

Table of Contents

About the Authors	v
Acknowledgements	vii
Preface	xiii
1 Introduction & History of Rust	1
History	4
2 Cargo	7
Overview	8
Generating a Basic Manifest File	9
Build Targets	10
Building your Crate	12
Generating Documentation	14
Manifest File	15
Semantic Versioning	17
Publishing Crates	18
Expansion Commands for Cargo	20
Key Takeaways	23
3 Type System	25
Types & Values	25
Primitive Types	27
Structs and Enums	29
Algebraic Data Types	34

Traits	35
Generic Types	38
Dynamically Sized Types	45
Key Takeaways	49
4 Extending Types	51
Adding Functionality	52
Extending Collections	53
Conversion Traits	55
Re-Implementing Traits	58
Type Safety	59
Key Takeaways	64
5 Ownership, Borrowing & Lifetimes	65
Ownership	65
Borrowing	69
Lifetimes	75
Key Takeaways	83
6 Iterators	85
Introduction	85
Iterator Adapters	87
Consumers	92
Building your own Iterator	94
Building your own Adapter	100
Other Iterator Traits	101
Streaming Iterators	102
Limitations	106
Cursors	107
Key Takeaways	111
7 Concurrency	113
Message Passing Concurrency	115
Shared Memory Concurrency	123
Key Takeaways	131
8 Type-Safe Idiomatic Code	133
The Builder Pattern	134
Resource Acquisition is Initialization (RAII)	139

Type-Safe State Machines	142
Key Takeaways	149
9 Writing Tested Code	151
A Minimum Binary Heap	152
Simple Unit Testing	155
Property-Based Unit Testing	157
Integration Testing	160
Documentation Testing	161
Benchmarking	163
Key Takeaways	165
10 Macros	167
A Brief Introduction to Rust Macros	168
Designing a Macro	173
Advanced Macros	185
Key Takeaways	192
11 Foreign Function Interface	193
Binding to Foreign Code	194
Exposing Rust	210
Key Takeaways	217
12 Interior Mutability	219
What and Why?	219
Cell and RefCell	221
Where to Use Interior Mutability	223
UnsafeCell	227
Key Takeaways	227
13 Unsafe Rust	229
Systems Programming	229
Key Takeaways	237
Index	239