1	Every value is 'owned' by a single variable, argument, struct, vector, etc at a time	**Ownership**
2	Reassigning the value to a variable, passing it to a function, putting it into a vector, etc, *moves* the value. The old owner can't be used to access the value anymore!	
3	You can create many read-only references to a value that exist at the same time	**Borrowing**
4	You can't move a value while a ref to the value exists	
5	You can make a writeable (mutable) reference to a value *only if* there are no read-only references currently in use. One mutable ref to a value can exist at a time	
6	You can't mutate a value through the owner when any ref (mutable or immutable) to the value exists	
7	Some types of values are *copied* instead of moved (numbers, bools, chars, arrays/tuples with copyable elements)	
8	When a variable goes out of scope, the value owned by it is *dropped* (cleaned up in memory)	**Lifetimes**
9	Values can't be dropped if there are still active references to it	
10	References to a value can't outlive the value they refer to	
11	**These rules will dramatically change how you write code (compared to other languages)**	
12	**When in doubt, remember that Rust wants to minimize unexpected updates to data**	

Tons of corner cases and tiny things to remember around ownership + borrowing

Above all, Rust wants to avoid 'unexpected updates'

mustang

Field	*Value*
name	"Mustang"
engine	*

camaro

Field	*Value*
name	"Camaro"
engine	*

engine

Field	*Value*
working	false

1	Every value is '*owned*' by a **single variable** at a time
2	Reassigning the value to another variable ***moves*** the value. The old variable can't be used to access the value anymore!

Slightly simplified text

```rust
fn main() {
    let bank = Bank::new();

    let other_bank = bank;

    println!("{:#?}", bank);
}
```

'Bank' value

What are all the things that can store the Bank value?

```rust
fn main() {
    let bank = Bank::new();

    let other_bank = bank;

    println!("{:#?}", bank);
}
```

'bank' binding	
'other_bank' binding	

```rust
fn main() {
    let bank = Bank::new();

    let other_bank = bank;

    println!("{:#?}", bank);
}
```

'bank' binding	**NO VALUE HERE AT ALL!!!!**
'other_bank' binding	**'Bank' value**

1	Every value is '***owned***' by a **single variable** at a time
2	Reassigning the value to another variable ***moves*** the value. The old variable can't be used to access the value anymore!

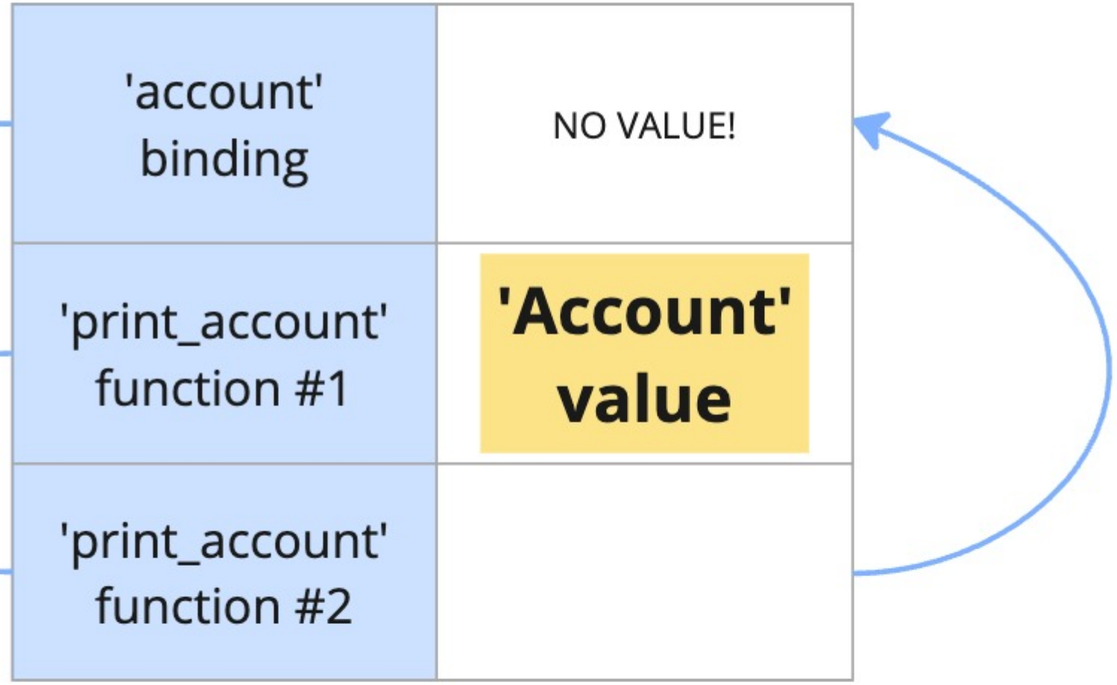
```rust
fn main() {
    let bank = Bank::new();

    let other_bank = bank;

    println!("{:#?}", bank);
}
```

'bank' binding	NO VALUE !!!
'other_bank' binding	**'Bank' value**

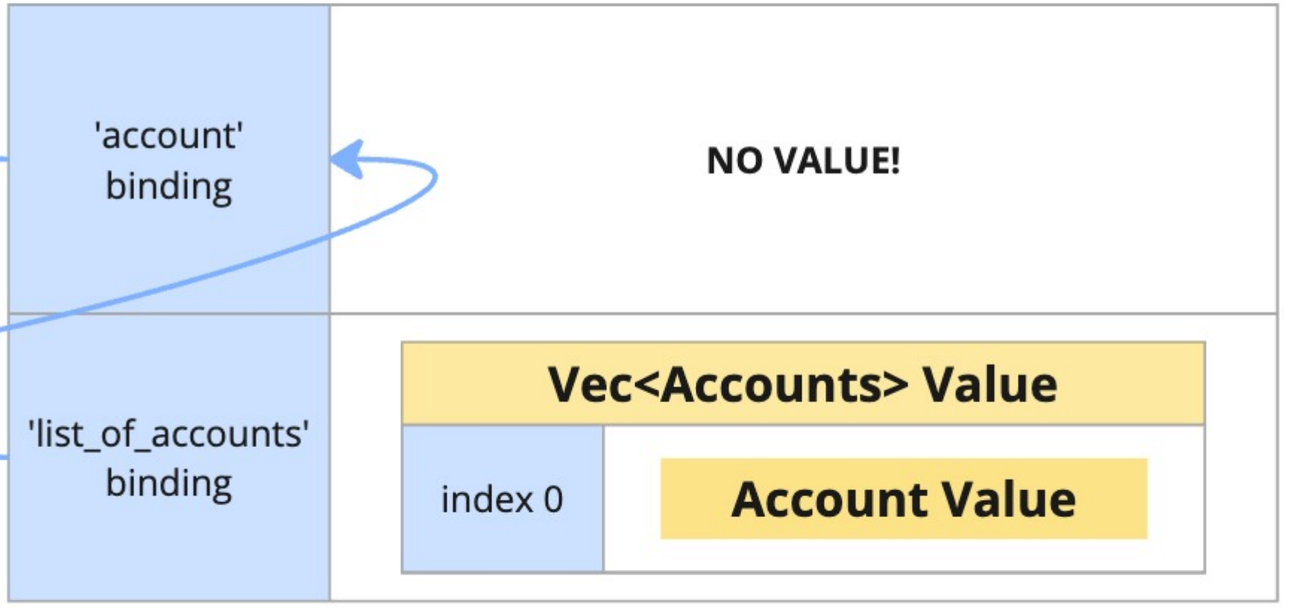
1	Every value is '***owned***' by a **single variable** at a time
2	Reassigning the value to another variable ***moves*** the value. The old variable can't be used to access the value anymore!

1	Every value is '**owned**' by a **single** variable, argument, struct, vector, etc at a time
2	Reassigning the value to a variable, passing it to a function, putting it into a vector, etc, ***moves*** the value. The old owner can't be used to access the value anymore!

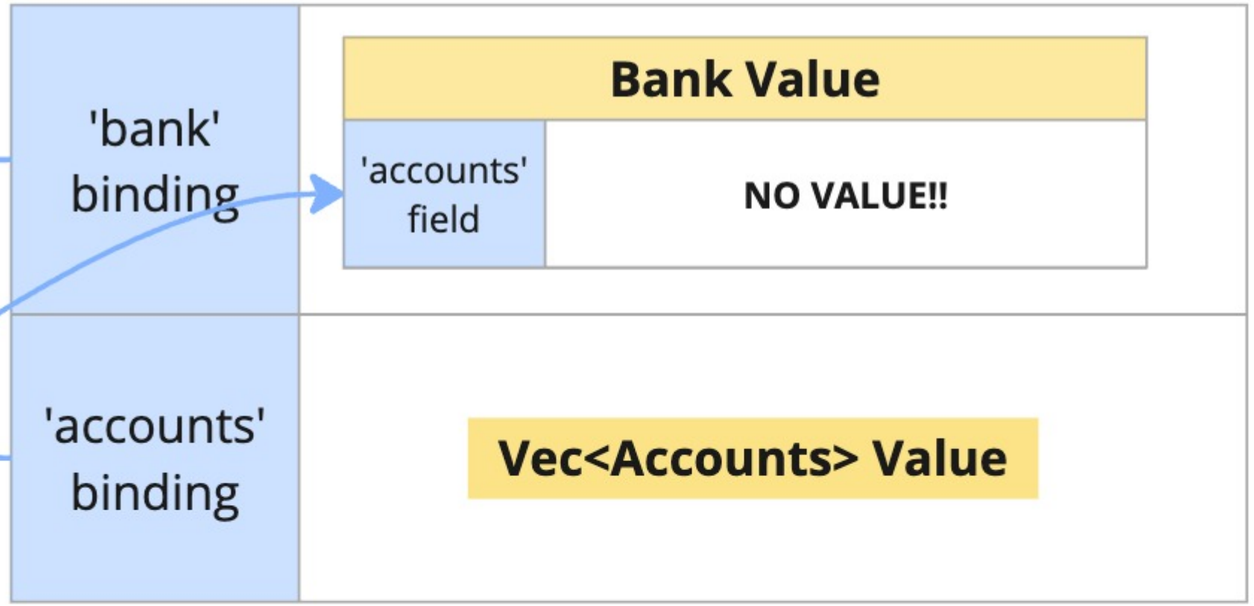
```rust
fn print_account(account: Account) {
    println!("{:#?}", account);
}

fn main() {
    let account = Account::new(
        1,
        String::from("me")
    );

    print_account(account);
    print_account(account);
}
```



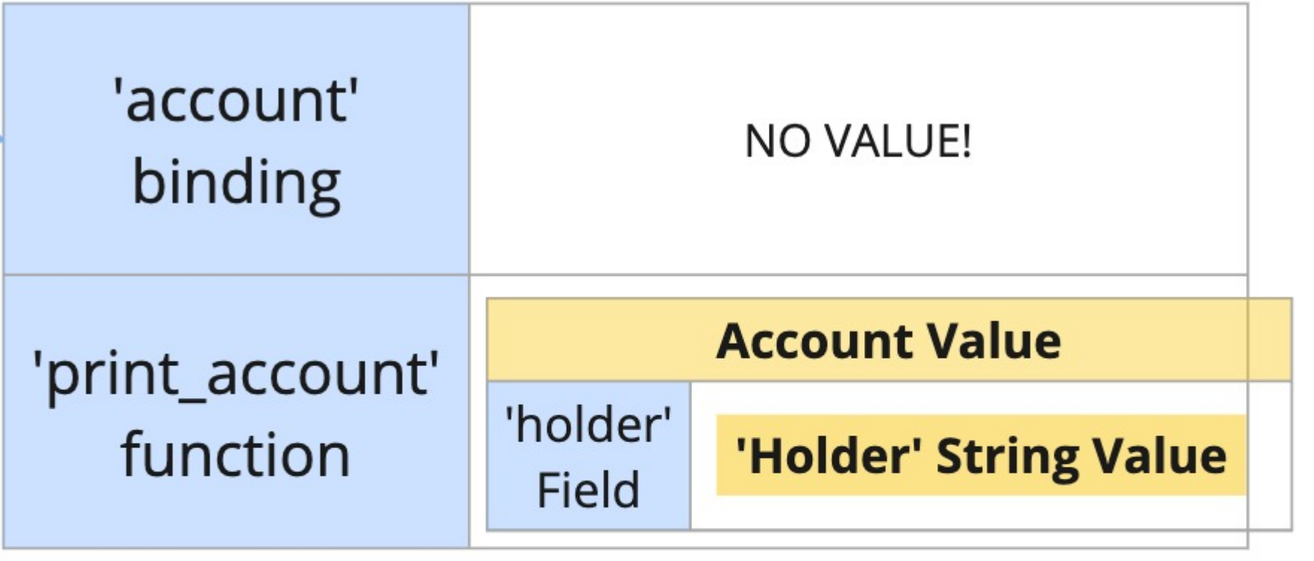
```rust
fn main() {
    let account = Account::new(
        1,
        String::from("me")
    );

    let list_of_accounts = vec![account];

    println!("{:#?}", account);
}
```



```rust
fn main() {
    let bank = Bank::new();

    let accounts = bank.accounts;

    println!("{:#?}", bank.accounts);
}
```



```rust
fn print_account(account: Account) {
    println!("{:#?}", account);
}

fn main() {
    let account = Account::new(
        1,
        String::from("me")
    );

    print_account(account);

    println!("{:#?}", account.holder);
}
```



```rust
fn print_account(account: Account) {
    println!("{:#?}", account);
}

fn print_holder(holder: String) {
    println!("{}", holder);
}

fn main() {
    let account = Account::new(
        1,
        String::from("me")
    );

    print_holder(account.holder);

    print_account(account);
}
```

'account' binding	**Account Value** 'holder' Field: NO VALUE!!!
'print_holder' function	**'Holder' String Value**
'print_account' function	

Given the ownership system, how do we write useful code?

Option #1

Manually move values back and forth between different owners

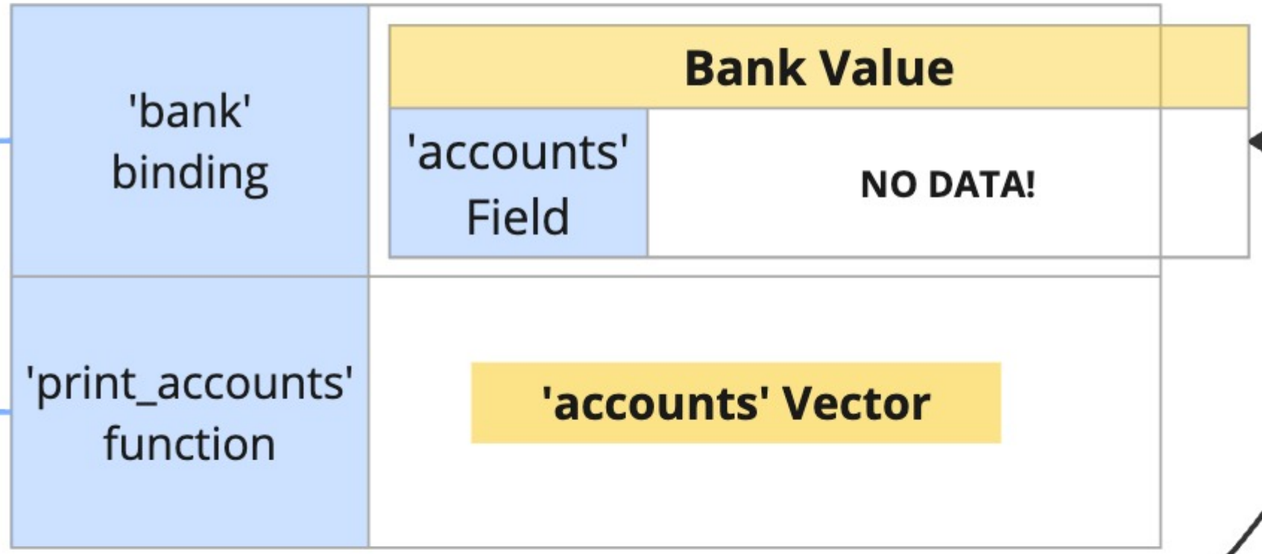
Option #2

Use the borrowing system

```rust
fn print_account(account: Account) -> Account {
    println!("{:#?}", account);
    account
}

fn main() {
    let mut account = Account::new(
        1,
        String::from("me")
    );

    account = print_account(account);
    account = print_account(account);

    println!("aslkjdfj", account)
}
```

'account' binding	**'Account' value**
'print_account' function #1	
'print_account' function #2	

```rust
fn print_bank(bank: Bank) {
    println!("{:#?}", bank);
}

fn print_accounts(accounts: Vec<Account>) {
    println!("{:#?}", accounts);
}

fn main() {
    let bank = Bank::new();

    print_accounts(bank.accounts);

    print_bank(bank);
}
```



Will show error, since we have partial data(Bank value is present but no accounts)
Rust doesn;t want you to use value that is partially moved.

```rust
fn add_account(bank: &mut Bank, account: Account) {
    bank.accounts.push(account);
}

fn main() {
    let mut bank = Bank::new();
    let account = Account::new(1, String::from("me"));

    add_account(&mut bank, account);

    println!("{:#?}", bank);
}
```