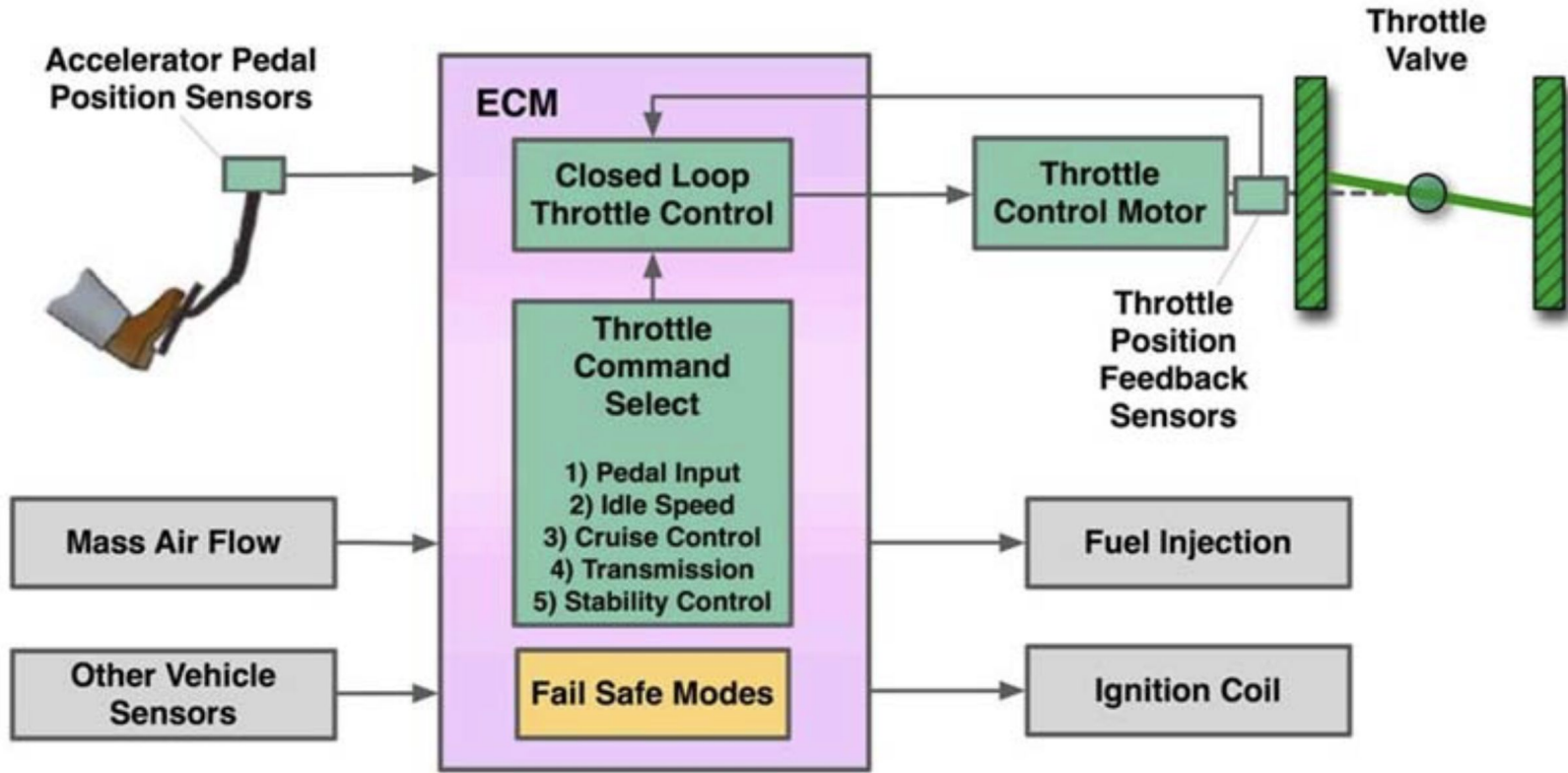


# Why Everyone Should Care About Crappy Code

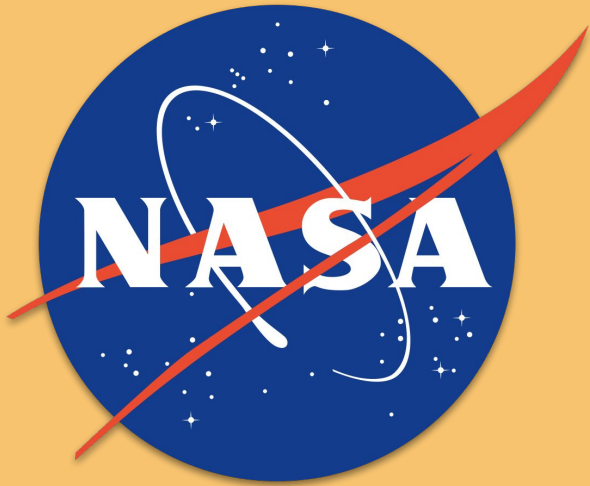
The cleanest code is the code you didn't write



**2005 TOYOTA CAMRY L4**



NHTSA Toyota Unintended Acceleration Investigation *Figure 4.0-1*



# MISRA C

A set of rules put forward by the Motor Industry Software Reliability Association that aims to ensure quality of C code used in embedded systems.

## Rule 12.4 (required)

The right-handed operand of a logical && or || operator shall not contain side effects.

```
1 if ( ishigh && ( x = i++ ) ) /* Not compliant */
2 if ( ishigh && ( x = f(x) ) ) /* Only acceptable if f(x) is
3                               known to have no side effects */
```

# MISRA C: 1998

93

Required Rules

34

Advisory Rules

# MISRA C: 2004

122

Required Rules

20

Advisory Rules



**Auto manufactures  
weren't required to  
follow these rules**

# 50%

Overlap claimed between Toyota's  
approximately 100 coding standards and  
the MISRA C ruleset

# 11

MISRA C rules actually included in  
Toyota's coding standards

# 7000

Violations found of 35 MISRA C rules  
found in NASA's investigation

# 80,000

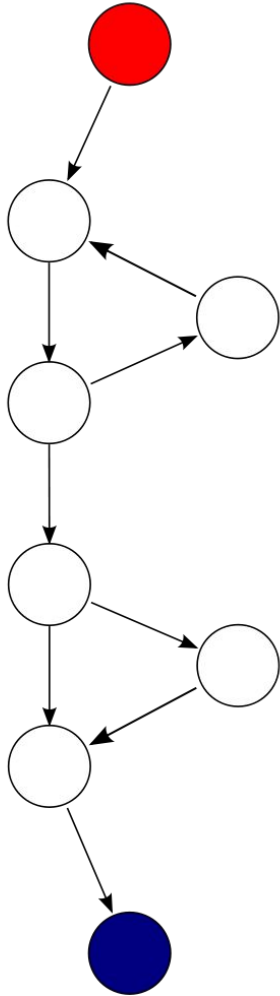
Violations found of all MISRA C rules  
found in Michael Barr's Investigation

# Cyclomatic Complexity

A software metric used to indicate the complexity of a program [through the] quantitative measure of the number of linearly independent paths through a program's source code



```
1 def is_negative(number):  
2     if number < 0:  
3         return True  
4     else:  
5         return False
```



9 edges  
- 8 nodes  
+ (1 connected component \* 2)

---

3 Cyclomatic Complexity



**Sum only even  
numbers over zero  
from a list of  
numbers**



```
1 def test_calculate_sum(self):
2     numbers = [2, 4]
3     result = calculate_sum(numbers)
4     self.assertEqual(6, result)
5
6 def test_calculate_sum_handles_empty_lists(self):
7     numbers = []
8     result = calculate_sum(numbers)
9     self.assertEqual(0, result)
```

# Cyclomatic Complexity: 2



```
1 def calculate_sum(numbers):  
2     final = 0  
3     for number in numbers:  
4         final = final + number  
5     return final
```



```
1     def test_calculate_sum_handles_null_case(self):  
2         result = calculate_sum(None)  
3         self.assertEqual(0, result)
```

# Cyclomatic Complexity: 3



```
1 def calculate_sum(numbers):
2     if numbers is None:
3         return 0
4     else:
5         final = 0
6         for number in numbers:
7             final = final + number
8         return final
```



```
1 def test_calculate_sum_ignores_numbers_under_zero(self):  
2     numbers = [-1, 2, -3]  
3     result = calculate_sum(numbers)  
4     self.assertEqual(2, result)
```

# Cyclomatic Complexity: 4




```
1 def calculate_sum(numbers):
2     if numbers is None:
3         return 0
4     else:
5         final = 0
6         for number in numbers:
7             if number > 0:
8                 final = final + number
9     return final
```



```
1 def test_calculate_sum_ignores_odd_numbers(self):  
2     numbers = [1, 2, 3]  
3     result = calculate_sum(numbers)  
4     self.assertEqual(2, result)
```



# Cyclomatic Complexity: 4



```
1 def calculate_sum(numbers):
2     if numbers is None:
3         return 0
4     else:
5         final = 0
6         for number in numbers:
7             if number > 0 and number % 2 == 0:
8                 final = final + number
9         return final
```

4

Cyclomatic Complexity

5

Test Cases

**A cyclomatic  
complexity of over  
50 is considered  
untestable**

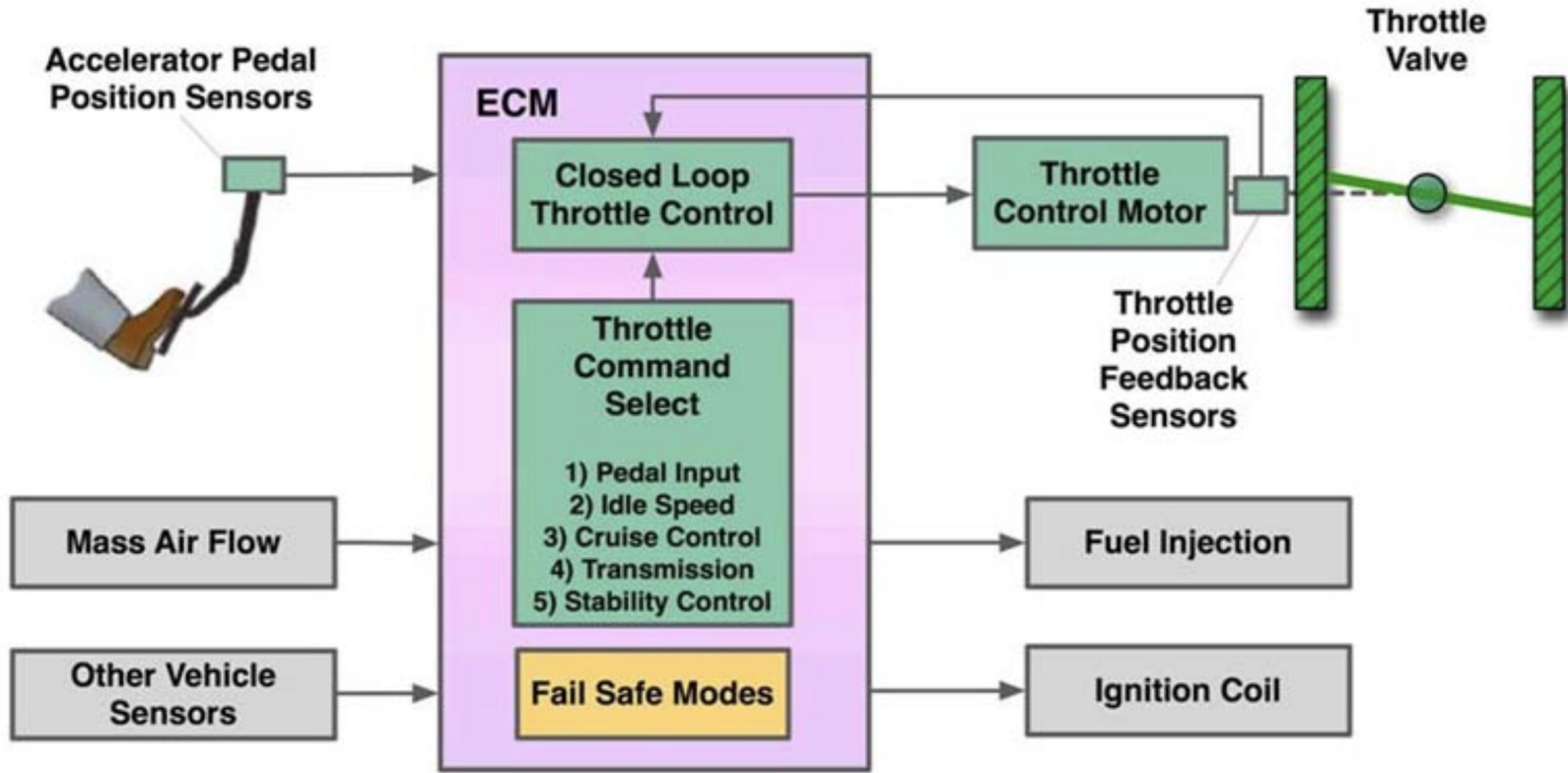
# 67

Functions with a complexity over 50

**A cyclomatic  
complexity of over  
100 is considered  
unmaintainable**

# 12

Functions with over a complexity over 100



NHTSA Toyota Unintended Acceleration Investigation *Figure 4.0-1*

# 146

Cyclomatic Complexity of the throttle angle function



# Toyota "Unintended Acceleration" Has Killed 89

MAY 25, 2010 / 7:08 PM / AP



Unintended acceleration in Toyota vehicles may have been involved in the deaths of 89 people over the past decade, upgrading the number of deaths possibly linked to the massive recalls, the government said Tuesday.

The National Highway Traffic Safety Administration said that from 2000 to mid-May, it had received more than 6,200 complaints involving sudden acceleration in Toyota vehicles. The reports include 89 deaths and 57 injuries over the same period. Previously, 52 deaths had been suspected of being connected to the problem.

Toyota Motor Corp. has recalled more than 8 million vehicles worldwide since last fall because of problems with gas pedals, floor mats and brakes. The Japanese automaker paid a record \$16.4 million fine for its slow response to an accelerator pedal recall and is facing hundreds of state and federal lawsuits.





# 80,000

Violations found of all MISRA C rules  
found in Michael Barr's Investigation

```
1 ***** Module guet.main
2 guet/main.py:20:0: C0301: Line too long (120/100) (line-too-long)
3 guet/main.py:22:0: C0301: Line too long (108/100) (line-too-long)
4 guet/main.py:35:0: C0301: Line too long (117/100) (line-too-long)
5 guet/main.py:37:0: C0301: Line too long (108/100) (line-too-long)
6 guet/main.py:39:0: C0301: Line too long (117/100) (line-too-long)
7 ***** Module guet.util.errors
8 guet/util/errors.py:12:0: C0301: Line too long (110/100) (line-too-long)
9 ***** Module guet.config.get_current_committers
10 guet/config/get_current_committers.py:20:0: C0301: Line too long (109/100) (line-too-long)
11 guet/config/get_current_committers.py:32:25: W0612: Unused variable 'set_time' (unused-variable)
12 guet/config/get_current_committers.py:32:35: W0612: Unused variable 'path_to_git' (unused-variable)
13 ***** Module guet.config.most_recent_committers_set
14 guet/config/most_recent_committers_set.py:16:9: W0612: Unused variable 'committer_initials' (unused-variable)
15 guet/config/most_recent_committers_set.py:16:39: W0612: Unused variable 'path_to_git' (unused-variable)
16 ***** Module guet.hooks.pre_commit
17 guet/hooks/pre_commit.py:31:0: C0301: Line too long (101/100) (line-too-long)
18 ***** Module guet.commands.help_decorator
19 guet/commands/help_decorator.py:19:47: R0123: Comparison to literal (literal-comparison)
20 ***** Module guet.commands.init_required_decorator
21 guet/commands/init_required_decorator.py:13:4: R1710: Either all return statements in a function should return an expression, or none of them should. (inconsistent-return-statements)
22 ***** Module guet.commands.lambda_strategy
23 guet/commands/lambda_strategy.py:1:0: W0611: Unused List imported from typing (unused-import)
24 guet/commands/lambda_strategy.py:4:0: W0611: Unused Settings imported from guet.settings.settings (unused-import)
25 ***** Module guet.commands.too_few_args
26 guet/commands/too_few_args.py:1:0: W0611: Unused List imported from typing (unused-import)
27 guet/commands/too_few_args.py:3:0: W0611: Unused Settings imported from guet.settings.settings (unused-import)
28 ***** Module guet.commands.cancellable_strategy
29 guet/commands/cancellable_strategy.py:5:0: C0301: Line too long (105/100) (line-too-long)
30 ***** Module guet.commands.print_strategy
31 guet/commands/print_strategy.py:1:0: W0611: Unused List imported from typing (unused-import)
32 guet/commands/print_strategy.py:4:0: W0611: Unused Settings imported from guet.settings.settings (unused-import)
33 ***** Module guet.commands.init.factory
34 guet/commands/init/factory.py:14:0: C0301: Line too long (105/100) (line-too-long)
35 guet/commands/init/factory.py:24:50: W0108: Lambda may not be necessary (unnecessary-lambda)
36 guet/commands/init/factory.py:3:0: W0611: Unused ArgSettingCommand imported from guet.commands.argsettingcommand (unused-import)
37 ***** Module guet.commands.remove.factory
38 guet/commands/remove/factory.py:10:0: C0301: Line too long (121/100) (line-too-long)
39 ***** Module guet.commands.setcommitters.factory
40 guet/commands/setcommitters/factory.py:9:0: C0301: Line too long (112/100) (line-too-long)
41 ***** Module guet.commands.config.factory
42 guet/commands/config/factory.py:9:0: C0301: Line too long (108/100) (line-too-long)
43 ***** Module guet.commands.start.start_strategy
44 guet/commands/start/start_strategy.py:1:0: W0611: Unused List imported from typing (unused-import)
45 ***** Module guet.commands.start.factory
46 guet/commands/start/factory.py:19:0: C0301: Wrong hanging indentation (add 4 spaces).
47 [FlagBuilder('-a/--alongside', 'Create hooks alongside current hooks with "-guet" on the end'),
48 ^ | (bad-continuation)
49 guet/commands/start/factory.py:6:0: W0611: Unused PrintCommandStrategy imported from guet.commands.print_strategy (unused-import)
50 guet/commands/start/factory.py:13:0: W0611: Unused git_present_in_cwd imported from guet.git.git_present_in_cwd (unused-import)
51 ***** Module guet.commands.get.committer_printing_strategy
52 guet/commands/get/committer_printing_strategy.py:5:0: W0611: Unused Settings imported from guet.settings.settings (unused-import)
53 ***** Module guet.commands.get.invalid_identifier_strategy
54 guet/commands/get/invalid_identifier_strategy.py:1:0: W0611: Unused List imported from typing (unused-import)
55 guet/commands/get/invalid_identifier_strategy.py:4:0: W0611: Unused Settings imported from guet.settings.settings (unused-import)
56 ***** Module guet.commands.get.get_factory
57 guet/commands/get/get_factory.py:26:0: C0301: Line too long (111/100) (line-too-long)
58 guet/commands/get/get_factory.py:27:0: C0301: Line too long (120/100) (line-too-long)
59 guet/commands/get/get_factory.py:42:4: R0201: Method could be a function (no-self-use)
60 guet/commands/get/get_factory.py:1:0: W0611: Unused Type imported from typing (unused-import)
61 guet/commands/get/get_factory.py:3:0: W0611: Unused ArgSettingCommand imported from guet.commands.argsettingcommand (unused-import)
62 ***** Module guet.commands.addcommitter.add_committer_strategy
63 guet/commands/addcommitter/add_committer_strategy.py:1:0: W0611: Unused List imported from typing (unused-import)
64 guet/commands/addcommitter/add_committer_strategy.py:3:0: W0611: Unused Settings imported from guet.settings.settings (unused-import)
65 ***** Module guet.commands.addcommitter.factory
66 guet/commands/addcommitter/factory.py:17:0: C0301: Line too long (111/100) (line-too-long)
67 guet/commands/addcommitter/factory.py:30:0: C0301: Line too long (104/100) (line-too-long)
68 guet/commands/addcommitter/factory.py:33:0: C0301: Line too long (118/100) (line-too-long)
69 guet/commands/addcommitter/factory.py:35:0: C0301: Line too long (105/100) (line-too-long)
70 guet/commands/addcommitter/factory.py:29:4: R0201: Method could be a function (no-self-use)
71 guet/commands/addcommitter/factory.py:32:4: R0201: Method could be a function (no-self-use)
72 ***** Module guet.git.git
73 guet/git/git.py:35:4: R0201: Method could be a function (no-self-use)
74 guet/git/git.py:4:0: W0611: Unused read_lines imported from guet.files.read_lines (unused-import)
75 ***** Module guet.git.hook
76 guet/git/hook.py:12:0: R0983: Too few public methods (0/1) (too-few-public-methods)
```

```
38 guet/commands/remove/factory.py:10:0: C0301: Line too long (121/100) (line-too-long)
39 ***** Module guet.commands.setcommitters.factory
40 guet/commands/setcommitters/factory.py:9:0: C0301: Line too long (112/100) (line-too-long)
41 ***** Module guet.commands.config.factory
42 guet/commands/config/factory.py:9:0: C0301: Line too long (108/100) (line-too-long)
43 ***** Module guet.commands.start.start_strategy
44 guet/commands/start/start_strategy.py:1:0: W0611: Unused List imported from typing (unused-import)
45 ***** Module guet.commands.start.factory
46 guet/commands/start/factory.py:19:0: C0301: Wrong hanging indentation (add 4 spaces).
47 [FlagBuilder('-a/--alongside', 'Create hooks alongside current hooks with "-guet" on the end'),
48 ^ | (bad-continuation)
49 guet/commands/start/factory.py:6:0: W0611: Unused PrintCommandStrategy imported from guet.commands.print_strategy (unused-import)
50 guet/commands/start/factory.py:13:0: W0611: Unused git_present_in_cwd imported from guet.git.git_present_in_cwd (unused-import)
51 ***** Module guet.commands.get.committer_printing_strategy
52 guet/commands/get/committer_printing_strategy.py:5:0: W0611: Unused Settings imported from guet.settings.settings (unused-import)
53 ***** Module guet.commands.get.invalid_identifier_strategy
54 guet/commands/get/invalid_identifier_strategy.py:1:0: W0611: Unused List imported from typing (unused-import)
55 guet/commands/get/invalid_identifier_strategy.py:4:0: W0611: Unused Settings imported from guet.settings.settings (unused-import)
56 ***** Module guet.commands.get.get_factory
57 guet/commands/get/get_factory.py:26:0: C0301: Line too long (111/100) (line-too-long)
58 guet/commands/get/get_factory.py:27:0: C0301: Line too long (120/100) (line-too-long)
59 guet/commands/get/get_factory.py:42:4: R0201: Method could be a function (no-self-use)
60 guet/commands/get/get_factory.py:1:0: W0611: Unused Type imported from typing (unused-import)
61 guet/commands/get/get_factory.py:3:0: W0611: Unused ArgSettingCommand imported from guet.commands.argsettingcommand (unused-import)
62 ***** Module guet.commands.addcommitter.add_committer_strategy
63 guet/commands/addcommitter/add_committer_strategy.py:1:0: W0611: Unused List imported from typing (unused-import)
64 guet/commands/addcommitter/add_committer_strategy.py:3:0: W0611: Unused Settings imported from guet.settings.settings (unused-import)
65 ***** Module guet.commands.addcommitter.factory
66 guet/commands/addcommitter/factory.py:17:0: C0301: Line too long (111/100) (line-too-long)
67 guet/commands/addcommitter/factory.py:30:0: C0301: Line too long (104/100) (line-too-long)
68 guet/commands/addcommitter/factory.py:33:0: C0301: Line too long (118/100) (line-too-long)
69 guet/commands/addcommitter/factory.py:35:0: C0301: Line too long (105/100) (line-too-long)
70 guet/commands/addcommitter/factory.py:29:4: R0201: Method could be a function (no-self-use)
71 guet/commands/addcommitter/factory.py:32:4: R0201: Method could be a function (no-self-use)
72 ***** Module guet.git.git
73 guet/git/git.py:35:4: R0201: Method could be a function (no-self-use)
74 guet/git/git.py:4:0: W0611: Unused read_lines imported from guet.files.read_lines (unused-import)
75 ***** Module guet.git.hook
76 guet/git/hook.py:12:0: R0983: Too few public methods (0/1) (too-few-public-methods)
```

📍 Back to Dashboard

🔍 Status

📄 Changes

🔄 Build Now

🚫 Delete Pipeline

⚙️ Configure

🔍 Full Stage View

📄 Rename

🔍 Pipeline Syntax

📄 Git Polling Log



### Build History

trend ▾

find  x

- 🔍 #42 Nov 26, 2019, 8:16 AM 🔴
- 🔍 #41 Nov 22, 2019, 11:04 AM
- 🔍 #40 Nov 22, 2019, 9:19 AM
- 🔍 #39 Nov 21, 2019, 4:19 PM
- 🔍 #38 Nov 21, 2019, 3:59 PM
- 🔍 #37 Nov 20, 2019, 4:42 PM
- 🔍 #36 Nov 20, 2019, 4:30 PM
- 🔍 #35 Nov 20, 2019, 3:48 PM
- 🔍 #34 Nov 20, 2019, 3:46 PM
- 🔍 #33 Nov 20, 2019, 3:44 PM
- 🔍 #32 Nov 20, 2019, 2:55 PM
- 🔍 #31 Nov 20, 2019, 10:33 AM
- 🔍 #30 Nov 19, 2019, 4:56 PM
- 🔍 #29 Nov 18, 2019, 11:01 AM

# Pipeline dev



Recent Changes

## Stage View

	Declarative: Checkout SCM	Lint	Test	Build	Deploy
Average stage times: (Average full run time: ~4min 17s)					
#42 Nov 26 08:16 No Changes	526ms	33s	12s	9s	2min 56s
3min 52s					
#41 Nov 22 11:04 1 commit	561ms	35s	14s	8s	3min 45s
#40 Nov 22 09:19 1 commit	557ms	33s	13s	9s	5min 12s
#39 Nov 21 16:19 1 commit	550ms	37s	13s	8s	3min 48s
#38 Nov 21 15:59 1 commit	648ms	33s	14s	9s	2min 22s

“

As the general stress level rises, manual builds tend to be done less often and less well, resulting in more errors and more stress.

**Kent Beck** *Extreme Programming Explained*

”

**Bad engineering  
practices alone  
resulted in Toyota's  
unintended  
acceleration**







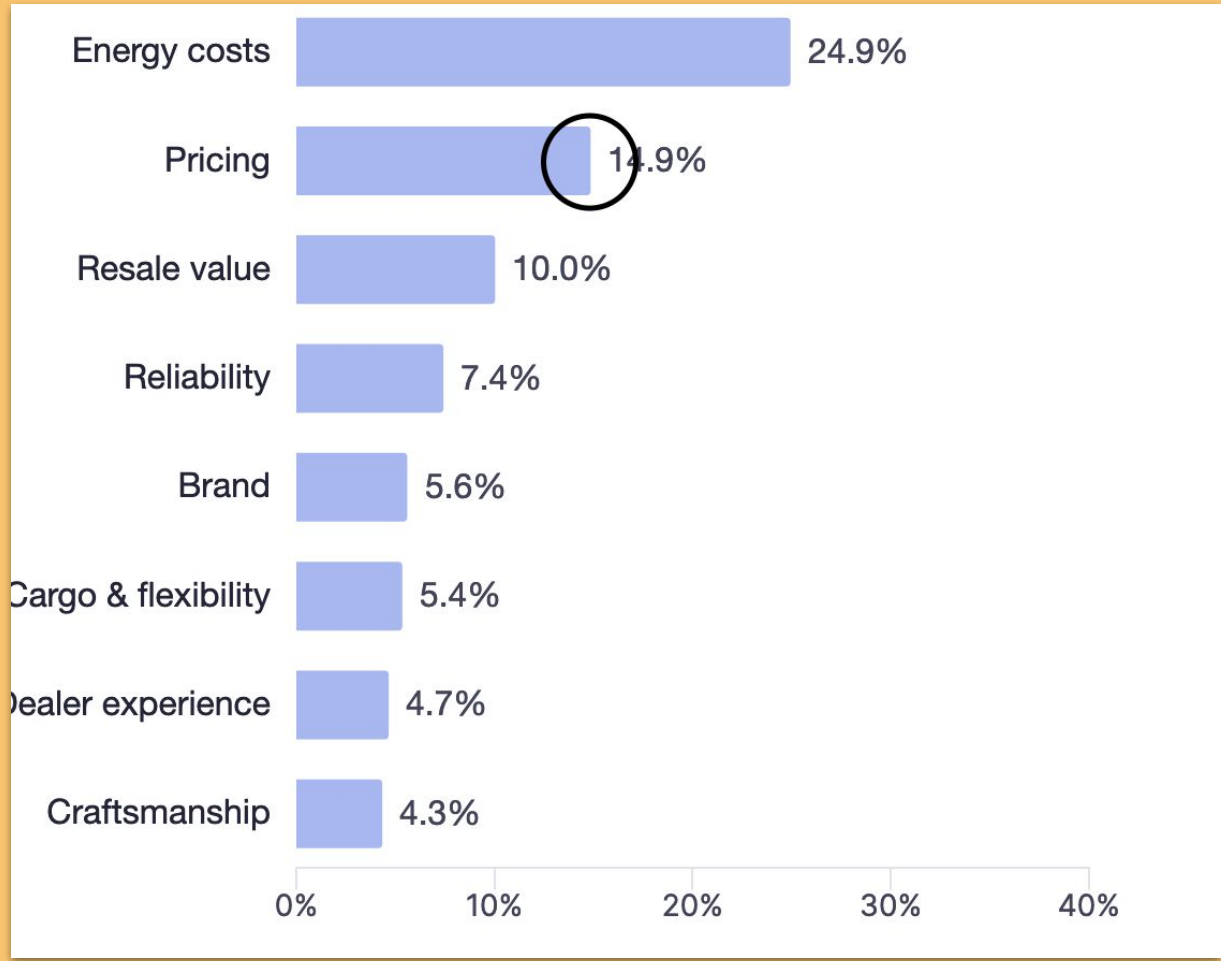


“

one unrepaired broken window is a signal that no one cares, and so breaking more windows costs nothing. (It has always been fun.)

**James Q. Wilson and George L. Kelling** *Broken Windows*

”



```

    // bar
    left = vm.x - vm.width / 2;
    right = vm.x + vm.width / 2;
    top = vm.y;
    bottom = vm.base;
    signX = 1;
    signY = bottom > top ? 1 : -1;
    borderSkipped = vm.borderSkipped || 'bottom';
  } else {
    // horizontal bar
    left = vm.base;
    right = vm.x;
    top = vm.y - vm.height / 2;
    bottom = vm.y + vm.height / 2;
    signX = right > left ? 1 : -1;
    signY = 1;
    borderSkipped = vm.borderSkipped || 'left';
  }

  // Canvas doesn't allow us to stroke inside the width so we can
  // adjust the sizes to fit if we're setting a stroke on the line
  if (borderWidth) {
    // borderWidth should be less than bar width and bar height.
    var barSize = Math.min(Math.abs(left - right), Math.abs(top - bottom));
    borderWidth = borderWidth > barSize ? barSize : borderWidth;
    var halfStroke = borderWidth / 2;
    // Adjust borderWidth when bar top position is near vm.base(zero).
    var borderLeft = left + (borderSkipped !== 'left' ? halfStroke * signX : 0);
    var borderRight = right + (borderSkipped !== 'right' ? -halfStroke * signX : 0);
    var borderTop = top + (borderSkipped !== 'top' ? halfStroke * signY : 0);
    var borderBottom = bottom + (borderSkipped !== 'bottom' ? -halfStroke * signY : 0);
    // not become a vertical line?
    if (borderLeft !== borderRight) {
      top = borderTop;
      bottom = borderBottom;
    }
    // not become a horizontal line?
    if (borderTop !== borderBottom) {
      left = borderLeft;
      right = borderRight;
    }
  }

  ctx.beginPath();
  ctx.fillStyle = vm.backgroundColor;
  ctx.strokeStyle = vm.borderColor;
  ctx.lineWidth = borderWidth;

  // Corner points, from bottom-left to bottom-right clockwise
  // | 1 2 |
  // | 0 3 |
  var corners = [[left, bottom], [left, top], [right, top], [right, bottom]];

  // Find first (starting) corner with fallback to 'bottom'
  var borders = ['bottom', 'left', 'top', 'right'];
  var startCorner = borders.indexOf(borderSkipped, 0);

```

“

One broken window—a badly designed piece of code, a poor management decision that the team must live with for the duration of the project—is all it takes for a project to decline.

**Andrew Hunt & David Thomas** *The Pragmatic Programmer*

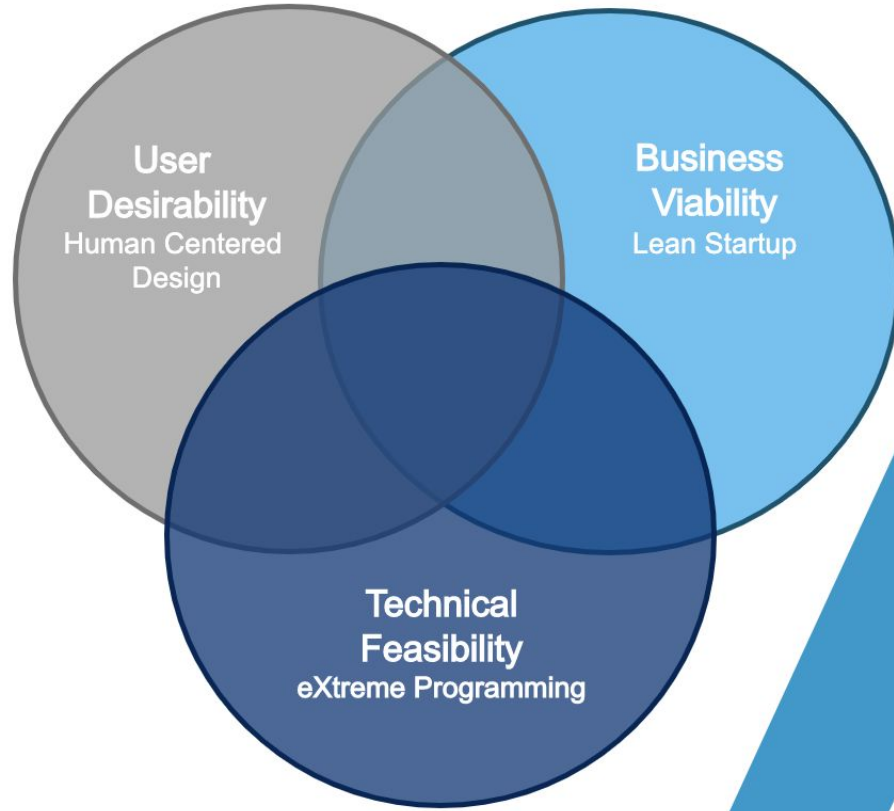
”





# Shared Code

Anyone on the team can improve any part of the system at any time. If something is wrong with the system and fixing it is not outside of scope for what I'm doing right now, I should go ahead and fix it.



**User  
Desirability**  
Human Centered  
Design

**Business  
Viability**  
Lean Startup

**Technical  
Feasibility**  
eXtreme Programming



**1. Everyone takes  
responsibility for  
implementation  
outcomes**

# Shared Code

Anyone on the team can improve any part of the system at any time. If something is wrong with the system and fixing it is not outside of scope for what I'm doing right now, I should go ahead and fix it.



Red

Green

**Refactor**

## 2. Always be refactoring





**guet**



🔥 shipping code

## Christopher M. Boyer chiptopher

it good tho

👤 @FordLabs

📍 Ann Arbor, Michigan

🔗 [chiptopher.com](https://chiptopher.com)

Block or report user

### Organizations



Overview Repositories 12 Projects 0 Stars 19 Followers 14 Following 12

### Pinned

📖 [guet](#)

Enable contribution tracking when pair programming with guet

● Python ★ 5 🍷 1

📖 [localdatetime](#)

a website for knowing local date times around the world

● TypeScript

📖 [squadpay](#)

👥 Keep track of who owes who what in the squad 🍷

● TypeScript

📖 [chiptopher.com](#)

A website outlining projects I've worked on, my thoughts, and other information.

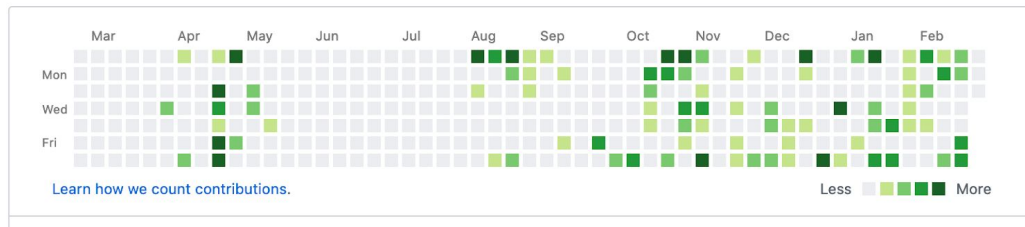
● JavaScript

📖 [FordLabs/retroquest](#)

RetroQuest is a website that enables teams to run retrospectives online.

● TypeScript ★ 29 🍷 16

### 337 contributions in the last year



2020

2019

2018

2017

2016

From d9f29fe768a7660d636d0d02e089404a7fd0713a Mon Sep 17 00:00:00 2001  
From: Chris Boyer and Connor Shaughnessy  
Date: Fri, 2 Nov 2018 09:49:37 -0400  
Subject: [PATCH] Add logging of VIN to persistor

## Add logging of VIN to persistor

[Browse files](#)

 master

 Chris Boyer and Connor Shaughnessy committed on Nov 2, 2018    1 parent [242d3dd](#)    commit [d9f29fe768a7660d636d0d02e089404a7fd0713a](#)



```
guet init
```

```
...
```

```
guet add cb "chris boyer" cboyer@example.com
```

```
guet add op "other person" operson@example.com
```

```
guet start
```

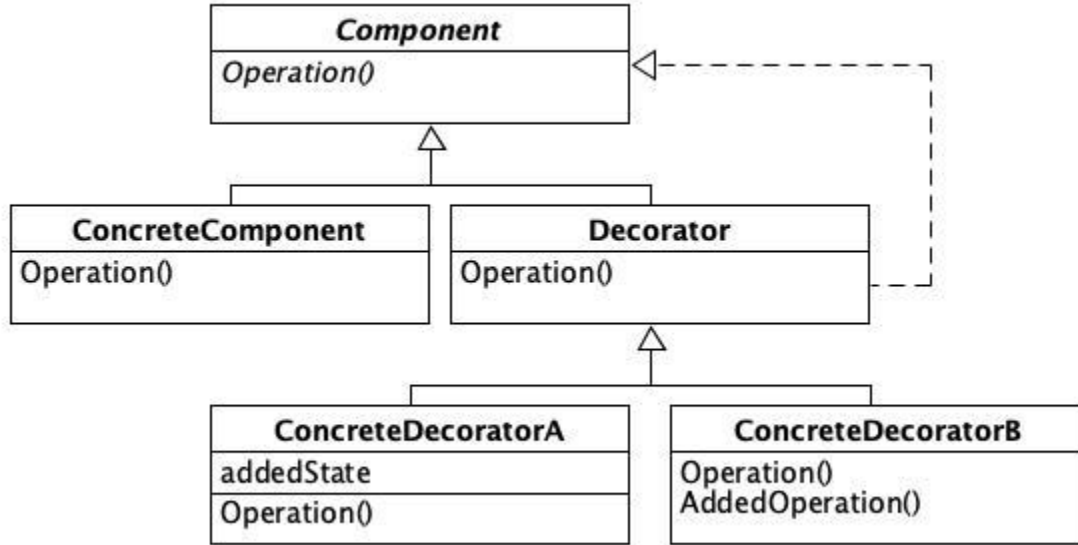
```
guet set cb op
```

```
git commit -m "Initial commit"
```

# Design Pattern

Each pattern describes a problem that occurs over and over again in our environment, and then describes the core of the solution to that problem, in such a way that you can use this solution a million times over, without ever doing it the same way twice.

**Christopher Alexander** *A Pattern Language: Towns, Buildings, Construction*



# Decorator Pattern

1. **Help message**
2. **Init Required**
3. **Start Required**
4. **Git Required**

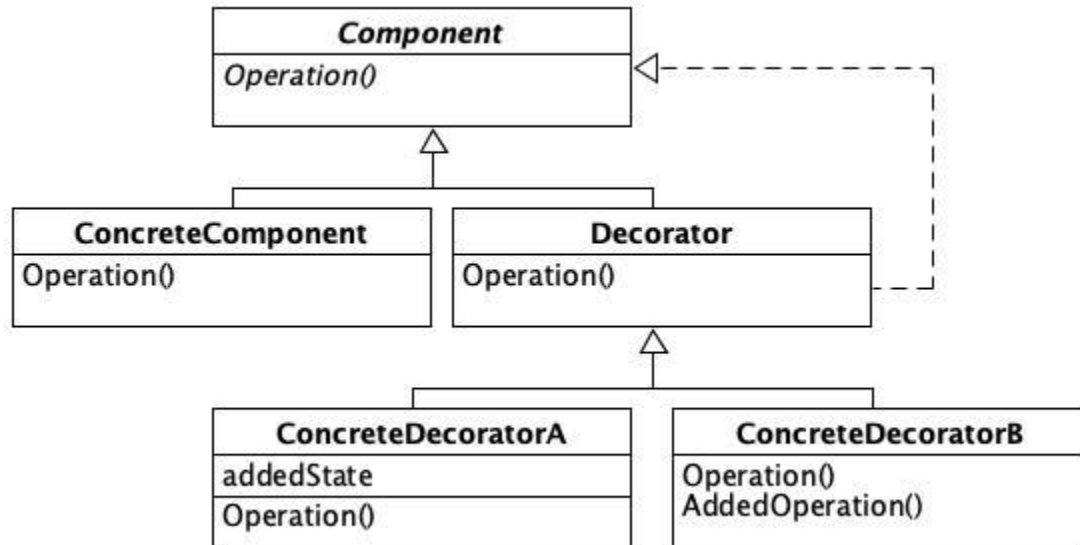


**“Throw Away” Code**

# Technical Debt

Shipping first time code is like going into debt. A little debt speeds development so long as it is paid back promptly with a rewrite.





**3. Be vigilant when  
making risky  
bets**

Set filters

Create visualizations  
the filters that you se

Target vehicle:

Stallion

Competitors:

- Volinda F5-0
- Gavin Solstice
- Maxy Apache
- Maize Rover
- Tappa Tower
- Stadium Life-35
- Mex Vrooms
- Ubuntu Ranger
- Zamboni Ruffagus
- Coral H-621

Time range (Model year)

Data available from 2000 -  
accuracy to calculate Attrib  
a minimum of 10 years' work

2000

to

GENERATE VISUALIZATION

Purchase Reason over Time

Satisfaction over Time



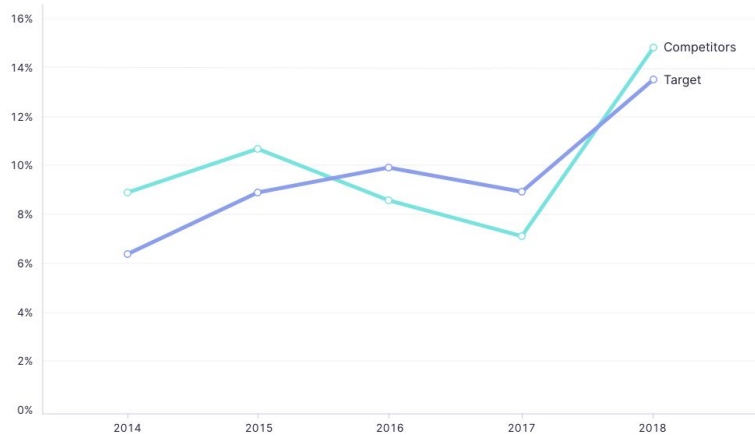
'Towing' as the main purchase reason over time

Methodology

Percent of customers who listed 'Towing' as their main purchase reason from 2014 - 2018

**Competitors:** Volinda F5-0, Gavin Solstice, Maxy Apache, Maize Rover, Tappa Tower, Stadium Life-35, Mex Vrooms, Ubuntu Ranger, Zamboni Ruffagus, Coral H-621

Main purchase reason (%)



Towing	13.8%	11.2%	2.6%
Durability Vehicle Life	11.5%	14.6%	-3.1%
Space & Size	10.1%	11.0%	-0.9%
Cargo & Flexibility	6.9%	9.3%	-3.3%
Financing Costs	5.2%	0.8%	4.4%
Exterior Design	4.1%	2.5%	1.6%
Hide	2.8%	1.1%	1.7%
Schedule Maintenance	2.0%	4.8%	-2.8%

## 4. Split stories where it makes sense

## LOGIN

Don't have an account? [Sign up](#)

EMAIL

janedoe@mail.com



There is no account associated with this email address

PASSWORD

\*\*\*\*\*



Incorrect password

Forgot your password? [Reset it](#)

Experiencing issues? [Contact us](#)

LOGIN




# 1. Login with necessary error messages

**LOGIN**


Don't have an account? [Sign up](#)

EMAIL

janedoe@mail.com 

There is no account associated with this email address

PASSWORD

\*\*\*\*\* 

Incorrect password

Forgot your password? [Reset it](#)  
Experiencing issues? [Contact us](#)


**LOGIN**

## 2. Providing invalid error password error message

**LOGIN**


Don't have an account? [Sign up](#)

EMAIL



There is no account associated with this email address

PASSWORD



Incorrect password

Forgot your password? [Reset it](#)  
Experiencing issues? [Contact us](#)


**LOGIN**

### 3. No account associated with email address

**LOGIN**


Don't have an account? [Sign up](#)

EMAIL

janedoe@mail.com 

There is no account associated with this email address

PASSWORD

\*\*\*\*\* 

Incorrect password

Forgot your password? [Reset it](#)  
Experiencing issues? [Contact us](#)

**LOGIN**

# Entropy

*noun*

*(physics)* A thermodynamic quantity representing the unavailability of a system's thermal energy for conversion into mechanical work, often interpreted as the degree of disorder or randomness in the system.



**5. Any codebase  
will deteriorate  
the work is not  
done to stop it**

**Questions?**

**Thank you for  
attending.  
Goodbye.**