

# Grain State of the Union

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 [oscar\\_spen](#)

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# Agenda

## Where We've Been and Where We're Heading

1. Overview
2. Language Features
3. Website & Documentation
4. Community
5. Marketing
6. The Path Forward
7. Wrap-up



# Grain Overview



**Grain is a new language that puts academic language features to work.**

# Grain Code

```
1 data PizzaTopping = Cheese | Pepperoni | Peppers | Pineapple
2
3 let topping = Peppers
4
5 match (topping) {
6   Cheese => print('Would it really be pizza without it?')
7   | Pepperoni => print('An instant classic.')
8   | Peppers => print('For those who like to spice things up.')
9   | Pineapple => print('You do you.')
10 }
```



# The Details

- Strongly-typed functional programming-oriented programming language
- Compiles to WebAssembly
- Targets the browser, server, and potentially more
- Focused on building web applications
- Productionizes academic language features



# Language Features



# It's Been a Busy Year

- 53 pull requests merged
- Too many new features to count!

 Showing **397** changed files with **19,464** additions and **8,358** deletions.





# Features Implemented in the Past Year

- Module import/export system
- Records
- Arrays
- Assertions
- New operators
- New standard libraries

```
1 import List, { map, forEach } from 'lists'
```

```
1 data User = {  
2   name: String,  
3   age: Number  
4 }  
5  
6 { name: 'Bobothy', age: 49 }
```

```
1 let count = box(7)  
2  
3 count += 9  
4 count -= 6  
5 count *= 5  
6 count /= 25  
7  
8 print(^count) # 2
```



# WebAssembly System Interface

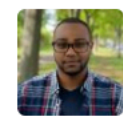
Aka "WASI"

WebAssembly / WASI Watch 143

Code Issues 75 Pull requests 7 Actions Projects 0 Security 0 Insights

## "Get Started" for Compiler Authors #255

Open ospencer opened this issue on Apr 8 · 9 comments



ospencer commented on Apr 8

Hi! I'm a dev over on <https://github.com/grain-lar> to WebAssembly, and we want to start transitioni

We're mostly looking to know the bare minimum modules are loaded (how imports are handled, w instantiation (if any)) and how wasm modules ac other import, or if some wasm magic happens).

If there's any relevant documentation you could p greatly appreciated if you could give us a quick p

7



sunfishcode commented on Apr 8

Member

We don't have a lot of documentation for this yet, but here's a quick overview:

```
1 import Sys from 'sys'
2
3 Sys.env()
4 Sys.realTime()
5
6 Sys.pathCreateDirectory(Sys.pwdfd, 'myNewDir')
7
8 Sys.random()
9 Sys.exit(0)
```

Implement WASI system calls #112

Merged ospencer merged 65 commits into master from wasi 8 days ago

wasmerio / wasmer-js Used by 1 Watch 1

Code Issues 24 Pull requests 0 Actions Projects 0 Wiki Security 0

Filters is:pr is:closed author:ospencer Labels 10 Mil

Clear current search query, filters, and sorts

0 Open ✓ 11 Closed Author Label Projects Milestones R

[wasi] path\_filestat\_get - linkcount should be a u64 ✓

#220 by ospencer was merged 17 days ago · Review required

n file length ✓

e flagged, return WASI\_EINVAL for

#215 by ospencer was merged 17 days ago · Approved

[wasi] Use ftruncateSync for fd\_filestat\_set\_size ✓

#214 by ospencer was merged 22 days ago · Approved

[wasi] fd\_filestat\_get linkcount should be a u64 ✓

#213 by ospencer was merged 22 days ago · Approved

[wasi] Have fd\_fdstat\_set\_rights set permissions properly ✓

#212 by ospencer was merged 24 days ago · Approved

Wrap fd\_datsync ✓

#210 by ospencer was merged 24 days ago · Approved



# Language-Related Improvements

- New build process
- Contributor docs
- OCaml 4.09 support
- Primitive framework
- AssemblyScript primitives

## Monorepo, yarn workspaces & esy #99

**Merged** ospencer merged 7 commits into [grain-lang:organization](#) from [phated:organization](#) on Apr 1

Conversation 2 Commits 7 Checks 0 Files changed 1,650

**phated** commented on Apr 1 Contributor

Alright, finally got this all working on my computer. Let's see if it works on travis 😊

## Add contributor docs #103

**Merged** ospencer merged 5 commits into [master](#) from [add-contributor-docs](#) on Apr 4

Conversation 1 Commits 5 Checks 0 Files changed 5

**ospencer** commented on Apr 4 Member

This sets up the `docs/contributor` folder, and adds a general compiler walkthrough and information on how data is represented in memory in Grain.

## Update project to work with OCaml 4.08 and 4.09 #66

**Merged** belph merged 5 commits into [master](#) from [ocaml-4.08](#) on Nov 19, 2019

Conversation 4 Commits 5 Checks 0 Files changed 34

**belph** commented on Nov 17, 2019 Member

(NOTE: CI build will fail until [ocaml/opam-repository#15313](#) is merged)



# Website & Documentation



# New Identity & Branding

Logo Design by Jim Kozlowski



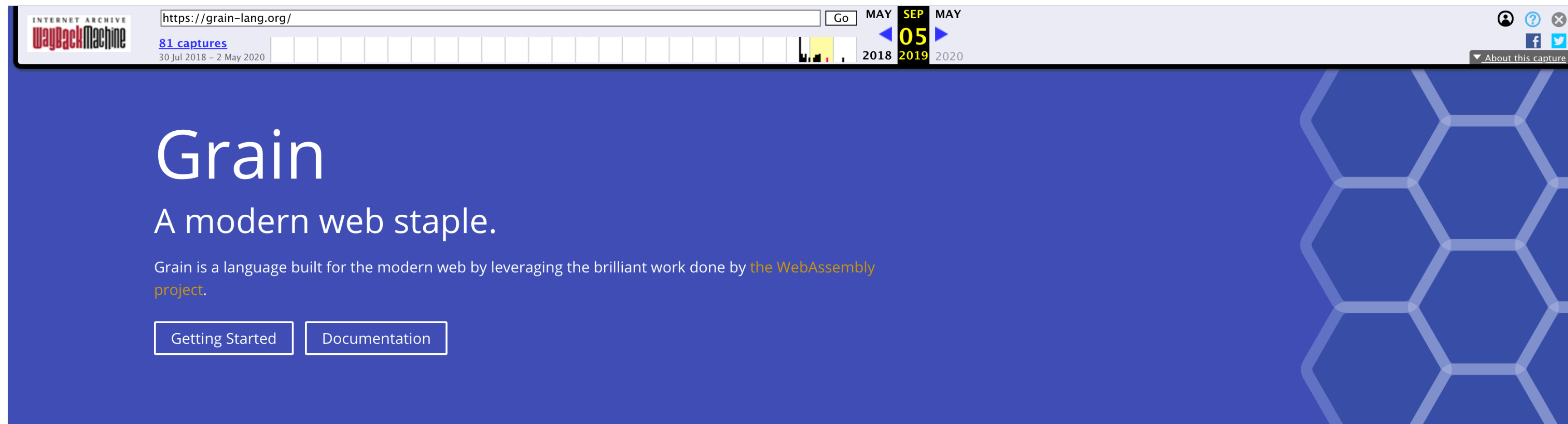
**Grain**

Special thanks to John Bintz for the design referral!



# Website Redesign

## Old Site



All of the types.  
None of the burden.

No runtime type errors, ever. Every bit of Grain you write is thoroughly sifted for type errors, with no need for any type annotations.

Seriously functional.  
Respectably pragmatic.

Grain is geared towards functional programming, but understands the web isn't as pure as we would like it to be. Easily write what's appropriate for the scenario.

### Language Constructs

#### Bindings

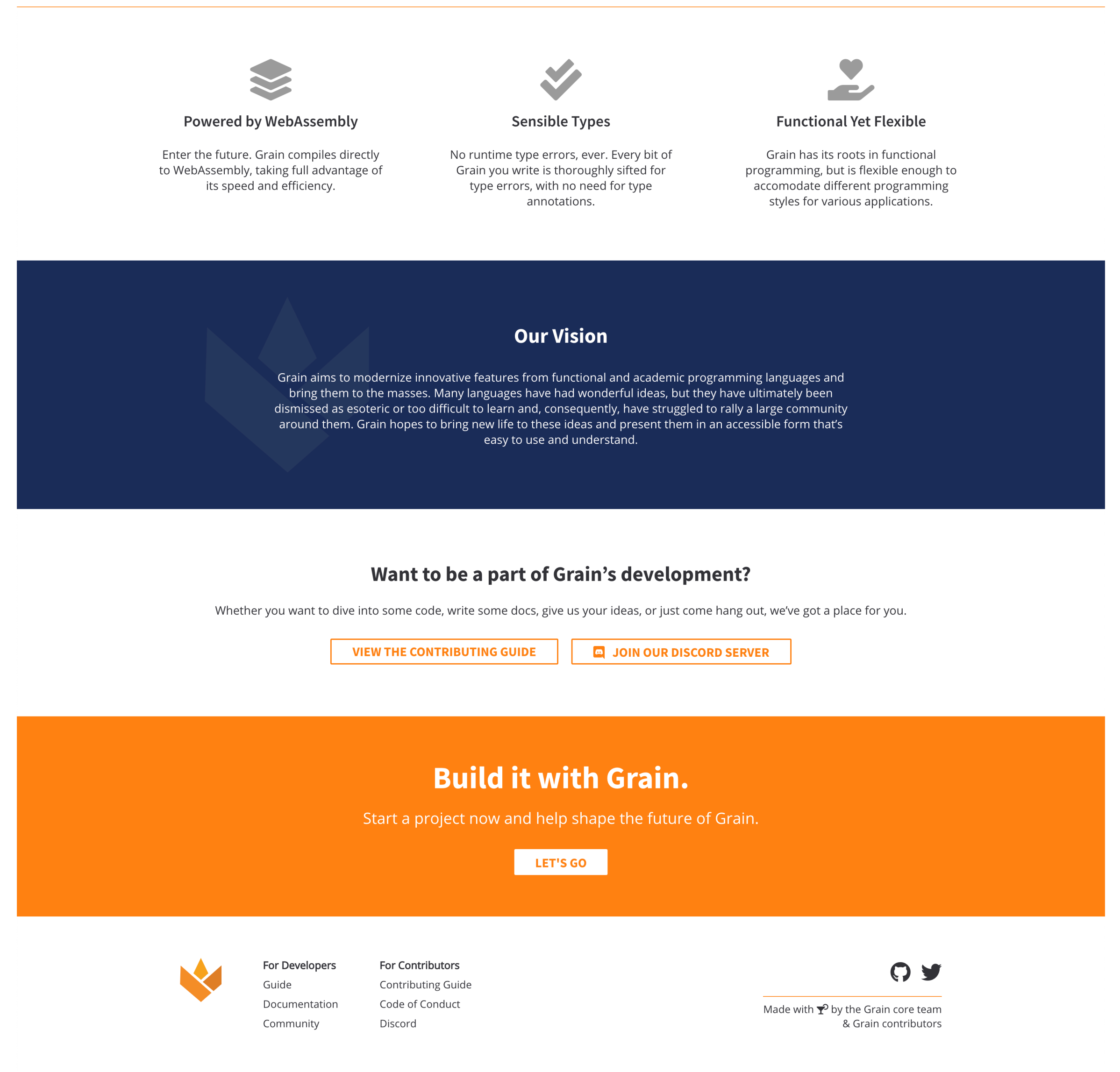
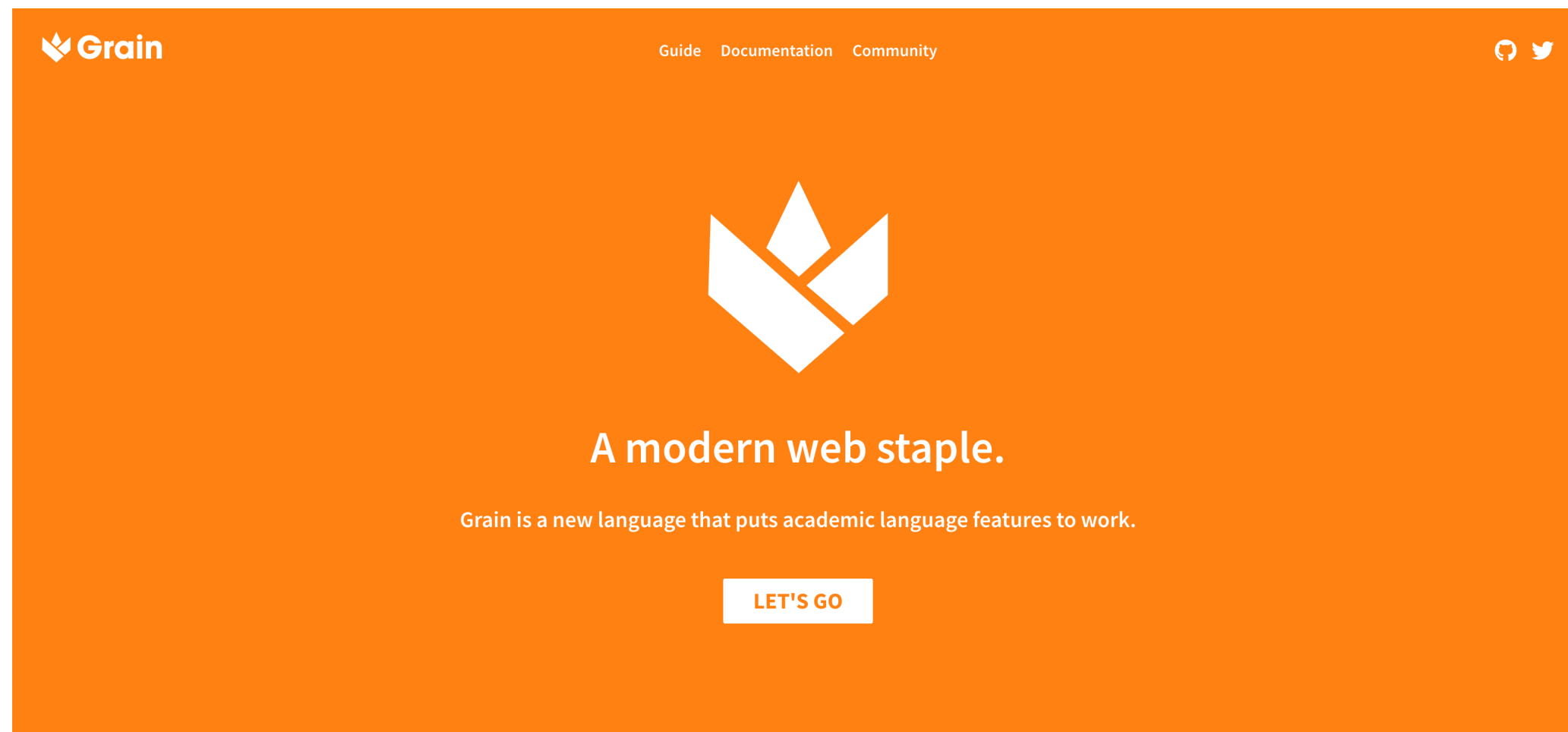
These work just as you'd expect of any reasonable language.

```
1 let someNumber = 5
2 let someString = "A collection of characters"
```



# Website Redesign

## New Site



Special thanks to Chris Grams for his feedback!



# Redesigned Docs



## The Grain Docs

Welcome to Grain!

[Getting Grain](#)

[Editor Setup](#)

### The Guide

[Hello World](#)

**The Basics**

[Functions](#)

[Boxes](#)

[Lists and Libraries](#)

### The Docs

[Introduction](#)

### Standard Library

[List](#)

[DOM](#)

### Language Constructs

[Overview](#)

[Bindings](#)

## The Basics

[EDIT ON GITHUB](#)

In this section, we'll learn how to declare new bindings and perform some basic operations on them.

### Declaring Named Values

Grain uses the `let` keyword to introduce new values with a given name, which we call bindings. Here are some examples using primitive types:

```
1 let someNumber = 42
2 let someBoolean = true
3 let someString = 'Welcome to Grain!'
```

We can reference bindings we've created in Grain to form compound expressions:

```
1 let firstNumber = 3, secondNumber = 4
2 let thirdNumber = firstNumber + secondNumber
```

### Working with Tuples

Tuples in Grain allow you to bundle up a few pieces of data. They're great for related, uniform data. Mixed data types are allowed within tuples, and we'll take advantage of that in this example. Here's

### Contents

**Declaring Named Values**

[Working with Tuples](#)

[Other Basic Operations](#)

[Number Operations](#)

[Number Comparisons](#)

[Equality](#)

[Boolean Operations](#)

[The if Statement](#)





# The Grain Guide

- The guide aims to teach the reader how to use the Grain language through a guided experience.
- The guide supplements the existing documentation and allows the reader to choose how they would prefer to learn.
- Guide topics have been written on setting up a development environment, the basics, functions, and data structures.
- Like all documentation, the Guide is only partially complete and will need more work to add topics on the rest of the language.



# Community



# Contributors

- Two new contributors have made significant contributions in the past year
- Several others are working on their first contribution!

## Remove grain-root & get stdlib/cli/runtime working together #86

**Merged** ospencer merged 5 commits into `grain-lang:master` from `phated:phated/remove-grain-root` on Mar 20

Conversation 2 Commits 5 Checks 0 Files changed 19



phated commented on Mar 18

Contributor 🗨️ ⋮

This PR does a few things. I'll outline below with reasons for "why".

Reviewers

ospencer

beloh

## Add tests for list append and for\_all #93

**Merged** ospencer merged 1 commit into `grain-lang:master` from `TyrelDenison:finish-list-stdlib-tests` on

Conversation 2 Commits 1 Checks 0 Files changed 1



TyrelDenison commented on Mar 21

Contributor 🗨️ ⋮

*No description provided.*

Thank you to all of the Grain contributors! This project would not be possible without you.



# Discord


- Grain now has a Discord server.
- Anyone can join to get help, provide feedback, discuss development, or just hang!






# Code of Conduct

- Grain has adopted the Contributor Covenant as its Code of Conduct.

Branch: master ▾ [grain](#) / CODE\_OF\_CONDUCT.md Find file Copy path

 ospencer Add code of conduct 4ab2638 on Feb 10

[1 contributor](#)

84 lines (49 sloc) | 5.1 KB Raw Blame History   

## Contributor Covenant Code of Conduct

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### Our Pledge

We as members, contributors, and leaders pledge to make participation in our community a harassment-free experience for everyone, regardless of age, body size, visible or invisible disability, ethnicity, sex characteristics, gender identity and expression, level of experience, education, socio-economic status, nationality, personal appearance, race, religion, or sexual identity and orientation.

We pledge to act and interact in ways that contribute to an open, welcoming, diverse, inclusive, and healthy community.



# Marketing



# Twitter

- The Grain Twitter account has accumulated 15 non-Philip and non-Oscar followers in the past year
- This may seem small, but maybe good since there have been no announcements or posts?

# Grain

0 Tweets



The screenshot shows the Twitter profile for 'Grain' (@grain\_lang). The profile picture is a stylized orange logo. The bio reads: 'Strongly typed 🦾 Functional always 🧑‍🚀 Your friendly neighborhood programming language: a modern web staple. 🌱'. The website link is 'grain-lang.org' and it was joined in July 2018. There are 6 accounts being followed and 17 followers.

**Grain**  
@grain\_lang Follows you


Strongly typed 🦾 Functional always 🧑‍🚀  
Your friendly neighborhood programming language: a modern web staple. 🌱

[grain-lang.org](https://grain-lang.org) 📅 Joined July 2018




6 Following 17 Followers

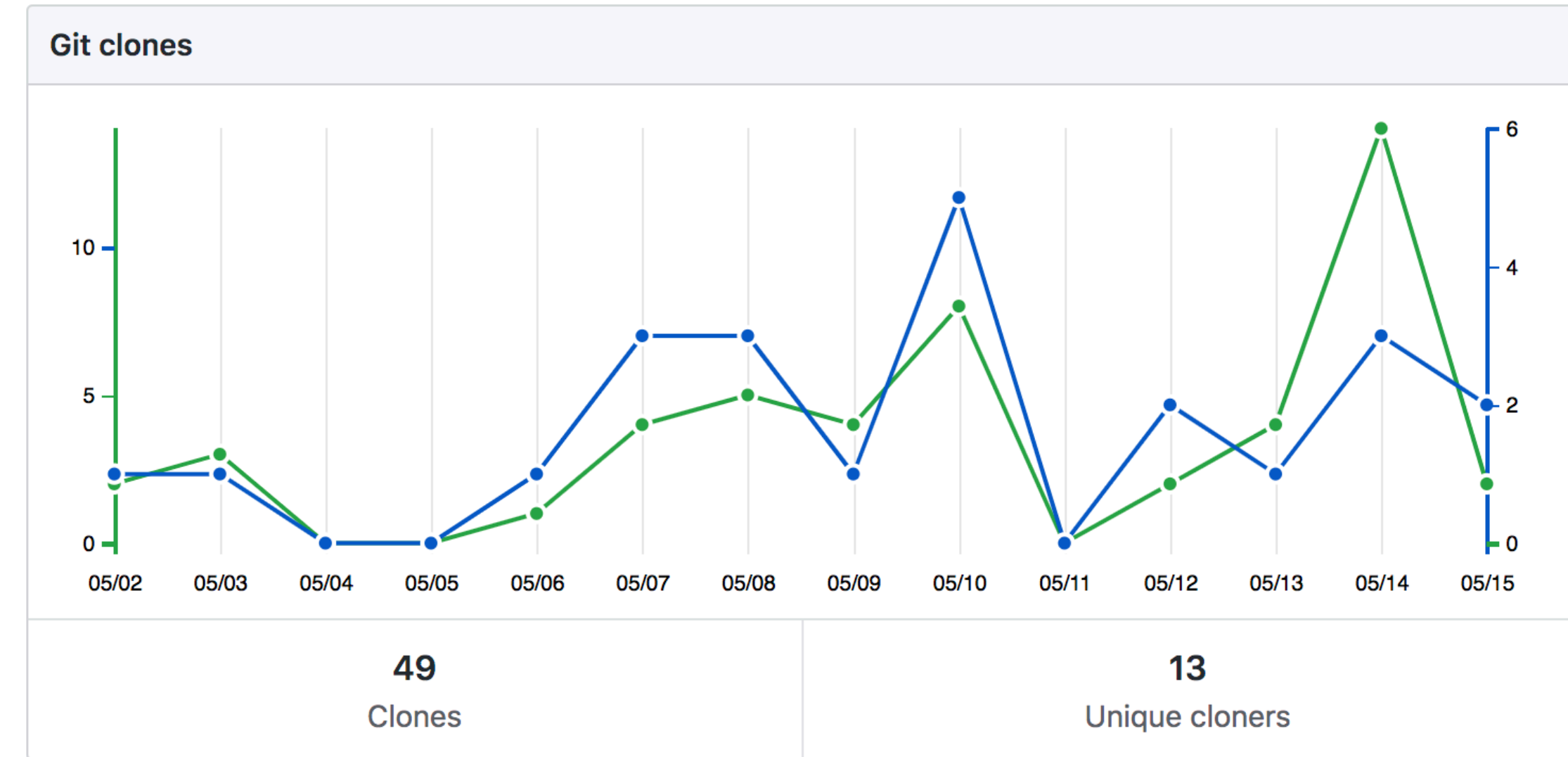
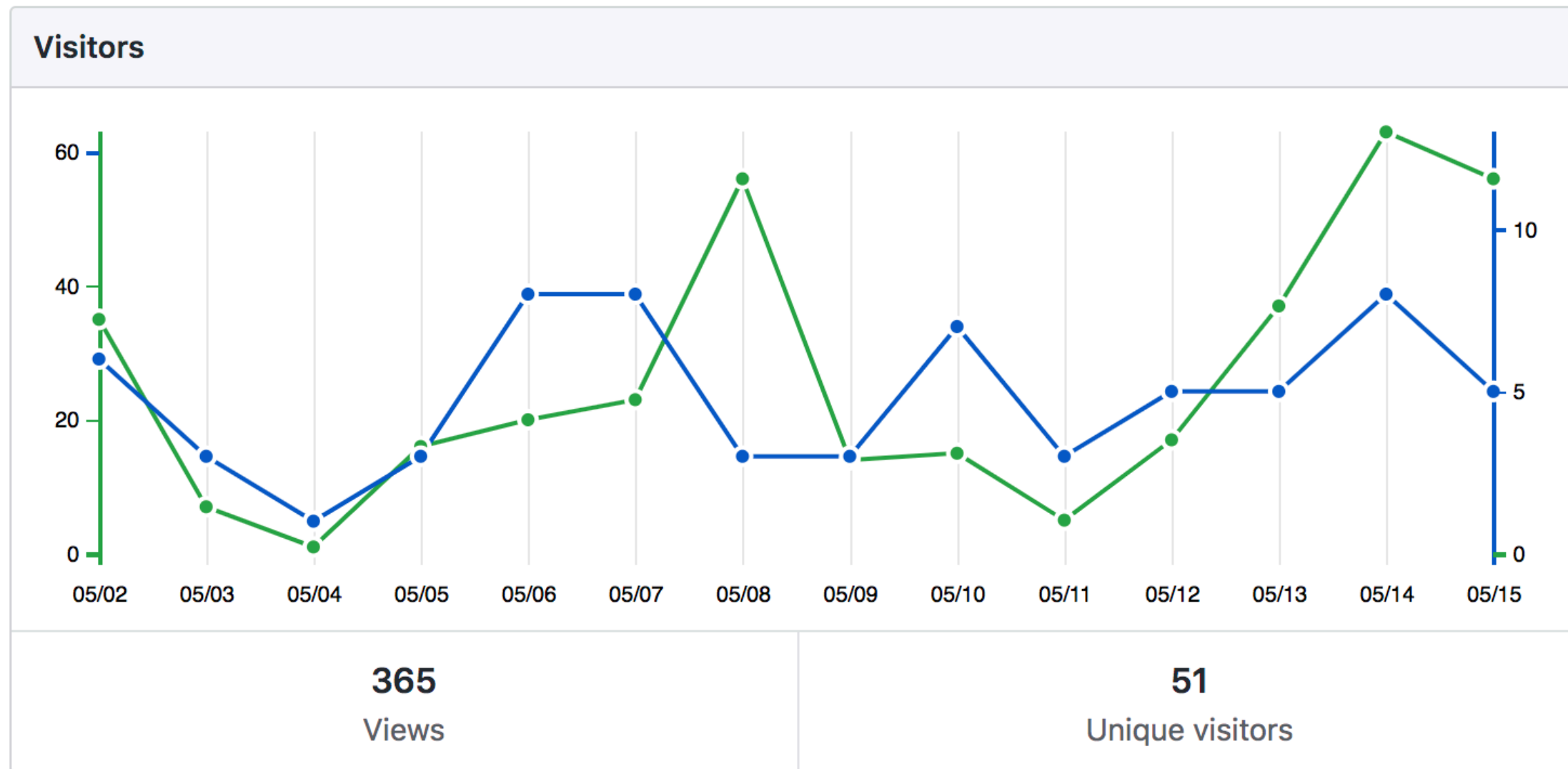


# GitHub

 **grain-lang/grain**

The Grain compiler toolchain and CLI. Home of the modern web staple. 🌾

 OCaml  1,267  23 Updated 2 days ago



These charts show data from the past two weeks.

The clone numbers are probably inflated because of CI, but unique cloners number makes it seem that folks are actually downloading the repo to mess around with Grain!





# Website Traffic



# The Path Forward



# Features Necessary for Alpha

## The First “Real” Grain Version

- Garbage Collection—Nearly complete
- Exception Handling—Has been started
- ...and that's it! There's loads more that needs to be done to make Grain truly useful, but we're very close to a version that would feel like a real language.



# Roadmap

## In No Particular Order

- Macros
- Number system overhaul
- Sourcemaps
- Error message improvement
- Standard libraries (improvements or new)—List, Array, String, Regex, Math, DOM, Option, Result, File, HTTP, Map, Set, Random, Crypto (just to name a few)
- Algebraic effects
- ...and much, much more.



# Wrap-up



# Get involved!

[grain-lang.org](http://grain-lang.org)

 [grain\\_lang](https://twitter.com/grain_lang)

 [oscar\\_spen](https://twitter.com/oscar_spen)