc, threadid=16, client=system, logtype=info
```

org.wahlzeit.model.PhotoManager.doAddPhoto(Photo myPhoto) : void - wahlzeit/src

- Your code smells. All signs for refactoring are given. Under which circumstances should you not start a refactoring?

Review / Summary of Session

- Agile principles of programming
  - KISS, YAGNI, DRY
  - Make it run, right, fast

- Technical debt and refactoring
  - Principles, two hats
  - Example refactorings and tools

Thank you! Questions?

dirk.riehle@fau.de – **http://osr.cs.fau.de**

dirk@riehle.org – http://dirkriehle.com – @dirkriehle

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- Original version
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    - ...