

All about 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

About Me

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Researching nature inspired intelligence for optimization

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?

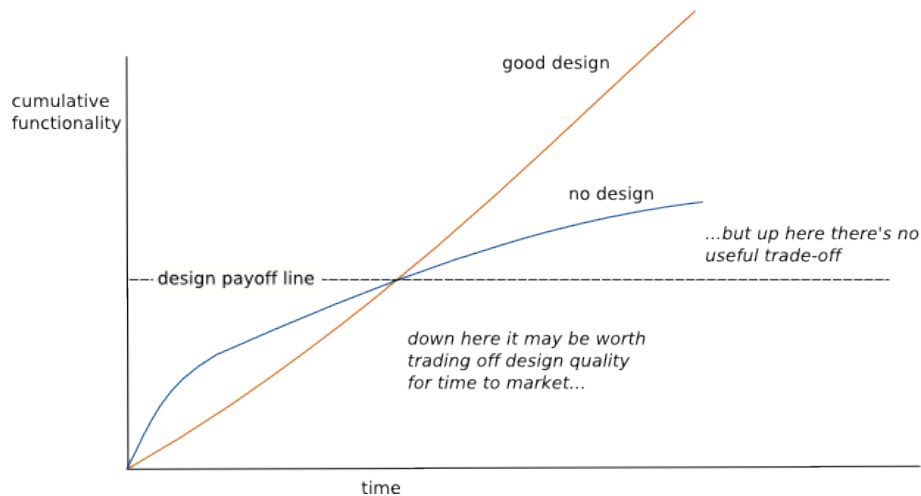


Figure 1: Features over time considering design quality

The four characteristics of Rotting software

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

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

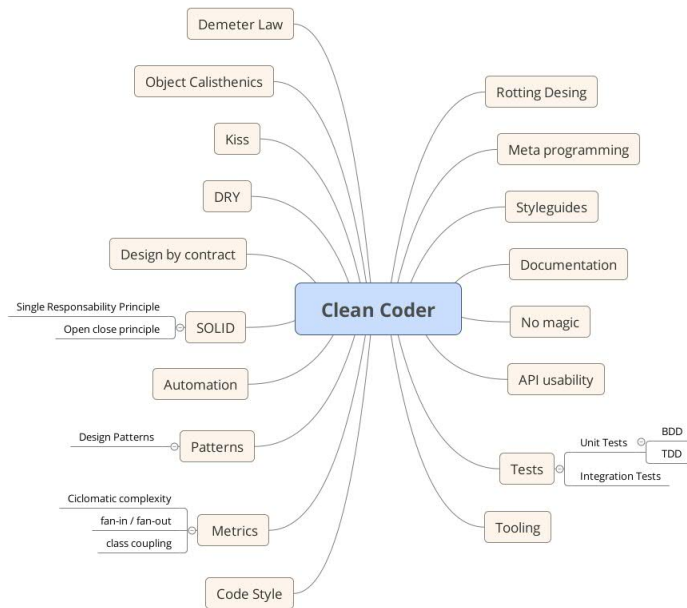


Figure 2:clean-coder-skills.jpg

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

Naming

Long names are generally better than small names.

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

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

```
testBuild_PRedBCWithDifference_whenCSOSN900AndICMSLessThan100Percent
```

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.

Functions Arguments

The ideal number of arguments of a function is ZERO.

More than tree is unacceptable.

Flags

Flag arguments are ugly.

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

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

Classes - Journal Metaphor

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.

KISS

Simplicity is different of easy.

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

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

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 all the magic goes away.

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

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.

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.

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.

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>

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>

Tools

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

Style Guides

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

- ▶ PSR2
- ▶ Zend
- ▶ Symfony

Literature

1. Clean code: A hand book of Agile Software craftsmanship; Robert C. Martin
2. The pragmatcal 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

Those who do not remember the past are condemned to repeat it. Jorge Agustin Nicolas Ruiz de Santayana y Borrás

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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