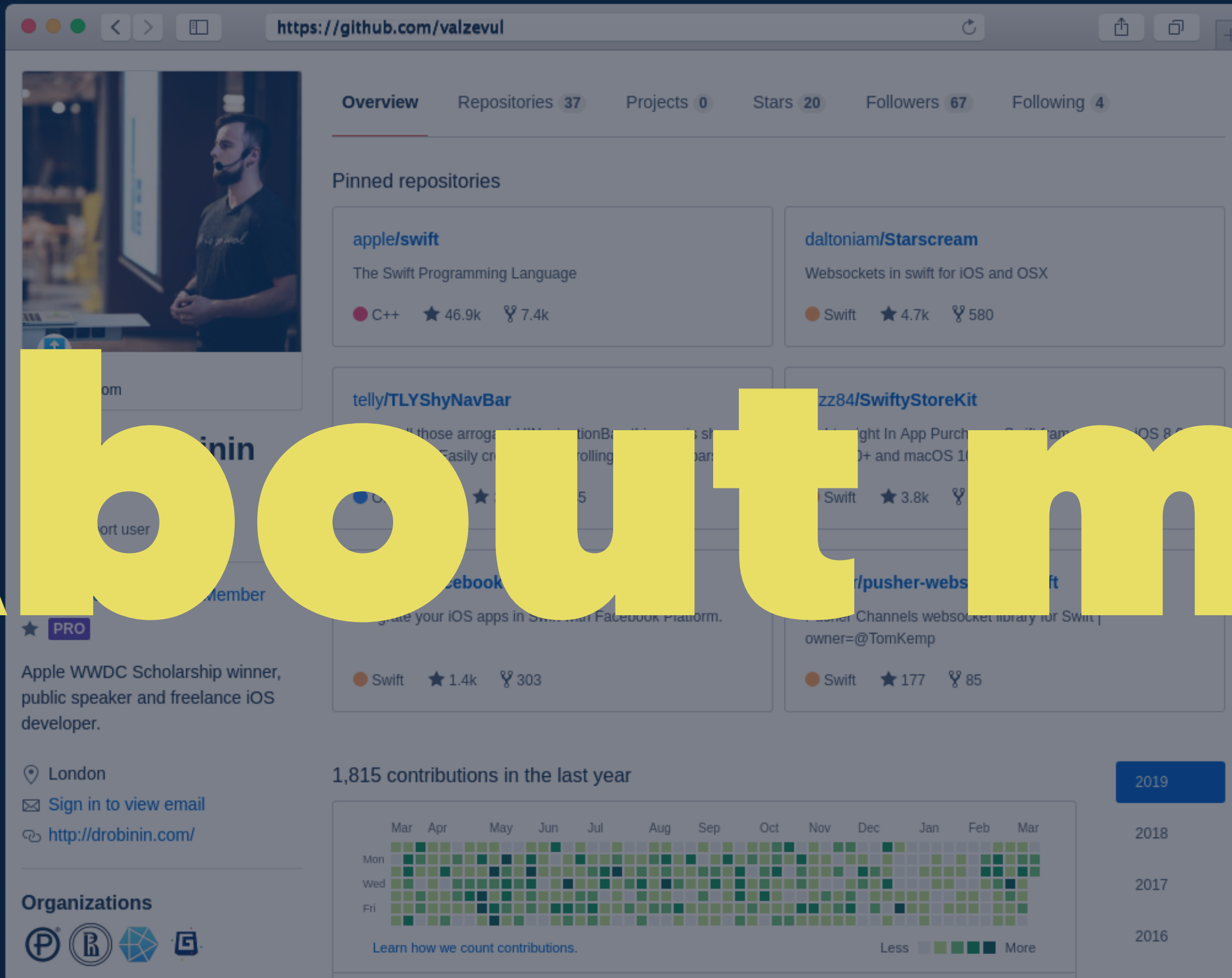




Debug like a Pro

Vadim Drobinin | drobinin.com

About me



The image shows a screenshot of a GitHub profile page for the user 'valzevul'. The page is displayed in a browser window with the URL 'https://github.com/valzevul'. The profile header includes a profile picture of a man with a beard, the name 'drobinin', and a bio: 'Apple WWDC Scholarship winner, public speaker and freelance iOS developer.' The location is 'London'. There are links to 'Sign in to view email' and 'http://drobinin.com/'. The profile statistics show 37 repositories, 0 projects, 20 stars, 67 followers, and 4 following. The 'Pinned repositories' section lists four repositories: 'apple/swift' (The Swift Programming Language, 46.9k stars, 7.4k forks), 'daltoniam/Starscream' (Websockets in swift for iOS and OSX, 4.7k stars, 580 forks), 'telly/TLYShyNavBar' (A library for those arrogant UINavigationController's, 1.4k stars, 303 forks), and 'zz84/SwiftyStoreKit' (A lightweight In App Purchase Swift framework for iOS 8.0+, 3.8k stars, 177 forks). The 'Contributions' section shows '1,815 contributions in the last year' with a heatmap for the year 2019. The heatmap shows activity from March to March, with a legend indicating 'Less' (light green) and 'More' (dark green) contributions. The 'Organizations' section shows logos for 'P', 'R', and 'G'.

<https://github.com/valzevul>

Overview Repositories 37 Projects 0 Stars 20 Followers 67 Following 4

Pinned repositories

- [apple/swift](#)
The Swift Programming Language
C++ 46.9k stars 7.4k forks
- [daltoniam/Starscream](#)
Websockets in swift for iOS and OSX
Swift 4.7k stars 580 forks
- [telly/TLYShyNavBar](#)
All those arrogant UINavigationController's should be easily controlled by a single bar.
Swift 1.4k stars 303 forks
- [zz84/SwiftyStoreKit](#)
A lightweight In App Purchase Swift framework for iOS 8.0+, macOS 10.10+ and macOS 10.11+
Swift 3.8k stars 177 forks

1,815 contributions in the last year

2019

2018

2017

2016

Organizations

P R G



What?



What?
Why?



What?
Why?
How?



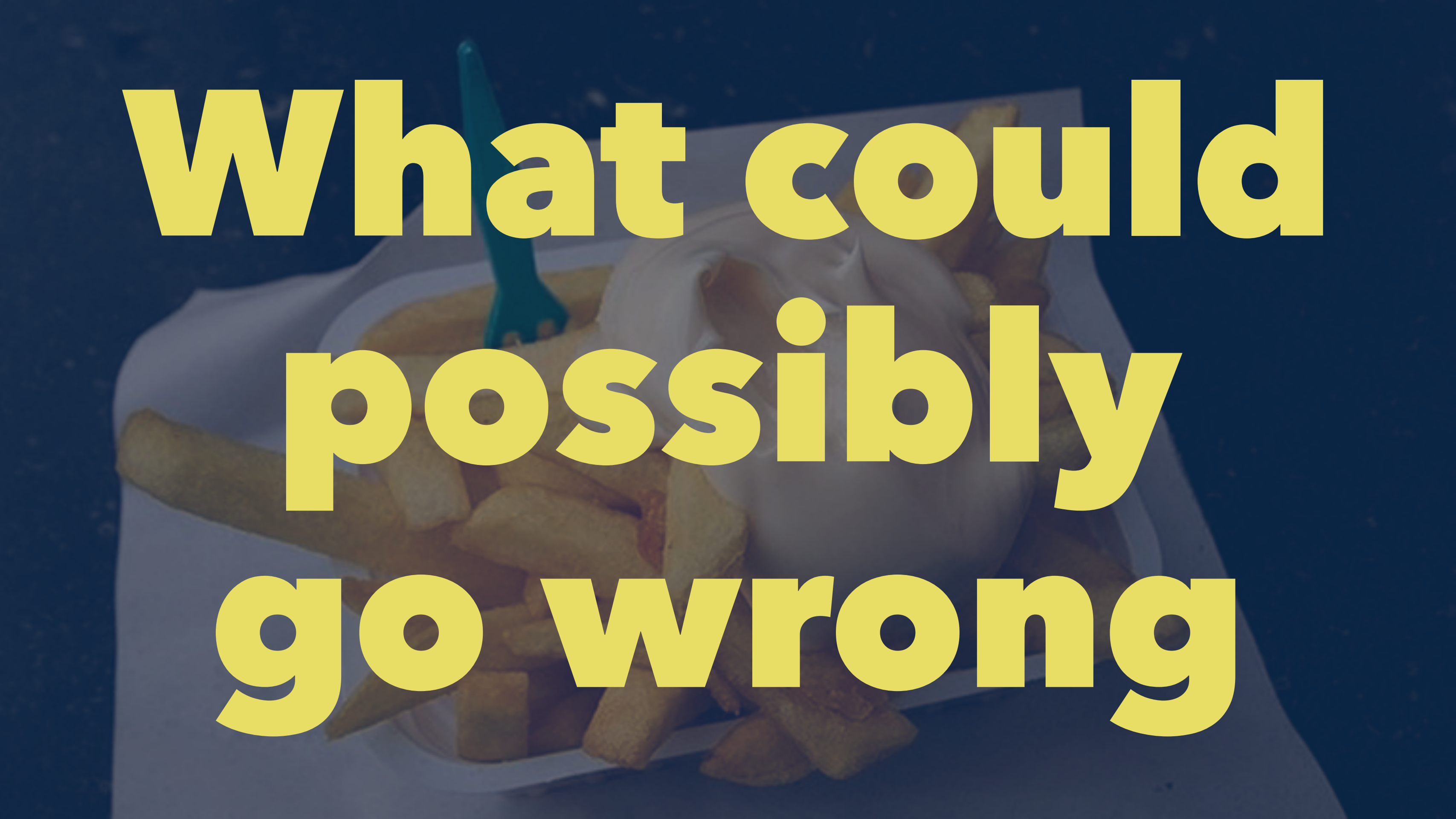
What?

Why?

How?

Demo!





**What could
possibly
go wrong**

```
let userAgeParsed = /*parseAge(with: json)*/ 23
```

```
func generateRandomSeed() -> Int {  
    return 4 //seed.reset()  
}
```

```
print(whatIsThatVariable)
```

```
if /*isSignedUp*/ true {  
    currentState = Flows.signUp  
}
```

```
UserDefault.standard.set(false, forKey: "seenUserOnboarding")
```




```
[665] (lldb) po (json as? JSON)?.  
["items"]["elements"].  
dictionaryObject["results"]  
.stringValue == "success"
```

```
[666] false
```



```
[665] (lldb) po (json as? JSON)?.  
["items"]["elements"].  
dictionaryObject["results"]  
.stringValue == "success"
```

```
[666] false
```

```
[667] (lldb) po (json as? JSON)?.  
["items"]["elements"].  
dictionaryObject["results"]  
.stringValue == "success"
```

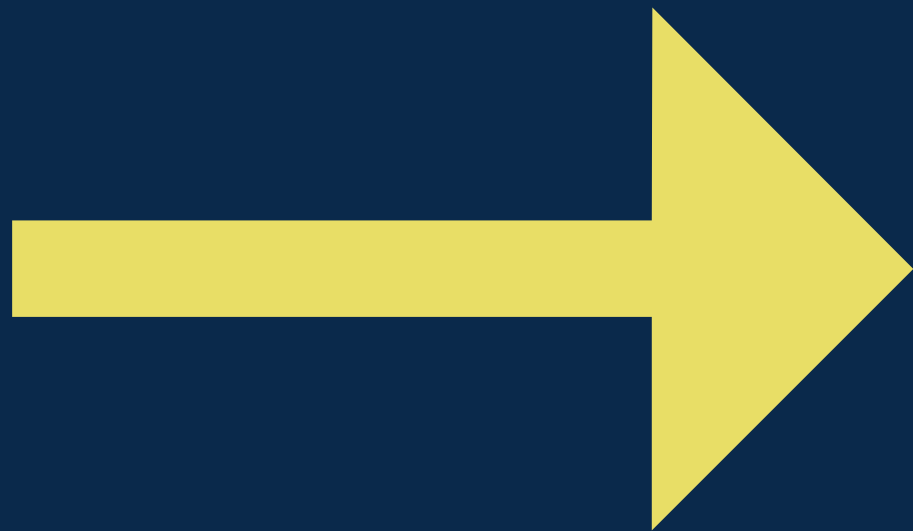
```
[668] false
```


Modify

Modify → Compile

Modify → Compile → Run

Modify → Compile → Run

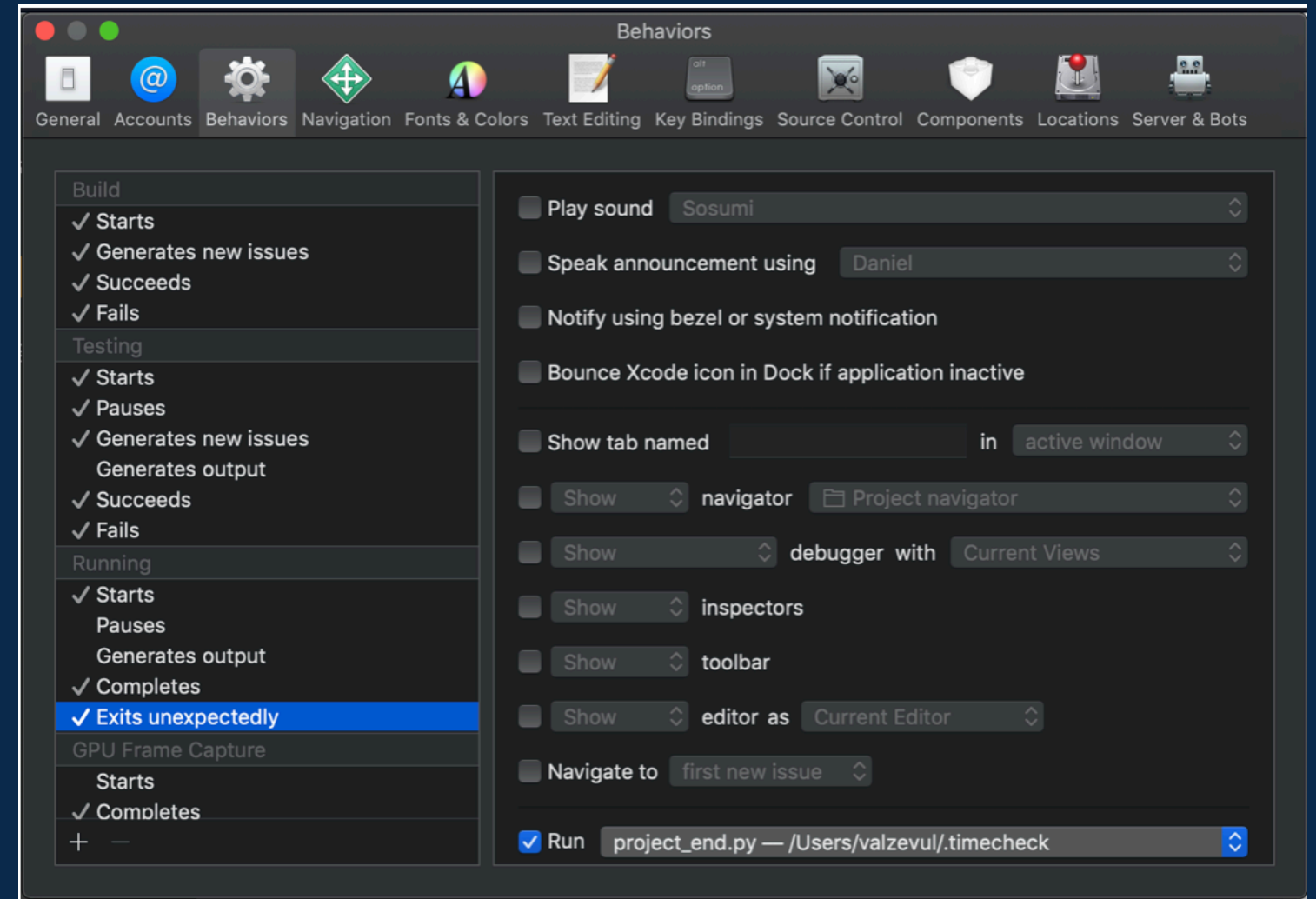


**What you can
measure,
you can manage**



How to measure?

- <http://github.com/valzevul/trackmecode>
- `chmod +x install.sh && ./install.sh`
- Xcode → Behaviours → Edit Behaviours
- **Build** (Succeeds, Fails)
Testing (Succeeds, Fails)
Running (Starts, Completes, Exits unexpectedly)

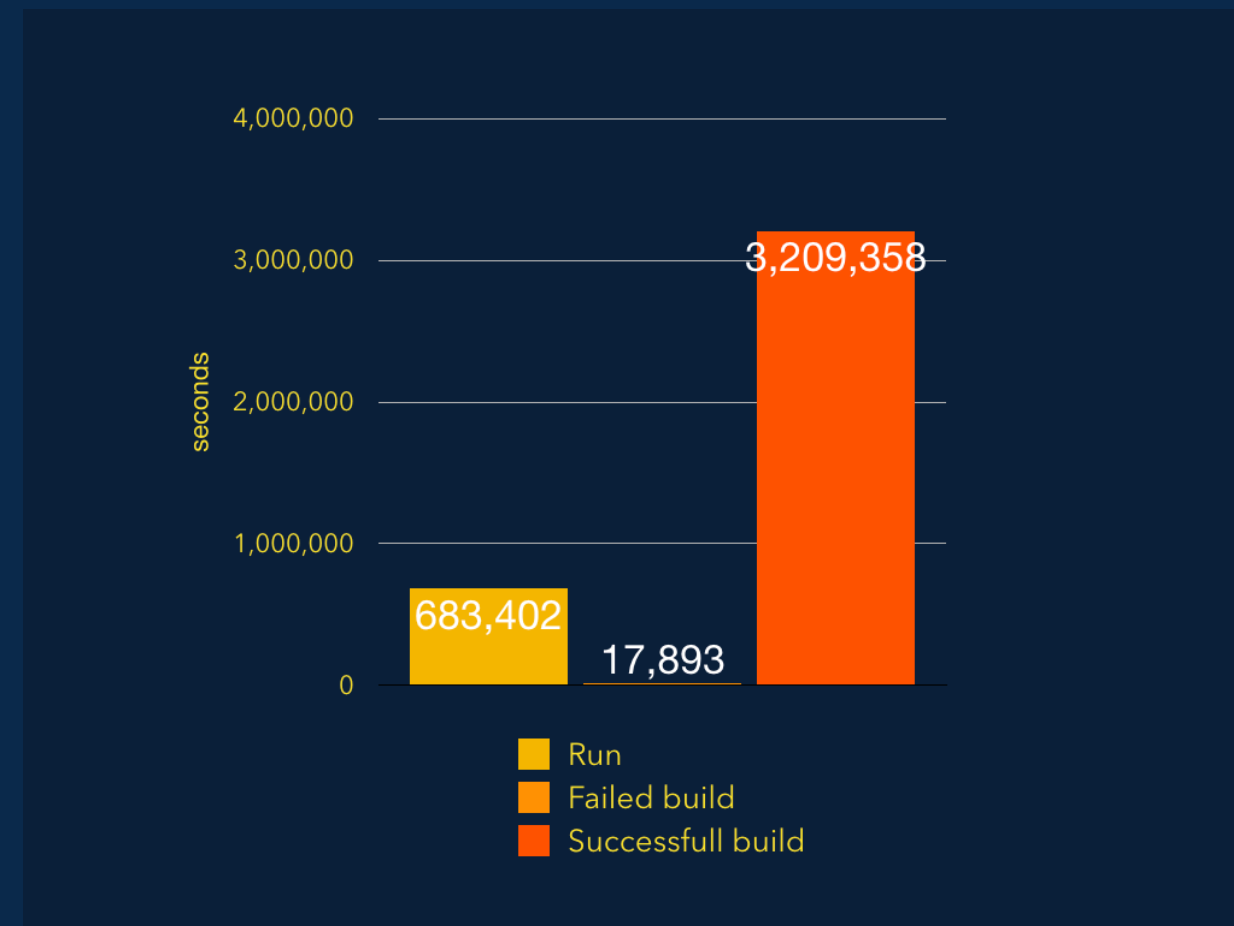


How to measure?

```
1. bash
No project,MySecretApp.xcworkspace,1552487653,1552487659,Build Failed,6
No project,MySecretApp.xcworkspace,1552487684,1552487714,Build Succeeded,30
No project,MySecretApp.xcworkspace,1552487714,1552487760,Run Completed,46
No project,MySecretApp.xcworkspace,1552487771,1552487799,Build Succeeded,28
No project,MySecretApp.xcworkspace,1552487799,1552487877,Run Completed,78
No project,MySecretApp.xcworkspace,1552487877,1552487905,Build Succeeded,28
No project,MySecretApp.xcworkspace,1552487905,1552487983,Run Completed,78
No project,MySecretApp.xcworkspace,1552487983,1552487999,Build Failed,16
No project,MySecretApp.xcworkspace,1552488001,1552488028,Build Succeeded,27
No project,MySecretApp.xcworkspace,1552488028,1552488068,Run Completed,40
No project,MySecretApp.xcworkspace,1552488069,1552488097,Build Succeeded,28
No project,MySecretApp.xcworkspace,1552488097,1552488267,Run Completed,170
No project,MySecretApp.xcworkspace,1552488296,1552488296,Build Succeeded,0
No project,MySecretApp.xcworkspace,1552488296,1552496271,Run Completed,7975
[08:57:44] valzevul ~/decks/Appdevcon19 (master)$ cat results | grep -c "Run Completed"
1694
[08:57:48] valzevul ~/decks/Appdevcon19 (master)$ cat results | grep -c "Build Succeeded"
1720
[08:58:00] valzevul ~/decks/Appdevcon19 (master)$ python3 generate_time.py
{'Run Completed': 3811990, 'Build Failed': 13996, 'Build Succeeded': 90676}
[08:58:10] valzevul ~/decks/Appdevcon19 (master)$
```

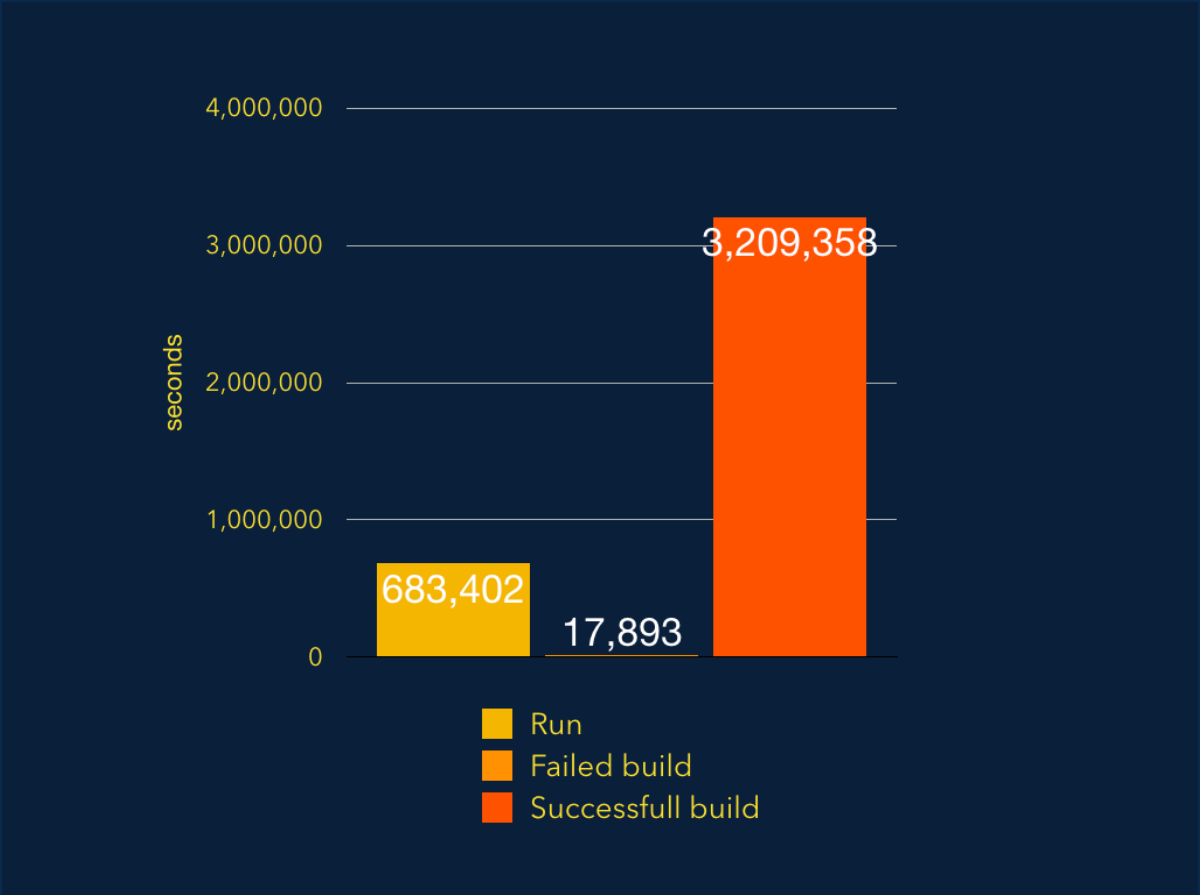
Is it that bad?

Rebuilding after
each change

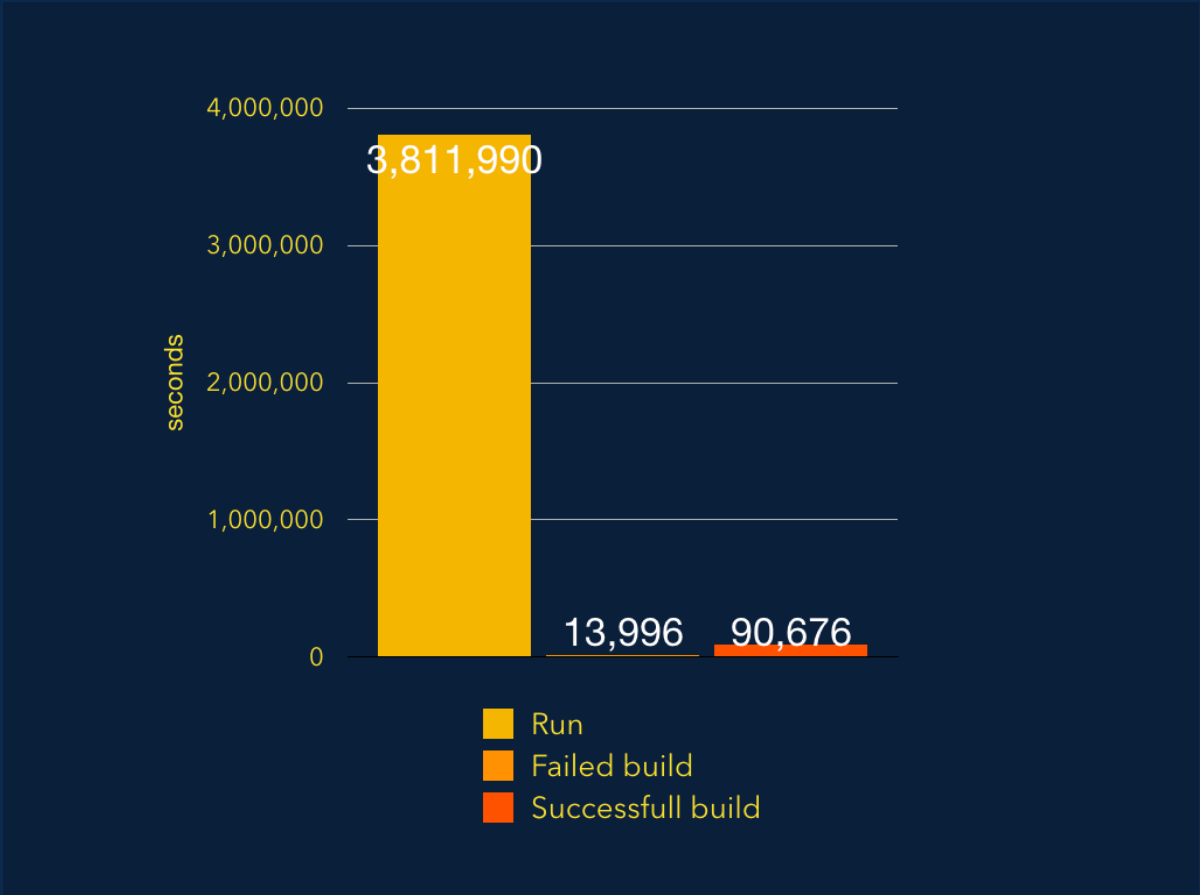


Is it that bad?

Rebuilding after
each change



Using
LLDB & breakpoints



LLVM & LLDB




```
C:\WINDOWS\system32\cmd.exe
File Edit Search Run Compile Debug Tools Options Window Help
CRASHSIM.PAS 1=[↑]

    end;
  end;
end;}

procedure addlink(a,b: integer);
var i : integer;
begin
  for i := 0 to numlinks-1 do
    if <(links[i div 1000]^[i mod 1000].u = a) and <(links[i div 1000]^[i mod 1
      <(links[i div 1000]^[i mod 1000].v = a) and <(links[i div 1000]^[i mod 1
links[numlinks div 1000]^[numlinks mod 1000].u := a;
links[numlinks div 1000]^[numlinks mod 1000].v := b;

links[numlinks div 1000]^[numlinks mod 1000].dist :=
  Dist(verts^[links[i div 1000]^[i mod 1000].v],
    verts^[links[i div 1000]^[i mod 1000].u]);
  if <(numlinks < 9001) then numlinks := numlinks + 1;
end;

procedure addtri(a,b,c : integer);
begin
  322:52
```

F1 Help F2 Save F3 Open Alt+F9 Compile F9 Make Alt+F10 Local menu

LLDB

```
(lldb) po $arg1
<UINavigationController: 0x7fe7b1007a00>

(lldb) po $arg2
4736199375

(lldb) po (SEL)$arg2
"pushViewController:animated:"

(lldb) po $arg3
<dddd.NameSelectionController: 0x7fe7b0c11fd0>
```

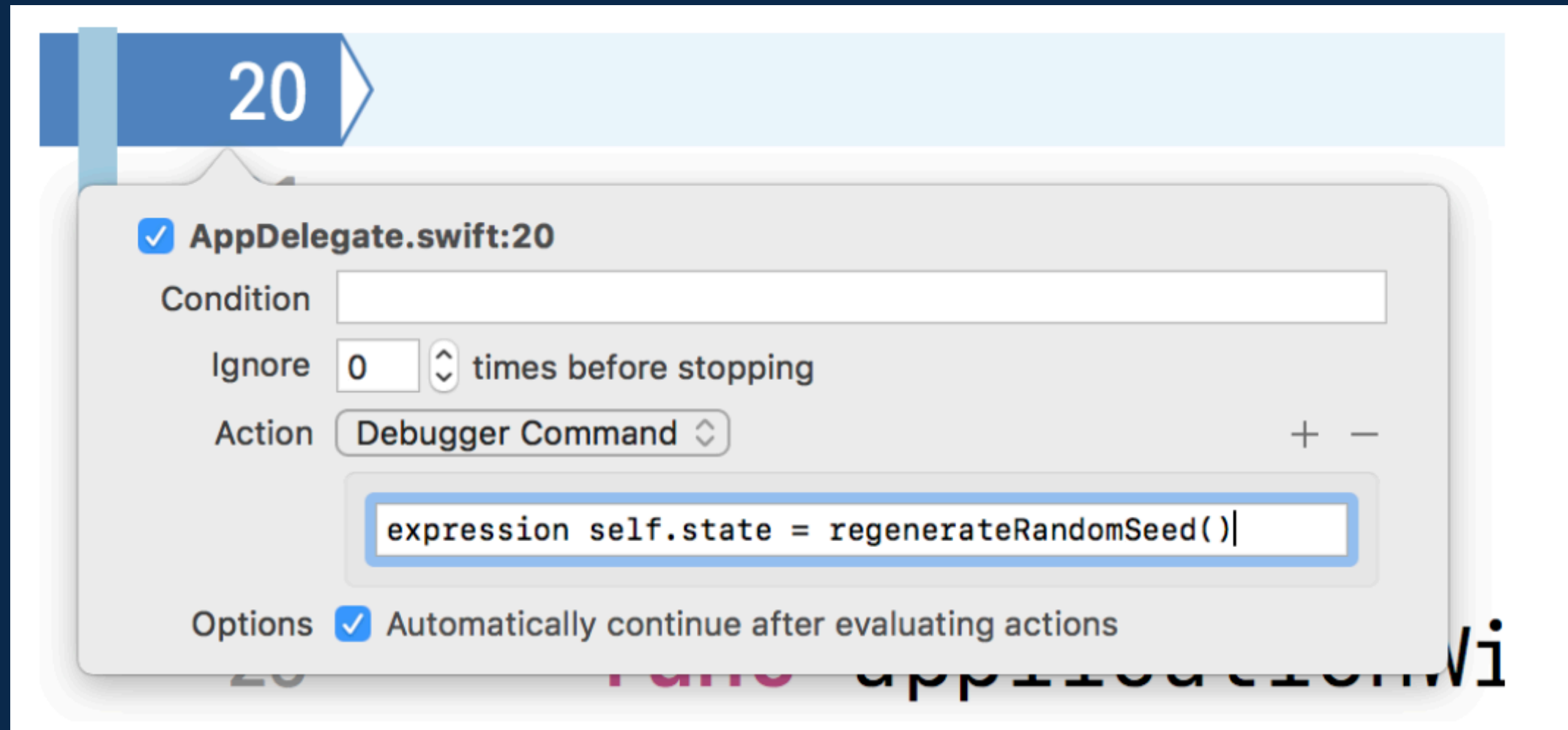
Perfect
the basics

expression

(lldb) **expression** <any Swift expression>
– var, method, any other runnable (*no classes!*) code

- **po <expression>**
stands for `expression -0 -- <expression>`
- **expr --ignore-breakpoints false -- <expression>**
- **ex import @UIKit**

Execute code with breakpoints



A still from The Lord of the Rings showing Gandalf the White. He has a long, flowing white beard and hair, and is wearing a brown robe. He is holding a sword in his right hand and a wooden staff in his left hand. The background is dark. The text "You shall not rebuild" is overlaid in a large, bold, yellow font across the center of the image.

You shall not rebuild

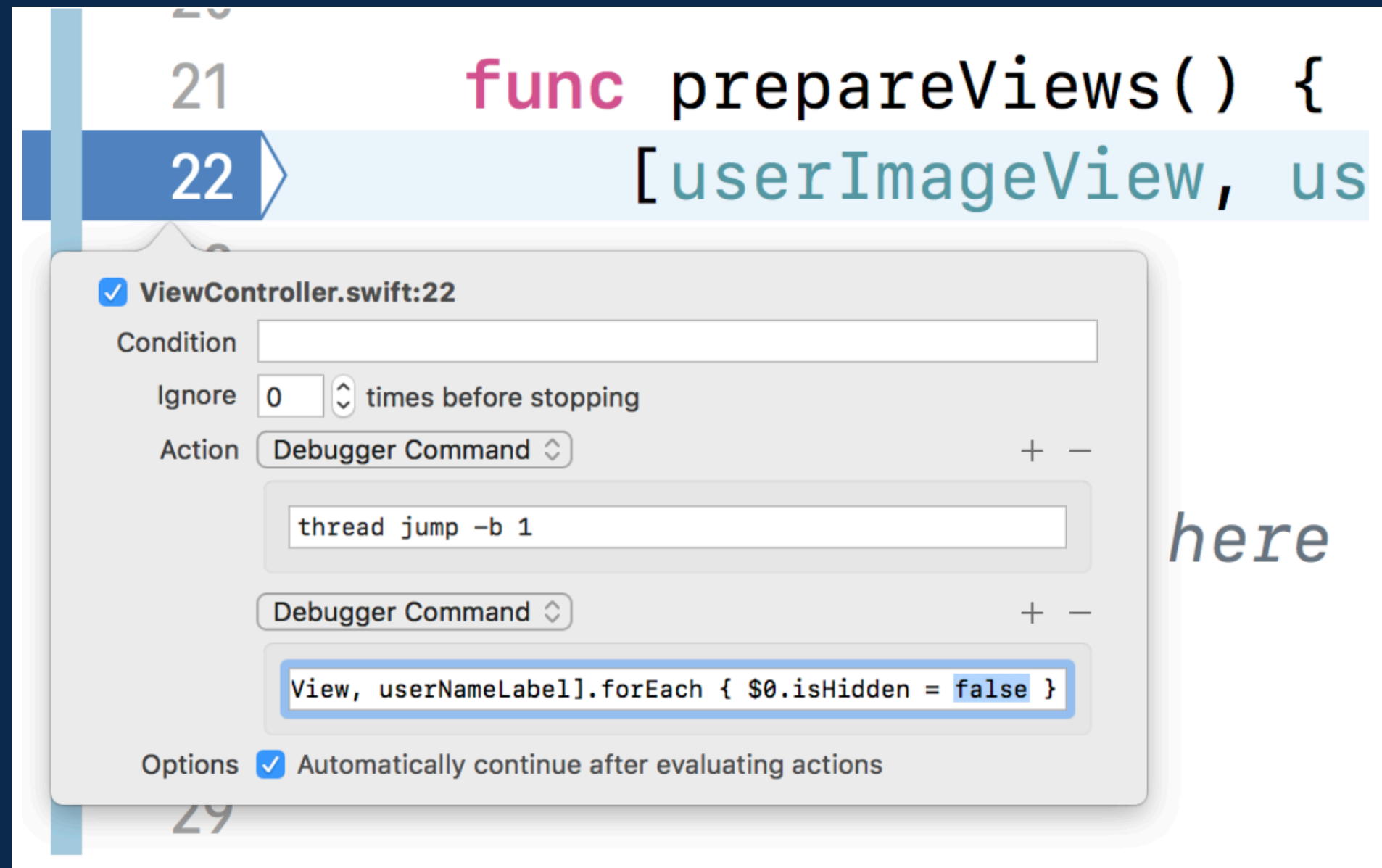
thread

- **thread until <line-number>**
- **thread jump -b <offset>**

Skip code with breakpoints

```
func prepareViews() {  
    /*  
        Some code goes here  
    */  
  
    [userImageView, userNameLabel].forEach { $0.isHidden = true }  
  
    userImageView.image = UIImage(named: "Appdevcon")  
    userNameLabel.text = "The User"  
}
```


Skip code with breakpoints



breakpoint

- **breakpoint list**
- **breakpoint set --func-regex <name>**
- **br set --one-shot -f AppDelegate.swift -l 90**
- **b <file.swift>:<line-number>**
breakpoint command add <breakpoint-number>

Good to know

- **platform status**
- **gui**
- LLDB API
- bugreport
 - **bugreport unwind --outfile <path to output file>**

UI Debugging

- `po unsafeBitCast(<memory-address>, to: <type>)`
- `expr -l Swift -- let $r = unsafeBitCast(<memory-address>, to: <type>)`
- `expression -l objc -- (void)[CATransaction flush]`

DEMO



<https://github.com/valzevul/appdevcon19-demo>

Not enough?

- **DerekSelander/LLDB**¹
A collection of LLDB aliases/regexes and Python scripts to aid in your debugging sessions
- **facebook/chisel**²
A collection of LLDB commands to assist debugging iOS apps.
- **"Debug like a Pro with LLDB"**³
Step-by-step guide on using LLDB in its full power
- **Reveal App**⁴
Runtime view debugging for iOS & tvOS apps and extensions

¹ <https://github.com/DerekSelander/LLDB>

² <https://github.com/facebook/chisel>

³ <https://drobinin.com/posts/lldb-debug-like-a-pro>

⁴ <https://revealapp.com/>



Questions?

drobinin.com | [@valzevul](#)