Rust Language quick reference

Owner one variable owns the value → *move* → **New owner** old binding unusable | **Borrow** many &T or one &mut T → *scope ends* → **Drop** memory freed, no GC

Ownership: move, borrow, drop

CONCEPTS

Every value has exactly one owner. Assigning or passing it moves it; borrow with & to keep using it.

Borrow rule: any number of &T or exactly one &mut T at a time, never both, and no reference outlives its owner.

BINDINGS AND TYPES

`let <x> = <v>;`
Immutable binding (shadowing allowed)

`let mut <x> = <v>;`
Mutable binding

`let <x>: <T> = <v>;`
Annotate the type

`i32 u8 usize f64 bool char`
Common scalar types

`&[<T>]`
Slice: borrowed view of a sequence

`&str / String`
Borrowed text / owned growable text

BINDINGS AND TYPES (cont.)

`Vec<T>`
Growable list

FUNCTIONS AND CONTROL FLOW

`fn <name>(<a>: <T>) → <R> { ... }`
Define a function

`|<x>| <expr>`
Closure

`move |<x>| <expr>`
Closure that takes ownership of captures

`if <c> { ... } else { ... }`
Conditional, usable as an expression

`if let <pat> = <v> { ... }`
Run when one pattern matches

`for <x> in <iter> { ... }`
Iterate a collection or range

STRUCTS AND ENUMS

`struct <S> { <f>: <T> }`
Struct with named fields

STRUCTS AND ENUMS (cont.)

`enum <E> { <A>, <B>(<T>), <C> { <f>: <U> } }`
Enum with data per variant

`impl <S> { fn <new>() → Self { ... } }`
Add methods and associated functions

`#[derive(Debug, Clone, PartialEq)]`
Auto-implement common traits

PATTERN MATCHING

`match <v> { <pat> ⇒ <expr>, _ ⇒ <expr> }`
Exhaustive branching

`Some(<x>) / None`
Option variants

`Ok(<v>) / Err(<e>)`
Result variants

OWNERSHIP AND REFERENCES

`&<x>`
Shared borrow (read only)

`&mut <x>`
Exclusive borrow (read and write)

OPTION AND RESULT

`<opt>.unwrap_or(<d>)`
Value or a default

`<x>?`
Return early on None or Err

TRAITS AND GENERICS

`trait <T> { fn <m>(&self) → <R>; }`
Define shared behaviour

`impl <Tr> for <S> { ... }`
Implement a trait for a type

`fn <f><T: <Tr>>(<x>: T)`
Generic function with a bound

COLLECTIONS AND ITERATORS

`vec![<a>, <b>]`
Vec literal

`<v>.iter() / .iter_mut() / .into_iter()`
Borrow / mutably borrow / consume

`<it>.map(|<x>| ...)`
Transform each item

`<it>.filter(|<x>| ...)`
Keep matching items

COLLECTIONS AND ITERATORS (cont.)

`<it>.collect::<Vec<_>>()`
Gather into a collection

STRINGS

`format!("{} {}", <a>, <b>)`
Build a String

`println!("{<x>}")`
Print with inline variable

`{:?} / {:#?}`
Debug / pretty Debug formatting

MODULES AND CRATES

`mod <name>;`
Declare a module (src/<name>.rs)

`use <path>::<Item>;`
Import a name

TESTING AND DOCS

`#[test] fn <name>() { ... }`
Mark a test function

`assert!(<c>) / assert_eq!(<a>, <b>)`
Fail the test on mismatch