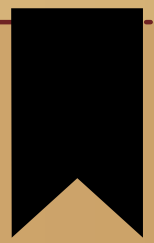
Principles in Refactoring

(chapter 2)



Refactoring is

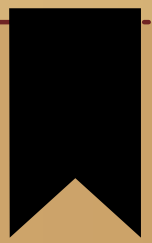
changing

the internal structure of software

keeping

the same observable behavior

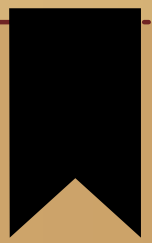
Goal



- The goal is to make the software easier to understand (clean up code, reduce complexity) without noticeable behavior changes.

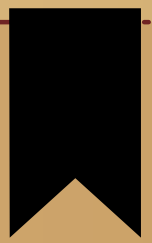
- Performance optimization, instead, is not a goal!

Writing Tests



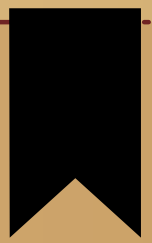
- Do not add any new tests, only restructure the code
- Only change existing tests to reflect occurred interface changes

The Two Hats



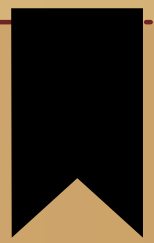
- Add new functions first
- Then refactor them considering the previous existing code

Regular refactoring helps



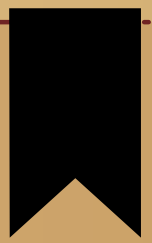
- Improving the design of software
- Tiding up the code, removing duplications
- Finding bugs
- Writing robust code
- Programming faster

When to refactor



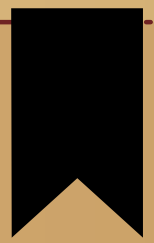
- After writing duplicated code
- After adding new functions
- On fixing bugs
- On code reviewing

Management



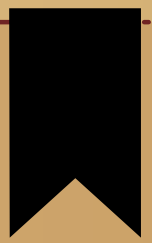
- Non-technical managers are not concerned by refactoring, thus hard to accept and schedule them.
- In any case during the development process, refactoring has to be performed

Indirection



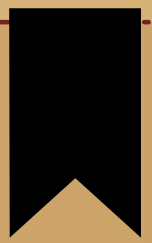
- Breaking big objects and big methods in smaller parts, reducing the complexity:
  - Sharing logic (i.e. helper method, superclass)
  - Explain intention (i.e. method name)
  - Isolate change
  - Encode conditional logic
- But it introduces the need of manage more objects and functions
  - Ensure then to avoid parasitic indirection

Problems with Refactoring



- Databases coupling
- Changing (published) interface
- Introducing exception throws
- Code is too messy and buggy (candidate to rewrite)
- Unfinished refactoring at the deadline

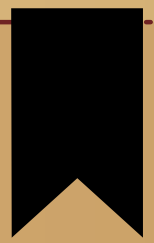
Design



- Do not try to have the perfect design on the first run
- Re-design over refactoring, better understand the problem to solve
- Flexibility never needed leads to overheads
- Simple solution first, then refactor for needed flexibility

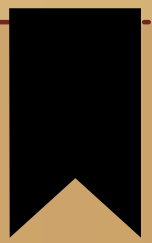
Bad Smells in Code

(chapter 3)



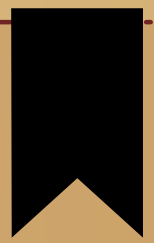
- Duplicated code
  - ➔ Dry! Reuse helper method
- Long method
  - ➔ Decompose in smaller methods
- Large class
  - ➔ Decompose in subclasses
- Long parameter list
  - ➔ Only pass what always required, call methods to get additional needed data
  - ➔ Pass map, keeping unchanged the interface
- Divergent change
  - ➔ Separate classes to reduce dependencies on change
- Shotgun surgery
  - ➔ Collect methods depending on common change
- Feature envy
  - ➔ Implement methods within the responsible classes

Refactoring Techniques
(chapter 3)



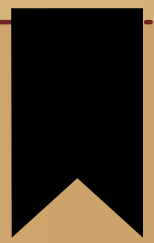
- Extract Method
  - Short and finely grained methods
  - Close semantic purpose
  - Self explaining code, no need of comments
  - Well-named methods explaining the specific functionality
  - Easy to override
- Pull Up Method
  - Eliminate duplicated behavior from classes, preventing partial alterations

Refactoring Techniques
(chapter 3)



- Form Template Method
  - Reduce duplicated behavior on subclasses
  - Exploit polymorphism
- Substitute Algorithm
  - Replace complex method body with simpler one
  - Easy to understand
  - Avoid duplication with library features
- Extract Class
  - Short and well defined purpose
  - Split classes grouping common responsibilities

Refactoring Techniques
(chapter 3)



- Replace Temp With Query
  - ➔ Prevent using local variable storing expression result
  - ➔ Accessibility of an expression, extracting it into a method
  - ➔ Possible reuse of the new method
- Introduce Parameter Object
  - ➔ Reduce list of parameters
  - ➔ Group relative parameters into object
  - ➔ Detect potential extract class candidates

- Preserve Whole Object
  - ➔ Reduce parameter list
  - ➔ Coupling direct source object instead of call many methods for its data
  - ✗ Cons: increase dependencies between objects
- Replace Method With Method Object
  - ➔ A method with many local variables is a candidate to be converted to an object with its attributes
  - ➔ Complex method can still be extracted within the new class

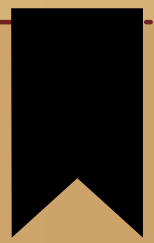
- Decompose Conditionals
  - Reduce complexity of control flow
  - Better describing of code branching
  - Accessibility of conditional checks, extracting them into methods
  - Possible reuse of the new methods
- Extract Subclass
  - Separate methods only used by some instances of a class
  - Better specification of a class

- Replace Data Value with Object
  - Transform object attribute from native value to a separate entity
  - Relational object
- Replace Type Code with Class
  - Rely on symbolic names instead of numeric type codes
  - Enforce compiler check

- Replace Type Code with Subclasses
  - Split behavior depending the object type
  - Exploit polymorphism
- Replace Type Code with State/Strategy
  - Split behavior and switch them during the life cycle of the instance
- Replace Array with Object
  - Semantic description of the values

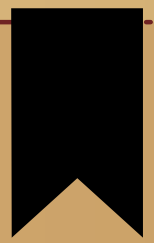
Bad Smells in Code

(chapter 3)



- Data Clumps
  - ➔ Extract group of data items into value object
- Primitive Obsession
  - ➔ Encapsulate primitive type attributes into value object
- Switch Statements
  - ➔ Exploit polymorphism
- Parallel Inheritance Hierarchies
  - ➔ Consider folding the hierarchy into a single class

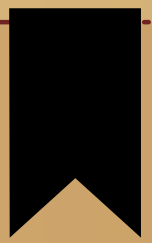
Bad Smells in Code
(chapter 3)



- Lazy Class
  - Eliminate classes without enough responsibilities
  - Collapse hierarchy if any
- Speculative Generality
  - Avoid implementation of non-required and never used features
- Temporary Field
  - Ensure instance variables are always used
  - Extract instance variables and relative algorithms in separate class
- Message Chains
  - Method call delegation through many related objects could break the chain

Bad Smells in Code

(chapter 3)



- Middle Man
  - ➔ Avoid objects just responsible to forward method calls
- Inappropriate Intimacy
  - ➔ Separate classes that are tightly coupled
- Alternative Classes with Different Interfaces
  - ➔ Detect and merge classes with same purpose