

Related Roadmaps

- ✓ Backend Roadmap
- ✓ DevOps Roadmap
- ✓ Go Roadmap

Find the detailed version of this roadmap
Along with resources and more roadmaps

<https://roadmap.sh>

Rust

Introduction

What is Rust?

Why use Rust?

Memory Safety and Zero-Cost Abstractions

Environment Setup

Installing Rust and Cargo

IDEs and Rust Toolchains

Rust REPL (Rust Playground)

- Pattern Matching and Destructuring
- Functions and Method Syntax
- Control Flow Constructs
- Variables, Constants, and Data Types
- Syntax and Semantics

Language Basics

- Enums
 - Structs
 - Traits
 - Impl Blocks
- Constructs

Data Structures

- Integers
- Floats
- Boolean
- Character
- Tuple
- Array
- Vector
- String
- HashMap
- HashSet
- LinkedList
- BinaryHeap
- Stack
- Queue
- Advanced
- BTreeMap
- BTreeSet
- Rc
- Arc
- Mutex
- RwLock
- Channels

Threads, Channels, and Message Passing

Atomic Operations and Memory Barriers

Futures and Async/Await Paradigm

Concurrency and Parallelism

- Ownership System
- Ownership Rules and Memory Safety
- Borrowing, References, and Slices
- Deep Dive: Stack vs Heap

Error Handling

- Option & Result Enumerations
- Propagating Errors and '?' Operator
- Custom Error Types and Traits

Modules and Crates

- Code Organization and Namespacing
- Dependency Management with Cargo.toml
- Publishing to crates.io

- Declarative Macros with macro_rules!
- Procedural Macros and Custom Derive
- Domain-Specific Languages (DSLs) in Rust

Macros and Metaprogramming

Lifetimes and Borrow Checker

- Explicit Lifetime Annotations
- Lifetime Elision Rules
- Covariant and Contravariant Lifetimes

Traits and Generics

- Trait Definitions and Implementations
- Trait Bounds and Associated Types
- Advanced Generics and Type-level Programming

Ecosystem and Libraries

- Rocket
- Warp
- Actix
- Yew

Web Development

- Tokio
- async-std
- smol

Asynchronous Programming

- request
- hyper
- quinn

Networking

- ring
- rust-crypto
- sodiumoxide

Cryptography

Database and ORM

- Diesel
- sqlx
- rusqlite

Serialization/Deserialization

- Serde
- json-rust
- toml-rs

- clap
- structopt
- termion

CLI Utilities

- bevy
- fyrox
- ggez

Game Development

- macroquad
- wgpu-rs

- druid
- gtk-rs
- relm

GUI Development

- wasm-bindgen
- wasm-pack
- wasmer

WebAssembly (WASM)

- embedded-hal
- rppal
- nrf-hal

Embedded and Systems

- rust-gdb
- rust-lldb

Debugging

Testing

- Unit and Integration Testing
- Mocking and Property-based Testing

Documenting with 'rustdoc'

Performance and Profiling

Criterion.rs

Keep Learning