LESSON 4

main.rs

```
let s2 = s1;   // move
let r = &s2;   // borrow
let m = &mut x;
```

Rust

Ownership

Learn it all @MyWebUniversity



A FREE MYWEBUNIVERSITY COURSE

RUST PROGRAMMING

LESSON 4

Ownership and Borrowing

The three ownership rules, moves, clone, references and the borrow checker

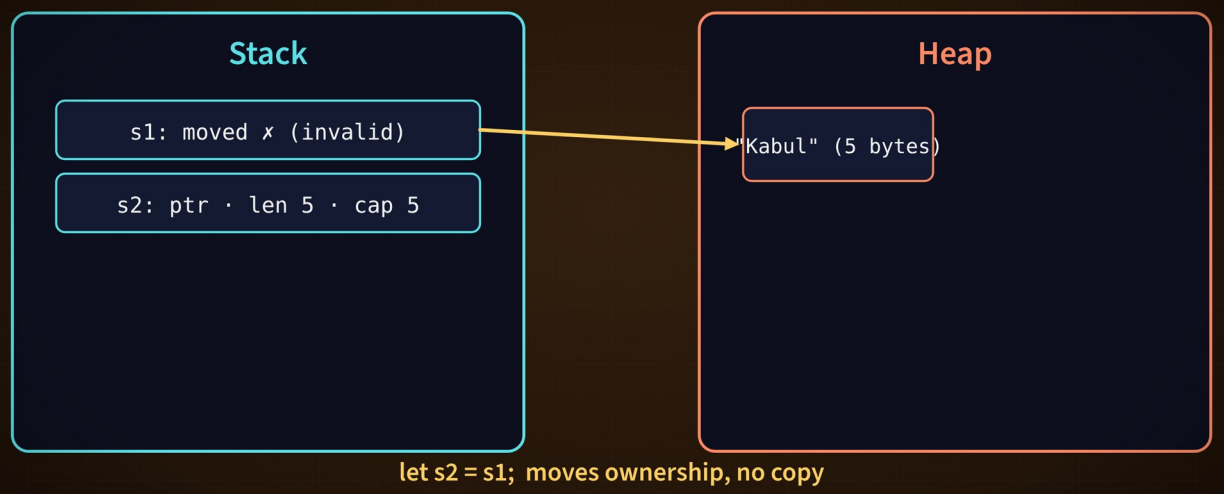
The Ownership Rules

#	Rule
1	each value has one owner
2	only one owner at a time
3	owner leaves scope → value dropped

- Every value has exactly one owner. When the owner goes out of scope, the value is dropped …
- These three rules let Rust manage memory at compile time, with no garbage collector and no …

01

Move



- Assigning a String to another variable moves it. The first variable is no longer valid, so …
- Simple types like integers and bools are Copy, so they are copied instead of moved.

02

clone

main.rs

```rust
let s1 = String::from("Kabul");
let s2 = s1.clone();           // deep copy
println!("{s1} {s2}");        // both valid

let a = 5;
let b = a;                     // i32 is Copy
println!("{a} {b}");
```

- When you really need two independent copies, call clone. It copies the heap data too, so it …
- Seeing clone in code is a signal: a deep copy is happening here.

03

Borrowing with References

main.rs

```rust
fn length(s: &String) -> usize {
    s.len()                      // borrows, does not own
}
fn shout(s: &mut String) {
    s.push_str("!");
}
let mut city = String::from("Herat");
let n = length(&city);
shout(&mut city);                // "Herat!"
```

- Instead of moving a value into a function, lend it with an ampersand. The function borrows …
- An ampersand mut reference lets the borrower change the value.

04

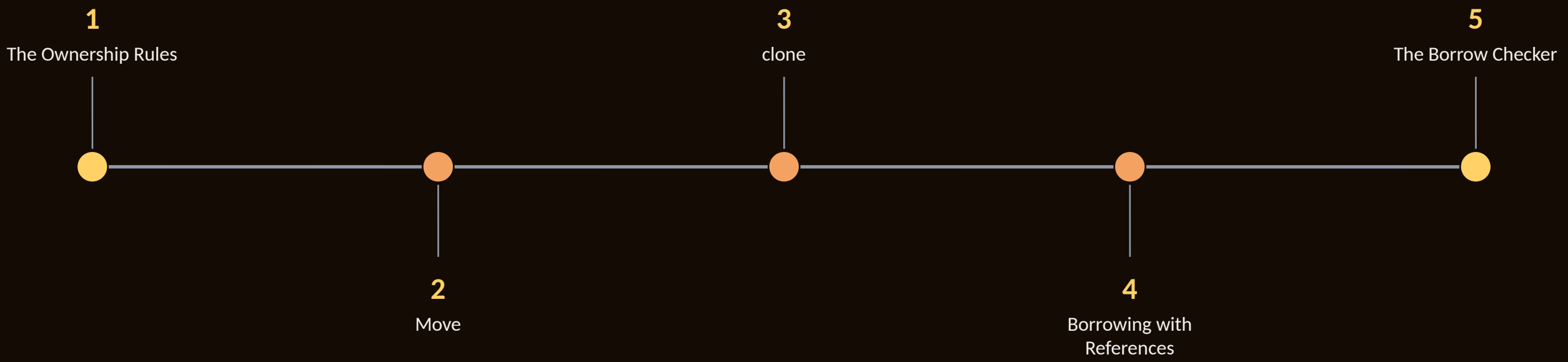
The Borrow Checker



- The rule: at any moment you can have either many shared references, or exactly one mutable …
- This single rule, checked at compile time, prevents data races and use-after-free bugs …

05

Lesson Map


1
The Ownership Rules
2
Move
3
clone
4
Borrowing with References
5
The Borrow Checker

Sources and Further Reading





Thank you for watching

MyWebUniversity.com

Free technical education since 2000 — English and Dari

@MyWebUniversity · @MyWebUniversity-Dari