

# Clean Code

*There's no problem so simple that a bad developer can't make it complicated.*

Steve Bohlen

*Programming is the art of telling another human what one wants the computer to do.*

Donald Knuth

# What Clean Code stands for?

Clean code is a reader-focused development style that produces software that's easy to:

- ▶ write
- ▶ read
- ▶ maintain

# Why it matters?

## Broken windows theory

One *broken window* is all it takes to start the decline.

“All the rest of this code is crap, I'll just follow suit.”

Software entropy, software rot.

# Why it matters?

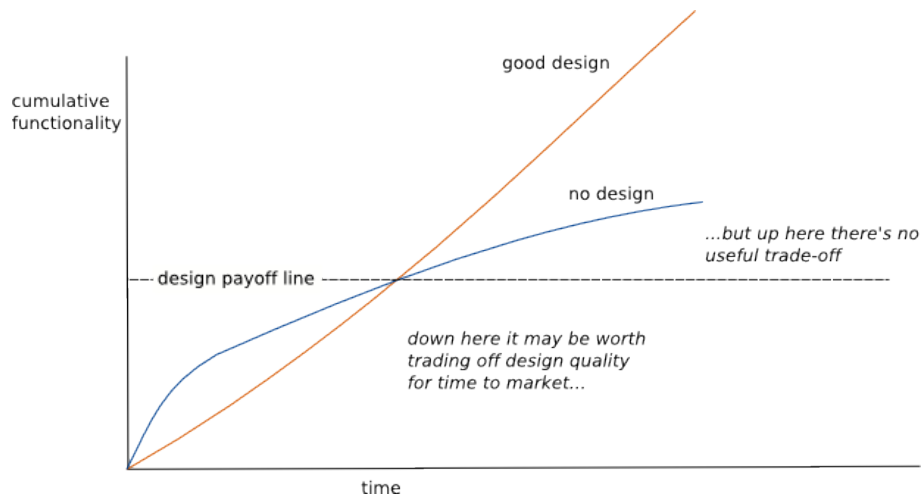


Figure 1: Features over time considering design quality

# The four characteristics of Rotting software

- ▶ Rigidity
- ▶ Fragility
- ▶ Immobility
- ▶ Viscosity

From the book *Design Principles and Design Patterns* de Robert C. Martins

# Rotting software 1 - Rigidity

It's hard to solve simple problems.

No one knows how long will take to solve them.

Estimating is hard.

## Rotting software 2 - Fragility

The software breaks too often.

A change in one unrelated part breaks others.

Changes must be echoed in many places.

## Rotting software 3 - Immobility

It's the inability of reusing software from other places.



## Rotting software 4 - Viscosity

It's easier to go to the *hacking mode* than to the *design preservation* mode.

# Implications

Software rot implies in frustrated developers.

Frustrated developers implies in more rotting.

Too much rooting implies in system rewrite.

Loss of money.

Loss of users.

# Solution?

- ▶ Good practices
- ▶ Software craftsmanship
- ▶ Clean code

*Anyone can write code a computer can understand, but only professional developers write code humans can understand.*

# Clean coder skills

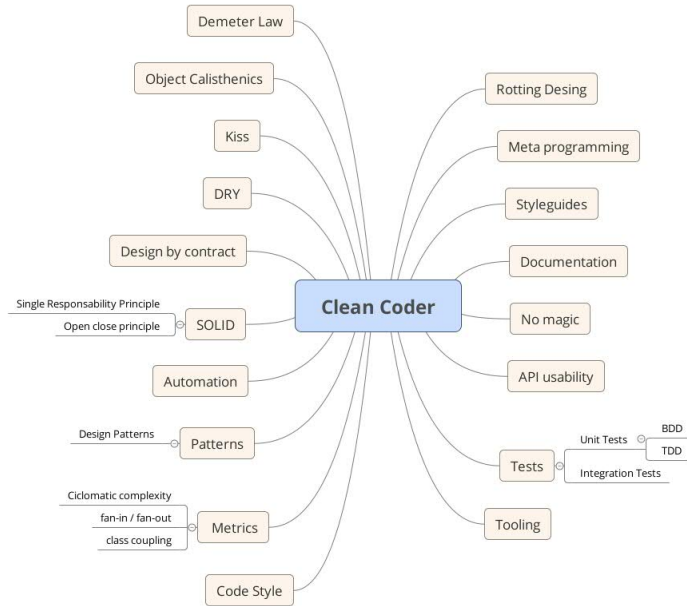


Figure 2:clean-coder-skills.jpg

# Recommendations

*Relatively simple things can tolerate a certain level of disorganization.  
However, as complexity increases, disorganization becomes suicidal.  
Robert Martin*

Follow the ones what suites you most.

*Dear truth always deceiving simplicity. John Green*

# SOLID

Or the “first five principles” by Michael Feathers.

To make systems that are: is easy to maintain and extend over time

# Single Responsibility Principle (SRP)

If you can think of more than one motive for changing a class, then that class has more than one responsibility.

```
<?php
interface UserInterface
{
    public function setId($id);
    public function getId();
    public function setName($name);
    public function getName();
    public function findById($id);
    public function insert();
    public function update();
    public function delete();
}
```

# Open Close Principle (OC)

The interface is closed to modification - and new implementation must, at least, implement that interface.



# Liskov substitution (LS)

It's possible to change subclasses without breaking the program.

# Interface segregation Principle (ISP)

It's better more interfaces than less.

Clients should not be forced to depend upon interfaces that they don't use.

```
abstract class AbstractPostgreSQLDriver implements  
Driver,  
ExceptionConverterDriver,  
VersionAwarePlatformDriver
```

# Dependency inversion

One should depend only on abstractions.

For PHP:

- ▶ <https://github.com/container-interop/container-interop>
- ▶ <https://github.com/auraphp/Aura.Dio>
- ▶ <https://github.com/zendframework/zend-servicemanager>

# DRY

Don't Repeat Yourself

```
/**  
 *  
 * @param $title The title of the CD  
 * @param $author The author of the CD  
 * @param $tracks The number of tracks of the CD  
 *  
 */  
public addCd($title, $author, int $tracks);
```

# Dry on documentation

Code and documentation are different views of the same underlying model.

Two places to edit models? DRY violation.

zendframework/ZendDeveloperTools generates diagrams of entities

# Orthogonality

Two or more things are *orthogonal* if changes in one do not affect any of the others.

## Benefits of Orthogonal Systems

- ▶ Eliminate effects between unrelated things
- ▶ Changes are localized
- ▶ Promotes reuse
- ▶ Disease sections of code are isolated
- ▶ The result system is less fragile
- ▶ Better tested
- ▶ Not tightly to a particular vendor

# Law of Demeter

You don't ever, ever play with your toy's toys.

If you need to change an object's state, get the object to do it for you.

Any method of an object should call only methods belonging to:

- ▶ itself;
- ▶ any parameters received;
- ▶ any objects it creates and any directly held component objects.

Really important for testing.

# Composite Reuse

One should build upon interfaces.

*OO languages replace function pointers with convenient polymorphism.*  
*Robert C. Martin*

## Benefits

- ▶ Easier to maintain (no unexpected behaviors)
- ▶ Performance gain
- ▶ The inversion of source code and run time dependencies



# Design by contract

*Objects collaborate with each other on the basis of “mutual obligations and benefits”. Bertrand Meyer*

Developing became the process of honoring contracts.

Accept few and promise few.

# Functions Arguments

The ideal number of arguments of a function is ZERO.

More than tree is unacceptable.

## Flags

Flag arguments are ugly. They state a SRP violation.

```
public function useResultCache($bool, $lifetime = null/**/**/)
{
    if ($bool) {
        $this->setResultCacheLifetime($lifetime);
        $this->setResultCacheId($resultCacheId);

        return $this;
    }
    //...
}
```

# Function Returns

Output from function is not so good as well. If functions must change a thing it must change itself.

# Comments

## Usage scenarios

Put in the dock block at least the authors name.

Comments serves as well to discuss the purpose and trade-offs of implementations.

## Avoid scenarios

The usual aim of comments is to express the code.

So, if they are necessary there's a grand chance that the design smells.

Inaccurate comments are way worse than no comments at all.

# Classes - Journal Metaphor (SRP)

Classes should be like journal articles.

In the header you get an general overview.

You are able to decide if you go further or not.

As you read down details increases.

A journal is made of many little articles.

# Objects vs Data structures

In any good system the distinction of data structures and objects is clear.

Objects hide data and expose operations over it.

Data structures expose data and have no meaningful operation.

# Naming

Long names are generally better than small names.

Need to see the source for to know what a function does? Work on names!

If there's an **And** in a function name it's violating SRP.

Complex operations can be made simple when intermediate variables are used.

```
testBuild_PRedBCWithDifference_whenCSOSN900AndICMSLessThan100Percent
```

# Many little classes vs Few big ones

Some fear to have to browser in many files till find the right piece of code.

Many classes does not imply in comprehension damage.

The Many and the Few approaches both have the same amount of business logic to care of.

So the question is:

**You prefer your tools being organized in boxes with little compartments and good names?**

**Or only a compartment and all inside?**



# Many little classes are always better than few big ones

Any regular system will contain a vast quantity of logic

The first goal of managing complexity is organizing in a way developers know how to look for a certain thing, without having to worry about neighbour details.

We want our systems to have many little classes - not few big ones.

Relates to ISP.

# Remove is better than adding

Don't let existing code dictate future code.

Be ready to refactor.

It may impact project schedule.

The assumption is that the impact will be less than the cost of not making the change.

*Perfection is attained not when there is nothing more to add, but when there is nothing more to remove. Antoine de Saint-Exupéry*

# Object Calisthenics

Seven code qualities premisses:

- ▶ Cohesion
- ▶ Loose coupling
- ▶ No redundancy
- ▶ Encapsulation
- ▶ Testability
- ▶ Readability
- ▶ Focus

# 1 - One level of indentation per method

## Benefits

Finding bugs is much easier.

If you have more than one indentation level you have more than one abstraction level.

## 2 - Don't use ELSE keyword

Else's encourages the inclusion of more, intermediate, ifs.

When possible avoid even if's.

Use polymorphism instead.

### 3 - Wrap all primitives and Strings

Small objects make programs more maintainable.

They serves as a container for logic that otherwise would be sparse.

## 4 - First class collections

Any class with a collection shouldn't contain other member variables.

## 5 - One dot per line

Bad:

```
this->myMemberObject  
    ->myMemberObjectMemberObject  
    ->doFoo();
```

Good:

```
this->myMemberObjectMemberObject  
    ->functionThatDoFooToo();
```

Relates to Law of Demeter



## 6 - Don't abbreviate

Abbreviation because of exhaustive use?

DRY violation.

Too long names?

Maybe a SRP problem.

## 7 - Keep all entities small

No classes over 50 lines and no packages over 10 files.

## 8 - No classes with more than two instance variables.

A class *Name* with first, middle and last name might be decomposed to: A class *Name* with a *Surname* class and a *GivenNames* class.

## 9 - No getters/setters/properties

When you have the enough quantity of encapsulation provided from the previous rules you will never need to do any operation on the getters/setters.

# Calisthenics Enforcer

PHPCS rules for OC: <https://github.com/object-calisthenics/phpcs-calisthenics-rules>

# Tests

Testing code use different patterns than production code.

They have different constraints.

There things you will never do in production code that in testing code is allowed.

Like memory and performance things.

But never clarity things.

Tests is the best way of documenting the system usage.

# No Magic

Never buy magic.

Before you commit to a framework, make sure you could write it.

Do this by actually writing something simple that does the basics that you need.

Make sure the magic all goes away.

# Three virtues of a programmer

- ▶ Laziness: The quality that makes you go to great effort to reduce overall energy expenditure. It makes you write labor-saving programs that other people will find useful and document what you wrote so you don't have to answer so many questions about it.
- ▶ Impatience: The anger you feel when the computer is being lazy. This makes you write programs that don't just react to your needs, but actually anticipate them. Or at least pretend to.
- ▶ Hubris: The quality that makes you write (and maintain) programs that other people won't want to say bad things about.

Larry Wall



# Style Guides

Follow a coding standard, no matter which, but all the code must follow the chosen one.

## Examples for PHP

- ▶ PSR2
- ▶ Zend
- ▶ Symfony

# KISS

Simplicity is different of easy.

*UNIX is very simple, it just needs a genius to understand it's simplicity.*  
*Dennis Ritchie*

# Measure

Nice things to measure:

- ▶ Cyclomatic complexity;
- ▶ Inheritance fan-in (number of base classes);
- ▶ Inheritance fan-out (number of derived modules using this one as parent);
- ▶ Class coupling ratios

# PHP7 for the clean coder

Anonymous classes as a way of mocking.

# Tools

- ▶ Codacy: <https://www.codacy.com/>
- ▶ PHP refactoring toolbox:  
<https://github.com/adoy/vim-php-refactoring-toolbox>

# Literature

*Those who do not remember the past are condemned to repeat it.*

Jorge Agustin Nicolas Ruiz de Santayana y Borrás

1. Clean code: A hand book of Agile Software craftsmanship; Robert C. Martin
2. The pragmatical programmer; Andrew Hunt
3. Code Complete; Steve McConnell
4. Refactoring: Improving the Design of Existing Code;
5. Release It!: Design and Deploy Production-Ready Software; Michael T. Nygard

Plural sight course

<http://app.pluralsight.com/courses/writing-clean-code-humans>

# Conclusion

*Quality is a team issue. Andy hunt.*

Teams as a whole should not tolerate broken windows.

Clean code is not about perfection.. It's about honesty.

We made our best to leave the camp cleaner than we find it?

# Conclusion

But if we aim for the 80% where code needs the most. We are cool.

Parts not critical to performance must be clean - not optimized.

*The best programmers are 28 times best than the worst ones. Robert Glass, Facts and Fallacies of Software Engineering*

There's always room for improvement.



# Thanks. Questions?

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