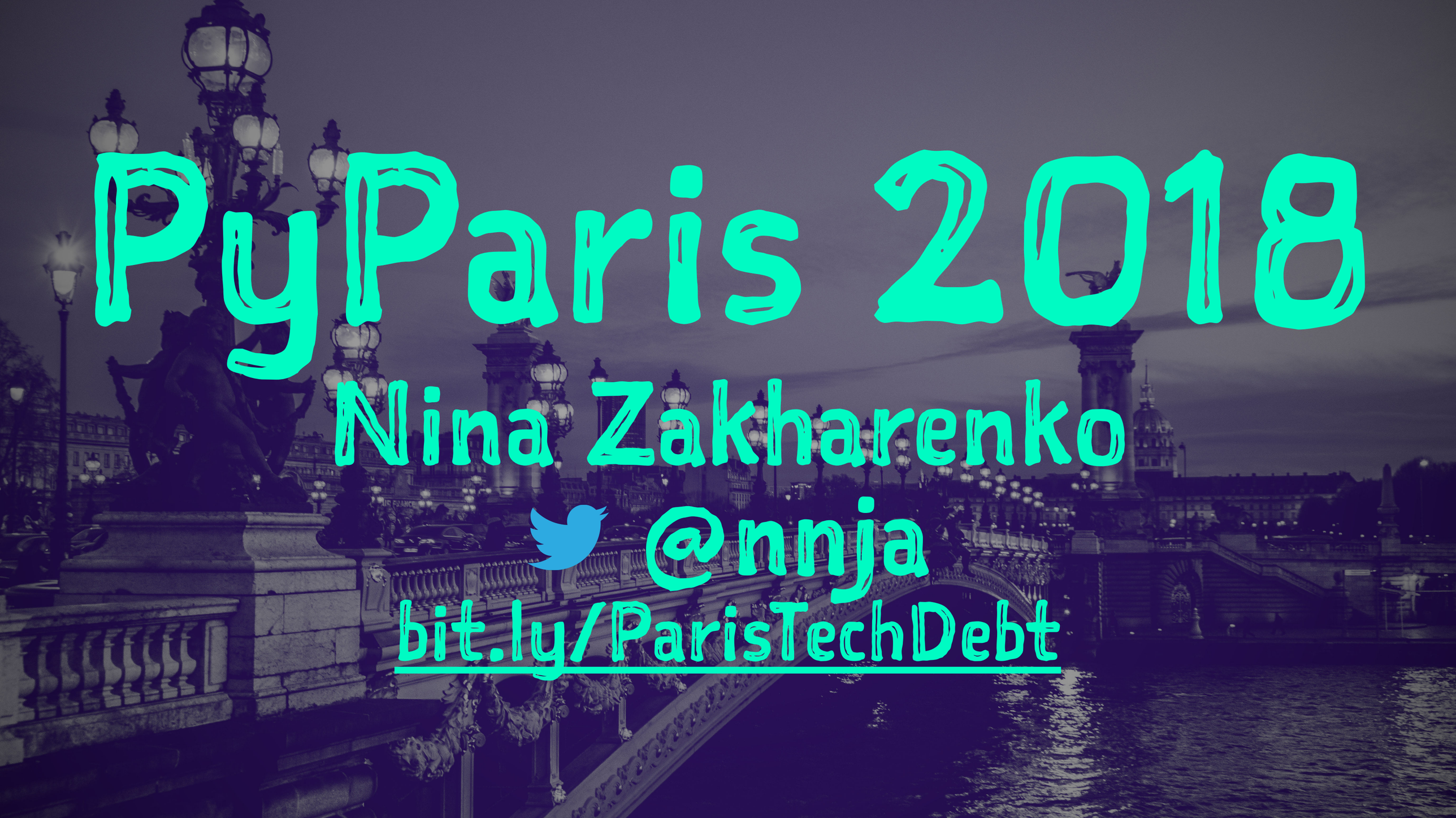
PyParis 2018
Nina Zakharenko
@nnja
bit.ly/ParisTechDebt

Livetweet!

use #PyParis

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Technical Debt

The code monster in your closet

slides: bit.ly/ParisTechDebt

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What is technical debt?

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A series of bad decisions

(Both business & technical)

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Which lead to ->

Error prone code & architecture

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... and using more

Resources

to accomplish

Less

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What decisions were made in the past that prevent me from getting sh** done today?

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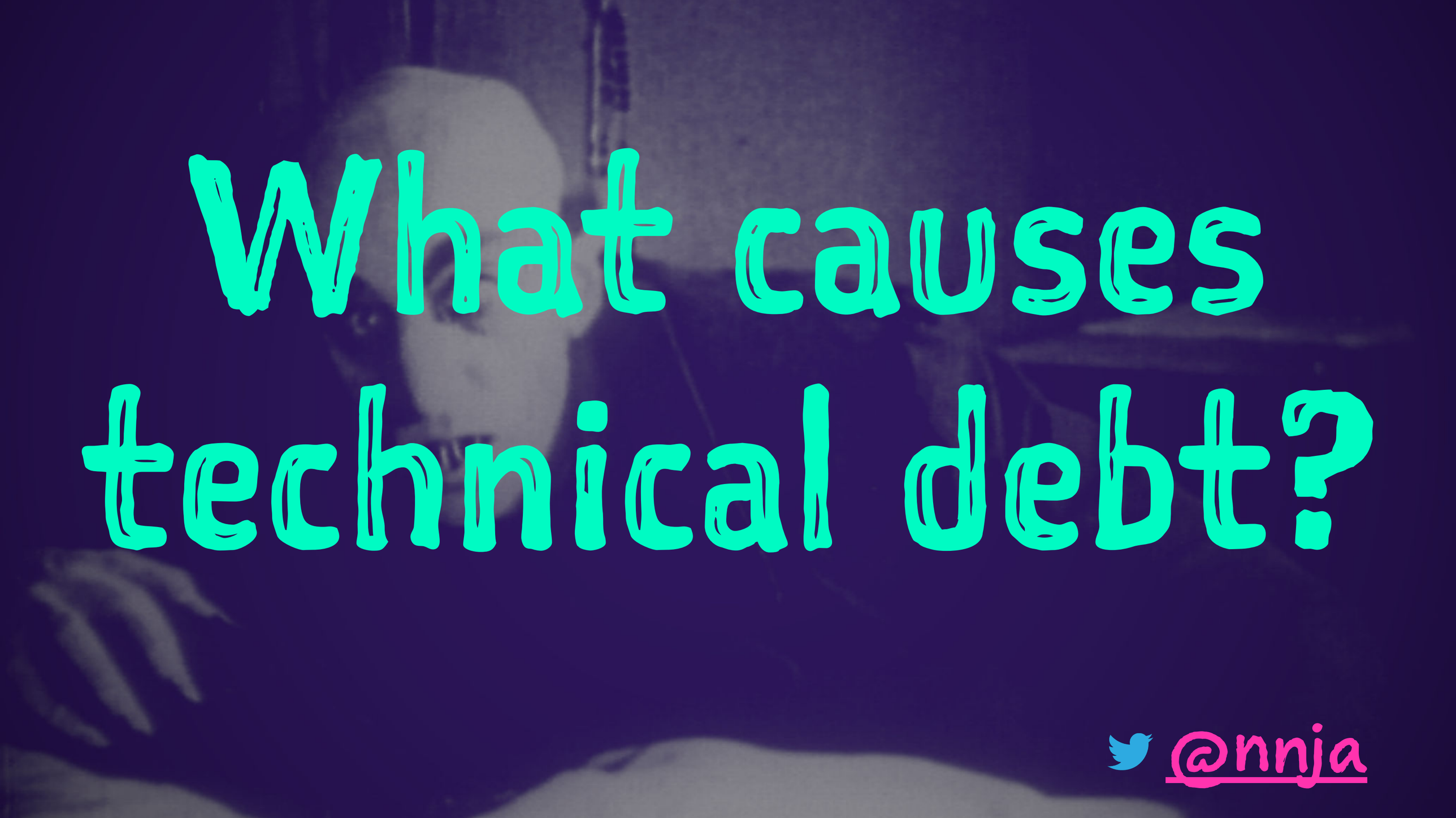
What causes technical debt?
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Me.
And you.

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Mistakes I Made Early On

- Not seeing the value in unit tests
- Not knowing how to say **NO** to features

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Mistakes I Made Early On

- Overly optimistic estimates
- Putting releases over good design & reusable code

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Time Crunch

That project was due yesterday!

I'll take a shortcut, and clean up the mess tomorrow.

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Unneeded Complexity

Lines of code committed != amount of work accomplished

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Lack of understanding

1. Have a problem
2. Look up a solution on stackoverflow
3. Copy & paste it into your code
4. ???
5. **Bugs!**

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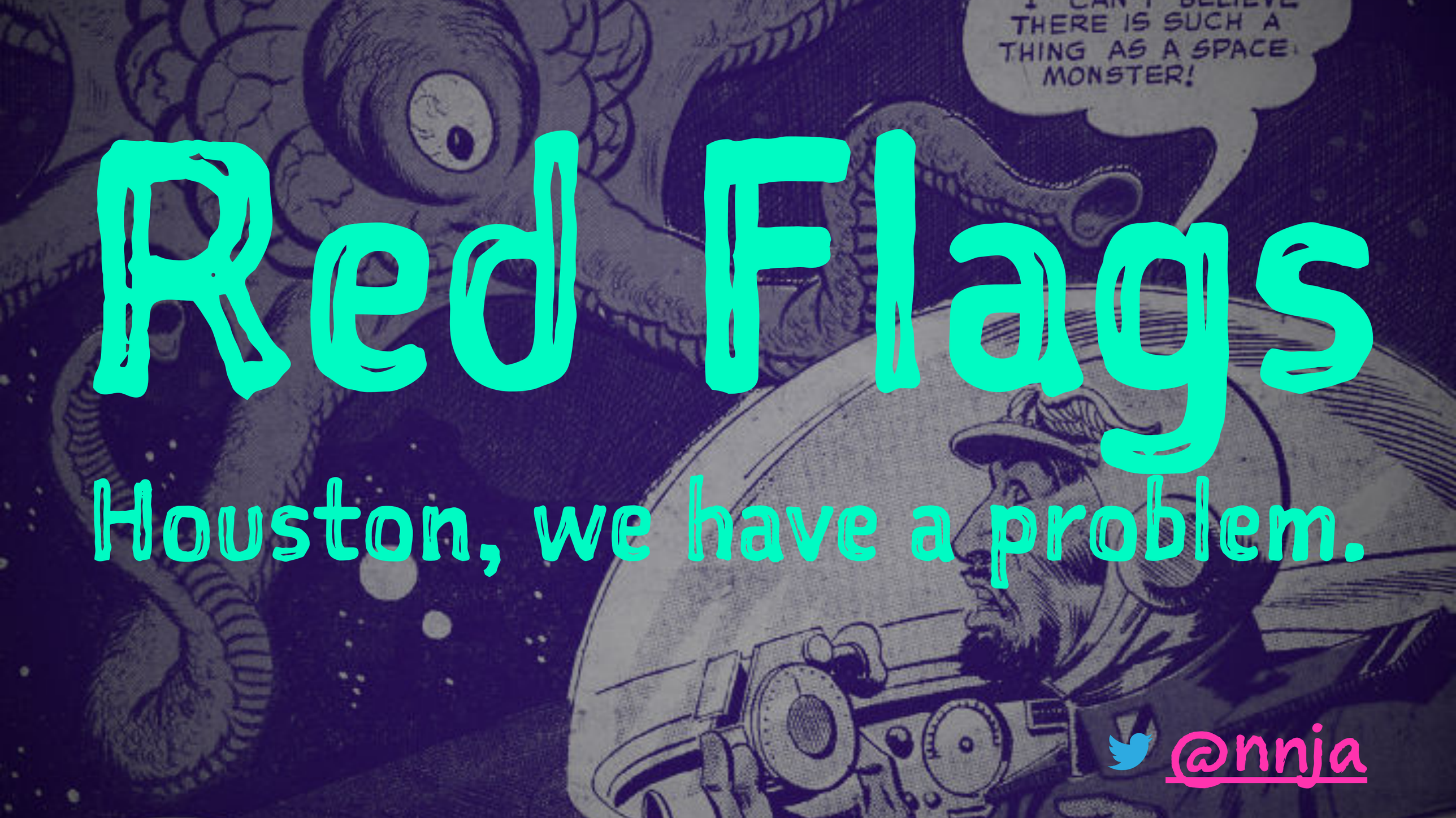
Culture of Despair

This is already a heap of trash.

Will anyone really notice if I add one more thing to the top?



Red Flags

Houston, we have a problem.

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Code Smells

- Not Bugs
- An indication of a deeper problem

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Code Smells

- Half implemented features
- No documentation, or poor documentation

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Code Smells

- Commented out code
- Incorrect comments
- No tests, or worse: broken tests

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Restore deleted code with git!

Find by content:

```
$ git log --summary -G'(D|d)jango'
```

Find the commit that deleted a file:

```shell
git log --diff-filter=D --summary -- <filename>
```

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No more commented out code! 

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Poor Documentation

```
class OrganicGlutenFreePizzaFactory:
    def get_dough(self):
        """
        Return amazing, organic, GMO and Gluten Free Dough
        """
        # ran out of organic gluten free, use the other stuff.
        # return 'organic gluten free dough'
        return 'gmo pesticide processed gluten-full dough'
```

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Architecture & Design... Smells

- Parts of the code no one wants to touch
- Brittle codebase -- changing code in one area breaks other parts of the system
- Severe outages caused by frequent & unexpected bugs

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Good Design -> Implementing new features comes easily

Poor Design -> New features are shoe-horned into the system

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Python Specific
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Functionality changes, but variable names don't

```
employees = ['John', 'Mary', 'Dale']

employees = 'Bob'

employees[0]
```

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Monkey Patching 🚫🐒

```
def new_init(self):
    pass

some_library.SomeClass.__init__ = new_init
```

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What exactly does this decorator do?

```
def decorator_evil(func):
    return False

@decorator_evil
def target(a,b):
    return a + b

>>> target(1,2)
TypeError: 'bool' object is not callable

>>> target
False
```

Circular Dependencies

```
# Circumvent circular dependency warnings
def some_function(x):
    from some.module import some_method
    some_method(x)
```

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Fig. 22.—Vampire Bat.

Case Studies

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IRS Chief:
"We still have applications that were running when JFK was President"
Tech at the IRS

50 Year Old Technology

"And we continue to use the COBOL programming language, it is extremely difficult to find IT experts who are versed in this language."

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It's not just the IRS

- Banks & Financial Institutions
- Universities
- Air Traffic Control
- ... many still use COBOL

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Story Time

- I used to work in finance.
- At the time I was there, all of the banking systems were run on mainframes.
- The bankers were getting frustrated. They wanted a UI.

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Big Idea!

- Let's write a fancy new web front end
- It'll do *ALL* the things

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But

- Rewriting the backend is too expensive
- It already does what we need
- Let's leave the mainframe as the backend

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Cursors

- The mainframe would output a text screen from a program result, based on a query.
- The results would be parsed by reading variables from the screen in certain positions.

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Result?

- The new system was incredibly slow
- And error prone
- After months of work, the multi-million dollar rewrite was scrapped

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You can try to cover up debt...
(but it probably won't work)

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The MVP

- (Minimum Viable Product)
- Get the product to market as soon as possible

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A Great Idea

- A successful project that was created by a lone developer in a coffee fueled 48 hours.

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There Was a Problem

- Years went on, but the initial code and design didn't go away.
- Instead, it became the base for an expanding project, with expanding features.
- There was never any time to refactor.

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Scope Creep

- Features that someone thought was a good idea one day, stuck around forever.
- > "In case we need them. Later."

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Sad Developers

- Minimal working tests (no time to write them).
- When a release was pushed, something was bound to break.
- Made everything feel like it was *your* fault.

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Grinding To a Halt

- Development time for new features skyrocketed
- The project was deemed too difficult to maintain
- ... and cancelled.

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Sometimes you need to
burn it.
With fire.
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Battling The Monster
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Don't point fingers

Technical debt is a team-wide problem.

Everybody needs to be part of the solution.

Work Together

- Code Standards
- Pair Programming
- Code Reviews

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Unless something is on fire,
or you're losing money,
don't merge unreviewed
code into master.

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Be Accountable

- Unit & Integration Tests
- Pre-Commit Hooks
- Continuous Integration

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Make a Commitment

Company tried to fight debt, but they didn't make a commitment.

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Ended up with twice as many technologies in their stack as needed, and twice as big of a mess.

Sell It To Decision Makers

By allocating project time to tackling debt, the end result will be less error prone, easier to maintain, and easier to add features to.

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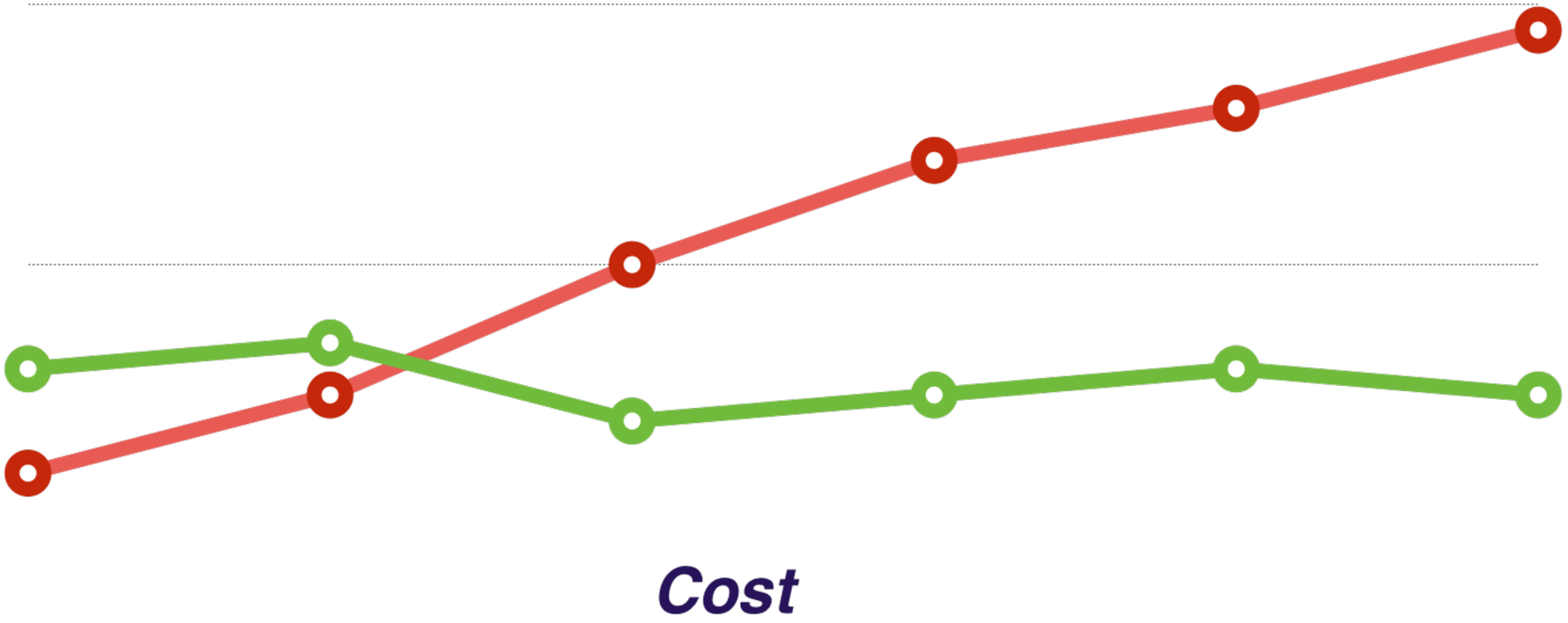
Not broken, why fix it?



Source

Ski Rental Problem

You're going skiing for an unknown number of days.

It costs $1 a day to rent, or $20 to buy.

Source

Hiring developers is hard.

Technical debt frustrates developers.

Frustrated developers are more likely to leave.

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Some lingering debt is inevitable.

Don't be a perfectionist.

Figure out the project tolerance, and work with it.

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Use these arguments to justify the additional time it takes to do things right

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To Win The Fight, Pay Down Your Debt
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Refactoring

The single greatest tool in your toolbox

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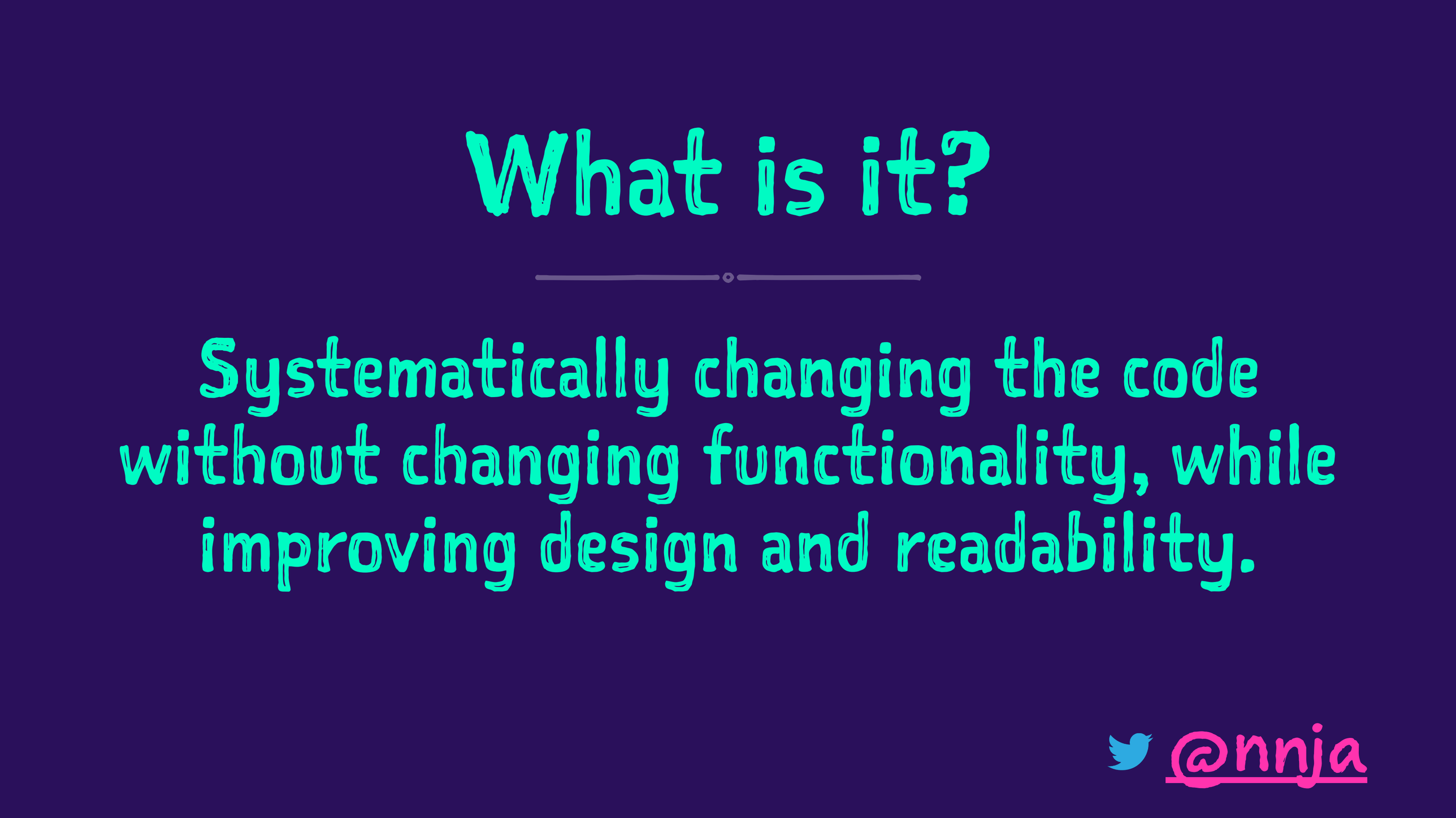
What is it?

Systematically changing the code without changing functionality, while improving design and readability.



Refactoring

- Slow and steady wins the race.
- The end goal is to refactor without breaking existing functionality.

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Refactoring

- Replace functions and modules incrementally.
- Test as you go.
- Tests are *mandatory* at this step.

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yelp Engineering

Undebt: How We Refactored 3 Million Lines of Code

Evan H., Software Engineering Intern

Aug 23, 2016

github.com/Yelp/undebt, yelp refactoring

Use proper design patterns

README.md

python-patterns

A collection of design patterns and idioms in Python.

github.com/faif/python-patterns

Use depreciation patterns

Like openstack debtcollector

```
class removed_property(object):
    """Property descriptor that deprecates a property.
    This works like the ``@property`` descriptor but can
    be used instead to provide the same functionality
    and also interact with the :mod:`warnings` module to
    warn when a property is accessed, set and/or deleted.
    """
```

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Use vulture.py to find dead or unreachable code

```
$ pip install vulture
$ vulture script.py package/
```

or

```
$ python -m vulture script.py package/
```

github.com/jendrikseipp/vulture

sample code

```
def foo():
    print("foo")

def bar():
    print("bar")

def baz():
    print("baz")

foo()
bar()
```

vulture.py output

```
› python -m vulture foo.py
foo.py:7: unused function 'baz' (60% confidence)
```

Prioritize

What causes the biggest & most frequent pain points for developers?

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Just like with
monetary debt,
pay off the high interest
loan first.
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Shelf Life

What's the life expectancy of this project?

Longer shelf life -> higher debt interest

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Technical debt can be strategic

If you don't have to pay it off, you got something for nothing.

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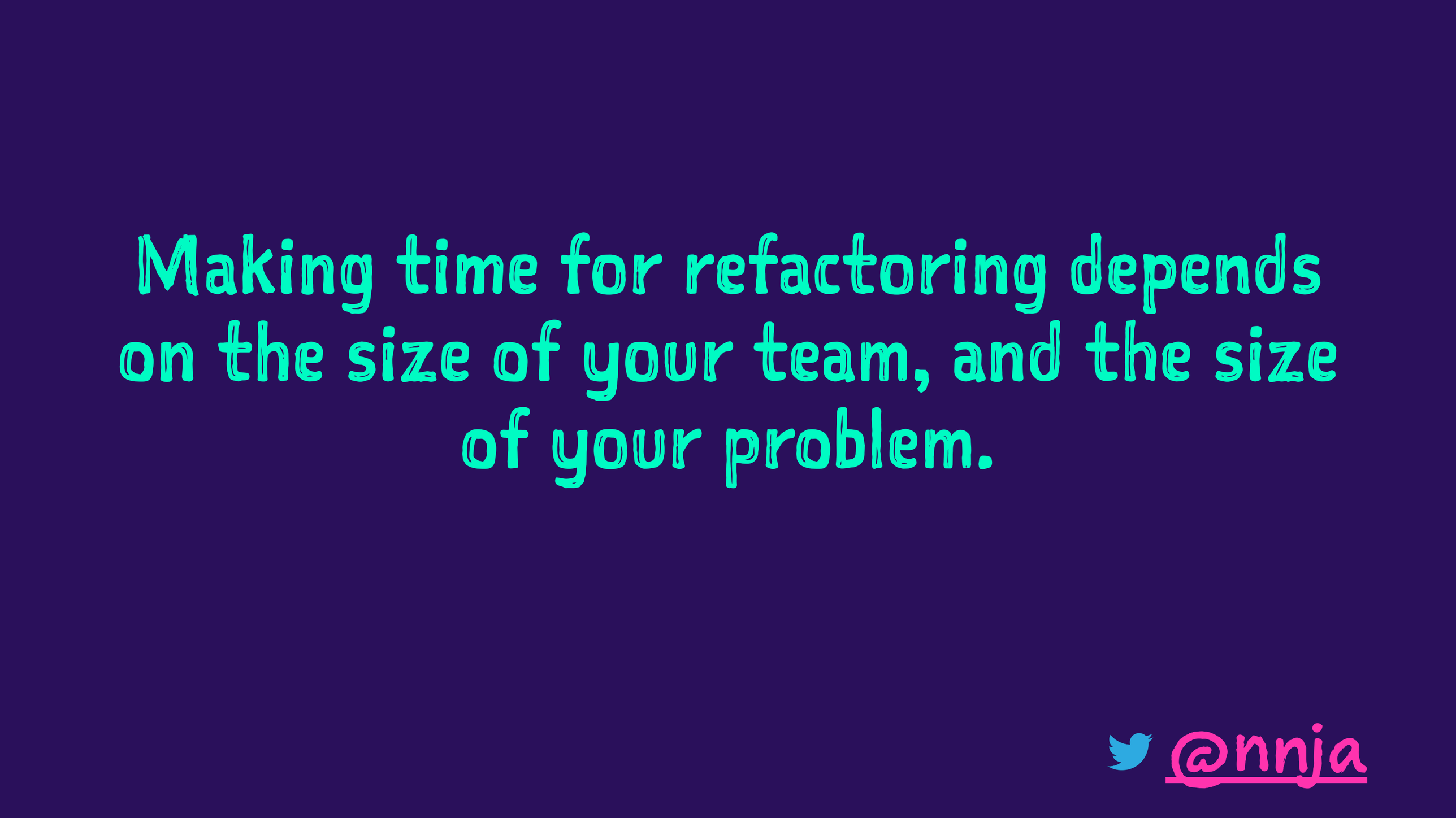
Making time for refactoring depends on the size of your team, and the size of your problem.



Guidelines

- Small
  - Devote a week every 6-8 weeks
- Medium
  - Devote a person every 1-4 weeks, rotate
- Large

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A Few Last Tips
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Code should be for humans

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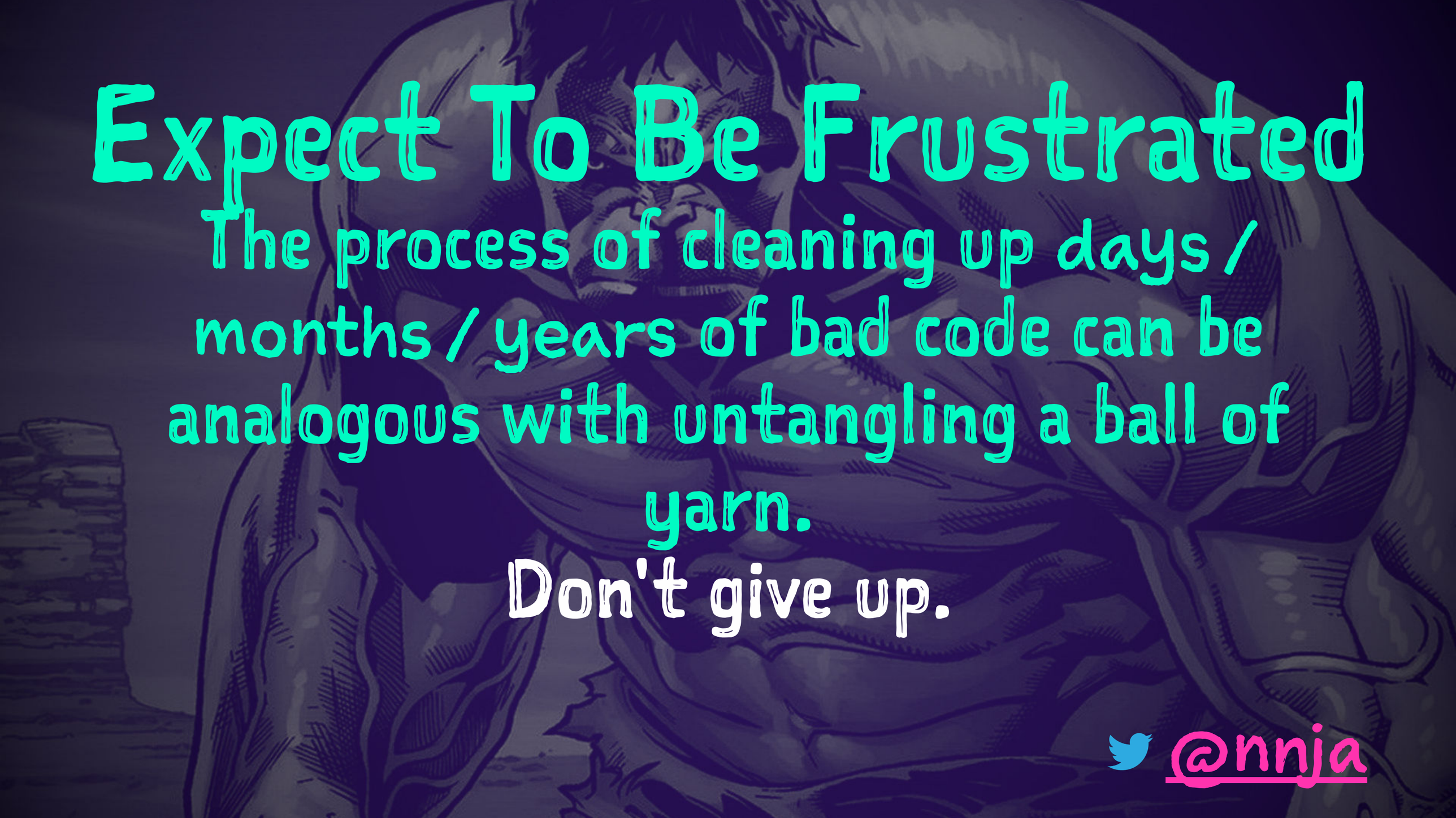
Boy Scout Rule

"Always check in a module cleaner than when you checked it out."

Source


Expect To Be Frustrated
The process of cleaning up days / months / years of bad code can be analogous with untangling a ball of yarn.
Don't give up.
@nnja


YOU CAN
DO IT!
memegenerator.net

Thank You!

Python @ Microsoft:
bit.ly/parispython

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