

RUST FOR BOSSSES

Hi boss, we
kept it
really simple!

*“This book contains
everything you
need to know...and
more!”*



QS²POINT



INTRODUCTION TO RUST (PROGRAMMING LANGUAGE)

By QS2 Writing Labs

1	Introduction to Rust (Programming Language)	1–2
	1.1 What is Rust?	1–2
	1.2 When was Rust introduced?	1–2
	1.3 The Basics	1–2
	1.4 Who uses Rust?	1–3
2	The Shortest Summary Ever	2–5

1 Introduction to Rust (Programming Language)

1.1 What is Rust?

Rust is a modern, multi-paradigm programming language designed for system-level software development. It combines high-level abstractions with low-level control, making it suitable for tasks requiring performance and safety. Rust aims to eliminate common programming errors, such as null pointer dereferences and data races, through its innovative ownership system and strict compiler checks. With its expressive syntax and powerful features, Rust empowers developers to write efficient, concurrent, and reliable code.

1.2 When was Rust introduced?

Mozilla initially announced Rust in 2010 as a personal research project of developer Graydon Hoare. It gained significant attention and support from the open-source community, leading to its official unveiling as a Mozilla-sponsored project in 2012. Since then, Rust has undergone continuous development and improvement, driven by an active community and a core team of developers. It has gained popularity for its unique features and has seen increased adoption in various domains.

1.3 The Basics

Rust incorporates several fundamental concepts that contribute to its reliability and performance:

1.3.1 Ownership and Borrowing

Rust's ownership system enables fine-grained control over memory management. Each value in Rust has a unique owner, and ownership can be transferred or borrowed to prevent issues like memory leaks or data races.

1.3.2 Lifetimes

Lifetimes in Rust enforce memory allocation and deallocation rules, preventing dangling references and use-after-free errors. The compiler analyzes lifetimes to ensure memory safety without the need for garbage collection.

1.3.3 Concurrency

Rust provides built-in concurrency primitives, such as threads and channels, allowing safe and efficient concurrent programming. The type system and ownership model guarantee thread safety, eliminating common concurrency issues.

1.3.4 Traits

Traits in Rust resemble interfaces in other languages, enabling code reuse and polymorphism. They define behavior and allow for generic programming, facilitating the creation of reusable and composable code.

1.3.5 Cargo

Cargo, Rust's package manager and build tool, simplifies project management, dependency resolution, and building. It automates many tasks, making development workflows more streamlined and efficient.

1.4 Who uses Rust?

Rust has gained popularity and is used by various organizations and developers. Some notable users of the Rust programming language include:

- **Mozilla:** The creators of Rust, Mozilla, use the language for various projects, including their web browser, Firefox, and their experimental browser engine, Servo.
- **Dropbox:** Dropbox has adopted Rust for its core infrastructure services to improve performance and enhance security.
- **Amazon Web Services (AWS):** AWS has embraced Rust for building critical cloud infrastructure components, such as the Firecracker lightweight virtualization technology.
- **Microsoft:** Microsoft has shown interest in Rust and is exploring its usage within projects like Azure Sphere, a secure IoT platform.
- **Cloudflare:** Cloudflare utilizes Rust for building networking tools and security-related services, benefiting from its performance, memory safety, and concurrency features.
- **Facebook:** Facebook uses Rust in some projects, including the Libra cryptocurrency project (now called Diem), where Rust is used to implement certain parts of the codebase.
- **Brave:** The developers of the privacy-focused web browser Brave have integrated Rust into their codebase to take advantage of its memory safety and performance benefits.
- **Red Hat:** Red Hat, a leading provider of open-source solutions, has embraced Rust for projects like the Podman container management tool and the Stratis storage management system.

- **Various open-source projects:** Rust is increasingly used in numerous open-source projects, such as the Tokio asynchronous runtime, the ripgrep search tool, and the Alacritty terminal emulator.

These are just a few examples, and the list of companies and developers using Rust continues to grow as more people recognize its benefits for systems programming and performance-critical applications.

2 The Shortest Summary Ever

Rust is a modern systems programming language designed for high-performance and reliable software development. It features an ownership system, lifetimes, and traits to ensure memory safety and prevent common programming errors. With built-in concurrency support and a powerful package manager called Cargo, Rust empowers developers to write efficient, concurrent, and reusable code. Its popularity has grown steadily since its introduction in 2010, attracting developers across various domains seeking safer, faster, and more productive programming experiences.