How To Learn Rust

October 6th, 2017

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Two Talks In One

Thanks

@anjuan
@Azuxul
@bulba_zord
@echorand
@EnamsuoBarry
@FranklinWaller
@gansai9
@glasnt
@gmebarthe
@hectorjcorrea
@iamed2
@IanBertolacci
@Ignoreintuition
@itsAhmedWay
@jackyboen
@joaomello
@jsookha
@l.d.walker
@llogiq
@macaronique
@mayaskme
@megamatman
@Mike_Fal
@proogey
@robn
@sundayayandokun
@Vinatorul
http://agares.info/

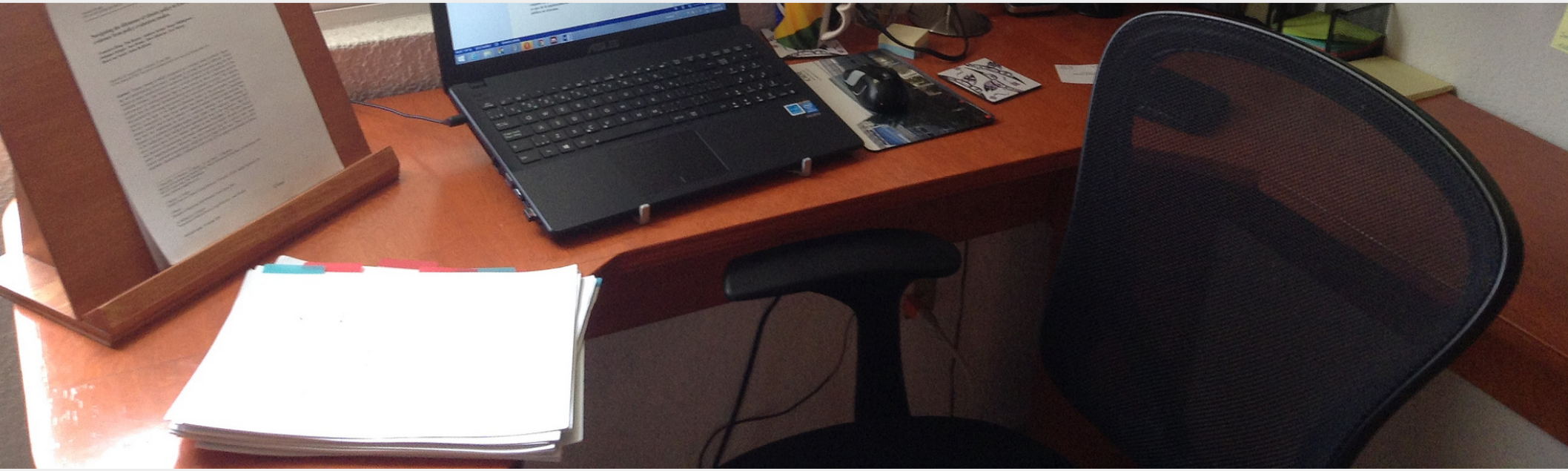
Today's Audience

Your Next Language

Curiosity

Features

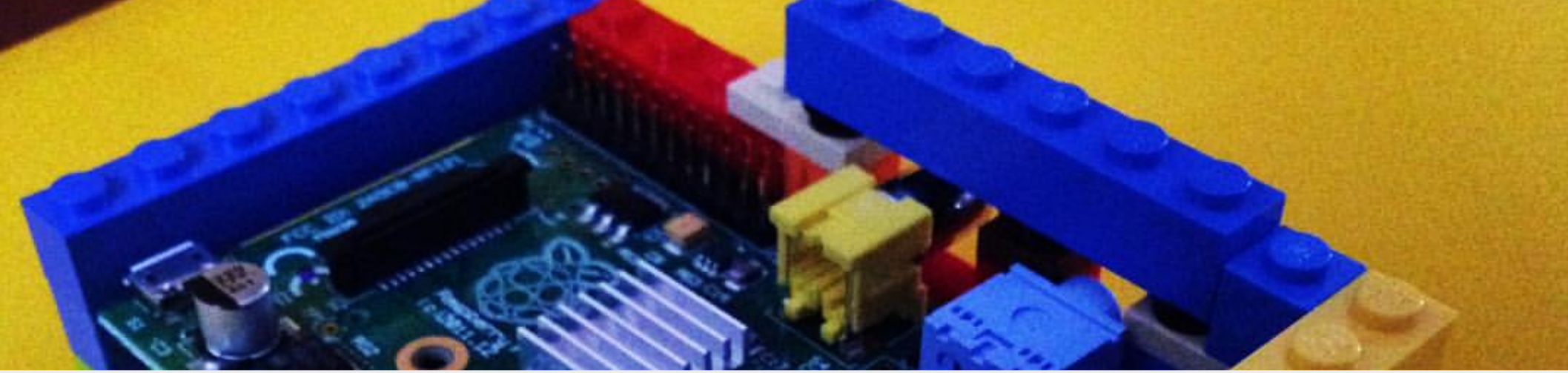
Work



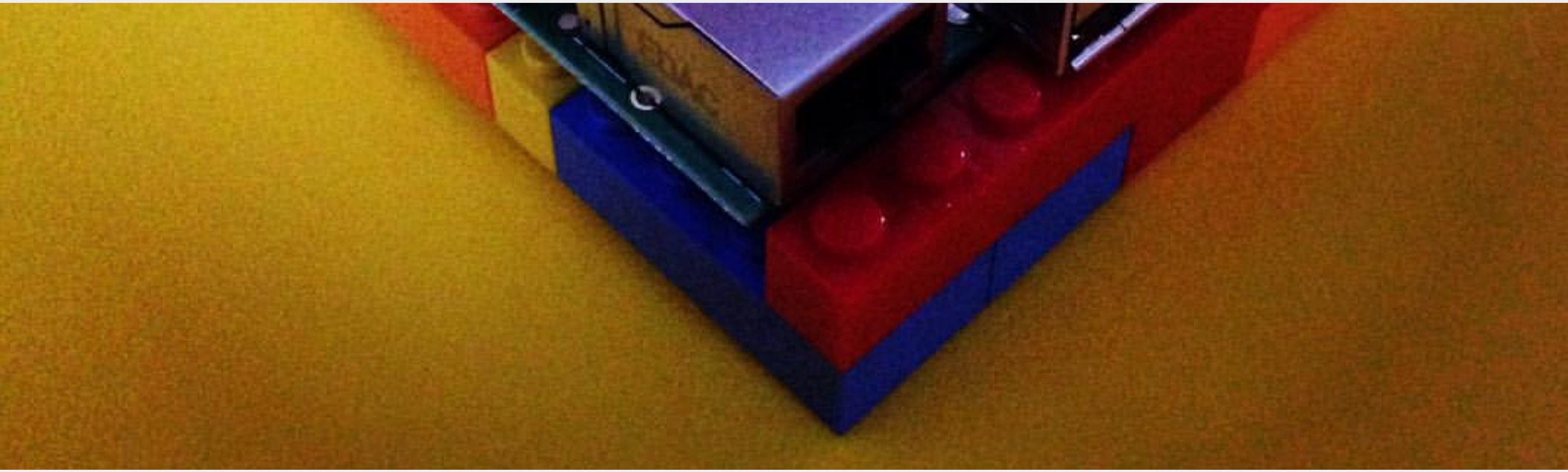
Why?

Pattern Recognition

Your Next Language



Learning Styles



Tasks You Enjoy

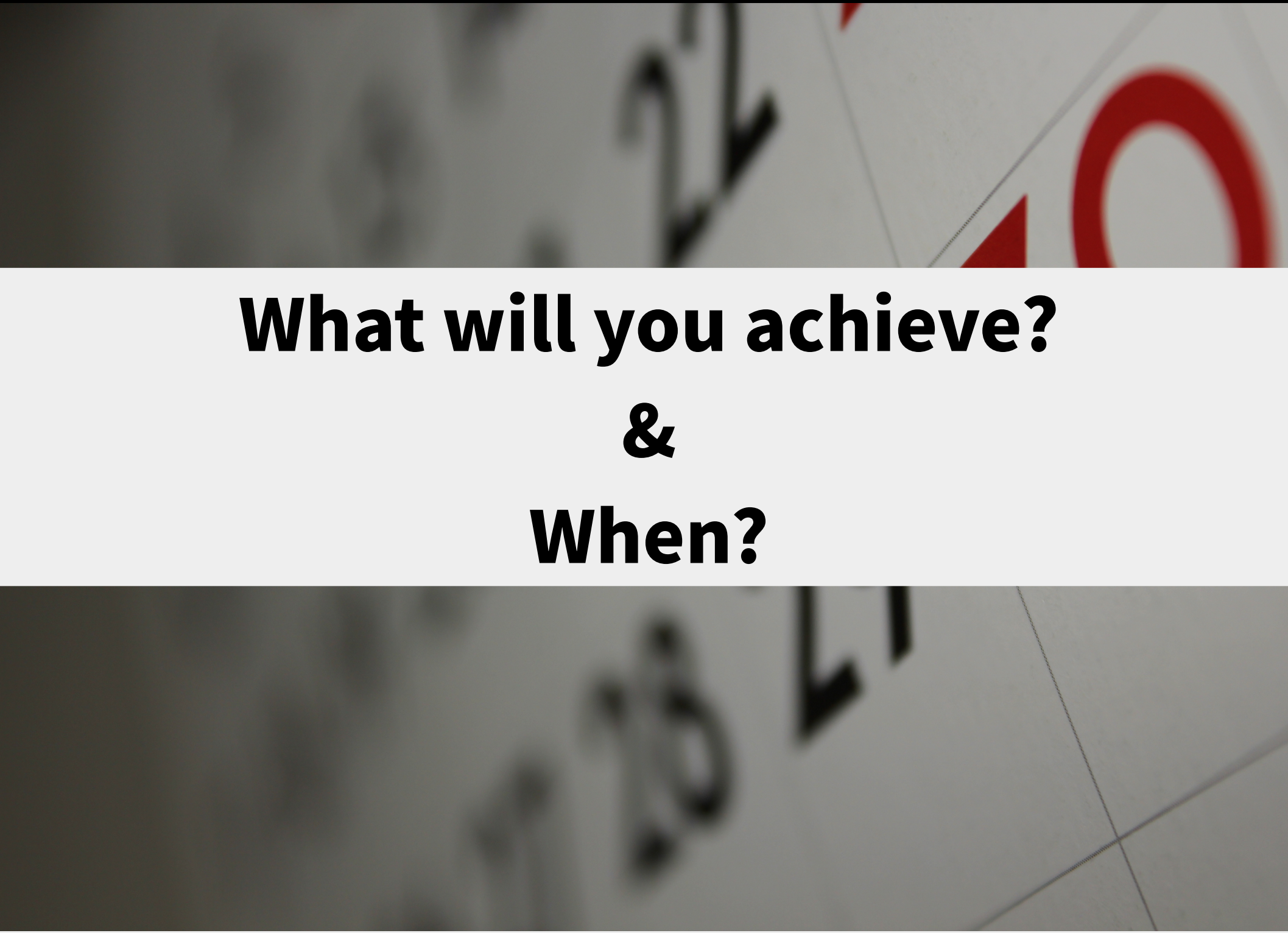
vs

Tasks You Despise

Successful Projects

vs

Unsuccessful Projects



What will you achieve?

&

When?

Which Language?

Popularity

Community

Resources


NIGHT
DAY
PRESS
TO TEST
OE-FMW
LEAN MAX1450TIT
GARMIN
GMA 340
GNS 530
CRUISE POW

Features

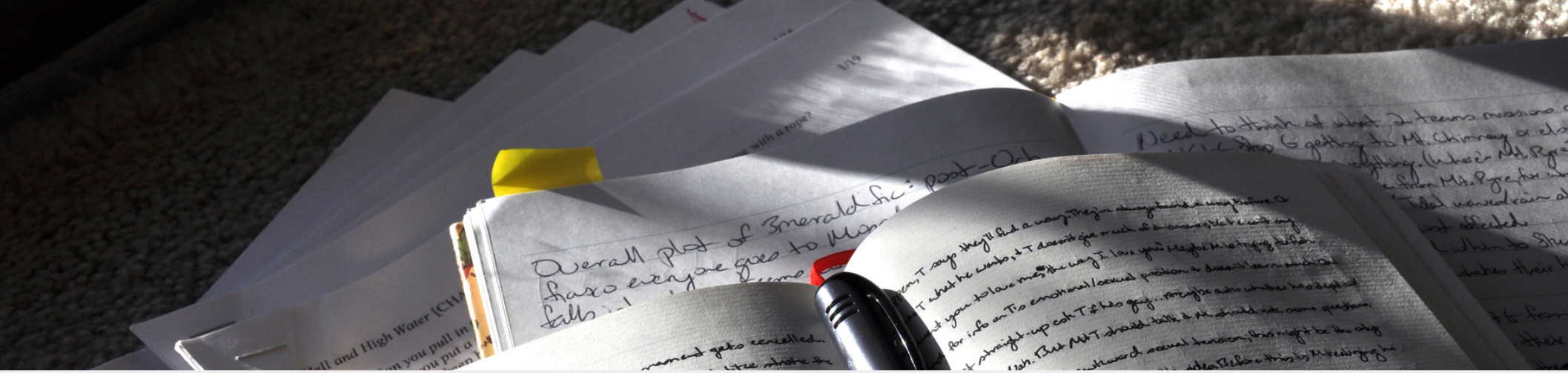

ACTIVE FLIGHT PLAN
LOAN / LHPP
Approach ILS 34
PP
D9.6
CI34
GNS 430
GPS
CAUTION
Goodrich
PROP DE-ICER AMPS
SURF DEICE
PROP HEAT
WSHLD HEAT
ICE LIGHT
PITOT STALL
WARN HEAT
WING FLAP
RADIO MASTR
WX CLEAR
OXYGEN
ALTERNATE STATIC SOURCE

Old & New Concepts

“My next language _____”

It’s worth taking time from…

Family? Hobbies? Sleep?



Capture Your Motivation

12 Study Techniques

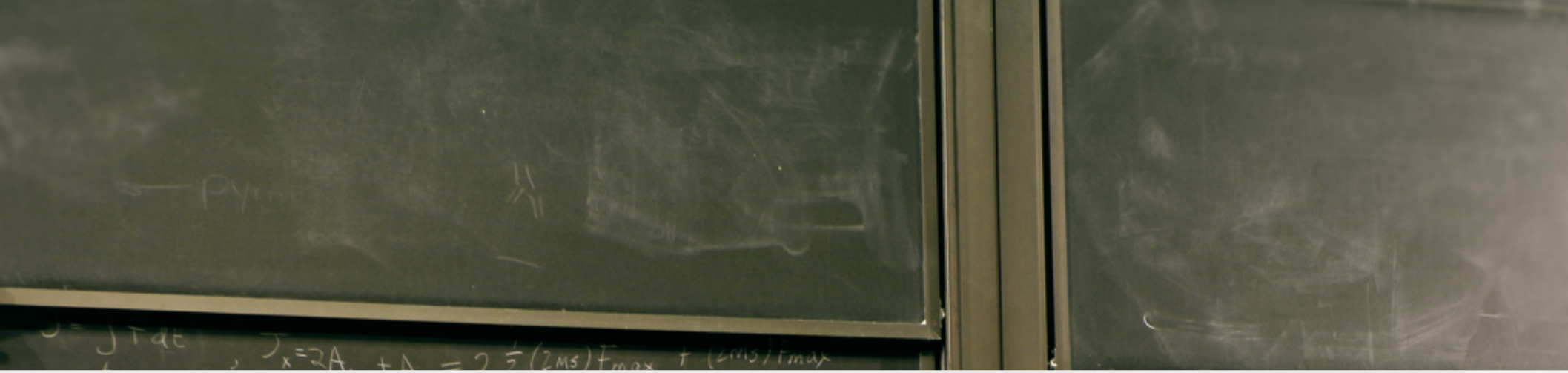
1) Language Docs

2) Similar Languages

3) Community Support

4) Write Real Code

5) Read The Books

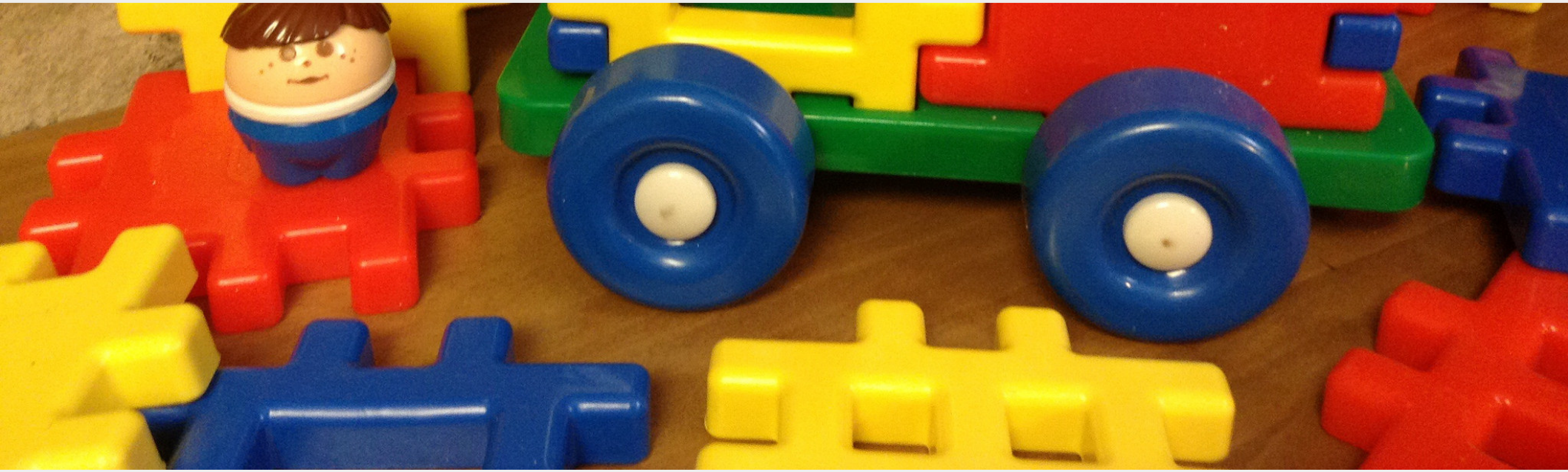


6) Examine Examples

7) Find Good Tools

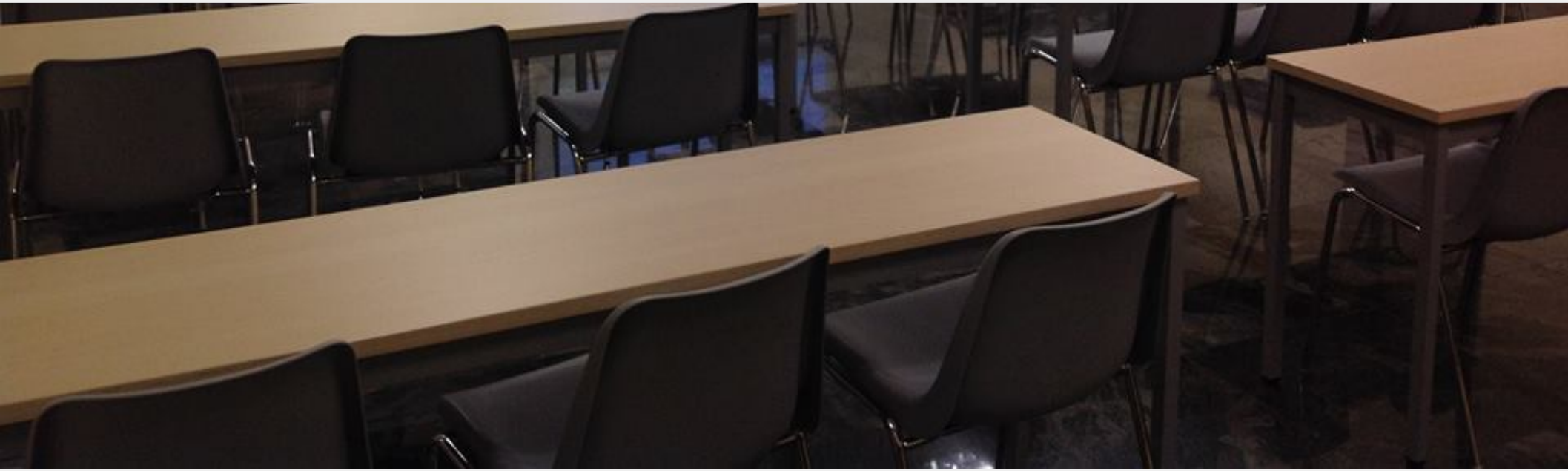
8) Read Real Code

9) Write Toy Programs



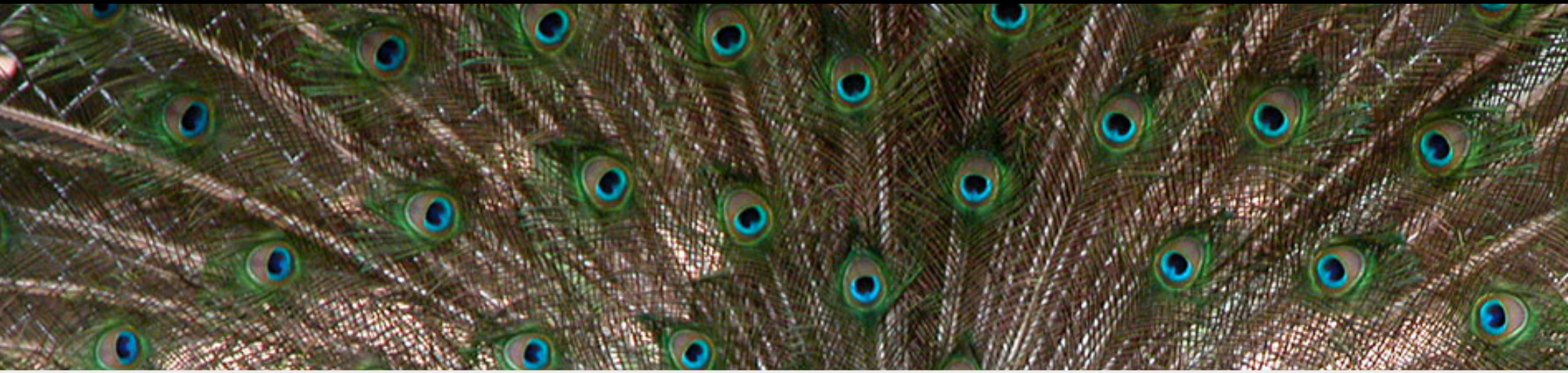
10) Google & Stackoverflow

11) Watch Lectures & Courses



12) Maintain Enthusiasm

Troubleshooting



Community Interaction

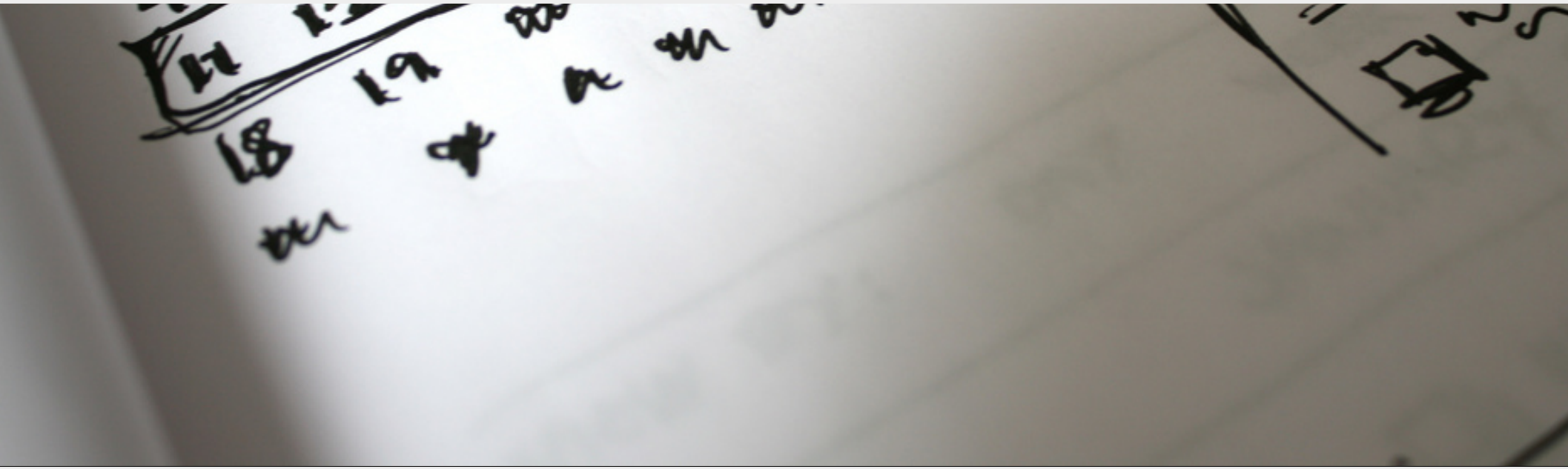
Time

Language features

Advice

Learn by Doing

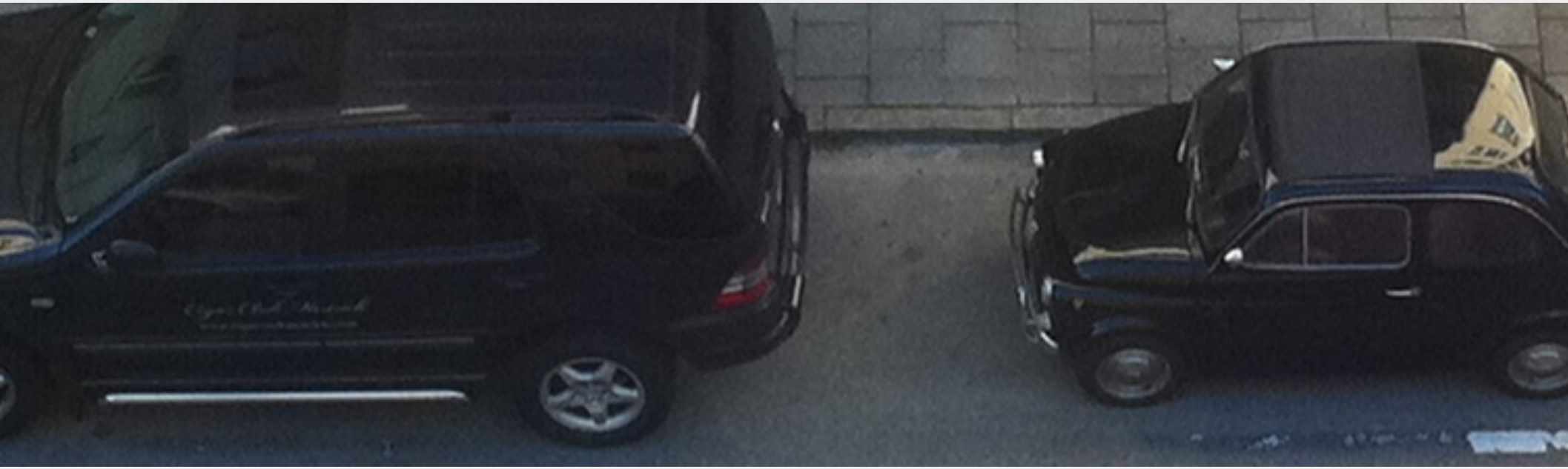
Practice Consistently

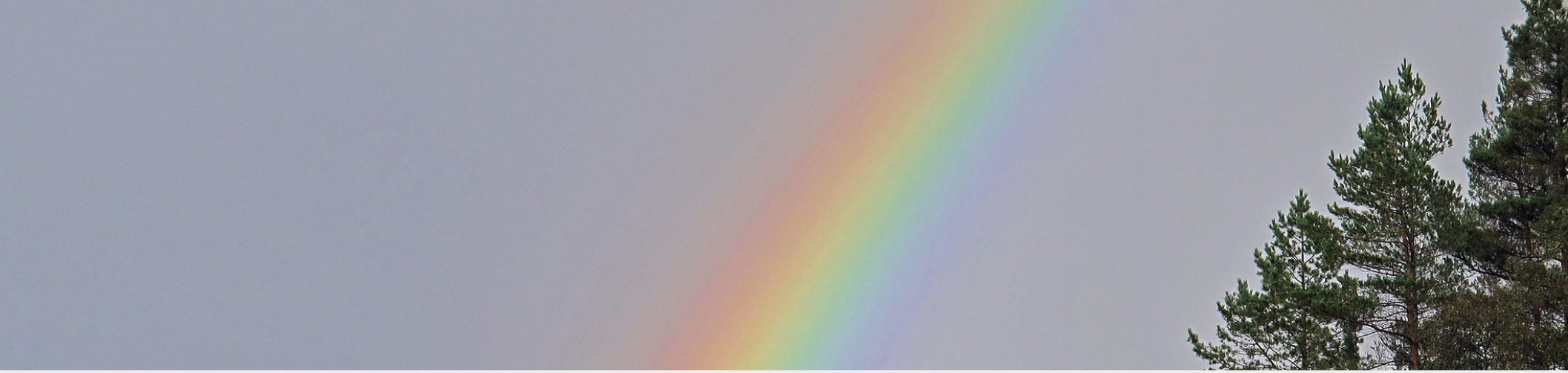


Start with the Basics

Build Something You Love

Respect Languages' Differences

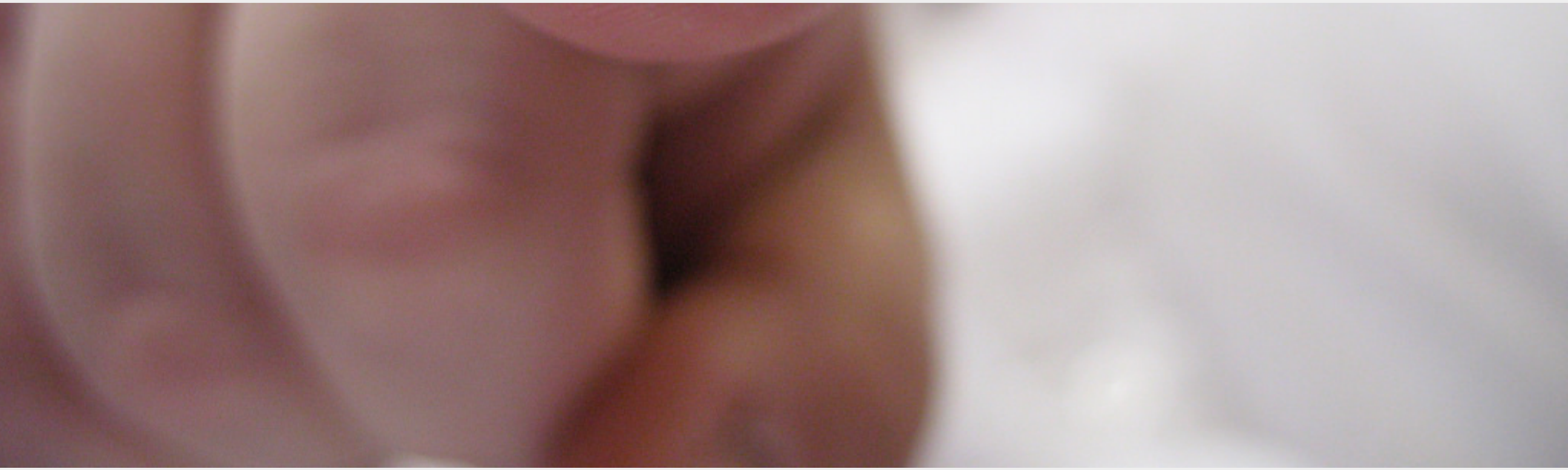




It Gets Better

Learning Rust!

Are You Ready?



www.rust-lang.org

1.0 on May 15, 2015

Currently 1.20.0

Systems Programming.
Safe, Concurrent, Fast.

Memory Safety, no GC.
Ownership + Lifetimes.
Types & Traits.

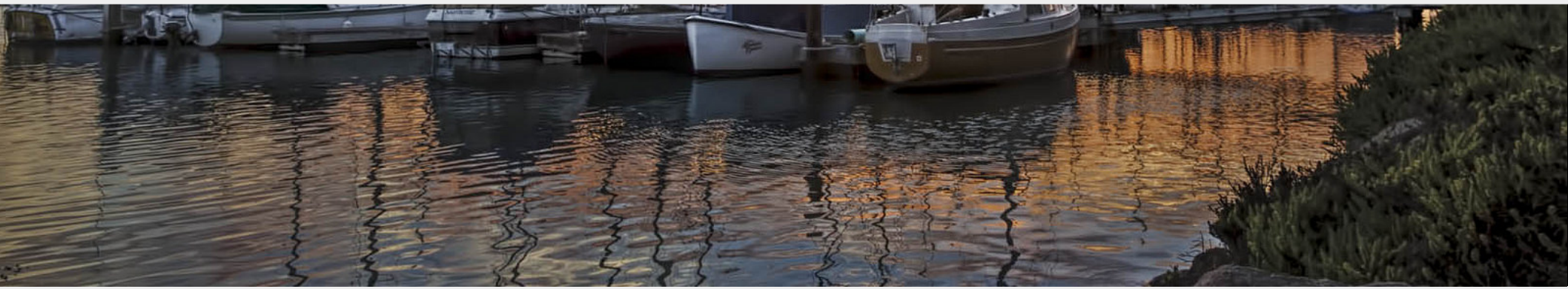
“I am learning @rustlang to ___”

1) Language Docs

doc.rust-lang.org

2) Similar Languages

github.com/ctjhoa/rust-learning/

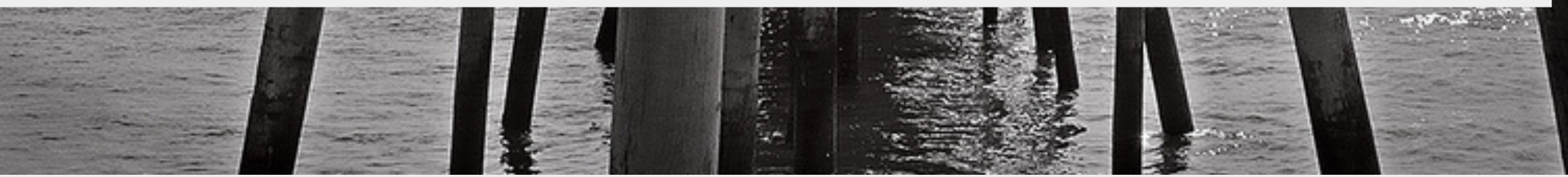


3) Community Support

www.rust-lang.org/community.html

users.rust-lang.org

#rust-beginners on irc.mozilla.org



4) Write Real Code

GitHub search “is:open is:issue language:rust”

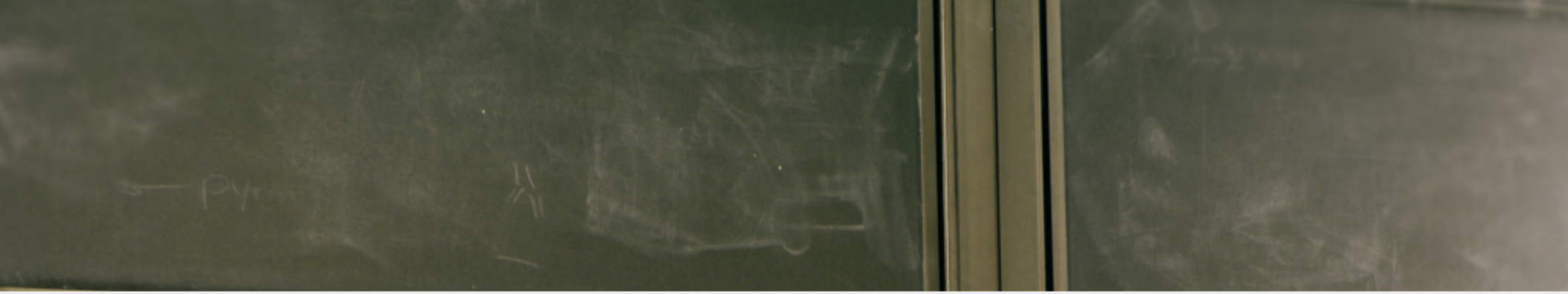
starters.servo.org

Hacktoberfest

5) Read The Books

doc.rust-lang.org/book

O'Reilly, Programming Rust



6) Examine Examples

rustbyexample.com

Carol's rustlings

Rosetta Code

7) Find Good Tools

play.rust-lang.org

Clippy and Rustfmt

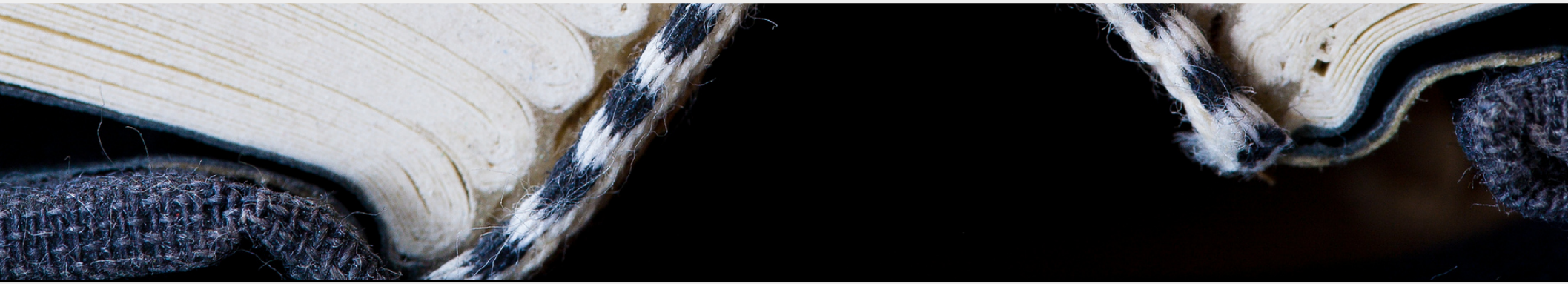
IDE support

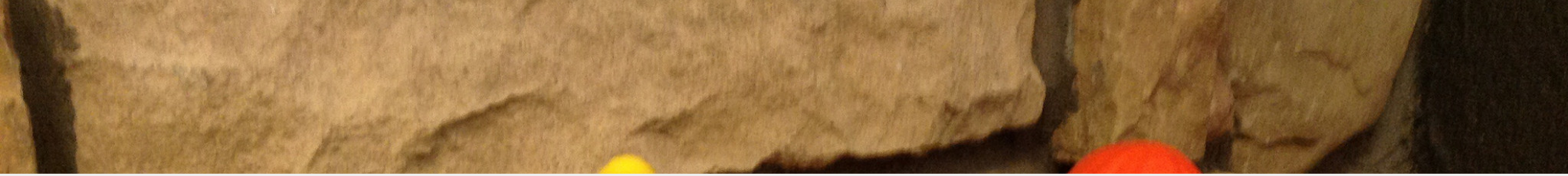
8) Read Real Code

crates.io popular libraries

The Rust Compiler

Rust in Production





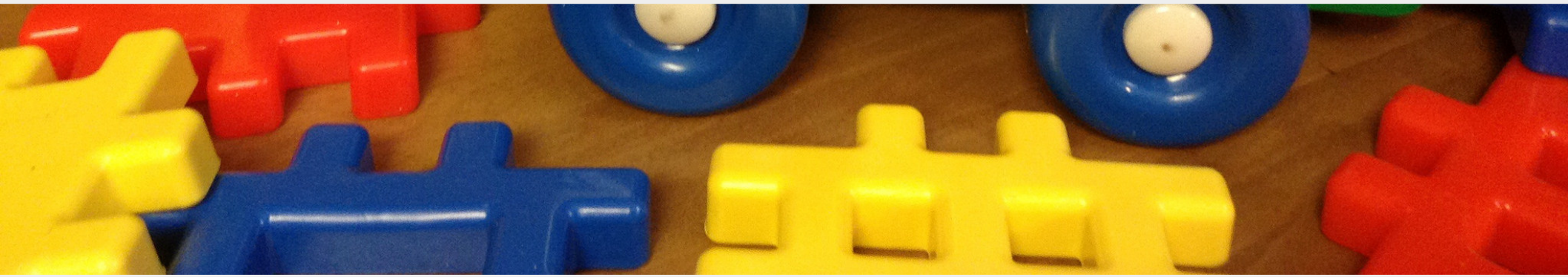
9) Write Toy Programs

Rust by Example

exercism.io

Project Euler

Hackerrank

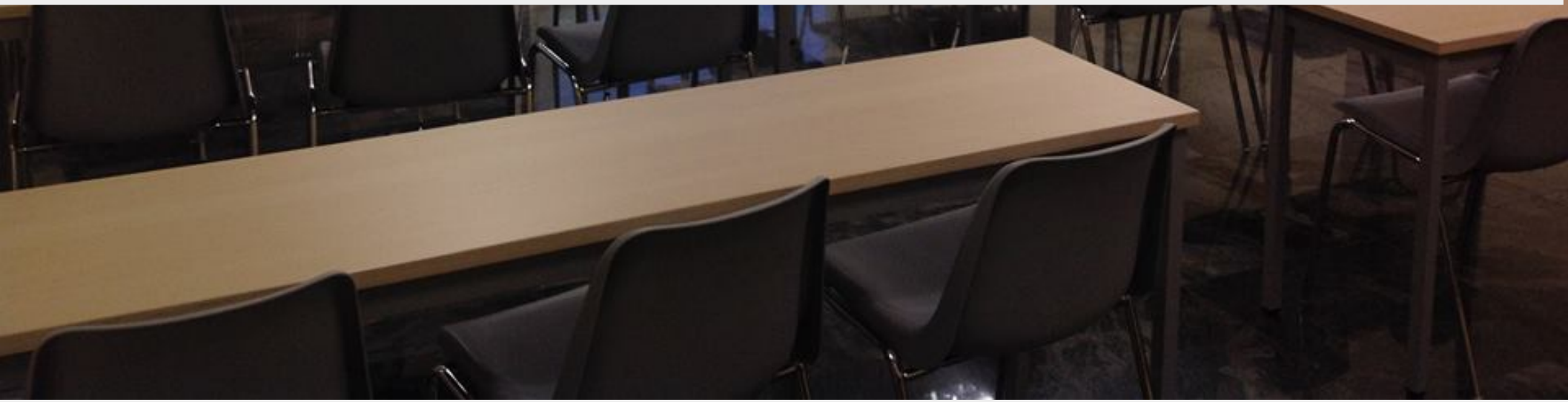


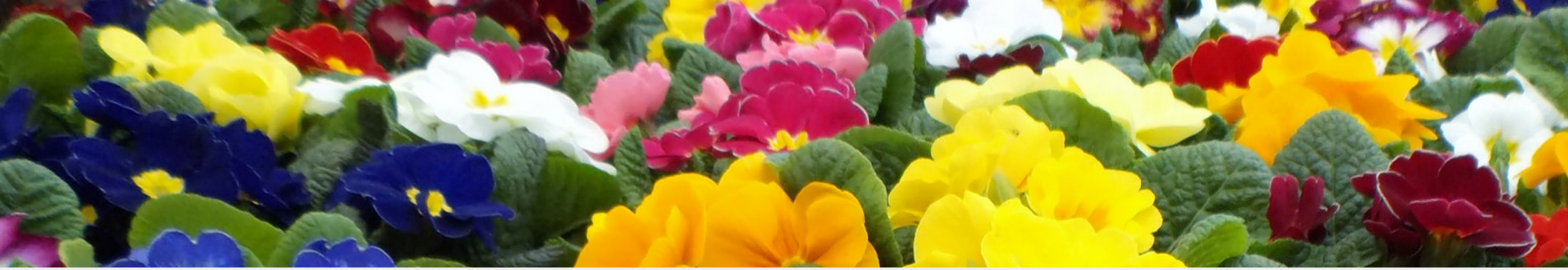
10) Google & Stackoverflow

Stackoverflow Rust tag

11) Watch Lectures & Courses

rust-learning list





12) Maintain Enthusiasm

Rust subreddit

This Week In Rust

Errors are here to help

Basic Syntax

```
1  // Main takes no arguments and returns nothing
2  fn main(){
3      // The function body is the *scope* inside these curly brace
4      // Create a variable. It owns a string.
5      let what_to_say = "Hello World";
6      // Meet print syntax
7      println!("This program says {}", what_to_say);
8  }
```

```
This program says Hello World

Program ended.
```

Scope Errors!

```
1  fn not_main(){
2      let what_to_say = "Hello World";
3  }
4  fn main(){
5      println!("This program says {}", what_to_say);
6  }
```

```
<anon>:5:38: 5:49 error: unresolved name `what_to_say` [E0425]
<anon>:5     println!("This program says {}", what_to_say);
                                              ^~~~~~~~~~~
```

Punctuation Errors

```
1 fn main(){
2     let what_to_say = "Hello World"
3     println!("This program says {}", what_to_say);
4 }
```

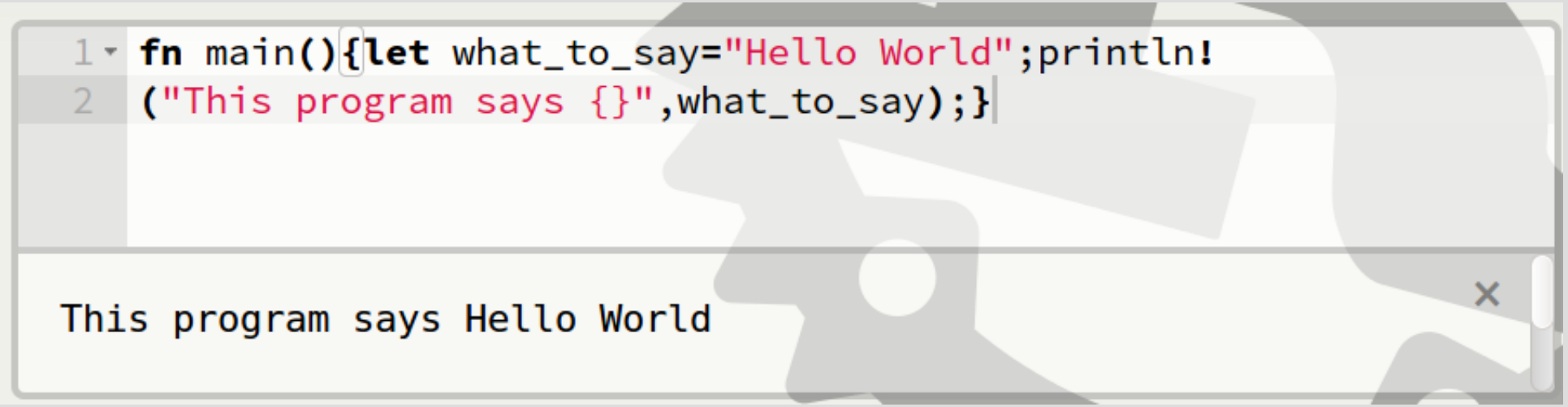
```
<anon>:3:5: 3:12 error: expected one of `.`, `;`, or an
operator, found `println`
<anon>:3     println!("This program says {}", what_to_say);
```

Unused Variables

```
1 fn main(){
2     let what_to_say = "Hello World";
3     println!("Hello");
4 }
```

```
<anon>:2:9: 2:20 warning: unused variable: `what_to_say`,
#[warn(unused_variables)] on by default
<anon>:2     let what_to_say = "Hello World";
```

Hey, Pythonistas!



Hey, Pythonistas!

```
1  fn
2  main
3  (
4      ){
5  let what_to_say
6      =
7  "Hello World"
8  ;println
9  !  (
10 "This program says {}"
11     , what_to_say
12 ) ;           }
```

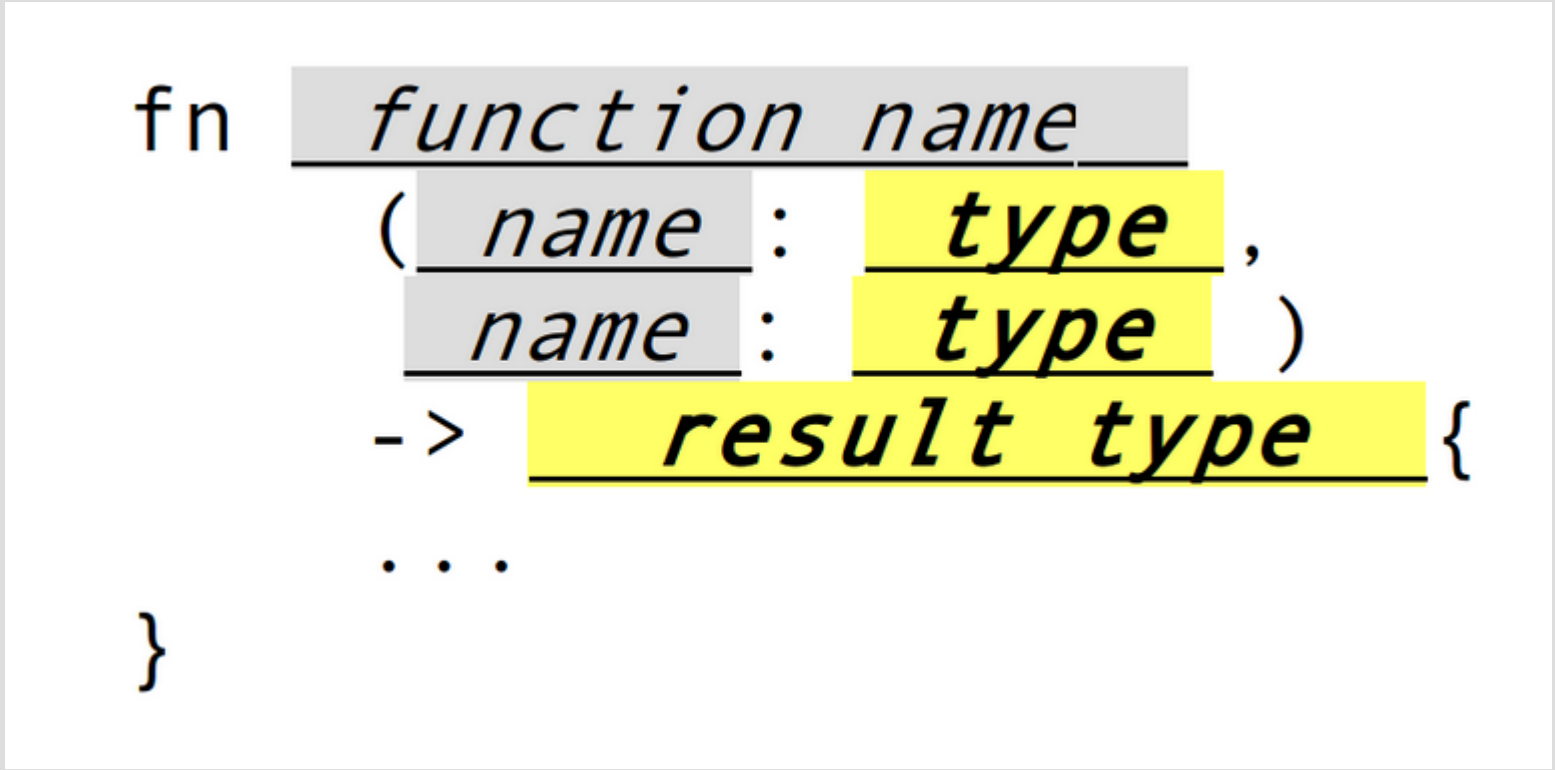
```
This program says Hello World

Program ended.
```

Primitive types (built-in)

- `bool`
- `char`
- `i8, i16, i32, i64`
- `u8, u16, u32, u64`
- `f32, f64`
- `isize, usize`
- `str`
- `tuple`

https://doc.rust-lang.org/book/primitive-types.html

Function Type Signatures



Function with a type signature

```
1  fn sum(a: i32, b: i32, c: i32) -> i32{
2      a + b + c
3  }
4
5  fn main(){
6      println!("A sum is {}", sum(1, 2, 3))
7  }
```

```
A sum is 6

Program ended.
```

Synonymous return

```
1  fn sum(a: i32, b: i32, c: i32) -> i32{
2      return a + b + c;
3  }
4
5  fn main(){
6      println!("A sum is {}", sum(1, 2, 3))
7  }
```

```
A sum is 6

Program ended.
```

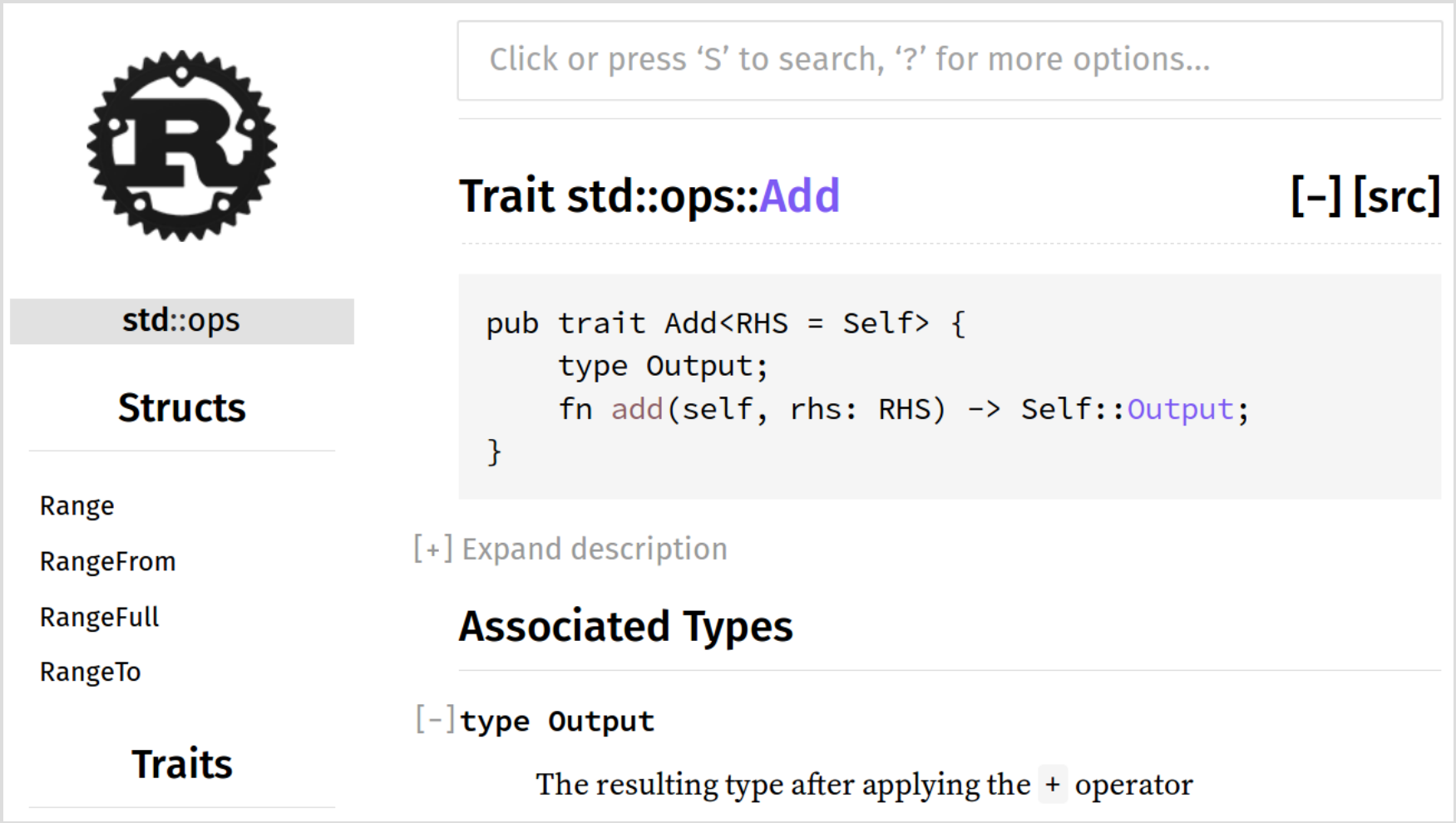
Type Errors

```
1  fn sum(a: i32, b: i32, c: i32) -> i32{
2      return a + b + c;
3  }
4
5  fn main(){
6      println!("A sum is {}", sum(1.1, 2.3, 3.2))
7  }
```

```
<anon>:6:33: 6:36 error: mismatched types:
 expected `i32`,
    found `_`
(expected i32,
    found floating-point variable) [E0308]
```

Anything you can add...

https://doc.rust-lang.org/std/ops/trait.Add.html



Traits

```
1  use std::ops::Add;
2
3  fn sum<T: Add<Output=T>>(a: T, b: T, c: T) -> T{
4      return a + b + c;
5  }
6
7  fn main(){
8      println!("A sum is {}", sum(1.1, 2.3, 3.2))
9  }
```

```
A sum is 6.6

Program ended.
```

Additional Resources

- https://doc.rust-lang.org/book/traits.html
- http://blog.rust-lang.org/2015/05/11/traits.html
- http://rustbyexample.com/trait.html
- http://pcwalton.github.io/blog/2012/08/08/a-gentle-introduction-to-traits-in-rust/

Ownership Rules

- No borrow may outlive value's owner
- Exactly 1 mutable reference (&mut T)
  - OR
- As many read-only references (&T) as you want

Giving Away a Value

```
1  fn main() {
2      let mystring = "I'm immutable!".to_string();
3      println!("{}", mystring);
4      let mut yarn = mystring; //yarn now owns the value
5      println!("{}", yarn);
6      yarn = "I have been mutated".to_string();
7      println!("{}", yarn);
8  }
9
```

```
I'm immutable!
I'm immutable!
I have been mutated

Program ended.
```

Given away means gone

```
1  fn main() {
2      let mystring = "I'm immutable!".to_string();
3      println!("{}", mystring);
4      let mut yarn = mystring; //yarn now owns the value
5      println!("{}", mystring);
6  }
7
```

```
<anon>:5:20: 5:28 error: use of moved value: `mystring` [E0382]
<anon>:5      println!("{}", mystring);
                             ^~~~~~~~
<std macros>:2:25: 2:56 note: in this expansion of format_args!
<std macros>:3:1: 3:54 note: in this expansion of print!
```

Borrow the value

```
1  fn main() {
2      let mystring = "I'm immutable!".to_string();
3      println!("{}", mystring);
4      let yarn = &mystring;
5      println!("{}", mystring);
6      println!("{}", yarn);
7  }
8
```

```
I'm immutable!
I'm immutable!
I'm immutable!

Program ended.
```

Make a mutable copy

```
1  fn main() {
2      let mystring = "I'm immutable!".to_string();
3      println!("{}", mystring);
4      let mut yarn = mystring.clone();
5      println!("{}", mystring);
6      println!("{}", yarn);
7      yarn = "I have been mutated".to_string();
8      println!("{}", yarn);
9  }
```

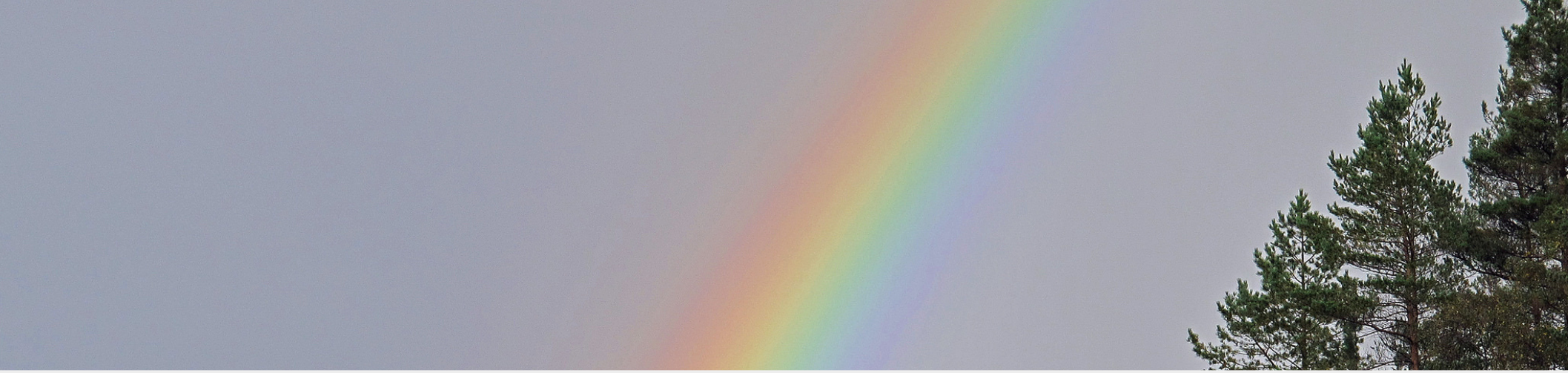
```
I'm immutable!
I'm immutable!
I'm immutable!
I have been mutated
```

Review

- Only owner can access value
- 1 mutable reference or unlimited read-only references to each value
- Borrow may not outlive owner

Additional Resources

- http://doc.rust-lang.org/stable/book/ownership.html
- http://doc.rust-lang.org/stable/book/references-and-borrowing.html
- Why the to_string()? http://hermanradtke.com/2015/05/03/string-vs-str-in-rust-functions.html
- http://rustbyexample.com/trait/clone.html
- https://www.reddit.com/r/rust/comments/2xxjda/when_should_my_type_be_copy/



It Gets Better

Thank You

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