Lecture 1

Rust Setup

Goals For Today

- Discuss more about the course
- Explore the Rust environment
- Hello, CS 128 Honors!

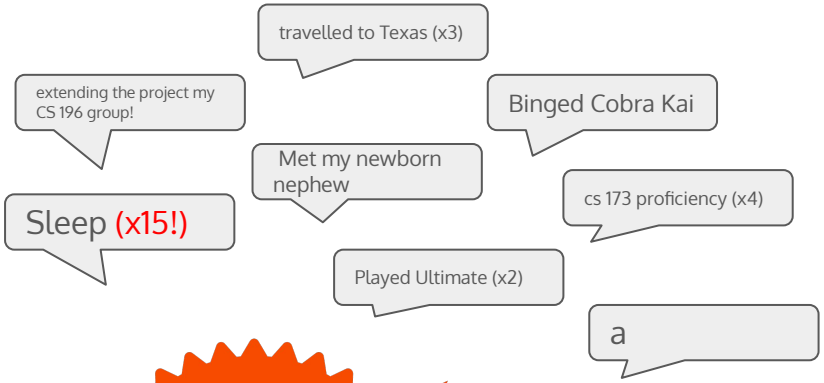
Quick Reminders

Reminders:

- Fill out the checklist form
  - If you're a James Scholar, submit your HCLA
  - If you're not a James Scholar, make sure you're registered on Self Service
- Join the Discord

But First...

What did you all do this break?



This is Ferris the Crab, the Rust mascot

But First...

What are your favorite pastas?

Spaghetti (x12)

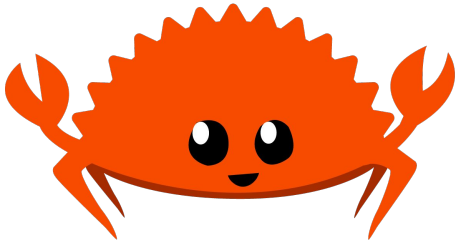
a

Penne (x7)

Conchiglie (x2)

Tortellini (x3)

idk, the normal kind



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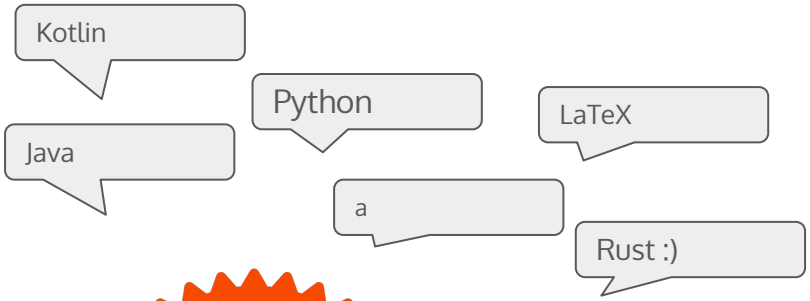
But First...

What are your favorite languages?



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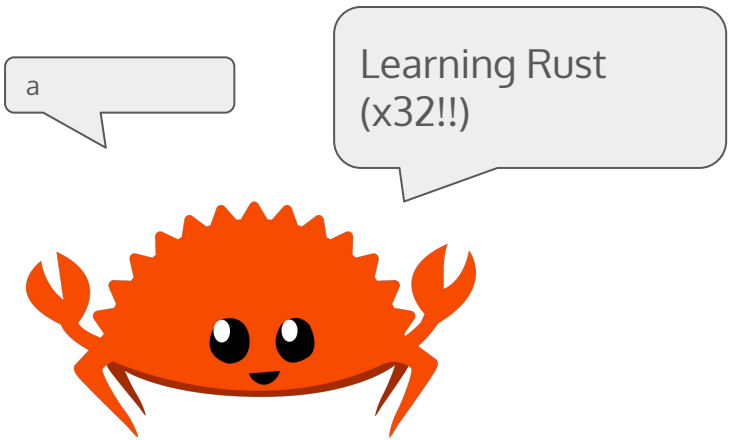
But First...

Why are you taking this course?



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This Course

- This is the Honors add-on for CS128
- In this course, we'll (initially) follow topics you learn in CS128, but in Rust
- Eventually we'll branch off to more topics

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- This course is structured for you to get out as much as you put in

So... What is Rust?

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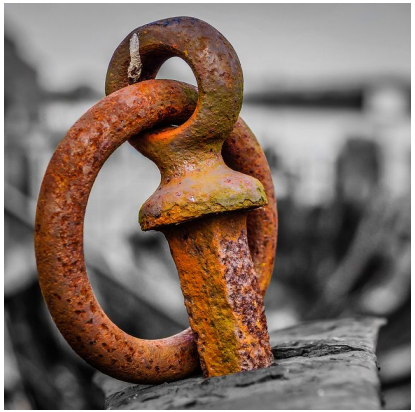

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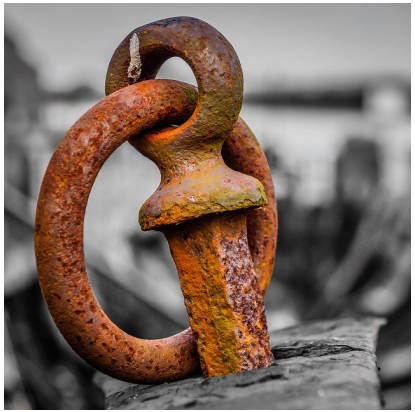

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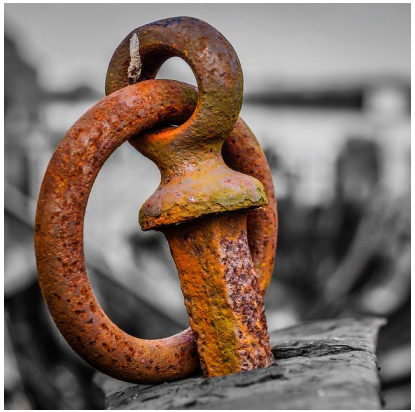

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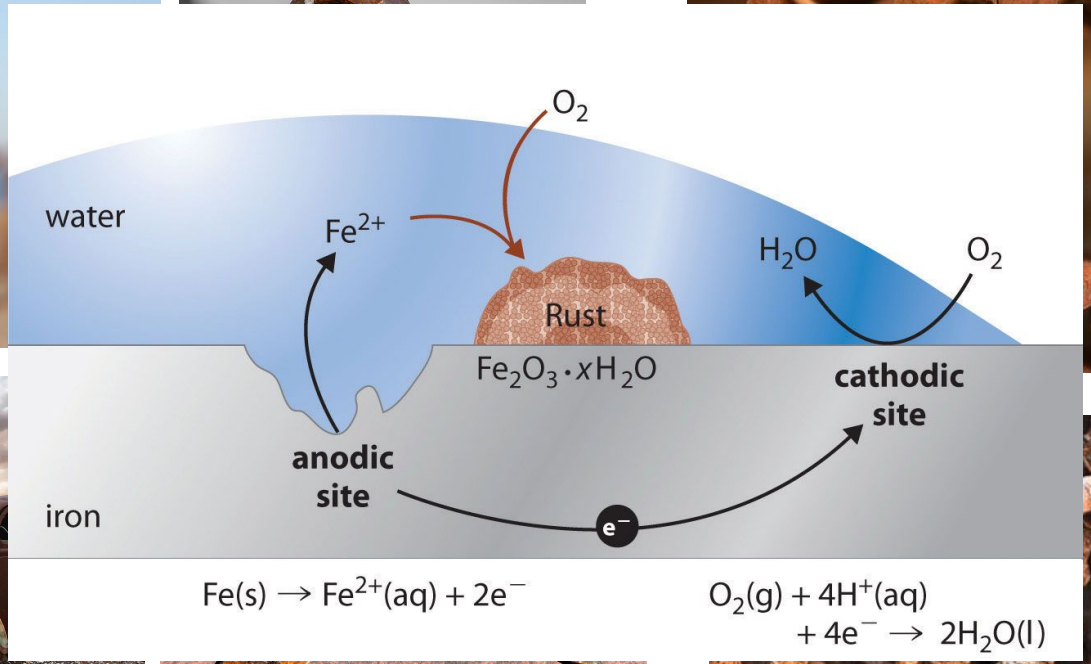

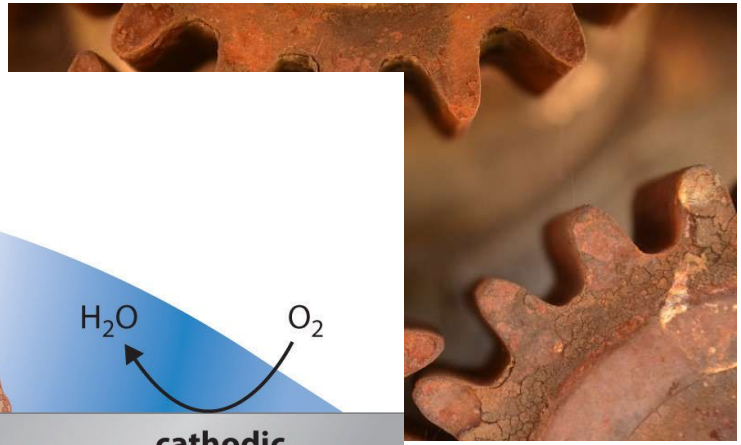

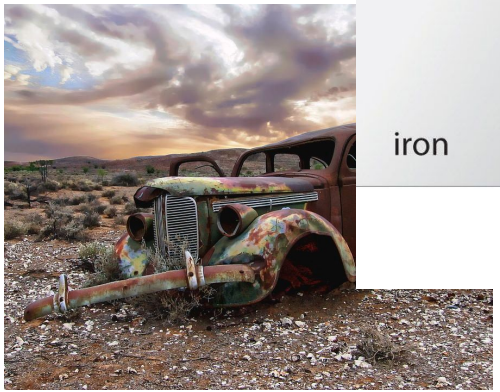

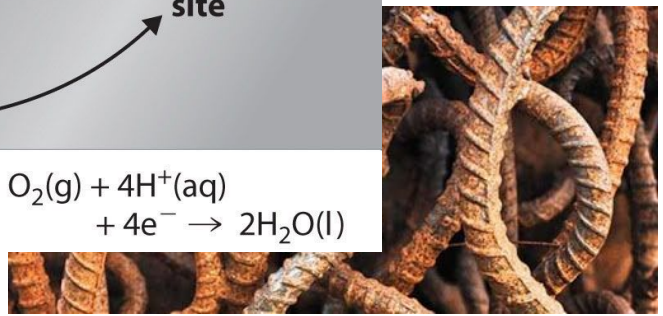

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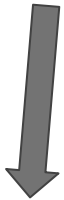

Programming Paradigms: Categorizing programming languages based on their features

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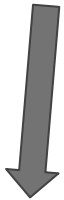

Programming Paradigms:
Categorizing programming languages based on their features

Multi-Paradigm:
Languages that support several programming paradigms and don't restrict the programmer to a single paradigm

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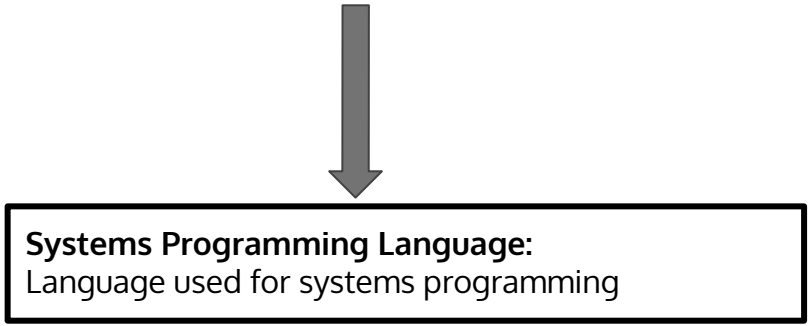

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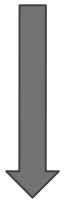

Systems Programming Language:
Language used for systems programming

Systems programming is **used for system software**. System software provides a platform for other software.

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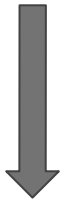

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System programming languages are designed to provide easy **access to the underlying hardware** and for **performance**

So... What is Rust?

- Rust is a **multi-paradigm system programming language**
- Rust focuses on **safety**

What even is Safety?

> Safe Rust is the true Rust programming language. If all you do is write Safe Rust, **you will never have to worry about type-safety or memory-safety**. You will never endure a dangling pointer, a use-after-free, or any other kind of Undefined Behavior.

The Rustonomicon, Chapter 1

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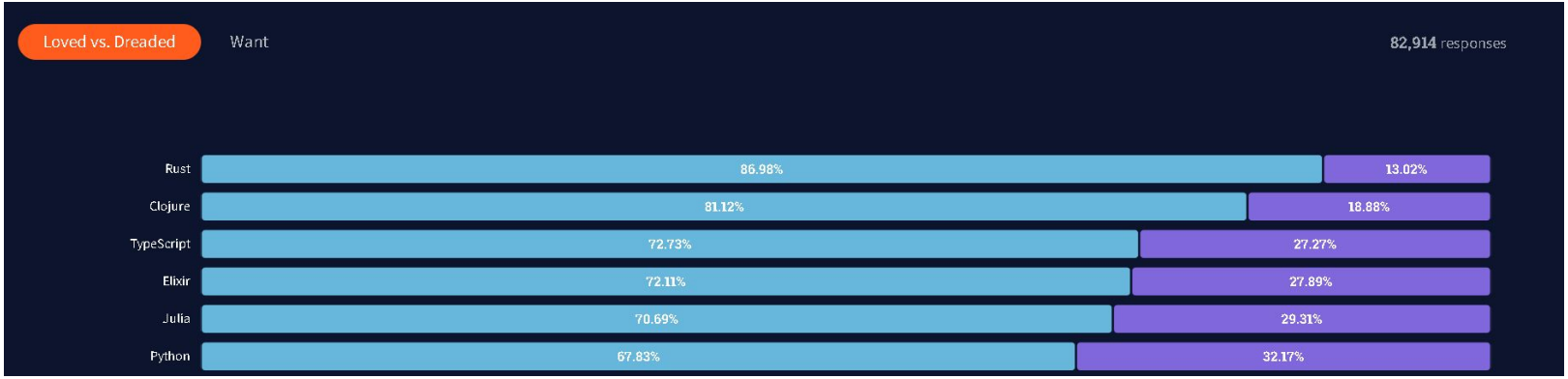

StackOverflow 2021 Developer Survey - Rust is the most loved language

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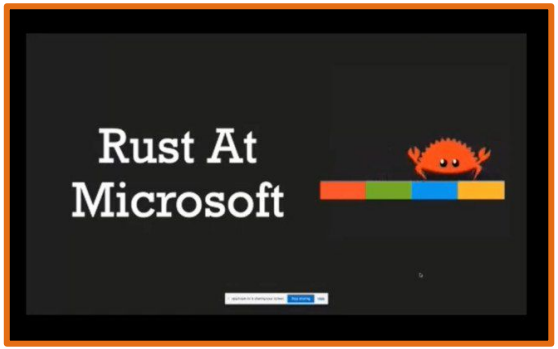
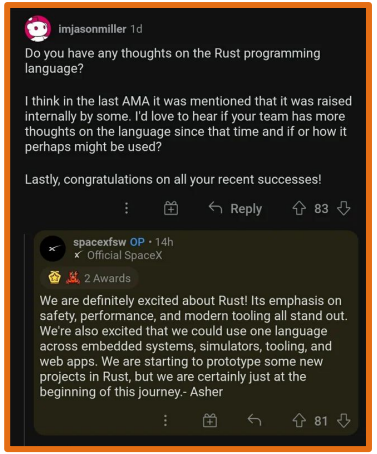


Microsoft: Rust Is the Industry's 'Best Chance' at Safe Systems Programming



How will we learn Rust?

- We will often use the Rust textbook
  - Google “Rust Textbook”, it’s free online
  - https://doc.rust-lang.org/book/

How will we learn Rust?

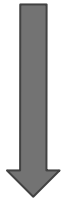
- Rust is already installed in your CS128 virtual machine
- Please test this whenever possible with

`cargo -V`

```
vagrant@0d603b65c801:~$ cargo -V
cargo 1.57.0 (b2e52d7ca 2021-10-21)
vagrant@0d603b65c801:~$
```

Cargo?

- Cargo is Rust's **build system** and **package manager**

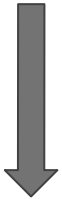


Build Systems:
Cargo **compiles*** your Rust project so that it can be executed by your computer

* Technically rustc is Rust's Compiler. Cargo acts as an abstraction layer that manages packages, handle metadata, and invokes rustc for you

Cargo?

- Cargo is Rust's **build system** and **package manager**



Package Manager:
Modern projects depend on external packages and libraries. A package manager handles those packages (and the packages that they might depend on)

Cargo?

- Cargo is Rust's **build system** and **package manager**
- How will we (primarily) use Cargo?
  - Create, Compile, and Execute your code
  - Download and manage packages you use (final project!)

Your First Rust Project - Hello, CS 128 Honors!

Lets walk through the process of creating and executing some Rust code from scratch.

1. Create a new project
2. Edit your code
3. Compile
4. Run

Your First Rust Project - Hello, CS 128 Honors!

Lets walk through the process of creating and executing some Rust code from scratch.

1. Create a new project
2. Edit your code*
3. Compile
4. Run

*You should use whatever editor you want, but we recommend VSCode with the rust-analyzer extension

More about Cargo

Let's learn some of the basic Cargo (build) functionality

- `cargo check`
- `cargo build`
- `cargo run`
- `cargo clean`

- `cargo test`
- `cargo bench`

More about Cargo

Let's learn some of the basic Cargo (package) functionality

- `cargo new`
- `cargo install`